MINNESOTA MEDICAL SOLUTIONS LLC
5200 Willson Road Suite 150, Edina MN, 55410

Minnesota Medical Solutions LLC is pleased to submit our application and we would like to thank the Department and everyone involved in the evaluation process for their time and efforts. We would also like to provide the following information, as requested in the RFA:

Request for Presentation -- Minnesota Medical Solutions LLC would like to formally request a presentation for the application evaluation. Minnesota Medical Solutions has prepared a formal presentation for the Department to be presented at a date specified by the Department.

Site Visits – We propose the locations listed below for site visits if Minnesota Medical Solutions LLC is selected as a Semi-Finalist by the Department. The locations will allow the Department to view currently operating facilities, as well as our newly constructed greenhouse facility. The currently operating facilities utilize cultivation methods and techniques that will also be utilized by Minnesota Medical Solutions. MinnMed has taken the best from many places and would like to demonstrate that.

1) Minnesota Medical Solutions (newly constructed greenhouse manufacturing facility)

Address: 8740 77th St. NE, Otsego, MN 55362

2) New Brunswick, Canada (TLO cultivation methods and techniques)

Address: LTO 35A English Dr. Moncton, New Brunswick E1A1X3 Canada

3) Rino Supply Company (cannabis greenhouse cultivation facility)

Address: 10452 Isabelle St, Lafayette, CO 80026

4) Patient's Choice (patient distribution facility)

Address: 7063 West Colfax Ave, Lakewood, CO 80214

As a final note, we are aware that the Second Draft Manufacturer Rules state that a manufacturer's name or logo must not include "medical symbols" and that the name "Minnesota Medial Solutions" and "MinnMed," while not in violation of the Rule per se, may be contrary to the intent of the Rule. As such, we have registered "Minnesota Botanical Solutions" as an assumed name and will agree to use that name, or another, should the Department make that request in the future.

Thank you,

Dr. Kyle Kingsley, CEO, Minnesota Medical Solutions LLC

MANDATORY FORMS

- **Application Checklist**
  - Signed by Dr. Kyle Kingsley
- **Regulatory Agency Authorization Form**
  - Brooke Gehring
  - Jared Penman
  - Greg Goldston
- **Notice of Proper Manufacturing Facility Zoning Form**
  - Signed by D. Daniel Licht, Zoning Administrator, City of Otsego
- **Owner and Managing Director Certification Statement Form**
  - Signed and sworn to before a notary by the following:

Charles Aug
Greg Berkhof
Laura Bultman
Amelia Burgess
Charles Crutchfield, III
Mekea Duffy
Ann Gaertner
Michele Gatzke
Brooke Gehring
Greg Goldston
Nathan Haines
R. Brain Harvey
Susan Hewittson
Ross Hussey
James Hussey
Ross Kiehne
David Kingsley
Kyle Kingsley
Luke Lathrop
Charles Ledermann
Mitchell Michaelson
Josh O'Neill
Nancy Overby
Ron Owens
Jared Penman
Aaron Peterson
Jerry Quall
Paul Schaffer
Joe Schaffer
Robert Shimpa
Debra Skaalen
Jeffery Soma
Basir Tareen
Jon Thompson
Charles Todd
Dan Totushek
James Vagts
Susan Viergever

Trade Secret Form also enclosed in this section

APPLICATION CHECKLIST

Applicant Name: Minnesota Medical Solutions LLC

Application Date: Oct 3, 2014

Service Area(s): A (odd # districts): ☑ B (even # districts): ☒

	Statutory Requirement	Yes	No
1	I certify I have read the provisions of Minn. Stat. §§152.22 – 152.37 and my application complies with all the statutory requirements	☒	☐
2	My proposal entails a plan that would accomplish supplying medical cannabis to patients by July 1, 2015	☒	☐
3	My proposal entails a plan that would begin distribution at four (4) distribution facilities supplying medical cannabis to patients by July 1, 2016	☒	☐
4	I certify I will contract with a laboratory, subject to the commissioner's approval of the laboratory and any additional requirements set by the commissioner, for purposes of testing medical cannabis manufactured by the medical cannabis manufacturer as to content, contamination, and consistency to verify the medical cannabis meets the requirements of Minn. Stat. §§152.22, subdivision 6	☒	☐
5	I certify I will document and make available on request the following operating documents:		
	a. Procedures for the oversight of the manufacturer and procedures to ensure accurate recordkeeping	☒	☐
	b. Procedures for the implementation of appropriate security measure to deter and prevent the theft of medical cannabis and unauthorized entrance into areas containing medical cannabis	☒	☐
6	My proposal would implement security requirements, including requirements for protection of each location by a fully operational security alarm system, facility access controls, perimeter intrusion detection systems and a personnel identification system	☑	☐
7	I certify our manufacturing facility will not share office space with, refer patients to a health care practitioner, or have any financial relationship with a health care practitioner	☒	☐
8	I certify that we will not permit any person to consume medical cannabis on the property of the manufacturing or distribution facilities	☒	☐

	Statutory Requirement	Yes	No
9	I acknowledge I am subject to reasonable inspection by the commissioner and his or her designates	☒	☐
10	I certify I will not employ any person who is under 21 years of age or who has been convicted of a disqualifying felony offense and that all employees and staff must submit to a criminal history records check and a full set of classifiable fingerprints prior to beginning work	☒	☐
11	I certify I will not operate in any location, whether for distribution or cultivation, harvesting, manufacturing, packaging, or processing, within 1,000 feet of a public or private school existing before the date of the manufacturer's registration	☒	☐
12	I certify that I will comply with reasonable restrictions set by the commissioner relating to signage, marketing, display, and advertising of medical cannabis	☒	☐

The undersigned attests that the applicant organization will adhere to the statutory requirements listed above and that they have the authority to bind the applicant organization to the statutory requirements.

KL MD
Name – Signature

Oct 3, 2014
Date

KYLE KINGSLEY MD
Name - Printed

REGULATORY AGENCY AUTHORIZATION FORM

I/We, the undersigned applicant, hereby state as follows:

I/We have either applied for or are currently or have been previously licensed or authorized to produce or otherwise deal in the distribution of cannabis in any form, in the following states or jurisdictions and corresponding agency or authority:

State & Agency	Name of Licensee	License or Registration #
Colorado Marijuana Enforcement Div.	Jared Penman	*See attached

I/We hereby specifically grant the Minnesota Department of Health permission to contact the above listed states or jurisdictions and their licensing agency or authority to confirm the information contained in the application for a manufacturer registration. I/We hereby specifically grant permission to the above listed states or jurisdictions and their licensing agency or authority to release to the Minnesota Department of Health any and all information relating to the application, licensure or authorization to produce or otherwise deal in the distribution of cannabis in any form, including the following:

a. Any denial, suspension, revocation or other sanction of the application, license or authorization and
b. A copy of documentation so indicating; or
c. A statement that the applicant was so licensed or authorized and was never sanctioned.

The undersigned attests that the applicant organization will adhere to the statutory requirements listed above and that they have the authority to bind the applicant organization to the statutory requirements.

Name – Signature

9.30.2014
Date

Jared Penman
Name - Printed

Name	License #
Bryant St Wellness Center LLC	402-00656
Bryant St Wellness Center LLC	403-00492
Bryant St Wellness Center LLC	404-00257
Colorado Photosynthetic Research Facilities LLC	402-00041
Colorado Photosynthetic Research Facilities LLC	403-00055
RiNo Supply Co Inc	402-00793
RiNo Supply Co Inc	403-01200
RiNo Supply Co Inc	403-01201
RiNo Supply Co Inc	403-01327
The Health Joint LLC	402-00299
The Health Joint LLC	403-00446
The Health Joint LLC	403-00447

REGULATORY AGENCY AUTHORIZATION FORM

I/We, the undersigned applicant, hereby state as follows:

I/We have either applied for or are currently or have been previously licensed or authorized to produce or otherwise deal in the distribution of cannabis in any form, in the following states or jurisdictions and corresponding agency or authority:

State & Agency	Name of Licensee	License or Registration #
COLORADO DEPT.	BOULDER ORGANIC FOOD GROUP	OIL PRODUCTION (MIP) 404-00337/404R-0041
OF REVENUE	BOULDER ORGANIC FOOD GROUP	CULTIVATION CENTER FOR MIP (OPC) 403-01313/403R-00241
MARIJUANA ENFORCEMENT	OPTIONS MEDICAL CENTER WR, LLC	OPC FOR DISPENSARY 403R-00240/403-01159/ 403R-00294
DIVISION	OPTIONS MEDICAL CENTER WR, LLC	DISPENSARY 402-00834/402R-00184
	OPTIONS MEDICAL CENTER	DISPENSARY/OPC 402R-00198/403R-00257

I/We hereby specifically grant the Minnesota Department of Health permission to contact the above listed states or jurisdictions and their licensing agency or authority to confirm the information contained in the application for a manufacturer registration. I/We hereby specifically grant permission to the above listed states or jurisdictions and their licensing agency or authority to release to the Minnesota Department of Health any and all information relating to the application, licensure or authorization to produce or otherwise deal in the distribution of cannabis in any form, including the following:

a. Any denial, suspension, revocation or other sanction of the application, license or authorization and
b. A copy of documentation so indicating; or
c. A statement that the applicant was so licensed or authorized and was never sanctioned.

The undersigned attests that the applicant organization will adhere to the statutory requirements listed above and that they have the authority to bind the applicant organization to the statutory requirements.

Name – Signature

9-30-2014
Date

GREG GOLDSTON
Name - Printed

Licenses for Greg Goldston

State and Agency	Name of Licensee	License or Registration #
Colorado Department of Revenue	Boulder Organic Food Group	404R0041
Colorado Department of Revenue	Boulder Organic Food Group	4404R0041
Colorado Department of Revenue	Boulder Organic Food Group	403-01313
Colorado Department of Revenue	Boulder Organic Food Group	403R-00241
Colorado Department of Revenue	Options Medical Center WR, LLC	403R-00240
Colorado Department of Revenue	Options Medical Center WR, LLC	403-011591
Colorado Department of Revenue	Options Medical Center WR, LLC	403R-00294
Colorado Department of Revenue	Options Medical Center WR, LLC	402-00834
Colorado Department of Revenue	Options Medical Center WR, LLC	402R-00184
Colorado Department of Revenue	Options Medical Center WR, LLC	402R-00198
Colorado Department of Revenue	Options Medical Center WR, LLC	403R-00257

REGULATORY AGENCY AUTHORIZATION FORM

I/We, the undersigned applicant, hereby state as follows:

I/We have either applied for or are currently or have been previously licensed or authorized to produce or otherwise deal in the distribution of cannabis in any form, in the following states or jurisdictions and corresponding agency or authority:

State & Agency	Name of Licensee	License or Registration #
See attached	Patients Choice of Colorado	See attached
See attached	Live Green Consulting	See attached
See attached	Bud Med Health Centers	see attached

I/We hereby specifically grant the Minnesota Department of Health permission to contact the above listed states or jurisdictions and their licensing agency or authority to confirm the information contained in the application for a manufacturer registration. I/We hereby specifically grant permission to the above listed states or jurisdictions and their licensing agency or authority to release to the Minnesota Department of Health any and all information relating to the application, licensure or authorization to produce or otherwise deal in the distribution of cannabis in any form, including the following:

a. Any denial, suspension, revocation or other sanction of the application, license or authorization and
b. A copy of documentation so indicating; or
c. A statement that the applicant was so licensed or authorized and was never sanctioned.

The undersigned attests that the applicant organization will adhere to the statutory requirements listed above and that they have the authority to bind the applicant organization to the statutory requirements.

Brooke E. M

Name – Signature

9/29/2014

Date

Brooke E Gehring

Name - Printed

Master List of Current Licenses for Brooke Gehring
Current List as of: 9/12/14

License #	*Type*	*Issuing Authority*	*Entity Name*	*Med or Rec*
24663	MMC	City and County of Denver	Bud Med Health Centers	Med
24987	RMS	City and County of Denver	Bud Med Health Centers	Rec
1069084	RMCF	City and County of Denver	Bud Med Health Centers	Rec
1061707	OPC	City and County of Denver	Bud Med Health Centers	Med
1067095	OPC	City and County of Denver	Bud Med Health Centers	Med
04276417-0003	RMS	Colorado Dept of Revenue	Bud Med Health Centers	Rec
402-00582	MMC	Colorado Dept of Revenue MED	Bud Med Health Centers	Med
403-01344	OPC	Colorado Dept of Revenue MED	Bud Med Health Centers	Med
403-00863	OPC	Colorado Dept of Revenue MED	Bud Med Health Centers	Med
402R-00050	RMS	Colorado Dept of Revenue MED	Bud Med Health Centers	Rec
403R-00064	RMCF	Colorado Dept of Revenue MED	Bud Med Health Centers	Rec
1069081	RMS	City of Denver Excise and License	Live Green Consulting	Rec
1069083	RMCF	City of Denver Excise and License	Live Green Consulting	Rec
1061705	OPC	City of Denver Excise and License	Live Green Consulting	Med
1045669	MMC	City of Denver Excise and License	Live Green Consulting	Med
402-00658	MMC	Colorado Dept of Revenue MED	Live Green Consulting	Med
403-00993	OPC	Colorado Dept of Revenue MED	Live Green Consulting	Med
402R-00049	RMS	Colorado Dept of Revenue MED	Live Green Consulting	Rec
1061663	OPC	City and County of Denver	Patients Choice of Colorado	Med
1069078	RMS	City and County of Denver	Patients Choice of Colorado	Rec
1069082	RMCF	City and County of Denver	Patients Choice of Colorado	Rec
1067096	OPC	City and County of Denver	Patients Choice of Colorado	Med
1045725	MMC	City and County of Denver	Patients Choice of Colorado	Med
39425	MMC	City of Lakewood	Patients Choice of Colorado	Med
48830	MMC	City of Lakewood	Patients Choice of Colorado	Med
403-01343	OPC	Colorado Dept of Revenue MED	Patients Choice of Colorado	Med
402R-00048	RMS	Colorado Dept of Revenue MED	Patients Choice of Colorado	Rec
403R-00062	RMCF	Colorado Dept of Revenue MED	Patients Choice of Colorado	Rec
402-00374	MMC	Colorado Dept of Revenue MED	Patients Choice of Colorado	Med
403-00563	OPC	Colorado Dept of Revenue MED	Patients Choice of Colorado	Med
402-00375	MMC	Colorado Dept of Revenue MED	Patients Choice of Colorado	Med
402-00562	OPC	Colorado Dept of Revenue MED	Patients Choice of Colorado	Med

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☒ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation. _____ _____	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation. _____ _____	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position. _____		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☒ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☒ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 29TH day of SEPTEMBER, 2014

[signature]
Signature of Owner / Managing Director

CHARLES AUG
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 29TH day of SEPTEMBER, 2014.

BRIAN N. ABERG
(SEAL) Notary Public–Minnesota
My Comm. Expires Jan. 31, 2017

Brian N Aberg
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☑ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☑ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☑ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☑ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☑ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☑ No
If you are employed by the State, please state the name, agency and position.		

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I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☑ Yes	☐ No

Dated this 25th day of September, 2014

Signature of Owner / Managing Director

Greg Berkhof
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25th day of September, 2014.

(SEAL)
BETH ANN KRUGER
Notary Public-Minnesota
My Commission Expires Jan 31, 2015

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☒ No N/A
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position.		

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I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 26 day of Sept, 2014

Signature of Owner / Managing Director

LAURA BULTMAN
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 26th day of Sept, 2014.

(SEAL) DIANA C. GONZALEZ
NOTARY PUBLIC - MINNESOTA
MY COMMISSION EXPIRES 01/31/19

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation. _____ _____	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position. _____		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
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I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 25th day of September, 2014

Amelia Burgess
Signature of Owner / Managing Director

Amelia Burgess
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25 day of September, 2014.

VENERA M YISMAW
Notary Public
Minnesota
My Comm. Expires
Jan 31, 2015

Venera M. Yismaw
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
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2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position.		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☒ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☒ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 24th day of September, 2014

Signature of Owner / Managing Director

Charles E. Crutchfield III
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24th day of September, 2014.

LAURIE A. CRUTCHFIELD
NOTARY PUBLIC - MINNESOTA
My Commission Expires
January 31, 2018
(SEAL)

Laurie A Crutchfield
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☒ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position.		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☒ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☒ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 25 day of September, 2014

Signature of Owner / Managing Director

Mekea Duffy
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25th day of Sept, 2014.

DOLLY J. PETERSON
NOTARY PUBLIC - MINNESOTA
MY COMMISSION EXPIRES 01/31/15

Dolly J. Peterson
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☑ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☑ No
If you are employed by the State, please state the name, agency and position. _____		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☑ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☑ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☑ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☑ Yes	☐ No

Dated this 25 day of September, 2014

Signature of Owner / Managing Director

Ann Kelly Gardner
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25th day of SEPTEMBER 2014.

ROBIN J ROHE ELLSWORTH
NOTARY PUBLIC - MINNESOTA
My Commission Expires Jan. 31, 2015
(SEAL)

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☒ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation. _____ _____	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation. _____ _____	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position. _____		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☒ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☒ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 24th day of Sept, 2014

Signature of Owner / Managing Director

Michele Gatzke
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24th day of September, 2014.

CHRISTOPHER J. SKAALEN
Notary Public–Minnesota
My Commission Expires Jan. 31, 2020

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☑ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☑ No
If you are employed by the State, please state the name, agency and position. _____		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☑ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☑ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☑ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☑ Yes	☐ No

Dated this 24th day of September, 2014

Brooke E. M
Signature of Owner / Managing Director

Brooke E Gehring
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24th day of September, 2014.

MARCY SELIGMAN NOLIN
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20124079724
MY COMMISSION EXPIRES DECEMBER 10, 2016
(SEAL)

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☒ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position. N/A		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☒ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☒ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 24th day of SEPTEMBER, 2014

Signature of Owner / Managing Director

GREG GOLDSTON
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24 day of SEPTEMBER, 2014.

AMANDA K WOODS
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20094039336
MY COMMISSION EXPIRES DECEMBER 04, 2017
(SEAL)

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☒ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position.		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☒ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☒ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 24 day of September, 2014

Signature of Owner / Managing Director

Nathan L. Haines
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24 day of September, 2014.

(SEAL)
LYNETTE STAFFORD
NOTARY PUBLIC - MINNESOTA
My Commission Expires Jan. 31, 2015

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☑ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☑ No
If you are employed by the State, please state the name, agency and position. _____		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☑ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☑ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☑ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☑ Yes	☐ No

Dated this 26th day of September, 2014

Richard Brian Harvey
Signature of Owner / Managing Director

Richard Brian Harvey
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 26th day of September, 2014.

BRIAN ALCAIDE
NOTARY PUBLIC - MINNESOTA
My Commission Expires Jan. 31, 2018

B. Alcaide
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☒ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position.		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☒ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☒ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 24 day of September 2014

S. Hewitson
Signature of Owner / Managing Director

Susan Hewitson
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24th day of September, 2014.

(SEAL)
SHELLY ELIZABETH HALVERSON
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2015

Shelly Elizabeth Halverson
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☑ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☑ No
If you are employed by the State, please state the name, agency and position. _____		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☑ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☑ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☑ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☑ Yes	☐ No

Dated this 23 day of Sept., 2014

James P. Hussey
Signature of Owner / Managing Director

JAMES P. HUSSEY
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 23rd day of Sept., 2014.

MIRIAM ARACELI ENCALADA
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2018

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☒ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position.		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☒ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☒ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 29 day of September 2014

Ross Hussey
Signature of Owner / Managing Director

Ross Hussey
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 29th day of Sept., 2014.

MIRIAM ARACELI ENCALADA
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2018

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☒ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position.		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☒ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☒ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☒ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 24th day of Sept., 2014

Signature of Owner / Managing Director

Benjamin Kiehne
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24th day of Sept., 2014.

VICKI CHRISTIANSON
Notary Public-Minnesota
(SEAL)
My Comm. Expires Jan. 31, 2015

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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Dated this 26th day of September, 2014

Signature of Owner / Managing Director

Ross W Kiehne
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 26th day of Sept., 2014.

SUSAN M. SIKKINK
Notary Public–Minnesota
My Comm. Expires Jan. 31, 2016
(SEAL)

Susan M. Sikkink
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
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Dated this 26 day of Sept, 2014

Signature of Owner / Managing Director

Dave Kingsley
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 26th day of September, 2014.

DIANE KAY WOJTKIEWICZ
Notary Public–Minnesota
My Comm. Expires Jan. 31, 2017
(SEAL)

Diane Wojtkiewicz
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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Dated this 23rd day of September, 2014

Signature of Owner / Managing Director

KYLE KINGSLEY
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 23rd day of September, 2014.

TERESA A FANE
NOTARY PUBLIC - MINNESOTA
MY COMMISSION EXPIRES 1/31/2015
(SEAL)

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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Dated this 25 day of Sept, 2014

Signature of Owner / Managing Director

Luke Lathrop
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25 day of Sept, 2014.

(SEAL)

Notary Public

Notary Public, DeKalb County, Georgia
My Commission Expires Feb. 16, 2016

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

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Dated this 23rd day of September, 2014

Signature of Owner / Managing Director

Charles Ledermann
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 23rd day of Sept, 2014.

(SEAL)
ANGEL R. SNETSINGER
NOTARY PUBLIC - MINNESOTA
My Commission Expires Jan. 31, 2017

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
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Dated this 25 day of SEPTEMBER, 2014

Signature of Owner / Managing Director

MITCH MICHAELSON
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25 day of September, 2014.

LEANNA ROSE HALL
NOTARY PUBLIC MINNESOTA
My Comm. Expires Jan. 31, 2015
(SEAL)

Notary Public

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Dated this 26th day of September 2014

John O'Neill
Signature of Owner / Managing Director

Joshua O'Neill
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 26th day of September, 2014.

IAN J MAYES
(SEAL) NOTARY PUBLIC - MINNESOTA
MY COMMISSION EXPIRES 01/31/17

Ian J. Mayes
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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Dated this Sept day of 25, 2014

Nancy M. Overby
Signature of Owner / Managing Director

Nancy M. Overby
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25th day of Sept., 2014.

SUSAN M. SIKKINK
Notary Public–Minnesota
My Comm. Expires Jan. 31, 2016
(SEAL)

Susan M Sikkink
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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Dated this 25th day of September, 2014

Signature of Owner / Managing Director

Rod Owens
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25th day of September, 2014.

J. SKELTON
Notary Public - Notary Seal
State of Missouri
Commissioned for St. Charles County
My Commission Expires: May 20, 2017
Commission Number: 13385242

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☑ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation.	☑ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☑ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☑ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation.	☐ Yes	☑ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation.	☑ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☑ No
If you are employed by the State, please state the name, agency and position.		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☑ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☑ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☑ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☑ Yes	☐ No

Dated this 25th day of September, 2014

Signature of Owner / Managing Director

JARED PEDMAN
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25 day of Sept., 2014.

LAWRENCE E. GUSTAFSON NOTARY PUBLIC STATE OF COLORADO (SEAL)

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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Dated this 25 day of September, 2014

Signature of Owner / Managing Director

Aaron Peterson
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25 day of September, 2014.

LEANNA ROSE HALL
NOTARY PUBLIC MINNESOTA
My Comm. Expires Jan. 31, 2015
(SEAL)

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
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Dated this 25th day of SEPT., 2014

Jerry L. Quaal
Signature of Owner / Managing Director

JERRY L. QUAAL
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25th day of September, 2014.

Katherine S. Connell
Notary Public, State of Minnesota
My Commission Expires
January 31, 2018
SEAL

Katherine S Connell
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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Dated this 25th day of September, 2014

Joe Schaffer

Signature of Owner / Managing Director

Joe Schaffer

Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25th day of September, 2014.

AMANDA MARIE SAVCHENKO
Notary Public
(SEAL) Minnesota
My Commission Expires
January 31, 2018

Amanda Marie Savchenko

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
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Dated this 24th day of Sept, 2014

Paul W Schaffer
Signature of Owner / Managing Director

PAUL W. SCHAFFER
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24 day of Sept., 2014.

KIMBERLY K. REES
MY COMMISSION # FF 112618
EXPIRES: August 14, 2018
Bonded Thru Notary Public Underwriters

K Rees
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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If you are employed by the State, please state the name, agency and position.		

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I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 24th day of September, 2014

Robert Shimpa

Signature of Owner / Managing Director

Robert Shimpa

Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24th day of Sept, 2014.

MIRIAM ARACELI ENCALADA
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2018

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☒ Yes	☐ No
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3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation.	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation.	☒ Yes	☐ No
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Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position.		

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Dated this 26th day of September, 2014

Debra A. Dowe Skaalen
Signature of Owner / Managing Director

Debra A. Dowe Skaalen
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 26th day of Sept, 2014.

SUSAN M. SIKKINK
Notary Public–Minnesota
My Comm. Expires Jan. 31, 2016

Susan M Sikkink
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
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Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
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Dated this 24th day of SEPTEMBER, 2014

Signature of Owner / Managing Director

Jeffrey A. Soman
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24th day of SEPTEMBER, 2014.

CHRISTOPHER J. SKAALEN
(SEAL)
Notary Public–Minnesota
My Commission Expires Jan. 31, 2020

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
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Dated this 24 day of Sept., 2014

Signature of Owner / Managing Director

Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24 day of Sept., 2014.

DAWN THERESE ZAMORA
Notary Public
(Seal) Minnesota
My Comm. Expires
Jan 31, 2018

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 24 day of Sept, 2014

Signature of Owner / Managing Director

Jon Thompson
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24 day of Sept, 2014.

Pearl M. Stevens
Notary Public-Minnesota
My Commission Expires Jan. 31, 2015
(SEAL)

Pearl M. Stevens
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
1. I certify that I have not held an ownership interest in a cannabis manufacturer or its equivalent in another state or territory of the United States that had the registration or license suspended, revoked, placed on probationary status or subject to disciplinary action.	☑ Yes	☐ No
2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation. _____ _____	☐ Yes	☑ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation. _____ _____	☑ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☑ No
If you are employed by the State, please state the name, agency and position. _____		

I acknowledge that as an applicant, I have actual notice that, notwithstanding any State law: • Cannabis is a prohibited Schedule I controlled substance under federal law; • Any activity not sanctioned by the Statute or the administrative rules may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration; • Use of medical cannabis may affect an individual's ability to receive federal or State licensure in other areas; • Use of medical cannabis, in tandem with other conduct, may be a violation of State or federal law and could result in arrest, prosecution, conviction, or incarceration;	☑ Yes	☐ No
I certify that I have not been charged with or have been convicted of a "disqualifying felony offense" as defined under Minnesota section 152.22, subdivision 3.	☑ Yes	☐ No
I certify my acknowledgment that application fees are non-refundable.	☑ Yes	☐ No
I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☑ Yes	☐ No

Dated this 24th day of September, 2014

Charles Todd

Signature of Owner / Managing Director

Charles Todd

Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24th day of September, 2014.

CHRISTOPHER J. SKAALEN
(SEAL)
Notary Public–Minnesota
My Commission Expires Jan. 31, 2020

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation. _____ _____	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
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Dated this 25 day of September, 2014

Signature of Owner / Managing Director

Daniel E Tatushek
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25th day of September, 2014.

Katherine S. Connell
Notary Public, State of Minnesota
My Commission Expires
January 31, 2018
(SEAL)

Katherine S Connell
Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

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MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
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2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
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Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position. _____		

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I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 24th day of September, 2014

James Vaclav
Signature of Owner / Managing Director

JAMES VACLAV
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 24th day of September, 2014.

CHRISTOPHER J. SKAALEN
Notary Public–Minnesota
My Commission Expires Jan. 31, 2020
(SEAL)

Notary Public

OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM

This form is to be completed by each owner of the applicant company and its managing director.

MEDICAL CANNABIS OWNER AND MANAGING DIRECTOR CERTIFICATION STATEMENT FORM		
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2. I certify that I have not managed or served on the board of any business or not-for-profit that was convicted, fined, censured, or had a registration suspended or revoked in an administrative or judicial proceeding. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
3. Are you a party to any legal proceeding where damages, fines, or civil penalties may reasonably be expected to exceed $500,000 above any insurance coverage available to cover the claim? If yes, provide a brief explanation. _____ _____	☐ Yes	☒ No
4. I certify that I am not delinquent on the filing of state or federal taxes. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
5. If you have held a medical cannabis or medical marijuana license or registration in another State, have you been disciplined (including, but not limited to restricted, suspended, or terminated) by any State? If yes, provide a brief explanation. _____ _____	☐ Yes	☒ No
6. I certify that I have not been denied a professional license, privilege of taking an examination, or had a professional license or permit disciplined by a licensing authority in Minnesota or other state. If no, provide a brief explanation. _____ _____	☒ Yes	☐ No
Are you employed by the State of Minnesota? If no, skip next question.	☐ Yes	☒ No
If you are employed by the State, please state the name, agency and position. _____		

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I acknowledge that in filing an application for registration and receiving a date and time stamped receipt, the following: a. The Department is vested with broad discretion to select the applicants to be awarded a registration; and b. The Department's decisions in selecting the applicants shall be final.	☒ Yes	☐ No

Dated this 25th day of Sept, 2014

Signature of Owner / Managing Director

Susan Viergever
Printed Name of Owner / Managing Director

Sworn to and subscribed before me on this 25th day of Sept, 2014.

DELANEY LACOLE LYLES
NOTARY PUBLIC - MINNESOTA
MY COMMISSION EXPIRES 01/31/18
(SEAL)

Notary Public

NOTICE OF PROPER MANUFACTURING FACILITY ZONING FORM

TO BE COMPLETED BY APPLICANT		
1. NAME OF ENTITY APPLYING FOR A MEDICAL CANNABIS REGISTRATION Minnesota Medical Solutions LLC		
2. ADDRESS OF THE PROPOSED MANUFACTURING LOCATION 8740 77th Street NE	3. DISTRICT 6	
4. CITY Otsego	5. COUNTY Wright	6. ZIP CODE 55362

CHECK ALL THAT APPLY		
There are no local zoning restrictions specific to a medical cannabis manufacturing facility at the identified location.	☒ Yes	☐ No
The location of the proposed medical cannabis dispensary is in compliance with local zoning restrictions for medical cannabis manufacturing.	☐ Yes	☐ No
The proposed manufacturing has duly filed a request to the appropriate local zoning authority to approve the specified location for a medical cannabis manufacturing. If a zoning request was filed but has not been approved, the zoning determination is expected to be issued in approximately _____ DAYS ☐ WEEKS ☐ MONTHS ☐ (check one)	☐ Yes	☐ No

TO BE COMPLETED BY AN AUTHORIZED REPRESENTATIVE OF THE LOCAL ZONING OFFICE

Zoning Administrator
Title of the Authorized Zoning Representative

City of Otsego
Name of the Local Jurisdiction

D. Daniel Licht
Printed Name

763.441.4414
Telephone Number

17 Sep 14
Signature/Date

Subscribed and sworn to before me this 17th day of September, 2014.

(SEAL)
SANDRA L. LINDENFELSER
NOTARY PUBLIC - MINNESOTA
My Commission Expires Jan. 31, 2018

Sandra L. Lindenfelser
Notary Public

A. BUSINESS OVERVIEW AND PLAN

1. Brief Summary

Minnesota Medical Solutions LLC (MinnMed) is uniquely qualified to be the safest, most reliable source of medical cannabis for patients in the state of Minnesota. MinnMed's operational plans for Minnesota have been developed from the patient's perspective. Our large group of healthcare providers and scientists brings the unique ability to change the paradigm for medical cannabis programs and truly make a safe, compassionate clinical experience and patient-centric pharmaceutical grade medicines. We have put together a talented and diverse group of national medical cannabis industry experts to advise, guide, and help operate our cannabis cultivation, processing, and dispensing efforts.

Minnesota Medical Solutions is a locally owned, physician-led group comprised of doctors, pharmacists, scientists, greenhouse operators, lawyers, contractors, teachers, and other community contributors from the state of Minnesota. This group of community leaders is looking to become one of the two state-licensed producers/distributors of medical cannabis in Minnesota. MinnMed will provide an unprecedented level of professionalism and expertise not seen to date within the regulated medical cannabis industry.

MinnMed is not completely comfortable with the rigid nature of many enterprises in the cannabis industry. For this reason, we prefer to work with multiple partners in each step of the medical cannabis production process. We understand there are many cultivation methods, and we have decided to partner with multiple experienced growers and staff, including those with direct knowledge in regulated, organic, pharmaceutical grade production, and distribution of medical cannabis, and those with experience operating in a greenhouse. We have chosen to pursue multiple separate sources of knowledge or partners for each step of the production process.

In addition to the robust Minnesota team, we have drawn on the best national experts to assist in the production of cannabis-based medicine. Starting very early in the process, MinnMed had the opportunity to select the best national medical cannabis experts and were able to select the exact experts in regulated medical cannabis operations, implementation, and scalability needed to be successful from the first day of operations.

Our partners include American Cannabis Company Inc. (ACC), a fully reporting publicly traded company, which has assisted in starting and operating regulated medical cannabis facilities in the U.S. and Canada. We were drawn to the consulting expertise of American Cannabis Company Inc. because of their focus on sustainable, patient-centric cannabis production. The founders and core team consist of previous owners and operators from the regulated Colorado market. ACC has experience in nine states and Canada in the development, operations, deployment and scaling of regulated medical cannabis facilities of the highest quality. In particular, ACC's *True Living Organics* © method of cannabis production has proven highly effective in the U.S. and Canada as a reliable, clean, fully organic, patient-centric cultivation method.

Due to the flexibility of American Cannabis Company Inc., we were able to retain additional experts in medical cannabis operations to satisfy our objective of knowledge redundancy and variance. The use of several unique industry experts in each step of the medical cannabis cultivation, manufacturing, and dispensing processes ensures patient safety and reliability, a vital component of MinnMed's operational plans.

Other medical cannabis industry experts being utilized include Brooke Gehring, directing partner of Patient's Choice, a group of medical dispensaries located in Denver, CO; Jared Penman, owner and operator of a large cannabis greenhouse operation located near Boulder, CO; and Greg Goldston, owner and operator of dispensaries and a large cannabis-based extraction company located in Boulder, CO. Ms. Gehring is the founder of Live Green Consulting and Managing Partner of Patients Choice of Colorado, a medical focused cannabis company that operates several medical cannabis centers and large-scale cultivation facilities in Colorado. Ms. Gehring comes from over 11 years of banking and regulatory compliance experience and transitioned from commercial banking into the medical cannabis industry in 2009. She has extensive experience in medical cannabis operations, seed-to-sale cultivation, licensing, and compliance. She is actively involved with the Colorado Regulatory bodies that help shape the framework and develop effective rulemaking for a transparent and successful regulated industry. Ms. Gehring's keen focus on compliance and her sound business acumen make her the evident choice as the first COC of MinnMed. Ms. Gehring will be hands on throughout MinnMed's implementation, operations, expansion and strategy moving ahead. Mr. Penman is the President of RiNo Supply Company Incorporated founded in Denver, Colorado and is a

large-scale cultivator of medical cannabis in a greenhouse setting. He has been cultivating medical cannabis legally since 2001 and has established proven organic methodologies to grow premium medicinal cannabis. In 2010, Mr. Penman expanded his understanding of cultivation to seed-to-sale operations, compliance, and the science of the manufacturing of the cannabis plant. Mr. Penman's previous 20 plus years of experience as a contractor and his agricultural expertise will be a major contributor to the design and functionality in the state of the art new greenhouse cultivation facility commenced in July by MinnMed. He also will advise on the development and needs of the cultivation team and will be instrumental in future expansion, infrastructure and function of our facilities

This extensive team developed by MinnMed is necessary to bring the skills and expertise needed to cultivate, manufacture, and dispense cannabis-based medications the correct way for the patients of Minnesota. We want to break the mold of the single cannabis producer and their own mythology or single-minded way of doing things. Taking several successful cannabis manufacturers/operators and combining their knowledge will lead to a safer, more reliable source of medical cannabis for the patients of Minnesota.

The refining team created by MinnMed is comprised of a wide range of professionals from different fields of expertise. The team consists of consultants, shareholders, contractors and direct employees. Refining team members have extensive experience and expertise in one or more fields that are required for an efficient operation. Operations will entail refining, analytical, formulations, and pharmaceutical manufacturing processes. Team members have extensive expertise in extraction, fracturing, chemical processes, manufacturing processes, analytical, and quality control procedures.

MinnMed created this leading professional team for the refining process with the intent to change the medical cannabis industry. The focus of the team and the refining process will be to create cannabis medicine products specifically designed to alleviate symptoms and ailments of medical cannabis patients within the state of Minnesota. What follows is a brief outline of the MinnMed team. Please see the organizational chart in section D.2 of this application for a visual representation of the MinnMed team.

Minnesota Medical Solutions' Healthcare Professionals and Scientists:

Kyle Kingsley MD-- CEO

Dr. Kingsley is a board-certified emergency medicine physician and founder/president of Clinical Scribes LLC, a multi-state medical scribe training company. Through Clinical Scribes LLC and other startup companies, Dr. Kingsley has developed the leadership and business skills needed for a large-scale endeavor with many employees. Dr. Kingsley is co-author of the *Medical Cannabis Primer for Healthcare Providers*, which was written for physicians and other healthcare providers to improve medical cannabis education and understanding in the medical community. Dr. Kingsley is also the physician representative on the board of directors for the Cannabis Industry Association, which includes national cannabis industry experts such as Chloe Villano. Dr. Kingsley's single goal is to make MinnMed the safest, most reliable and compassionate choice for the patients of Minnesota.

Jon Thompson PhD-- Scientific Director

Dr. Thompson is the founder and CEO of United Science Corporation. In addition to a separation science expertise, Dr. Thompson has served in various P&L positions in business development, sales, marketing, manufacturing, and product development. He has extensive experience in chemical manufacturing and research operations, business strategy, and mergers and acquisitions. Dr. Thompson and the United Science Corporation working together with MinnMed will change the extraction and cannabis-based oil industry nationally.

Laura Bultman MD--Medical Director

Dr. Bultman is a board-certified emergency medicine physician and currently works as a consultant for electronic medical records implementation. Dr. Bultman is co-author of the *Medical Cannabis Primer for Healthcare Providers* with Dr. Kingsley. Dr. Bultman's major responsibility is keeping MinnMed abreast of all new research and developments in the U.S. and internationally and integrating these changes into our practice and patient educational materials. Dr. Bultman is also working on "The MinnMed Patient Experience" and other vital initiatives that require physician expertise.

Brian Harvey-- Chief Pharmacist

Mr. Harvey has clinical experience as a pharmacist, in addition to an extensive healthcare-specific, IT background, making him a natural choice to direct the dispensaries of MinnMed. Mr.

Harvey has been instrumental in developing the MinnMed formulary of medications, designing the MinnMed compassionate dispensary model, and vetting our seed-to-sale tracking systems.

Sean Leighton-- Advisor, Product Integrity and Sustainability

Mr. Leighton is a Minnesota native, and is currently Director of Quality, Safety & Environmental at Coca-Cola. He will bring his expertise in product safety and sustainability to Minnesota Medical Solutions.

Chuck Ledermann-- Chief Technology Officer/Vice President of Operations

Mr. Ledermann currently works as IT director for HealthPartners. He brings substantial healthcare-specific IT, leadership, and operations experience, along with a comprehensive understanding of patient privacy and electronic medical records.

Paul Schaffer-- Retail Pharmacy Advisor

In addition to being a pharmacist, Mr. Scaffer owned and operated Bloomington Drug in Bloomington, Minnesota for 42 years. His extensive direct retail pharmacy ownership and operations experience will be vital for MinnMed dispensaries.

The following details the background of refining team members:

Greg Goldston, Founder and Owner, Options Medical Center

Mr. Goldston is currently a retained operations consultant for Minnesota Medical Solutions. Mr. Goldston has developed Options Medical Center, which encompasses two medical retail facilities with 2014 gross sales exceeding $6.5M, and one million watts of indoor grow under 70,000 square feet.

United Science, Exclusive Contractor to Minnesota Medical Solutions

Conor Smith, Ph.D. is the key liaison between Minnesota Medical Solutions and United Science. He holds a Ph.D. in Chemistry. Dr. Smith is currently Process Engineering Manager for United Science and leads chemical manufacturing and production of chemical consumables under an ISO controlled environment. He has over seven years of experience in process chemical sensing and controls and is an expert in GC/MS, LC/UV, and reactor design. Dr. Smith has built many custom reactors and sensor control systems for chemical production.

Jon Thompson Ph.D., Scientific Director, MinnMed

Dr. Thompson is currently Scientific Director for Minnesota Medical Solutions. Dr. Thompson is an analytical chemist with a chemical, process, and manufacturing background. He has been

trained by Options Medical in their CO_2 and butane extraction processes, decarboxylation, formulations, HPLC purification, and lab operations in Washington and Colorado. He has personally conducted cannabis extractions, HPLC and GC separations on active ingredients in the states of Washington and Colorado. Dr. Thompson has been creating company specific standard operating procedures (SOPs) for extraction, analytical, formulation, stability testing, final inspection, and packaging migration testing. Dr. Thompson has a thorough understanding of manufacturing process from seed to packaging.

Jon Berdahl, Berdahl Consulting

Jon Berdahl Ph.D. is owner and founder of Berdahl Consulting and has 13 years of experience in the pharmaceutical industry as QC Technical Services Manager, QC Lab Manager, Quality Engineer, and GLP Study Director. He has worked for large pharmaceutical companies and currently assists companies with auditing and creating quality programs that are compliant with current good manufacturing practices regulations. He is well versed in all pharmaceutical manufacturing and quality functional roles and has successfully managed OOS, OOT, CAPA investigations. Dr. Berdahl will assist Minnesota Medical Solutions in assuring compliancy with SOPs, regulatory and internal auditing.

Cannabis Industry Experts:

Brooke Gehring-- Chief Operations Consultant

Ms. Gehring has a banking/regulatory background and is managing partner of Patients' Choice Medical, which runs several medical cannabis and cultivation facilities in Colorado. Ms. Gehring left a career in the banking industry and has been managing medical cannabis companies for the last five years. She has extensive experience in medical cannabis operations, cultivation and is heavily involved with Colorado state regulatory boards. Ms. Gehring's focus on compliance and doing things the right way makes her the obvious choice as the first COC of MinnMed. Ms. Gehring will be heavily involved in MinnMed's implementation, operations, and expansion moving ahead.

Greg Goldston-- Vice President of Operations

Mr. Goldston developed Options Medical Center, which runs two medical cannabis dispensaries and a large cultivation facility in Colorado. He also developed Boulder Organic Food Group LLC, a large producer of CO_2-extracted cannabis oils. Mr. Goldston has been involved in the

medical cannabis industry since 2009. His expertise in starting, operating, and expanding cannabis facilities and extraction will prove important in the first months of MinnMed. His real world cannabis extraction experience, coupled with MinnMed's partner Jon Thompson and the United Science Corporation will lead to remarkable progress in efficient mass extraction of cannabis oils and separation of individual cannabinoids.

Jared Penman-- Vice President of Operations, Greenhouse

Mr. Penman is the president of Rino Supply Company Incorporated and is a large-scale cultivator of cannabis in a greenhouse setting. He has been growing medical cannabis legally since 2001. Mr. Penman will be a major contributor to the design and function in the new greenhouse cultivation facility started in July by MinnMed. He will also be instrumental in future expansion and function of our facilities.

Corey Hollister and American Cannabis Company Inc.

Mr. Hollister and his team of experts are currently active in nine states and Canada. Collectively, ACC has decades of medical cannabis and botanical experience. Their medical cannabis experience, including implementation and scalable operations, is fundamental to the immediate industry standard function of MinnMed. Mr. Hollister and his team have helped to integrate the MinnMed team with its national industry experts.

Other Team Members:

Ross Hussey, JD-- Chief Regulatory Officer

Currently Mr. Hussey works in his own business law practice. As in-house legal counsel, he will make regulatory compliance his full time job for MinnMed if awarded a contract.

Ron Owens-- Chief of Security

Mr. Owens is a former secret service agent with extensive drug and law enforcement experience. He will ensure that Minnesota Medical Solutions has the most up-to-date security and transfer systems in the country. His experience with presidential and motorcade security bring a level of expertise that we have not encountered in the medical cannabis industry. Mr. Owens will ensure safe, effective transportation of our medicines to our dispensaries, and the quick, seamless transfer of assets to our bank. His facility and dispensary security plan will be the most comprehensive in the industry, balanced by our awareness of our patients' limitations and disabilities.

In addition to the above team, the Minnesota Medical Solutions investors include a large number of Minnesotans who are experts in some aspect of our plan including health care providers, teachers, contractors, farmers and other community members.

Minnesota-Based Greenhouse and Cultivation Experts:

Please see the in depth information in our Operations section for these team members.

Joe Schaffer-- Head Cultivator for MinnMed, Owner Minnesota Native Landscapes Inc.

Dan Totushek-- Greenhouse Advisor for MinnMed, Owner, Dan and Jerry's Greenhouses

Jerry Quall-- Greenhouse Advisor for MinnMed, Owner, Dan and Jerry's Greenhouses

Aaron Peterson and Mitch Michaelson-- Cultivation Advisors, Owners of Peterson Farms

Our Minnesota Partners:

Minnesota Medical Solutions has several strategic partners that, although they will not be involved in the production of medical cannabis directly, are able to facilitate the function of MinnMed.

Minnesota Native Landscapes Inc. will assist in many environmental initiatives including rain collection and native grass restoration around our cultivation facility.

United Science Corporation's CEO Jon Thompson is the leader of the MinnMed scientific team. This company's ability to produce an affordable extraction and separation (fracturing) machines gives MinnMed a substantial advantage in driving down patient costs and improving the quality of our medications. MinnMed has signed an exclusive agreement with the United Science Corporation.

2K Health LLC is a single member LLC owned by Dr. Kingsley. This company is responsible for some of the real estate holdings that will facilitate MinnMed's ability to serve our patients. 2K Health is responsible for the construction of the Phase 1 cultivation facility that is scheduled for completion in November.

Cultivation Experience/Expertise

Experience within the Regulated Medical Cannabis Industry

MinnMed has contracted with American Cannabis Company Inc. (ACC), a Colorado consulting firm to provide consulting, training, and operational procedures based on their tenured experience in the regulated cannabis industry. The firm has a combined 40 years of cultivation

experience utilizing multiple cultivation mediums, techniques, and strains of cannabis. To this we have added additional key experts to add to our strategy of diversity in knowledge.

ACC Consultant Experience/Expertise

American Cannabis Company Inc. is a fully reporting and publicly traded company that operates two vertically integrated businesses delivering end-to-end business solutions for clients within the regulated cannabis industry. Through these operations, ACC provides industry specific services and products. The consulting team consists of seasoned professionals from diverse industries such as healthcare, agriculture, construction, and engineering.

The ACC team members have owned several businesses that were among the first licensed and regulated cannabis cultivation and dispensary centers in Colorado and has extensive experience organically cultivating multiple medical cannabis varieties including indica, sativa, hybrid and high-CBD strains and will provide a strategic advantage over competitors and accelerate operations deployment.

2. A manufacturer shall operate in accordance with the business plan submitted to, and approved by, the Department as part of the application. Please provide a business plan that shows the following information **The complete business plan is available upon request.*

a. The applicant's expected production capacity, including any ability of the applicant to expand capacity within the approved manufacturing facility

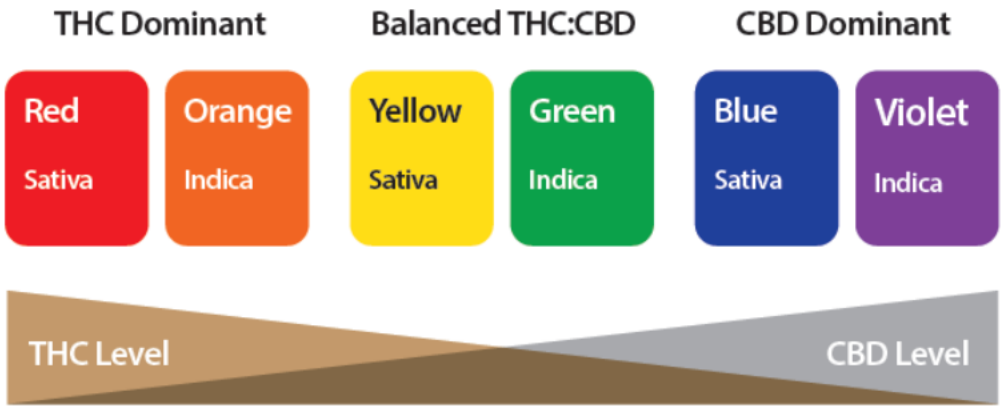
MinnMed will have access to a state-of-the-art, cannabis-specific, greenhouse facility. Phase 1 of the project was started in July of this year and is scheduled to be completed in early November of 2014. This will enable MinnMed to produce safe, organic cannabis from day one in an environmentally sustainable manner. The Phase 1 facility consists of 15,000 square feet of space. Phase 2 has been started and will be completed if MinnMed receives a license from the state of Minnesota. This will double the square footage to more than 30,000 feet by April 1. This measured expansion will allow MinnMed to easily accommodate a broad range of patient numbers on July 1, 2015. We will open with on-hand inventory to immediately meet patient needs and anticipate total monthly production capacity of 30,000 grams of finished medical

cannabis oil beginning July 1, 2015. Actual production will be scaled in line with patient demand and can be increased to approximately 55,000 grams of finished medical cannabis oil at full capacity. A gram of oil will produce 100, 10mg units in edible pill form. We anticipate a consumption rate of 6 grams of active cannabinoids per month based on comparable markets.

Through the partnership with Joe Schaffer and Minnesota Native Landscapes, MinnMed is able to expand into the adjacent acres as needed in the years to come. MinnMed will be able to scale to any size cultivation facility that is necessary to serve patient demand.

b. All Medical Cannabis products intended to be offered by the producer during the first year of operation and, for each product, provide a sample of the proposed label and identify the types of packaging

Products: MinnMed will cultivate a variety of cannabis plants which predictably produce a clinically significant amounts of THC, CBD and many other pharmacologically active cannabinoids, such as CBV, CNC, and CBG among others. MinnMed's extracts will used to create medicines that fall into one of 6 categories in "The MinnMed Spectrum" as outlined here based on the THC/CBD ratio and Indica/Sativa characteristics:



To decrease the incidence of adverse effects, MinnMed plans to incorporate an emerging, evidence-based suggestion that all Cannabis Based Medicines "CBM" should contain a minimum amount of CBD, to serve as what has been coined a "**CBD Buffer**". For example, the presence of a minimal amount of CBD in our predominately THC formulations, may help to reduce adverse side effects.

MinnMed will also set up **concentration and absolute amount maximum for the THC in our products** to prevent adverse effects.

MinnMed will produce: 1) **oils for vaporization** in pre-filled vaporizer pens and small volume packages of bulk oil, 2) **oral solid or semi-solid oral dosage form or "pills"** and 3) **oral and sublingual liquids**. Each product produced by MinnMed will eventually be available in all six colors of the MinnMed spectrum. Oral and sublingual liquids may be flavored.

PACKAGING & LABELING- MinnMed maintains the strongest commitment to preventing accidental ingestion or diversion of our CBM. Our products will always be clearly labeled, and secured in opaque Child Resistant Packaging (CRP). Each package of every medication produced by MinnMed will be labeled with a color that identifies its place in the MinnMed Spectrum. An additional label containing all of the required information about purity and potency, as well as the product's cannabinoid profile, will be affixed to every package manufactured by MinnMed. Every package of medication that is distributed by MinnMed's pharmacists to a patient, will clearly bear an additional label that contains all of the required patient transaction information.

MinnMed will package prefilled cartridges of oil for vaporization into opaque CRP vials, similar to that found in today in traditional pharmacies. The packages will be labeled with the Standard MinnMed Spectrum product label, the purity and potency label, and a patient transaction label.

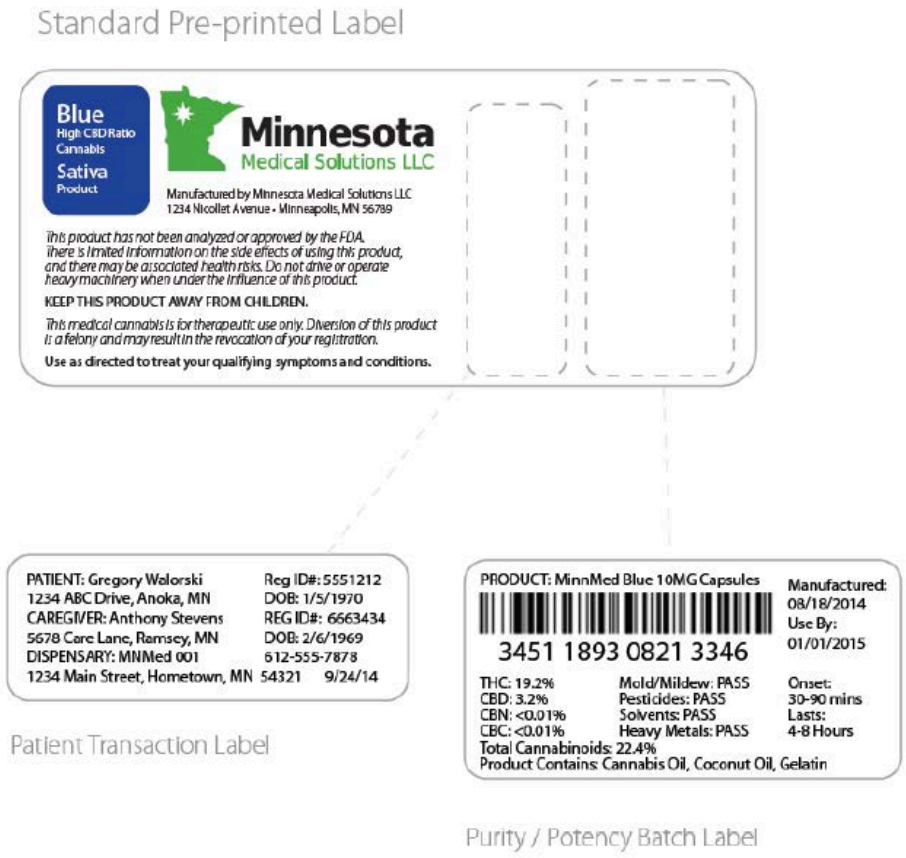
MinnMed will package bulk vials of oil for vaporization into amber dropper bottles or into opaque squeeze bottles. These small volume, multi-dose containers will bear a Small MinnMed Spectrum product label, the purity and potency label. This multi-dose container will be enclosed in large opaque CRP vials, similar to that found in today in traditional pharmacies. The packages will be labeled with the Standard MinnMed Spectrum product label, the purity and potency label, and a patient transaction label prior to being distributed by MinnMed's pharmacists in our dispensaries.

MinnMed will package hard shelled gelatin capsules in large mouth CRP vials made from High Density Polyethylene (HDPE), similar to the empty vials sold under the trade name MegaVials. The packages will be labeled with the Standard MinnMed Spectrum product label, the purity and

potency label, and a patient transaction label prior to being distributed by MinnMed's pharmacists in our dispensaries.

MinnMed will package vials of sublingual tincture into amber dropper bottles. These small volume, multi-dose containers will bear a Small MinnMed Spectrum product label, the purity and potency label. This multi-dose container will be enclosed in large opaque CRP vials, similar to that found in today in traditional pharmacies. The packages will be labeled with the Standard MinnMed Spectrum product label, the purity and potency label, and a patient transaction label prior to being distributed by MinnMed's pharmacists in our dispensaries.

MinnMed will package oral solutions in amber CRP bottles, similar to that found in today in traditional pharmacies. The packages will be labeled with the Standard MinnMed Spectrum product label, the purity and potency label, and a patient transaction label prior to being distributed by MinnMed's pharmacists in our dispensaries. We will provide the patient adaptive and assistive devices at no additional charge that will empower them to measure accurate doses. What follows are: 1) a Standard MinnMed label with standard components, 2) the full spectrum of labels, and 3) representative bottles, vials and packaging as described above.



A2. Attachment: Labels

Standard Label

Small Label

c. Expected product pricing in each of the first 3 years of operations

Pricing for all MinnMed medical cannabis-extracted products will be based on the current fair market value of said items in the state of Minnesota. Price control is very important for MinnMed as we feel that medicines should be approachable by patients of all income levels. Pricing will be computed so that all costs associated with the production and dispensing of the cannabis-extracted products are covered; pricing will also be computed to ensure MinnMed is profitable and able to continue operations, research, and growth strategies. We understand that in order for our patients to have a stable, reliable source for medications, MinnMed must be a successful, thriving business.

Based on our financial models, which incorporate assumptions about the cost of production and consumer demand and which are described in greater detail in our more comprehensive business plan, attached at the end of this section, we estimate that our average retail price for a gram of cannabis oil will be approximately $55 per gram in Year 1. We anticipate a similar price per gram in years 2 and 3, but significant variation in this price may occur given the unproven market in Minnesota.

MinnMed will provide free high-CBD, low-THC products for our pediatric patients once MinnMed is profitable. MinnMed's lowest price point will be the cost of production, plus 10%. We feel that this is a socially responsible price point. We want to provide the lowest priced medicines possible for patients, but this must be balanced by a social responsibility to the community at large and the ability to operate successfully. Further we will focus on high CBD >1% THC products in our hardship program to reduce the potentially for abuse and/or misuse.

MinnMed has a few advantages that will help control prices moving forward:

- MinnMed will fund and vigorously promote Minnesota CannaCare, a non-profit organization that will help to control patient costs. MinnMed will donate 3% of net profits to this organization which will also take donations from the public to drive awareness and offset some of the medication cost.
- MinnMed will eventually diversify its income streams to non-cannabis products, including vaporizers and other medical devices. This will help us to not be reliant on just

medication prices to drive profitability. This will allow MinnMed to remain evidence-based and not push to expand the patient base unless there is supporting evidence.

- MinnMed has a broad base of community investors who understand that MinnMed is a long-term investment and opportunity to improve our community. MinnMed is not beholden to venture capital or other large companies that will put immediate profit before patients. Patients are the number one priority of MinnMed. MinnMed will not raise medication prices to drive profits for investors.
- The partnership between MinnMed and Jon Thompson and the United Science Corporation, allows MinnMed to achieve remarkable lab abilities and scalability at very low costs. The ability to scale extraction and processing at a low cost will allow us to pass these savings to patients.
- A major expense in the production of cannabis is electricity. MinnMed will rely on natural light in a state-of-the-art greenhouse facility with renewable energy, including solar power and highly energy efficient supplemental lighting to minimize energy costs.

MinnMed's pricing for its manufacture of cannabis-extract based medicines will be based on cost of production, cost of dispensing, and fair market value for cannabis-extracted products.

MinnMed has developed and will implement a patient hardship program. The patient hardship program will be created for the purpose of helping state licensed medical marijuana patients obtain medical marijuana in the cases that said patients cannot financially afford the medication. Please see section E, #4 for an extensive discussion of our compassionate need plan.

d. Expected number of customers in each of the first 3 years of operations

The MinnMed assumptions are based on current law, and we understand that law changes are possible or even likely sometime in the future. We will be able to accommodate substantial scaling as needed, but for financial projections, the most conservative numbers are most prudent in our approach. We anticipate between 5,000 and 10,000 patients total for the state of Minnesota by July of 2018 if there are no changes in the law. MinnMed has also assumed very slow patient adoption. Our working estimate is 7,500 patients at month 36 with a gradual increase to that number. Numbers are based on published Arizona patient adoption rates,

analysis of other regulated markets, and current approximate patient numbers for Minnesotans with qualifying diagnoses. With changes to the law, these numbers will be substantially higher.

3. Marketing Plan

a. Web templates, educational materials such as brochures, posters, or promotional items

Many current industry materials are not acceptable to MinnMed given the lack of evidence for many statements/claims, so MinnMed has been and will continue to develop extensive disease-specific educational materials. In addition, we are in the process of vetting current national materials that will help educate patients and healthcare providers. Please see the attached documents "MinnMed Intro Poster, Brochure" and the attached website screen captures: "HOME, CANNACARE, FORMULARY SPECTRUM, IN MINNESOTA, and Web Portal Captures"

b. Expected outreach, media, events or promotional activities to communicate medical cannabis to physicians

Drs. Bultman and Kingsley have worked together to write the *Medical Cannabis Primer for Healthcare Professionals,* which they expect will become the industry standard text for physicians in the medical cannabis realm. The text is designed to familiarize doctors with cannabis-derived medicines. Please see the attached PDF "Medical Cannabis Primer for Healthcare Professionals".

MinnMed is also developing an online portal for providers with educational content. This will be vetted by our medical team prior to placement on our website.

MinnMed will engage in active outreach and lectures to pertinent groups and specialists including oncologists, gastroenterologists and other specialists. This will require clearance by the state and the individual institutions. We are aware of the conflict of interest in active outreach and education with simultaneous production of the medicines. We will be transparent regarding this conflict of interest and will be certain that all attendants of lectures or activities understand our perspective. Our medical director, Dr. Laura Bultman, will lead educational efforts.

c. Expected outreach, media, events or promotional activities to communicate medical cannabis to patients and caregivers

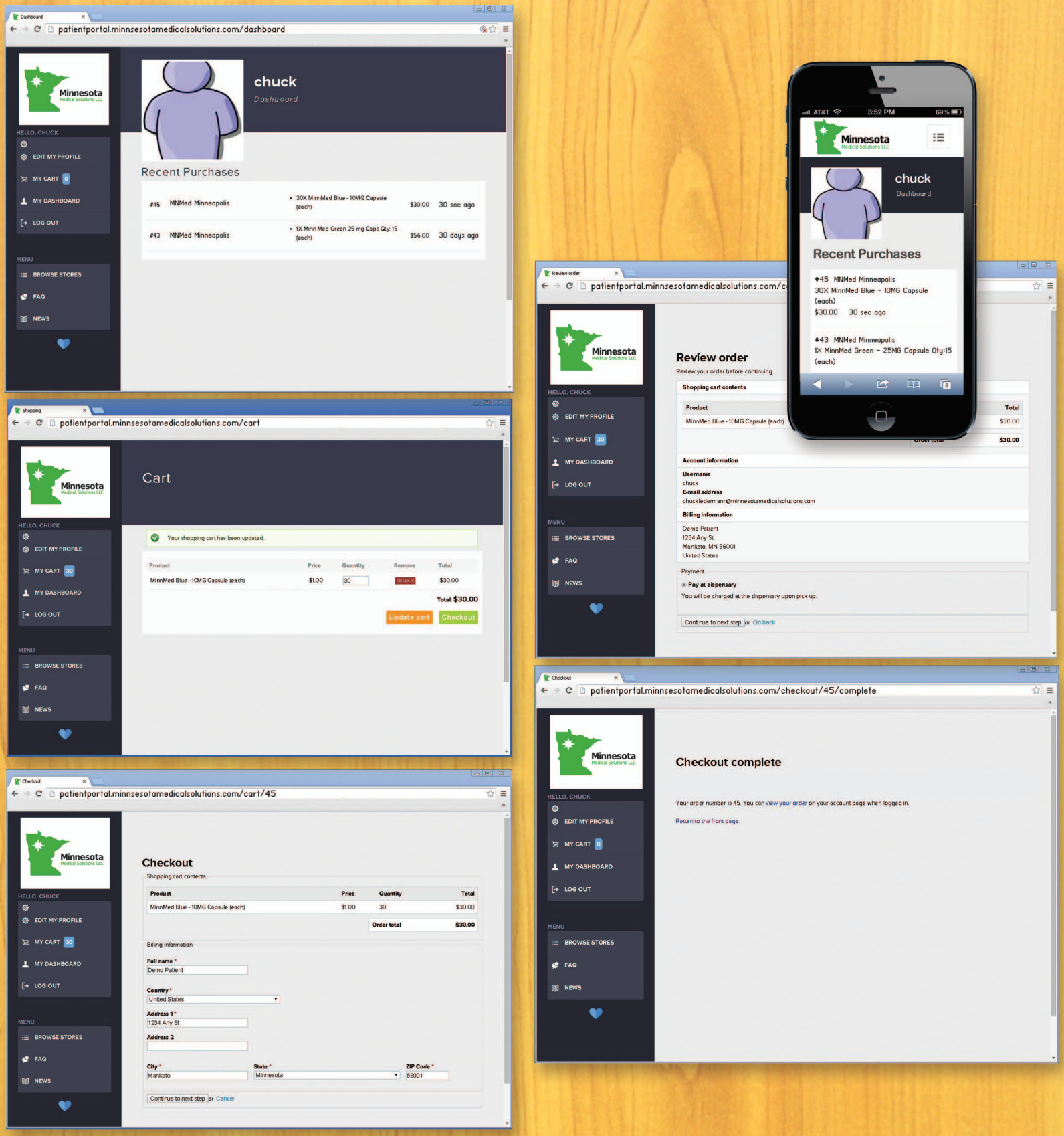
MinnMed has already formed an expanding patient and parent advisory group that will directly inform our efforts including our patient experience, pricing, and even product development. This group has been very helpful during the application process.

MinnMed will reach out directly to pertinent patient groups and organizations to coordinate activities and presentations, outlining our exact role in the manufacturing process and possible conflicts of interest. MinnMed will hold new patient and caregiver seminars for the first several months of operations to inform new patients and caregivers regarding medications and their proper use.

d. Any other advertising, media, events or promotional activities planned for any other audience:

Minnesota Medical Solutions plans community education events in each city in which we operate, including Otsego, the site of our cultivation facility. MinnMed is building a robust online presence that is expanding and which will include our introduction video for the public once this application is submitted. Below are screenshots from the MinnMed website. These shots are also included as an attachment to this application.

A3. Attachment: Web Templates



A3. Attachment: Web Templates

Minnesota
Medical Solutions LLC

A Medical Milestone for Minnesota

Minnesota, the star of the north, has a storied history as a leader in the medical marketplace. Our neighbors look up to us as a shining example for visionary healthcare solutions.

The spark of innovation led to the creation of Minnesota Medical Solutions LLC–where scientific excellence in the manufacturing and processing of medical cannabis is married to compassionate and transformative patient experiences.

Medical Cannabis Formulary Spectrum

Minnesota
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Our Formulary Spectrum

Cannabis can have a variety of effects on each individual patient, so at Minnesota Medical Solutions we believe in careful counseling and preparation for cannabis-naïve patients. We provide the two most common varieties of cannabis, indica and sativa, as well as a blend of the two most common active ingredients in cannabis, THC and CBD. Together, these chemicals have greater effect than if administered alone, in fact, CBD ameliorates many of the side effects commonly experienced by users of THC. In our spectrum of cannabis derivatives, a small CBD percentage will be incorporated into the THC-dominate products to minimize side effects.

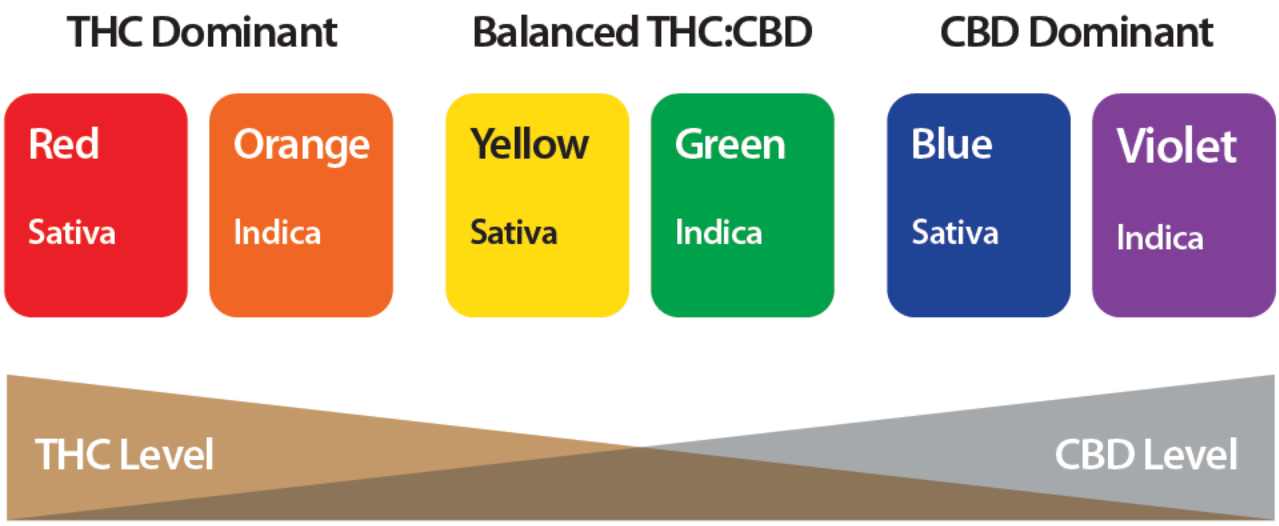
Sativa

Of the two common Cannabis varieties, sativa is said to produce a more uplifting and energizing experience.

Indica

This variety can produce more relaxation and relief from insomnia.

Each variety can have a mixture of THC and CBD as pictured below, but other compounds within the plant known as terpenes and flavonoids may be responsible for the difference in mental effects experienced by users of the two varieties.



THC = Δ9-tetrahydrocannabinol

This chemical produces the mental effects of cannabis, commonly referred to as "high". In the past, THC was the most desired chemical within the cannabis plant, and strains have been bred to maximize THC content ranging from 4-35%.

CBD = cannabidiol

This compound produces medicinal effects without psychoactivity. Historically, this less-desired chemical was nearly nonexistent within popular cannabis strains, but more recently its medical potential has brought CBD to the forefront of cannabis research.

Medical Cannabis Formulary Spectrum

Which Products are Right for Which Patients?

As with most medications, understanding the patient's underlying condition and other needs will help Minnesota Medical Solutions recommend the best product for each individual patient. For instance, THC-predominate products are most often used for chemotherapy-related nausea and vomiting, but high-CBD products are most often used for epilepsy.

THC Dominant Products that are predominantly THC, with a small component of CBD to reduce side effects. While very potent THC preparations are available, side effects are dose-related and by limiting the maximum percentage of THC in our products, we aim to minimize the risks of side effect and inadvertent over-medication.

Red Sativa

Orange Indica

Balanced THC:CBD Using a balance of THC and CBD may give the patient the best of both worlds. A balanced ratio is currently used in a number of pharmaceutical products and has demonstrated benefits for many patients worldwide.

Yellow Sativa

Green Indica

CBD Dominant Recently, demand for CBD-dominant products have skyrocketed after recent research has shown the diverse range of medical benefits this chemical offers for inflammatory conditions and epilepsy. One of the primary advantages is that CBD is not psychoactive, so patients can use their medication without fear of mental limitations or other side effects. Our CBD formulations may exceed a 20:1 CBD/THC ratio.

Blue Sativa

Violet Indica

Other Cannabinoids There are many other chemicals present in cannabis that are meaningful from a medical standpoint. The MinnMed spectrum will be expanded over the coming months and years to include CBN, CBC, CBG and many others. These formulations will simply be represented by another color on the spectrum. As the MinnMed offerings increase, additional identifiers will be added to the color system.

Minnesota Medical Solutions LLC

An Introduction to Medical Cannabis in Minnesota

Minnesota
Medical Solutions LLC

The Facts

Medical cannabis was approved for use in the state of Minnesota by qualifying patients starting on July 1, 2015. Unlike many other states in which medical cannabis is legal, Minnesota limits the ways in which medical cannabis can be used. For example, only cannabis extracts can be used, as opposed to smoking the raw plant material. Approved forms of medical cannabis include: oils for vaporizing (gentle heating and inhaling), tinctures, and solutions for consumption and capsules/pills.

Who Is Able to Use Medical Cannabis?

By law, only certain conditions currently qualify for treatment with medical cannabis in Minnesota:

1. **In the setting of cancer:**
   a. Severe or chronic pain
   b. Nausea or severe vomiting
   c. Cachexia or severe wasting
2. **Seizures, including those characteristic of epilepsy, or when the associated treatment causes:**
   a. Severe or chronic pain
   b. Nausea or severe vomiting
   c. Cachexia or severe wasting
3. **Terminal illness, with a probable life expectancy of one year, with associated:**
   a. Severe or chronic pain
   b. Nausea or severe vomiting
   c. Cachexia or severe wasting
4. **Human immunodeficiency virus (HIV) and/or Acquired Immune Deficiency Syndrome (AIDS)**
5. **Glaucoma**
6. **Severe muscle spasms, such as those associated with multiple sclerosis (MS)**
7. **Amyotrophic lateral sclerosis (ALS)**
8. **Crohn's disease**
9. **Tourette's syndrome**

How Can You Register?

For persons with a qualifying medical condition, the first step is to see your Minnesota doctor or licensed health-care provider to receive certification, then submit the certification to the MN Department of Health. The Commissioner of Health will then enroll the candidate in the registry and provide verification to the patient. Persons issued the registry verification paperwork can then present to one of eight dispensaries in Minnesota, that will be able to begin distributing medications beginning July 2015.

Is There a Fee?

Registrants will contribute an annual fee to participate in the program, which can be reduced for patients on Social Security Disability.

Be Safe & Sensible.

When using any sort of medicine that could have effects on your mental clarity, it is best to take great caution before driving or performing other complex tasks that could be dangerous.

"Start Low and Go Slow" when it comes to how much medicine you take, and see how the medicine affects you. Especially at first, dose your medications in a safe place with responsible adults present. Talk to your doctor and your dispensary pharmacist about questions.

When in doubt—ASK.

Who Can Pick Up the Medicine?

Registered patients, parents, or designated caregivers can retrieve and administer the medication. In the case of incapacitated patients or children, the Commissioner of Health can approve and register a designated caregiver if the patient's health care provider certifies that this is required.

Minnesota Medical Solutions LLC

Minnesota Cannacare Foundation

Minnesota
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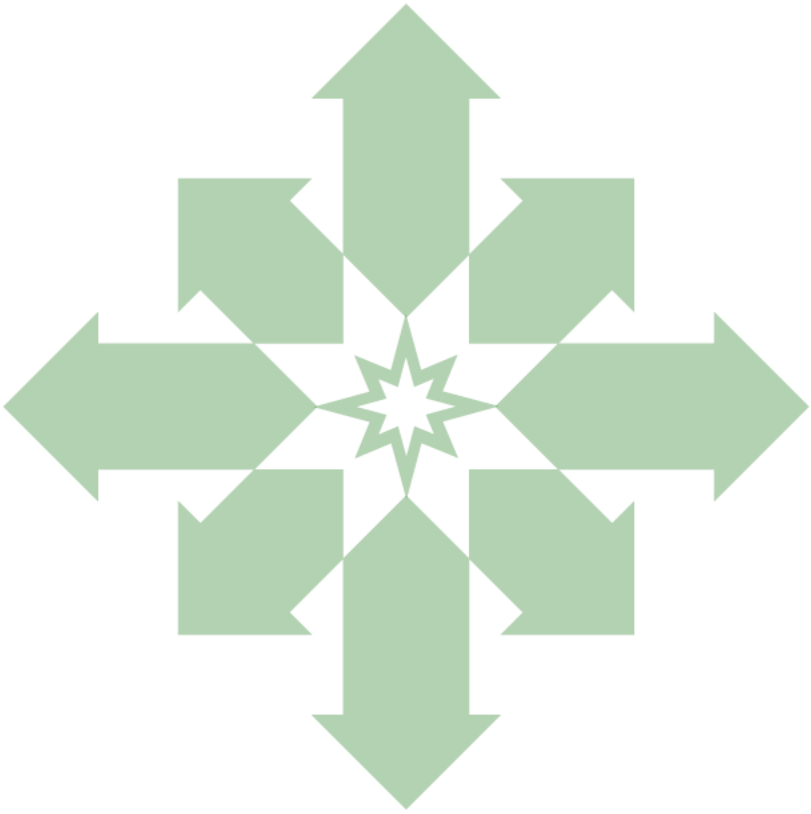
MinnMed House



Community Outreach & Education

Patient Assistance Programs

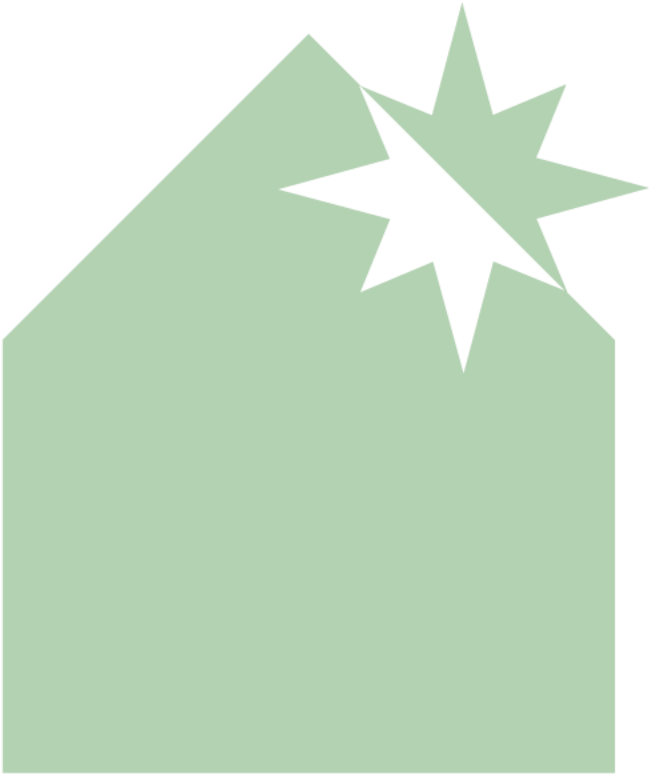
Decreasing Costs

Community Involvement

Minnesota CannaCare is the Minnesota Medical Solutions non-profit sister organization through which we will do everything we can to help our community and patients. Minnesota Medical Solutions will contribute a large amount each year to Minnesota CannaCare to improve the lives of our patients and communities. Some of these funds will be used to decrease the costs of medicines for patients. Additional programs will include community outreach and education, patient assistance programs and the MinnMed House.

MinnMed House

Temprary Housing Solutions for Medical Cannabis Patients and Their Families

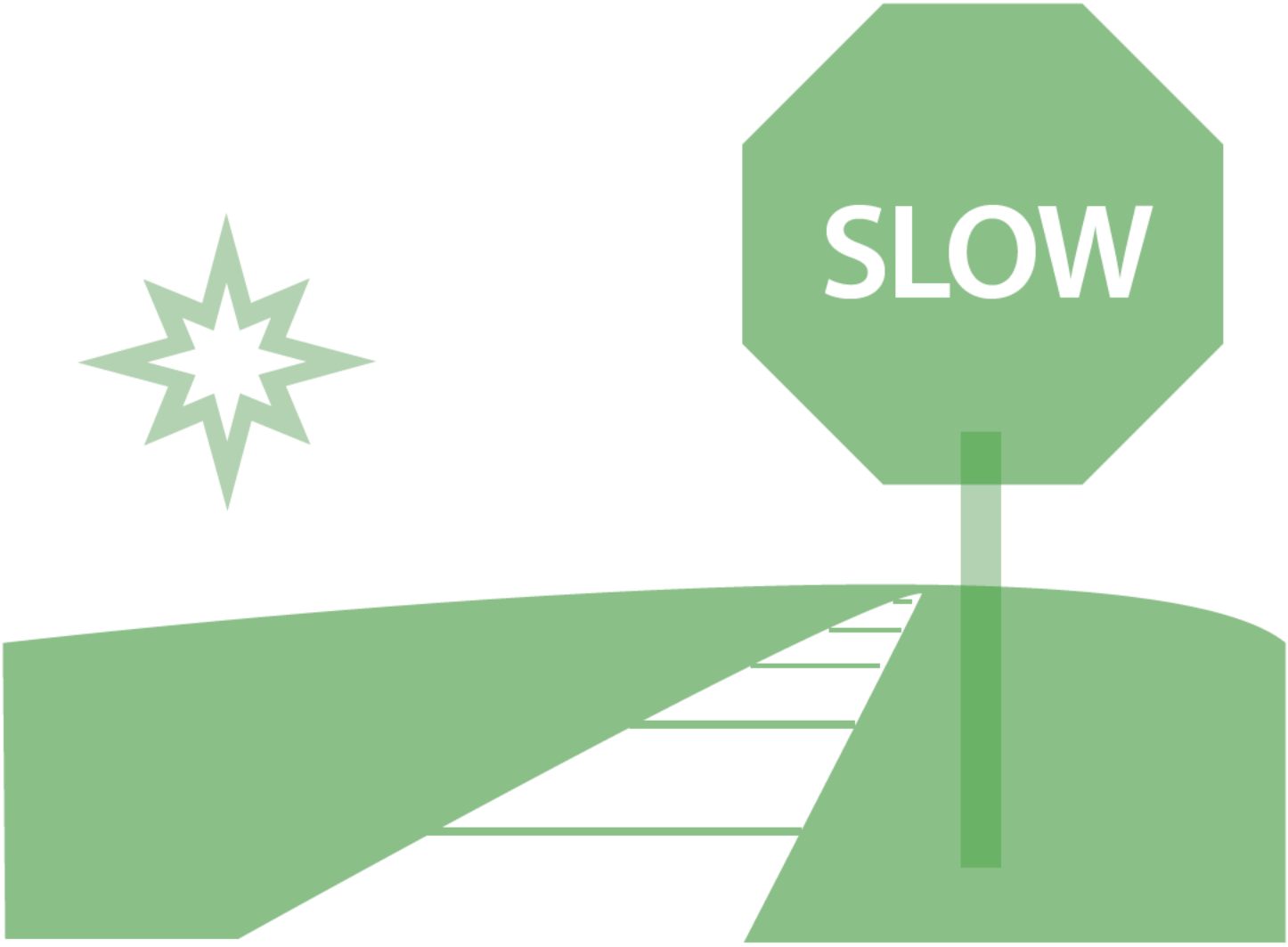


Minnesota CannaCare will start the MinnMed House as soon as it is financially feasible. This will consist of homes for parents that would like to obtain Minnesota residency in order to trial our medications for their children with severe seizure disorders. If the child responds to the medicines, the family can then seek more permanent living arrangements in Minnesota to continue treatment.

Join Us.

Minnesota CannaCare will actively reach out to the other manufacturer in Minnesota to join our cause and improve the lives of our patients and community.

Start Low Go Slow



A First-Time Medical Cannabis Patient's Guide

Minnesota
Medical Solutions LLC

Start Low Go Slow

Minnesota Medical Solutions is very concerned about the experience of our patients who are not yet familiar with medical cannabis. The first few times that medical cannabis is utilized can be the most risky regarding unpleasant side effects for patients. MinnMed supports the "Start Low, Go Slow" philosophy to minimize these risks. **This means that patients should start with a very low dose and wait a long time at first to wait for the effects to take hold, which is a similar approach to medication safety dosing for many other traditional medications.**

The MinnMed pharmacists and dispensary team will work with you to ensure that you have a positive experience and are confident when you leave the dispensary.

Initial Dosing Protocols

MinnMed is working vigorously on initial dosing protocols, based upon guidelines in other countries and states with more long-term experience with dosing cannabis products. These systems will help our pharmacist to best instruct you on the best way to use your medicine.

MinnMed is also committed to responding to patient and caregiver questions and concerns. Educational materials will be available online to be accessed from home, along with answers to common questions. A 24-hour patient hotline will also be available for emergent needs of patients, parents and the caregivers of patients.

Delivery Recommendations

There are several approved ways that you can use medical cannabis in Minnesota:

Vaporizer

Vaporizers gently heat medical cannabis oils until they evaporate and can be inhaled. **It is important with your first use that you take a very short "puff" from the vaporizer. You should then wait at least 10 minutes to feel the effects.** At that point you can again take another slightly longer "puff". It is important to wait for sufficient time after each inhalation to be certain you do not take too much.

Solutions/Tinctures

Solutions and tinctures are medical cannabis liquids that can be placed in the mouth and either swallowed or absorbed in the moist membranes of the mouth itself. **It can take up to 2-3 hours for these medicines to take full effect, so you should wait three hours before taking another dose**. Often, because of the delay to effect, patients do not believe the first dose is working, so they take another. Unfortunately, these doses add up over time, and the patient becomes over-medicated and has a higher risk of side-effect.

Pills/Tablets/Capsules

These types of medicine, like the liquids, take a long time to enter your system and take effect. They also last for a long time. **You should wait at least 3 hours before taking another dose as a general rule.**

Be Safe & Sensible.

When using any sort of medicine that could have effects on your mental clarity, it is best to take great caution before driving or performing other complex tasks that could be dangerous.

"Start Low and Go Slow" when it comes to how much medicine you take, and see how the medicine affects you. Especially at first, dose your medications in a safe place with responsible adults present. Talk to your doctor and your dispensary pharmacist about questions.

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PRODUCTS
LOCATIONS
MINNESOTA CANNACARE
NEWS
ABOUT MEDICAL CANNABIS
FOR PATIENTS
Compassionate Care Through Cannabis
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Minnesota Cannacare Foundation
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Our Formulary Spectrum
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Minnesota Cannacare Foundation

- Programs
- Get Involved
- Our Events

Minnesota Cannacare Foundation

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Minnesota
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Formulary Spectrum

Available Products
Formulary Spectrum

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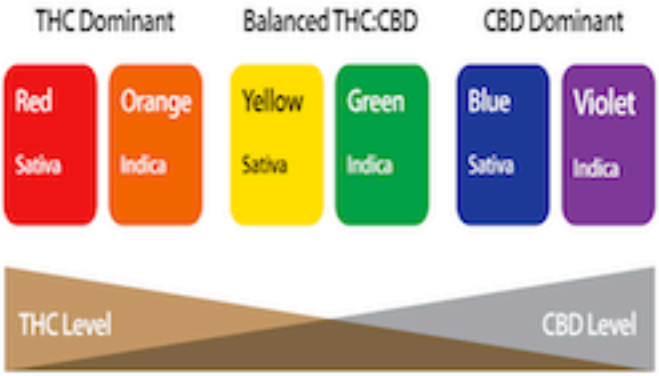

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Minnesota
Medical Solutions LLC

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    - Cachexia or severe wasting
3. Terminal illness, with a probable life expectancy of one year, with associated:
    - Severe or chronic pain
    - Nausea or severe vomiting
    - Cachexia or severe wasting
4. Human immunodeficiency virus (HIV) and/or Acquired Immune Deficiency Syndrome (AIDS)
5. Glaucoma
6. Severe muscle spasms, such as those associated with multiple sclerosis (MS)
7. Amyotrophic lateral sclerosis (ALS)
8. Crohn's disease
9. Tourette's syndrome

Medical Cannabis Primer

for Healthcare Professionals

Laura Bultman, MD

and Kyle Kingsley, MD

Foreword

Background and Purpose

The book is intended as a brief guide to help health care providers understand the use of cannabis as medicine for patients with qualifying conditions. This volume is by no means comprehensive, but the goal is to give you the knowledge needed to assist your patients to find the best relief of their symptoms. It is apparent that a concise reference is needed by providers who need to provide sound advice to their patients, but have no experience to date with cannabis as medicine. In particular, we will focus on the research and evidence that exists for certain symptoms and conditions traditionally treated with cannabis derivatives and also the potential risks in the use of cannabis.

While politics and policy are mentioned this book, the focus is on providing simply the necessary medical knowledge to effectively use cannabis derivatives in the clinical setting. There is substantial evidence for the efficacy of cannabis in several conditions, but the presentation of that evidence is often colored by bias regarding cannabis in a political light.

From the Authors

Research on the subject of cannabis-based medicines both from the bench science and clinical therapeutic perspectives is compelling that this controversial field has tremendous value and an exciting future, and that medical science will continue striving toward defining it.

Like the authors, readers had no education about the endocannabinoid system or its manipulation in medical school, and likely had little education about pharmacognosy, the study of plants as medicine. With the development of medical cannabis programs in many states, it can be difficult to reconcile these new programs with long-held beliefs regarding avoidance of addictive drugs and the dangers of smoking.

How then do we approach these developments in cannabis medicine? Where can we find reliable information, untainted by political and other bias? Before recommending cannabis-based medicines to a patient, how is a provider to know the risks and benefits? Other clinicians have also likely found that it is difficult to separate the propaganda from the stigma from the science, and the information provided here is intended to bridge these informational gaps.

This book is certainly not intended to be static or all-inclusive, but aims to provide clinicians with the core knowledge necessary to discuss cannabis with patients and colleagues intelligently. Conducting a search for up-to-date, relevant medical works reveals that books written in the last five years are sparse, and are not often directed to a medical audience. This work represents a compilation of information from medical reference sources, bench science research, popular information and position statements, presented with the viewpoint of medical cannabis clinical professional.

Contents

Brief Medicinal Cannabis Lexicon

Budtender: the individual working the counter at medical marijuana dispensaries, who is employed to offer suggestions and advice to customers

Butane: as it applies to cannabis products, butane can be used to extract cannabinoids, terpenes and other lipophilic products from the whole cannabis plant. The residual butane solvent is then removed before consumption, resulting in an oily, sticky concentrate.

Cannabidiol (CBD): the second most well studied of the cannabinoids; it does not have psychotropic effects and has shown useful for a variety of inflammatory and neurologic disorders. As a constituent of cannabis species, it is most abundant in hemp varieties, but less common in cannabis strains that have been cultivated for higher THC and psychoactivity.

Cannabinoid: a family of terpenophenolic compounds unique to the cannabis plant. They can be further specified to be synthetic or of plant origin (phytocannabinoid). Mammals possess an endogenous system of ligands and receptors, termed the endocannabinoid system, upon which exogenous cannabinoids have a variety of effects. The naturally occurring or "raw" form of these cannabinoids exists with a carboxylic acid chain, which is most often removed with the application of heat to convert the raw form to the active form.

Charlotte's Web: a high-CBD variety of cannabis, developed in Colorado by the Stanley brothers, named for Charlotte Figi. Charlotte's struggle with intractable epilepsy was publicized on CNN by Dr. Sanjay Gupta, and started a widespread movement to expand patient access to CBD-only treatments.

Decarboxylation: in reference to cannabis, this refers to the process required to convert the natural acidic form of cannabinoids to a physiologically active form by removing the carboxylic acid side chain. This does occur naturally with time, however the application of heat will greatly speed this process, and thus the most common routes of cannabis ingestion involve heat such as vaporizing, combustion or cooking.

Dispensary: a facility specializing in the distribution of either medicinal or recreational cannabis products. Unlike a pharmacy, they do not process true prescriptions for medical marijuana, but rather receive a medical recommendation for cannabis products in general. Personnel within the dispensary then make recommendations regarding the type of cannabis strain and delivery form, dose, and route of administration based on the needs of the patient.

Edibles: term for cannabis-containing products that are cooked or baked into more ordinarily edible forms, such as cookies or brownies.

Endocannabinoid: term for the widespread endogenous system of fatty-acid derived neuromodulators that affect intracellular signaling mainly in the nervous and immune systems. Receptors and intracellular proteins involved in natural endocannabinoid signaling are also sensitive to exogenous cannabinoids, which is the mechanism by which cannabis exerts its effects. Anandamide or *N*-arachidonoylethanolamine (AEA) and 2-arachidonoylglycerol (2-AG) are the two best known endocannabinoids, others include 2-arachidonylglyceryl ether (noladin ether), O-arachidonoyl-ethanolamine (virodhamine), and N-arachidonoyl-dopamine (NADA).

Ganja: Sanskrit for cannabis

Hash: traditionally this referred to a product made by collecting the resin glands of the cannabis plant, which have a concentrated amount of cannabinoids, and was more common practice in countries outside of the United States.

Hemp: term for Cannabis sativa varietals that lack THC, but retain other cannabinoids and can be grown for agricultural and medical use

Hybrid: as the term suggests, this refers to blending strains possessing different genetic characteristics into the final cannabis product in order to achieve desired effects

Indica: along with sativa, one of the main varieties of the *Cannabaceae* species. More often from a tropical source, the variety of compounds found within Indica is reported to have mental effects that are more relaxing and sedating.

Marij/huana (vs. cannabis): initially a pejorative term for cannabis derived from Mexican slang, now more commonly used to refer to dried cannabis buds, leaves and associated plant products, as well as in the conjoined term "Medical Marijuana."

Medicated: often used in lieu of the term "high" or "stoned"

NIDA: National Institute on Drug Abuse, the federal agency that currently mediates provision of cannabis to FDA-approved research studies that address drug abuse

NORML: National Organization for the Reform of Marijuana Laws. Formed in 1970 contemporaneously with the passage of the Controlled Substances Act (CSA), they are a non-profit organization missioned to legalize the responsible use of marijuana by adults, and to serve as an advocate for consumers to asure they have access to high quality marijuana that is safe, convenient, and affordable.

Phoenix Tears: a cannabis extract oil developed by Rick Simpson, using plants he originally grew in his own yard. The method for extraction is posted on his website.

Sativa: one of the main varieties of the *Cannabaceae* species originating primarily from equatorial areas of the world. The mental effects derived from this varietal are reported to be more uplifting and creativity-inducing.

Sinsemilla: "without seed", refers to the asexual cloning of plants, such that fertilization is unnecessary and a cultivar can be limited to specific female strains

Terpene: a wide variety of aromatic compounds found within cannabis and other vascular plants. These chemicals imparts the characteristic smell and flavor to cannabis, and the wide variety gives rise to an assortment of cannabis products designed to suit the user's taste inclinations. Apart from personal preferences, terpenes have demonstrated benefits for medicinal and aromatherapy purposes.

THC: abbreviation for (-)-trans-Δ9-tetrahydrocannabinol, the primary cannabinoid found in the cannabis plant and the most studied.

Tincture: an extract of oils, typically suspended in alcohol or glycerol. By using a dropper, measured amounts may be administered under the tongue or added to other products.

Vaporizing/Vaping: as an alternative to smoking, cannabis and related products may be gently heated to their boiling points producing a vapor, however, combustion does not occur. Multiple commercial products are available, similar to electronic cigarettes, with prefilled cartridges or chambers for plant material.

Introduction

What is Cannabis?

Cannabis species are ancient plants indigenous to south or central Asia and is likely one of the first plants cultivated by man. Hemp fibers, used nearly worldwide for rope, textiles and paper were likely a major reason for the spread of the plant through multiple continents, as well as the nutrient value of hemp seeds. The cannabis resin produced by the flowering plant trichomes, which includes concentrated psychoactive substances most notably in the female plant, is likely the best-known, most controversial component used in more recent times.

Cannabaceae is genus with three separate species or varieties. *Cannabis ruderalis* is a small atypical variety, mainly localized to Eastern Europe and Russia, with limited medicinal uses. *Cannabis sativa* and *Cannabis indica* are the two variants of clinical consequence. The main differences between these two species are appearance and growth characteristics. The *Cannabis sativa* and *indica* plant varietals can both contain a mixture of psychoactive and non-psychoactive substances, but most modern strains have been bred to maximize the percentage of the psychoactive substance known as THC, (-)-trans-Δ9-tetrahydrocannabinol. However, not all breeders seek to maximize the THC-induced psychoactivity. In the United States, Great Britain and Israel, firms have developed low-THC, high-cannabidiol strains as well (Tikun Olam 2014).

The dried female flowers of the cannabis plant, commonly called simply flowers or buds, can contain up to 30% THC by weight. The term "hemp" generally refers to cannabis strains that are very low in THC, but it is also the general name for the plant fiber itself. On a federal level, hemp cannot be legally cultivated in the United States after WWII, but a number of states allow for hemp pilot studies, and eight states passed laws aimed to promote hemp agriculture. In parts of the European Union, products must contain < 0.3% dry weight or 5-10ppm THC to be considered hemp, and American states have adopted a similar standard. Although hemp does not possess the psychoactive THC, it is higher in a cannabinoid called cannabidiol (CBD). Large volumes of hemp seeds can be pressed to make hemp oil, which has nutritious omega fatty acids.

Compressed cannabis resin is referred to as "hash" or "hashish", and is generally higher in THC content than commonly available dried marijuana bud/leaf mixtures. Traditionally the hash preparation method was from the Middle East and India, using Indica varieties that produced

higher amounts of resin, but modern hash products in the United States differ due to plant strain and environmental dissimilarity.

Cannabis Sativa is characterized classically by longer stalks and plants with leaves that are long and thin. Because of the long tall stalks, sativa hemp varieties are useful for fiber and are grown for this purpose in other industrialized nations. Many sativa varieties require more time to flower because they evolved in warm equatorial regions. Like indica, sativa varieties can contain a wide spectrum of THC to cannabidiol (CBD) ratios, and a variety of associated compounds as well. Common belief is that the mental effects derived from cannabis sativa use are more euphoric and uplifting.

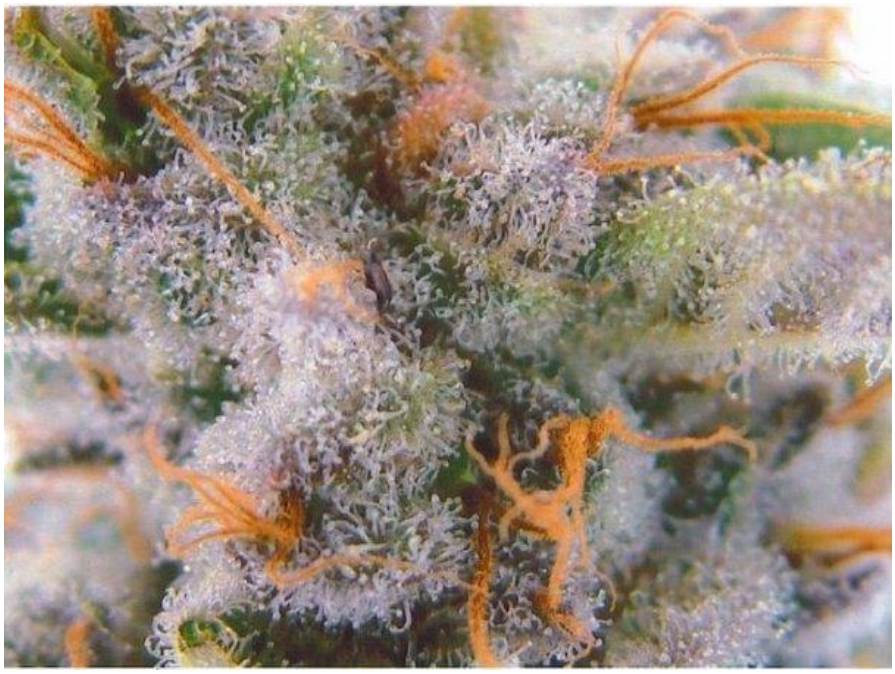
Cannabis Indica is characterized by shorter, stalkier plants, with wider leaves and a shorter time to flowering. Native to the Middle East and Asia, this variety is the traditional source of hash and has a stronger deeper odor. The reported subjective effects of using indica varieties have been described as more sedative or fatigue-inducing.

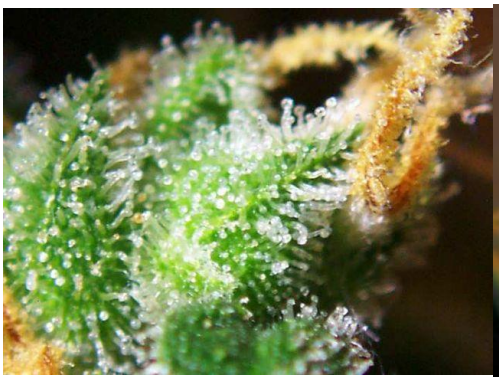
Currently many producers categorize cannabis products based upon the strains involved:

1) Indica
2) Predominately Indica
3) Hybrid
4) Predominately Sativa
5) Sativa

It is likely that in the future a number of additional qualifiers will be applied to the characterization of cannabis products as the constituents outlined in the following chapter are further defined and isolated.

Figure 1a-c: Female flowers with magnification of crystalline resin





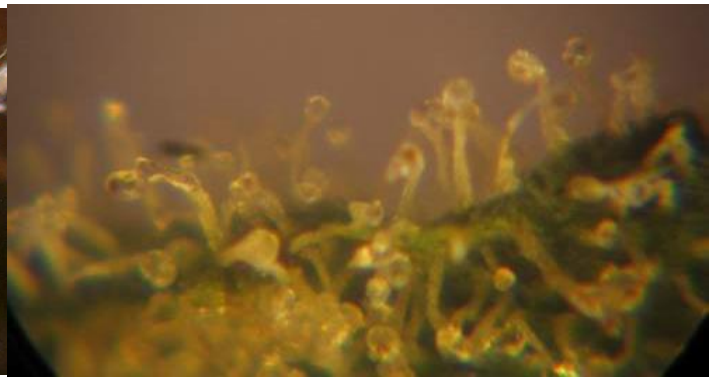


Figure 2: Cannabis indica

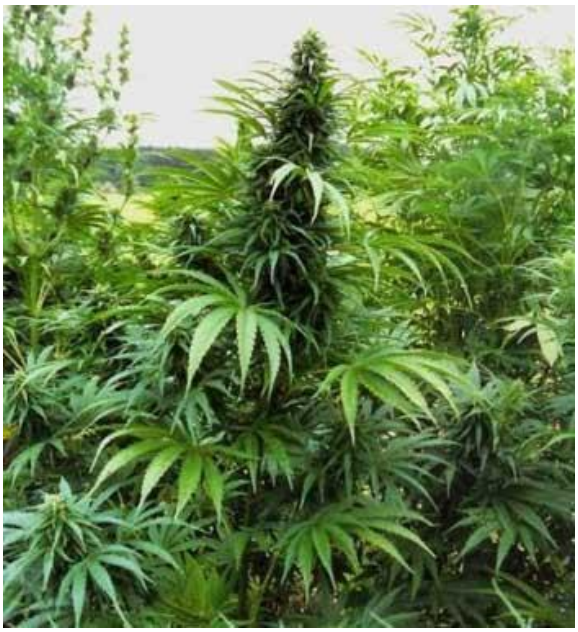


Figure 3: Cannabis sativa

Cannabis Constituents

The cannabis plant as a whole contains hundreds of distinct compounds, which fall into chemical classes that have medically important distinctions. The most prominent and well-known terpenophenolic compounds unique to cannabis are referred to as cannabinoids or phytocannabinoids to indicate their plant origin, including tetrahydrocannabinol (THC), cannabigerol (CBG), cannabinol (CBN), cannabichromene (CBC), and cannabidiol (CBD).

To date the compounds that have been the best studied and represent the most medically important cannabinoids are THC and CBD. Each cannabis cultivar has its own unique chemical profile which can be manipulated through selective breeding and/or asexual clonal reproduction of desirable strains, called sinsemilla. Many current crops are hybridized sativa/indica strains with a wide spectrum of chemical components. Both genetic character and environment play a role in the composition of cannabinoids and the yield obtained from each harvest.

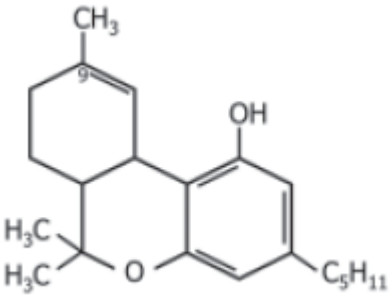
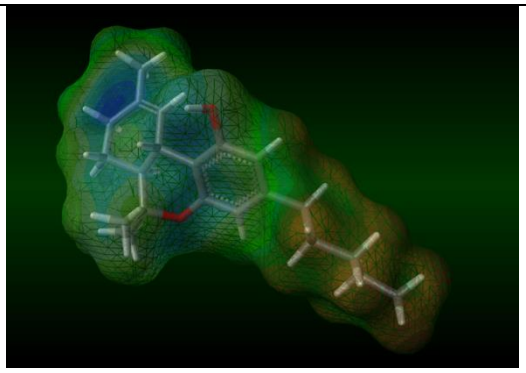
In the past, the psychoactivity of THC was the most sought-after component and genetic lineages high in CBD became increasingly rare until entities internationally began cultivating higher-CBD varieties. Contrary to the oversimplified opinion that cannabis is simply a vehicle for THC delivery, the effects of cannabinoids go far beyond THC into groundbreaking areas of molecular biology and epigenetics. Today, hundreds of strains of cannabis have been developed to genetically dispose the plant to produce particular quantities and ratios of the desired constituents. The strains may have casual names, such as diesel, AC/DC, kush and haze, but these cannabis varieties arose purposefully and systematically.

Cannabis constituent descriptions are outlined individually below, but their medical use is most often a blend, with a ratio of CBD: THC best suited to a patient's specific need.

Δ9-tetrahydrocannabinol (THC)

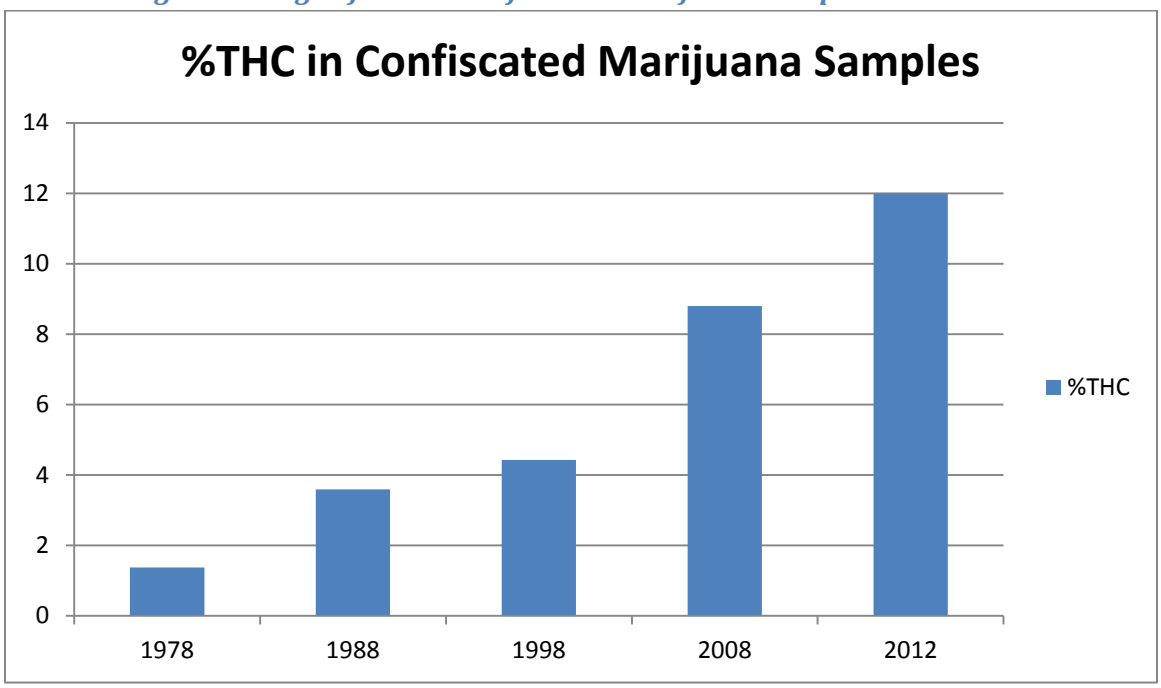
Identified and synthesized decades ago, Δ9-tetrahydrocannabinol, better-known as THC, is the most psychoactive of the phytocannabinoids and most likely the best-studied and commonly familiar. As the chemical responsible for the majority of the psychoactivity of the cannabis plant, it causes most of the controversy as well. In addition to its notorious mental effects, THC has multiple other medical properties through its augmentation of the endocannabinoid system discussed in a later chapter, including tempering of pain and nausea perception.

Table 1: THC structure

THC 2-D structure	THC 3-D representation
	

At the federally-endorsed University of Mississippi, the Potency Monitoring Project (UMPMC) analyzes samples of confiscated marijuana, "ditch weed", and hash for cannabinoid content. Samples of confiscated cannabis in the United States have revealed that the THC content had risen from 1-2% in 1980 to over 12% in 2012, with some samples surpassing 30% (Mehmedic 2010), (M. ElSohly 2014). In 2014, samples of marijuana seized in Switzerland reached a similar average of 11.5% THC (Ambach 2014). These trends give credence to the widely held belief that marijuana is "stronger" now than it was in the past, assuming that confiscated samples are representative. Given the wide range of THC in illicit samples, it could be difficult for users to predict the mental effects of use.

Figure 4: Rising Percentage of THC in Confiscated Marijuana Samples



Cannabidiol (CBD)

CBD is likely the second best-studied cannabinoid as of late, after a drastic increase in research in the last decade. It lacks psychoactive effects itself and mutes the psychoactivity of THC, so a combination of THC and CBD can be used to prevent untoward mental effects of cannabis use. Because CBD has not been extensively studied as a monotherapy until very recently, it is difficult to outline the full range of benefits in humans. However, animal studies have demonstrated favorable effects for conditions such as psychiatric disorders, epilepsy, autoimmune disease, and cancer.

CBD very recently became more well-known because of its putative effects upon refractory pediatric seizure disorders such as Dravet syndrome. A growing market for predominately-CBD or CBD-only products has arisen from the promising research regarding seizure disorders as well as autoimmune disorders and cancer. A number of states have made a legal distinction between CBD and marijuana in the last couple of years, such that "marijuana" remains illegal but CBD is considered separately. These legislative efforts will expand access to this non-psychoactive

medicine to patients and families even in states where cannabis is generally prohibited. CBD is available in CBD-rich oils, edibles, topicals, tinctures, and oral capsules.

Other cannabinoids

Cannabinol (CBN) is a breakdown product of THC, so is often found in cannabis products aged by time, heat and/or light. It shares some of the psychoactivity of THC, but has greater affinity for CB2 receptors, so has more effects upon the immune system. It does have some psychoactive effects, but at approximately 10% the activity of THC. Other effects are similar to its parent compound, including reduction in spasms, insomnia, and pain related to inflammation.

Interest in other minor cannabinoids has grown as well, although they typically only comprise <1% of cannabis by weight. Cannabigerol (CBG), as its name implies, is a precursor molecule for other cannabinoids, and has shown success as an anti-inflammatory (Ruhaak 2011) and antimicrobial (M. a. ElSohly 2005). In limited studies, the minor constituent cannabichromene (CBC) has shown anti-inflammatory properties as well, which appear non-receptor related, and can act synergistically with THC in mice (DeLong 2010).

Analogues of the more common cannabinoids with a propyl side chain are also found in cannabis, including CBDV (cannabidivarin) and THCV (tetrahydrocannabivarin). These compounds have similar properties to their more well-known siblings. Like CBD, cannabidivarin has antiepileptic properties and can desensitize TRPV1 channels, which makes it a potential mediator of general neuronal hyperactivity (Iannotti 2014).

THCV is of special interest because it exhibits some concentration-dependent and competitive antagonist action at CB1 and agonist action at CB2, and may act as an appetite suppressant in mice (Riedel 2009) with promising research underway for treatment of insulin-resistance. It does have psychoactivity due to activity at CB1, but has been described as milder and clearer, and does not cause hyperexcitabiltiy in animal models (J. e. McPartland 2014). Until human studies are undertaken, its full potential is unclear.

Raw forms

The naturally-occurring, sometimes called "raw" form of THC and other cannabinoids has a carboxylic acid side chain, so are often denoted as THCA, CBDA, etc. Decarboxylation into the phenolic form is required for psychotropic effects, and can occur both slowly with time, or more quickly with application of heat. The percentage of acid versus phenolic forms varies highly based on the climate in which the plant is grown. Approximately five minutes at 180-200°C is sufficient for decarboxylation, but higher heat produced during cigarette smoking achieves decarboxylation in much less time (F. Grotenhermen, Clinical Pharmakinetics of Cannabinoids 2006). The higher temperatures achieved with combustion and sometimes with manufacture will inactivate the majority of naturally-occurring volatile terpenes.

Terpenes

There is also another important class called the terpenes, aromatic compounds that impart flavor and the characteristic odor, but have less well-defined medical purposes (Clarke 2007). It has been suggested that the terpene constituents contribute to a number of effects experienced by intake of whole cannabis herb as opposed to isolated THC (J. a. McPartland 2001), which is often termed the "entourage effect." Like cannabinoids, terpenes are lipophilic, and many can cross the blood brain barrier, so it is quite feasible that they work in conjunction with other cannabinoids in the central nervous system. Many terpenes are not unique to cannabis, and can be found in other herbs such as citrus plants, rosemary, lavender, lemongrass and hops, and are known to have a variety of benefits including control of carcinogenesis, inflammation and microbial growth. In the study of aromatherapy, even small amounts of inhaled aromatics such as the terpenes can affect mood.

As an example, the terpene beta-caryophyllene is found in black pepper, basil, oregano, cinnamon, rosemary, hops, and cloves. In mice, it has been shown to be an agonist of the CB2 receptor, but its medicinal properties as a dietary cannabinoid are not fully explored (Gertsch, Beta-caryoophyllene is a dietary cannabinoid 2008).

Terpenes likely contribute to the entourage effect by providing balance to psychotropic effects. In ancient times, terpene-rich foods such as lemons, pine nuts and black pepper were used to counteract unpleasant effects of cannabis, and now with the knowledge of terpene mechanisms, these ancient practices gained merit (E. Russo 2011).

Flavonoids

Additionally, flavonoids present in other commercialized herbal preparations are also present in cannabis. A flavonoid called apigenin, better-known in chamomile, exerts anxiolytic properties by binding to central GABA receptors. The popularized flavonoid quercetin as well as a number of the known cannabinoids acts as potent antioxidant, and together they mediate a number of downstream benefits such as scavenging free radicals and inhibiting inflammation.

Apart from THC and CBD, a number of the associated phytochemicals within cannabis possess the ability to inhibit the cytochrome P450 system of the liver. In modern medicine, this must be taken into effect because of the metabolism of other exogenous prescription medications. However, the P450 system is also responsible for metabolism of carcinogen precursors to active metabolites, so inhibition of this system can lead to chemo-protection in nature. A well-studied example is the oxidation of the aflatoxin found in *Aspergillus* species into hepatotoxic metabolites.

Holistic Approach

While the cannabis plant can be broken down into several of its individual constituents, it would not be correct to describe the herb simply as a list of ingredients. At this time, it is likely that the "active ingredients" of a particular strain will be listed as THC and CBD percentages, but over time additional constituents may likely be quantified as well. However, it will not be possible in the near future to completely quantify the hundreds of compounds and their interactions, so the exact properties of the whole herb must be revealed over time.

In some aspects, the descriptions of cannabis varieties are reminiscent of the experience of wine consumption and the subjective experiential terms used by sommeliers. While the active ingredient, ethyl alcohol, is listed and quantified, there are other aspects to wine intake that are more difficult to quantify yet have known physiologic effects. The example below is an illustration of two wine types with the same alcohol content, but other important attributes that may not be specified on the label.

Table 2: Drawing an Anology to Wine

	Wine A	Wine B
Alcohol content	14%	14%
Grape varietal	Chardonnay	Malbec
Unlisted ingredients	Higher in sulfites	Higher in tannins
Unlisted factors	Yeast and sugar residuals	Tyramines from aging
Flavor profile	Fruity, flowery notes	Nose of cinnamon and blackberry

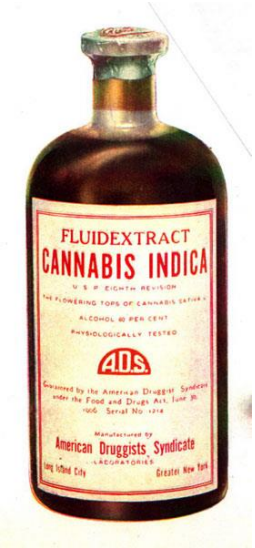
Considering the wine as a whole, rather than focusing on the single active ingredient, would lead one to recommend wine A for a migraineur sensitive to tannins.

Cannabis-Based Medical Therapy

While the cannabis plant has been in popular use for centuries, recent developments in the political, biochemical and medical arenas have brought the medical benefits of cannabis to the foreground of medical research. Looking back to the development of opiates, there are similarities: a plant had been cultivated for centuries for its desirable properties, the active substance was identified, extracted, modified and synthesized, then generally accepted as a medical therapy. Cannabis is earlier in this process of acceptance, and is developing in a different age of medicine where a whole herb is not as trusted as an isolated chemical created in a lab and pressed into a tablet. As our understanding of the complex interactions of chemicals within the human body changes, medical science continues to progress. Only within the last 25 years has the exact structure of THC, CBD, and their major CB1 and CB2 receptors been defined (R. Pertwee 1997). This major advance in the molecular biology of cannabinoids has launched invigorated research efforts to the therapeutic potential of this historically medicinal plant.

Cannabis-Based Medicines and US Historical Background

Cannabis has a long, conflicted history in politics, society and medicine. Physicians trained at different periods in this history are likely to have internalized various opinions and even biased education regarding how cannabis should be approached as a medication. In the early 1900's, cannabis extracts were required pharmacy stocks. The Marihuana Tax Act of 1937 changed how cannabis was regulated such that it amounted to prohibition, and therefore, made cannabis unavailable for medical treatment. The federal 1970 Controlled Substances Act then regulated marijuana as a highly addictive substance with no medical value, subject to criminal penalty. Efforts were underway throughout to end the prohibition, but research on a Schedule I substance is difficult, and conflicts arose among medical panels, organizations such as NORML, and leaders in levels of government. Societal influences such as the "War on Drugs," the AIDS epidemic and healthcare costs have also contributed to the evolving conflict, ultimately leading to the complicated and at times illogical framework currently positioned around medical cannabis today.



Compassionate Use Program

The "Compassionate Single Investigational New Drug Program" began in 1976 as a novel approach to the federally complex legal status of marijuana. After a glaucoma patient filed a lawsuit contending that his marijuana use was justified, federal judge James Washington ruled:

> *…no adverse effects from the smoking of marijuana have been demonstrated...Medical evidence suggests that the medical prohibition is not well-founded* (The Criminal Law Reporter 1976)

A small core group of patients was approved to receive federally-grown and funded marijuana cigarettes through NIDA and the University of Mississippi, under the premise that each individual case was receiving the material as an Investigational New Drug (IND). Now decades old, only four surviving patients continue to receive the metal tins packed with cigarettes. Monitoring their usage over the years has provided some information regarding average consumption amounts, but no formal investigational research was undertaken on these individual patient studies with n=1. On average, the patients consume between 6-8 grams of cannabis bud/leaf each day, or about 6.63 pounds per year (E. e. Russo 2002). The program received an influx of applications with the AIDS epidemic, but was closed to new applicants in 1991.

California Proposition 215

Also called the Compassionate Use act of 1996, this was the first of what is now a growing body of state medical cannabis laws. It was also groundbreaking because it was enacted by voter initiative and pressed the issue of federal vs. state rights. In California, a medical provider can recommend cannabis for any condition in which marijuana might be of benefit, and patients are able to both grow and smoke cannabis in a non-public setting.

Following California's lead, a number of other states enacted medical marijuana legislation, but with variations regarding regulation of home cultivation, herbal cannabis versus extracts, and the number of qualifying medical conditions. In another groundbreaking step, the people of the states of Colorado and Washington were first to "legalize" cannabis, effectively allowing for the use and regulation of cannabis in a manner similar to alcohol. Colorado first opened retail outlets January 1, 2014 (Colorado 2011) and Seattle followed in July.

Intersection of Medical and Recreational Use

The potential psychoactivity of some cannabinoids has led to both medicinal and recreational use for thousands of years, but it was not until recently that medical technology can disentangle the two areas. The psychoactivity alone however will discourage many physicians from recommending cannabis use, particularly if patients seem to be seeking the mental effects more than the medicinal benefits. The media has long portrayed users of cannabis to be mentally addled, deranged, dazed, or just lazy. Movies featuring the use of nonpsychoactive CBD in chronically ill, suffering patients are not likely to gain popularity, so the stereotype may persist. In the past, cannabis was simply considered a plant that delivered THC to get a person "stoned", and without education for both the providers and patients regarding the range of cannabinoids and their purposes, both parties may be reluctant to initiate cannabis therapy.

Misuse or abuse of healthcare industry in the United States is in the news nearly every day, and the growing medical cannabis field is unlikely to be exempt. Licensed providers who operate clinics with no function other than providing cannabis recommendations may be disposed to financial incentives. Patients with ulterior motives may find that unethical providers are apt to provide recommendations without a proper medical exam. Unfortunately, the misuse of the system reflects negatively upon the conscientious providers and patients who seek cannabis to treat existing medical conditions that have been shown objectively to benefit from cannabis.

Establishing a boundary between purely medical use and recreational use is simple for cannabinoids such as cannabidiol, but more difficult for products containing psychoactive cannabinoids. On the contrary, in states such as Colorado and Washington, recreational cannabis is available without seeking medical attention so the boundary is drawn outside of the doctor-patient relationship. Patients who are comfortable asking about medical cannabis may have previous experience with recreational marijuana use, and providers may feel as though medical cannabis is simply an excusable route of obtaining recreational cannabis. Some providers may have had negative experiences with patients "seeking" pain medications, and translate the experience to cannabis patients as well. In one study of Canadian HIV-positive patients, 80% of patients using medicinal cannabis also continued using cannabis recreationally (Furler 2004). A much larger survey of over 4000 medical cannabis users in California revealed that nearly 90%

used daily or near-daily inhaled medical cannabis (O'Connell 2007), which would may preclude the need for additional recreational cannabis.

Ultimately, a black-and-white line may not be possible. The art of medical practice requires evaluation of gray areas on a regular basis, and providers of cannabis therapy must follow ethical principles in this area as well.

What Providers and Patients Need to Know about Cannabis Legislation

At this time, 20 states and the District of Columbia have legislation supporting medical cannabis use, two states for non-medical use, and 11 states have legislation passed or in process considering CBD separately from other marijuana prohibition. Because of the variability in state laws, licensed providers are wise to investigate the laws of the state(s) in which they practice. Many laws specify cannabis quantities in grams or ounces, which refers to the dried plant material rather than other forms such as extracts and edibles, which further complicates interpretation of state regulations.

The intricacies of cannabis legislation can be difficult enough for trade experts to understand, so it is likely that patients will have difficulties understanding how to use medical cannabis in a legally appropriate fashion. Some rough guidelines can answer some of the most common patient questions without delving into formal legal advice:

- What medical problems is medical cannabis used for?
- Can I travel out-of-state with my medicine?
- Can I order products like hemp oil online? What cannabis products can be shipped?
- Can I grow my own plants at home?
- What forms of cannabis are medical? Can this be smoked, or vaporized?
- Can I drive after I take my medicine?
- Who can give the medicine to patients like children or disabled adults?
- Is there a difference between retail/recreational cannabis and medical cannabis?
- Do I have to carry a cannabis license?
- Will my work drug screen make me lose my job?

Patients accustomed to receiving a prescription and proceeding to a retail pharmacy will also encounter some questions. Rather than a prescription where the provider proscribes the exact dose and timing, cannabis dosing is not often so black-and-white. Different patients respond differently to its effects, and individual titrations are often required to achieve the optimal dose and timing. At dispensaries, the personnel assisting patients with this process may range from budtenders with no formal education to clinicians to pharmacists, and this contrast from the typical retail pharmacy may raise patient questions as well regarding who is directing their care.

Federally, any form of plant-based cannabis remains schedule I, which has led to numerous court battles regarding state vs. federal conflicts. It remains unclear how federally-based institutions such as CMS and the DEA will respond to DEA-licensed providers who also choose to write cannabis recommendation letters. In California and the rest of the Ninth Circuit, the 2007 appeals case of *Conant v. McCaffrey* does protect providers under the First Amendment to make medical cannabis recommendations, but other districts have no such case precedents and the case does not protect the dispensaries themselves. As yet, there have not been widespread DEA license revocations in medical cannabis states, but some reports have recently arisen regarding providers receiving warnings from the DEA in Massachusetts (Lazar 2014).

Medical Society Positions on Medical Cannabis

Providers likely formed different opinions about cannabis during the era of strict prohibition than they would form today. After various states have passed diverse cannabis regulations, physician opinion may vary regionally as well. Physicians in a specialty such as oncology may have differing opinions than a sports medicine specialist, based on their daily experiences. An unfortunate byproduct of the political attitudes toward cannabis is that the natural endocannabinoid system and its manipulation is not freely taught in medical school curriculums, so the knowledge base of providers varies as well. This patchwork of influences leads to heterogeneity in provider attitudes, and the messages they communicate to patients.

In the face of contradictory opinions regarding a controversial subject such as cannabis, respected organizations such as the American Medical Association (AMA) and American College of Physicians (ACP) may offer useful information and guidance.

Reports from the AMA in 2009, and updated in 2013, addressed both the medical use and the social effects of cannabis in policies H-95.992, H-95.995 and H-95.98. To summarize, the AMA supported approaches to conduct more rigorous scientific evaluations regarding the medicinal values of cannabis. In that context, they recognized that the schedule I classification of cannabis hinders research efforts, and in 2009 they endorsed reclassification for this purpose. The vote reached in 2009 does represent a reversal of a long-held position that marijuana should remain classified as schedule I, which was previously reaffirmed in 2001. From the executive summary of the Council on Science and Public Health (CSAPH) report in 2009:

> *The future of cannabis-based medicine lies in the rapidly evolving field of botanical drug substance development, as well as the design of molecules that target various aspects of the endocannabinoid system. To the extent that rescheduling marijuana out of schedule one will benefit this effort, such a move can be supported.* (American Medical Association 2009)

They also recommended the formulation of a more comprehensive national drug policy, particularly to address issues of adolescent drug use. In 2013, they did retain language that "cannabis is a dangerous drug and as such is a public health concern", as well as opposition to widespread, undifferentiated legalization.

Similarly, the American College of physicians supports increased funding and research into the area of medicinal cannabis. Their position paper in 2008 included appetite stimulation, nausea relief, neurological and movement disorders, glaucoma, and pain relief as potential medical uses. They also urged:

> *…an evidence-based review of marijuana's status as a Schedule I controlled substance to determine whether it should be reclassified to a different schedule. This review should consider the scientific findings regarding marijuana's safety and efficacy in some clinical conditions as well as evidence on the health risks associated with marijuana consumption, particularly in its crude smoked form.* (American College of Physicians 2008)

What do other physicians think about medical marijuana? A recent survey by WebMD asked over 1500 physicians, with the majority of physicians indicating that it help with certain conditions (69%) and that it should be a medical option for patients (67%). Oncologists, who are likely more familiar with cannabis-based medicines, had even higher responses at 82% (Rappold 2014).

New Approaches to Medical Cannabis Utility

Generally, the concept of cannabis as a medicine has been well-accepted in the ancient as well as more recent medical society. The historical perspective of cannabis is addressed expertly in other books (see author Ethan Russo), so will not be covered here in detail; instead, presentation of how the medical cannabis field has changed in recent decades.

Contemporaneously, the delivery of healthcare in America has experienced significant changes as well. Partially due to cost factors as well as other societal issues, many Americans are turning to complementary and alternative medicine. In 1990, one third of Americans used some form of alternative medicine, which nearly doubled over the following decade (Su 2011). This resurgence in alternative, holistic, homeopathic and/or naturalistic medicine is concomitant with the acceptance of using herbal preparations such as cannabis as medicines.

Cannabis-based medications are not often used first-line, as monotherapy, or to replace traditional medical treatment; rather, as adjuncts to conditions that are difficult to treat with conventional medicines, or in patients who have had difficulties with conventional treatments. A collection of neurologic disorders falls in this category, as well as terminal illnesses such as cancer and AIDS. The limited medical modalities that attempt to treat the recalcitrant underlying medical pathophysiology often carry a heavy side effect burden for patients and their caregivers, so seeking alternative treatments is a natural inclination.

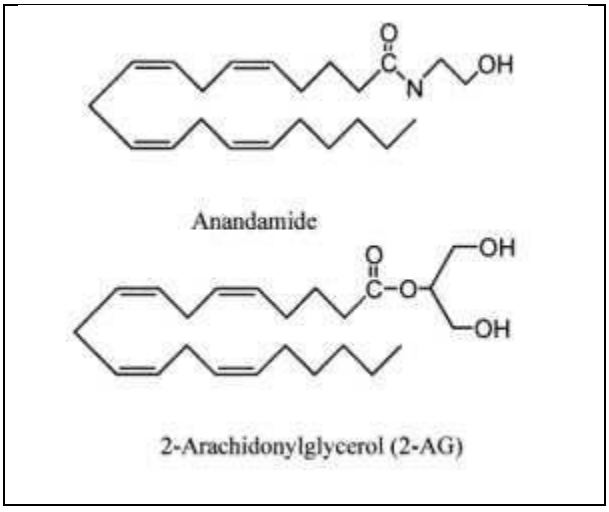
Symptom-based medications such as opiates have been in use for decades, but their side effect profile is also taxing: including lethargy, nausea, constipation, addiction, and overdose. So pervasive have the negative effects of opiates been upon American society that counties in California have filed a lawsuit against several opiate manufacturers for misleading medical providers about opiate safety (http://bit.ly/11Hxf8q). Further, a study released online by JAMA in August 2014 indicated that states with medical marijuana laws had a nearly 25% reduction in

annual opioid overdose death rate as compared to states without such laws, and that the reduction in fatalities grew year-by-year following legislation passage (Bachhuber 2014). Also in 2014, the well-known opiate hydrocodone will be re-classified from schedule III to schedule II, reflecting the increased scrutiny on American opiate use.

While the mood-altering properties of cannabis are common knowledge, what has not been well-known until recently is that cannabinoids have disease-modification benefits related to neurologic and inflammatory pathophysiology. As a result, cannabinoids have a unique medicinal profile insofar as they can simultaneously alter disease pathology, offer immediate symptom reduction, and pose little risk for serious deleterious side effects.

The Endocannabinoid System

In medicine, understanding first the normal physiologic process is essential to understanding how it can be manipulated. A variety of endocannabinoid molecules, chemically similar to compounds in cannabis, exist naturally within the nervous system of humans and other mammals. The term "endocannabinoid" arose retroactively after the elucidation of their similarity to phytocannabinoids, but these chemicals are endogenous to mammalian biology and despite the name, should not be confused with exogenous cannabinoids derived from cannabis. Initially perplexing, the designation does logically correlate with the pharmacologic history of opium, where an cultivated plant (poppy) produces chemicals that mimic the action of endogenous molecules (endorphins, e.g. endo-morphine), that bind to existing receptors (μ receptor). Among the five endocannabinoids identified in the 1990's, two have emerged as the most functionally important: anandamide or *N*-arachidonoylethanolamine (AEA) and 2-arachidonoylglycerol (2-AG), each pictured below:



Other human endocannabinoids include 2-arachidonylglyceryl ether (noladin ether), O-arachidonoyl-ethanolamine (virodhamine), and N-arachidonoyl-dopamine (NADA). Based upon the common root -arachido-, the similar chemical nature of these chemicals is apparent. Arachidonic acid, at times abbreviated ARA or AA, is a fatty acid similar to dietary omega-6 fatty acids.

Because they are produced on-demand, endocannabinoids differ from classical neurotransmitters which are stored in vesicles, so they are often termed neuromodulators instead. Endocannabinoids are produced through depolarization-initiated, intracellular-calcium mediated phospholipase cleavage of precursors in the lipid cell membrane. In some disease states, and in response to physiologic stress such as neuronal damage, levels of endocannabinoids are increased by cleaving the membrane precursors as needed. Studies suggest that an increase in endocannabinoid levels facilitates recovery from oxidative stress, free radical damage, and the subsequent inflammation produced by apoptosis.

In nerve tissues, endocannabinoids function as retrograde neuromodulators in a complex feedback system.

Figure 5: High-level Depiction of Forward Neurotransmission

"Chemical synapse schema cropped" by user:Looie496 created file, US NIH, National Institute on Aging created original - http://www.nia.nih.gov/Alzheimers/Publications/UnravelingtheMystery/. Licensed under Public domain via Wikimedia Commons

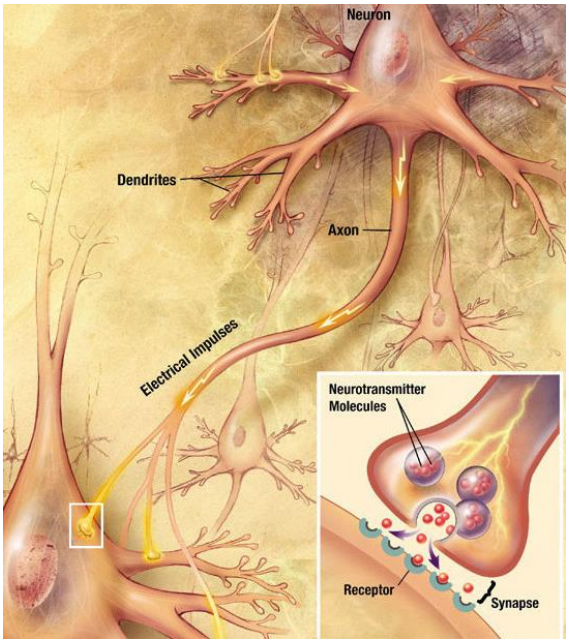


Figure 6: Simplified endocannabinoid Neuromodulatory Cycle

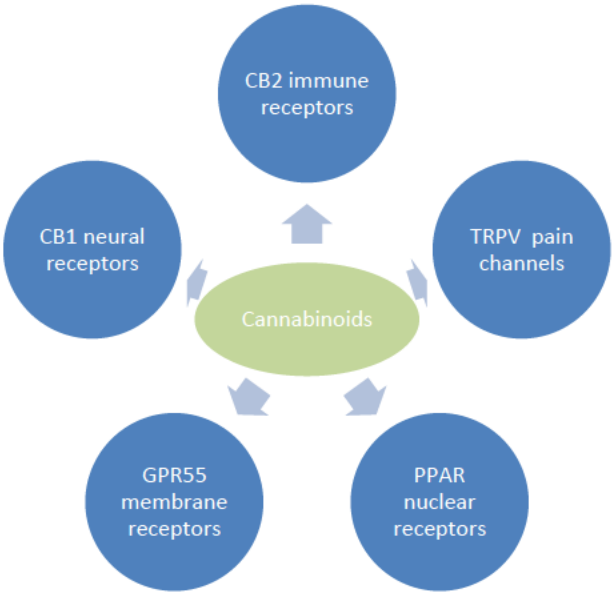
In vivo, AEA is quickly inactivated enzymatically by the fatty acid amide hydrolase (FAAH). AEA can be potentiated by inhibition of the FAAH catalytic enzyme (Hwang J 2010) or by methylation modification of the anandamide molecule to impede FAAH action. 2-AG is broken down by monoglyceride lipase primarily, as well as other enzymes.

Sites of Exogenous Cannabinoid Action

THC and many of its derivatives are agonists at the CB1 and CB2 receptors in tissues where those receptors are expressed. Intake of THC systemically, in the amounts used in therapeutic and recreational doses, causes activation of these receptors that is more widespread and nonspecific than the subtle modulatory effects of natural endocannabinoids.

The mechanism of action of CBD remained unclear for years because it only showed weak affinity to the known CB receptors and actually has some inhibitory effects for CB1 and CB2 agonists at the receptor. Recent research suggests that one of CBD's main mechanisms of action is inhibiting FAAH-mediated hydrolysis of AEA. By delaying AEA breakdown, mean levels of AEA are increased. CBD is also an inhibitor of p450-mediated oxidation of THC so can prolong the action of THC in vivo.

Figure 7: Sites of Cannabinoid Action



Connection to Dietary Fatty Acids and Supplements

A variety of fatty acids are required for normal cell membrane functioning, and "essential" fatty acids are those of the body cannot synthesize, but are necessary for health. In humans, the two essential fatty acids are alpha linoleic acid (ALA) and linoleic acid, both of which belong to the omega fatty acid family. Intake of omega (ω) fatty acids leads to modification in the mammal to eicosanoids (then prostaglandins, leukotrienes) and arachidonic acid—a component of the endocannabinoids AEA and 2-AG.

Docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) are polyunsaturated ω3 fatty acids made from ALA and found in fish oil, canola oil, flaxseed, walnuts and wild rice. Normally found in high concentrations in neuronal membranes, low levels of these fatty acids have been linked to depression as well as cardiovascular disease. When these molecules are esterified with ethanolamide, they display endocannabinoid similarities such as activating CBRs and breakdown by FAAH catalysis (Brown 2010).

Considering the high amounts in neural tissue and the demands of a developing brain, polyunsaturated fatty acid supplementation was theorized to support mental development in infants, and led to DHA and arachidonic acid-enriched baby formulas (Birch 2007).

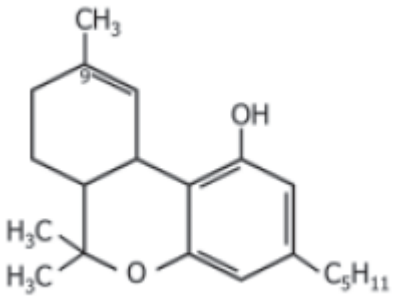
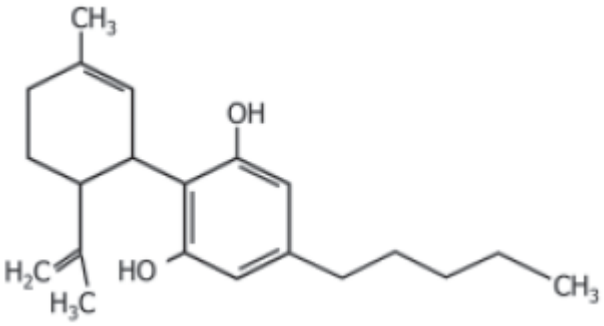
Other dietary compounds can affect endocannabinoids as well. Naturally-occurring unsaturated fatty acids in chocolate, N-oleoylethanolamine and N-linoleoylethanolamine do not directly bind to the CB1 receptor, however they do inhibit the FAAH-mediated breakdown of AEA in rat brain, indirectly increasing AEA levels (di Tomaso 1996).

Hemp oil contains essential fatty acids as well as the desired 3:1 ratio of ω6:3 fatty acids. Studies regarding the health benefits of fish and other oils revealed that the ω6 and ω3 fatty acids are best consumed in a 2-3:1 ratio, which is uncommon in the Western diet, so supplements have been developed that enhance this ratio.

Together, the fatty acid nature of the endocannabinoids and the research regarding fatty acid intake suggest that indeed measured dietary intake of essential fatty acids is beneficial for the delicate interplay amongst cell membrane function in the ubiquitous endocannabinoid system.

Exogenous Phytocannabinoids

Pictured below are the two primary cannabinoids found in cannabis: THC and CBD. These molecules exert their effects by enhancing the endocannabinoid system. THC binds to both the CB1 and CB2 receptors, and CBD hinders the hydrolysis of AEA, so together they can augment natural endocannabinoid functioning in a synergistic fashion. Other phytocannabinoids are discussed in the Cannabis Constituents section.

THC	CBD
	

A non-cannabis plant compound has also been discovered to have cannabinomimetic activity at CB2—N-akyl amides from *Echinacea*/purple coneflower (Gertsch 2006). Ongoing discoveries of such as this may lead to further research into related plant compounds that affect the endocannabinoid system.

Synthetic Cannabinoids

After the discovery of both the natural endocannabinoid structure as well as their receptors, scientists began investigations as to how the system could be modified to achieve specific effects. Laboratory modifications of cannabinoids can alter their affinity for CB receptors, interfere with the actions of other cannabinoids, and alter hydrolytic kinetics. These synthetic or modified cannabinoids are not generally purposed for medicinal use at this time, but they are quite useful in laboratory investigations and research regarding endocannabinoid signaling pathways.

Back in 1977, laboratories began experimenting with synthetic enantiomers of THC and cannabidiol in the + configuration, that were dubbed “abnormal” or abn-THC, abn-CBD (Adams

1977). They noted that abn-CBD had vasodilatory effects, without causing behavior changes in the laboratory dogs. Many years later, this observation is now believed to be related to a proposed new cannabinoid receptor, GPR18, which mediates the vasodilatory effects of AEA and abn-CBD (Penumarti and Abdel-Rahman 2014).

Another synthetic cannabinoid molecule was developed as an inhibitor rather than an agonist. Given that cannabinoids typically induce appetite, it might follow that blockade of the cannabinoid system may be useful for weight loss. SR141716A is an antagonist at CB1 receptors, and did indeed show appetite suppression in mice. As an investigational medication, it was called rimonabant/Acomplia and underwent trials in Europe which did show weight loss. Unfortunately untoward mental effects in humans resulted, which underscores the importance of the endocannabinoid system in normal human physiology.

DEA photo

Synthetic cannabinoids have also been manufactured for recreational use, and in recent years substances called K2 and "spice" have emerged in the US market. Many of these "designer" drugs are CB1 agonists, but are structurally dissimilar to natural THC. The increased incidence of adverse effects related to these illicit substances is partially related to very potent activation of the CB1 receptor, but also multiple effects in the other neurotransmitter systems such as serotonin (Seely 2013).

Medicinal Cannabinoids: Mechanism of Action

The elucidation of exogenous and endocannabinoid molecular structure, along with their receptor targets, has led to a great deal of research on the mechanisms through which the cannabinoids work in the human body. At least two cannabinoid receptors have been well-defined: CB1 and CB2. They are the most abundant G-protein coupled receptor in the CNS, yet were relatively unknown until the 1990's when research volume regarding cannabinoids skyrocketed. The CB1 and CB2 receptors are both G-protein-linked and stereoselective, but display disparate properties in other aspects.

CB1 receptors are found primarily on neurons within the central and peripheral nervous system, but also in smaller concentrations other cells such as lymphocytes, retinal and endocrine cells. CB1 receptors activation leads to the downstream psychoactive effects of cannabis.

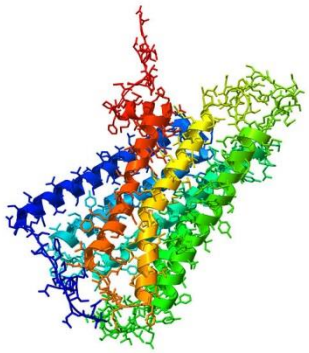


Figure 8: Structure of the CB1 receptor

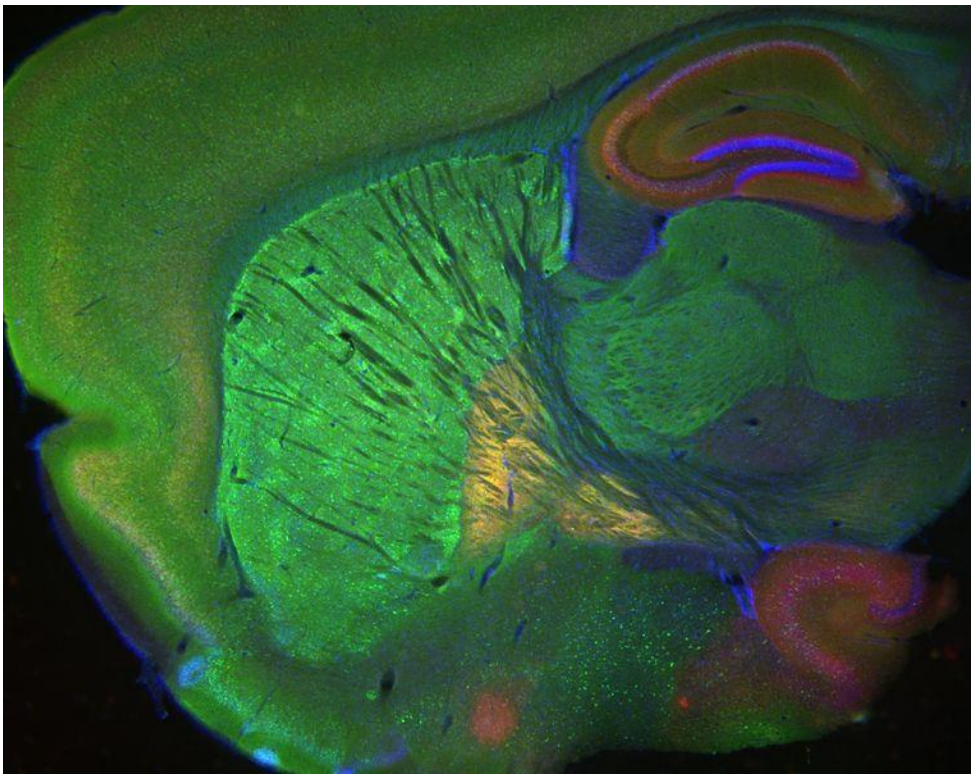
Source P21554 CNR1_HUMAN Cannabinoid receptor 1 OS=Homo sapiens GN=CNR1 PE=1 SV=1Morten Kallberg, Haipeng Wang, Sheng Wang, Jian Peng, Zhiyong Wang, Hui Lu & Jinbo Xu. Template-based protein structure modeling using the RaptorX web server. Nature Protocols, 7(8) 1511-1522, 2012. Public domain.

CB2 receptors are distributed differently within human tissues, concentrated in the immune system and the glia that support the CNS. Knowing the distribution of this receptor, it is logical that activation does not induce psychoactive effects; rather, immunomodulation. The THC molecule, AEA, 2-AG and synthetic analogs can activate either cannabinoid receptor at low concentrations.

CBD has not been shown to activate either the CB1 or CB2 receptor with significant affinity. Recent work has shown that the lipophilic endocannabinoids bind to fatty acid binding proteins within the cell cytoplasm and are then catalyzed by fatty acid amide hydrolase (FAAH). CBD appears to indirectly increase AEA levels by inhibiting FAAH (Bisogno 2001).

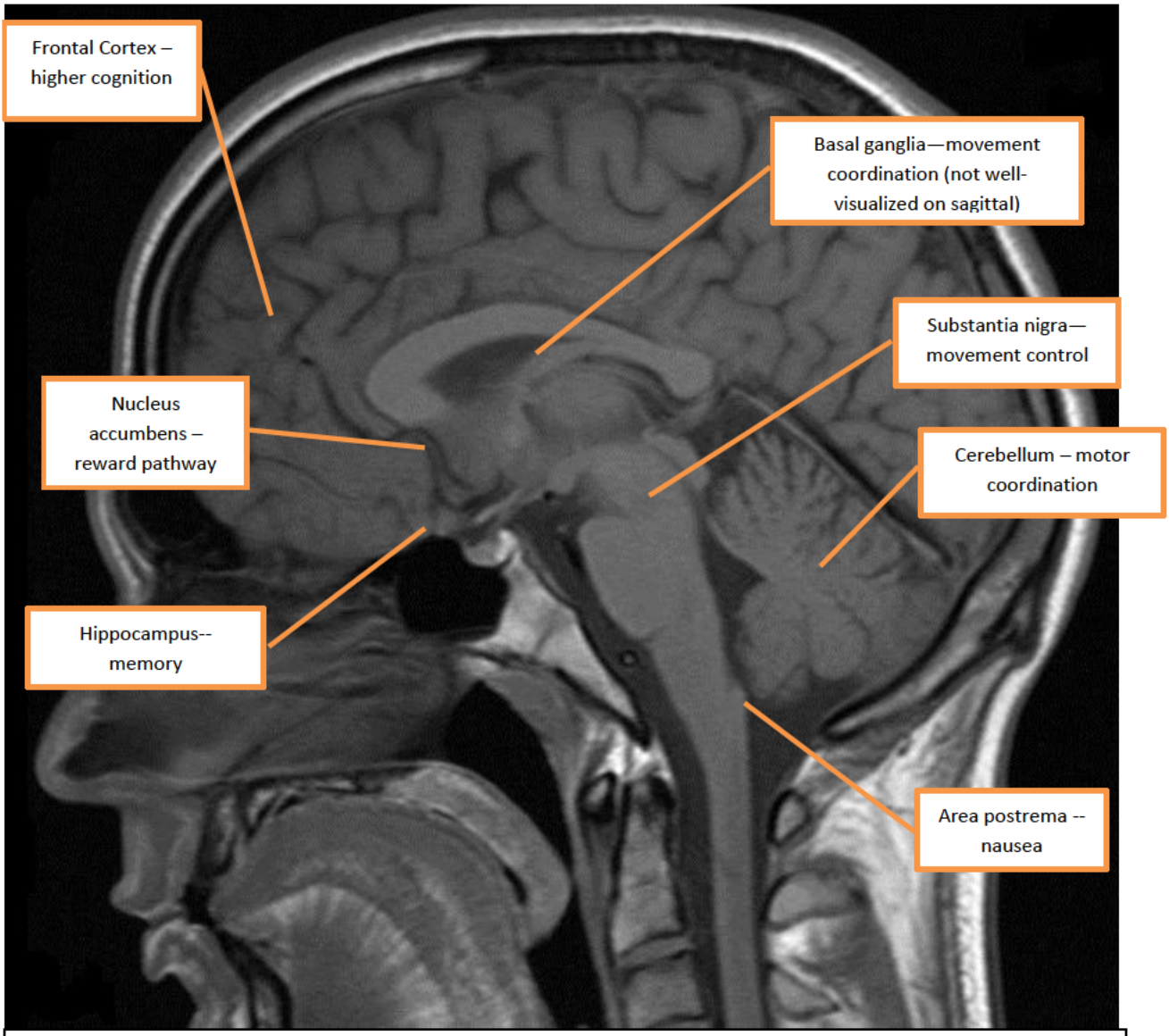
In vivo, the complex interactions amongst endocannabinoids and exogenous cannabinoids cannot be oversimplified to a linear process. As neuromodulators, cannabinoids typically exhibit an inhibitory feedback effect upon the neurotransmitter released at the presynaptic terminal. Some neurotransmitters are suppressive and others are excitatory, so the net effect may in fact be upregulation. The neural pathways of the mammalian brain are not simply excitatory or inhibitory either, and these tissues may express different ratios of receptors, so the overall effect of cannabinoids upon the CNS is incredibly complex. The widespread distribution of CB and non-CB receptors makes manipulation of a single area much more difficult. Clearly the pharmaceutical potential is also vast, so in the future highly specific pharmaceutical modulators of the endocannabinoid system are sure to develop.

Figure 9: Immunohistochemical Staining for the CB1 Receptor in a Sagittal Section of Mouse Brain



Source: National Institutes of Health (NIH) Creator: Margaret I. Davis Date Added: 5/24/2012. Image was taken with a Zeiss Lumar stereomicroscope. Public domain.

Figure 10: Sites of CB1 Receptors



"Mrt big" by Helmut Januschka - Helmut Januschka. Licensed under Creative Commons Attribution-Share Alike 3.0 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Mrt_big.jpg#mediaviewer/File:Mrt_big.jpg

Figure 11: Mechanism of endocannabinoids at nerve terminals

Elucidation of non-CB Receptors

GPR55

The CB1 and CB2 receptors were characterized in the 1960's by Dr. Mechoulam's renowned research laboratory. Another receptor, GPR55, was more recently cloned in 1999. Despite its widespread presence throughout the CNS, it remained an orphan receptor until more recently when it was noted that it shared sequence similarity to the binding region of cannabinoid receptors (D. Baker 2006). AEA as well as THC binds to the GPR55 receptor, and 2-AG can be interconverted to GPR55's primary ligand L-α-lysophosphatidylinositol (LPI) (Zhao 2013). Similar to its actions at CB receptors, CBD is more likely a GPR55 antagonist (H. a. Sharir 2010). Together, the evidence supports that GPR55 does play a role in the interdependencies of the cannabinoid system, with more research underway.

TRPV1

Also known as the Vanilloid Receptor 1 (VR1), the transient receptor potential vanilloid (TRPV1) receptor channel is activated in response to tissue irritants such as heat, decreased pH and exogenous capsaicin "heat". Mediating sensory nociception, activation of TRPV1 causes calcium ion influx and a subsequent burning sensation. However, chronic activation of the receptor leads to a paradoxical desensitization. THC and AEA also activate TRPV1, and this activation leads to phosphorylation and ion influx. CBD and CBDV, on the other hand, desensitize the receptor in vitro much like capsaicin does (Bisogno 2001) and may prove therapeutic in arthritis, neuropathic pain, and diseases of neuronal hyperexcitability (Iannotti 2014).

PPARs

Within the cell, cannabinoids also interact with peroxisome proliferator activated receptors (PPARs). These nuclear receptors cause downstream binding to DNA promoter sequences to enhance gene transcription. The PPAR receptor family regulates lipid metabolism, and fatty acids activate the receptors in what could be a feedback mechanism. By inhibiting fatty acid hydrolase, CBD increases intracellular levels of fatty acids that bind to PPARγ such as AEA, linoleic acid, arachidonic acid, and EPA (J. a. Berger 2002). Recalling the names of the endocannabinoids and their relation to fatty acids, it follows that endocannabinoids have direct influence at PPARs as well. It is possible that other cannabinoids directly bind to PPAR, but it is not yet clear if PPAR activation is direct or indirect (Sun 2007). The FDA approved fibrates and thiazolidinediones (such as pioglitazone) for insulin sensitization, and later it was discovered that their mechanism of action was PPARα and PPARγ activation, respectively. Given the extent of diabetes and related metabolic disorders, this area has enormous pharmaceutical potential.

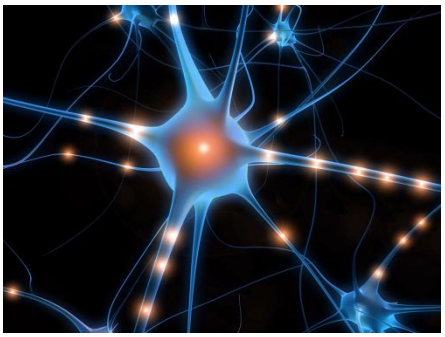
5-HT$_{1a}$

Taking into account that cannabis has been used for centuries to control pain and nausea, it may come as no surprise that cannabinoids can have effects upon the serotonin system and its 5-HT receptors. Dr. Ethan Russo has long recommended that cannabis should be applied to migraine therapy (E. Russo 1998), and in 2005 demonstrated that CBD has agonist effects at 5-HT$_{1a}$ receptors (E. e. Russo 2005). In addition to headache, serotonergic effects are being considered with regards to neuromodulation in the serotonergic basal ganglia (Espejo-Porras, et al. 2013), central nausea (Rock 2012), and stroke neuroprotection (Mishima 2005).

Mental Effects of Cannabinoids

Generally, a number of medical terms have been used to describe the effects of cannabis use: relaxation, intoxication, memory impairment, time distortion, increased appetite, dysphoria, euphoria, reduced concentration, reduced reaction time, dry mouth, tachycardia, conjunctival injection, hyperactivity, heightened attentiveness, depersonalization, dizziness, confusion, flushing, somnolence, vision changes, and disorientation.

In addition to familiar medical terminology, patients may report a wider variety of colloquial terms regarding the mental alterations of cannabis: chill, dreamy, floating, heaviness, peaceful, whole-body, relaxation, euphoria, "body" effect, head rush, social effect, uplifting, chatty, creative, focus, laid-back, foggy, "couch lock", attentive, buzz, hilarity, or time-expansion.



The range of symptoms experienced by cannabis user will vary based upon the components of cannabis contained within the product used, the route of administration, the metabolism of the individual user, as well as their environment and mental mindset. It may be difficult then to predict accurately how any one individual patient may react to medicinal cannabis, so generally beginning with a small initial dose and titrating upward very slowly is advisable. To be safe, naiive users may find that a safe, comfortable environment with known, trusted adults is the best setting to trial first doses of medical cannabis. Beginning with a low dose of psychoactive constituents is also advisable, to avoid inadvertent over-intensity of symptoms. A number of studies have shown that a balance of CBD can ameliorate some of the negative effects of unopposed THC (Niesink 2013), including memory loss at the hippocampus (Englund 2013).

A phenomenon known as Acute Cannabis psychosis has been described, where patients who had consumed large amounts of cannabis in a short time-frame became suddenly confused, delusional, labile, amnestic, and paranoid, then recovered with residual deficit after cannabis abstinence. This does not likely represent a primary psychiatric disorder, rather, an expected effect of large cannabis doses.

Observationally, it is often found that users can become tolerant to the unpleasant side effects relatively quickly, while preserving therapeutic effect. Because most cannabis studies are 12 weeks or less, it is difficult to quantity long-term tolerance. It is reasonable to surmise that CB receptors, if continually activated, would undergo down-regulation over time, but further study is needed to evaluate the process.

Users may tend to have a preference for one strain of cannabis over another. There is no objective evidence to demonstrate that these effects are supported by molecular biology except by accounting for THC and CBD, but after understanding the multiple active components of cannabis it is possible the lesser cannabinoids and terpenes could account for these effects.

Table 3: Subjective Differences between sativa and indica strains of cannabis

	Sativa	Indica
Subjective Effects	Euphoria	Analgesia
	Energy	Sleep
Conditions Where One Strain Preferred	Weight loss	Nonmigraine Headaches
	Recreational Use	Neuropathy
		Seizures

Source: (Pearce 2014)

Treatment

In cases of over-ingestion of cannabis, where the product consumed is known, there is likely little medical danger in overdose as outlined in the Safety Profile section below. Often a quiet, calming environment is reassuring to anxious or paranoid patients. If symptoms are severe, with psychotic or other dangerous tendencies, administration of benzodiazepines in a medical setting may be effective in reducing agitation until effects of THC wear off. Orally-ingested THC does undergo significant first-pass metabolism in the liver to a psychoactive metabolite 11-OH-THC, so prompt gut decontamination may be of some benefit in reducing the duration of symptoms.

In cases where decreased mental acuity and/or paranoia make it difficult to ascertain what substances the user may have consumed, medical attention is the most prudent approach.

Safety Profile

Within cannabis literature, it is nearly ubiquitously reported that marijuana alone has never caused a human fatality. Wayne Hall at the National Drug and Alcohol Research center in Australia has reported in a number of publications that there have been no confirmed cases of cannabis overdose, and the estimated lethal dose for humans extrapolated from animal studies is so high that it cannot be achieved by users (W. Hall 1995).

The FDA-approved medication dronabinol, consisting of Δ9-THC, indicates on the label that the estimated lethal human dose of intravenous dronabinol is 30 mg/kg (FDA rev 2004). Quantifying the LD50 of cannabis in humans has not been demonstrated, and the coexistence of other substances such as cocaine or heroin further confounds the causality in postmortem cases. A possible explanation is a paucity of receptors in the brain stem of humans, saving the overdosed patient from the respiratory depression seen in other overdoses such as opiates (F. Grotenhermen, Cannabinoids and the Endocannabinoid System 2006). Before extrapolating this observation into a blanket statement regarding the safety of cannabis, further investigation is warranted.

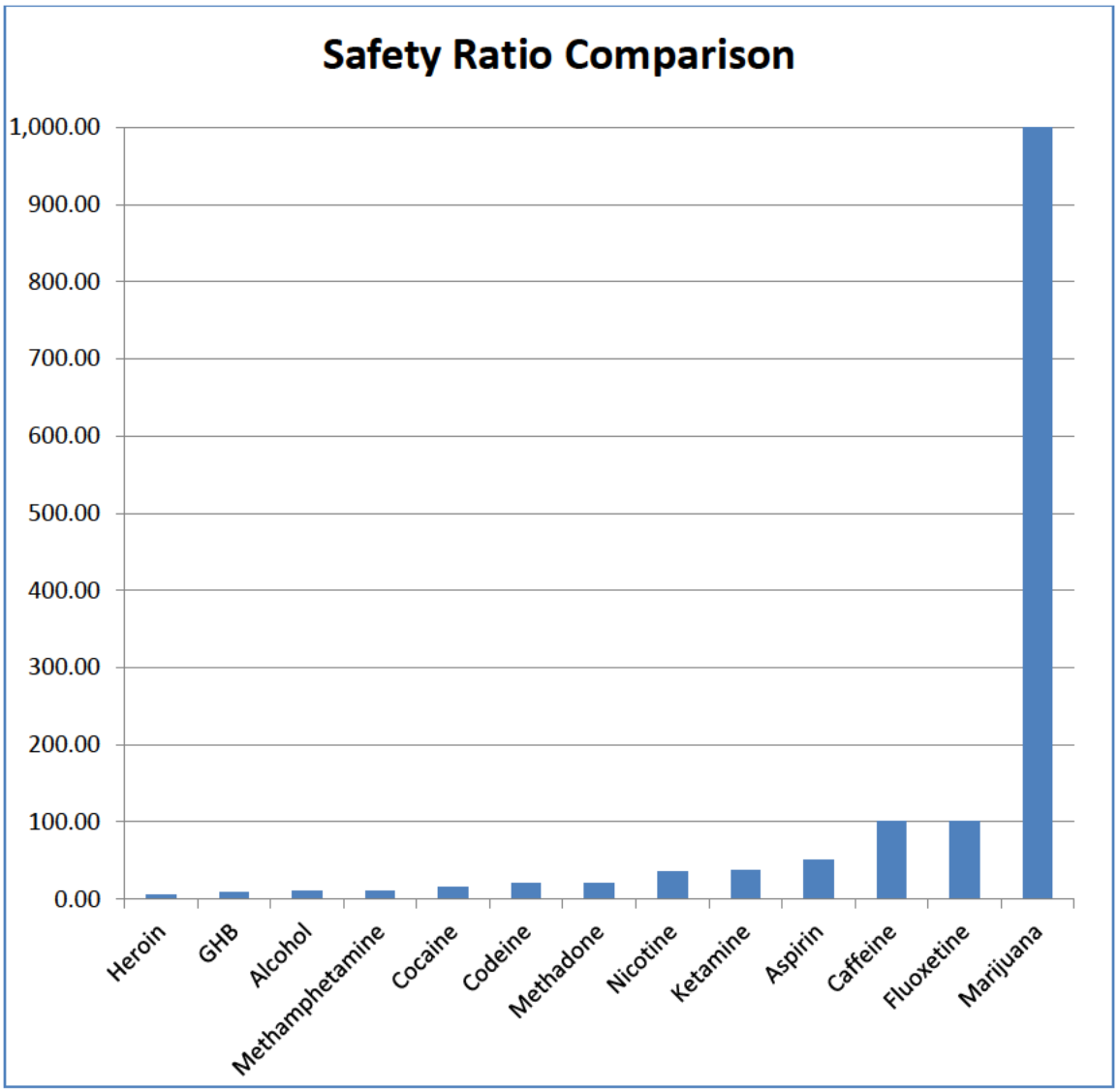
The LD50 value, which is the gross single dose of a substance that causes lethality in 50% of test animals, is an informative piece of data however it does not put this dose into the context of a therapeutic dose. With many prescription drugs, a therapeutic index is more useful to determine the overall safety of a particular substance. The therapeutic index is calculated by dividing the median toxic dose by the median effective dose, so the smaller the number, the more hazardous the medication.

A narrow therapeutic index is defined by the FDA as a less than 2-fold difference between median lethal and median effective dose, or between minimum toxic and minimum effective concentrations in the blood. Commonly used medications within this category include digoxin, lithium and phenytoin. Using digoxin as an example, therapeutic blood levels are approximately 0.8-2.0 ng/mL, and the toxic level is approximately 2.4 ng/mL, producing a therapeutic index of about 1.7.

For illicit or non-FDA approved substances, it is difficult to calculate a therapeutic index. In these cases, a safety ratio is often used, where Safety ratio = ratio of toxic dose to desired

effective dose. Again, the smaller the number, the more risky the substance. The estimated fatal human dose of THC is between 15-70 grams. Starting with a common single dose of 20mg, this would translate into 750-3500 doses. These values are intrinsically difficult to calculate, but the figure below depicts some estimated numbers (Gable 2004):

Figure 12: Safety ratios of commonly abused psychoactive drugs



The historical safety of cannabis products preceded the development of synthetic and other highly concentrated forms of THC. Therefore, it is wise to carefully study which substance exactly as being consumed, as well as the route of administration and other underlying medical conditions when considering the overall safety of cannabis. The recent manufacture of illicit "synthetic" products may lead one to believe that synthetic cannabis is unsafe; however, the

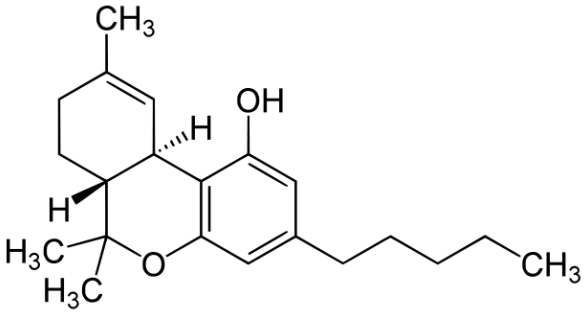
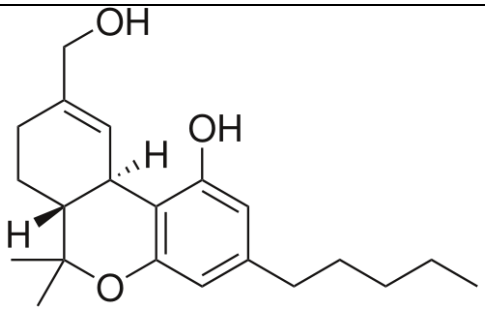
chemical structure of "synthetic" marijuana such as K2 is dissimilar to the natural form so the potency and metabolism is different. Fortunately with use of medicinal and other regulated products as well as careful cannabis cultivation, both patients and their medical providers are better informed regarding the active chemicals contained within cannabis products they consume.

Regardless of the known safety profile, cannabis and its related medicinal derivatives must be stored in a safe manner and labeled accurately as to avoid accidental ingestion, particularly for children.

Metabolism of Cannabinoids

After initial absorption and distribution into the bloodstream, plasma levels drop as cannabinoids distribute into highly vascularized and lipophilic tissues. Over time, cannabinoids redistribute back into the bloodstream, often causing perplexing fluctuations in blood levels. Because they are lipophilic, cannabinoids require extensive chemical modification to be eliminated.

The major modifications take place through oxidation in the hepatic cytochrome p450 system, with subsequent hydroxylation and glucoronidation. Orally consumed cannabinoids undergo significant first-pass hepatic metabolism through this mechanism. Some major metabolites produced are 11-OH-THC, THC-COOH and their glucoronidated and fatty-acid conjugated forms. Both THC and CBD are primarily metabolized through the CYP2C9 and CYP3A4 p450 subsets, which affects metabolism of other cannabinoids as well as other exogenous medications, as listed in the Cautions: Interactions section (Jiang 2011) (Watanabe 2007). Due to this first-pass liver effect, oral ingestion of THC leads to increased levels of 11-OH-THC compared to inhalation. 11-OH-THC has prolonged psychoactive effects at the CB1 receptor, so oral ingestion leads to more sustained mental status alteration.

THC	11-OH-THC
	

The lipophilic forms that have distributed into the body tissues are slow to re-diffuse from the body fat back into the plasma, which can result in metabolites appearing in the urine for days after exposure. Researchers have proposed that the ratio of the THC-COOH metabolite to THC can be used to estimate the elapsed time from THC exposure (Huestis 1992) and attempts to validate this research are still underway to provide guidance regarding legal matters such as driving under the influence (MA Huestis 2006). Unfortunately, there is no linear or predictable relationship amongst the time of exposure, plasma levels, degree of intoxication, or excretion. The mean terminal half-life of THC is estimated to be 30 hours but can vary widely.

Metabolized THC is excreted into the water-based bodily fluids of urine, saliva and sweat in smaller amounts compared to fecal elimination. Lipophilic free THC is completely reabsorbed by the renal tubules, so only conjugated metabolites appear in the urine.

Drug testing

The chemical detected most commonly in urinary drug tests is THC-COOH. Because of the complex metabolism of THC and variability amongst users, it is often difficult to predict how long a urine drug test will remain positive. A variety of researchers have found that 3 to 5 days is most common, however reports of persistence for weeks to months are not uncommon (F. Grotenhermen, Clinical Pharmakinetics of Cannabinoids 2006). This is likely due to the distribution of cannabis metabolite into bodily compartments at various time points. While the medicolegal aspects of cannabis drug testing is outside the scope of this book, providers recommending cannabis-based medicines likely have questions regarding detection of cannabinoids for medical and other practical reasons.

Because of its biochemical structure, CBD and its related compounds are not detected by traditional urine drug testing (Tsai 2007). Dronabinol, structurally identical to naturally-occurring THC, undergoes the same metabolic process and is indistinguishable from illicit THC in a urine drug test. However, the presence of other cannabinoids naturally occurring in herbal cannabis, such as THCV, is a sign that a drug test was not positive due to dronabinol alone.

The Substance Abuse and Mental Health Services Administration (SAMSHA) oversees with eating federally regulated drug testing programs. They define both what constitutes a screening versus confirmatory test, as well as the cutoff level that defines a positive result. Effective 2010, the immunoassay initial testing cut off was set at 50 ng/mL, a reduction from the previous 100 ng/mL (Substance Abuse and Mental Health Services Administration 2010). The cutoff for confirmatory testing drops to 15 ng/mL, so this level is often used as a reference point in research studies.

SAMHSA also has guidelines in place for testing and reporting of sample adulteration. Widely available on the Internet, kits containing adulterants are marketed to persons wishing to mask positive urine drug screening tests. Among these methods, oxidizing agents can be used to significantly reduce the amount of THC-COOH detectable in the urine (Paul 2004).

Legally rigorous detection methods for THC metabolites in other bodily fluids are still under investigation. Point-of-care sweat and saliva detection offers an obvious advantage to urine collection, but technology has yet to meet the stringent error rates required from a medicolegal perspective.

Common Cannabis-Based Medications

The Entourage Effect

It is a common observation in clinical use that whole plant/extract oil use is often more subjectively efficacious than single isolated plant or synthetic cannabinoids such as dronabinol. This is dubbed the "entourage" effect, and over time what began as frequent subjective reports has been bourne out in the objective analysis of cannabis constituents. The interplay of the well-known cannabinoids THC, CBD, CBV, CBC and terpenes in humans has not been decisively established, but the mechanisms of action demonstrated in the laboratory makes it clear that multiple interactions are at play. While some constituents may have a synergistic effect, it is also likely that the balance of chemicals can mitigate side effects. For instance, cannabidiol is an antagonist of CB1 and CB2 agonists and inhibits the metabolism of THC to its long-acting psychoactive metabolite 11-OH-THC, so can ameliorate possible unpleasant mind-altering effects of THC. While THC, CBD and a small number of other cannabinoids have been the most extensively studied as single agents, the effects of the other 400 phytochemicals have been encompassed, and contribute to the difference in subjective effects between whole-plant and isolated extracts.

The Extract Movement

The detriments of inhaling a combustion product have long been cited as an objective medical reason to avoid cannabis use. To avoid smoking, cannabinoids have been extracted from the plant matter through a variety of methods including hydrocarbons, oils, carbon dioxide, and alcohol to produce tinctures and oils.

One of the more famous oils was pioneered by Rick Simpson from Canada, who developed "Phoenix Tears" after struggling with conventional medications for his own medical ailments. His story gained attention after he grew over 1500 plants to produce the oil (for free distribution) and subsequently faced significant legal consequences. His efforts spawned a number of other personal documentaries outlining the benefits of cannabis oil in individuals who chose to go public with their stories, and now a large number of these testimonials are available on the internet with written and video accounting of individual's disease progress.

Compelling personal accounts of patients achieving a cure is likely to elicit strong emotions in even the most reluctant reader. Science has demonstrated significant benefits of cannabinoids in multiple disease areas, but accounts of miraculous cures must of course be interpreted with skepticism. Whether the hopes raised by these stories is hype remains to be seen, and patient education is vital in setting reasonable expectations.

Interested adults can now acquire extracts in a variety of manners—including a number of advocate organizations, the internet, or even performing extracts on plants they grow legally at home. Some states allow for the personal controlled cultivation of a limited number of plants, so skilled patients would then even be able to extract cannabinoids from their plants at home. The oil yielded from the extracting process is not precisely predictable in amount or composition, so commercially-available products with labels and safety precautions are preferable for all but experienced home extractors.

For cutting-edge manufacturers, the extraction process can be taken forward to a very sophisticated level. Typically, the raw plant materials are subjected to solvents which dissolve the valuable oils from the plant matter. Solvents can include hydrocarbons such as butane, or alcohols such as ethanol that are suitable to the lipophilic nature of the desired compounds. Rather than a chemical solvent, pressurized carbon dioxide extraction offers the advantage of low residuals and environmental impact; however, it is more technically complex and expensive than other methods.

After removal of the plant solids and any residual solvent, a concentrate remains containing cannabinoids, terpenes and flavonoids. The resulting extract contains a blend of cannabinoid and other compounds based upon the genetics and growing environment of the cultivated plant. This cannabinoids can then be separated from other compounds like the terpenes based on

The temperature at which the extraction and fractionation occurs can affect volatile compounds such as terpenes, so the process by which individual manufacturers process their extracts affects the end product.

Medical Cannabis Dispensary Products

Medical dispensaries vary from state to state with regards to what products can be offered, and in what forms. Some states allow for whole buds, whereas others allow for only extracted forms. State regulations regarding the packaging, labelling, and testing of cannabis-based medicines also varies from state to state. When cannabis was universally an illegal substance, testing for potency and adulterants was not possible, but this is now widely available, and required in some states. Accredited laboratories are now able test samples for the cannabinoid profile and potency as well contaminants such as residual solvents, microbials including fungus, heavy metals, and pesticides.

Unfractionated herbal cannabis:

As previously discussed, there is variability in THC and CBD content in the whole plant based on strain genetics and growing environment. However buds and extracts available in medical dispensaries have the distinct advantage of advertised chemical composition for the major cannabinoids. Below is a depiction of how medical buds might be identified *(for illustrative use only, public domain images).*

Table 4: Examples of Cannabis Bud Content

Representative photo	Name	Strain	%THC	%CBD
	Example A	Sativa	21.2%	0.3%
	Example B	Sativa	14.7%	14.2%
	Example C	Indica	1.1%	18.5%

There is no ratio of CBD:THC that can be generally described as ideal. For an 8 year-old pediatric epilepsy patient, 20:1 CBD:THC or even higher might be advisable, whereas a 50 year-old anorexic cancer patient may benefit more from a 1:4 ratio. In most cases, evidence does suggest that a balanced approach is best to avoid excess side effect.

Extracts

Due to preference and/or state mandate, some dispensaries offer only extracts. As discussed above, extracting the active ingredients from the flowers and leaves allows for consumption without combustion, as well as more controlled components. With specialized equipment and engineering, extracts can be even further fractionated into cannabinoids and terpenes. This breakdown does allow for customization of ratios outside of the plant's genetics, and also allows the product to become more standardized and consistent with regards to the major cannabinoids. Extracts are often easier to measure than attempting to quantify puffs of a cigarette, so dosing can be more precise with flexible consumption options. On the downside, the approach can counter the entourage effect and possible lost benefits from synergistic effects of the whole herb.

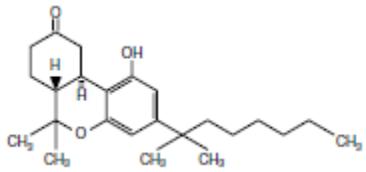
Infusions and Edibles

Whole cannabis or cannabinoids can be solubilized into other lipophilic media such as butters and coconut oil, as well as alcohols. Without overheating beyond 200°C, cannabis-infused oils or butters can be cooked into a variety of edible products that could differ very little from the unmedicated version.

Pharmaceuticals

Dronabinol (Marinol®): a capsule commonly provided in 2.5, 5 and 10 mg dosages. The active ingredient is synthetic trans-isomer THC, suspended in sesame oil. Because of the oral route of administration, the absorption, pharmacokinetics, and metabolism the amount of THC that enters the bloodstream is variable, as discussed below. Currently Schedule III in the United States, it was FDA-approved for use in chemotherapy-induced refractory nausea and vomiting in 1985, and AIDS-related anorexia in 1992.

Nabilone (Casamet®): a synthetic cannabinoid most similar in structure to THC and dronabinol, pictured below. Like dronabinol, it has been approved for refractory chemotherapy-related nausea and vomiting since the 1980's, but was not actively marketed in the United States until 2006. Metabolism and bioavailability mirror THC and dronabinol; however, a significant difference is that the DEA has categorized nabilone as Schedule II.



Nabiximols/Sativex®: comprised of 50% THC and 50% CBD, this is a sublingual spray that has the advantage of avoiding the absorptive and metabolic variability found in oral medications. Because of the shorter duration to active effect, patients are also able to titrate their dose based on a range of sprays per day (Bayer Pharmaceuticals 2014). Developed in Great Britain and studied there since 1999, it has recently received the following recommendation from the All Wales Medicines Strategy Group: Delta-9-tetrahydrocannabinol/ cannabidiol (Sativex®) is recommended as an option for use within NHS Wales as treatment for symptom improvement in adult patients with moderate to severe spasticity due to multiple sclerosis who have not responded adequately to other anti-spasticity medication and who demonstrate clinically significant improvement in spasticity related symptoms during an initial trial of therapy. (All Wales Medicines Strategy Group 2014). It has also been placed in Fast Track status by the US FDA for the treatment of cancer pain.

Cannador®: not available in the United States, this preparation is a capsule of whole plant extracts in a standardized CBD:THC ratio of 1:2, containing approximately 2.5 mg of THC and 1.25 mg of CBD in each capsule. It has been used in smaller studies of MS-related spasticity as well as cancer-related anorexia.

Cannabidol (Epidiolex®): plant-derived CBD. After preliminary studies showed benefit in pediatric epilepsy, it was granted orphan drug status in the United States. GW pharmaceuticals in Great Britain began cultivating high-CBD strains back in 1998, and this particular medication is produced from their crops. It is almost 100% CBD, so has nearly no psychoactive effects which makes it more acceptable for pediatric use.

After the news reports regarding Charlotte's Web, patients and families may be seeking alternative sources of CBD online. In the US, a strict interpretation of federal guidelines is that any form of marijuana or hemp is illegal. However a quick search of the internet reveals that CBD products are widely available as natural supplements. Without FDA-sanctioned quality or testing guidelines, it may be difficult for patients or physicians to know the exact potency or purity of these products. Preparations currently available commercially on the internet contain doses far lower than the therapeutic doses studied, which would require purchase of relatively large quantities of product.

Table 5: Summary of Common Cannabis-Based Medicine Forms

	Dronabinol	Nabilone	Nabiximols	Cannabidiol	Cannabis
Active ingredient	Synthetic THC	Synthetic THC analog	1:1 plant-based THC/CBD	~99% CBD	Mixture, typically >4% THC
Forms	Capsules	Capsules	Sublingual spray	Liquid, capsules	Inhaled, ingested
Doses	2.5-10 mg peri-chemo	1-2 mg peri-chemo	2.5mg/2.7mg per spray, up to 12 sprays per day	0.5-5 mg/lb/day, or 100-300 mg/d in adults	500 mg herb/cigarette = 20 mg THC, 0.25 mg/kg/d

Table 6: Drug Enforcement Agency (DEA) Schedules of Medications

Schedule	Examples
Schedule I drugs, substances, or chemicals are defined as drugs with no currently accepted medical use and a high potential for abuse. Schedule I drugs are the most dangerous drugs with potentially severe psychological or physical dependence.	heroin, LSD, marijuana (cannabis), ecstasy, and peyote
Schedule II: drugs with a high potential for abuse, less abuse potential than Schedule I drugs, with use potentially leading to severe psychological or physical dependence. These drugs are also considered dangerous.	cocaine, methamphetamine, methadone, hydromorphone, meperidine, oxycodone, fentanyl, Dexedrine, Adderall, and Ritalin
Schedule III: drugs with a moderate to low potential for physical and psychological dependence. Schedule III drugs abuse potential is less than Schedule I and Schedule II drugs but more than Schedule IV.	Codeine, ketamine, anabolic steroids
Schedule IV: drugs with a low potential for abuse and low risk of dependence	Xanax, Soma, Valium, Ativan, Talwin, Ambien
Schedule V: drugs with lower potential for abuse than Schedule IV and consist of preparations containing limited quantities of certain narcotics	Robitussin, Lomotil, Lyrica

Source: http://www.justice.gov/dea/druginfo/ds.shtml

Routes of Systemic Administration

Like endocannabinoids, cannabinoids such as THC and CBD belong to a family of lipophilic fatty acids. The central nervous system is also lipophilic, and cannabinoids can cross the blood-brain barrier. Depending on the route of administration, the cannabinoid will enter the bloodstream and the neurons at different rates.

Inhalation:

Likely the most common route of cannabis intake, since it achieves decarboxylation and absorption very quickly. The main advantage to inhaled methods is a near-immediate absorption of cannabinoids into the bloodstream. Unfortunately, the traditional "smoking" method produces harmful products of combustion such as carbon monoxide found in both tobacco and cannabis smoke. Lacking a filter, smoked marijuana actually has higher levels of tar products such as benz-α-anthracene and benzo-α-pyrene (Wu 1988). Smokers of tobacco and cannabis products alike experience increase pulmonary symptoms such as throat irritation, increased mucus production and bronchitis. Over half of THC is lost to pyrolysis and sidestream smoke with conventional smoking methods, but by avoiding the gastrointestinal tract, more predictable absorption is achieved.

Combustion-based smoking of marijuana products can be associated with a number of pulmonary consequences. Most commonly, users display an increased prevalence of bronchitis-like symptoms. In immunocompromised individuals such as those that are HIV-positive, an increased likelihood of opportunistic infections was also seen. Immunohistochemical staining of the epithelium of chronic marijuana smokers displayed an increased expression of epidermal growth factor receptor, which is a concerning precursor for the development of bronchoalveolar cancer. However, there is been no conclusive evidence that marijuana smoking is associated with an increased risk of cancer (Medicine, Institute of 1999), (Hashibe 2006).

Figure 13: Smoking a Common Marijuana Cigarette (Public domain, WikiCommons)

The smoking of any substance will not likely gain favor in the minds of many medical professionals, and in many states that have legislated medical marijuana laws, combustion smoking is not considered a medicinal route. Older studies reported the dangers of marijuana, many of which could be attributed to the smoking itself rather than what substance was smoked. In light of the clinical nature of this work, information presented will focus on more modern and medically-acceptable routes of cannabinoid intake.

An alternative known as vaporization does heat the product to an inhalable vapor, however combustion does not occur due to lower, controlled heating temperatures. Generally the oral uptake of cannabinoids is much more variable than inhalation, and will display more erratic blood levels due to variability in absorption and metabolism. Vaporization through a variety of commercially-available devices, including a heating device with a vapor collection bag, as well as smaller electronic "cigarettes", has been shown to be an effective delivery route for inhaled cannabis and cannabis extracts (D. Abrams 2007).

The vaporization of cannabis products offers a number of advantages over both the oral route and traditional smoking: (Gieringer 2004)

- avoiding carcinogenic hydrocarbons and carbon monoxide combustion byproducts
- preservation of near-immediate absorption and symptom relief
- ability to titrate dosing based on the short-acting effects and ability to re-dose

The lower temperature produced in vaporizers likely also preserves the activity of more terpenes, which become a vapor at around the same boiling point as THC. A temperature of approximately 185°C (365°F) will vaporize the majority of THC. Other more harmful vapors appeared over 200°C, with true combustion around 220-230°C.

Vaporization is not entirely harmless. Like electronic tobacco cigarettes, the active ingredient is accompanied by other chemicals required for extraction and suspension. Close inspection of the ingredients is warranted to avoid exposure to excess propylene glycol or other residual solvents.

Oral/per os (PO):

This refers to the most common overall route of medication administration, which is swallowing a capsule or pill. The medication is absorbed through the gastrointestinal tract, and metabolized by the liver. THC undergoes degradation by stomach acid, so meal intake and stomach acidity are additional variables affecting oral THC absorption. Onset occurs in about 30min to 2h, but duration can be as long as 8-10 hours. As discussed in the pharmacology section, the first-pass metabolite 11-OH THC is psychoactive, which may enhance and lengthen the subjective effects. For edible products such as brownies or cookies, the total THC content in milligrams as well as the serving size must be read carefully to avoid accidental overconsumption.

Due to the very long time of onset (up to 3 hours) with many ingested forms of cannabis, there is significantly more difficulty with dose titration and an increased likelihood of premature re-dosing with subsequent over-medication. This risk is most likely with new users, such as many cannabis-naïve patients that may be enrolling in new state medical cannabis programs or visiting states with recreational marijuana legislation.

Urban folklore has long relayed tales of persons accidentally eating marijuana brownies. In 2007, a Michigan police officer ingested marijuana brownies that he confiscated from a suspect, but his lack of experience with ingesting THC led him and his wife to call 911 fearful of a lethal overdose. The incident was broadcast on the news, along with the recording of his 911 call. Recently a prominent New York Times author wrote about her experience underestimating the

effects of edible marijuana products while sampling recreational products in Colorado, which highlights how simple it might be to over-ingest THC in the edible preparations that are widely available today (Dowd 2014).

Transmucosal:

Cannabinoid preparations can be administered via various mucous membranes, most commonly sublingually or buccal, as well as intranasal or rectal. Even ocular drops can be manufactured by using newer technology to make the cannabinoids more soluble in water. By avoiding first pass metabolism through the liver, bioavailability via mucosal absorption is more consistent than oral. Another advantage is the avoidance of smoking or vaporization of any kind, which minimizes secondhand exposure.

For rectal suppositories, THC is chemically modified to the hemisuccinate, but has demonstrated roughly twice the bioavailability of the oral route in limited studies. This route also offers advantages to treat disease states in which the oral route may be unsafe such as seizure disorders or aspiration risk (F. e. Grotenhermen 2002).

Transdermal:

In this case a medication is absorbed directly through the skin, through the use of a patch or ointment. This route does offer the advantages of a more constant level of medication delivery, however absorption of medication through the various layers of the skin can be more variable, and additional variability regarding adhesive and other inactive supportive chemicals can make this method less desirable.

Due to effects upon the TRPV1 receptor that are similar to capsaicin, cannabinoids have potential as pain-relieving patches. Patches containing a variety of cannabinoids are currently commercially available in medical cannabis states, including THC, CBD, 1:1 THC to CBD, and CBN.

Cautions

Unlike the vast majority of chemicals used for medical treatment, isolated cannabis has never been definitively shown to produce lethal effects in humans. Survey data indicating the widespread use of cannabis in the US and other countries is also reassuring regarding the volume and duration of cannabis use in millions of persons without report of lethality. Taken together, data would indicate that cannabis has a favorable safety profile both in laboratory animals and in everyday human use.

However, any chemical with active effects upon human chemistry must be used with thoughtfulness. A licensed provider recommending medical cannabis should do so with knowledge of pharmacology and attention to each individual patient's underlying medical state—the same caution required with any other medication. Because therapeutic cannabis is a newly developing field, additional educational resources may be needed to bring both patients and medical prescribers up to speed with the state of cannabis research and practical use. In the end, the professional judgment of the licensed medical provider will determine the potential risks and benefits of cannabis use for each individual patient before making a recommendation.

Underlying disease processes

Cardiovascular Disease:

THC has effects upon the cardiovascular system through multiple sites of action. Initially, vasodilation and reflex tachycardia may be observed, but chronic use of THC can lead to less predictable outcomes. The exact effect of cannabinoids on the sympathetic and parasympathetic systems, baroreceptors, and vascular endothelium is yet to be fully determined, and could be influenced by the common practice of breath-holding during cannabis inhalation. A growing number of case reports have highlighted the cardiovascular risks with regard to angina, acute coronary events, cerebrovascular events, and arrhythmias (Thomas 2014); however, it is difficult to interpret which risks are attributable to cannabinoids themselves versus the effects of smoking and concurrent tobacco use. Research into the mechanism of these cardiovascular events found that the cause could be related to platelet activation. CB1 and CB2 receptors are both found on human platelet cells, however the mechanism appears to be related to the arachidonic acid that is produced by enzymatic breakdown of endogenous and exogenous cannabinoids (Brantl 2014).

Overall, this evidence may lead a provider to exercise caution recommending THC-containing compounds to individuals prone to cardiovascular morbidity.

Pulmonary Disease:

Not surprisingly, users of smoked marijuana cigarettes experience increased rates of bronchitis-like symptoms such as cough and sputum. There is no evidence of increased emphysema in cannabis-only smokers, and no clear evidence for increased cancer risk in case-control studies (Aldingtoon 2008). A large cohort of 64,855 Kaiser Permanante patients found no increase in respiratory cancers either. Regardless, smoking any substance is not advisable for persons with pulmonary disease and other routes of cannabis intake are available.

Interactions

Cannabinoids are highly protein-bound due to hydrophobic structure, which could potentiate interaction with other highly protein-bound medications. At this time, displacement of protein-bound medications by cannabinoids has not been demonstrated in humans so this may not be clinically significant.

In modern medicine where polypharmacy is common, interactions at the P450 system may be of clinical relevance. Cannabinoids are metabolized by the P450 system, and as competitors for metabolism, drug levels of some common medications may be affected. CBD is typically quite benign, but as a potent p450 inhibitor, patients on certain medications will require extra caution if they are on large doses of CBD.

Table 7: Common medications metabolized by the p450 system

2C9	3A4
Ibuprofen, naproxen	Erythromycin
Glipizide	Quinidine
Losartan	Benzodiazepines
Amitriptyline	cyclosporine
Fluoxetine	Calcium channel blockers
phenytoin	lovastatin
warfarin	Estrogen, testosterone
	Cocaine, codeine, methadone

Polypharmacy

In addition to the interactions noted above at a molecular level, at the organism level, the additive effects of other sedative medications should also be considered. Mixing medications for anxiety, sleep and pain with medical cannabis could lead to oversedation.

Previous studies have demonstrated that patient understanding of prescription labels is limited by patient literacy rates and the number of prescriptions they must maintain (Davis 2006). Chronically ill patients seeking relief from cannabis are likely taking other prescriptions, some of which may have additive mind-altering effects that further impair their ability to track multiple medications. Taking additional time to educate patients and reinforce medication instructions in a fashion fitting to the patient is required to avoid misunderstanding and noncompliance.

Driving

Cannabis is known to be associated with functional impairment on multiple neurocognitive measures that correlate with driving: attention, vigilance, tracking, time perception, and motor coordination. However the amount of cannabis required to cause significant impairment varies by the user's metabolism, experience with cannabis, and experience with driving. Furthermore, laboratory neurocognitive studies do not directly translate into real-world driving tests, where experienced cannabis users often show little functional impairment (Sewell 2009).

The effect of cannabinoids with regards to driving impairment is difficult to quantify. Unlike the hydrophilic alcohol, where the dose and route of administration is more easily quantifiable, cannabinoids are ingested in a variety of forms and display variable absorption and metabolism. There is no national standardized plasma concentration at which an individual could be considered too impaired to participate in activities such as driving or legal matters, but the state of Colorado is using 5 ng/mL as the basis of new driving under the influence legislation (Colorado Department of Transportation 2014), and Washington state may follow. This is correlated to multiple studies evaluating both culpability for motor vehicle fatalities and driving under the influence arrests, where an odds ratio (OR) was calculated for THC-positive drivers versus drug-free drivers. An OR at 5 ng/mL for THC was found to exceed the OR for a blood alcohol concentration of 0.1-0.15% (Drummer 2004), which suggests similar levels of driving impairment at these two levels. Previous studies that did not clarify the blood level, using only

positive or negative, were unable to show that cannabis was associated with driving injuries, with an OR slightly less than 1.

Other countries have legislation regarding blood levels lower than 5 ng/mL, such as 2.2 in Sweden, and zero-tolerance in Australia (Hartmann 2013). Due to the erratic absorption and metabolism, retroactively determining the blood level at the time of the driving infraction versus the time of the blood draw cannot be done reliably.

Drivers <25 years old account for a disproportionate number of traffic fatalities. This younger group of drivers is also more prone to risk-taking behaviors such as alcohol and drug misuse, risk-taking behaviors, and overconfidence. Lacking the driving skills acquired over years of experience, younger drivers may suffer more driving impairment while under the influence of cannabis and/or alcohol, and particularly while under the influence of both.

The National Highway Traffic Safety Administration Drug and Human Performance Fact Sheet for cannabis indicates that driving performance is impaired for approximately three hours, including decreased car handling performance, decreased reaction time, impaired time and distance estimation, motor incoordination, and sleepiness, but also stipulates that it is impossible to predict specific effects based on blood THC or THC-COOH concentrations (National Highway Traffic Safety Administration n.d.).

Regardless of the numeric levels of intoxicant, field sobriety test have been designed to assess the level of substance-induced impairment. In a standard field sobriety test, a number of maneuvers are used to assess the motor coordination of the driver, including nystagmus, walk-and-turn, and one-leg stand. In many cases, an individual intoxicated on THC would fail roadside sobriety testing. Many states such as Colorado have begun specific training for drug intoxication recognition.

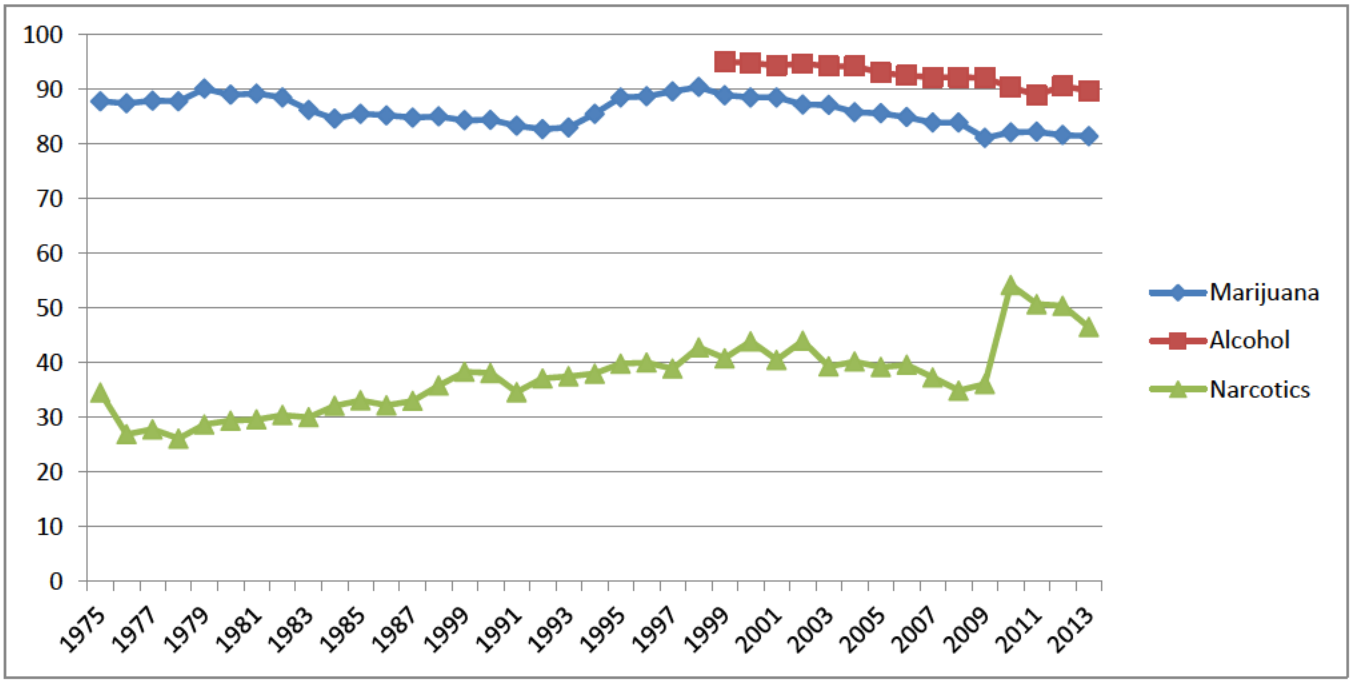
Youth

The endocannabinoid system is widespread throughout the CNS, and develops with the brain throughout childhood and adolescence. Introducing chemicals such as cannabis, psychotropics, amphetamines, and other psychoactive chemicals affects neural activity in the developing brain.

A number of studies have shown that persons who choose to use cannabis in the teenage years displayed long-term effects such loss of cognition and behavioral problems (Gonzalez 2012). One study in New Zealand found an 8-point reduction in IQ in heavy teenage smokers, and more importantly, the cognitive and behavioral problems are not regained. In the case of youth cannabis use, it is difficult to determine the causality of these harmful effects. In the case of a troubled youth who is using illegal marijuana, there are likely associated familial and societal confounders contributing to the long-term difficulties reported in this population. In persons who began smoking cannabis as a youth, reduced activity in prefrontal regions and hippocampus can be seen, which reinforces the effects upon developing brain matter (Volkow 2014).

In the War on Drugs, cannabis was portrayed as a gateway drug for youth. This has not been a persistent concept, but because cannabis does have effects on the reward center of the brain, it could indeed alter reward center development if used before brain maturation. Conversely, in adult users of cannabis, it can act as a substitute for "harder" drugs including alcohol.

Figure 14: Percentage of 12th graders reporting a substance is fairly easy or very easy to get



Source: The Monitoring the Future Study, the University of Michigan, http://www.monitoringthefuture.org/data/13data/13drtbl14.pdf. In 2010, the question regarding narcotics was changed to include Vicodin, Percocet, Oxycontin

With more and more states decriminalizing and/or supporting the medical use of cannabis, a valid concern is raised that impressionable youth may mistakenly believe that all cannabis use is "OK", and increased rates of adolescent marijuana use will result. Indeed, a parallel could be drawn between cannabis products and the widespread societal acceptance of mind-altering prescriptions such as sleeping pills and pain pills. Complex family and social dynamics is outside the scope of this work, but the information presented here would certainly indicate that recreational marijuana use amongst underage persons is not acceptable. Accurate education of parents and the community, as well as open and honest communication with medical providers, will dispel myths and promote responsible parenting practices.

All cannabis products should be properly labelled, kept in child-proof containers, and stored in a fashion that avoids accidental ingestion by children or impaired adults. While stories about accidental ingestion of "pot brownies" can a humorous component of urban lore, this can represent a real danger for the psyche of children. With the development of multiple edible products in states such as Colorado, it is easy to see how candies and brownies could lead to accidental ingestion if these products are not labelled and stored safely.

Pregnancy/Lactation

THC and its metabolites have been shown to cross the placenta and into breast milk. Due to its effects on nausea, cannabis may be sought by pregnant women suffering from morning sickness or hyperemesis gravidarum, but there are no studies to support the safe use of cannabis in pregnancy or breast feeding. Dronabinol, synthetic THC, is pregnancy category C, which indicates limited teratogenicity studies in rats have not revealed overt dangers, but there no adequate studies in pregnant humans.

Pregnant mothers who smoke cannabis or other combustibles inhale increased carbon monoxide, which deprives the fetus of oxygen, a known harm to the fetus. As with studies on youth, alteration of developing brain chemistry with exogenous neuromodulators could have long-term effects. A 2013 review article in *Pediatrics* outlined effects of prenatal THC exposure, and in summary found no evidence for physical malformations, but mixed evidence for fetal growth, withdrawal irritability, and long-term cognitive linguistic and behavioral measures (M. a. Behnke 2013).

Studies examining prenatal exposure to cannabis and the long-term effects on the neonate should be interpreted with an eye for confounders rather than causality. For instance, one study found that maternal use of THC during the 2nd and 3rd trimester predicted depressive symptoms 10 years later in the offspring (Gray 2005). If further questioning determined that the mother was using THC for her own depression, then both the genetic and environmental effects of maternal depression would influence depression incidence in her children. Additionally, maternal use of an illicit substance would imply an element of substance addiction, would also has heritability.

To date, there are no published studies regarding CBD-only formulations.

Psychiatry

Conventional wisdom is to avoid cannabis in persons at high risk for psychiatric disease. This recommendation is again based upon older studies in which cannabis containing primarily THC, with only traces of other cannabinoids, was found to be associated with a higher risk of psychotic symptoms and/or diagnoses. A foundational Swedish questionnaire study followed a large cohort of 45,570 military enrollees and found a dose-dependent relative risk of schizophrenia of 3 for conscripts who had used cannabis between 1-50 times, and 6 for conscripts who had used cannabis >50 times over 15 years (Andreasson 1987).

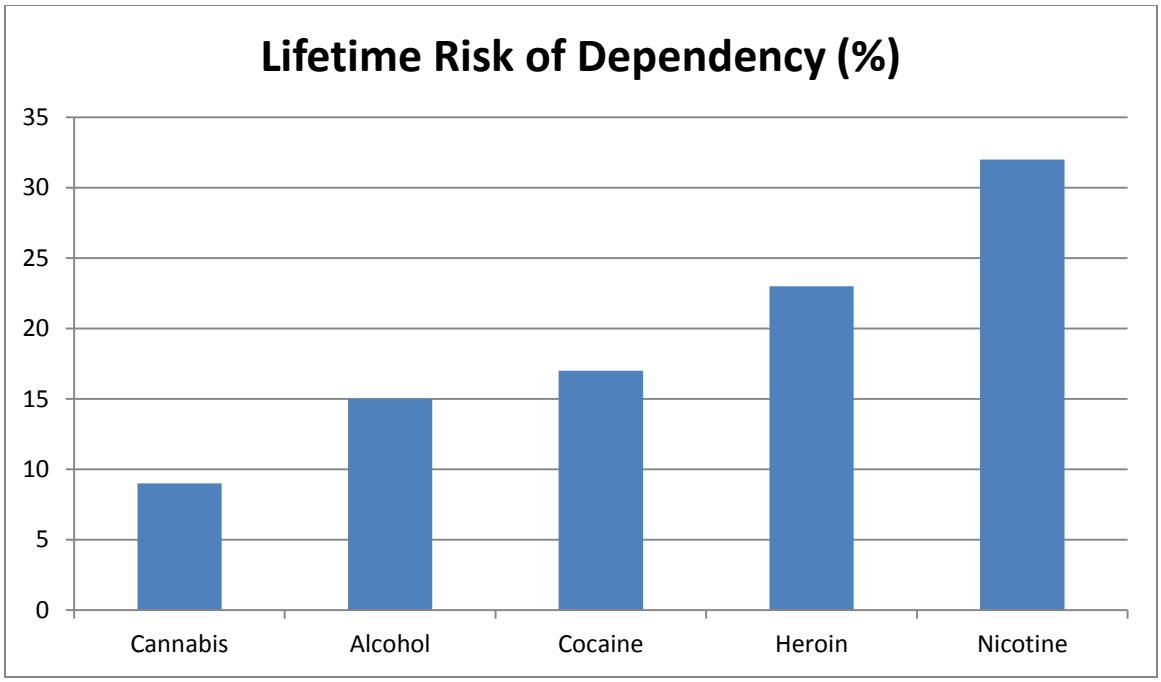
Epidemiologic studies along this line did continue, and continued to associate cannabis use with schizophrenia and/or psychosis at a relative risk of approximately 2 for adult cannabis initiation, and higher for those who began as a youth. In addition to this association, some studies found that in patients with psychotic prodromal symptomatology, that cannabis use could provoke full-blown symptoms (van der Meer 2012). Drawing a causal relationship is still not solidified, since persons with mental health disorders often self-medicate with cannabis and other mind-altering substances (W. e. Hall 2004) and the underlying etiology of schizophrenia remains elusive. Studies evaluating the etiology of schizophrenia have identified a genetic predisposition at COMT, CNR1, BDNF, AKT1 and NRG1 that may cause a person to be more susceptible to the psychic stress of cannabis use (Pelayo-Teran 2012). Also, as emphasized in other areas, a higher CBD content prevents unpleasant psychic experiences (Schubart 2011), and CBD is a growing area for treatment of mental disorders such as schizophrenia.

Addiction/Abuse

In the context of a federally illegal substance such as cannabis, questions regarding the potential for abuse and addiction are apt to arise. Like anxiety and pain medications, providers should exercise caution in recommending any mind-altering substance to a patient with a history of addiction or high potential for such.

2012 National Survey on Drug Abuse and Health, 8.6 million Americans meet criteria for alcohol, 5.1 million for any drug, and 2.7 for marijuana (Center for Behavioral Health Statistics and Quality 2013). The high baseline prevalence of substance-related disorders in potential medical cannabis patients may influence a provider to screen for addictive behaviors with a tool such as SBIRT (Screening, Brief Intervention, and Referral to Treatment) before recommending a psychoactive substance such as cannabis, or prescribing psychoactive substances such as opiates or amphetamine derivatives.

In the case of substance abuse, addiction can be broadly described as a person continuing to use the substance even though it has led to negative life consequences. The National Institute on Drug Abuse (NIDA) estimates that 9% of adults who use cannabis will display elements of addiction, but the number rises to 17% in those that began using marijuana between ages 13-25. Compared to other substances, cannabis does have a lower lifetime risk of dependence: (Anthony 1994)



A withdrawal syndrome has now been recognized in the American Psychiatric Association (APA) DSM-V including anxiety, irritability and sleep disruption (Budney 2004), and would be characterized as mild in comparison to withdrawal from other substances such as alcohol or opiates, but more similar to nicotine or caffeine. This is most commonly seen in chronic daily users who cease abruptly. The APA's Charles O'Brien, MD, PhD also clarified their stance on addiction versus dependence:

> *The term dependence is misleading, because people confuse it with addiction, when in fact the tolerance and withdrawal patients experience are very normal responses to prescribed medications that affect the central nervous system. On the other hand, addiction is compulsive drug- seeking behavior which is quite different. We hope that this new classification will help end this wide-spread misunderstanding.*

Review of Cannabinoid Treatment for Selected disorders

Background

While a body of research exists regarding treatment for a number of conditions, review of the literature must be undertaken with an understanding of the cannabis compounds used at the time. Early research involved undifferentiated cannabis, which would likely be best translated into current treatment modalities using whole dried smoked marijuana plant material. In particular, FDA-endorsed research within the United States is limited to cannabis regulated by the National Institute on Drug Abuse (NIDA) and grown at the University of Mississippi by contract. Historically distributed strains of marijuana plant matter contained about 3.5-4% THC and no CBD, so research findings should be interpreted within this context. Now, the Mississippi facility has expanded the range of THC available, such as low (2%), medium (4%) and high (8%), and is reported to stock strains up to 14%. Health Canada currently distributes marijuana dried leaves at about 11-15% THC (Health Canada 2007).

Even NIDA has had to respond to the increased need for suitable cannabis supplies for research purposes. In late August 2014, they requested a massive increase in their quota for cannabis production through the University of Mississippi-- from 21 kg to 650 kg (Drug Enforcement Agency 2014). In particular, the increased demand for high-CBD strains and the state specific legislation that has passed in 2014 to support the demand will require dramatically different approach toward the cultivation of cannabis products for federally-approved research. Due to the time required to grow the plants to maturity, this increased supply will have some delay before it is available.

With an understanding of the endocannabinoid functions, it is not surprising that exogenous cannabinoids can have widespread effects upon the nervous system. While cannabis is still used for its long-standing indications of nausea, anorexia, and glaucoma, further study of the endocannabinoid system, its receptors, its natural and synthetic ligands are taking the field of medical cannabis research in new directions. One new area of study is neuroprotection from the neurotoxic effects of hyperexcitability, free radical damage and ultimately cellular apoptosis. In this process, a cellular insult such as hypoxia or hypoglycemia leads to a variety of downstream

effects. This includes an excess production of excitatory neurotransmitter such as glutamate, which in turn results in increased NMDA receptor sensitivity and excess calcium influx. Nitric oxide production also synergizes apoptosis, and results in oxidative free radical production. These free radicals lead to further damage, which perpetuates this neurotoxic process. CBD can temper this process through its effects as antioxidant free radical scavenger, as well as modulation of calcium influx.

Another new area of cannabis-based treatment involves the immune system. CB2 receptors are found in CNS microglia, along with CB1 receptors at lower levels. CBD and CB2 receptor agonists are able to quell inflammation in the delicate neural tissues, and potentially offer benefit in neuroinflammatory and neurodegenerative disorders.

Review of Specific Medical Conditions

Seizure disorders

Previous studies reported concern that seizure frequency may be increased in marijuana smokers. At that time, this would have described smokers of traditional marijuana cigarettes, which is a far cry from how cannabis is being used with regard to epilepsy today.

Seizure disorders affect approximately three million Americans, more patients than any of the other conditions commonly treated by cannabinoids. Studies regarding epilepsy and cannabis began long ago, in the Mechoulam laboratory (Carlini 1975) and expanded exponentially upon the elucidation of cannabis constituents and their varying mechanisms of action.

THC, acting as an agonist at cannabinoid receptors, may still have a mixed excitatory/inhibitory effect upon brain systems involved in epilepsy due to the opposing neurotransmitters involved in anatomic pathways, which likely explains why the reports of THC's epileptic effects are mixed (R. Pertwee 2008). In contrast, CBD has inhibitory effects at cannabinoid receptors CB1, CB2 and GPR55, and in vivo its general effect upon hyperexcitable neural tissues appears to be inhibitory as well, which makes it a good candidate for antiepileptic treatment.

More recently, the use of CBD in particular for the treatment of seizure disorders was brought to the forefront by Dr. Sanjay Gupta (CNN 2013). In a televised special called Weed, Dr. Gupta chose to recant his previous opinions regarding cannabis, and promote the use of high-CBD cannabis in the treatment of Charlotte Figi's refractory Dravet epilepsy syndrome. The Charlotte's Web™ strain of high-CBD cannabis was developed in Colorado, and there is now a long waiting list of patients hoping to gain benefit.

The recent publicity powered a wave of grass-roots pressure on state legislatures, which has already resulted in a number states passing legislation that considers therapeutic hemp separately from marijuana. The lack of psychoactivity in CBD-only products makes these products far less controversial than cannabis initiatives in general. In July 2014, H.R. 5226 was presented to Congress, entitled "Charlotte's Web Medical Hemp Act of 2014" (Perry 2014). The passage of this bill would provide federal uniformity in tolerance for CBD and hemp products instead of

patchwork state regulations. To be considered a hemp product, the cannabis sativa plant materials, alive or not, must contain <0.3% THC by dry weight.

GW Pharmaceuticals has a high-CBD product as well, Epidiolex®, that is derived from plants grown in the UK. The company has received both orphan drug designation and Fast Track designation from the FDA for this CBD-only medication. Expanded access studies are underway for refractory pediatric epilepsy in California and New York, and the company just released preliminary results on 27 patients who had completed 12 weeks of adjunctive Sativex® therapy, with response quantified by % change in seizure frequency average over four weeks, as compared to baseline. The overall reduction in seizure frequency was 44%, and 15% were seizure-free. In the Dravet subset (n=9), the mean reduction in seizure frequency was 52%, with 33% achieving seizure-free status. Most patients did experience at least one side effects, including somnolence, fatigue, diarrhea, and appetite changes. Three patients are being withdrawn due to lack of effect.

Multiple sclerosis (MS)

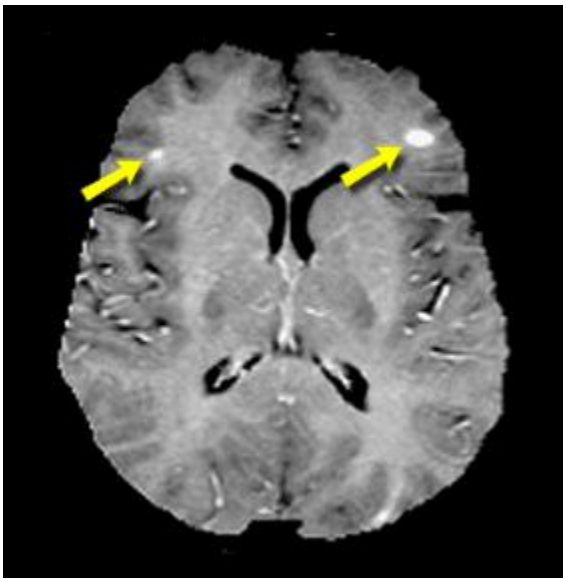
MS is the most common inflammatory disease of the central nervous system. The incidence of MS varies depending on the population and geographic area, but ranges from less than 5 to 200 per 100,000 persons (Mayr WT n.d.) Spasticity is a common and debilitating symptom, which affects daily life in about one-third of MS patients (Rizzo MA 2004).

In Europe, cannabis has been explored as a treatment option for MS for many years. As early as 1997, a survey reported improved pain and spasticity with cannabis use (Consroe 1997) and subsequent trials seemed to support the beneficial effect (Petro & Ellenberger). Fortunately their years of experience using cannabinoids and the clinical studies they have published have solidified the therapeutic uses and safety profile.

Because the endocannabinoid system is distributed throughout the CNS, broad cannabinoid treatment in MS affect the motor control areas, pain perception areas, as well as the glial cells that mediate autoimmune inflammation (D. a. Baker 2008). Randomized controlled trials such as CUPID evaluated dronabinol alone in disease progression, which did not show benefit (Zajicek 2013), but did not incorporate the anti-inflammatory effects of CBD.

Sativex, a combination of 1:1 THC:CBD is a sublingual spray approved for use in Europe for the treatment of pain and spasticity in MS patients. In the United States, the combination medication is under investigational use in phase III clinical trials, and has granted Fast Track status for approval in treatment of cancer pain. Initial benefits in spasticity were shown to be prolonged long-term as monitoring continued in the MOVE trial, without reports of serious adverse events (Flachenecker 2014). Treatment tolerance was also documented in long-term follow-up in the UK (Serpell 2013), with adverse effects including dizziness (24.7%) and fatigue (12.3%).

Figure 14: MRI of MS lesions



In addition to the known effects upon spasticity, a neuromodulatory benefit of cannabis may benefit as well. MS patients often have monoclonal antibodies as evidence of the underlying autoimmune response to myelin basic protein. Current disease-modifying therapies in MS are designed to modify this immune response, by reducing the TH1 response, by increasing TH2 response, and by limiting T cell migration into the CNS. Pathologic evidence suggests that apoptosis, perhaps triggered by excitotoxicity, may be the primary event preceding inflammation and lesion formation in patients with relapsing-remitting MS (Matute 2001).

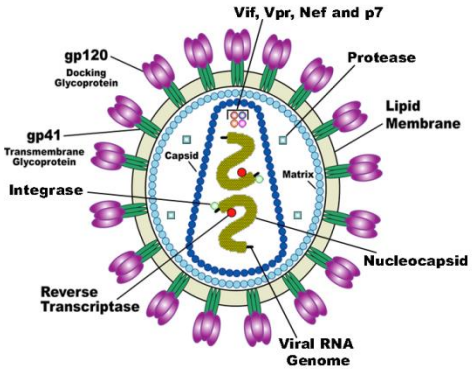
Amyotrophic Lateral Sclerosis (ALS)

In some ways similar to MS, ALS is characterized by motor neuron degeneration and death with gliosis replacing lost neurons. In some familial cases, mutations in superoxide dismutase (SOD1) trigger superoxide radicals, setting off an inflammatory cascade which activates microglial cells. Once activated, microglial cells perpetuate the pathologic inflammatory responses by releasing additional oxygen radicals, excess excitatory glutamate, and cytokines that promote further immune cell migration into the CNS. Activated microglia behave much like activated macrophages in the periphery, but in the neural tissues the inflammation in ALS can lead to long-term tissue damage and neural degeneration/death. Excess glutamate-mediated excitotoxicity is central to ALS pathophysiology, possibly due to dysfunctional glutamate receptors, so an inhibitory cannabinoid could be of therapeutic value.

In animal models of ALS, a synthetic CB2 receptor agonist was shown to achieve delay in disease progression (Kim 2006). THC has been previously shown to induce a shift from TH1 to TH2 cytokine profiles in T cells, which would modulate immune response favorably in ALS (Wolf 2008).

Aside from disease modification, symptom control in this terminally ill population is vital. Cannabis has been used to treat a number of the symptoms ALS patients suffer, such as spasticity, pain, and nausea (Carter 2001). Antioxidants are a mainstay of therapy, so CBD and other cannabinoids could achieve the goals of symptom control and disease control simultaneously. ALS patients did report that marijuana relieved major symptoms of their disease except for speech and swallowing difficulties, but access to cannabis treatment is not always available (Amtmann 2004).

Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome



Already used by a significant proportion of patients living with HIV/AIDS (Woolridge 2005), cannabis may help to ameliorate the chronic symptoms of anorexia, nausea, and pain. (Sidney 2001) but conclusive evidence is lacking (Lutge EE 2013).

In more recent years, delineation of the effects of cannabinoids on neurodegenerative disorders shed light upon possible treatment for HIV-Associated Neurocognitive Disorder (HAND). Similarly to other CNS disorders, glial activation is suppressed by CBD and can reduce long-term inflammatory damage. Further inflammatory suppression through CB2-specific treatment would also offer promising benefit (Purohit 2014).

HIV-sensory neuropathy may also benefit from cannabinoid treatment, as was suggested by Dr. Abrams' study of cannabis in painful sensory neuropathy (D. e. Abrams 2007).

Previously, questions about the interactions of cannabinoids and protease inhibitors arose due to the shared hepatic metabolism. Results of this investigation revealed that cannabis produced no significant reduction in protease inhibitor function (Kosel BW 2002), and the use of marijuana is theorized to indirectly improve antiretroviral function by reducing gastrointestinal symptoms and thereby increasing compliance.

Terminal Illness and Palliative Care

Increasing numbers of Americans are choosing hospice for end-of-life care (Thompson 2011). When hospice care was established in the 1970s, cancer patients made up the largest percentage of hospice admissions. Today, cancer diagnoses account for less than half of all hospice admissions (37.7%), with increasing numbers of unspecified debility (13.9%), dementia (12.5%), heart disease (11.4%), and lung disease (8.5%). ALS and AIDS together make up less than 1% (National Hospice and Palliative Care Organization 2012).

Despite increasing numbers, palliative care has not enjoyed an insurgence of cannabis-based research, but as more and more patients choose to die at home, that the use of cannabis products to promote end-of-life comfort will increase.

Pain control

In states with well-established registry programs such as AZ, pain is the single most common indication for medical marijuana. However, pain can be a vague term for a number of diagnoses and syndromes that may have differing pathophysiology. Pain caused by a broken bone cannot be compared to pain caused by a phantom limb, by diabetic neuropathy, or metastatic cancer. Similarly, it is difficult to compare human pain perception with pain models in animal research, which uses tests such as tail-flick, paw pressure, and hot plates.

When used appropriately, cannabinoids appear to have great potential in treating particular types of pain. Secondary to the anti-inflammatory effects, rheumatoid arthritis would be an inflammatory condition well-suited to cannabis therapy. Cannabinoids offer anti-inflammatory effect, but through different mechanism than COX, so carry reduced risks for gastrointestinal complications.

Pain perception is a complex process, originating at a site of injury or inflammation, carried through peripheral nerves to the spinal cord "gating" process, then ascending the spinothalamic tract and dorsal column into various areas such as the thalamus, cortex, and periaqueductal gray matter. Because of the multiple synapses involved along this route, the pathway is amenable to therapeutic targets. Leveraging cannabinoids and the TRPV1 receptor may prove to elucide new ways of treating chronic pain and neuropathic pain, neither of which finding a niche in conventional medical treatments.

The endocannabinoid pathways have even shed new light on acetaminophen, an extremely common medication. After endocannabinoids are cleaved and arachidonic acid is formed by FAAH, acetaminophen combines with arachidonic acid to form a molecule called AM404. AM404 has effects at the TRPV1 receptor, as well as weak agonist effects at cannabinoid receptors, which may mediate acetaminophen's pain-relieving effects (Hogestatt 2005). This finding again demonstrates that the endocannabinoids and their root fatty acids have many areas of interdependency.

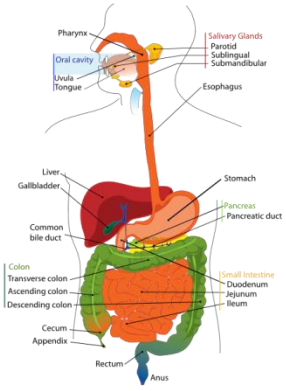
Nausea and Vomiting

Controlling nausea and vomiting has been one of the more familiar indications for cannabis-based medicines, supported by the FDA approval of dronabinol for chemotherapy-induced nausea and vomiting in 1985. Later, the FDA rescheduled dronabinol from schedule II to schedule III, indicating a known therapeutic use and a lower potential for addiction. Demonstration of CB1 receptors in the rat area postrema, the "vomiting" center of the brain, supports an objective mechanism for THC mediated symptom control. Additionally, studies have now demonstrated CB receptors in the GI tract, so cannabinoids act upon nausea and vomiting both centrally and peripherally.

A systemic review of cannabinoids for the control of chemotherapy-induced nausea and vomiting showed that cannabis was more effective than conventional antiemetics such as prochlorpromazine and metoclopramide, but also had higher incidence of side effects such as feeling "high", drowsy, dizzy, and either euphoric or dysphoric (Tramer 2001). However, a head-to-head study between isolated cannabis products and newer antiemetics such as odansetron has not been undertaken.

Appetite Stimulation

While suppression of nausea and vomiting can indirectly promote appetite, there is evidence that THC and the CB1 receptor have a more direct role in stimulating appetite through central pathways. Long known to be a side effect of cannabis, this side effect can be leveraged to benefit patients suffering anorexia and wasting.

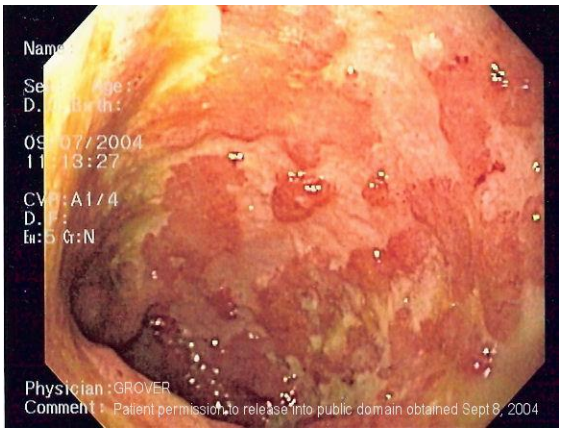


In comparison to other agents such as megestrol, a clear benefit has not been shown for cancer-associated anorexia (Jatoi 2002).

Trials in AIDS patients did show benefit versus placebo both short- and long-term regarding appetite stimulation, but less effect upon measured weight gain (Beal 1997).

Inflammatory bowel disease

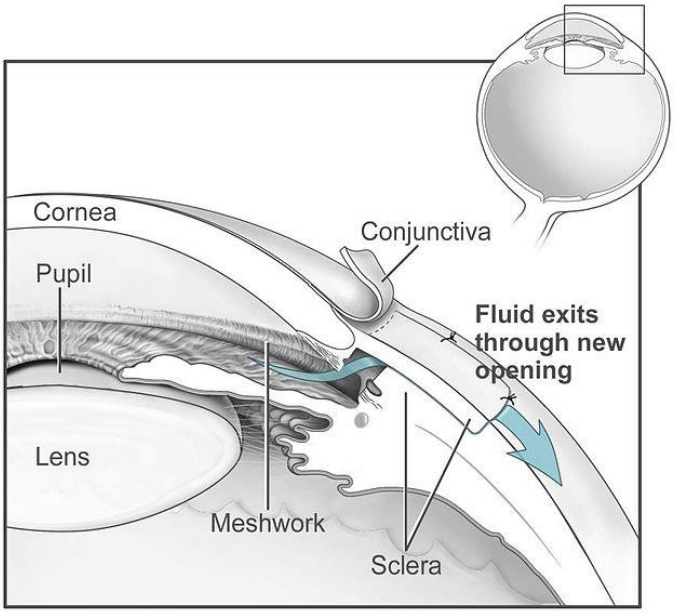
Inflammatory bowel diseases such as Crohn's and ulcerative colitis stand to benefit from the known anti-inflammatory effects of CBD and CB2 agonists together with the antidiarrheal and antiemetic qualities of THC. The gastrointestinal tract has a large volume of nervous tissue, and both CB1 and CB2 are expressed in the mammalian gut (Massa 2005). CBD was shown to reduce colon injury in a murine model of colitis by reducing reactive oxygen species in 2009 (Borelli 2009), and other studies showed that intestinal disease activity correlated with AEA levels in ulcerative colitis and celiac sprue, suggesting again that endocannabinoid manipulation may be of benefit. The first human evaluation came in 2011 with Dr. Naftali's observational study of THC cigarettes in Israel (Naftali, Treatment of Crohn's disease with cannabis: an observational study 2011). A small group of Crohn's disease patients improved clinical scores with the use of cannabis, and could reduce other medications. A followup placebo-controlled study also showed benefit in clinical response (Naftali 2013). Given the short duration of investigation in this field, it is too early to draw conclusions but the underlying principles and initial studies are encouraging.



Glaucoma

Confirmatory to popular lore, studies in the early 1970s showed that marijuana, when smoked, lowered intraocular pressure (IOP) in people with normal pressure and those with glaucoma. In an effort to determine whether marijuana, or drugs derived from marijuana, might be effective as a glaucoma treatment, the National Eye Institute (NEI) supported research studies beginning in 1978. These studies demonstrated that some derivatives of marijuana transiently lowered IOP

when administered orally, intravenously, or by smoking, but not when topically applied to the eye. This duration of action was deemed too short to make smoked THC a practical route of delivery for 24-hour intraocular pressure control (National Eye Institute, National Institutes of Health 1997).



However, none of these studies demonstrated that marijuana -- or any of its components -- could lower IOP as effectively as drugs already on the market. In addition, some potentially serious side effects were noted, including an increased heart rate and a decrease in blood pressure in studies using smoked marijuana.

The most recent recommendation from the American Academy of Ophthalmology found "no evidence demonstrating increased benefit and/or diminished risk of marijuana use in the treatment of glaucoma compared with the wide variety of pharmaceutical agents now available." (AAO Complementary Therapy Task Force 2014)

Unfortunately much of the research done in this area was done prior to the advances in molecular biology that identified CB1 mRNA and proteins in the human eye (A. e. Porcella 2000). The synthetic cannabinoid WIN 55212–2 applied topically was shown to reduce intraocular pressure in glaucoma cases resistant to conventional therapies (A. e. Porcella 2001). Recent research with regards to the anti-inflammatory and neuroprotective effects of cannabinoids may lead to advances in the cannabinoid treatment of retinal disorders (Yazulla 2008). Since vision loss in glaucoma is mediated through optic nerve damage, neuroprotective agents would still offer benefit in preventing vision loss in glaucoma and other ophthalmologic disorders.

Because of the lipophilic nature of cannabinoids, an effective aqueous delivery system for ophthalmologic use was difficult to develop. Hydrophobic drug delivery vehicles using

cyclodextrins developed in the late 1990s (Jarvinen 2002) which enabled the hydrophobic cannabinoids such as THC and AEA to be soluble in an ophthalmologic preparation. Future research regarding the ophthalmologic benefits of cannabinoids will benefit both from more specific THC doses and from more consistent delivery vehicles.

Tourette's and neurologic tics

Tourette's syndrome is a developmental neuropsychiatric disorder characterized by chronic motor and verbal tics, beginning before age 18. According to the CDC, GTS affects about 2-3/1,000 children aged 6-17. Going back to the 1980s, anecdotal reports began appearing in the literature related to THC use and Gilles de la Tourette syndrome (GTS). Benefits were reported, however the sample sizes were small and the benefits are based upon subjective patient reports. Later, Müller-Vahl published two studies reporting reduction in frequency and severity of tics, but again only a small number of patients (28) participated. Her research, based in Germany, demonstrated some beneficial effects at low doses of THC, titrated upward slowly (Mueller-Vahl 2003).

In review, only these two studies have been conducted and the sample size was not large enough to make any determinations about supporting the use of cannabinoids in treating tics or obsessive behaviors in Tourette's syndrome (Curtis 2009).

Brief Review of Newly Developing Research

Cancer

Reports of the antineoplastic properties of cannabinoids have recently sparked a great deal of excitement regarding the future of cannabis science. Experimental cell cultures of varying cell lines have been treated with CBD and other cannabinoids, and antineoplastic properties such as reduced invasion and reduced proliferation have been seen.

- AEA inhibits breast cancer cell proliferation (Petrocellis 1998)
- CBD, CBG and CBC inhibit breast carcinoma cell growth (Ligestri 2006)
- CBD inhibition of tumor pathways in glial cells (Solinas 2013)
- CBD and high-CBD strain cannabis inhibition of colon carcinogenesis (Romano 2014)

This burgeoning field will likely take some time to clarify, since the mechanism of cannabinoid effect differs by tissue, and different cell lines express different receptors. One example would be antineoplastic effects through the PPAR receptor. Because PPAR is primarily expressed peripherally in adipocytes, cancer cells lines such as liposarcomas and mammary adenocarcinomas often express PPAR receptor, as well as some colon cancer.

Diabetes

Endocannabinoids intersect with diabetes on two fronts: food intake and PPAR (discussed previously). Appetite stimulation through cannabinoid actions at central CB1 can lead to increased food intake, but peripheral CB1 modulation has shown to increase fatty acid metabolism as well as decrease food intake (O'Keefe 2014). Central CB1 antagonism can cause unpleasant psychiatric side effects as was the case with rimonabant, so a synthetic, peripherally-restricted CB1R anatagonist that did not cross the blood brain barrier would lack effects on mood while preserving effects on peripheral fat metabolism.

Influence from dietary omega fatty acids and their effects upon fatty acid metabolism, are at play as well, which in turn affects PPARl. One hypothesis is that a high omega 6:3 ratio causes overactive endocannabinoid activity, which then can dispose to obesity (Murru 2013).

The size of the antihyperglycemic and antiobesity market will likely keep pharmaceutical companies working toward answers around the obesity/cannabinoid interplay.

Osteoporosis

Osteoporosis is most common form of degenerative bone disease and affects over 50 million Americans. Natural bone remodeling is affected by a number of factors, but usually begins to favor resorption with decreased hormone levels and aging.

Nonspecific CB1 and CB2 agonists such as anandamide and THC appear to tip the bone remodeling balance in favor of resorption, resulting in decreased bone mass. CBD inhibits GPR55, which in mice has been shown to inhibit osteoclast activity without affecting osteoblasts, suggesting that it could be valuable for osteoporosis prevention (Idris 2012). Genetically CB2-deficient mice develop osteoporosis-like bone structure , and selective CB2 activation with a synthetic agonist prevented oophorectomy-induced bone loss (Ofek 2006).

Following initial studies with CBD, other cannabinoids are also being evaluated for osteoporosis prevention, particularly those that are active at CB2 but lack significant CB1-mediated psychoactivity, such as THCV (R. Pertwee 2008).

Mental Health

One-third of pts with schizophrenia do not achieve adequate results with conventional treatment, despite suffering multiple side effects. Earlier studies indicating that cannabis could trigger psychotic breaks earlier in life did not specify CBD or THC content, but given the timeframe of the studies, likely there was no significant CBD component.

CBD has been shown to have much the opposite effect—calming the psyche. Effects at 5-HT have been recently demonstrated, which mediate a calming, antidepressant effect. Endogenous AEA appears to play a part in schizophrenia, since levels of AEA appear to correlate with symptoms in some patients. Following up on earlier case reports, a recent clinical trial in Germany showed that CBD and the associated rise in AEA had therapeutic effect in patients comparable to a conventional antipsychotic, but with fewer side effects (Leweke 2012).

Other Neurodegenerative Diseases

Parkinson's disease (PD)

PD is a neurodegenerative disorder characterized by a dramatic loss of dopaminergic neurons in the substantia nigra (SN). Several pathologic mechanisms have been proposed, including excitotoxicity and oxidative stress. In recent years, the involvement of neuroinflammatory

processes in nigral degeneration has gained increasing attention. Not only have activated microglia and increased levels of inflammatory mediators been detected in the striatum of PD patients, but a large body of animal studies points to a contributory role of inflammation in dopaminergic cell loss.

Huntington's Disease

Known for its hypertonic chorea, Huntington's disease is neurologic condition with little treatment in conventional medicine. In postmortem brain samples, CB1 receptors are lost in the basal ganglia of Huntington's patients as well as mice, but the exact role in the endocannabinoid system in Huntington's is not yet clear. Through TRPV1 receptors, cannabinoids have potential to downregulate hyperkinesia, but only limited studies have taken place which indicated that Nabilone was not effective for chorea (al 1999).

Alzheimer's Disease

Deposition of beta-amyloid and subsequent microglial inflammation are hallmarks of Alzheimer's disease. In an animals injected with beta-amyloid, CBD treatment showed benefit in amyloid deposition and functional tests (Bachmeier 2013). Benefits in mouse cognitive functioning improved with administration of chronic CBD as well (Cheng 2014).

Dermatology

A number of the lesser-known cannabinoids as well as terpenes have antimicrobial, antifungal, and antiseborreic qualities. Topical cannabis preparations are safe and inexpensive compared to alternatives manufactured by prescription, and may offer a novel route to combat MRSA.

General References and Further Reading

O'Shaughnessy's: http://www.beyondthc.com/

Erowid: https://www.erowid.org/plants/cannabis/cannabis.shtml

UCSF Center for Medicinal Cannabis Research: http://www.cmcr.ucsd.edu/

http://www.coloradodot.info/programs/alcohol-and-impaired-driving/law-enforcement/aride

Charlotte's web via Realm of Caring:
http://theroc.us/index.php?option=com_content&view=article&id=57&Itemid=388

High Times: http://www.hightimes.com

National Organization for the Reform of Marijuana Laws: http://norml.org/about

Project CBD: www.projectCBD.org

National Highway Traffic Safety Administration: http://www.nhtsa.gov/Driving+Safety

National Institute on Drug Abuse: www.drugabuse.gov/drugs-abuse/marijuana

State web sites:

AZ: http://www.azdhs.gov/medicalmarijuana/rules/

CA: www.cdph.ca.gov/programs/mmp

CO: https://www.colorado.gov/pacific/cdphe/medicalmarijuana

MN: http://www.health.state.mn.us/topics/cannabis/

NY: Bill No. A06357
http://assembly.state.ny.us/leg/?default_fld=&bn=A06357&Summary=Y&Text=Y

WA: http://www.doh.wa.gov/YouandYourFamily/Marijuana/MedicalMarijuanaCannabis

Disclaimer

The information provided here is not intended to be a comprehensive review of the literature nor a substitute for medical education or legal advice. We believe that an understanding of the current state of medical research is essential to the proper preparation and dispensing of medical cannabis products. In this constantly evolving field, information can quickly become outdated. Website and other electronically-published information presented may be frequently updated and we recommend that the reader seek primary source information.

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Watanabe, K. "Cytochrome p450 enzymes involved in the metabolism of tetrahydrocannabinols and cannabidiol by human hepatic microsomes." *Life Sci* 80 (2007): 1415-9.

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Zhao, P. "GPR55 and GPR35 and their relationship to cannabinoid and lysophospholid receptors." *Life Sciences* 92 (2013): 453-457.

B. FACILITIES

No longer than 25 pages, excluding copies of maps, blueprints, photos, etc.

1. Intended Service Area(s)

Minnesota Medical Solutions is applying for EITHER Service Area A or Service Area B.

2. Manufacturing Facility

Please provide the following information:

a. The location of the proposed manufacturing facility (it must be located in the State of Minnesota)

The MinnMed cultivation facility is located in Otsego, MN. The address is 8740 77th Street NE, Otsego, MN 55362. This location is near the I-94 corridor and provides a centralized location for distribution to all MinnMed dispensary locations in the state.

b. Documents sufficient to establish that the applicant is authorized to conduct business in Minnesota; and that state and local building, fire and zoning requirements and all applicable local ordinances are met for the proposed location of the production facility.

MinnMed will ensure that all construction and building of any MinnMed locations will be done in accordance with all applicable state and local laws and regulations. Our manufacturing facility will meet all state and local building, fire, and zoning requirements. MinnMed has filed for a Minnesota Tax ID number and several pertinent local sales taxes. MinnMed will also obtain all of the local licenses if granted a production license (sales tax etc). Please see the attached documents to establish MinnMed is authorized to conduct business in Minnesota: 1) MinnMed Articles of Organization, 2) Certificate of Good Standing in the State of Minnesota and 3) Zoning Letter from the City of Otsego.

Office of the Minnesota Secretary of State
Certificate of Organization

I, Mark Ritchie, Secretary of State of Minnesota, do certify that: The following business entity has duly complied with the relevant provisions of Minnesota Statutes listed below, and is formed or authorized to do business in Minnesota on and after this date with all the powers, rights and privileges, and subject to the limitations, duties and restrictions, set forth in that chapter.

The business entity is now legally registered under the laws of Minnesota.

Name:	Executive Health Network LLC
File Number:	625651900041
Minnesota Statutes, Chapter:	322B
This certificate has been issued on:	11/02/2012

Mark Ritchie

Mark Ritchie
Secretary of State
State of Minnesota

62565190004

LLC 0R

MINNESOTA SECRETARY OF STATE
ARTICLES OF ORGANIZATION FOR
A LIMITED LIABILITY COMPANY
MINNESOTA STATUTES CHAPTER 322B

Filing Fee: $160.00

READ THE INSTRUCTIONS BEFORE COMPLETING THIS FORM

1. Name of Company: **Executive Health Network LLC** ✓

(The Company name must include the words Limited Liability Company or the abbreviation LLC)

2. Registered Office Address: (P.O. Box is Unacceptable)

4920 Drew Ave. South, Minneapolis MN **55410** ✓

Complete Street Address or Rural Route and Rural Route Box Number — City — Zip Code

3. Name of Registered Agent (optional): **Kyle Kingsley** ✓

4. Business Mailing Address: (if different from registered office address)

4920 Drew Ave. South, Minneapolis, Minnesota 55410

Address — City — State — Zip Code

5. Desired Duration of LLC: (in years) _____ (If you do not complete this item, a perpetual duration is assumed by law.)

6. Does this LLC own, lease or have any interest in agricultural land or land capable of being farmed?
(Check One) Yes _____ No ✓

7. Name and Address of Organizer(s):

Name (print)	Complete Address (Street, City, State, Zip)	Signature
Karla Figueroa	101 N. Brand Blvd., 11th Floor Glendale, CA 91203	

STATE OF MINNESOTA
DEPARTMENT OF STATE
FILED
NOV 02 2012
Mark Ritchie
Secretary of State

8. List a name, daytime phone number, and e-mail address of a person who can be contacted about this form.

Shikha Chand — Contact Name
(323) 962-8600 x 883 — Phone Number
onlinefilings@legalzoom.com — E-Mail Address

Office of the Minnesota Secretary of State

Minnesota Limited Liability Company | Amendment to Articles of Organization

Minnesota Statutes, Chapter 322B

Read the instructions before completing this form.
Filing Fee: $55 for expedited service in-person and online filings, $35 if submitted by mail

1. List the name of this company currently on file with the Office of the Minnesota Secretary of State: (Required)

Executive Health Network LLC

2. The articles of organization for this Limited Liability Company are amended pursuant to Chapter 322B.

AMENDMENT OPTIONS: Complete as many amendment options as apply. Complete an option only if you are changing the information related to that option.

3. The company name is changed to:

Minnesota Medical Solutions LLC

4. The registered office address is changed to:

5200 Willson Rd Suite 150	Edina	MN	55424
Street Address *(A post office box by itself is not acceptable)*	City	State	Zip Code

5. The registered agent is changed to:

6. List the date the expiration date has changed to in the jurisdiction of its organization, or list the word "perpetual"

mm/dd/yyyy or Perpetual

7. The business mailing address has changed to:

5200 Willson Rd Suite 150	Edina	MN	55424
Address	City	State	Zip Code

8. The articles of organization are otherwise amended as follows:

9. I, the undersigned, certify that I am signing this document as the person whose signature is required, or as agent of the person(s) whose signature would be required who has authorized me to sign this document on his/her behalf, or in both capacities. I further certify that I have completed all required fields, and that the information in this document is true and correct and in compliance with the applicable chapter of Minnesota Statutes. I understand that by signing this document I am subject to the penalties of perjury as set forth in Section 609.48 as if I had signed this document under oath.

Kyle Kingsley	6/6/14
Signature of Authorized Person or Authorized Agent	Date

Email Address for Official Notices
Enter an email address to which the Secretary of State can forward official notices required by law and other notices:

☒ Check here to have your email address excluded from requests for bulk data, to the extent allowed by Minnesota law.

Office of the Minnesota Secretary of State

Minnesota Limited Liability Company | Amendment to Articles of Organization

Minnesota Statutes, Chapter 322B

List a name and daytime phone number of a person who can be contacted about this form:

Kyle Kingsley [redacted]

Contact Name Phone Number

Entities that own, lease, or have any financial interest in agricultural land or land capable of being farmed must register with the MN Dept. of Agriculture's Corporate Farm Program.

Does this entity own, lease, or have any financial interest in agricultural land or land capable of being farmed?

Yes ☐ No ☒

Work Item 764463300023
Original File Number 625651900041

STATE OF MINNESOTA
OFFICE OF THE SECRETARY OF STATE
FILED
06/06/2014 11:59 PM

Mark Ritchie

Mark Ritchie
Secretary of State

STATE OF MINNESOTA

DEPARTMENT OF STATE

I hereby certify that this is a true and complete copy of the document as filed for record in this office.

DATED 9/11/2014

Mark Ritchie

Secretary of State

By Brenda Rosenack

B2b. Attachment: Articles of Organization

Office of the Minnesota Secretary of State
Certificate of Good Standing

I, Mark Ritchie, Secretary of State of Minnesota, do certify that: The business entity listed below was filed pursuant to the Minnesota Chapter listed below with the Office of the Secretary of State on the date listed below and that this business entity is registered to do business and is in good standing at the time this certificate is issued.

Name:	Minnesota Medical Solutions LLC
Date Filed:	11/02/2012
File Number:	625651900041
Minnesota Statutes, Chapter:	322B
Home Jurisdiction:	Minnesota

This certificate has been issued on: 09/24/2014

Mark Ritchie

Mark Ritchie
Secretary of State
State of Minnesota

NOTICE OF PROPER MANUFACTURING FACILITY ZONING FORM

TO BE COMPLETED BY APPLICANT		
1. NAME OF ENTITY APPLYING FOR A MEDICAL CANNABIS REGISTRATION Minnesota Medical Solutions LLC		
2. ADDRESS OF THE PROPOSED MANUFACTURING LOCATION 8740 77th Street NE	3. DISTRICT 6	
4. CITY Otsego	5. COUNTY Wright	6. ZIP CODE 55362

CHECK ALL THAT APPLY		
There are no local zoning restrictions specific to a medical cannabis manufacturing facility at the identified location.	☒ Yes	☐ No
The location of the proposed medical cannabis dispensary is in compliance with local zoning restrictions for medical cannabis manufacturing.	☐ Yes	☐ No
The proposed manufacturing has duly filed a request to the appropriate local zoning authority to approve the specified location for a medical cannabis manufacturing. If a zoning request was filed but has not been approved, the zoning determination is expected to be issued in approximately _____ DAYS ☐ WEEKS ☐ MONTHS ☐ (check one)	☐ Yes	☐ No

TO BE COMPLETED BY AN AUTHORIZED REPRESENTATIVE OF THE LOCAL ZONING OFFICE

Zoning Administrator
Title of the Authorized Zoning Representative

City of Otsego
Name of the Local Jurisdiction

D. Daniel Licht
Printed Name

763.441.4414
Telephone Number

17 Sep 14
Signature/Date

Subscribed and sworn to before me this 17th day of September, 2014.

(SEAL)
SANDRA L. LINDENFELSER
NOTARY PUBLIC - MINNESOTA
My Commission Expires Jan. 31, 2018

Sandra L. Lindenfelser
Notary Public

B2b. Attachment: Proper Zoning Form

c. If support exists by a local government authority, include documentation indicating the support that exists

Otsego City authorities have cleared the MinnMed manufacturing facility. We have had multiple successful meetings with the Otsego City Council, and the council has been helpful. Please see the attached: 1) Letter of Support--Otsego and 2) the letter from Wright County Sheriff.

d. If the property is not owned by the applicant, provide a written statement from the property owner certifying that they have consented to the applicant operating a production facility on the premises and the duration of the actual or potential lease

This property is owned by MinnMed equity holders and partners, Joe and Amy Schaffer. The duration of the lease is 25 years to 2K Health LLC, which is entirely owned by Dr. Kingsley. 2K Health LLC was responsible for the construction of the greenhouse. This structure, is, in turn, leased from 2K Health LLC to Minnesota Medical Solutions LLC for a duration of five years, with renewal as needed. 2K Health LLC was used so that construction of the facility could start immediately in July, ensuring our patients will have access to medications by July 1, 2015. Please see the attached: 1) Statements from Amy and Joe Schaffer, 2) Schaffer-2K Heath Lease, and 3) 2K -MinnMed Lease.

e. Any signage, lettering, text and graphic materials that will be shown on the exterior of the proposed production facility

The MinnMed production facility will have no signs, lettering, text or graphic materials on the outside of the building. The building will appear very similar to surrounding buildings belonging to Minnesota Native Landscapes Inc., which will allow the cultivation facility to be very inconspicuous and completely separate from all dispensaries.

CITY OF
Otsego
MINNESOTA

September 22, 2014

Kyle Kingsley, M.D.
Minnesota Medical Solutions LLC
5200 Willson Road, Suite 150
Edina, MN 55424

RE: Medical Cannabis Cultivation Facility

Dear Dr. Kingsley:

The City Council was pleased to receive your presentation regarding Minnesota Medical Solutions LLC's (MinnMed) application to the State of Minnesota for a license to provide medical cannabis and how your unique patient based approach will benefit those most in need of this treatment in accordance with the Minnesota Department of Health Rules, as proposed.

We also appreciate the consideration and forethought MinnMed has demonstrated in selection of Otsego as the location for a cultivation facility and your time spent with City staff and the Wright County Sheriff's Office to inform the community of your facility's planned operations. The City of Otsego welcomes the economic development opportunities created by MinnMed in Otsego, including living-wage employment with quality benefits and the commitment to provide a financial donation to the community that will benefit all Otsego residents.

Based on the comprehensive regulations outlined in the Minnesota Department of Health Rules, as proposed, and MinnMed's operational procedures, the City

does not anticipate any negative effects caused by the cultivation facility in terms of public health, safety and welfare or land use compatibility. To this end, so long as the facility is constructed and operated in accordance with the Statues and Rules of the State of Minnesota, the City of Otsego regards the proposed cultivation facility, as has been represented by MinnMed, as a permitted agricultural use of the property under the Zoning Ordinance. The Zoning Administrator has signed the zoning certification portion of the Minnesota Department of Heath license application form to this effect.

If there is any additional information or assistance the City of Otsego may provide in support of MinnMed's license application, please do not hesitate to contact City staff.

Sincerely,

CITY OF OTSEGO

Jessica L. Stockamp

Jessica L. Stockamp
Mayor

c. City Council
Lori Johnson, City Administrator
Tami Loff, City Clerk
Andrew MacArthur, City Attorney
Daniel Licht, City Planner/Zoning Administrator

Wright County Sheriff's Office

Sheriff Joe Hagerty

Dave Miller
Chief Deputy
Greg Howell
Captain
Dan Anselment
Captain
Pat O'Malley
Jail Captain

3800 Braddock Ave. NE
Buffalo, MN 55313

1-800-362-3667
Fax: 763-682-7610

Administration	763-682-7622
Dispatch	763-682-7600
Records	763-682-7630
Civil	763-682-7646
Warrants	763-682-7688
Investigations	763-682-7637
Jail Administration	763-682-7662
Victim Assistant	763-684-4537

September 4, 2014

Otsego City Council
13400 90th Street NE
Otsego, MN 55330

Re: Minnesota Medical Solutions' Proposed Medical Cannabis Facility

Dear Otsego City Council:

My staff and I recently met with Dr. Kyle Kingsley and Ross Hussey of Minnesota Medical Solutions regarding a proposed medical cannabis cultivation facility in the City of Otsego.

After discussing the proposed location and security concerns, the Wright County Sheriff's Office does not believe the location of the facility will have a negative effect on public safety. Therefore, so long as it is built and operated in accordance with Minnesota law, this office has no objection to the facility being located in the City of Otsego.

Sincerely,

Joe Hagerty
Wright County Sheriff

Minnesota Native Landscapes

September 18th, 2014

To Whom It May Concern:

We have given our consent as joint tenant landowners to the applicant to operate a production facility on the premises. The duration of the initial lease is for 25 years with the option to extend the lease every 10 years after that.

Thank You.

Joe Schaffer
President
Minnesota Native Landscapes, Inc.

Amy Schaffer
Vice-President
Minnesota Native Landscapes, Inc.

B2d. Attachment: Property Owner Consent

Ground Lease Agreement
By and Between:

JOSEPH P. SCHAFFER & AMY B. SCHAFFER,
AS JOINT TENANTS,
married individuals residing in the State of Minnesota,

Landlords,

and

2K HEALTH LLC,
a Minnesota Limited Liability Company,

Tenant,

FOR THE LAND LOCATED AT:

8740 77th Street Northeast
Otsego, Minnesota 55362

Dated: 09/16/2014

GROUND LEASE AGREEMENT

This Ground Lease Agreement (the "Lease") is made and entered into as of 12/01/2014 (the "Commencement Date"), between JOSEPH P. SCHAFFER & AMY B. SCHAFFER, AS JOINT TENANTS, MARRIED INDIVIDUALS RESIDING IN THE STATE OF MINNESOTA ("Landlords"), and 2K HEALTH LLC, a Minnesota limited liability company ("Tenant").

WHEREAS, at the Commencement Date, Landlords own the following real property (collectively, the "Land"):

(a) Generally, the northeast rectangular area of the land described as New Parcel B in Exhibit A consisting of the 300 feet west of the northeast corner of New Parcel B by the 400 feet south of the northeast corner of New Parcel B containing approximately 2.75 acres of land (the "Land"). Specifically, the Parties agree that Landlords will pursue creation of a separate and distinct legal description and property identification number for the Land and bear costs for the survey and filing fee with Wright County, and that the Land will specifically be defined by its unique property identification number when the parties learn the Land's PID;
(b) all right, title, and interest of Landlords, if any, in and to the land lying in the bed of any street or highway in front of or adjoining the Land to the center line of such street or highway;
(c) the appurtenances and all the estate and rights of Landlords in and to the Land; and
(d) any strips or gores adjoining the Land.

WHEREAS, Landlords desire to lease the Land to Tenant, and Tenant desires to lease the Land from Landlords;

WHEREAS, the parties desire to enter into this Lease to set forth their rights and obligations to each other relating to the Land; and

NOW, THEREFORE, for good and valuable consideration, Landlords lease and demise the Land to Tenant, and Tenant takes and hires the Land from Landlords, subject only to Permitted Exceptions, for the Term, upon the terms and conditions of this Lease.

Article 1. DEFINITIONS

The following definitions apply in this Lease.

1.01 "Additional Rent" means all sums that this Lease requires Tenant to pay Landlords, whether or not expressly called Additional Rent, except Fixed Rent.
1.02 "Affiliate" of any specified Person means any other Person Controlling or Controlled by or under common Control with such specified Person. "Affiliated" shall have the correlative meaning.

1.03 "Application" means any agreement, application, certificate, document, or submission (or amendment of any of the foregoing): (a) necessary or appropriate for any Construction this Lease allows, including any application for any building permit, certificate of occupancy, utility service or hookup, easement, covenant, condition, restriction, subdivision plat, or such other instrument as Tenant may from time to time reasonably request for such Construction; (b) to allow Tenant to obtain any abatement, deferral, or other benefit otherwise available for Real Estate Taxes; (c) if and to the extent (if any) this Lease permits, to allow Tenant to change the use or zoning of the Land; (d) to enable Tenant from time to time to seek any Approval or to use and operate the Land in accordance with this Lease; or (e) otherwise reasonably necessary and appropriate to permit Tenant to realize the benefits of the Land under this Lease.

1.04 "Approvals" means any and all licenses, permits (including building, demolition, alteration, use, and special permits), approvals, consents, certificates (including certificate(s) of occupancy), rulings, variances, authorizations, or amendments to any of the foregoing as shall be necessary or appropriate under any Law to commence, perform, or complete any Construction, or for the zoning, rezoning (to the extent this Lease allows), use, occupancy, maintenance, or operation of the Land.

1.05 "Bankruptcy Law" means Title 11, United States Code, and any other or successor state or federal statute relating to assignment for the benefit of creditors, appointment of a receiver or trustee, bankruptcy, composition, insolvency, moratorium, reorganization, or similar matters.

1.06 "Bankruptcy Proceeding" means any proceeding, whether voluntary or involuntary, under any Bankruptcy Law.

1.07 "Building" means all improvements located or to be located on the Land from time to time.

1.08 "Building Equipment" means all fixtures incorporated in the Land owned by Landlords or Tenant and used, useful, or necessary to operate the Building as such (including boilers; compactors; compressors; conduits; ducts; elevators; engines; equipment; escalators; fittings; heating, ventilating and air conditioning systems; machinery; and pipes) as opposed to operating any business in the Building.

1.09 "Business Day" means any weekday on which State-chartered banks are open to conduct regular banking business with bank personnel.

1.10 "Casualty" means any damage or destruction of any kind or nature, ordinary or extraordinary, foreseen or unforeseen, affecting any or all Improvements, whether or not insured or insurable.

1.11 "Construction" means any alteration, construction, demolition, development, expansion, reconstruction, redevelopment, repair, Restoration, or other work affecting any Improvements, including new construction.

1.12 "Control" means possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of such Person, whether by ownership of Equity Interests, by contract, or otherwise.

1.13 "County" means the county where the Land are located.

1.14 "Default" means any Monetary Default or Nonmonetary Default.

1.15 "Default Interest" means interest at an annual rate equal to the lesser of: (a) the Prime Rate; or (b) the Usury Limit.

1.16 "Development Rights" means any rights or benefits transferred to or from the Land through a Development Rights Transfer.

1.17 "Development Rights Transfer" means any so-called "zoning lot merger" or any other agreement or instrument that combines the Land with any other real property for purposes of any Law on bulk, development rights, use, zoning, or any similar matter, or by which any development rights (or so-called "floor area ratio," "FAR," or rights to construct "zoning floor area") under any such Law are transferred to or from any other real property.

1.18 "Environmental Law" means any Law regarding the following at, in, under, above, or upon the Land: (a) air, environmental, ground water, or soil conditions; or (b) clean-up, control, disposal, generation, storage, release, transportation, or use of, or liability or standards of conduct concerning, Hazardous Substances.

1.19 "Equipment Lien" means any security interest, financing lease, personal property lien, conditional sales agreement, chattel mortgage, security agreement, title retention arrangement or any similar arrangement (including any related financing statement) for Tenant's acquisition or leasing of any Financed FF&E used in the Land that is leased, purchased under conditional sale or installment sale arrangements, encumbered by a security interest, or used under a license, provided that each Equipment Lien encumbers or otherwise relates only to the Financed FF&E for which such secured party provides bona fide purchase-money financing or a bona fide equipment lease, after the Commencement Date. A Leasehold Mortgage is not an Equipment Lien.

1.20 "Equity Interest" means all or any part of any direct or indirect equity or ownership interest(s) (whether stock, partnership interest, beneficial interest in a trust, membership interest, or other interest of an ownership or equity nature) in any entity at any tier of ownership that directly or indirectly owns or holds any ownership or equity interest in a Person.

1.21 "Estoppel Certificate" means a statement, addressed to Tenant or as Tenant directs, containing assurances as Tenant reasonably requests.

1.22 "Expiration Date" means the date when this Lease terminates or expires in accordance with its terms, whether on the Scheduled Expiration Date, by Landlords' exercise of remedies for an Event of Default, or otherwise.

1.23 "Fee Debt Service" means all payments required from time to time under any Fee Mortgage, including principal, interest, late charges, costs of collection, reimbursement of protective advances, and any other sums any Fee Mortgage secures.

1.24 "Fee Estate" means Landlords' fee estate in the Land, including Landlords' reversionary interest in the Land after the Expiration Date.

1.25 "Fee Mortgage" means any Mortgage: (a) that encumbers all or part of the Fee Estate; (b) that contains or incorporates by reference, and fully complies with, the Statement of Priorities (as it applies to Fee Mortgagees) and contains no provisions (and secures no document containing any provisions) inconsistent with the Statement of Priorities; (c) that otherwise complies with this Lease; (d) a copy of which (recorded or unrecorded) is promptly after execution delivered to Tenant and all Leasehold Mortgagee(s) with a certification by Fee Mortgagee that the copy is accurate and stating Fee Mortgagee's name and Notice address; and (e) that is held by a Fee Mortgagee that is subject to the jurisdiction of the courts of the State of Minnesota and not immune from suit.

1.26 "Fee Mortgagee" means any Mortgagee holding a Fee Mortgage. Any participant or partial assignee holding any direct or indirect interest in a Fee Mortgage will not be deemed a Fee Mortgagee or affect Tenant in any way.

1.27 "FF&E" means all movable furniture, furnishings, equipment, and personal property of Tenant or anyone claiming through Tenant (excluding Building Equipment) that may be removed without material damage to the Land and without adversely affecting: (a) the structural integrity of the Land; (b) any electrical, plumbing, mechanical, or other system in the Land; (c) the present or future operation of any such system; or (d) the present or future provision of any utility service to the Land. FF&E includes items such as factory equipment, furniture, movable equipment, telephone, telecommunications and facsimile transmission equipment, point of sale equipment, televisions, radios, network racks, and computer systems and peripherals.

1.28 "Financed FF&E" means any FF&E subject to an Equipment Lien in favor of a lessor or lender that: (a) is not an Affiliate of Tenant, and (b) actually provides bona fide financing or a bona fide equipment lease after the Commencement Date for Tenant's acquisition or use of such FF&E.

1.29 "Government" means each and every governmental agency, authority, bureau, department, quasi-governmental body, or other entity or instrumentality having or claiming jurisdiction over the Land (or any activity this Lease allows), including the United States government, the State and County governments and their subdivisions and municipalities, and all other applicable governmental agencies, authorities, and subdivisions thereof. "Government" shall also include any planning commission, board of standards and appeals, department of buildings, city council, zoning board of appeals, or similar body having or claiming jurisdiction over the Land or any activities on or at the Land.

1.30 "Hazardous Substances Discharge" means any deposit, discharge, generation, release, or spill of Hazardous Substances that occurs at or from the Land, or into the Land, or that arises at any time from the use, occupancy, or operation of the Land or any activities conducted therein or any adjacent or nearby real property, or resulting from seepage, leakage, or other transmission of Hazardous Substances from other real property to the Land, whether or not caused by a party to this Lease and whether occurring before or after the Commencement Date.

1.31 "Indemnify" means, where this Lease states that any Indemnitor shall "Indemnify" any Indemnitee from, against, or for a particular matter (the "Indemnified Risk"), that the Indemnitor shall indemnify the Indemnitee and defend and hold the Indemnitee harmless from and against any and all loss, cost, claims, liability, penalties, judgments, damages, and other injury, detriment, or expense (including Legal Costs, interest and penalties) that the Indemnitee suffers or incurs: (a) from, as a result of, or on account of the Indemnified Risk; or (b) in enforcing the Indemnitor's indemnity. Indemnitor's counsel shall be subject to Indemnitee's approval, not to be unreasonably withheld. Any counsel satisfactory to Indemnitor's insurance carrier shall be automatically deemed satisfactory.

1.32 "Indemnitee" means any party entitled to be Indemnified under this Lease and its agents, directors, employees, Equity Interest holders, mortgagees, and officers.

1.33 "Indemnitor" means a party that agrees to Indemnify any other Person.

1.34 "Insubstantial Condemnation" means any Condemnation except a Substantial Condemnation or a Temporary Condemnation.

1.35 "Land Value" means the fair market value of the Land. The fair market value of the Land means the amount that a willing buyer would pay a willing seller for the Land, neither being under a particular compulsion to buy or to sell, each fully aware of all applicable facts about the Land, and assuming a reasonable marketing period, considered as if the Land were vacant and clear of any structures or excavations, and free and clear of all leases (including this Lease), taking into account then-current general economic conditions; costs of construction; recent sales of nearby comparable parcels; the real estate marketplace; and all other conditions as in effect that may reasonably be considered in determining the fair market value of the Land. Land Value shall otherwise be determined in accordance with prevailing standards of appraisal practice at the time of determination. Notwithstanding the foregoing, the determination of the fair market value of the Land shall not take into account any changes in zoning or building Law that may occur after the Commencement Date, so that as to any matter governed by zoning or building Law (including permitted uses, bulk, setbacks, sky exposure, yards, and all other matters governed by such Law), the zoning as of the Commencement Date shall be deemed to continue to apply, regardless of the actual terms of such zoning or building Laws (whether more or less favorable to development), except to the extent that both: (a) any such terms have been modified in a manner that would increase the development potential of the Land; and (b) Tenant has actually constructed Improvements, or modified the use of existing Improvements, in a manner that realizes the increased development potential resulting from such change (as opposed to construction of Improvements or modification of use of existing Improvements permitted under zoning and building Law in effect on the Commencement Date).

1.36 "Landlords" initially means the Landlords named in the opening paragraph of this Lease. After every transfer of the Fee Estate, "Landlords" means only the owner(s) of the Fee Estate at the time in question. If any former Landlords no longer have any interest in the Fee Estate or a Transfer of the Fee Estate occurs (in all cases in compliance with this Lease, including requirements regarding any Trust Funds), the Transferor (including a Fee Mortgagee, or anyone acting for a Fee Mortgagee, that has acquired and then disposed of the Fee Estate) shall be and hereby is entirely freed and relieved of all obligations of Landlords under this Lease accruing from and after the date of such Transfer. It shall be deemed and construed without further agreement between the parties or their successors in interest or between the parties and the Person who acquires or owns the Land, including the Transferee (including a Fee Mortgagee taking title to the Fee Estate or a Person taking title to the Fee Estate from a Fee Mortgagee) on any such Transfer, that such Person has assumed and agreed to carry out any and all agreements, covenants, and obligations of Landlords under this Lease accruing from and after the date of such Transfer.

1.37 "Laws" means all laws, ordinances, requirements, orders, proclamations, directives, rules, and regulations of any Government affecting the Land, this Lease, or any Construction in any way, including any use, maintenance, taxation, operation, or occupancy of, or environmental conditions affecting, the Land, or relating to any Real Estate Taxes, or otherwise relating to this Lease or any party's rights and remedies under this Lease, or any Transfer of any of the foregoing, whether in force at the Commencement Date or passed, enacted, or imposed at some later time, subject in all cases, however, to any applicable waiver, variance, or exemption.

1.38 "Lease Year" means: (a) the twelve calendar months starting on the first day of the first full calendar month after the Commencement Date; and (b) every subsequent period of twelve calendar months during the Term.

1.39 "Leasehold Estate" means Tenant's leasehold estate, and all of Tenant's rights, privileges, and Pre-Emptive Rights, under this Lease, upon and subject to all the terms and conditions of this Lease, and any direct or indirect interest in such leasehold estate.

1.40 "Leasehold Mortgage" means any mortgage, deed of trust, collateral assignment, or other lien (as modified from time to time) encumbering this Lease, the Leasehold Estate, and Tenant's Preemptive Rights. A Leasehold Mortgage will not attach to the Fee Estate.

1.41 "Leasehold Mortgagee" means a holder of a Leasehold Mortgage (and its successors and assigns), provided: (a) it is not an Affiliate of Tenant; and (b) Landlords have received notice of its name and address and a copy of its Leasehold Mortgage.

1.42 "Legal Costs" of any Person means all reasonable costs and expenses such Person incurs in any legal proceeding (or other matter for which such Person is entitled to be reimbursed for its Legal Costs), including reasonable attorneys' fees, court costs, and expenses, and in or as a result of any Bankruptcy Proceeding.

1.43 "Liability Insurance" means general comprehensive public liability insurance against claims for personal injury, death, or property damage occurring upon, in, or about the Land or adjoining streets and passageways, providing coverage for a combined single limit of $1,000,000 (one million) dollars for any one occurrence.

1.44 "Loss" means a casualty or condemnation affecting the Land.

1.45 "Loss Proceeds" means any insurance proceeds or condemnation award paid or payable for a Loss.

1.46 "Memorandum of Lease" means a memorandum of this Lease, in recordable form, setting forth the following provisions of this Lease: (a) all information any Law requires; (b) restrictions on Transfers, zoning lot mergers, and Fee Mortgages; (c) provisions required to be (or deemed) contained in Subleases, Fee Mortgages, and Leasehold Mortgages; (d) Landlords' nonresponsibility for costs of improvement; (e) Tenant's Right of First Refusal; (f) Tenant's purchase option; (g) covenants regarding real property other than the Land; (h) any grant of a power of attorney; and (i) such other provisions, except the amount or means of determining Rent, as either party reasonably desires.

1.47 "Modification" means any abandonment, amendment, cancellation, discharge, extension, modification, rejection, renewal, replacement, restatement, substitution, supplement, surrender, termination, or waiver of a specified agreement or document, or of any of its terms or provisions, or the acceptance of any cancellation, rejection, surrender, or termination of such agreement, document, or terms.

1.48 "Modify" means agree to, cause, make, or permit any Modification.

1.49 "Monetary Default" means Tenant's failure to pay any Rent or other money (including any required Real Estate Taxes and insurance premiums) when and as this Lease requires.

1.50 "Nonmonetary Default" means Tenant's material: (a) failure to comply with any affirmative or negative covenant or obligation in this Lease, except a Monetary Default; or (b) breach of any representation or warranty (as of the date made or deemed made).

1.51 "Notice" means any consent, demand, designation, election, notice, or request relating to this Lease, including any Notice of Default. Notices shall be delivered, and shall become effective, only in accordance with the "Notices" Article of this Lease.

1.52 "Notify" means give a Notice.

1.53 "Notice of Default" means any Notice claiming or giving Notice of a Default or alleged Default.

1.54 "Permitted Exceptions" means only: (1) the recorded title exceptions affecting the Fee Estate and prior to this Lease as of the Commencement Date, listed as exceptions in Tenant's leasehold policy of title insurance for this Lease; (2) any title exceptions (including Subleases) caused by Tenant's acts or omissions, consented to or requested by Tenant, or resulting from Tenant's Default; (3) any Application made at Tenant's request; (4) this Lease and its terms and provisions; and (5) any state of facts an accurate survey would show.

1.55 "Person" means any association, corporation, Government, individual, joint venture, joint-stock company, limited liability company, partnership, trust, unincorporated organization, or other entity of any kind. (This does not limit any Transfer restriction.)

1.56 "Prime Rate" means the prime rate or equivalent "base" or "reference" rate for corporate loans that, at Tenant's election, by Notice to Landlords, is from time to time: (a) published in the Wall Street Journal; (b) announced by any large United States "money center" commercial bank Tenant designates; or (c) if such rate is no longer so published or announced, then a reasonably equivalent rate published by an authoritative third party that Tenant reasonably designates. Notwithstanding anything to the contrary in this paragraph, the Prime Rate shall never exceed the Usury Limit.

1.57 "Prohibited Lien" means any mechanic's, vendor's, laborer's, or material supplier's statutory lien or other similar lien arising from work, labor, services, equipment, or materials supplied, or claimed to have been supplied, to Tenant (or anyone claiming through Tenant), but only if such lien attaches (or may attach upon termination of this Lease) to the Fee Estate. An Equipment Lien is not a Prohibited Lien.

1.58 "Property Insurance" means insurance providing coverage for the Land, and any Building or Building Equipment, against loss, damage, or destruction by fire and other hazards encompassed under the broadest form of property insurance coverage then customarily used for like properties in the County (except earthquake or war risk) from time to time during the Term, in an amount equal to 80% of the replacement value (without deduction for depreciation) of the Building and Building Equipment (excluding excavations and foundations) and in any event sufficient to avoid co-insurance, with "ordinance or law" coverage. Such insurance may contain a deductible clause not exceeding $7,500 times the CPI Adjustment Factor. To the extent customary for like properties in the County at the time, such insurance shall include coverage for explosion of steam and pressure boilers and similar apparatus located on the Land; and "increased cost of construction" endorsement; and an endorsement covering demolition and cost of debris removal. Property Insurance shall also include rental or business interruption insurance in an amount at least equal to two times annual Fixed Rent and Real Estate Taxes and providing for a two-month extended period of indemnity.

1.59 "Property Insurance Proceeds" means net proceeds (after reasonable costs of adjustment and collection, including Legal Costs) of Property Insurance, when and as received by Landlords, Tenant, Depository, or any Mortgagee, excluding proceeds of Tenant's business interruption insurance in excess of Rent.

1.60 "Real Estate Taxes" means all general and special real estate taxes (including taxes on FF&E, sales taxes, use taxes, and the like), business improvement district payments, assessments, municipal water and sewer rents, rates and charges, excises, levies, license and permit fees, fines, penalties and other governmental charges and any interest or costs with respect thereto, general and special, ordinary and extraordinary, foreseen and unforeseen, of any kind and nature whatsoever that at any time before or during the Term and applicable to the Term or any part of it may be assessed, levied, imposed upon, or become due and payable out of or in respect of, or charged with respect to or become a lien on, the Land, or the sidewalks or streets in front of or adjoining the Land, or any vault, passageway or space in, over or under such sidewalk or street, or any other appurtenances of the Land, or any FF&E, Building Equipment or other facility used in the operation thereof, or the rent or income received therefrom, or any use or occupancy thereof. "Real Estate Taxes" shall not, however, include any of the following, all of which Landlords shall pay before delinquent or payable only with a penalty: (a) any franchise, income, excess profits, estate, inheritance, succession, transfer, gift, corporation, business, capital levy, or profits tax, or license fee, of Landlords; (b) any item listed in this paragraph that is levied, assessed, or imposed against the Land during the Term based on the recapture or reversal of any previous tax abatement or tax subsidy, or compensating for any previous tax deferral or reduced assessment or valuation, or correcting a miscalculation or misdetermination, relating to any period(s) before the Commencement Date; and (c) interest, penalties, and other charges for items "a" and "b." If at any time during the Term the method of taxation prevailing at the Commencement Date shall be altered so that any new tax, assessment, levy (including any municipal, state or federal levy), imposition, or charge, or any part thereof, shall be measured by or be based in whole or in part upon the Land and imposed upon Landlords, then all such new taxes, assessments, levies, Real Estate Taxes, or charges, or the part thereof to the extent that they are so measured or based, shall be deemed to be included within the term "Real Estate Taxes," to the extent that such Real Estate Taxes would be payable if the Land were the only property of Landlords subject to such Real Estate Taxes.

1.61 "Rent" means Fixed Rent and Additional Rent.

1.62 "Restoration" means, after a Loss, the alteration, clearing, rebuilding, reconstruction, repair, replacement, restoration, and safeguarding of the damaged or remaining Improvements, substantially consistent with their condition before the Loss, subject to such Construction as Tenant shall perform in conformity with this Lease, subject to any changes in Law that would limit the foregoing.

1.63 "Restoration Funds" means any Loss Proceeds (and deposits by Tenant) to be applied to Restoration.

1.64 "Restore" means accomplish a Restoration.

1.65 "Scheduled Expiration Date" means 11:59 p.m. on December 31, 2039. To the extent that Tenant exercises any Renewal Option(s), the Scheduled Expiration Date means 11:59 p.m. on the last day of the corresponding Renewal Term.

1.66 "State" means the state or commonwealth where the Land are located.

1.67 "Structure" of the Land means only the concrete floors, footings, foundation, load-bearing walls, roof, roof support system, and structural steel or other structural support system of the Land.

1.68 "Sublease" means, for the Land, any: (a) sublease; (b) agreement or arrangement (including a concession, license, management, or occupancy agreement) allowing any Person to occupy, use or possess; (c) subsublease or any further level of subletting; or (d) Modification or assignment of "a" through "c." (Any reference to Subleases does not diminish, impair, limit, or waive any limit on Subleases.)

1.69 "Subrent" means all money due and payable by Subtenants under Subleases.

1.70 "Substantial Casualty" means a Casualty that: (a) renders 30% or more of the Land not capable of being used or occupied; (b) occurs less than two years before the end of the Term and renders 20% or more of the Land not capable of being used or occupied; (c) requires Restoration whose cost Tenant reasonably estimates in writing would exceed $50,000; or (d) under the Law, prevents the Land from being Restored to the same bulk, and for the same use(s), as before the Casualty.

1.71 "Substantial Condemnation" means any Condemnation that (a) takes the entire Land; (b) in Tenant's reasonable determination (with Leasehold Mortgagee's Consent) renders the remaining Land Uneconomic; or (c) occurs less than 2 years before the end of the Term.

1.72 "Subtenant" means any Person entitled to occupy, use, or possess any Land under a Sublease.

1.73 "Supplementary Agreement" means any other agreement, guaranty, letter of credit, security agreement, or other document (except this Lease) by which any Person provides assurances, credit enhancement, or security for any party's performance under this Lease.

1.74 "Term" means the Initial Term, as extended from time to time by Tenant's valid exercise of Renewal Option(s) to include one or more Renewal Term(s).

1.75 "Transfer" of any property means any of the following, whether by operation of law or otherwise, whether voluntary or involuntary, and whether direct or indirect: (a) any assignment, conveyance, grant, hypothecation, mortgage, pledge, sale, or other transfer, whether direct or indirect, of all or any part of such property, or of any legal, beneficial, or equitable interest or estate in such property or any part of it (including the grant of any easement, lien, or other encumbrance); (b) any conversion, exchange, issuance, modification, reallocation, sale, or other transfer of any direct or indirect Equity Interest(s) in the owner of such property by the holders of such Equity Interest(s); (c) any transaction described in "b" affecting any Equity Interest(s) or any other interest in such property or in any such owner (or in any other direct or indirect owner at any higher tier of ownership) through any manner or means whatsoever; or (d) any transaction that is in substance equivalent to any of the foregoing. A transaction affecting Equity Interests, as referred to in clauses "b" through "d," shall be deemed a Transfer by Tenant even though Tenant is not technically the transferor. A "Transfer" shall not, however, include any of the foregoing (provided that the other party to this Lease has received Notice thereof) relating to any Equity Interest: (a) that constitutes a mere change in form of ownership with no material change in beneficial ownership and constitutes a tax-free transaction under federal income tax law and the State real estate transfer tax; (b) to member(s) of the immediate family(ies) of the transferor(s) or trusts for their benefit; or (c) to any Person that, as of the Commencement Date, holds an Equity Interest in the entity whose Equity Interest is being transferred.

1.76 "Trust Funds" means any funds that this Lease requires or allows Landlords (or anyone acting on Landlords' behalf) to hold, and in which Tenant has an interest.

1.77 "Unavoidable Delay" means delay in performing any obligation under this Lease (except payment of money) arising from or on account of any cause whatsoever beyond the obligor's reasonable control, despite such obligor's reasonable diligent efforts, including industry-wide strikes, labor troubles or other union activities (but only to the extent such actions affect similar Land at that time and do not result from an act or omission of the obligor), the obligor's inability to obtain required labor or materials after commercially reasonable efforts to do so, litigation (unless caused by the obligor), Loss, accidents, Laws, governmental preemption, war, or riots. Unavoidable Delay shall exclude delay caused by the obligor's financial condition, illiquidity, or insolvency. Any obligor claiming Unavoidable Delay shall Notify the obligee: (a) within 30 days after such obligor knows of any such Unavoidable Delay; and (b) within 10 days after such Unavoidable Delay ceases to exist. To be effective, any such Notice must describe the Unavoidable Delay in reasonable detail. Where this Lease states that performance of any obligation is subject to Unavoidable Delay(s) or words of similar import, such Unavoidable Delay(s) shall extend the time for such performance only by the number of days by which such Unavoidable Delay(s) actually delayed such performance.

1.78 "Usury Limit" means the highest rate of interest, if any, that Law allows under the circumstances.

1.79 "Waiver of Subrogation" means a provision in, or endorsement to, any property insurance policy, by which the carrier agrees to waive rights of recovery by way of subrogation against either party to this Lease for any loss such policy covers.

Article 2. TERM

2.01 Initial Term. The initial term of this Lease (the "Initial Term") shall: (a) commence on the Commencement Date; and (b) continue until the Scheduled Expiration Date, unless terminated sooner. If the Commencement Date is not the first (or the Expiration Date is not the last) day of a Lease Year, then from the Commencement Date through the day before the first Lease Year (or from the day after the last Lease Year through the Expiration Date), the parties shall have all the same rights and obligations under this Lease (including regarding Rent) that they do during the first (or the last, as applicable) full Lease Year, all prorated daily.

2.02 Adjustment of Fixed Rents. The parties recognize and agree that the Minnesota Commissioner of Health is required by law to register two manufacturers under Minnesota Statute Section 311 and related laws and rules. The parties recognize and agree that the outcome of the Commissioner's registration under applicable Minnesota law will materially impact this Lease and its parties. Therefore, the parties agree to revisit and renegotiate in good faith the Fixed Rent outlined in Section 3.01 within sixty (60) days of the Commissioner's December 1, 2014 deadline to register two manufacturers under Minnesota Statute Section 311 and related laws and rules.

2.03 The initial term of this Lease (the "Initial Term") shall: (a) commence on the Commencement Date; and (b) continue until the Scheduled Expiration Date, unless terminated sooner. If the Commencement Date is not the first (or the Expiration Date is not the last) day of a Lease Year, then from the Commencement Date through the day before the first Lease Year (or from the day after the last Lease Year through the Expiration Date), the parties shall have all the same rights and obligations under this Lease (including regarding Rent) that they do during the first (or the last, as applicable) full Lease Year, all prorated daily.

2.04 Renewal Option(s). Tenant shall have the right and option (each such right and option, a "Renewal Option") to extend and renew this Lease upon all the same terms and conditions (except as this Lease otherwise expressly states), for one or more additional successive periods, as provided for below (each, a "Renewal Term") after the Initial Term expires. Tenant shall exercise each Renewal Option, if at all, by giving Landlords Notice of such exercise at most 30 months, and at least 12 months, before the first day of the corresponding Renewal Term. Notwithstanding the preceding sentence, Landlords shall give Tenant at least 90 and at most 180 days' prior written notice of the date when Tenant's right to exercise any Renewal Option will expire (a "Reminder Notice"). Tenant's period to exercise any Renewal Option shall automatically be extended until the date 90 days after Tenant has received Landlords' Reminder Notice. After the last Renewal Term, Tenant shall have no further right to renew or extend the Term. The Renewal Terms are:

Renewal Terms

Number	Commencing	Ending
1	January 1, 2040	December 31, 2049
2	January 1, 2050	December 31, 2059
3	January 1, 2060	December 31, 2069

2.05 Conditions to Exercise. If Tenant fails to validly and timely exercise any Renewal Option, then all subsequent Renewal Options shall terminate. Each Renewal Option shall remain effective notwithstanding Tenant's Default, unless and until all cure periods for such Default available to Tenant and Leasehold Mortgagee(s) have expired without cure, Landlords have terminated this Lease, and the period (if any) for any Leasehold Mortgagee to obtain a New Lease has expired. No other conditions, express or implied, shall limit Tenant's right to exercise any Renewal Option(s).

Article 3. RENT

3.01 Fixed Rent. Tenant shall pay Landlords, without notice or demand, in lawful money of the United States of America, a net annual rental (the "Fixed Rent") as follows:

Term	Fixed Rent	
	Annual	Monthly
Initial		

Renewal 1		
Renewal 2		
Renewal 3		

3.02 Renewal Term. If Tenant exercises any Renewal Option, then on the first day of the corresponding Renewal Term, Fixed Rent shall be adjusted to equal the Fixed Rent as in effect (as previously adjusted) during the last Lease Year before such Renewal Term.

3.03 Determination of Land Value. If Tenant exercises any Renewal Option, then the parties shall promptly endeavor to agree upon the Land Value for that Renewal Term. If, six (6) months before the first day of such Renewal Term, they have not agreed, then either shall notify the other of the impasse. Each party shall within 10 Business Days after the effective date of such Notice designate an Appraiser. The two Appraisers so designated shall within 10 Business Days designate a third. If either party fails to timely designate an Appraiser, and does not cure such failure within 10 Business Days after Notice of such failure, then the one Appraiser the other party designated shall resolve the dispute. Within 10 Business Days after designation of the Appraiser(s), each party shall simultaneously submit to the Appraiser(s), with a copy to the other party, such party's proposed Land Value, with such information and supporting materials as each submitter determines appropriate. Within 10 Business Days after the parties have made their submissions, the Appraiser(s), by majority vote (or by the determination of the one Appraiser, if only one Appraiser is designated), shall select as Land Value either Landlords' proposal or Tenant's proposal. The Appraiser(s) shall have no authority to designate any other Land Value. (If a party fails to make a timely proposal, then the submission and exchange of proposals shall be deferred by 10 Business Days. The party that was ready to proceed shall give the other party immediate Notice of such deferral and the consequences of failing to make a timely proposal. If, after such deferral and such Notice, a party still fails to make a timely proposal, then the other party's proposal shall automatically be deemed the Land Value, provided only that the Appraiser(s) determine(s) that such proposal is not commercially unreasonable, arbitrary, or capricious.) The Land Value the Appraiser(s) determine(s) shall be the Land Value for all purposes of this Lease. The parties shall promptly confirm such Land Value in writing. Landlords and Tenant may each, by Notice to the other, delegate to one Mortgagee all its rights under this paragraph. The recipient of such Notice shall be bound by such delegation from and after receipt of such Notice. Any such delegation shall remain effective until the related Mortgagee has either satisfied and discharged its Mortgage of record or given Notice terminating such delegation.

3.04 Payment; Proration; Etc. Tenant shall pay Fixed Rent in equal monthly installments in advance on the first day of each month. Tenant shall pay all Rent payable to Landlords by good and sufficient check payable to Landlords or by wire transfer, at such address as Landlords shall designate from time to time.

3.05 Additional Rent. In addition to Fixed Rent, Tenant shall pay Landlords (or the appropriate third party, as applicable), as additional rent under this Lease, all Additional Rent. Except where this Lease provides otherwise, Tenant shall pay all Additional Rent within 30 days after receipt of an invoice and reasonable backup documentation.

Article 4. ADDITIONAL PAYMENTS BY TENANT; REAL ESTATE TAXES

4.01 Landlords' Net Return. This Lease shall constitute an absolutely "net" lease. The Fixed Rent shall give Landlords an absolutely "net" return for the Term, free of any expenses or charges for the Land, except as this Lease expressly provides. Tenant shall pay as Additional Rent and discharge (subject to Tenant's right of Contest as this Lease expressly provides), before failure to pay creates a material risk of forfeiture or penalty, each and every item of expense, of every kind and nature whatsoever, related to or arising from the Land, or by reason of or in any manner connected with or arising from the leasing, operation, management, maintenance, repair, use, or occupancy of, or Construction affecting, the Land. Notwithstanding anything to the contrary in this Lease, Tenant need not pay, Tenant may offset against Rent any sums paid by Tenant on account of, and Landlords shall Indemnify Tenant against payment of, the following items payable, accrued, or incurred by Landlord: (a) Fee Debt Service; (b) depreciation, amortization, brokerage commissions, financing or refinancing costs, management fees, or leasing expenses for the Fee Estate or the Land; (c) consulting, overhead, accounting, tax preparation, other professional fees, travel, legal and staff costs, bank service charges, and other costs incidental to Landlords' ownership of the Land and administration and monitoring of this Lease, including such costs Landlords incur in reviewing anything Tenant delivers under this Lease (except where this Lease expressly provides otherwise) or determining whether Tenant is in compliance with this Lease; (d) any costs or expenses that Landlords incur in or for any Mediation, except to the extent that this Lease requires Tenant to pay such costs or expenses; (e) any costs arising from or under any instrument or agreement affecting the Land (but not a Permitted Exception) and to which either Landlord is a party and Tenant is not a party; (f) any insurance premiums, utilities, operating expenses, or other costs related to the Land that accrued before the Commencement Date; (g) any sums payable by Landlords under this Lease or expressly excluded from the definition of Real Estate Taxes; and (h) all other costs or expenses that, by their nature, are personal to Landlords or Landlords' business of investing in real estate or ownership of the Fee Estate.

4.02 Real Estate Taxes. Tenant shall pay and discharge all Real Estate Taxes payable or accruing for all period(s) on the Land within the Term, before failure to pay creates a material risk to Landlords of forfeiture or penalty, subject however to Tenant's right of Contest as this Lease expressly provides. Tenant shall also pay all interest and penalties any Government assesses for late payment of any Real Estate Taxes, except late payment because Landlords failed to remit any payment for Real Estate Taxes (paid to Landlords by Tenant) in accordance with Tenant's reasonable instructions (provided they involve only ministerial functions) or failed to promptly forward Tenant a copy of any applicable bill that Landlords receive. In the latter case Landlords shall pay such interest and penalties. Tenant shall within a reasonable time after Notice from Landlords give Landlords reasonable proof that Tenant has paid any Real Estate Taxes that this Lease requires Tenant to pay. Tenant shall have the sole right and authority to contest Real Estate Taxes, in compliance with the Contest Conditions.

4.03 Assessments in Installments. To the extent Law allows, Tenant may apply to have any assessment payable in installments. Upon approval of such application, Tenant shall pay and discharge only such installments as become due and payable during the Term.

4.04 Business Improvement District Decisions. If any proposal is made to include the Land in any Business Improvement District (or to Modify the terms of any Business Improvement District, including the amount or calculation of any required payments or assessments) and the owner of the Land is entitled to vote in favor of or against such proposal, then Tenant shall decide how to vote, the parties shall cooperate to effectuate such decision, and Tenant shall have full power to represent the Land in all matters regarding the Business Improvement District, provided that at the time of determination: (a) no uncured Event of Default exists; and (b) the unexpired Term is one year or more.

4.05 Direct Payment by Landlords. If any Additional Rent must be paid directly by Landlords, then: (a) Landlords appoint Tenant as Landlords' attorney-in-fact to make such payment; and (b) if the payee nevertheless refuses to accept payment from Tenant, then Tenant shall Notify Landlords and shall pay such amount to Landlords in a timely manner with reasonable instructions on remittance of such payment. Landlords shall with reasonable promptness comply with Tenant's reasonable instructions. Landlords shall Indemnify Tenant against Landlords' failure to do so.

4.06 Utilities. Tenant shall arrange and pay for all fuel, gas, light, power, water, sewage, garbage disposal, telephone, and other utility charges, and the expenses of installation, maintenance, use, and service in connection with the foregoing, for the Land during the Term. Landlords shall have absolutely no liability or responsibility for the foregoing, provided that Landlords perform their obligations regarding any related Application.

Article 5. USE

5.01 Permitted Use. Tenant may use the Land for any lawful purpose including, specifically, all business and activity authorized in and permitted under Minnesota Statutes Sections 152 and 311 and related endeavors. Tenant need not operate the Land or conduct business of any nature in the Land, or use or operate the Land in any particular manner. Tenant may discontinue operation of the Land at any time or from time to time. Tenant may vacate the Land.

5.02 Exclusive Control. Tenant shall have exclusive control, possession, occupancy, use, and management of the Land, subject only to Permitted Exceptions. Tenant shall have the exclusive right to install signage, fencing, and security on or at the Land, or to Transfer the right to install such signage, fencing, and security during the Term. Tenant may enter into, terminate, or Modify any existing or future contract for management or operation of the Land or provision of services to the Land. Any such contracts shall automatically expire on the Expiration Date. Tenant may cancel and terminate any management contracts that exist on the Commencement Date by providing Landlords written notice. Landlords will Indemnify Tenant for any such cancellation or termination.

5.03 Management Fees. Tenant shall timely pay and discharge all fees, costs, and expenses related to or arising from the management or operation of the Land and the provision of services to the Land.

Article 6. COMPLIANCE

6.01 Generally. Tenant shall during the Term, at Tenant's expense, in all material respects, subject to Tenant's right of Contest: (a) comply with all Laws and Permitted Exceptions; and (b) procure and comply with all Approvals required by Law.

6.02 Copies of Notices. Landlords shall promptly give Tenant a copy of any notice of any kind regarding the Land, and any notice of nonrenewal or threatened nonrenewal of any Approval that Landlords receive from any Government, utility company, insurance carrier, or insurance rating bureau.

Article 7. MAINTENANCE AND CONSTRUCTION

7.01 Obligation to Maintain. Except to the extent that (a) this Lease otherwise expressly provides or allows or (b) Tenant is performing Construction in compliance with this Lease, Tenant shall during the Term keep and maintain the Land in good order, condition, and repair, subject to Loss (governed by other provisions of this Lease), reasonable wear and tear, and any other condition that this Lease does not require Tenant to repair. Tenant's obligation to maintain the Land includes an obligation to make repairs that the Land may require by Law from time to time during the Term. Tenant shall remove trash, snow, and debris from the Land.

7.02 Construction. At Tenant's sole cost and expense, Tenant may (but need not) perform Construction as Tenant considers necessary or appropriate. To the extent that Tenant commences any Construction, Tenant shall complete it with reasonable diligence and within a reasonable time. Tenant shall pay for all Construction when and as required by the parties that perform such Construction. All Improvements that Tenant constructs on the Land shall become part of the Land.

7.03 Plans and Specifications. To the extent that Tenant obtains plans and specifications or surveys (including working plans and specifications and "as-built" plans and specifications and surveys) for any Construction, Tenant shall promptly upon Landlords' request give Landlords a copy, subject to the terms of any agreement between Tenant and the applicable architect, engineer, or surveyor. Tenant shall exercise reasonable efforts to cause its agreements with such professionals to permit these deliveries, which are for Landlords' information only except to the extent, if any, this Lease otherwise expressly states.

7.04 Excavations. If an excavation shall be made (or authorized) upon land adjacent to the Land, then Tenant shall either: (a) afford to the Person causing or authorized to cause such excavation a license to enter the Land, in accordance with Tenant's reasonable instructions, to perform such work as such Person shall reasonably deem necessary or desirable, and as Tenant shall reasonably approve, provided that such Person agrees to preserve and protect the Land from injury or damage and to support the Land by proper foundations; or (b) perform or cause to be performed, without cost or expense to Landlords in their capacity as Landlords under this Lease, work as described in clause "a" to the extent reasonably necessary under the circumstances. Notwithstanding anything to the contrary in this paragraph, Tenant shall comply with all Law that requires access to the Land for any excavation on adjacent land. Tenant shall not, because of any excavation or work described in this paragraph, have any claim against Landlords in their capacity as such for damages, indemnity, or suspension, diminution, abatement, or reduction of Rent. Any payment made because of any excavation described in this paragraph during the Term shall belong to Tenant free of any claim by Landlords.

7.05 Applications. Upon Tenant's request, Landlords shall, without cost to Landlords, promptly join in and execute any Application as Tenant reasonably requests, provided that: (a) such Application is in customary form and imposes no material obligations (beyond obligations ministerial in nature or merely requiring compliance with Law) upon Landlords; (b) no uncured Event of Default exists; and (c) Tenant reimburses Landlords' Legal Costs. Landlords grant to Tenant a power of attorney, coupled with an interest, and therefore irrevocable, to sign on Landlords' behalf any Application that this Lease requires Landlords to sign. Promptly upon Tenant's request and without charge (except reimbursement of Landlords' Legal Costs), Landlords shall furnish all information in their possession that Tenant reasonably requests for any Application.

7.06 Landlords Nonopposition. Unless an uncured Event of Default exists, Landlords shall not appear in opposition to any Application brought, sought, or defended by Tenant before any Government arising out of any Application consistent with this Lease.

Article 8. PROHIBITED LIENS

8.01 Tenant's Covenant. If a Prohibited Lien is filed then Tenant shall, within 30 days after receiving Notice from Landlords of such filing (but in any case within 15 days after Landlords Notifies Tenant of commencement of foreclosure proceedings), commence appropriate action to cause such Prohibited Lien to be paid, discharged, bonded, or cleared from title. Tenant shall thereafter prosecute such action with reasonable diligence and continuity. If Landlords receive notice of any such filing, then Landlords shall promptly Notify Tenant. Nothing in this Lease shall be construed to: (a) limit Tenant's right of Contest; or (b) obligate Tenant regarding any lien that results from any act or omission by Landlords. If any Subtenant causes a Prohibited Lien, then Tenant's obligations under this paragraph shall be suspended so long as both: (a) Tenant is with reasonable diligence endeavoring to cause the Subtenant to remove the Prohibited Lien; and (b) the holder of the Prohibited Lien has not commenced foreclosure proceedings.

8.02 Protection of Landlords. NOTICE IS HEREBY GIVEN THAT LANDLORDS SHALL NOT BE LIABLE FOR ANY LABOR OR MATERIALS FURNISHED OR TO BE FURNISHED TO TENANT UPON CREDIT, AND THAT NO MECHANIC'S OR OTHER LIEN FOR ANY SUCH LABOR OR MATERIALS SHALL ATTACH TO OR AFFECT THE FEE ESTATE. NOTHING IN THIS LEASE SHALL BE DEEMED OR CONSTRUED IN ANY WAY TO CONSTITUTE LANDLORDS' CONSENT OR REQUEST, EXPRESS OR IMPLIED, BY INFERENCE OR OTHERWISE, TO ANY CONTRACTOR, SUBCONTRACTOR, LABORER, EQUIPMENT OR MATERIAL SUPPLIER FOR THE PERFORMANCE OF ANY LABOR OR THE FURNISHING OF ANY MATERIALS OR EQUIPMENT FOR ANY CONSTRUCTION, NOR AS GIVING TENANT ANY RIGHT, POWER OR AUTHORITY TO CONTRACT FOR, OR PERMIT THE RENDERING OF, ANY SERVICES, OR THE FURNISHING OF ANY MATERIALS THAT WOULD GIVE RISE TO THE FILING OF ANY LIENS AGAINST THE FEE ESTATE. TENANT SHALL INDEMNIFY LANDLORDS AGAINST ANY CONSTRUCTION UNDERTAKEN BY TENANT OR ANYONE CLAIMING THROUGH TENANT, AND AGAINST ALL PROHIBITED LIENS.

Article 9. HAZARDOUS SUBSTANCES

9.01 Restrictions. Tenant shall not cause or permit to occur on, under or at the Land during the Term: (a) any violation of any Environmental Law; or (b) the use, generation, release, manufacture, refining, production, processing, storage, or disposal of any Hazardous Substance, or transportation to or from the Land of any Hazardous Substance, unless both: (i) reasonably necessary and customary to conduct any legal business in the Land in accordance with customary standards in such business, or to operate and maintain the Land for uses this Lease permits and (ii) in compliance with all Environmental Laws.

9.02 Compliance; Clean-Up. Tenant shall, at Tenant's expense: (a) comply with Environmental Law and, to the extent Environmental Law requires, clean up any Hazardous Substance Discharge; (b) make all submissions to, deliver all information required by, and otherwise fully comply with all requirements of any Government under Environmental Laws; (c) if any Government requires any clean-up plan or clean-up because of a Hazardous Substances Discharge, prepare and submit the required plans and all related bonds and other financial assurances; (d) promptly and diligently carry out all such clean-up plans; and (e) Indemnify Landlords against any Hazardous Substances Discharge or violation of Environmental Law. Any party's obligations under this paragraph shall not limit such party's rights against third parties.

Article 10. INDEMNIFICATION; LIABILITY OF LANDLORD

10.01 Obligations. Landlords and Tenant shall each Indemnify the other against any: (a) wrongful act, wrongful omission, or negligence of the Indemnitor (and anyone claiming by or through the Indemnitor) or its or their partners, members, directors, officers, or employees; (b) breach or default by the Indemnitor under this Lease; or (c) breach of any representation or warranty Indemnitor makes in this Lease. Tenant shall Indemnify Landlords against the following during the Term and so long as Tenant remains in possession after the Expiration Date: (u) any Contest Tenant initiates; (v) any Application made at Tenant's request; (w) use, occupancy, control, management, operation, and possession of the Land; (x) any Construction and any agreements that Tenant (or anyone claiming through Tenant) makes for any Construction; (y) the condition of the Land or any street, curb or sidewalk adjoining the Land, or of any vaults, tunnels, passageways or space under, adjoining or appurtenant to the Land; and (z) any accident, injury or damage whatsoever caused to any person in or on the Land or upon or under the sidewalks adjoining the Land. Notwithstanding anything to the contrary in this Lease, no Indemnitor shall be required to Indemnify any Indemnitee regarding the Indemnitee's intentional acts or omissions or negligence. This paragraph does not apply to Environmental Law and Hazardous Substances Discharges, which are covered elsewhere.

10.02 Liability of Landlords. During the Term: (a) Tenant is and shall be in exclusive control and possession of the Land; and (b) Landlords shall not be liable for any injury or damage to any property (of Tenant or any other Person) or to any person occurring on or about the Land, except to the extent caused by Landlords' intentional act, omission, or negligence. Landlords' right to enter and inspect the Land is intended solely to allow Landlords to ascertain whether Tenant is complying with this Lease and (to the extent this Lease allows) to cure any Default. Such provisions shall not impose upon Landlords any liability to third parties. Nothing in this Lease shall be construed to exculpate, relieve, or Indemnify Landlords from or against any liability of Landlord: (y) to third parties existing at or before the Commencement Date; or (z) arising from Landlords' intentional acts or omissions or negligence.

10.03 Indemnification Procedures. Wherever this Lease requires any Indemnitor to Indemnify any Indemnitee:

10.03.01 Prompt Notice. Indemnitee shall promptly Notify Indemnitor of any claim. To the extent, and only to the extent, that Indemnitee fails to give prompt Notice and such failure materially prejudices Indemnitor, Indemnitor shall be relieved of its indemnity obligations for such claim.

10.03.02 Selection of Counsel. Indemnitor shall select counsel reasonably acceptable to Indemnitee. Counsel to Indemnitor's insurance carrier shall be deemed satisfactory. Even though Indemnitor shall defend the action, Indemnitee may, at its option and its own expense, engage separate counsel to advise it regarding the claim and its defense. Such counsel may attend all proceedings and meetings. Indemnitor's counsel shall actively consult with Indemnitee's counsel. Indemnitor and its counsel shall, however, fully control the defense.

10.03.03 Cooperation. Indemnitee shall reasonably cooperate with Indemnitor's defense, provided Indemnitor reimburses Indemnitee's actual reasonable out of pocket expenses (including Legal Costs) of such cooperation.

10.03.04 Settlement. Indemnitor may, with Indemnitee's consent, not to be unreasonably withheld, settle the claim. Indemnitee's consent shall not be required for any settlement by which: (w) Indemnitor procures (by payment, settlement, or otherwise) a release of Indemnitee by which Indemnitee need not make any payment to the claimant; (x) neither Indemnitee nor Indemnitor on behalf of Indemnitee admits liability; (y) the continued effectiveness of this Lease is not jeopardized in any way; and (z) Indemnitee's interest in the Land is not jeopardized in any way.

10.03.05 Insurance Proceeds. Indemnitor's obligations shall be reduced by net insurance proceeds Indemnitee actually receives for the matter giving rise to indemnification.

Article 11. RIGHT OF CONTEST

11.01 Tenant's Right; Contest Conditions. Notwithstanding anything to the contrary in this Lease, Tenant shall have the right to contest, at its sole cost, by appropriate legal proceedings diligently conducted in good faith, the amount or validity of any Real Estate Taxes or Prohibited Lien; the valuation, assessment, or reassessment (whether proposed, phased, or final) of the Land for Real Estate Taxes; the amount of any Real Estate Tax; the validity of any Law or its application to the Land; the terms or conditions of, or requirements for, any Approval; or the validity or merit of any claim against which this Lease requires Tenant to Indemnify Landlords (any of the foregoing, a "Contest"). Tenant may defer payment or performance of the contested obligation pending outcome of the Contest, provided that Tenant causes the following conditions (collectively, the "Contest Conditions") to remain satisfied:

11.01.01 No Criminal Act. Such deferral or noncompliance shall not constitute a criminal act by Landlords or subject Landlords to a material risk of any fine or penalty, except civil penalties for which Tenant has given Landlords a bond, letter of credit, or other security reasonably satisfactory to Landlords (the "Contest Security") in an amount equal to the reasonably estimated amount of such civil penalties.

11.01.02 No Liability. Such deferral or noncompliance creates no material risk of a lien, charge, or other liability of any kind against the Fee Estate, unless Tenant has given Landlords Contest Security equal to the reasonably estimated amount of such lien, charge, or other liability.

11.01.03 No Forfeiture. Such deferral or noncompliance will not place the Fee Estate in material danger of being forfeited or lost.

11.01.04 No Cost to Landlords. Such Contest shall be without cost, liability, or expense to Landlords.

11.01.05 Diligence. Tenant shall prosecute such Contest with reasonable diligence and in good faith.

11.01.06 Payment. If required for such Contest, Landlords shall have paid the Contested Real Estate Taxes or other matter.

11.01.07 Collection of Real Estate Taxes. If such Contest relates to any Real Estate Tax, then such Contest shall suspend its collection from Landlords and the Fee Estate.

11.01.08 No Tax Deed. If, at any time, payment of any Real Estate Taxes is necessary to prevent the imminent (i.e., within 30 days) delivery of a tax deed of the Fee Estate for nonpayment, then Landlords shall pay or cause to be paid the sums in sufficient time to prevent delivery of such deed.

11.01.09 No Event of Default. No Uncured Event of Default shall exist under this Lease at the time of such Contest.

11.01.10 Named Parties. If either Landlord has been named as a party in any action, then Tenant shall cause Landlord(s) to be removed as such party and Tenant substituted in Landlords' place, if permissible under the circumstances.

11.02 Landlords' Obligations and Protections. Landlords need not join in any Contest unless (a) Tenant has complied with the Contest Conditions; and (b) such Contest must be initiated or prosecuted in Landlords' names. In such case, Landlords shall cooperate, as Tenant reasonably requests, to permit the Contest to be prosecuted in Landlords' names. Landlords shall give Tenant any documents, deliveries, and information in Landlords' control and reasonably necessary for Tenant to prosecute its Contest. Landlords shall otherwise assist Tenant in such Contest as Tenant reasonably requires. Tenant shall pay all reasonable costs and expenses, including Legal Costs, of any Contest. Tenant shall, at Landlords' request, advance (when Landlords incurs them) such reasonable costs and expenses as Landlords incurs or reasonably anticipates incurring, for Tenant's Contest and Landlords' assistance with such Contest.

11.03 Miscellaneous. Landlords shall be entitled to any refund of any Real Estate Taxes (and penalties and interest paid by Landlords), to the extent attributable to periods within the Term, whether such refund is made during or after the Term. When Tenant concludes Tenant's Contest of any Real Estate Taxes, Landlords shall pay the amount of such Real Estate Taxes (if any) as has been finally determined in such Contest to be due, to the extent attributable to periods within the Term, and any costs, interest, penalties, or other liabilities in connection with such Real Estate Taxes. Upon final determination of Tenant's Contest of a Law, Tenant shall comply with such final determination. So long as the Contest Conditions remain satisfied, Landlords shall enter no objection to any Contest. Landlords may contest any matter for which Tenant is entitled to (but does not) prosecute a Contest, but only if: (a) Landlords Notify Tenant of Landlords' intention to do so; (b) Tenant fails to commence such Contest within 15 days after receipt of such Notice; and (c) Landlords' contest complies with all conditions and covenants that would apply to a Contest by Tenant, transposing references to the parties and their interests as appropriate.

11.04 Contest Security. Landlords shall promptly release any Contest Security to Tenant after the Contest has been resolved and Tenant has performed its obligations, if any, as determined by such resolution. Landlords shall hold any Contest Security in the same manner as the Security.

Article 12. INSURANCE

12.01 Tenant to Insure. Tenant shall, at its sole expense, during the Term, maintain the following insurance (or its then reasonably available equivalent): (a) Property Insurance; and (b) Liability Insurance.

12.02 Nature of Insurance Program. All insurance policies this Lease requires shall be issued by carriers that: (a) have a policyholders' rating of "B+-VIII" or better, based on the latest rating publication of Property and Casualty Insurers by A.M. Best Company (or its equivalent if such publication ceases to be published); and (b) are lawfully doing business in the State. Tenant may provide any insurance under a "blanket" or "umbrella" insurance policy, provided that (i) such policy or a certificate of such policy shall specify the amount(s) of the total insurance allocated to the Land, which amount(s) shall equal or exceed the amount(s) required by this Lease and shall not be reduced for claims made for other properties; and (ii) such policy otherwise complies with this Lease.

12.03 Policy Requirements and Endorsements. All insurance policies this Lease requires shall contain (by endorsement or otherwise) the following provisions:

12.03.01 Insureds. Liability Insurance policies shall name Landlords as "additional insureds" and all Mortgagees this Lease allows as "additional insureds." Notwithstanding anything to the contrary in this paragraph, all Property Insurance Proceeds shall be paid and applied as this Lease provides.

12.03.02 Primary Coverage. All policies shall be written as primary policies not contributing to or in excess of any coverage that Landlords may carry.

12.03.03 Contractual Liability. Liability Insurance policies shall contain contractual liability coverage, for Tenant's indemnity obligations under this Lease, to the extent covered by customary contractual liability insurance coverage. Tenant's failure to obtain such contractual liability coverage shall not relieve Tenant from any indemnity obligation under this Lease.

12.03.04 Notice to Landlords. The insurance carrier shall undertake to give Landlords 30 days' prior Notice of cancellation or nonrenewal, except for nonpayment of premiums, provided that failure to give such Notice shall not adversely affect the rights or increase the obligations of the insurance carrier.

12.04 Deliveries to Landlords. On the Commencement Date, and no later than 10 days before any Liability Insurance or Property Insurance expires or is cancelled, Tenant shall deliver to Landlords certificates of insurance evidencing Tenant's maintenance of all Liability Insurance and Property Insurance this Lease requires, in each case providing coverage for at least one year from the date delivered. In the event of any dispute regarding Tenant's compliance with the insurance requirements of this Lease, Tenant may at Tenant's option obtain a certificate from a reputable insurance broker confirming such compliance. Such certificate shall be dispositive.

12.05 Tenant's Inability to Obtain Insurance. So long as (a) any insurance (except Property Insurance) this Lease requires is, after diligent effort by Tenant, unobtainable at commercially reasonable rates through no act or omission by Tenant; (b) a Leasehold Mortgagee that is an Institutional Lender has waived the provision or maintenance of such insurance; and (c) Tenant obtains the maximum insurance coverage reasonably obtainable and Notifies Landlords of the extent of Tenant's inability to obtain the full insurance this Lease requires, Tenant's obligation to procure and maintain such insurance as is unobtainable shall be excused, but only so long as conditions "a" through "c" are satisfied. Notwithstanding the foregoing, if Landlords at any time can procure for Tenant such insurance at commercially reasonable rates at any time after Tenant's Notice of inability to do so (and before Tenant has withdrawn such Notice), then Tenant shall obtain and maintain such insurance at Tenant's expense.

12.06 Waiver of Certain Claims. To the extent that Landlords or Tenant purchases any policy of property insurance, the party purchasing such insurance (the "Insurance Purchaser") shall attempt to cause the insurance carrier to agree to a Waiver of Subrogation, if not already in the policy. If any insurance policy cannot be obtained with a Waiver of Subrogation, or a Waiver of Subrogation is obtainable only by paying an additional premium, then the Insurance Purchaser shall so Notify the other party. The other party shall then have 10 Business Days after receipt of such Notice either to (a) direct the Insurance Purchaser to place such insurance with a company reasonably satisfactory to the other party and willing to issue the insurance with a Waiver of Subrogation at no greater or additional cost; or (b) agree to pay the additional premium if such a policy can be obtained only at additional cost. To the extent that the parties actually obtain insurance with a Waiver of Subrogation, the parties release each other, and their respective authorized representatives, from any claims for damage to any person or the Land that are caused by or result from risks insured against under such insurance policies.

12.07 No Representation. Neither party makes any representation that the limits, scope, or forms of insurance coverage this Lease requires are adequate or sufficient.

Article 13. Losses and Loss Proceeds

13.01 Notice. If either party becomes aware of any Casualty or any actual, threatened, or contemplated Condemnation, then such party shall promptly Notify the other.

13.02 Effect of Casualty. If any Casualty occurs, then: (a) no Rent shall abate; (b) this Lease shall not terminate or be impaired; and (c) Tenant shall Restore with reasonable promptness regardless of cost. If, however, the Casualty is a Substantial Casualty, then Tenant may, by Notice to Landlords, given within three months after the Casualty, terminate this Lease effective 60 days after such Notice, provided that Tenant assigns to Landlords all Property Insurance Proceeds (and rights thereto) arising from the Casualty.

13.03 Adjustment of Claims; Use of Property Insurance Proceeds. Unless Tenant has validly elected a Casualty Termination, Tenant shall have the sole right and authority to adjust any insurance claim, subject to rights of Leasehold Mortgagee(s). Subject to any Leasehold Mortgagee's loan documents, Property Insurance Proceeds shall be disbursed: (a) in the case of an Immaterial Loss, to Tenant, to be held in trust to be applied first for Restoration; and (b) in the case of any other Casualty, to Depository, to be released in installments for Restoration provided that Restoration Funds are sufficient to Restore. To obtain each such disbursement, Tenant shall deliver to Depository:

13.03.01 Architect's Certificate. A certificate of Tenant's licensed architect, confirming that in such architect's professional judgment: (a) the sum then being requested is then properly due and payable to contractors, subcontractors, or other Persons for Restoration; (b) Restoration is proceeding in substantial compliance with the applicable plans and specifications and otherwise satisfactorily; (c) the sum being requested does not exceed the amount then due and payable; (d) except in the case of the final disbursement of Restoration Funds, the remaining Restoration Funds after disbursement are reasonably anticipated to suffice to pay for the remaining Restoration yet to be performed; and (e) in the case of the final disbursement of Restoration Funds, Tenant has substantially completed Restoration and obtained a temporary certificate of occupancy for the Restoration to the extent Law requires and delivered (or simultaneously delivers in exchange for payment) final lien waivers from all Persons otherwise entitled to claim a Prohibited Lien because of the Restoration;

13.03.02 Lien Waivers. Progress lien waivers for Restoration completed and paid for through the date of the preceding disbursement; and

13.03.03 Other. Such other documents, deliveries, certificates, and information as Depository reasonably requires.

13.04 Substantial Condemnation. If a Substantial Condemnation occurs, then this Lease (except as it relates to allocation of the Condemnation Award) shall terminate on the Condemnation Effective Date. Rent shall be apportioned accordingly. The Condemnation Award shall be allocated as follows: Tenant's share of any condemnation award will be no less than the total condemnation award less the value of Landlords' reminder interest in the Land, considered as if unimproved and as if this Lease had not terminated. To the extent that Tenant is entitled to any condemnation award, it will be paid to the most senior Leasehold Mortgagee.

13.05 Insubstantial Condemnation. If an Insubstantial Condemnation occurs, then (subject to Leasehold Mortgages) any Condemnation Award shall be paid to Depository to be applied first for Restoration in the same manner as Property Insurance Proceeds. Tenant shall Restore in the same manner as Restoration upon Casualty. Any Condemnation Award remaining after Restoration shall be applied in the same manner as a Condemnation Award from an Immaterial Loss, including the adjustment in Fixed Rent provided for in such case.

13.06 Temporary Condemnation. If a Temporary Condemnation relates to a period longer than 60 days, then Tenant may, by Notice within 60 days of the Notice Date, terminate this Lease effective on the Condemnation Effective Date. If the Temporary Condemnation relates to a shorter period, or if Tenant does not terminate this Lease, then Tenant shall receive any Condemnation Award (to the extent for periods within the Term), without affecting Tenant's obligations in any way.

13.07 Immaterial Loss. If an Immaterial Loss occurs, then Tenant shall receive any Condemnation Award in trust to be applied first to Restoration. Tenant shall Restore in accordance with this Lease. After Restoration, Landlords shall receive any remaining Condemnation Award. From and after the effective date of the Immaterial Loss, Fixed Rent shall be adjusted as follows. New Fixed Rent shall equal the product of (a) Fixed Rent before the Immaterial Loss, times (b) a fraction whose numerator is the aggregate value of the Land after the Immaterial Loss and whose denominator is the aggregate value of the Land immediately before such Immaterial Loss, without considering such Immaterial Loss or the expectation thereof. Subsequent Fixed Rent shall be adjusted proportionately.

13.08 Disputes. Any dispute about a Loss (including its characterization), Restoration, timing of Restoration, Loss Proceeds, Restoration Funds, or the use of such proceeds or funds shall be resolved by mediation first, then litigation in Minnesota State Court.

Article 14. Representations and Warranties

Landlords represent and warrant to Tenant that the following facts and conditions exist and are true as of the Commencement Date. In addition, Tenant makes, for the benefit of Landlords, certain reciprocal representations and warranties as set forth below.

14.01 Due Authorization and Execution. Landlords have full right, title, authority, and capacity to execute and perform this Lease, the Memorandum of Lease, and any other agreements and documents to which Landlords are a party and referred to or required by this Lease (collectively, the "Lease-Related Documents"); the execution and delivery of the Lease-Related Documents have been duly authorized by all requisite actions of Landlords; the Lease-Related Documents constitute valid, binding, and enforceable obligations of Landlords; and neither the execution of the Lease-Related Documents nor the consummation of the transactions they contemplate violates any agreement (including Landlords' organizational documents), contract, or other restriction to which Landlords are parties or are bound. Tenant makes to Landlords representations and warranties reciprocal to those in the preceding sentence. Both parties' representations and warranties in this paragraph shall continue to apply in full force and effect throughout the Term as if made continuously during the Term.

14.02 No Litigation. There is no existing or, to Landlords' knowledge, pending or threatened litigation, suit, action, or proceeding before any court or administrative agency affecting Landlords, any constituent entity or individual of Landlords, or the Land that would, if adversely determined, materially adversely affect Landlords, the Land, this Lease, the Leasehold Estate, or Tenant's ability to develop and operate the Land.

14.03 No Pending Condemnation. There is no existing or, to Landlords' knowledge, pending or threatened Condemnation affecting any portion of the Land or any pending public improvements in, about, outside, or appurtenant to the Land that will materially adversely affect the use and operation of the Land, the value of the Land, or access to the Land or that will create additional cost to any owner or Tenant of the Land by means of special assessments or otherwise.

14.04 Equipment Liens. The Land are free and clear of any rights or claims of a type that, if Tenant entered into or granted them after the Commencement Date, would constitute Equipment Liens.

14.05 FIRPTA. Landlords are not "foreign persons" within the meaning of United States Internal Revenue Code §1445(f)(3).

14.06 No Pending Construction or Liens. Landlords are not parties to any contract for any Construction. No Person has the right to claim any mechanic's or supplier's lien arising from any labor or materials furnished to the Land before the Commencement Date.

14.07 No Other Tenants. Tenant is the only lessee of the Land. No other Person has any right to lease, use, or occupy the Land at any time.

Article 15. LANDLORDS' TRANSFERS

15.01 Landlords' Right to Convey. Landlords (or the holder of any Equity Interest in Landlords) may Transfer the Fee Estate (or such Equity Interest) from time to time, but only if (a) the transferor has first complied with Tenant's ROFR; (b) such transaction and the resulting ownership of Landlords do not otherwise violate this Lease; and (c) Landlords promptly Notify Tenant of such Transfer. If any transaction violates the preceding sentence, then: (w) it shall be null, void, and of no force or effect; (x) notwithstanding the foregoing, Tenant shall be entitled to equitable relief to cancel and rescind it; (y) Tenant may terminate this Lease; and (z) Tenant may exercise any other available right or remedy.

15.02 Release of Landlords. Upon any Transfer of the entire Fee Estate in compliance with this Lease, the grantor shall be automatically freed and relieved from all liability (excluding liability previously accrued) for performance of any covenants or obligations to be performed by Landlords after the Transfer, provided that: (i) Landlords deliver and turn over to the grantee all Trust Funds; and (ii) such successor Landlord(s) acknowledge to Tenant receipt of such Trust Funds and assumes Landlords' past, present, and future obligations under this Lease, subject to the Nonrecourse Clause. This Lease shall bind Landlords only while Landlords own the Fee Estate, except as to any liabilities and obligations accrued before the date of Transfer of the Fee Estate or arising from failure to turn over Trust Funds.

15.03 Development Rights. Without Tenant's prior written consent, which Tenant may withhold for any reason or no reason, Landlords shall enter into no Development Rights Transfer.

15.04 Tenant's Right of First Refusal. If Landlords desire to Transfer the Fee Estate in the Land or any of Landlords' adjacent land (P.I.D. R118-800-281200 or P.I.D. R118-800—28101), then, provided that this Lease has not terminated or expired, Landlords shall first offer (the "Landlords' Offer") to Transfer the Fee Estate to Tenant (or a purchaser Tenant procures) ("Tenant's ROFR") before offering it to any other Person, all as follows:

15.04.01 Certain Exempt Transactions. Tenant's ROFR shall not apply to: (a) the grant of a bona fide Fee Mortgage to an Institutional Lender; (b) any Transfer by (or in lieu of) exercise of remedies under such a Fee Mortgage; or (c) any subsequent Transfer(s) by anyone whose title derives directly or indirectly from any Transfer in clause "b."

15.04.02 Landlords' Offer. Landlords' Offer shall be in writing and shall set forth the terms on which Landlords propose to Transfer the Fee Estate. Such terms shall: (a) require either payment in cash at closing or deferred payments secured, if at all, only by a standard printed form Fee Mortgage; (b) involve no any other property; (c) not require either purchaser or seller to perform or bear any material post-closing obligations or deliver any guaranties; (d) allow the purchaser to assign its contract; and (e) require conveyance of title subject only to permitted exceptions. The Transfer shall otherwise be on the terms of a standard printed form contract of sale used in the State for improved real property and selected by Tenant, modified as necessary in Tenant's reasonable judgment to reflect the terms of Landlords' Offer, with a closing 60 to 180 days (as Tenant specifies on 30 days' Notice to Landlords) after the date Tenant has accepted Landlords' Offer. Time shall not be of the essence for the closing date. Tenant's acceptance of Landlords' Offer shall not limit any of Tenant's obligations under this Lease (including Tenant's obligations to continue to pay Rent) unless and until the Transfer has actually closed.

15.04.03 Sale to Third Party. If Tenant Notifies Landlords that Tenant does not desire to purchase the Fee Estate on the terms of Landlords' Offer, or if Tenant fails to accept Landlords' Offer within 30 days after receipt, then Landlords may Transfer the Fee Estate to any other Person, except as set forth below, provided that such Transfer closes within 180 days after the date of Landlords' Offer and complies with the limitations that apply to "Landlords' Offer" in the previous paragraph. If, however, Landlords desire to Transfer the Fee Estate for a price less than 95% of the price in Landlords' Offer, or on terms that in any other way are materially more favorable to the purchaser than those in Landlords' Offer, then Landlords shall again deliver to Tenant a Landlords' Offer. The procedure described above shall again apply, but Tenant's response period shall be 15 days.

15.04.04 Transferees. Any purchaser (or direct or indirect subsequent purchaser) of the Fee Estate or any interest in the Fee Estate shall be bound, as to subsequent Transfers, by Tenant's ROFR, whether or not the instrument(s) of Transfer to such purchaser so state.

15.05 Equity Interests. If the holder of any Equity Interest in Landlords desires to Transfer such Equity Interest, then such holder shall comply with Tenant's ROFR, but each reference to the Fee Estate shall refer to such Equity Interest and each reference to Landlords shall refer to the holder of such Equity Interest. Landlords shall cause such holder to comply with Tenant's ROFR.

Article 16. FEE MORTGAGES

This Lease and the Leasehold Estate shall be prior and superior to all Fee Mortgages and the rights of all Fee Mortgagees. Any inconsistency between any Fee Mortgage and this Lease shall be resolved in favor of this Lease.

Article 17. TENANT'S TRANSFERS

17.01 Tenant's Absolute Right. Tenant may Transfer this Lease or the Leasehold Estate without Landlords' consent, except to any Person that is (or can elect to be) immune from civil process. Any assignee of Tenant shall assume all obligations and liabilities of Tenant under this Lease. Tenant shall pay all transfer and other taxes payable on account of any Transfer by Tenant or any holder of any Equity Interest in Tenant. Tenant shall promptly Notify Landlords of any Transfer. After Tenant assigns this Lease and the assignee assumes it, the assignor shall have no obligation or liability under this Lease, except: (a) any obligation to hold and apply Restoration Funds held by the assignor at the date of the assignment (unless transferred to the assignee); and (b) any unperformed obligations that arose before the assignment (unless assumed in writing, in recordable form, by the assignee). If Tenant assigns this Lease, then as between Landlords and Tenant, Tenant shall be deemed to have assigned to the assignee or transferee all claims against Landlords then existing, and the assignee shall be deemed, by assuming this Lease, to have assumed all liabilities and obligations of Tenant then existing or thereafter arising under this Lease (except as this Lease otherwise expressly states).

Article 18. SUBLEASES

18.01 Tenant's Right. Tenant may enter into or Modify any Sublease, terminate any Sublease or evict any Subtenant, and grant any consent under any Sublease, all without Landlords' consent. No Sublease shall affect any obligations of Tenant or rights of Landlords under this Lease, all of which shall continue in full force and effect notwithstanding any Sublease. Any Sublease shall expire no later than one hour before the Expiration Date. The fact that any Subtenant causes any Default shall not relieve Tenant of Tenant's obligation to cure it. Tenant shall take all steps reasonable and necessary to prevent any such Default.

18.02 Assignment of Subrents. Unless and until this Lease has terminated, Tenant shall have a license to exercise its right, title, and interest in and to all Subleases and Subrent. Landlords may revoke such license, at their option, if and only if this Lease has terminated. Upon any such revocation, Landlords may collect Subrent directly from Subtenants, and apply the net amount collected to the Rent. No such collection shall be, or be deemed to be, Landlords' waiver of any terms of this Lease, acceptance of any Subtenant as Tenant, or release of Tenant from any obligations under this Lease. Any sums Landlords collect in excess of the net amount Landlords apply against Rent shall (so long as this Lease has not been terminated) belong to Tenant and be promptly refunded to Tenant (subject to the rights of Leasehold Mortgagee).

18.03 Required Provisions. Each Sublease shall contain provisions in form and substance substantially as set forth below in this Section. By executing its Sublease, each Subtenant shall be deemed to have agreed to these provisions, which reflect the definitions in this Lease. All such defined terms shall be modified in the Sublease as appropriate to reflect the definitions in the Sublease.

> All terms, covenants, and provisions of this Sublease and all rights, remedies, and options of Subtenant under this Sublease are and shall at all times remain fully subject and subordinate in all respects to the Lease. If the Lease and the Leasehold Estate terminate, then this Sublease shall terminate. In that event, Subtenant, only at the option and request of Landlords (except as Landlords have agreed otherwise in writing), shall attorn to Landlords and recognize Landlords as Subtenant's direct Landlords under this Sublease. Subtenant shall execute and deliver, at any time and from time to time, upon the request of Tenant, Landlords, or any Mortgagee, any instrument necessary or appropriate to evidence such attornment. Subtenant appoints each of the foregoing as Subtenant's attorney-in-fact, irrevocably, with full power of substitution, to execute and deliver any such instrument. This appointment is coupled with an interest and is irrevocable. Subtenant waives any Law that may allow Subtenant to terminate this Sublease or surrender possession of the demised subpremises if the Lease terminates.

18.04 Conditions to Effectiveness of Certain Transactions. No assignment of this Lease or Sublease of (substantially) the entire Land shall be effective or have any validity unless and until such assignment or Sublease otherwise complies with this Lease and Landlords have received: (a) in the case of an assignment, an executed counterpart of the assignment and an assumption of this Lease by the assignee, in recordable form, effective as of the date of assignment; (b) in the case of a Sublease of all or substantially all the Land, a copy of the executed Sublease complying with this Lease; and (c) Notice of the assignee or Subtenant.

Article 19. NONDISTURBANCE OF SUBTENANTS

If this Lease terminates, Landlords shall not disturb the possession, interest, or quiet enjoyment of any subtenant not in default beyond applicable cure periods under its Sublease, provided that the Sublease either: (a) does not demise all or substantially all the Land and was on commercially reasonable and fair market terms (including fixed subrent that cannot decline except upon Loss) when the Subtenant became legally bound; or (b) demises the entire Land and is in all material respects at all times no less favorable to Landlords that this Lease.

Article 20. LEASEHOLD MORTGAGES

20.01 Without Landlords' consent, at any time(s): (a) provided that any monetary or material nonmonetary Event of Default has been, or simultaneously is, cured, Tenant may grant Leasehold Mortgage(s); (b) any Leasehold Mortgagee may initiate and complete any Foreclosure Event and exercise any other rights and remedies against Tenant and the Leasehold Estate (but not the Fee Estate) under its Leasehold Mortgage; and (c) any transferee through a Foreclosure Event, and its successors and assigns, may assign this Lease.

20.02 Lease Impairments. Any Lease Impairment made without Leasehold Mortgagee's consent will (at Leasehold Mortgagee's option) be null, void, and of no force or effect, and not bind Tenant, Leasehold Mortgagee, or New Tenant.

20.03 Notices. Any notice from Landlords to Tenant will have no effect unless Landlords give a copy to Leasehold Mortgagee. If any Default occurs for which Landlords intend to exercise any remedy, Landlords will promptly give Leasehold Mortgagee a Default Notice.

20.04 Opportunity to Cure. Landlords will accept Leasehold Mortgagee's cure of any Default at any time until 60 days after both: (a) Tenant and Leasehold Mortgagee have received the Default Notice for that Default; and (b) Landlords have notified Leasehold Mortgagee that Tenant's cure period for that Default has expired. If Leasehold Mortgagee cannot reasonably cure the Default within Leasehold Mortgagee's cure period under the preceding sentence, it will have further time as it reasonably needs so long as it proceeds with reasonable diligence. If Leasehold Mortgagee cannot reasonably cure a Default without possession, or if any Tenant-Specific Default(s) occur(s), Leasehold Mortgagee will be entitled to additional time it reasonably needs to consummate a Foreclosure Event and obtain possession, provided Leasehold Mortgagee timely exercises its cure rights for all other Defaults. If Leasehold Mortgagee consummates a Foreclosure Event, Landlords will waive all Tenant-Specific Defaults.

20.05 Cure Rights Implementation. Whenever Leasehold Mortgagee's time to cure a Default or consummate a Foreclosure Event has not expired, Landlords will not terminate this Lease, accelerate any rent, or otherwise interfere with Tenant's or Leasehold Mortgagee's possession and quiet enjoyment of the Leasehold Estate. Leasehold Mortgagee may enter the Land to seek a cure of Default. This right or its exercise will not be deemed to give Leasehold Mortgagee possession.

20.06 New Lease. If this Lease terminates for any reason (except with Leasehold Mortgagee's consent or because of a Total Loss), even if Leasehold Mortgagee failed to timely exercise its cure rights for a Default, Landlords will promptly give Leasehold Mortgagee a Lease Termination Notice. By giving notice to Landlords on or before the day that is 15 days after Leasehold Mortgagee receives Landlords' Lease Termination Notice, Leasehold Mortgagee may require Landlords to promptly enter into a New Lease with New Tenant. Landlords need not do so, however, unless New Tenant has, consistent with the Lease Termination Notice: (a) cured all reasonable curable Defaults (except Tenant-Specific Defaults); and (b) reimbursed Landlords' reasonable costs and expenses (including reasonable attorneys' fees and expenses) to terminate this Lease, recover the Land, and enter into the New Lease.

Article 21. EQUIPMENT LIENS

21.01 Tenant's Rights. If at any time or from time to time Tenant desires to enter into or grant any Equipment Lien that otherwise complies with this Lease, and provided that no uncured Event of Default exists, then upon Tenant's request Landlords shall enter into (and shall cause every Fee Mortgagee to enter into) such customary documentation regarding the Financed FF&E as Tenant reasonably requests, providing for matters such as: (a) waiver of any right to take possession of such Financed FF&E upon an Event of Default; (b) waiver of any other right, title, or interest in the Financed FF&E; and (c) agreements to enable the holder of such Equipment Lien to repossess such Financed FF&E if such holder exercises remedies under its Equipment Lien.

21.02 Required Provisions for Equipment Liens. If Tenant enters into any Equipment Lien, then Tenant shall: (i) not file (or cause or permit to be filed) such Equipment Lien as a lien against the Land or any part of the Land (except the Financed FF&E); and (ii) cause to be inserted in the documents for such Equipment Lien a provision to the following effect:

Notwithstanding anything to the contrary herein, this chattel mortgage, conditional sales agreement, title retention agreement, or security agreement shall not create or be filed as a lien against the Fee Estate.

Article 22. QUIET ENJOYMENT; TITLE TO CERTAIN LAND; CERTAIN AGREEMENTS

22.01 Quiet Enjoyment. So long as this Lease has not been terminated, Landlords covenant that Tenant shall and may peaceably and quietly have, hold, and enjoy the Land for the Term, subject to the terms of this Lease, without molestation, hindrance, or disturbance by or from Landlords or anyone claiming by or through Landlords or having title to the Land paramount to Landlords, and free of any encumbrance created or suffered by Landlords, except Permitted Exceptions.

22.02 Access and Inspection. Landlords and Tenant acknowledge and agree that Tenant (and Tenant's subtenants) will have and expect full compliance with a detailed security plan, policies, and procedures, and that Landlords' access and inspection of the Land is subject to the security plan, policies, and procedures in place on the Land. Subject to that compliance, Landlords and their agents, representatives, and designees may enter the Land upon reasonable request during regular business hours, solely to: (a) ascertain whether Tenant is complying with this Lease; (b) cure Tenant's Defaults; (c) inspect the Land and any Construction; (d) perform such tests, borings, and other analyses as Landlords determine may be necessary or appropriate relating to (non)compliance with any Law or possible Hazardous Substances Discharge; or (e) show the Land to a prospective Transferee or Fee Mortgagee. In entering the Land, Landlords and their designees shall not unreasonably interfere with operations on the Land and shall comply with Tenant's reasonable instructions. Landlords will Indemnify Tenant against any claims arising from Landlords' entry upon the Land (except upon termination of this Lease or an Event of Default).

22.03 Title. Notwithstanding anything to the contrary in this Lease, all Improvements, Building Equipment, and FF&E located in, on, or at the Land or otherwise constituting part of the Land shall during the Term be owned by, and belong to, Tenant. All benefits and burdens of ownership of the foregoing, including title, depreciation, tax credits, and all other tax items, shall be and remain in Tenant during the Term.

Article 23. Events of Default; Remedies

23.01 Definition of "Event of Default." An "Event of Default" means the occurrence of any one or more of the following:

23.01.01 Monetary Default. If a Monetary Default occurs and continues for 30 days after Notice from Landlords, specifying in reasonable detail the amount of money not paid and the nature and calculation of each such payment.

23.01.02 Prohibited Liens. If Tenant fails to comply with any obligation regarding Prohibited Liens and does not remedy such failure within 15 days after Notice from Landlords.

23.01.03 Bankruptcy or Insolvency. If Tenant ceases to do business as a going concern, ceases to pay its debts as they become due or admits in writing that it is unable to pay its debts as they become due, or becomes subject to any Bankruptcy Proceeding (except an involuntary Bankruptcy Proceeding dismissed within 180 days after commencement), or a custodian or trustee is appointed to take possession of, or an attachment, execution or other judicial seizure is made with respect to, substantially all of Tenant's assets or Tenant's interest in this Lease (unless such appointment, attachment, execution, or other seizure was involuntary and is contested with diligence and continuity and vacated and discharged within 180 days).

23.01.04 Nonmonetary Default. If any other Nonmonetary Default occurs and Tenant does not cure it within 60 days after Notice from Landlords describing it in reasonable detail, or, in the case of a Nonmonetary Default that cannot with due diligence be cured within 60 days from such Notice, if Tenant shall not (x) within 60 days from Landlords' Notice advise Landlords of Tenant's intention to take all reasonable steps to cure such Nonmonetary Default; (y) duly commence such cure within such period, and then diligently prosecute such cure to completion; and (z) complete such cure within a reasonable time under the circumstances (not necessarily limited to 60 days).

23.02 Remedies. If an Event of Default occurs, then Landlords shall, at Landlords' option, have any or all of the following remedies, all cumulative (so exercise of one remedy shall not preclude exercise of another remedy), in addition to such other remedies as may be available at law or in equity or under any other terms of this Lease. Landlords' remedies include:

23.02.01 Termination of Tenant's Rights. Landlords may terminate Tenant's right to possess the Land by any lawful means, in which case this Lease and the Term shall terminate, such date of termination shall be the Expiration Date, and Tenant shall immediately surrender possession to Landlords.

23.02.02 Taking Possession. Landlords may re-enter and take possession of the Land with process of law, whether by summary proceedings or otherwise, and remove Tenant, with or without having terminated this Lease, and without thereby being liable for damages or guilty of trespass. This is intended to constitute an express right of re-entry by Landlords. Except as expressly provided in this Lease or prohibited by Law, Tenant, for and on behalf of itself and all persons claiming by, through or under Tenant, expressly waives any right to service of notice of intention to re-enter provided in any Law and any and all right of redemption provided by any Law, or re-entry or repossession or to restore the operation of this Lease if Tenant is dispossessed by a judgment or by warrant of any court or judge or in case of re-entry or repossession by Landlords or any expiration or termination of this Lease. No re-entry by Landlords, whether had or taken under summary proceedings or otherwise, shall absolve or discharge Tenant from liability under this Lease. The terms "enter," "re-enter," "entry," and "re-entry," as used in this Lease, are not restricted to their technical legal meanings.

23.02.03 Suits Before Expiration Date. Landlords may sue for damages or to recover Rent from time to time at Landlords' election.

23.02.04 Receipt of Moneys. No receipt of money by Landlords from Tenant after termination of this Lease, or after the giving of any notice of termination of this Lease, shall reinstate, continue, or extend this Lease or affect any notice theretofore given to Tenant, or waive Landlords' right to enforce payment of any Rent payable or later falling due, or Landlords' right to recover possession by proper remedy, except as this Lease expressly states otherwise, it being agreed that after service of notice to terminate this Lease or the commencement of suit or summary proceedings, or after final order or judgment for possession, Landlords may demand, receive, and collect any moneys due or thereafter falling due without in any manner affecting such notice, proceeding, order, suit or judgment, all such moneys collected being deemed payments on account of use and occupation or, at Landlords' election, on account of Tenant's liability.

23.02.05 No Waiver. No failure by Landlords to insist upon strict performance of any covenant, agreement, term, or condition of this Lease or to exercise any right or remedy upon a Default, and no acceptance of full or partial Rent during continuance of any such Default, shall waive any such Default or such covenant, agreement, term, or condition. No covenant, agreement, term, or condition of this Lease to be performed or complied with by Tenant, and no Default, shall be Modified except by a written instrument executed by Landlords. No waiver of any Default shall Modify this Lease. Each and every covenant, agreement, term, and condition of this Lease shall continue in full force and effect with respect to any other then-existing or subsequent Default of such covenant, agreement, term or condition of this Lease.

23.02.06 Conditional Limitation. Landlords may serve upon Tenant a written 60-day notice of cancellation and termination of this Lease. Upon the expiration of such 60-day period, this Lease and the Term shall automatically and without any action by anyone terminate, expire, and come to an end, by the mere lapse of time, as fully and completely as if the expiration of such 60-day period were the Expiration Date. The passage of such 60-day period constitutes the limit beyond which Tenant's tenancy no longer exists. Tenant shall then quit and surrender the Land to Landlords but remain liable as this Lease provides. It is a conditional limitation of this Lease that the Term shall terminate and expire as set forth in this paragraph. This paragraph is intended to establish a conditional limitation and not a condition subsequent. Nothing in this paragraph shall limit Landlords' right to commence and prosecute a summary dispossess proceeding.

23.02.07 Damages. Landlords may recover from Tenant all damages Landlords incur by reason of Tenant's Default, including reasonable costs of recovering possession, reletting the Land, and any and all other damages legally recoverable by Landlords, and reimbursement of Landlords' reasonable out of pocket costs, including Legal Costs and bank fees for dishonored checks. Such damages shall include, at Landlords' election, either (a) the present value, calculated at a discount rate equal to the then-current Prime Rate, of the excess of the total Fixed Rent under this Lease over the fair market rental value of the Land for the balance of the Term; or (b) the Rent payable to Landlords provided for in this Lease, when and as due and payable under this Lease, less (in the case of this clause "b" only) Landlords' actual proceeds of reletting less Landlords' actual reasonable costs of reletting. Landlords may recover such damages at any time after Tenant's default, including after expiration of the Term. Notwithstanding any Law to the contrary, (x) Landlords need not commence separate actions to enforce Tenant's obligations for each month's Rent not paid, or each month's accrual of damages for Tenant's Default, but may bring and prosecute a single combined action for all such Rent and damages; and (y) Landlords may not recover any consequential damages for Tenant's Default.

23.02.08 Injunction of Breaches. Whether or not an Event of Default has occurred, Landlords may obtain a court order enjoining Tenant from continuing any Default or from committing any threatened Default. Tenant specifically and expressly acknowledges that damages would not constitute an adequate remedy for any Nonmonetary Default.

23.02.09 Continue Lease. Landlords may at Landlords' option maintain Tenant's right to possession. In that case, this Lease shall continue and Landlords may continue to enforce it, including the right to collect Rent when due and any remedies for nonpayment.

23.02.10 Restoration Funds. Upon any termination of this Lease, to the extent that Landlords or Depository then holds any Restoration Funds, they shall be applied solely as Landlords direct, including as a payment toward any sums then payable to Landlords.

23.02.11 Bank's Consent. Notwithstanding anything in this Lease to the contrary, no modification or termination of this Lease will be effective without the written consent of any Leasehold Mortgagee.

23.03 Proceeds of Reletting. Landlords shall apply any proceeds of any reletting as follows, without duplication, but including Default Interest on all such sums:

23.03.01 Landlords' Costs. First, to pay to itself the cost and expense of terminating this Lease, re-entering, retaking, repossessing, repairing, performing any Construction, and the cost and expense of removing all persons and property therefrom, including in such costs reasonable and customary brokerage commissions and Legal Costs;

23.03.02 Preparation for Reletting. Second, to pay to itself the cost and expense reasonably sustained in securing any new tenants and other occupants, including in such costs all brokerage commissions, Legal Costs, and any other reasonable costs of preparing the Land for reletting;

23.03.03 Costs of Maintenance and Operation. Third, to the extent that Landlords shall maintain and operate the Land, to pay to itself the reasonable cost and expense of doing so; and

23.03.04 Residue. Fourth, to pay to itself any balance remaining on account of Tenant's liability to Landlords.

23.04 Exculpation; Landlords' Sole and Exclusive Remedy. Notwithstanding anything to the contrary in this Lease, Landlords' right to terminate this Lease and re-enter the Land and take possession of the Land (and collect damages from Tenant, but only to the extent of Tenant's interest in the Land) shall constitute Landlords' sole and exclusive remedy for any Default or Event of Default. Landlords expressly waive, release, and relinquish any and all right to recover damages or any other sum, or have any other remedy against Tenant, except to the extent of Tenant's interest in the Land.

23.05 Tenant's Late Payments; Late Charges. If Tenant fails to make any payment to Landlords required under this Lease within 15 days after such payment is first due and payable, then in addition to any other remedies of Landlords, and without reducing or adversely affecting any of Landlords' other rights and remedies, Tenant shall pay Landlords within 5 days after demand Default Interest on such late payment, beginning on the date such payment was first due and payable and continuing until the date when Tenant actually makes such payment. In addition, and without limiting any other rights or remedies of Landlords, Tenant shall pay Landlords, as Additional Rent, an administrative charge equal to 5% of any payment that Tenant fails to pay within 30 days after such payment is first due and payable. Such administrative charge is intended to compensate Landlords for the inconvenience and staff time incurred by Landlords to handle the late or missed payment, shall not be deemed a penalty or compensation for use of funds, and shall not be credited against any other obligations of Tenant under this Lease.

23.06 Landlords' Right to Cure. If Tenant at any time fails to make any payment or take any action this Lease requires, then Landlords, after 15 Business Days' Notice to Tenant, or in an emergency with such notice (if any) as is reasonably practicable under the circumstances, and without waiving or releasing Tenant from any obligation or Default and without waiving Landlords' right to take such action as this Lease may permit as a result of such Default, may (but need not) make such payment or take such action. Tenant shall reimburse Landlords, as Additional Rent, for an amount equal to (a) all reasonable sums paid, and reasonable costs and expenses (including Legal Costs) incurred, by Landlords in exercising their cure rights under this paragraph; and (b) Default Interest on "a."

23.07 Holding Over. If for any reason or no reason Tenant remains in the Land after the Expiration Date, then Landlords will suffer injury that is substantial, difficult, or impossible to measure accurately. Therefore, if Tenant remains in the Land after the Expiration Date, for any reason or no reason, then in addition to any other rights or remedies of Landlords, Tenant shall pay to Landlords, as liquidated damages and not as a penalty, for each month (prorated daily for partial months) during which Tenant holds over after the Expiration Date, a sum equal to: 120% (for the first month or partial month of holding over), 133% (for the second month or partial month of holding over), and 150% (for each subsequent month or partial month of holding over) times the monthly Rent, including Additional Rent, payable under this Lease during the year preceding the Expiration Date.

23.08 Accord and Satisfaction; Partial Payments. No payment by Tenant or receipt by Landlords of a lesser amount than the amount owed under this Lease shall be deemed to be other than a part payment on account by Tenant. Any endorsement or statement on any check or letter accompanying any check or payment of Rent shall not be deemed an accord or satisfaction. Landlords may accept any such check or payment without prejudice to Landlords' right to recover the balance of such Rent or pursue any other remedy.

23.09 Miscellaneous. Landlords and Tenant further agree as follows with respect to any Defaults and Landlords' rights and remedies.

23.09.01 Survival. No termination of this Lease and no taking possession of or reletting the Land shall relieve Tenant of its liabilities and obligations hereunder, all of which shall survive such expiration, termination, repossession, or reletting, but subject to any limitations on personal liability or recourse in this Lease.

23.09.02 Multiple Suits. Landlords may sue to recover damages, or sum(s) equal to any installment(s) of Rent payable by Tenant, from time to time at Landlords' election. Nothing in this Lease requires Landlords to await the date when this Lease or the Term would have expired absent an Event of Default and a resulting termination of this Lease.

23.09.03 Receipt of Monies. Unless such payment shall fully cure all Monetary Defaults, no receipt of moneys by Landlords from Tenant after the giving of a termination notice or a notice to obtain possession, or after the retaking of possession by Landlords as aforesaid, shall reinstate, continue, or extend the Term or affect any notice previously given to Tenant, waive Landlords' right to enforcement of Rent payable by Tenant or thereafter falling due, or waive Landlords' right to recover possession of the Land. After the service of any such notice, or commencement of any suit or summary proceedings, or after a final order or judgment for possession of the Land, Landlords may demand, receive, and collect any moneys due or thereafter falling due without in any manner affecting such notice, proceeding, order, suit, or judgment, unless such payments fully cure all Monetary Defaults. Any sums so collected (without thereby curing all Monetary Defaults) shall instead be deemed payments on account of use and occupation of the Land or, at Landlords' election, to have been made on account of Tenant's liability under this Lease.

23.09.04 No Double Recovery. In no event shall Landlords be entitled, directly or indirectly, to recover twice for the same element of Landlords' damages.

Article 24. END OF TERM.

Upon any Expiration Date: (a) all Improvements, FF&E, and Building Equipment shall become Landlords' property; (b) Tenant shall deliver to Landlords possession of the Land, in the condition this Lease requires, subject to any Loss that this Lease does not require Tenant to Restore; (c) Tenant shall surrender any right, title, or interest in and to the Land and deliver such evidence and confirmation thereof as Landlords reasonably require; (d) Tenant shall deliver the Land free and clear of all: (i) Subleases, and (ii) liens except (1) Permitted Exceptions and (2) liens that Landlords or any of their agents caused; (e) Tenant shall assign to Landlords, without recourse, and give Landlords copies or originals of, all assignable licenses, permits, contracts, warranties, and guarantees then in effect for the Land; (f) the parties shall cooperate to achieve an orderly transition of operations from Tenant to Landlords without interruption, including delivery of such books and records (or copies thereof) as Landlords reasonably require; (g) the parties shall adjust for Real Estate Taxes and all other expenses and income of the Land and any prepaid Rent and shall make such payments as shall be appropriate on account of such adjustment in the same manner as for a sale of the Land (but any sums otherwise payable to Tenant shall first be applied to cure any Default); (h) the parties shall terminate the Memorandum of Lease; and (i) Tenant shall assign to Landlords, and Landlords shall reimburse Tenant for, all utility and other service provider deposits for the Land. Notwithstanding anything to the contrary in this paragraph, Tenant may remove from the Land any FF&E and Building Equipment that (in either case) Tenant acquired after the Commencement Date, but Tenant must do so, if at all, before or within 30 days after the Expiration Date. Tenant shall repair any material damage from any such removal. During such 30-day period: (x) Tenant may enter the Land for such purposes, without being deemed a holdover; (y) Landlords shall have no obligation to preserve or protect such FF&E or Building Equipment; and (z) in entering the Land, Tenant shall comply with Landlords' reasonable instructions. Tenant's FF&E and Building

Equipment not removed within 30 days after the Expiration Date shall be deemed abandoned.

Article 25. NOTICES

All Notices shall be in writing and addressed to Landlords and Tenant (and their designated copy recipients) as set forth in **Exhibit C.** Notices (including any required copies as set forth in **Exhibit C**) shall be delivered by Federal Express or other overnight (one-night) courier service to the addresses set forth in **Exhibit C.** in which case they shall be deemed delivered on the date of delivery (or when delivery has been attempted twice, as evidenced by the written report of the courier service) to such address(es). Notwithstanding the foregoing, Notices for the regular payment of Rent under this Lease (as opposed to late payments, for example) may be sent by first class mail, in which case they shall be deemed delivered three Business Days after deposit in the United States mail, provided that no postal strike (or other event likely to disrupt postal service) is then in effect. Either party may change its address by Notice in compliance with this Lease. Notice of such a change shall be effective only upon receipt. Any party giving a Notice may request the recipient to acknowledge receipt of such Notice. The recipient shall promptly comply with any such request, but failure to do so shall not limit the effectiveness of any Notice. Any attorney may give any Notice on behalf of its client.

Article 26. NO BROKER

Each party: (a) represents and warrants that it did not engage or deal with any broker or finder in connection with this Lease and no person is entitled to any commission or finder's fee on account of any agreement or arrangement made by such party; and (b) shall Indemnify the other party against any breach of such representation.

Article 27. NONRECOURSE

Notwithstanding anything to the contrary in this Lease, the liability under this Lease of Landlords and Tenant (including any New Tenant or Post-Foreclosure Tenant) and each of their parent(s), subsidiary(ies), or affiliated corporations or other entities, and any of their constituent partners, joint venturers, or tenants-in-common, for damages or otherwise, shall be enforceable against, and shall not extend beyond, their interests in the Land (including the proceeds thereof). No property or assets whatsoever, except Landlords' or Tenant's (as applicable) interest in the Land (including the proceeds thereof), shall be subject to levy, execution or any other enforcement procedure for the satisfaction of any remedies (monetary or otherwise) of the other party arising under or in connection with this Lease. The limitation of liability and limitation of remedy in this paragraph shall not apply in any way to, and shall not be construed to limit or preclude, personal liability (if any) arising under any Supplementary Agreement. No shareholder, officer, member, manager, director, agent, or employee of Tenant or Landlords shall have any liability under this Lease, but this shall not limit any liability arising under the express terms of any Supplementary Agreement. (This Lease sometimes refers to this paragraph as the "Nonrecourse Clause.")

Article 28. ADDITIONAL DELIVERIES; THIRD PARTIES

28.01 Estoppel Certificates. Up to twice a year, each party to this Lease (a "Requesting Party") may require the other party (a "Certifying Party") to execute, acknowledge, and deliver to the Requesting Party (or directly to a designated third party) up to four original counterparts of an Estoppel Certificate. The Certifying Party shall sign, acknowledge, and return such Estoppel Certificate within 15 days after request, even if the Requesting Party is in Default. Any Estoppel Certificate shall bind the Certifying Party.

28.02 Further Assurances. Each party shall execute and deliver such further documents, and perform such further acts, as may be reasonably necessary to achieve the parties' intent in entering into this Lease.

28.03 Memorandum of Lease. Upon request by either, the parties shall promptly execute, acknowledge, and deliver duplicate originals of a Memorandum of Lease. Either party may record such Memorandum of Lease. Any taxes imposed upon such recording shall be paid by the party that caused such recording to occur. If the parties amend this Lease, then the parties shall have the same rights and obligations regarding a memorandum of such amendment as they do for the Memorandum of Lease. Tenant may at any time by Notice to Landlords elect to require the Memorandum of Lease to be terminated.

28.04 Modification. Any Modification of this Lease must be in writing signed by the party to be bound.

28.05 Successors and Assigns. This Lease shall bind and benefit Landlords and Tenant and their successors and assigns, but this shall not limit or supersede any Transfer restrictions. Nothing in this Lease confers on any Person (except Landlords, Tenant, Leasehold Mortgagees, and Fee Mortgagees) any right to insist upon, or to enforce against Landlords or Tenant, the performance or observance by either party of its obligations under this Lease.

Article 29. MISCELLANEOUS

29.01 Confidentiality. Landlords shall maintain the confidentiality of any information that Tenant gives Landlords about the Land. Landlords shall require any actual or prospective Fee Mortgagee or Transferee to maintain the confidentiality of such materials, all under a direct confidentiality agreement between Tenant and such actual or prospective Fee Mortgagee or Transferee, in normal and customary form reasonably satisfactory to Tenant.

29.02 Costs and Expenses; Legal Costs. In the event of any litigation or dispute between the parties, or claim made by either party against the other, arising from this Lease or the landlord-tenant relationship under this Lease, or Landlords' enforcement of this Lease upon a Default, or to enforce or interpret this Lease or seek declaratory or injunctive relief in connection with this Lease, or to exercise any right or remedy under or arising from this Lease, or to regain or attempt to regain possession of the Land or terminate this Lease, or in any Bankruptcy Proceeding affecting the other party to this Lease, the prevailing party shall be entitled to reimbursement of its Legal Costs with Default Interest and all other reasonable costs and expenses incurred in enforcing this Lease or curing the other party's default.

29.03 No Consequential Damages. Whenever either party may seek or claim damages against the other party (whether by reason of a breach of this Lease by such party, in enforcement of any indemnity obligation, for misrepresentation or breach of warranty, or otherwise), neither Landlords nor Tenant shall seek, nor shall there be awarded or granted by any court, arbitrator, or other adjudicator, any speculative, consequential, collateral, special, punitive, or indirect damages, whether such breach shall be willful, knowing, intentional, deliberate, or otherwise. The parties intend that any damages awarded to either party shall be limited to actual, direct damages sustained by the aggrieved party. Neither party shall be liable for any loss of profits suffered or claimed to have been suffered by the other.

29.04 No Waiver by Silence. Failure of either party to complain of any act or omission on the part of the other party shall not be deemed a waiver by the noncomplaining party of any of its rights under this Lease. No waiver by either party at any time, express or implied, of any breach of this Lease shall waive such breach or any other breach.

29.05 Performance Under Protest. If a dispute arises about performance of any obligation under this Lease, the party against which such obligation is asserted shall have the right to perform it under protest, which shall not be regarded as voluntary performance. A party that has performed under protest may institute appropriate proceedings to recover any amount paid or the reasonable cost of otherwise complying with any such obligation, with interest at the Prime Rate.

29.06 Survival. All rights and obligations that by their nature are to be performed after any termination of this Lease shall survive any such termination.

29.07 Unavoidable Delay. Each party's obligation to perform or observe any nonmonetary obligation under this Lease shall be suspended during such time as such performance or observance is prevented or delayed by Unavoidable Delay.

29.08 Vault Space. Any vaults and other areas now existing or later built extending beyond the building line of the Land are not part of the Land, but Tenant may occupy and use them during the Term, subject to applicable Law and payment of applicable Real Estate Taxes. No revocation by any Government of any license or permit to maintain and use any such vault shall in any way affect this Lease or the Rent. Landlords make no representation or warranty about any such vault or Tenant's right to use or occupy it for any purpose, or any fees or taxes that may be imposed on account of such use or occupancy.

Article 30. Interpretation, Execution, and Application of Lease

30.01 Captions. The captions of this Lease are for convenience and reference only. They in no way affect this Lease.

30.02 Counterparts. This Lease may be executed in counterparts.

30.03 Delivery of Drafts. Neither party shall be bound by this Lease unless and until such party shall have executed and delivered at least one counterpart of this Lease. The submission of draft(s) or comment(s) on drafts shall bind neither party in any way. Such draft(s) and comment(s) shall not be considered in interpreting this Lease.

30.04 Entire Agreement. This Lease contains all terms, covenants, and conditions about the Land. The parties have no other understandings or agreements, oral or written, about the Land or Tenant's use or occupancy of, or any interest of Tenant in, the Land.

30.05 Governing Law. This Lease, its interpretation and performance, the relationship between the parties, and any disputes arising from or relating to any of the foregoing, shall be governed, construed, interpreted, and regulated under the laws of the State of Minnesota, without regard to principles of conflict of laws.

30.06 Partial Invalidity. If any term or provision of this Lease or its application to any party or circumstance shall to any extent be invalid or unenforceable, then the remainder of this Lease, or the application of such term or provision to persons or circumstances except those as to which it is invalid or unenforceable, shall not be affected by such invalidity. All remaining provisions of this Lease shall be valid and be enforced to the fullest extent Law allows.

30.07 Principles of Interpretation. No inference in favor of or against any party shall be drawn from the fact that such party has drafted any part of this Lease. The parties have both participated substantially in its negotiation, drafting, and revision, with advice from counsel and other advisers. A term defined in the singular may be used in the plural, and vice versa, all in accordance with ordinary principles of English grammar, which also govern all other language in this Lease. The words "include" and "including" shall be construed to be followed by the words: "without limitation." Each of these terms shall be interpreted as if followed by the words "(or any part of it)" except where the context clearly requires otherwise: Building Equipment; FF&E; Fee Estate; Improvements; Land; Leasehold Estate; Land; Structure; and any other similar collective noun. Every reference to any document, including this Lease, refers to such document as Modified from time to time (except, at Landlords' option, any Modification that violates this Lease), and includes all exhibits, schedules, and riders to such document. The word "or" includes the word "and."

30.08 Reasonableness. Wherever this Lease states that a party shall not unreasonably withhold approval: (a) such approval shall not be unreasonably delayed or conditioned; (b) no withholding of approval shall be deemed reasonable unless withheld by Notice specifying reasonable grounds, in reasonable detail, for such withholding, and indicating specific reasonable changes in the proposal under consideration that would make it acceptable; (c) if a party grants its consent (or fails to object) to any matter, this shall not waive its rights to require such consent for any further or similar matter; and (d) any dispute on the withholding or delay of consent shall be determined by Mediation.

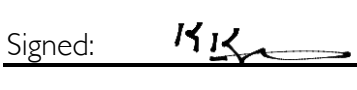
[THE REMAINDER OF THIS PAGE WAS LEFT BLANK INTENTIONALLY. SIGNATURES FOLLOW ON THE NEXT PAGE.]

IN WITNESS WHEREOF, Landlords and Tenant have executed this Lease as of the Commencement Date.

JOSEPH P. SCHAFFER

Signed: 

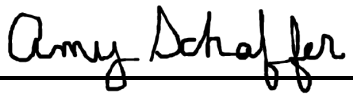
2K HEALTH LLC

Signed: 

By: Kyle Kingsley

Its: Member

AMY B. SCHAFFER

Signed: 

Attachments:
EXHIBIT A (Legal Description)
EXHIBIT B (Additional Permitted Exceptions)
EXHIBIT C (Notice Addresses, Including Required Copy Recipients)

EXHIBIT A
LEGAL DESCRIPTION

New Parcel B

That part of the Northwest Quarter of the Northeast Quarter (NW1/4 NE1/4), Section 28. Township 121, Range 24, Wright County, Minnesota, lying northeasterly of MINNESOTA DEPARTMENT OF TRANSPORTATION RIGHT OF WAY PLAT NO. 86-3, as is on file and of record in the office of the County Recorder in and for Wright County, Minnesota, described as follows:

Commencing at the southeast corner of said NW1/4 NE1/4; thence North 89 degrees 24 minutes 09 seconds West, assumed bearing, along the south line of said NW1/4 NE1/4 a distance of 287.12 feet to the northeasterly line of said MINNESOTA DEPARTMENT OF TRANSPORTATION RIGHT OF WAY PLAT NO. 86-3; thence North 52 degrees 31 minutes 24 seconds West along the last described northeasterly line a distance of 351.95 feet; thence North 00 degrees 36 minutes 10 seconds West a distance of 838.59 feet; thence North 89 degrees 23 minutes 50 seconds East a distance of 564.09 feet to the point of intersection with the east line of said NW1/4 NE1/4; thence South 00 degrees 36 minutes 10 seconds East along the last described east line a distance of 1061.67 feet to the point of beginning.

EXHIBIT B
ADDITIONAL PERMITTED EXCEPTIONS

Permitted Exceptions shall include all of the following, as they existed on 09/16/2014:

1. All leases, subleases, tenancies and rights of occupancy affecting the Land caused or permitted by Tenant or by anyone claiming by, through, or under Tenant;

2. All rights, if any, for electricity, gas, telephone, water, cable television, and any other utilities to maintain and operate lines, cables, poles, and distribution boxes in, over, and upon the Land;

3. Possible projections or encroachments of retaining walls, foundations, stoops, areas, steps, sills, trim, cornices, standpipes, fire escapes, coal chutes, casings, ledges, water tables, lintels, porticos, keystones, windows, hedges, copings, cellar doors, sidewalk elevators, fences, fire escapes, and the like, or similar projections or objects upon, under, or above any adjoining buildings or streets or avenues or those belonging to adjoining Land which encroach upon the Land or within any set-back areas, and variations between the lines of record title and fences, retaining walls, hedges, and the like;

4. Variations between the tax diagram or the tax map and the record description;

5. Zoning, environmental, municipal, building, and all other laws, regulations or similar matters imposed by any federal, state, municipal, or local government or any public or quasi-public board, authority, or similar agency having jurisdiction over the Land or any portion thereof;

6. All notes or notices of any violation of law or municipal ordinances, orders, or requirements noted in or issued by any governmental or quasi-governmental authority or departments having or asserting jurisdiction, now or hereafter affecting the Land;

7. The lien for all taxes, charges, rents, assessments, and any other governmental charges which are not yet due and payable;

8. Any Fee Mortgage, but only if Tenant can obtain a leasehold policy of title insurance affirmatively insuring that such Fee Mortgage is subordinate to this Lease.

EXHIBIT C
NOTICE ADDRESSEES
(INCLUDING REQUIRED COPY RECIPIENTS)

PARTY	NOTICE ADDRESS	WITH A COPY TO
LANDLORDS	Amy & Joe Schaffer	Minnesota Native Landscapes, Inc.
2K HEALTH LLC	Kyle Kingsley, MD 5200 Willson Rd Suite 150 Edina MN, 55424	Marshall Lichty ENTREPARTNER LAW FIRM, PLLC 4470 West 78th Street Circle Suite 210 Bloomington, Minnesota 55435

Signature Certificate

Document Reference: IGK3TMJX72V5XYS3HVWHLL

RightSignature
Easy Online Document Signing

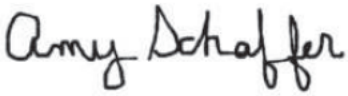
Joe Schaffer
Party ID: 8KK2FWJ3TKDZUZI6GEKLHS
[redacted]
VERIFIED EMAIL [redacted]

Electronic Signature:

Multi-Factor Digital Fingerprint Checksum: 3213d9eafc0860959fa7b82f429e4098647f481c

Amy Schaffer
Party ID: BZNZD5J954XCZEYHRFUIR5
[redacted]
VERIFIED EMAIL [redacted]

Electronic Signature:



Multi-Factor Digital Fingerprint Checksum: 15064b5846894f444846de3a350952baaf81992a

Kyle Kingsley
Party ID: 3N83P2I5NIRHHXXS9CXX5V
IP Address [redacted]
VERIFIED EMAIL [redacted]

Electronic Signature:

Multi-Factor Digital Fingerprint Checksum: 865c18a2bfd8881d5b58581cfe51a23446c2451a

Timestamp	Audit
2014-09-17 06:36:01 -0700	All parties have signed document. Signed copies sent to: Joe Schaffer, Amy Schaffer, Kyle Kingsley, Janet Westenberg, and Marshall Lichty.
2014-09-17 06:36:01 -0700	Document signed by Amy Schaffer [redacted] with drawn signature. - [redacted]
2014-09-17 06:29:48 -0700	Document viewed by Amy Schaffer [redacted] - [redacted]
2014-09-16 19:49:40 -0700	Document signed by Joe Schaffer [redacted]) with drawn signature. - [redacted]
2014-09-16 19:48:33 -0700	Document viewed by Joe Schaffer [redacted] - [redacted]
2014-09-16 19:25:11 -0700	Document signed by Kyle Kingsley [redacted] with drawn signature. - [redacted]
2014-09-16 19:23:45 -0700	Document viewed by Kyle Kingsley [redacted] . - [redacted]
2014-09-16 19:03:34 -0700	Document created by Marshall Lichty (marshall@entrepartnerlaw.com). - 66.41.31.134

This signature page provides a record of the online activity executing this contract.

B2d. Attachment: Schaffer Lease

Lease and Sublease Agreement
By and Between:

2K HEALTH LLC,
a Minnesota Limited Liability Company,

Sublandlord,

and

MINNESOTA MEDICAL SOLUTIONS LLC,
a Minnesota Limited Liability Company,

Subtenant,

FOR THE STRUCTURE LOCATED AT:

8740 77th Street Northeast
Otsego, Minnesota 55362

Dated: 09/16/2014

LEASE AND SUBLEASE AGREEMENT

This Lease and Sublease Agreement (the "Sublease") is made and entered into as of 12/01/2014 (the "Commencement Date"), by and between 2K HEALTH LLC, a Minnesota limited liability company ("Sublandlord"), and MINNESOTA MEDICAL SOLUTIONS LLC, a Minnesota limited liability company ("Subtenant").

RECITALS

WHEREAS, Sublandlord desires to lease the Structure situated on the Premises and sublease the land, as described on the attached Exhibit A, to Subtenant, and Subtenant desires to lease the Structure and sublease the land from Sublandlord;

WHEREAS, the parties desire to enter into this Sublease to set forth their rights and obligations to each other relating to the Structure; and

NOW, THEREFORE, for good and valuable consideration, Sublandlord leases and demises the Structure and subleases and demises the land to Subtenant, and Subtenant takes and hires the Structure and land from Sublandlord, upon the terms and conditions of this Sublease.

ARTICLE 1. DEFINITIONS

1.1 "Additional Rent" means all sums that this Sublease requires Subtenant to pay Sublandlord or a third party, whether or not expressly called Additional Rent, except Base Rent or the Security Deposit.

1.2 "Alteration" means improvements, alterations, or additions to the Structure as outlined in Section 8.2.

1.3 "Base Rent" means the amount of rent assessed before inclusion of additional expenses, Additional Rent, or other factors that increase the amount of rent to be paid.

1.4 "Commencement Date" means the commencement of the term of this Sublease and the date on which the terms of this Sublease are implemented.

1.5 "Event of Default" means a party's monetary or non-monetary failure to comply with any affirmative or negative covenant or obligation in this Sublease.

1.6 "Expiration Date" means the date when this Sublease terminates or expires in accordance with its terms, whether on the Scheduled Expiration Date, by Sublandlord's exercise of remedies for default, or otherwise.

1.7 "Landlords" means JOSEPH P. SCHAFFER & AMY B. SCHAFFER, as established in the Master Lease.

1.8 "Leasehold Estate" means Sublandlord's leasehold estate and all of Sublandlord's rights, privileges, and preemptive rights, as defined and enumerated under the Master Lease, and any direct or indirect interest in the leasehold estate.

1.9 "Master Lease" means that certain lease agreement between Sublandlord, as Tenant, and JOSEPH P. SCHAFFER & AMY B. SCHAFFER, as Landlords, for the Premises dated 12/01/2014.

1.10 "Notice" means any consent, demand, designation, election, notice, or request relating to this Sublease. Notices will be delivered and will become effective only in accordance with this Sublease.

1.11 "Premises" means, with respect to the property generally located at 8740 77th Street Northeast, Otsego, Minnesota 55362 and specifically described in the Master Lease:

(a) all buildings, structures, and other improvements and appurtenances;

(b) all right, title, and interest of Sublandlord, if any, in and to the land lying in the bed of any street or highway in front of or adjoining the property to the center line of the street or highway;

(c) all appurtenances and all estate and rights of Sublandlord in and to the property;

(d) any strips or gores adjoining the Land; and

(e) all building equipment, fixtures, furniture, and equipment attached to or within any of the foregoing.

1.12 "Rent" means all monetary obligations of Subtenant to Sublandlord under the terms of this Sublease (except for the Security Deposit).

1.13 "Security Deposit" means money Sublandlord holds on behalf of Subtenant to protect itself from unpaid rent, damage to the Structure, or other violations of the terms of this Sublease.

1.14 "Structure" means all buildings, structures, and other improvements, and appurtenances located on the Premises and all building equipment, fixtures, furniture, and equipment attached to or within.

1.15 "Sublandlord" means the Sublandlord named in the opening paragraph of this Sublease.

1.16 "Subtenant" initially means the Subtenant named in the opening paragraph of this Sublease. In the event of any assignment or transfer under this Sublease, Subtenant

will mean any person or entity entitled to occupy, use, or possess the Structure under the terms of this Sublease.

1.17 "Tenant" refers to Sublandlord, as established under the Master Lease.

1.18 "Term" means the stated period of time, from the Commencement Date to the Expiration Date, during which the terms of the Sublease are in force.

ARTICLE 2. STRUCTURE AND USE

2.1 Structure. Sublandlord leases to Subtenant, and Subtenant hires and takes from Sublandlord, the Structure, to be used and occupied by Subtenant for any lawful purpose, including (but not limited to) purposes described in Minnesota Statutes Chapter 311.

2.2 Master Lease. A copy of the Master Lease is attached as Exhibit B and made a part of this Sublease. All terms, covenants, and provisions of this Sublease and all rights, remedies, and options of Subtenant under this Sublease are and will at all times remain fully subject and subordinate in all respects to the Master Lease.

2.3 Leasehold Improvements. Subtenant is taking the Structure and accepting the condition of the Structure "as is," and Sublandlord is under no obligation to make any structural or other alterations, decoration, additions, or improvements. Subtenant will not make or commence any improvement that has not been previously approved by Sublandlord. If any improvement is made or commenced without Sublandlord's consent, and Sublandlord does not give subsequent approval, Subtenant will, upon receiving written Notice from the Sublandlord, restore that portion of the Structure affected by the improvement to its preexisting condition at Subtenant's expense.

ARTICLE 3. TERM AND RENT

3.1 Term of Sublease.

(a) Initial Term. The term of this Sublease will be for 60 months commencing on the Commencement Date and ending on 11/30/2019, (the "Scheduled Expiration Date") unless sooner terminated under any provision of this Sublease. Sublandlord agrees to use its best commercially reasonable efforts to deliver possession of the Structure by the Commencement Date.

(b) Renewal Term. Subtenant will have the option to renew the Lease for an additional Renewal Term of 5 year(s). Subtenant will exercise this renewal option, if at all, by giving written Notice to Sublandlord not less than ninety (90) days before the Scheduled Expiration Date. The Renewal Term will be at a rate agreed to between the parties or otherwise upon the same covenants, conditions, and provisions as provided in this Sublease.

3.2 Base Rent. Subtenant will pay to Sublandlord as Base Rent for the Structure equal monthly payments of [redacted] on the first day of each month of the term hereof. If the lease term commences on a day other than the first day of a calendar month, the first month's rent will be adjusted accordingly. If Subtenant fails to make a Base Rent payment in full within ten (10) days after it is due, a late payment penalty of 3% will be applied and will be payable as Additional Rent.

3.3 Additional Rent. Additional Rent refers to items Subtenant may be charged for that are not included in Base Rent, including after-hours services, common area maintenance, fees, and any other costs not included in Base Rent. Except where this Sublease provides otherwise, Subtenant will pay all Additional Rent within thirty (30) days after receipt of an invoice and reasonable documentation.

3.4 Rent. All monetary obligations of Subtenant to Sublandlord under the terms of this Sublease (except for the Security Deposit) are deemed to be rent ("Rent"). Rent will be payable to Sublandlord at the address stated on Exhibit C or to other persons or at other places as Sublandlord may designate in writing.

3.5 Security Deposit.

(a) Before the Commencement Date and before taking possession of the Structure, Subtenant will pay Sublandlord a Security Deposit of [redacted] The Security Deposit will be placed in an interest-bearing savings account in the joint names of Sublandlord and Subtenant and will be held in escrow as security for the performance by Subtenant of Subtenant's covenants and obligations under this Sublease. It is expressly understood that the Security Deposit is not considered an advance payment of Rent or a measure of Sublandlord's damages in case of default by Subtenant.

(b) Sublandlord may, from time to time, without prejudice to any other remedy, use the Security Deposit to the extent necessary to make good any arrears of Rent or to satisfy any of Subtenant's other covenants or obligations. Following any application of the Security Deposit under this Section, Subtenant will pay Sublandlord on demand the amount applied in order to restore the Security Deposit to its original amount.

(c) If Subtenant is not in default at the Expiration Date or earlier termination of this Sublease, or any extension or renewal of the Sublease, the Security Deposit (or remaining balance after deductions for arrears of rent or other amounts owing by Subtenant, if any) will be returned by Sublandlord to Subtenant. The party eventually entitled to the Security Deposit amounts, in whole or in part, will be entitled to the interest accrued or to its pro-rata share of the interest accrued.

(d) If Sublandlord transfers its interest in the Structure during the term of this Sublease, Sublandlord may assign the Security Deposit to the transferee and thereafter has no further liability for the return of the Security Deposit.

ARTICLE 4. USE OF STRUCTURE

4.1 Agreed Use. The Structure will be used solely for Subtenant's business purposes, including (but not limited to) pursuits contemplated under Minnesota Statutes Chapter 311. Subtenant agrees to use the Structure for reasonable business, commercial, retail, warehousing, or industrial uses that do not materially damage the Structure. Subtenant's use of the Structure will be in a lawful, careful, safe, and proper manner, and Subtenant will carefully preserve, protect, control, and guard the same from damage at Subtenant's sole expense. Subtenant will not use the ingress and egress area of the Structure in an unreasonable manner so as to interfere with the normal flow of traffic or the use of areas by occupants of properties adjacent to the Structure or the Premises. Subtenant will not use the Structure for the purposes of storing, manufacturing or selling any explosives, flammables, or other inherently dangerous substance, chemical, thing, or device. Subtenant will, on the Expiration Date or, if earlier terminated, upon the termination, surrender possession of the Structure without further notice to quit, in as good condition as reasonable use will permit. Subtenant will not use the Structure for living quarters or as a residence. Except as contemplated under Minnesota Statutes Chapter 311, Subtenant will not use the Structure for any unlawful, immoral, or improper purpose, or in any manner that is contrary to law or to any directions, rules, regulations, or regulatory bodies, or which will be injurious to any person or property.

4.2 Compliance. Sublandlord warrants that any and all improvements to the Structure comply with all applicable covenants or restrictions of record and applicable building codes, regulations, and ordinances in effect on the Commencement Date. Subtenant is responsible for determining whether or not the zoning is appropriate for its intended use.

4.3 Security. Sublandlord and Subtenant acknowledge that the Structure may be used for pursuits contemplated under Minnesota Statutes Chapter 311, and the parties mutually agree to reach further agreement about the parties rights and responsibilities to meet security requirements and implement appropriate security measures to comply with Minnesota law.

4.4 Master Lease.

(a) Sublandlord is the tenant of the Premises by virtue of a ground lease, (the "Master Lease"), a copy of which is attached as Exhibit B, wherein JOSEPH P. SCHAFFER & AMY B. SCHAFFER, as Joint Tenants, married individuals residing in the State of Minnesota, are the landlords ("Landlords").

(b) This Sublease is and will at all times be subject to and subordinate to the Master Lease.

(c) Subtenant agrees that it will occupy the Structure in accordance with the terms of the Master Lease and will not do any act that may result in a violation of or a default under any of the terms and conditions of the Master Lease or render Sublandlord liable for any damage, charge, or expense thereunder.

(d) Except to the extent caused by Sublandlord's negligence or willful misconduct, Subtenant covenants and agrees to hold Sublandlord free and harmless from all liability, judgments, costs, damages, claims, or demands (including reasonable attorneys' fees) arising out of Subtenant's failure to comply with or perform any assumed obligations under the Master Lease.

(e) Sublandlord agrees to maintain the Master Lease during the entire term of this Sublease, subject, however, to any earlier termination of the Master Lease, without the fault of the Sublandlord. Sublandlord further agrees to comply with or perform its obligations under the Master Lease and to hold Subtenant free and harmless from all liability, judgments, costs, damages, claims, or demands arising out of Sublandlord's failure to comply with or perform its obligations.

(f) Sublandlord represents to Subtenant that the Master Lease is in full force and effect and that no default exists on the part of any party to the Master Lease.

(g) All terms, covenants, and provisions of this Sublease and all rights, remedies, and options of Subtenant under this Sublease are and will at all times remain fully subject and subordinate in all respects to the Master Lease. If the Master Lease and the Leasehold Estate terminate, then this Sublease will terminate. In that event, Subtenant, only at the option and request of Landlords (except as Landlords have agreed otherwise in writing), will attorn to Landlords and recognize Landlords as Subtenant's direct landlords under this Sublease. Subtenant will execute and deliver, at any time and from time to time, upon the request of Tenant, Landlords, or any Mortgagee, any instrument necessary or appropriate to evidence the attornment. Subtenant appoints each of the foregoing as Subtenant's attorney-in-fact, irrevocably, with full power of substitution, to execute and deliver the instrument. This appointment is coupled with an interest and is irrevocable. Subtenant waives any Law that may allow Subtenant to terminate this Sublease or surrender possession of the demised subpremises if the Lease terminates.

ARTICLE 5. TAXES, ASSESSMENTS, AND UTILITIES

5.1 Real Estate and Other Taxes. Subtenant will pay all real estate taxes and assessments due and payable with respect to the Structure, and improvements thereon, during the Initial Term and any extension or renewal of the Sublease. In addition, Subtenant will pay all taxes or other charges imposed during the Initial Term, and any extension or renewal Sublease, with respect to any business conducted in the Structure or on the Premises by Subtenant. Taxes, assessments, or other charges that Subtenant is obligated to pay or cause to be paid under this Sublease and which relate to any fraction of a tax year at the commencement or termination of this Sublease will be prorated based upon the ratio that the number of days in the fractional tax year bears to 365.

5.2 Failure to Pay. If Subtenant fails to pay any tax or assessment set out in Section 5.1, Sublandlord may pay the same on Subtenant's behalf, and Subtenant will reimburse Sublandlord for the same. Subtenant will hold Sublandlord harmless on account of any taxes and assessments.

5.3 Contest of Taxes. If Subtenant wishes to contest any assessment or levy of taxes relating to the Structure, Sublandlord covenants and agrees that it will execute documents and do all things necessary to aid Subtenant in contesting or litigating the assessment, provided, however, that the contest or litigation will be at Subtenant's sole cost and expense. Any resulting reduction or rebate of taxes paid or to be paid by Subtenant will belong to Subtenant.

5.4 Payment of Assessments. Subtenant will pay all assessments attributable to or against the Structure not later than twenty-one (21) days after the day on which the assessment(s) became due.

5.5 Utilities. Subtenant will pay for all water, sanitation, sewer, electricity, light, heat, gas, power, fuel, janitorial, and other services incident to its use of the Structure.

ARTICLE 6. INSURANCE

6.1 Fire and Extended Coverage Insurance. Subtenant will, at its sole cost and expense, obtain and thereafter maintain in full force and effect, at all times during the Initial Term and any extension or renewal of this Sublease, fire and extended coverage insurance in the amount of no less than eighty percent (80%) of the full insurable value of the Structure. Subtenant will maintain fire insurance coverage on all of Subtenant's stock in trade, furniture, fixtures, and other property within the Structure in an amount equal to its full insurable value. Subtenant will promptly deliver to Sublandlord copies of any and all policies of insurance. Subtenant covenants that any insurance coverage will contain a waiver of the insurer's right of subornation against Sublandlord.

6.2 Release. Sublandlord releases Subtenant, to the extent of its insurance coverage, from any and all liability for loss or damage caused by fire or any of the extended coverage casualties, notwithstanding fire or other casualty due to the fault or negligence of Subtenant or its agents or employees. This release will be in full force

and effect only with respect to loss or damage occurring during the time the policies for fire and extended coverage insurance contain a clause to the effect that this release will not affect the policies or the right of Sublandlord to recover thereunder.

6.3 Failure to Maintain Insurance. If Subtenant fails at any time to maintain the insurance coverage required under this Section, Sublandlord may, at its option, pay for the same on Subtenant's behalf, and Subtenant will reimburse Sublandlord for the same.

6.4 Permissible Inventory and Acts. Notwithstanding anything specifically contemplated under Minnesota Statutes Section 311, Subtenant will not carry any item of inventory, nor do any act, or fail to do any act, in or about the Structure that will in any way impair or invalidate any insurance policy on or in reference to the Structure.

6.5 Subordination Clause. The parties will use good faith efforts to have any and all fire, extended coverage, and material damage insurance on the Structure endorsed with the following subornation clause: "This insurance will not be invalid should the insured waive, in writing, before a loss, any and all right of coverage against any party for a loss occurring to the property described herein." The parties mutually agree that any right of subornation afforded to the insurance carriers of their respective property insurance policies with respect to real or personal property in the Structure or on the Premises is waived, and the parties undertake to give their respective insurance carriers notice of this waiver.

6.6 Liability Insurance. Subtenant is solely responsible, at its sole cost and expense, for maintaining in full force and effect, at all times during the Initial Term and any extension or renewal of this Sublease, adequate health, automobile, workers' compensation, unemployment compensation, disability, liability, and any other type of insurance required by law or as is common practice in Subtenant's business. Upon request, Subtenant will provide Sublandlord with certificates of insurance or evidence of coverage before commencing performance under this Sublease. Subtenant will provide adequate coverage for any Sublandlord property under its care, custody, or control, or the care, custody, and control of its personnel. Sublandlord will be listed as an additional insured under all Subtenant's applicable insurance policies. All insurance policies required under this Section will contain a written obligation of the insurer to notify Sublandlord in writing at least ten (10) days before any cancellation.

ARTICLE 7. ASSIGNMENT OF SUBLEASE

7.1 Sublease and Assignment. Subtenant will have the right, without Sublandlord's consent, to assign this Sublease to a corporation with which Subtenant may merge or consolidate, to any subsidiary of Subtenant, to any corporation under common control with Subtenant, or to a purchaser of substantially all of Subtenant's assets. Except as set forth above, Subtenant will not sublease all or any part of the

Structure, or assign this Sublease in whole or in part, without Sublandlord's written consent, which consent will not to be unreasonably withheld or delayed. No assignment of this Sublease, whether by act of Subtenant or by operation of law, and no sublease of the Structure, or any part of it, by or from Subtenant, will relieve or release Subtenant from any of its obligations hereunder.

7.2 Consent of Landlords.

(a) In the event that the Master Lease requires that Sublandlord obtain the consent of Landlords to any subletting by Sublandlord, then this Sublease will not be effective unless, within ten (10) days of the date hereof, Landlords give their consent to this subletting by signing this Sublease.

(b) In the event that Landlords do give their consent, then:

(i) The consent will not release Sublandlord of its obligations or alter the primary liability of Sublandlord to pay the Rent and perform and comply with all of the obligations of Sublandlord to be performed under the Master Lease.

(ii) The acceptance of Rent by Landlords from Subtenant or anyone else liable under the Master Lease will not be deemed a waiver by Landlords of any provisions of the Master Lease.

(iii) The consent to this Sublease will not constitute consent to any subsequent subletting or assignment.

(iv) In the event of any default of Sublandlord under the Master Lease, Landlords may proceed directly against Sublandlord, any guarantors, or anyone else liable under the Master Lease or this Sublease without first exhausting Landlords' remedies against any other person or entity liable thereon to Landlords.

(v) Landlords may consent to subsequent sublettings and assignments of the Master Lease or this Sublease or any amendments or modifications thereto without notifying Sublandlord or anyone else liable under the Master Lease and without obtaining his, her, or their consent. The action will not relieve any persons from liability.

(c) The signatures of Landlords at the end of this document will constitute consent to the terms of this Sublease.

(d) Landlords acknowledge that, to the best of their knowledge, no default presently exists under the Master Lease of obligations to be performed by Sublandlord and that the Master Lease is in full force and effect.

(e) In the event that Sublandlord defaults under its obligations to be performed under the Master Lease, Landlords agree to deliver to Subtenant a copy of any Notice of default. Subtenant will have the right to cure any default of Sublandlord described in any Notice within ten (10) days after the Notice of default on Subtenant. If Subtenant cures the default, Subtenant will have the right of reimbursement and offset from and against Sublandlord.

ARTICLE 8. MAINTENANCE, REPAIRS, ALTERATIONS, AND IMPROVEMENTS

8.1 Maintenance and Repairs.

(a) Subject to anything contained in this Sublease about destruction of, damage to, or condemnation of the Structure, Subtenant will, at its sole cost and expense, keep and maintain the Structure, including, without limitation, the roof, exterior, foundation, structural, and operational parts (cooling, heating, air conditioning, plumbing equipment and fixtures), windows, doors, locks and security systems, paving and landscaping, snow and ice removal, interior maintenance (floors, doors, toilets, light replacement, etc.), and all other elements or systems of the Structure, in a condition and repair similar to its original condition and repair, reasonable wear and tear excepted.

(b) Except as otherwise provided in this Sublease, Sublandlord will have no obligation whatsoever with respect to the maintenance and repair of the Structure.

(c) Replacement and repair parts, materials, and equipment used by Subtenant to fulfill its obligations hereunder will be of a quality equivalent to those initially installed within the Structure. All repair and maintenance work will be done in compliance with then-existing federal, state, and local laws, regulations, and ordinances pertaining thereto.

(d) If Subtenant refuses or neglects to commence repairs within ten (10) days after receipt of written demand from Sublandlord, or fails to adequately complete the repairs without liability to Sublandlord, Sublandlord may, at its option, make the repairs. If Sublandlord elects to make the repairs, Subtenant will pay the costs to Sublandlord as Additional Rent, with interest at the maximum rate allowable by law, calculated from the date the repairs commenced until the date Subtenant pays Sublandlord in full for the repairs.

8.2 Alterations and Improvements. Subtenant will have the right to make, at no expense to Sublandlord, improvements, alterations, or additions (hereinafter collectively referred to as "Alteration") to the Structure, whether structural or nonstructural, interior or exterior, provided that:

(a) no Alteration will be made without the prior written consent of Sublandlord, which consent will not be unreasonably withheld;

(b) no Alteration will materially alter the character or substantially lessen the value of the Structure;

(c) no Alteration will be commenced until Subtenant has first obtained and paid for all required permits and authorizations of all regulatory bodies for the Alteration;

(d) any Alteration will be made in a good workmanlike manner and in compliance with all laws, ordinances, regulations, codes, and permits;

(e) Subtenant will not decorate or paint the exterior of the Structure, or any part of it, except in a manner and in color(s) approved by Sublandlord;

(f) any Alteration will become and remain Sublandlord's property unless Sublandlord otherwise agrees in writing.

8.3 Liens. Subtenant will keep the Structure and its improvements, at all times during the term of this Sublease, free of mechanics and materialmen's liens and other liens of like nature, except for liens created and claimed by reason of any work done by or at the direction of Sublandlord. Subtenant will indemnify and hold Sublandlord harmless from and against any mechanics or materialmen's liens and claims for work, labor, or materials supplied to the Structure at the direction of Subtenant and against all attorneys' fees and other costs and expenses arising out of or incurred by reason or on account of any liens and claims. In the event that any liens or claims are filed for work, labor, or materials supplied to the Structure at the direction of Subtenant, Subtenant will, at Sublandlord's option, either escrow an amount equal to the amount of the lien or claim being filed, or obtain a bond for the protection of Sublandlord in an amount not less than the amount of the lien or claim being filed.

ARTICLE 9. SUBTENANT'S COVENANTS

9.1 Subtenant Covenants. Subtenant covenants and agrees to procure any and all licenses and permits required for any use of the Structure by Subtenant, and, upon the expiration or termination of this Sublease, to remove its goods and effects and to yield the Structure peaceably to Sublandlord in good order, repair, and condition in all respects, excepting damage by fire and casualty covered by Tenant's insurance coverage, structural repairs (unless Tenant is obligated to make the repairs under this Sublease) and reasonable wear and tear.

9.2 Access for Prospective Purchasers. Subject to Subtenant's security plans, policies, and procedures, Subtenant agrees to permit Sublandlord and its agents to examine the Structure at reasonable times and to show the Structure to prospective

purchasers, provided that Sublandlord will not unreasonably interfere with the conduct of Tenant's business.

9.3 Access for Inspection. Subject to Subtenant's security plans, policies, and procedures, Subtenant agrees to permit Sublandlord to enter the Structure to inspect the Alteration as may be required under the provisions of this Sublease. If, as a result of an Alteration, Subtenant is deprived of the use of the Structure, the Rent will be abated or adjusted, as the case may be, in proportion to that time during which, and to that portion of the Structure of which, Subtenant was deprived.

ARTICLE 10. DEFAULT AND REMEDIES

10.1 Default. Except as expressly set forth in this Sublease, Subtenant will perform all obligations with respect to the Structure that Sublandlord would be required to perform under the Master Lease. It will constitute an Event of Default hereunder if Subtenant fails to perform any obligation hereunder (including, without limitation, the obligation to pay Rent), or any obligation under the Master Lease that has been incorporated herein by reference.

10.2 Remedies. In the Event of Default by Subtenant, Sublandlord will have all remedies provided to the "Landlords" in the Master Lease, as if an event of default had occurred thereunder, and all other rights and remedies otherwise available at law and in equity. Without limiting the foregoing, Sublandlord may continue this Sublease in effect after Subtenant's breach and abandonment and recover Rent as it becomes due. Sublandlord may resort to its remedies cumulatively or in the alternative.

10.3 Right to Cure Defaults. If Subtenant fails to perform any of its obligations under this Sublease after expiration of applicable grace or cure periods, then Sublandlord may, but will not be obligated to, perform any obligations for Subtenant's account. All costs and expenses incurred by Sublandlord in performing any act for the account of Subtenant will be deemed Additional Rent payable by Subtenant to Sublandlord upon demand, together with interest, at the lesser of (i) the default interest rate under the Master Lease or (ii) the maximum rate allowable under law from the date of the expenditure until repaid. If Sublandlord undertakes to perform any of Subtenant's obligations for the account of Subtenant under this Section, the taking of action will not constitute a waiver of any of Sublandlord's remedies.

ARTICLE 11. INDEMNIFICATION

11.1 Sublandlord and Subtenant mutually agree each will indemnify and hold harmless the other for any claims, losses, lawsuits, damages, or claims for damages arising by or through the negligence of the other party, its agents, or its employees.

ARTICLE 12. MISCELLANEOUS

12.1 Confidentiality. Sublandlord and Subtenant agree to respect and, to the extent reasonably possible, preserve the confidentiality of each party's relationships and transactions with their respective business endeavors, contacts, customers, and clients.

12.2 Costs and Expenses; Legal Costs. In the event any litigation or dispute arises between the parties arising from this Sublease or the sublandlord-subtenant relationship under this Sublease, the prevailing party will be entitled to reimbursement of its legal costs and all other reasonable costs and expenses incurred in enforcing this Sublease or curing the other party's default.

12.3 No Consequential Damages. In the event either party seeks or claims damages against the other party for breach, neither Sublandlord nor Subtenant will seek, nor be awarded, any speculative, consequential, collateral, special, punitive, or indirect damages, whether the breach is willful, knowing, intentional, deliberate, or otherwise. The parties intend that any damages awarded to either party will be limited to actual, direct damages sustained by the aggrieved party. Neither party will be liable for any loss of profits suffered or claimed to have been suffered by the other.

12.4 No Waiver by Silence. Failure of either party to complain of any act or omission on the part of the other party will not be deemed a waiver by the noncomplaining party of any of its rights under this Sublease. No waiver by either party at any time, express or implied, of any breach of this Sublease will constitute a waiver of the breach or any other breach.

12.5 Performance Under Protest. If a dispute arises about the performance of any obligation under this Sublease, the party against which the obligation is asserted will have the right to perform it under protest, which will not be regarded as voluntary performance. A party that has performed under protest may institute appropriate proceedings to recover any amount paid or the reasonable cost of otherwise complying with any obligation, with interest.

12.6 Survival. All rights and obligations that by their nature are to be performed after any termination of this Sublease will survive any termination.

ARTICLE 13. INTERPRETATION, EXECUTION, AND APPLICATION OF SUBLEASE

13.1 Captions. The captions of this Sublease are for convenience and reference only.

13.2 Counterparts. This Sublease may be executed in counterparts.

13.3 Delivery of Drafts. Neither party will be bound by this Sublease unless and until the party has executed and delivered at least one counterpart of this Sublease. The

submission of draft(s) or comment(s) on drafts will bind neither party in any way. The draft(s) and comment(s) will not be considered in interpreting this Sublease.

13.4 Entire Agreement. This Sublease contains all terms, covenants, and conditions regarding the Structure.

13.5 Governing Law. This Sublease, its interpretation and performance, the relationship between the parties, and any disputes arising from or relating to any of the foregoing, will be governed, construed, interpreted, and regulated under the laws of the State of Minnesota, without regard to principles of conflict of laws.

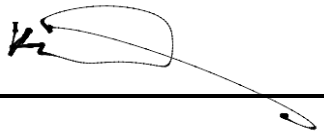
13.6 Partial Invalidity. If any term or provision of this Sublease or its application to any party or circumstance is to any extent be invalid or unenforceable, then the remainder of this Sublease, or the application of the term or provision to persons or circumstances except those as to which it is invalid or unenforceable, will not be affected by the invalidity. All remaining provisions of this Sublease will be valid and be enforced to the fullest extent the law allows.

13.7 Principles of Interpretation. No inference in favor of or against any party will be drawn from the fact that the party has drafted any part of this Sublease. The parties have both participated substantially in its negotiation, drafting, and revision, with advice from counsel and other advisers.

[THE REMAINDER OF THIS PAGE WAS LEFT BLANK INTENTIONALLY. SIGNATURES FOLLOW ON THE NEXT PAGE.]

IN WITNESS WHEREOF, Sublandlord and Subtenant have executed this Sublease as of the Commencement Date.

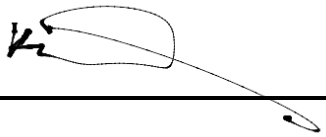
2K HEALTH LLC

Signed: 

By: Kyle Kingsley

Its: Member

MINNESOTA MEDICAL SOLUTIONS LLC

Signed: 

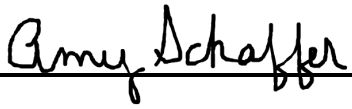
By: Kyle Kingsley

Its: CEO

JOSEPH P. SCHAFFER

Signed: 

AMY B. SCHAFFER

Signed: 

Attachments:
EXHIBIT A (Building Description)
EXHIBIT B (Master Lease)
EXHIBIT C (Notice Addresses, Including Required Copy Recipients)

EXHIBIT A

EXHIBIT B
MASTER LEASE

EXHIBIT C
NOTICE ADDRESSEES
(INCLUDING REQUIRED COPY RECIPIENTS)

PARTY	NOTICE ADDRESS	WITH A COPY TO
2K HEALTH LLC	Kyle Kingsley, MD 5200 Willson Rd Suite 150, Edina MN 55424	Marshall Lichty ENTREPARTNER LAW FIRM, PLLC 4470 West 78th Street Circle Suite 210 Bloomington, Minnesota 55435
MINNESOTA MEDICAL SOLUTIONS LLC	Kyle Kingsley, MD 5200 Willson Rd Suite 150, Edina MN 55424	Marshall Lichty ENTREPARTNER LAW FIRM, PLLC 4470 West 78th Street Circle Suite 210 Bloomington, Minnesota 55435
JOSEPH P. SCHAFFER AND AMY B. SCHAFFER	9471 Jaber Ave NE, Monticello MN	Minnesota Native Landscapes, Inc.

Signature Certificate

Document Reference: BTSNDKIMZ4RNNBHER7C59E

RightSignature
Easy Online Document Signing

Joe Schaffer
Party ID: M7U6AJINR59DI5HI3EWYS5
IP Address
VERIFIED EMAIL

Electronic Signature:

Multi-Factor Digital Fingerprint Checksum: 3213d9eafc0860959fa7b82f429e4098647f481c

Amy Schaffer
Party ID: YXPVX8JUT27DVXHXIP6657
IP Address
VERIFIED EMAIL

Electronic Signature:

Multi-Factor Digital Fingerprint Checksum: 15064b5846894f444846de3a350952baaf81992a

Kyle Kingsley
Party ID: 6RBMS8JDSLB2DRGE89X3NM
IP Address
VERIFIED EMAIL

Electronic Signature:

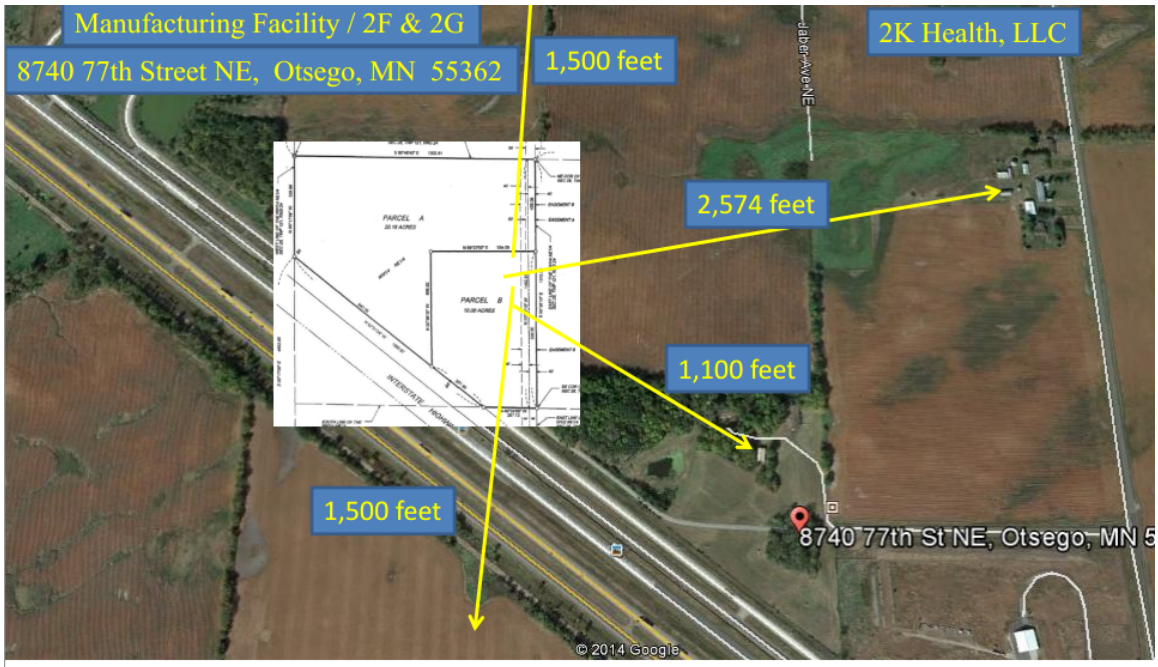
Multi-Factor Digital Fingerprint Checksum: 865c18a2bfd8881d5b58581cfe51a23446c2451a

Timestamp	Audit
2014-09-17 06:42:06 -0700	All parties have signed document. Signed copies sent to: Joe Schaffer, Amy Schaffer, Kyle Kingsley, Janet Westenberg, and Marshall Lichty.
2014-09-17 06:42:06 -0700	Document signed by Amy Schaffer) with drawn signature. -
2014-09-17 06:39:02 -0700	Document viewed by Amy Schaffer -
2014-09-16 19:47:51 -0700	Document signed by Joe Schaffer with drawn signature. -
2014-09-16 19:29:04 -0700	Document signed by Kyle Kingsley with drawn signature. -
2014-09-16 19:25:32 -0700	Document viewed by Kyle Kingsley). -
2014-09-16 19:24:25 -0700	Document viewed by Joe Schaffer - 6
2014-09-16 19:19:53 -0700	Document created by Marshall Lichty -

This signature page provides a record of the online activity executing this contract.

f. Photographs of the surrounding neighborhood and businesses within 500 feet of the manufacturer's property, sufficient to evaluate the proposed production facility's compatibility with commercial or residential structures already constructed, or under construction, within the surrounding area

There are no businesses within 500 feet of the manufacturing property with the exception of the office and work buildings of Minnesota Native Landscapes Inc., which belongs to a MinnMed shareholder, Joe Schaffer. All existing buildings will be separated from the MinnMed cultivation facility by a fence. *Please the Minnesota Native Landscapes existing structure photos and the illustrated map below:*

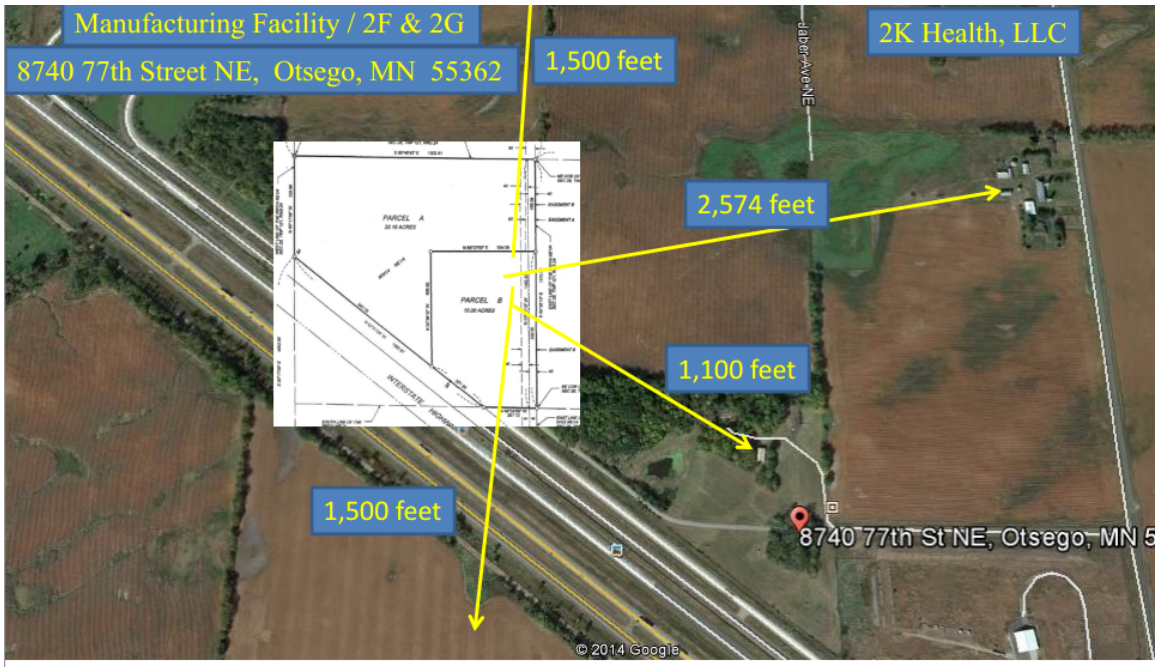


Photograph Of Surrounding Neighborhood and Business with in 500 feet Manufacturer's property

B2f. Attachment: Photographs

g. A map that identifies all places used primarily for religious worship, public or private schools, convents, charitable institutions whether supported by private or public funds, hospital or veterans' homes, or any camp or military establishment that are within 1000 feet of the proposed production facility location

There are no churches, public or private schools, convents, charitable institutions, hospitals or veterans homes, camps or military establishments within 1000 feet of the MinnMed manufacturing facility. The closest building that does not belong to Minnesota Native Landscapes is a farmhouse approximately 1100 feet from the manufacturing facility. *Please see the photograph below:*



Photograph Of Surrounding Neighborhood and Business with in 500 feet Manufacturer's property

h. A site plan, drawn to scale, of the proposed production facility showing any perimeter fencing as well as all streets, property lines, buildings, parking areas, and outdoor areas, if applicable, that are within a 500 foot radius of the production facility

i. A blueprint or floor plan, drawn to scale, of the proposed production facility, which shows and identifies the following information:

Below are the blueprints for MinnMed's new state-of-the-art greenhouse cultivation facility that is already under construction. We have also included these blueprints as an attachment. Please see the attached greenhouse floor plan. It will be easier for viewing and has a legend key for determining areas and square footages within the facility.

The overall initial square foot of the cultivation facility will be 15,000 square feet. Phase 2 construction has also been started which will take the total square footage to over 30,000. MinnMed will have the ability to quickly expand and increase production areas and the facility as needed. The square foot of individual rooms/areas can be seen on the attached blueprints within the legend.

x. The locations of any business operations on the property that will not be related to the production and distribution of medical cannabis

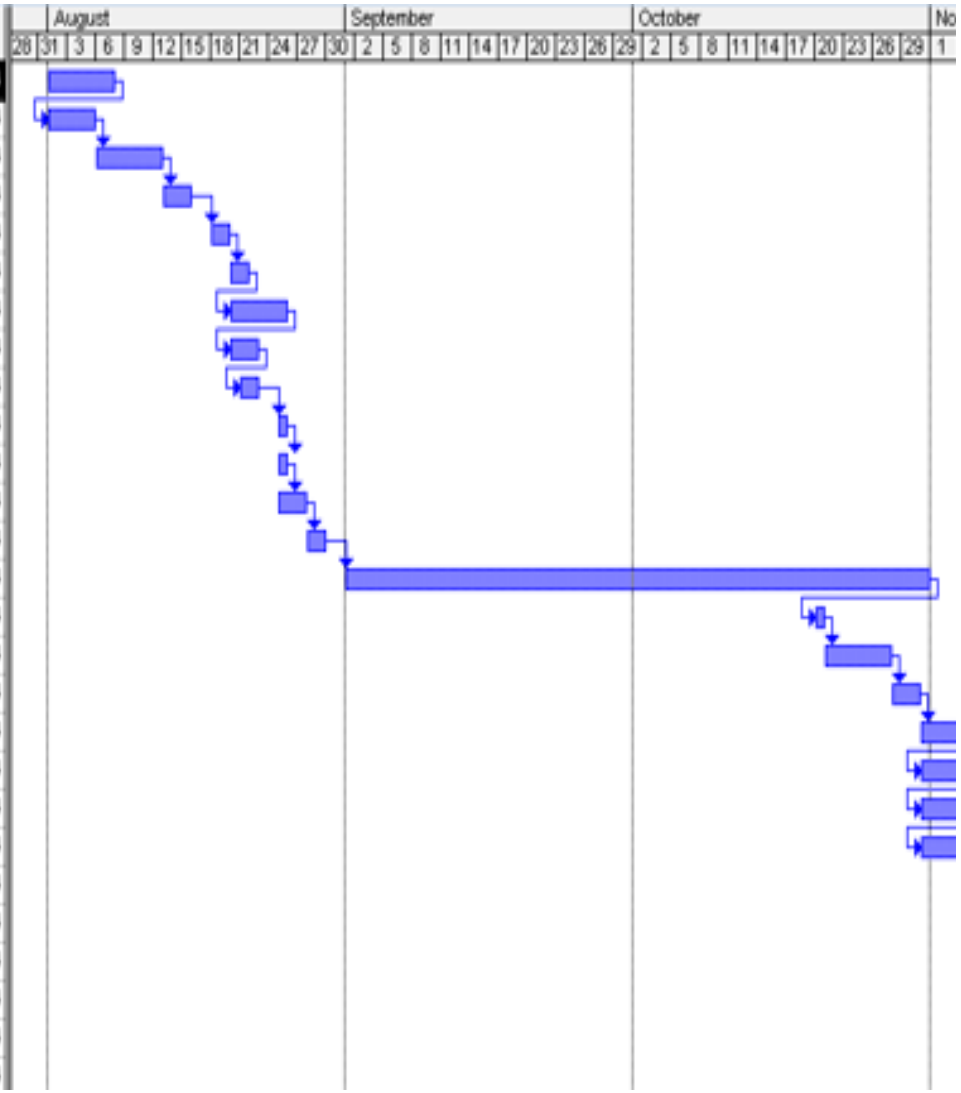
The cultivation facility will be completely separated from Minnesota Native Landscapes' existing buildings, and no functions within the production facility will be unrelated to the production and distribution of cannabis. **See photograph below.*

The locations of any business operations on the property that will not be related to the production and distribution of medical cannabis

j. A site development and construction plan identifying the start date, duration of the construction and the completion date

In late July of 2014, MinnMed started construction of a state-of-the-art greenhouse manufacturing facility. The facility's construction is being managed by American Cannabis Company Inc. All construction activities have been completed in a timely manner. MinnMed expects the facility to be completed in November 2014, ahead of a potential December 1st license date. This was done to avoid using a temporary site or another sub-optimal production facility. The total construction duration including site preparation and excavation will be approximately 15 weeks. Please view the chart below for a construction timeline. Phase 2 will follow a very similar timeline. The site preparation will start in October, but no full scale construction for phase 2 will start until Dec. 1 if MinnMed is awarded a manufacturing license.

Task Name	Duration	Start	Finish
Site Grading	5 days	Fri 8/1/14	Thu 8/7/14
Excavation of foundations	3 days	Fri 8/1/14	Tue 8/5/14
Pour Building Footing	5 days	Wed 8/6/14	Tue 8/12/14
Pour Building Foundation walls	3 days	Wed 8/13/14	Fri 8/15/14
Back fill foundation walls	2 days	Mon 8/18/14	Tue 8/19/14
Final site grading	2 days	Wed 8/20/14	Thu 8/21/14
Install building post	4 days	Wed 8/20/14	Mon 8/25/14
Install under slab plumbing	3 days	Wed 8/20/14	Fri 8/22/14
Trench Drains	2 days	Thu 8/21/14	Fri 8/22/14
Install Stone	1 day	Mon 8/25/14	Mon 8/25/14
Install under slab Insulation	1 day	Mon 8/25/14	Mon 8/25/14
In floor Radiant Floor Heat	3 days	Mon 8/25/14	Wed 8/27/14
Install Concrete Slab	2 days	Thu 8/28/14	Fri 8/29/14
Framing GH structure	45 days	Mon 9/1/14	Fri 10/31/14
Install Side Walls	1 day	Mon 10/20/14	Mon 10/20/14
Install HH roofing	5 days	Tue 10/21/14	Mon 10/27/14
Install Glass Roof	3 days	Tue 10/28/14	Thu 10/30/14
Metal Studs Farming Walls	5 days	Fri 10/31/14	Thu 11/6/14
Rough Electrical	5 days	Fri 10/31/14	Thu 11/6/14
Rough Plumbing	5 days	Fri 10/31/14	Thu 11/6/14
Rough HVAC	5 days	Fri 10/31/14	Thu 11/6/14
Install Drywall	5 days	Fri 11/7/14	Thu 11/13/14
Tape and Finnish Drywall	5 days	Fri 11/7/14	Thu 11/13/14
Install Doors Frames Hardware	1 day	Fri 11/14/14	Fri 11/14/14
Paint Walls	3 days	Mon 11/17/14	Wed 11/19/14
Finsh Electrical	4 days	Thu 11/20/14	Tue 11/25/14
Finsh Plumbing	4 days	Thu 11/20/14	Tue 11/25/14



B2j. Attachment: Construction Plan

k. Do you plan to begin manufacturer at a temporary site prior to your manufacturing facility described above being complete? If so, provide all of the information previously requested in subsection h, for the temporary site, in addition to the following:

MinnMed does not plan to begin manufacturing at a temporary site. The construction time frame will allow MinnMed to be fully operational as early as November in order to ensure cannabis medications will be available for patients of Minnesota by July 1, 2015.

l. Explanation of how the manufacturing facility will be secured to minimize the potential for theft or diversion of cannabis plants, cultivation materials and byproducts

Minnesota Medical Solutions' security system, used in both structures and surrounding areas, will be a premier example of external and internal diversion prevention. Security measures, protocols and procedures are detailed thoroughly within the 'Cultivation Facility Security Plan' attached to section C #8.

[redacted]

[redacted]

[redacted]

[redacted]

B. Facilities

[redacted]

[redacted]

[redacted]

[redacted]

B. Facilities

[redacted]

[redacted]

[redacted]

m. The process that the producer will take to ensure that access to the manufacturing facility premises will be limited only to employees and authorized personnel

MinnMed will take proper measures and will ensure that access to the manufacturing facility premises is limited to employees and authorized personnel.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

n. Any air treatment or other system that will be installed and used to reduce off-site odors

Odor Reduction

MinnMed will install air treatment and odor control systems within the manufacturing facility to reduce off-site odors and offensive smells. After air leaves each working area, it will be filtered through a carbon filter. The air will be filtered a second time and will also be treated with ozone before leaving the building through a roof top stack.

Detailed Description of Air Treatment Systems that Reduce Off-Site Odors: The manufacturing facility will contain a three-phase odor reduction system to eliminate odor in and around our production facility. Cannabis production is organized into a series of separately sealed zones including but not limited to: vegetative, flowering, trimming, curing, storage, processing, infused products, and hallways connecting rooms. Within each zone, a predetermined number of activated carbon filters will circulate and scrub the air at a flow rate calculated to filter all the air in the room every 15 minutes. Each zone will maintain neutral air pressure created by exhausting the air through one point at the same rate fresh air enters the zone. The exhaust from each zone will be filtered a second time through an activated carbon filter before entering a sealed ducting system to be transferred to a common air bank. Before exiting the building through a stack system, all exhaust is filtered a third time through a series of activated carbon filtration screens thoroughly reducing odor emission rates.

Odor Reduction Plan: **Step 1:** Create sealed zones, **Step 2**: Exhaust system with neutral pressure, **Step 3**: Three-phase odor reduction system:

- Air within zone filtered through activated carbon every 15 minutes
- Air exhausted from rooms filtered through activated carbon, transferred through sealed ducting system
- All exhaust collected in a common air-bank where it is filtered a third time before leaving the building through an engineered stack system

UV Odor Reduction:

UV filtration systems (Advanced Photo Catalytic Oxidation) represent an entirely new type of air purifier. The UV filtration systems will be installed in the ductwork of the central air system where they scrub the air as it passes by. By using a unique combination of UVC light and activated carbon, UV filtration can achieve unmatched germicidal and odor reduction effectiveness without producing any harmful ozone. UV filtration is particularly effective at reducing odor-causing and potentially toxic volatile organic compounds (VOCs) which include toxic chemical vapors like formaldehyde and toluene.

Airborne contaminants can be divided roughly into thirds: particulates, mold/germs, and VOCs. Conventional filtration is only effective against particulates, like dust, but has no effect on the

other two thirds. UV filtration is proven to safely reduce both VOCs and biological contaminants inside the air system and throughout manufacturing facilities.

According to the EPA, indoor air quality can be five times worse than outdoor air quality and can represent significant health risks. An UV filtration facility air purifier improves indoor air quality by destroying odor-causing and potentially toxic VOCs, while sterilizing mold, bacteria, viruses, and allergens from the air stream.

Scientists have long known about the germ-killing properties of UVC light. Because this frequency of light is filtered out by the Earth's atmosphere, microorganisms have no defense against it. It works by scrambling microorganism DNA, which prevents them from reproducing.

UV filtration detoxes the air with a process called photo catalytic oxidation (PCO), a technology similar to the catalytic converter on your car's exhaust. UVC light reacts with titanium dioxide infused into the carbon which effectively disintegrates the captured contaminants, leaving only harmless water vapor and CO_2 which are released back into the air. UV filtration actually removes odors by transforming odor-causing VOC molecules into harmless water vapor and CO_2. This process leaves the carbon cells clean so they never fill up or need to be replaced. The result is clean, odor-free air throughout the manufacturing facility.

UV filters shall be installed in all areas of the manufacturing facility to reduce smell and destroy germs, mold, and disease.

o. Explanation of previous experience developing new manufacturing facilities

MinnMed has partnered with a Colorado consulting firm, American Cannabis Company Inc. (ACC) that has years of experience building cannabis cultivation facilities for the regulated cannabis industry. Members of American Cannabis Company Inc. bring 30+ years of experience in general contracting and construction management. MinnMed has retained the services of American Cannabis Company Inc. to help with organizational efforts, operations, and goals. American Cannabis Company Inc. has guided MinnMed during the design and construction phase of our current, under construction state-of-the-art greenhouse manufacturing facility.

American Cannabis Company Inc. is comprised of diverse individuals who bring years of experience and expertise from different fields. This diversity creates an atmosphere conducive to

designing, developing, implementing, and operating within the regulated medical cannabis industry.

ACC has designed, remodeled, and built numerous regulated and compliant cultivation and distribution facilities throughout the U.S. Each site has been specifically designed with efficiency and efficacy in mind. In 2010, ACC team members worked with architects and engineers to design two distribution centers and two manufacturing centers. Both distribution centers were designed with a patient-centric approach: make patients feel comfortable, educate patients effectively, and serve patients high quality medical cannabis in a timely manner.

In 2011, ACC team members received the first license to be awarded to an active cultivation center in Boulder, one of Colorado's most competitive markets. Soon after, a second cultivation facility was licensed and larger companies began to request ACC team member guidance so that both new builds and remodeling facilities would be compliant and efficient. The quality of attention put into the designs caught the eye of the biggest companies in the state, and over time, successful mergers created some of the most effective companies in the state at producing and providing consistent clean medicine to the patients of Colorado.

In 2012, ACC was formed, and the team began helping people throughout the nation and Canada, build successful cultivation and distribution facilities. To date the team has built, remodeled, and designed multiple facilities in Colorado (over 10), Canada (1), Connecticut (1), Massachusetts (3 designs), Illinois (3), and Washington (2).

In addition to ACC's experience, Dan Totushek and Jerry Quall have extensive experience in building acres of cold-weather greenhouses for Dan and Jerry's Greenhouses here in Minnesota.

3. Distribution Facilities

Please provide the following information specific to each of the proposed distribution facilities:

a. The location of the proposed distribution facilities (it must be located in the State of Minnesota) and the date each facility will be operational. As a reminder, one distribution facility in each Service Area must be operational by July 1, 2015 with all four in each Service Area being operational by July 1, 2016.

MinnMed has worked extensively to develop a large range of options for dispensary facilities. We reserve the right to continue development of these and other locations to optimize access for our patients. MinnMed has secured many options for dispensaries, but will continue to search for additional options after our application is submitted. Due to time constraints, we feel that an ongoing search is prudent to find the best solutions for our patients. As of this writing, we have an ongoing search in all eight congressional districts in the state. MinnMed will readily change our dispensary site if it comes to light that there is a problem (such as a small private school) that is too close to a dispensary. MinnMed intends to open all four distribution facilities on July 1, 2015, maximizing access for patients. Please see the attached "Dispensary Narratives" for more information on our site selection process and potential dispensary sites. MinnMed does have multiple options we are developing in some districts.

Proposed Distribution Locations as of Oct 3, 2014:

Service Area A-- Odd Districts (date operational if awarded appropriate service area)

Minnesota Congressional District 1 (July 1, 2015):

500 Raintree Road, Suite 30, Mankato, MN 56001

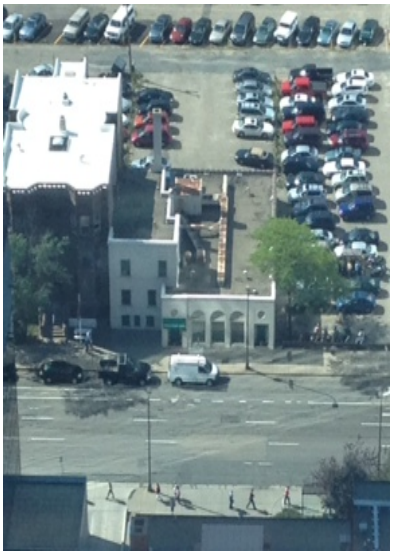
This option in District 1 with Landlord consent is a 2,652 square foot suite in a multi-tenant retail building. This property has nearly 100 unassigned surface parking lots with easy access and close to River Hills Mall in the heart of the regional retail hub. The property is over 1000' from any known public or private school, is over 30 miles outside of the Twin Cities seven county metro area and is ADA accessible.

Minnesota Congressional District 3 (July 1, 2015): 9513 Black Oaks Lane N. Maple, Grove 55311

The subject property is a multi-tenant retail building and the leased premises will comprise 1,423 square feet. There is easy access from I-94 and the area is an anchor trade area for retail and medical with a fast growing and increasing diverse population base. The property is over 1000' from any known public or private school and is ADA accessible. Minnesota Medical Solutions has Landlord consent and Letter of Intent to lease the property.

Minnesota Congressional District 5 (July 1, 2015):

207 9th Street S. Minneapolis, MN



The subject property is a planned reuse and rehabilitation of a historic building in the heart of Downtown Minneapolis. There at 16 free surface parking spaces and the building has about 4,600 square feet of rentable space on the ground floor for the dispensary, a partial basement of about 3,500 square feet for secure storage and administrative use and about approximately 3,000 square feet of additional office space. The property is over 1000' from any public or private school and is ADA accessible. Minnesota Medical Solutions has Landlord consent and Letter of Intent to lease the property.

This building is four blocks from the Central Corridor "Green Line" light rail train service, a half block from multiple bus stops and has easy access to 35W and Hwy 394. It is within two miles of the most ethically and economically diverse neighborhoods in the State of Minnesota. Most surrounding tenants and land owner are Fortune 500 companies and local government operations that employ large diverse employee bases that commute into the city each day. In addition to the corporate neighbors the area has several retail and hospitality tenants.

Minnesota Congressional District 7 (July 1, 2015):

312 U.S. 75 N. Moorhead, MN

The subject property is a multi-tenant retail building with a leasable premises of 2,700 square foot property located at 312 US 75 N., Moorhead, MN 56560 (corner of N. US 75 and 4th Ave. N.). This property is a former health care clinic with 16 surface parking spots and has convenient access situated only two blocks from Hwy 10. The property is over 1000' from any public or private school, is over 30 miles outside of the Twin Cities seven county metro area and is ADA accessible. See photo 7 at bottom.

Service Area B-- Even Districts (date operational)

Minnesota Congressional District 2 (July 1, 2014):

3926 Cedar Grove Parkway Eagan, MN 55122

This property is a brand new multi-tenant retail building and the leased premises will comprise 2,252 square feet. It is part of the South Metro's largest new retail development and close to a vibrant diverse population with easy access from Cedar Avenue and Hwy 13. The property is over 1000' from any known public or private school and is ADA accessible. Minnesota Medical Solutions has Landlord consent and Letter of Intent to lease the property.

Minnesota Congressional District 4 (July 1, 2015):

611 Bielenberg Drive, Woodbury, MN 55125

The subject property is a brand new multi-tenant retail building and the leased premises will comprise 2,500 square feet. There is ample free surface parking is a low crime area within a well monitored development. The property is over 1000' from any known public or private school and is ADA accessible. Minnesota Medical Solutions has Landlord consent and Letter of Intent to lease the property. No picture available at this time.

Minnesota Congressional District 6 (July 1, 015):

125 33rd Avenue S. St. Cloud, MN 5

The subject property is a free standing 7,000 square foot building on .62 acres with 30 surface parking lots. The rentable area is approximately 3,000 square feet and sits in a high traffic easily accessible trade area one block south of Division Street. Minnesota Medical Solutions has Landlord consent and a sign Letter of Intent to lease the property. The property is over 1000' from any public or private school, is over 30 miles outside of the Twin Cities seven county metro area and is ADA accessible.

Minnesota Congressional District 8 (July 1, 2015):

1101 37th Street E. Hibbing, MN 55746

The subject property is a free standing 2,567 square foot building on .75 acres with 30 surface parking lots. It is located close the regional medical center and several specialty clinics in the heart of the Iron Range Region's retail district with direct access to the Hwy 169. The property is over 1000' from any public or private school, is over 30 miles outside of the Twin Cities seven county metro area and is ADA accessible. *See photo 8 at bottom.*

b. Documents sufficient to establish that state and local building, fire and zoning requirements and all applicable local ordinances are met for the proposed location of the distribution facilities. If documents to this effect do not exist yet, please indicate this but provide the information that does exist and the plan and timeline to finalize the documentation. All documentation must be provided for at least the first distribution facility to the Department by November 14, 2014 in order to be a registered manufacturer.

MinnMed will ensure that all construction and building of any MinnMed locations will be done in accordance with all applicable state and local laws and regulations. Our distribution facility(s) will meet all state and local building, fire and zoning requirements. We currently have approval letters for some of the above dispensary sites (at least one in each service area A and B). We will continue to pursue local governmental support throughout the application process and beyond. Additional city letters will be provided to MDH as they come in through the application process. MinnMed does request some flexibility in changing sites if better options for our patients arise in the interim or if issues arise with current sites. Additional vetting will occur at all sites prior to construction of the dispensaries. Please see the attached city zoning letters.

c. If support exists by a local government authority, include documentation indicating the support that exists

Please see the previous city zoning letters in section 3(c). Minnesota Medical Solutions is committed to becoming a trusted and respected community partner. We understand that not everyone is open to the idea of medical cannabis in their community and so we will continue to work diligently with local leaders and members of the community to address any concerns and bridge any gaps. Our most valuable feedback regarding facilities and community concerns has come from local government and law enforcement. We will consider any municipality that we are privileged to do business in as a partner. In an effort to begin forging such relationships, we

have covered many areas of the State and have met with municipal leaders in every congressional district, including, but not limited to, the following:

District	Location	Meeting Information and City Attendees
1st	Rochester:	Meeting: City of Rochester, September 4 Stevan Kvenvold, City Manager Kathy Meyerle, Mayo Clinic General Counsel
	Mankato:	Phone Conference: Paul Vogal, Community Development Director
2nd	Eagan	Meeting: City of Eagan, September 3 Mike Maguire, Mayor Dave Osberg, City Administrator
3rd	Plymouth	Meeting: City of Plymouth, August 26 Dave Callister, City Manager Michael S. Goldstein, Chief of Police Steve Juetten, Community Development Director
	Minnetonka	Meeting: City of Minnetonka, September 9 Terry Schneider, Mayor Jeff Sebenaler, Chief of Police Julie Wischnack, Community Development Director
	Maple Grove	Meeting: City of Maple Grove, September 26 Eric T. Werner, Chief of Police Peter Vickerman, City Planner
4th	St. Paul	Phone Conference: Kristen Beckman, Deputy Mayor
5th	Minneapolis	Meeting: City of Minneapolis, September 16 Barb Johnson, City Council President
6th	St. Cloud	Phone Conference: Kathy Mehelich, Economic Development Director
7th	Moorhead	Meeting: City of Moorhead, September 8 Del Rae Williams, Mayor Michael J. Redlinger, City Manager David Ebinger, Chief of Police Bill Bergquist, Clay County Sheriff
8th	Hibbing	Meeting: City of Hibbing, September 11

		Tom Dicklich, City Administrator Maryann Hooper, Chief of Police

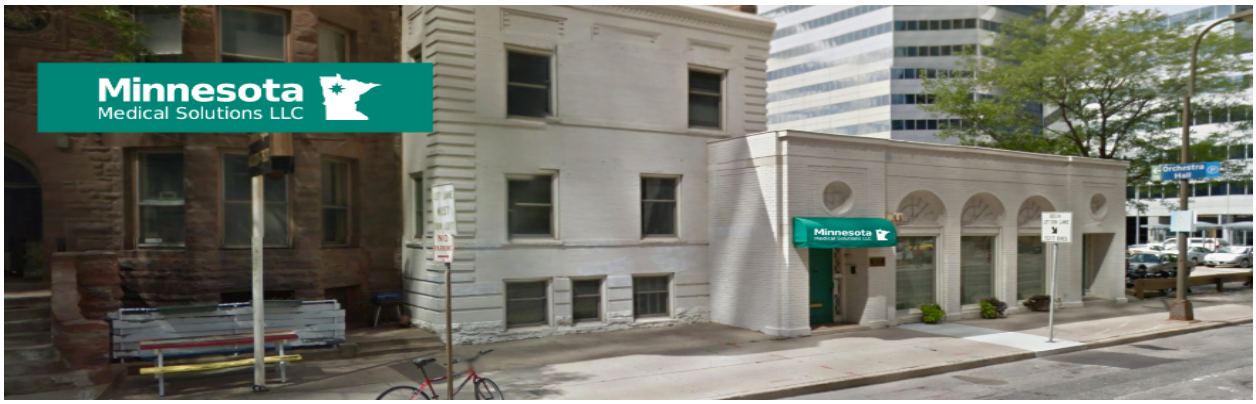
d. If the properties are not owned by the applicant, provide a written statement from the property owner certifying that they have consented to the applicant operating a distribution facility on the premises and the duration of the actual or potential lease

Please see the attached documents certifying consent to use properties/buildings. Included are letters from property owners, leases and/or Letters of Intent (LOI's). We will continue to send updates to MDH as requested.

e. If the applicant intends to locate any of the distribution facilities in anything other than a physical retail space dedicated only to medical cannabis, provide a description of the other activities at the location as well as any agreements with the existing business owners.

MinnMed does not intend to locate any distribution facilities in locations other than retail space dedicated only to medical cannabis.

f. Any signage, lettering, text and graphic materials that will be shown on the exterior of any distribution facilities. Please see the below MinnMed examples. All sites will have similar discrete signage.

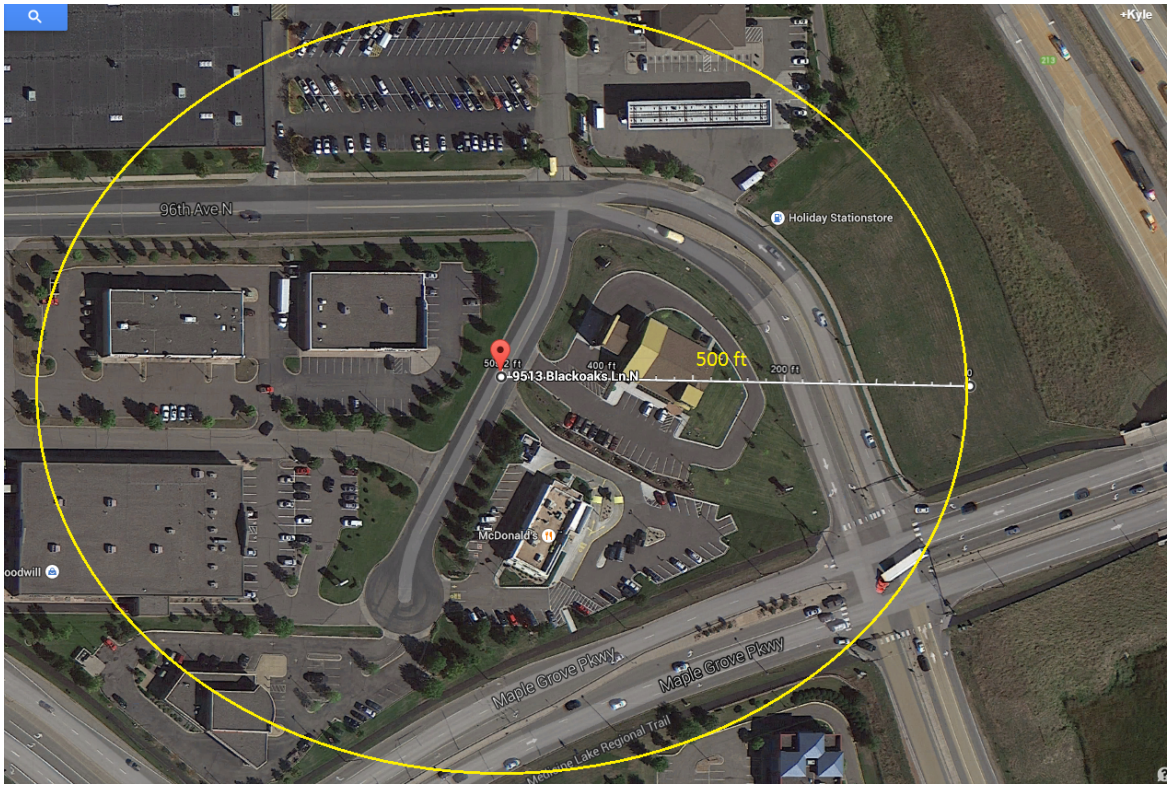


g. Photographs of the surrounding neighborhood and businesses within 500 feet of the distribution facility, sufficient to evaluate the proposed facility's compatibility with commercial or residential structures already constructed, or under construction, within the surrounding area. Please see the below photos by district.

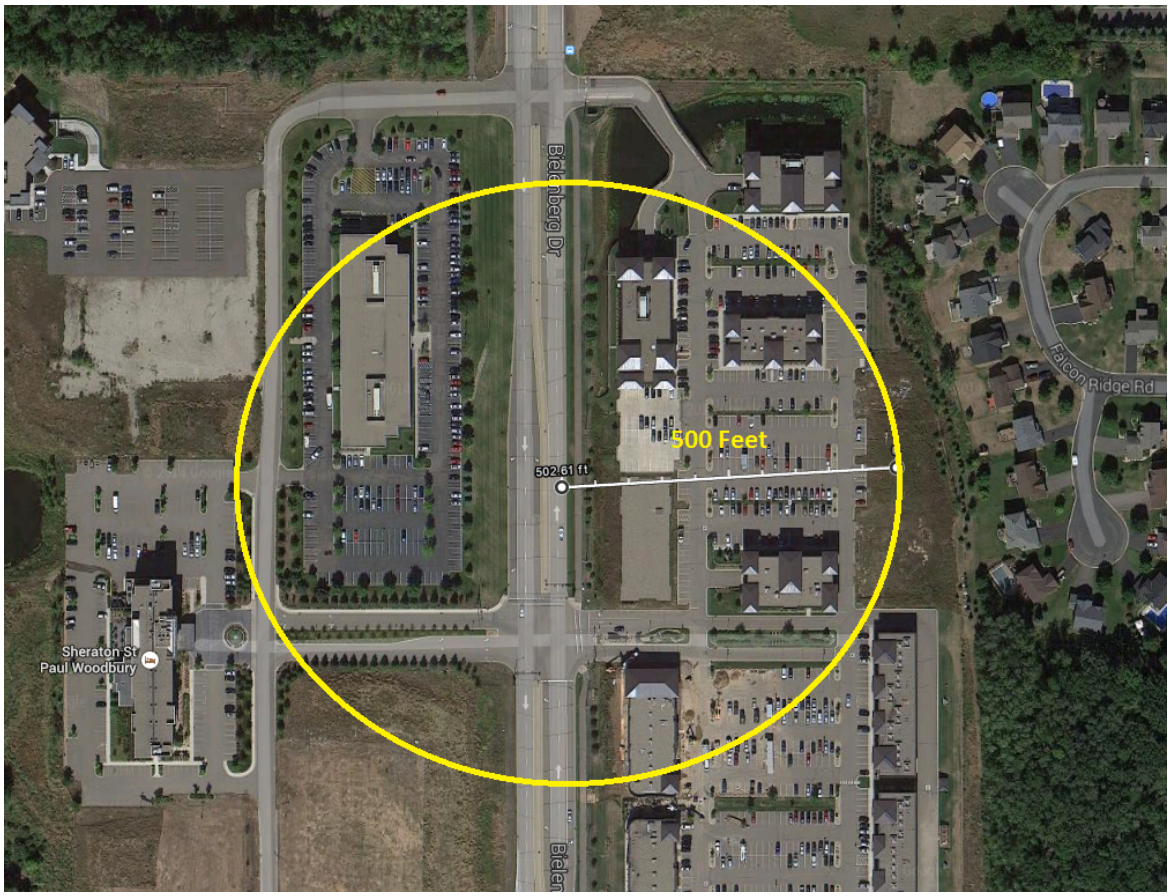
District 1, Mankato: No photos available at this time.

District 2, Eagan: Surrounding neighborhood and aerial within 500 feet of proposed facility:

District 3, Maple Grove: Surrounding buildings and aerial within 500 feet of proposed facility:

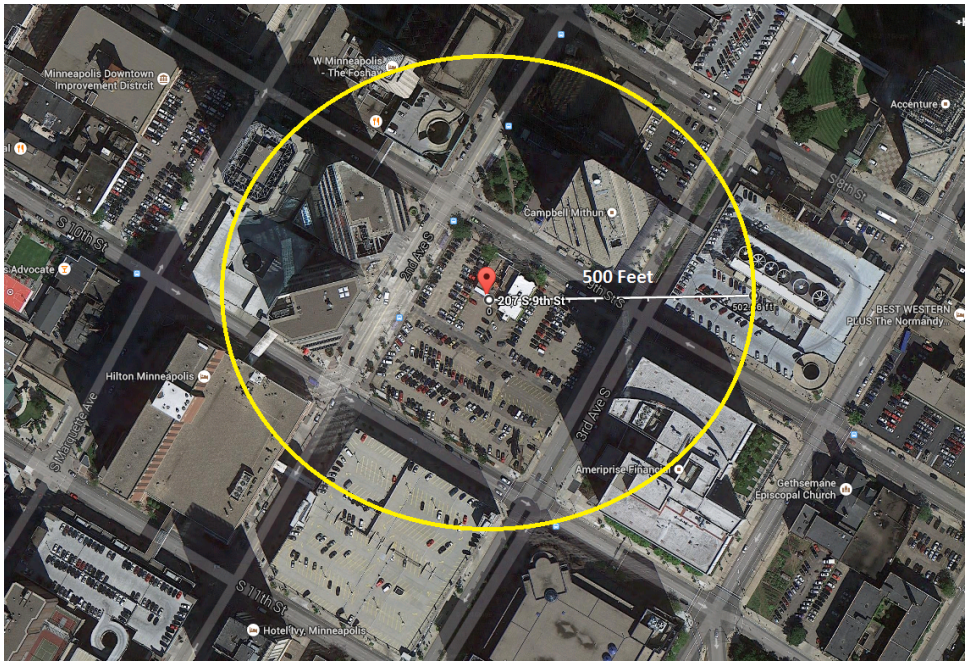


District 4, Woodbury: Surrounding buildings and aerial within 500 feet of proposed facility:

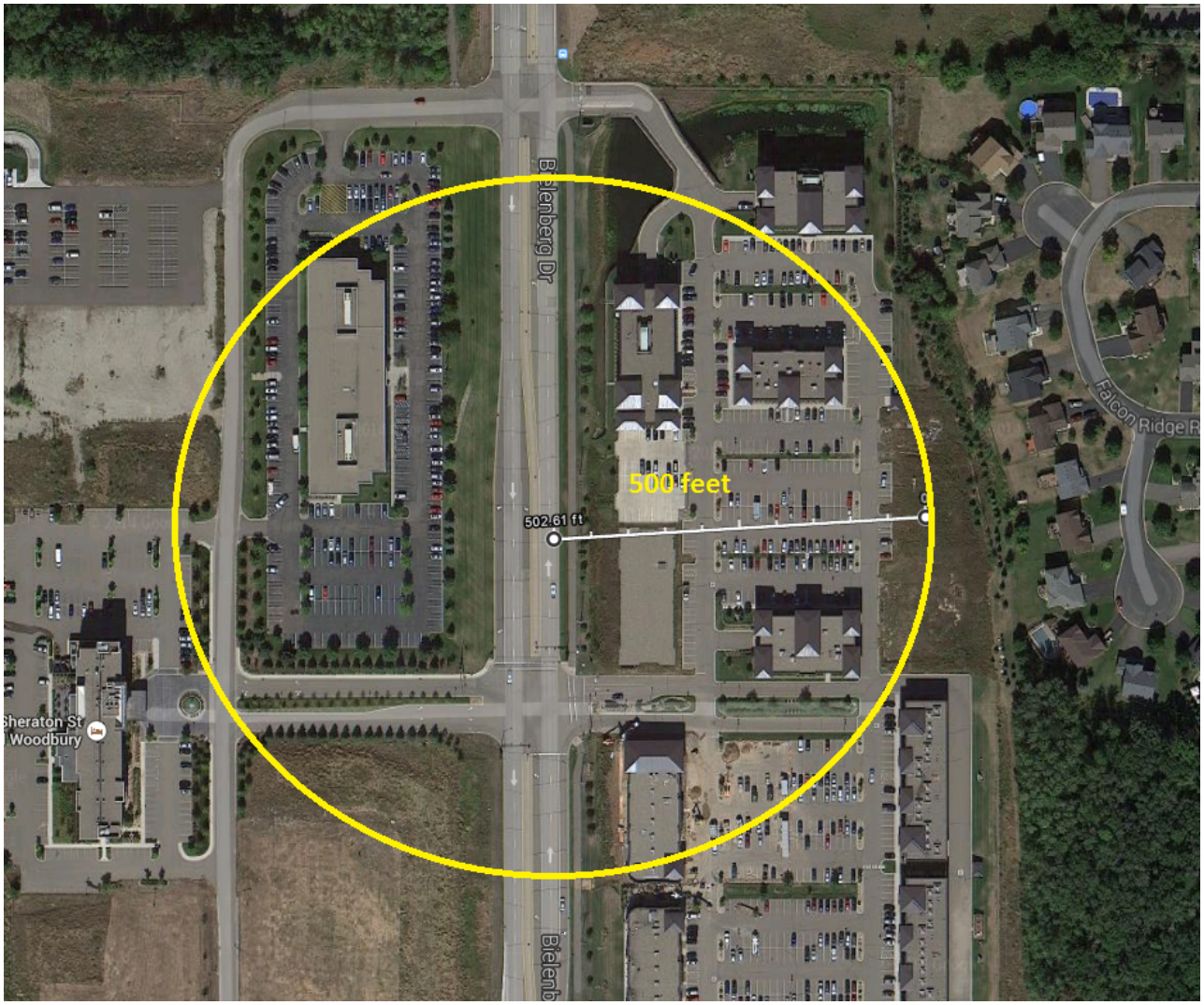


B3g. Attachment: Photographs

District 5, Minneapolis: Surrounding buildings and aerial within 500 feet of proposed facility:



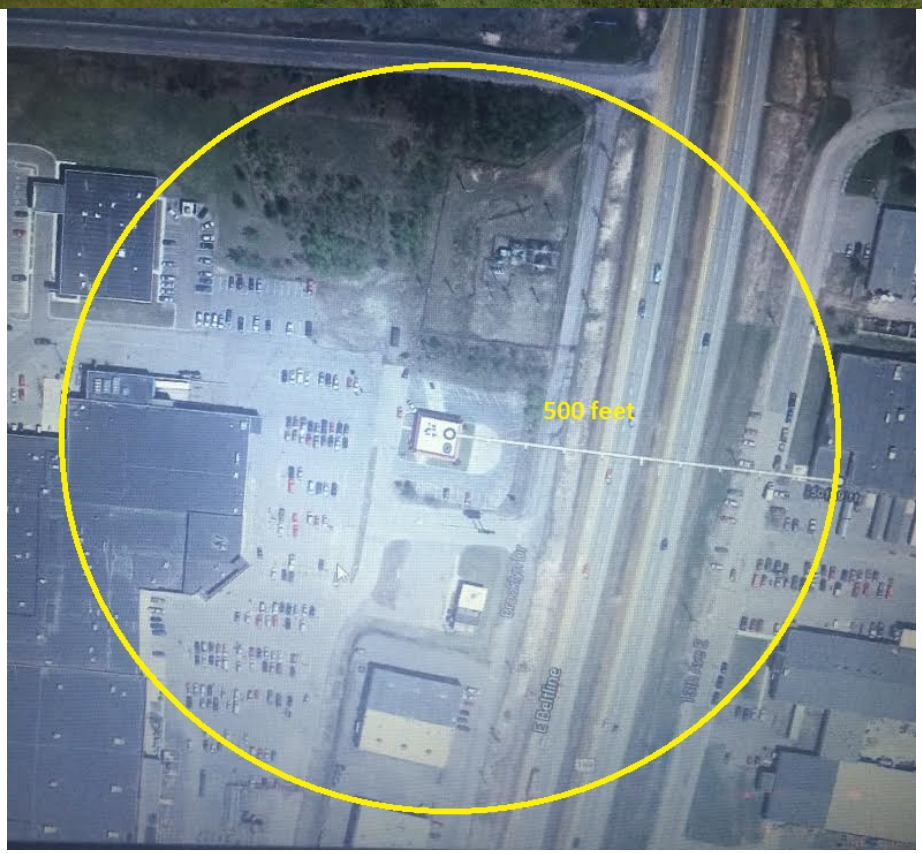
District 6, St. Cloud: Surrounding buildings and aerial within 500 feet of proposed facility:



B3g. Attachment: Photographs

District 7: Moorhead, Aerial view showing neighborhood within 500 feet.

District 8, Hibbing: Surrounding buildings and aerial within 500 feet of proposed facility:



10 Civic Center Plaza
Post Office Box 3368
Mankato, Minnesota 56002-3368

Phone: (507) 387-8600
Fax: (507) 388-7530
www.ci.mankato.mn.us

September 22, 2014

Minnesota Medical Solutions, LLC
5200 Willison Rd., Suite 150
Edina, MN 55424

Re: Proposed Medical Cannabis Dispensary

Dear Minnesota Medical Solutions:

After a review of your proposal for a medical cannabis dispensary, located at 500 Raintree Road, Mankato, we agree that the dispensary is 1,000 feet from any public or private school as required in Minn. Stat. §152.29 subd. 1 (j) and is in compliance with local zoning restrictions.

At this time, the City of Mankato has no objection to the proposed dispensary.

Sincerely,

Paul Vogel
Director of Community Development

STATE OF MINNESOTA)

) SS

COUNTY OF BLUE EARTH)

On this 22nd day of September, 2014, before me, a Notary Public, within and for said County, personally appeared Paul Vogel to me personally known, who being each by me duly sworn did say that they are respectively the Director of Community Development of the City of Mankato, a municipal corporation named in the foregoing

Renae Kopischke

Notary Public

RENAE KOPISCHKE
Notary Public-Minnesota
My Commission Expires Jan 31, 2015

MOORHEAD
MINNESOTA

September 22, 2014

Minnesota Medical Solutions, LLC
5200 Willison Rd., Suite 150
Edina, MN 55424

Re: Proposed Medical Cannabis Dispensary
312 Highway 75 North, Moorhead, MN 56560
Zoning District – Community Commercial – Permitted Use

Dear Minnesota Medical Solutions:

After review of your proposal for a medical cannabis dispensary located at 312 Highway 75 North, I agree that the dispensary is 1,000 feet from any public or private school (as required in Minn. Stat. §152.29 subd. 1 (j)) and the use is in compliance with the City of Moorhead Zoning Code. At this time, the City of Moorhead Planning and Zoning Office has no objection to the proposed dispensary.

Please contact me if there's any additional information I can provide.

Sincerely,

Kristie Leshovsky, AICP
City Planner & Zoning Administrator
City of Moorhead, Minnesota
500 Center Avenue - Moorhead, MN 56561-0779
218.299.5332

City of Eagan

September 30, 2014

Minnesota Medical Solutions, LLC
5200 Willison Rd., Suite 150
Edina, MN 55424

Re: Proposed Medical Cannabis Dispensary

Dear Minnesota Medical Solutions:

After a review of your proposal for a medical cannabis dispensary, located at Cedar Grove Business Center, 3900 Cedar Grove Parkway, 55122 we agree that the dispensary appears to be 1,000 feet from any public or private school as required in Minn. Sat. §152.29 subd. 1 (j) and is in compliance with local zoning restrictions.

Sincerely,

Jon Hohenstein
Community Development Director

Notarized by Sarah J. Brandel
On October 1, 2014

SARAH JEAN BRANDEL
Notary Public-Minnesota
My Commission Expires Jan 31, 2019

Municipal Center
3830 Pilot Knob Road
Eagan, MN 55122-1810
651.675.5000 phone
651.675.5012 fax
651.454.8535 TDD

Maintenance Facility
3501 Coachman Point
Eagan, MN 55122
651.675.5300 phone
651.675.5360 fax
651.454.8535 TDD

www.cityofeagan.com

CITY OF
ST. CLOUD
MINNESOTA

OFFICE OF THE MAYOR

September 30, 2014

Minnesota Medical Solutions, LLC
5200 Willison Road, Suite 150
Edina, MN 55424

To the Board of Minnesota Medical Solutions:

This letter shall serve as confirmation that City of St. Cloud staff have reviewed preliminary information as it relates to the proposal to locate a successful medical cannabis dispensary facility. Formal land use application review will be required in conformance with the St. Cloud Zoning Ordinance and Municipal Code and approvals by the Planning Commission and City Council.

Following approval from the State of Minnesota, please contact us to discuss specific proposed locations and the City of St. Cloud's land use and zoning application process.

Sincerely,

Dave Kleis
Mayor, City of St. Cloud

Matt Glaesman
Community Development Director, City of St. Cloud

Cathy Mehelich
Economic Development Director, City of St. Cloud

0 2nd Street South > St. Cloud, MN 56301-3699 > 320.255.7201 > www.ci.stcloud.mn.us

September 18, 2014

Dr. Kyle Kingsley
Chief Executive Officer
Minnesota Medical Solutions LLC
5200 Wilson Road, Suite 150
Edina. MN 55424

Dear Dr. Kingsley,

Lundin Properties, LLC dba Raintree Mall owner of 500 Raintree Road, Suite 30 looks forward to the tenancy of Minnesota Medical Solutions LLC in our building and approves the use of the premises for a medical cannabis dispensary licensed by the State of Minnesota.

Sincerely,

Name: Richard Lundin

Its: Owner

NON BINDING LETTER OF INTENT

Date: 9/19/2014

RE: PROPOSAL FOR LEASING 500 Raintree Road Suite 30, Mankato, MN. 56001

"Property Owner/Landlord": Richard C. Lundin, Lundin Properties LLC

"Prospective Tenant": Minnesota Medical Solutions LLC

"Property/Leased Premises": 500 Raintree Road Suite 30, Mankato, MN.

This letter will outline the general basic terms and conditions under which the Prospective Tenant desires to lease the Property described above. The proposed terms and conditions outlined below are for the sole purpose of initiating discussions between the Parties and are not intended as, and shall not be construed nor interpreted as, constituting either a binding offer by or a binding obligation on the part of either Party for the leasing of the Property on such terms and conditions.

Landlord:	**Lundin Properties LLC**
Tenant:	**Minnesota Medical Solutions LLC**
Leased Premises:	**Exhibit A.**
Initial Term:	**5 years beginning Feb. 1, 2015**
Options:	**At the end of year five, with a 90 day notice, to renew the lease for an additional five years at 3% annual increase in base rent.**
Base Rental Rate:	

Lease Type:	***Net,Net,Net Tenant*** **is responsible for their proportionate share of insurance, common utilities, common area maintenance and real estate taxes (11.35%)** ***Landlord*** **is responsible for structural repairs not caused by the actions of the Tenant**
Real Estate Taxes:	***Tenant*** **shall pay the proportionate share cost of the real estate taxes (11.35%)**
Other Services:	***Tenant*** **to pay the cost for any other service directly contracted for by Tenant (i.e., telephone service, cable service, janitorial services inside Tenant's Leased Premises, etc.)**
Repairs:	***Landlord*** **shall, at its sole expense, be responsible for structural repairs to the building and roof deck (and any other expense which would be considered a capital expense under generally accepted accounting principles).** ***Tenant*** **shall be responsible for all other repairs and maintenance required to the Premises and equipment, including but not limited to plumbing, replacement of light bulbs and ballasts and repairs and maintenance of the heating, ventilating, air conditioning and electrical systems.**
Landlord Improvements:	**NONE.**
Tenant Improvements:	***Tenant*** **will be responsible for all other improvements required for Tenant's use of the Premises, including but not limited to: interior partitions - including changes to the heating, ventilating, air conditioning and electrical systems required by said partitions; wall covering; floor covering; painting; installation of equipment, fixtures; and any other improvements and decorating required for Tenant's use of the Premises. All such improvements must be pre-approved by the Landlord.**
Possession:	***Tenant*** **shall be given possession of the Premises Dec. 1, 2014**
Tenant's Use:	***Tenant*** **proposes to use the Premises for a medical cannabis dispensary**
Signage:	***as allowed*** **per city code and approved by Landlord**

Confidentiality:	**Notwithstanding the non-binding nature of the terms hereof and anything to the contrary contained herein, both Parties agree to keep the terms of negotiations between the Property Owner and the Prospective Tenant confidential and free from disclosure to any third parties.**
Exclusivity:	**None**
Commission:	**To be paid to Lidstrom Commercial Realtors by Landlord as agreed.**

THIS LETTER OF INTENT SETS FORTH THE SALIENT BASIC TERMS UPON WHICH THE PARTIES SHALL CONSIDER A LEASING OF THE PROPERTY. HOWEVER, THE PARTIES ACKNOWLEDGE AND AGREE THAT THIS LETTER OF INTENT DOES NOT IMPOSE ANY BINDING OBLIGATION UPON EITHER PARTY, EXCEPT AS EXPRESSLY SET OUT IN THE SUBSEQUENT PARAGRAPH HEREOF.

PROSPECTIVE TENANT AND LANDLORD FURTHER ACKNOWLEDGE AND AGREE: (A) NO BINDING OBLIGATIONS SHALL ARISE BETWEEN THE PARTIES TO LEASE THE PROPERTY NOR TO NEGOITATE THE LEASING OF THE PROPERTY UNTIL THE EXECUTION AND DELIVERY BY BOTH PARTIES OF A FORMAL WRITTEN LEASE, WHICH LEASE AGREEMENT SHALL SUPERSEDE ALL PRIOR DISCUSSIONS AND CONSTITUTE THE ENTIRE AGREEMENT BETWEEN THE PARTIES; AND (B) ALL COSTS AND EXPENSES REPSECTIVELY INCURRED BY PROPOSECTIVE TENANT AND LANDLORD IN CONNECTION WITH ANY DISCUSSIONS OR NEGOTIATIONS SHALL BE BORNE BY THE PARTY INCURRING THE SAME, AT ITS SOLE COST AND EXPENSE.

Provided the above basic terms are satisfactory and this letter reflects the understanding of the Landlord and Prospective Tenant, please so indicate by executing this Letter of Intent in the space provided below and returning a signed copy to my office on or before ____ PM Central Standard Time on the _____ day of _____, 20___, and if not so signed, this Letter of Intent will expire.

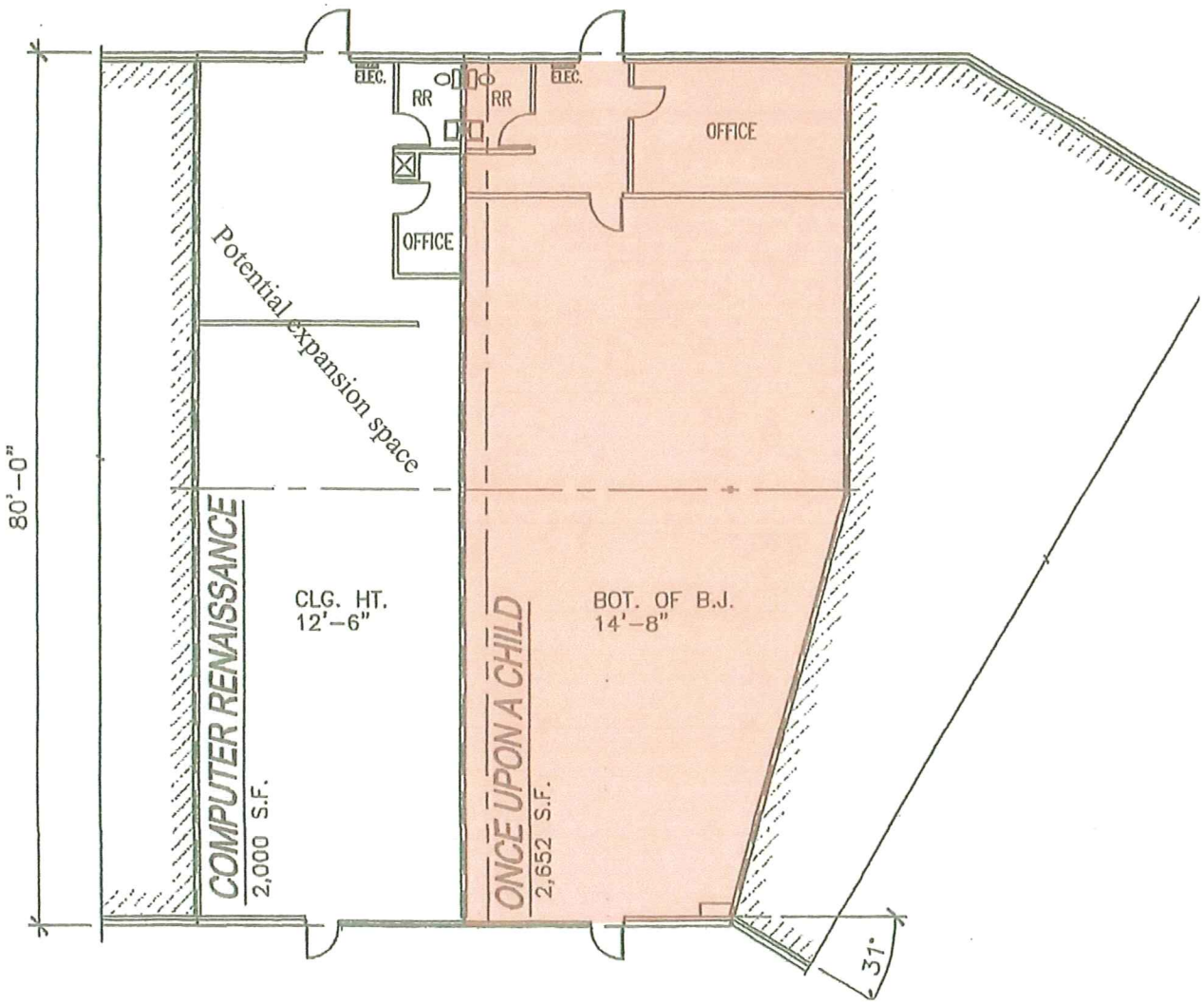
Sincerely,
LIDSTROM COMMERCIAL REALTORS

Dan Robinson, Agent

AGREED AND ACCEPTED ON THE DATE WRITTEN BELOW:

LANDLORD:	PROSPECTIVE TENANT:
By: _____	By: _____
Name: _____	Name: _____
Title: _____	Title: _____
Date: _____	Date: _____

Exhibit A – Leased Premises



September 19, 2014

Dr. Kyle Kingsley
Chief Executive Officer
Minnesota Medical Solutions LLC
5200 Wilson Road, Suite 150
Edina. MN 55424

Dear Dr. Kingsley,

Cedarvale Business Center, LLP, owner of Cedar Grove Business Center at 3900 Cedar Grove Parkway, Eagan, MN 55122 looks forward to the tenancy of Minnesota Medical Solutions LLC in our building and approves the use of the premises for a medical cannabis dispensary licensed by the State of Minnesota.

Sincerely,

Name: Mark Robinson

Its: Agent

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410

September 29, 2014

Mr. Mark Robinson
Mid America
5353 Wayzata Boulevard, Suite 650
Minneapolis, MN 55416

RE: PROPOSAL TO LEASE SPACE AT 3926 CEDAR GROVE PARKWAY, EAGAN, MN 55122

Dear Mark,

We are pleased to provide you with the following Letter of Intent to lease space in the above referenced property. Please confirm that Cedarvale Business Center, LLP is willing to proceed in good faith to negotiate a mutually acceptable lease agreement by executing a copy of this LOI where indicated below and returning it to the undersigned. Execution of this LOI shall not obligate either party to accept any particular terms. It is expressly agreed the form and content of the lease agreement must be mutually acceptable to both parties and their respective counsel and that if a mutually acceptable lease agreement is not agreed to and executed by both parties, neither party shall have any further obligation to continue negotiating with the other.

Minnesota Medical Solutions, LLC, with an address of 5200 Wilson Road, Suite 150 Edina, MN 55424 ("Tenant"), hereby agrees to lease from Cedarvale Business Center, LLP ("Landlord") the space described below under the terms set forth.

The proposed terms are as follows:

ADDRESS:	3926 Cedar Grove Parkway, Eagan, MN 55122
PREMISES:	Approximately 2,252 rentable square feet
PERMITTED USE:	A medical cannabis dispensary licensed by the State of Minnesota
TERM:	Five years
POSSESSION DATE:	January 1, 2014.
RENT COMMENCEMENT:	Earlier of 1) March 1st, 2015 or 2) The date tenant opens to the public
EXPIRATION:	60 months after Rent Commencement
RENEWAL OPTIONS:	Tenant shall have two options to renew this Lease for term of 3 years. Tenant must provide Landlord a one hundred eighty (180) day advance written notice indicating intention to exercise.
BASE RENTAL RATE:	[redacted]. Such Base Rent shall increase by 3% annually.
SECURITY DEPOSIT:	Tenant shall pay a security deposit of one month's Base and Additional rent, due three work days (3) after Tenant receives copies of a fully executed lease.
UTILITIES:	. Heating, cooling, and water for the Premises shall be included in Operating Expenses

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410

CAM CHARGES:

In addition to Base Rent, Tenant shall be responsible for its Proportionate Share of Operating Expenses including common area maintenance, insurance, Real Estate Taxes and Special Assessments for the Shopping Center, all of which is referred to as "Additional Rent" within the Lease. Electricity serving the Premises shall be separately metered to the Premises and paid by Tenant directly to such utility company. Heating, cooling, and water for the Premises shall be included in Operating Expenses. 2014 budgeted Operating Expenses are $4.37 per square foot and 2014 budgeted Real Estate Taxes are $1.33 per square foot.

MAINTENANCE:

Tenant shall maintain and repair the interior of the premises. Such maintenance and repair shall include, but shall not be limited to glass windows and doors, including door closing and locking mechanisms, pest control services, the repair of any damage resulting from the movement of furniture, fixtures, merchandise or supplies, and all floor coverings. Landlord to maintain roof and structure elements of the building, parking lot and common areas of the building, the mechanical systems, plumbing lines, and unexposed electrical within the premises.

SIGNAGE:

Subject to Landlord's approval, all signage fabrication and installation shall be at the expense of the Tenant unless otherwise specifically agreed to in writing by both parties. Tenant shall be allowed to install a nameplate on any monument sign and building signage.

PARKING:

Tenant employee and patient parking shall be provided at no additional cost to the Tenant.

LEASEHOULD IMPROVEMENTS:

Landlord shall deliver Premises to Tenant in a "shell" condition, with existing walls & doors demolished, existing flooring and base removed, existing ceiling and lights demolished, and existing bathrooms to be demolished and two (2) new fully functional ADA compliant restrooms to be installed.

OTHER CONDITIONS:

This Letter of Intent shall be subject to Landlord and Tenant agreeing to final floor plans, specifications and costs associated with the leasehold improvements described. Agreement shall be deemed given by the Tenant and Landlord through initialing or signing the construction bid.

Contingent upon Tenant obtaining a Medical Cannabis a Manufacturers license from the Minnesota Department of Health Office of Medical Cannabis Manufacturers. More information on the application review and approval process is available here:
http://www.health.state.mn.us/topics/cannabis/mfrfinalrfa.pdf

Landlord will require a financial statement for the Tenant and Guarantor(s) named in this Letter of Intent. These financial statements will need to be reviewed and approved prior to lease preparation.

By signing this Letter of Intent, I certify that I have the authority to enter into this agreement on behalf of the Landlord and Tenant.

The terms of this proposal are approved this September day of 29th, 2014.

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410

TENANT
Minnesota Medical Solutions, LLC

By: Dr. Kyle Kingsley
Its: Chief Executive Officer

LANDLORD
Cedarvale Business Center, LLP

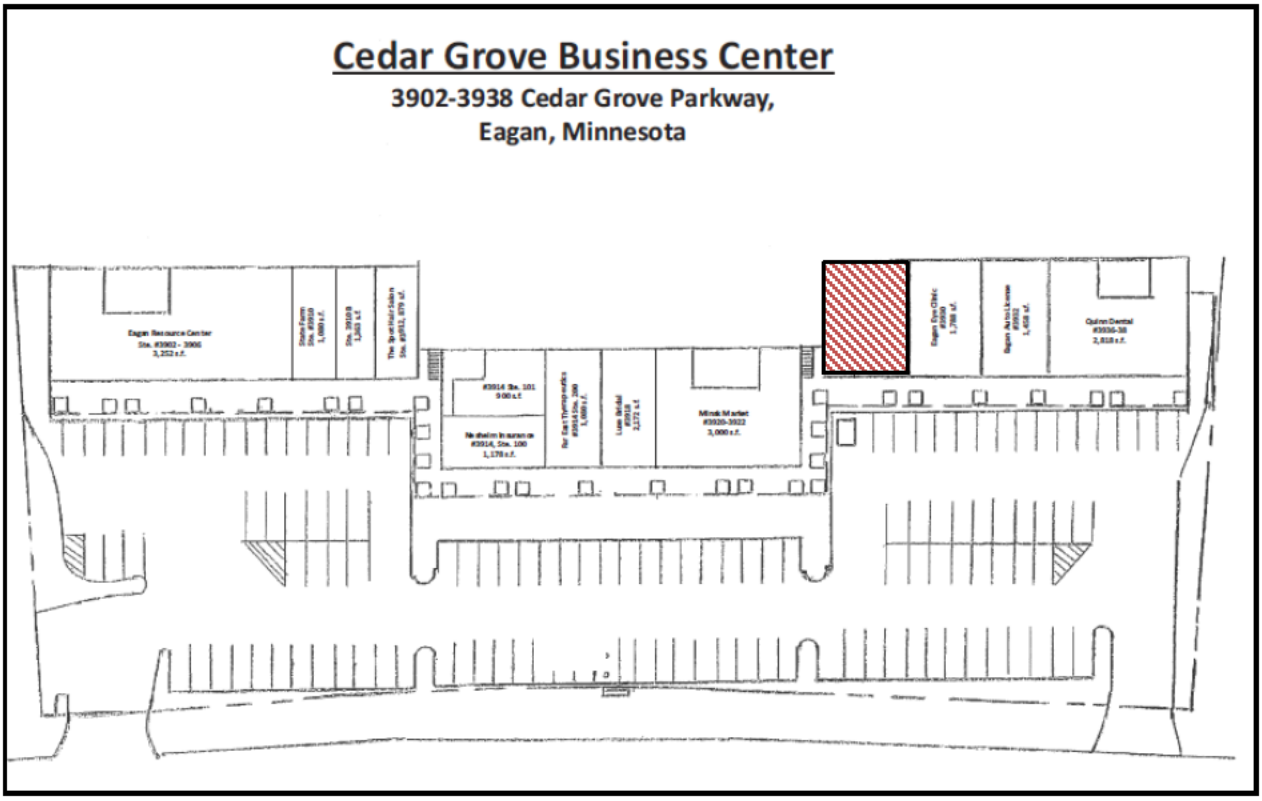
By: Mark Robinson
It's: Agent

Sincerely,

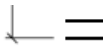
Joshua R. O'Neill

The following Letter of Intent has been furnished by the office of The Dungannon Group LLC to the Tenant and Landlord at their request The Dungannon Group LLC and its agents are not liable for any legal problems that may arise in the future from the use of these documents To protect your interests, Tenant and Landlord are strongly recommended to seek professional legal advice

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410
PREMISES



The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410
AS-BUILT SPACE PLAN



September 21, 2014

Dr. Kyle Kingsley
Chief Executive Officer
Minnesota Medical Solutions LLC
5200 Wilson Road, Suite 150
Edina. MN 55424

Dear Dr. Kingsley,

The owner of 9525 Black Oaks Lane N., Maple Grove, MN looks forward to the tenancy of Minnesota Medical Solutions LLC in our building and approves the use of the premises for a medical cannabis dispensary licensed by the State of Minnesota.

Sincerely,

Name: Mark Robinson

Its: Agent

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410

September 29, 2014

Mr. Mark Robinson
Ms. Jesseka Doherty
Mid America
5353 Wayzata Boulevard, Suite 650
Minneapolis, MN 55416

RE: PROPOSAL TO LEASE SPACE AT 9513 BLACK OAKS LANE N., MAPLE GROVE, MN

Dear Mark,

We are pleased to provide you with the following Letter of Intent to lease space in the above referenced property. Please confirm that Cedarvale Business Center, LLP is willing to proceed in good faith to negotiate a mutually acceptable lease agreement by executing a copy of this LOI where indicated below and returning it to the undersigned. Execution of this LOI shall not obligate either party to accept any particular terms. It is expressly agreed the form and content of the lease agreement must be mutually acceptable to both parties and their respective counsel and that if a mutually acceptable lease agreement is not agreed to and executed by both parties, neither party shall have any further obligation to continue negotiating with the other.

Minnesota Medical Solutions, LLC, with an address of 5200 Wilson Road, Suite 150 Edina, MN 55424 ("Tenant"), hereby agrees to lease from Cedarvale Business Center, LLP ("Landlord") the space described below under the terms set forth.

The proposed terms are as follows:

ADDRESS:	9513 Black Oaks Lane N., Maple Grove, MN 55311
PREMISES:	Approximately 1,423 rentable square feet
PERMITTED USE:	A medical cannabis dispensary licensed by the State of Minnesota
TERM:	Five years
POSSESSION DATE:	January 1, 2014.
RENT COMMENCEMENT:	Earlier of 1) March 1st, 2015 or 2) The date tenant opens to the public
EXPIRATION:	60 months after Rent Commencement
RENEWAL OPTIONS:	Tenant shall have two options to renew this Lease for term of 3 years. Tenant must provide Landlord a one hundred eighty (180) day advance written notice indicating intention to exercise.
BASE RENTAL RATE:	per square foot / year. Such Base Rent shall increase by 3% annually.
SECURITY DEPOSIT:	Tenant shall pay a security deposit of one month's Base and Additional rent, due three work days (3) after Tenant receives copies of a fully executed lease.
UTILITIES:	. Heating, cooling, and water for the Premises shall be included in Operating Expenses

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410

CAM CHARGES:

In addition to Base Rent, Tenant shall be responsible for its Proportionate Share of Operating Expenses including common area maintenance, insurance, Real Estate Taxes and Special Assessments for the Shopping Center, all of which is referred to as "Additional Rent" within the Lease. Electricity serving the Premises shall be separately metered to the Premises and paid by Tenant directly to such utility company. Heating, cooling, and water for the Premises shall be included in Operating Expenses. 2014 budgeted Operating Expenses and Real Estate Taxes are $9.36 per square foot.

MAINTENANCE:

Tenant shall maintain and repair the interior of the premises. Such maintenance and repair shall include, but shall not be limited to glass windows and doors, including door closing and locking mechanisms, pest control services, the repair of any damage resulting from the movement of furniture, fixtures, merchandise or supplies, and all floor coverings. Landlord to maintain roof and structure elements of the building, parking lot and common areas of the building, the mechanical systems, plumbing lines, and unexposed electrical within the premises.

SIGNAGE:

Subject to Landlord's approval, all signage fabrication and installation shall be at the expense of the Tenant unless otherwise specifically agreed to in writing by both parties. Tenant shall be allowed to install a nameplate on any monument sign and building signage.

PARKING:

Tenant employee and patient parking shall be provided at no additional cost to the Tenant.

LEASEHOULD IMPROVEMENTS:

Landlord shall deliver Premises to Tenant in a "shell" condition, with existing walls & doors demolished, existing flooring and base removed, existing ceiling and lights demolished, and existing bathrooms to be demolished and two (2) new fully functional ADA compliant restrooms to be installed.

OTHER CONDITIONS:

This Letter of Intent shall be subject to Landlord and Tenant agreeing to final floor plans, specifications and costs associated with the leasehold improvements described. Agreement shall be deemed given by the Tenant and Landlord through initialing or signing the construction bid.

Contingent upon Tenant obtaining a Medical Cannabis a Manufacturers license from the Minnesota Department of Health Office of Medical Cannabis Manufacturers. More information on the application review and approval process is available here:
http://www.health.state.mn.us/topics/cannabis/mfrfinalrfa.pdf

Landlord will require a financial statement for the Tenant and Guarantor(s) named in this Letter of Intent. These financial statements will need to be reviewed and approved prior to lease preparation.

By signing this Letter of Intent, I certify that I have the authority to enter into this agreement on behalf of the Landlord and Tenant.

The terms of this proposal are approved this __ September __ day of _21th, 2014.

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410

TENANT
Minnesota Medical Solutions, LLC

By: Dr. Kyle Kingsley
Its: Chief Executive Officer

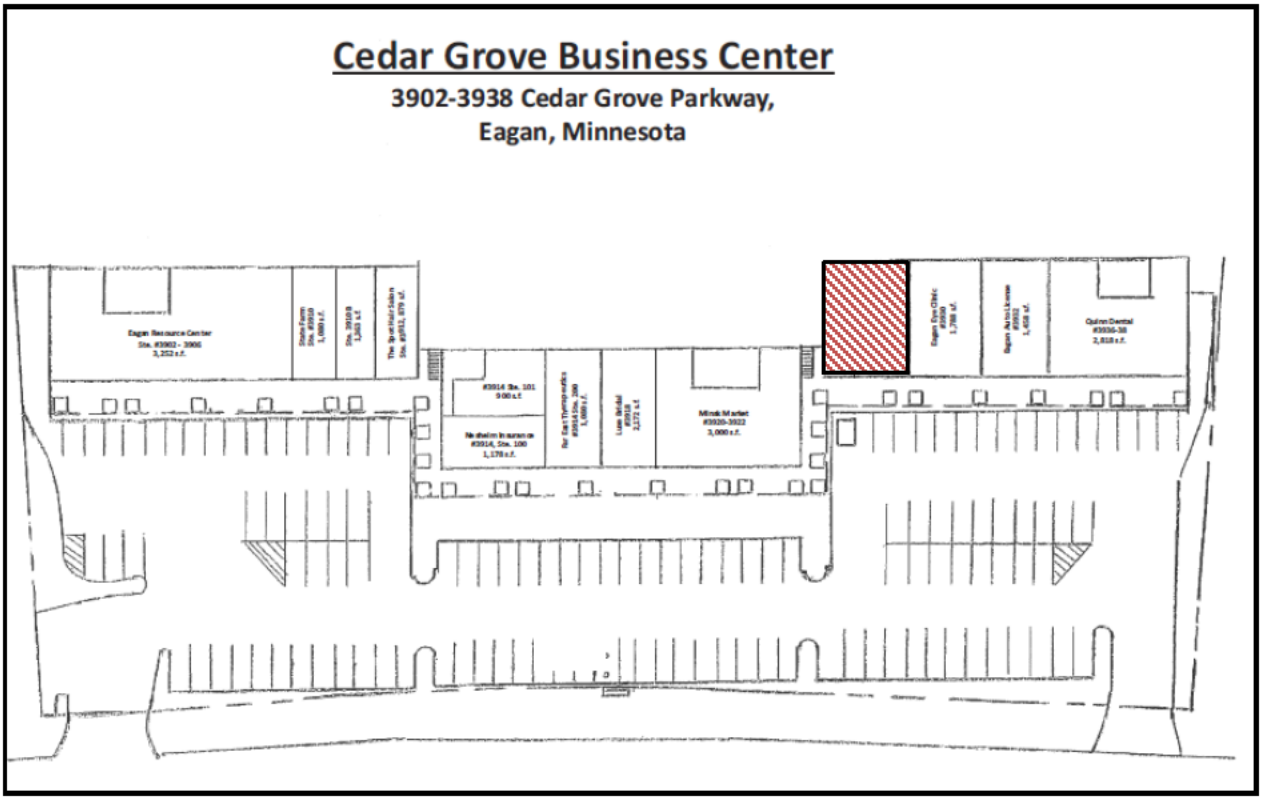
LANDLORD
Maple Grove Square Owner or Its Agent

By: Mark Robinson
It's: Agent

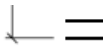
Sincerely,

Joshua R. O'Neill

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410
PREMISES



The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410
AS-BUILT SPACE PLAN



September 19, 2014

Dr. Kyle Kingsley
Chief Executive Officer
Minnesota Medical Solutions LLC
5200 Wilson Road, Suite 150
Edina. MN 55424

Dear Dr. Kingsley,

St. Paul Development Corp., owner of 611 Bielenberg Drive in Woodbury, MN, looks forward to the tenancy of Minnesota Medical Solutions LLC in our building and approves the use of the premises for a medical cannabis dispensary licensed by the State of Minnesota.

Sincerely,

Name: John A. McCarthy

Its: President

St. Paul Development Corp.
1818 Grand Avenue
St. Paul, MN 55105

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410

September 19, 2014

Mr. John McCarty
St. Paul Development Corp.
1818 Grand Avenue
St. Paul, MN 55105

RE: PROPOSAL TO LEASE SPACE AT 611 BIELENBERG DRIVE IN WOODBURY, MN

Dear John,

We are pleased to provide you with the following Letter of Intent to lease space in the above referenced property. Please confirm that St. Paul Development Corp. is willing to proceed in good faith to negotiate a mutually acceptable lease agreement by executing a copy of this LOI where indicated below and returning it to the undersigned. Execution of this LOI shall not obligate either party to accept any particular terms. It is expressly agreed the form and content of the lease agreement must be mutually acceptable to both parties and their respective counsel and that if a mutually acceptable lease agreement is not agreed to and executed by both parties, neither party shall have any further obligation to continue negotiating with the other.

Minnesota Medical Solutions, LLC, with an address of 5200 Wilson Road, Suite 150 Edina, MN 55424 ("Tenant"), hereby agrees to lease from St. Paul Development Corp. ("Landlord") the space described below under the terms set forth.

The proposed terms are as follows:

ADDRESS:	611 Bielenberg Drive, Woodbury, MN 55125
PREMISES:	Approximately 2,500 rentable square feet
PERMITTED USE:	A medical cannabis dispensary licensed by the State of Minnesota
TERM:	Five years
POSSESSION DATE:	January 1, 2014.
RENT COMMENCEMENT:	Earlier of 1) March 1st, 2015 or 2) The date tenant opens to the public
EXPIRATION:	60 months after Rent Commencement
RENEWAL OPTIONS:	Tenant shall have two options to renew this Lease for term of 3 years. Tenant must provide Landlord a one hundred twenty (120) day advance written notice indicating intention to exercise.
BASE RENTAL RATE:	per square foot / year
SECURITY DEPOSIT:	Tenant shall pay a security deposit of one month's rent, due three work days (3) after Tenant receives copies of a fully executed lease.
UTILITIES:	Tenant pays electrical, gas, water, sewer, and garbage.
CAM CHARGES:	Landlord shall be responsible for common area maintenance charges which include, but not limited to heating, ventilating and cooling, real estate taxes and special assessments, parking lots, lighting, maintenance, snow removal,

grounds maintenance and cleaning, and property and liability insurance. Tenant shall pay it proportionate share of the total as defined in the Lease.

MAINTENANCE: Tenant shall maintain and repair the interior of the premises. Such maintenance and repair shall include, but shall not be limited to glass windows and doors, including door closing and locking mechanisms, pest control services, the repair of any damage resulting from the movement of furniture, fixtures, merchandise or supplies, and all floor coverings. Landlord to maintain roof and structure elements of the building, parking lot and common areas of the building, the mechanical systems, plumbing lines, and unexposed electrical within the premises.

SIGNAGE: Subject to Landlord's approval, all signage fabrication and installation shall be at the expense of the Tenant unless otherwise specifically agreed to in writing by both parties. Tenant shall be allowed to install a nameplate on any monument sign and building signage.

PARKING: Tenant employee and patient parking shall be provided at no additional cost to the Tenant.

LEASEHOULD IMPROVEMENTS: Landlord shall detail the scope of work they shall complete in an Exhibit to the Lease.

OTHER CONDITIONS: This Letter of Intent shall be subject to Landlord and Tenant agreeing to final floor plans, specifications and costs associated with the leasehold improvements described. Agreement shall be deemed given by the Tenant and Landlord through initialing or signing the construction bid.

Contingent upon Tenant obtaining a Medical Cannabis a Manufacturers license from the Minnesota Department of Health Office of Medical Cannabis Manufacturers. More information on the application review and approval process is available here: http://www.health.state.mn.us/topics/cannabis/mfrfinalrfa.pdf

By signing this Letter of Intent, I certify that I have the authority to enter into this agreement on behalf of the Landlord and Tenant.

The terms of this proposal are approved this 19 day of Sept, 2014.

TENANT
Minnesota Medical Solutions, LLC

By: Dr. Kyle Kingsley
Its: Chief Executive Officer

LANDLORD
St. Paul Development Corp.

By: John McCarty

Sincerely,

Joshua R. O'Neill

September 19, 2014

Dr. Kyle Kingsley
Chief Executive Officer
Minnesota Medical Solutions LLC
5200 Wilson Road, Suite 150
Edina. MN 55424

Dear Dr. Kingsley,

St. Paul Development Corp. as Landlord subject to property purchase of 207 S. 9th Street in Minneapolis, MN, looks forward to the tenancy of Minnesota Medical Solutions LLC in our building and approves the use of the premises for a medical cannabis dispensary licensed by the State of Minnesota.

Sincerely,

Name: John A. McCarthy

Its: President

St. Paul Development Corp.

1818 Grand Avenue

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410

September 26, 2014

Mr. John McCarty
St. Paul Development Corp.
1818 Grand Avenue
St. Paul, MN 55105

RE: PROPOSAL TO LEASE SPACE AT 207 S. 9TH STREET, MINNEAPOLIS, MN

Dear John,

We are pleased to provide you with the following Letter of Intent to lease space in the above referenced property. Please confirm that St. Paul Development Corp. is willing to proceed in good faith to negotiate a mutually acceptable lease agreement by executing a copy of this LOI where indicated below and returning it to the undersigned. Execution of this LOI shall not obligate either party to accept any particular terms. It is expressly agreed the form and content of the lease agreement must be mutually acceptable to both parties and their respective counsel and that if a mutually acceptable lease agreement is not agreed to and executed by both parties, neither party shall have any further obligation to continue negotiating with the other.

Minnesota Medical Solutions, LLC, with an address of 5200 Wilson Road, Suite 150, Edina, MN 55424 ("Tenant"), hereby agrees to lease from St. Paul Development Corp. ("Landlord") the space described below under the terms set forth.

The proposed terms are as follows:

ADDRESS:	207 S. 9th Street, Minneapolis, MN 55402
PREMISES:	Entire free standing building and dedicatd parking
PERMITTED USE:	A medical cannabis dispensary licensed by the State of Minnesota
TERM:	Five years
POSSESSION DATE:	January 1, 2014.
RENT COMMENCEMENT:	Earlier of 1) March 1st, 2015 or 2) The date tenant opens to the public
EXPIRATION:	60 months after Rent Commencement
RENEWAL OPTIONS:	Tenant shall have two options to renew this Lease for term of 3 years. Tenant must provide Landlord a one hundred twenty (120) day advance written notice indicating intention to exercise.
BASE RENTAL RATE:	[redacted] per square foot / year
SECURITY DEPOSIT:	Tenant shall pay a security deposit of one month's rent, due three work days (3) after Tenant receives copies of a fully executed lease.
UTILITIES:	Tenant pays electrical, gas, water, sewer, and garbage.
CAM CHARGES:	Tenant shall be responsible for common area maintenance charges which include, but not limited to heating, ventilating and cooling, real estate taxes and special assessments, parking lots, lighting, maintenance, snow removal,

grounds maintenance and cleaning, and property and liability insurance.

MAINTENANCE: Tenant shall maintain and repair the interior of the premises. Such maintenance and repair shall include, but shall not be limited to glass windows and doors, including door closing and locking mechanisms, pest control services, the repair of any damage resulting from the movement of furniture, fixtures, merchandise or supplies, and all floor coverings. Landlord to maintain roof and structure elements of the building, parking lot and common areas of the building, the mechanical systems, plumbing lines, and unexposed electrical within the premises.

SIGNAGE: Subject to Landlord's approval, all signage fabrication and installation shall be at the expense of the Tenant unless otherwise specifically agreed to in writing by both parties. Tenant shall be allowed to install a nameplate on any monument sign and building signage.

PARKING: Tenant employee and patient parking shall be provided at no additional cost to the Tenant.

LEASEHOULD IMPROVEMENTS: Landlord shall detail the scope of work they shall complete in an Exhibit to the Lease.

OTHER CONDITIONS: This Letter of Intent shall be subject to Landlord and Tenant agreeing to final floor plans, specifications and costs associated with the leasehold improvements described. Agreement shall be deemed given by the Tenant and Landlord through initialing or signing the construction bid.

This Letter of intent is contingent on Landlord purchasing the said property.

Contingent upon Tenant obtaining a Medical Cannabis a Manufacturers license from the Minnesota Department of Health Office of Medical Cannabis Manufacturers and Landlord closing on the sale of the property. More information on the application review and approval process is available here: http://www.health.state.mn.us/topics/cannabis/mfrfinalrfa.pdf

By signing this Letter of Intent, I certify that I have the authority to enter into this agreement on behalf of the Landlord and Tenant.

The terms of this proposal are approved this Sept 9 day of ____, 2014.

TENANT
Minnesota Medical Solutions, LLC

By: Dr. Kyle Kingsley
Its: Chief Executive Officer

LANDLORD
St. Paul Development Corp.

By: John McCarty

Sincerely,

Joshua R. O'Neill

September 22, 2014

Tony Tillemans
Cinema Entertainment Corporation

RE: 125 – 33RD AVENUE SOUTH – FORMER HOLLYWOOD VIDEO BUILDING

Dear Tony:

I'm presenting to you a Letter of Intent for Retail Space as more specifically outlined below. This letter of Intent is not intended to be a formal offer, but merely an outline of terms which would be acceptable terms for leasing space in the below described property.

Premises:	3,000 – 3,500 s.f. of interior space in the multi-tenant retail building located at 125 – 33rd Avenue South, St. Cloud, MN.
Tenant:	Minnesota Medical Solutions, LLC
Landlord:	Cinema Entertainment Corporation
Use:	The permitted use shall be as a dispensary for medical cannabis as approved by the State of Minnesota, and the sale of products related thereto.
Annual Minimum Rent:	psf Months 1 - 36 psf Months 37 - 60
Option Rent:	Tenant shall have 1 five-year option to be exercised by giving 120 days written notice to Landlord prior to the expiration of the lease period. Base rent for the option period shall be negotiated at the time Tenant exercises its option to extend.
Landlord Turnover:	The projected Landlord turnover date is to be determined.
Percentage Rent:	None.
Security Deposit:	One Month's Rent
Term of Lease:	Five (5) years
Lease Commence:	Lease will commence Thirty (30) days from the date which the landlords construction permit is complete and finaled by the government agency with jurisdiction. It is at this point the tenant space will be turned over to the tenant.

CAM:	Paid monthly based on Tenant's pro rata share of gross leasable area of the shopping center. Tenant may audit upon request with 15 days notice. CAM, estimated at $3.25 – $3.50 per square foot per year.
Real Estate Taxes:	Paid annually based on Tenant's pro rata share of gross leasable area of the shopping center, excluding separately assessed tenants. Real estate taxes shall be defined as all ad valorem taxes that are assessed on real estate property owners as a class. Taxes are currently estimated at $3.50 per square foot on an annualized basis.
Utilities:	Tenant shall pay all utility expenses related to the leased premises. It is anticipated that electricity and natural gas will be separately metered, and Tenant will have full responsibility for direct payment of utility bills. Tenant shall also pay its pro-rata share of all utilities relating to the common area. In the event that utilities are shared, Tenant shall pay its pro-rata share.
Assignment/Subleasing:	Tenant will have the right to assign or sublease the premises to any other entity for any lawful use with Landlord's reasonable consent and review of financials.
Exclusive Clause:	No other store in the individual building, leased by Tenant, shall be used for the purpose of operating as a dispensary for medical cannabis as approved by the State of Minnesota, or selling related products.
Landlords Work:	Landlord will provide the following items per Tenant's plan: • All demising walls sheet-rocked, taped, sanded and ready for paint. • Floor ready for ceramic/porcelain tile or VCT floor covering. • Rooftop unit for heating/cooling to code ready for use, minimum 1 ton per every 300 square feet, with a minimum of 3 tons. • 2' x 4' drop in acoustical ceiling tile suspended on a T-bar system both white in color, with 2' x 4' drop in lighting. • Provide a minimum of 200 AMP, three-phase, circuit service panel electrical service;
Signage:	It is agreed that the Tenant will have the right to incorporate signing on its storefront of the building at the Tenant's own expense. All signing shall conform to the Landlord's sign criteria, city ordinances and shall be subject to Landlord's approval.
Commission:	Landlord shall be responsible for and pay all commissions arising from this Lease. The parties acknowledge that a real estate broker, other than Granite City Real Estate, LLC in this transaction does not represent the Tenant .

This Letter of Intent is intended by the parties to be entirely non-binding, with no contractual obligations or duties, either expressed or implied, arising hereunder. Either party is free to terminate negotiations at any time for any reason whatsoever.

Sincerely,

Joshua O'Neill

We consent to this Letter of Intent this 22 day of September, 2014

Landlord

By: Tom Tillemans

Its: Vice President

GOLDMARK SCHLOSSMAN
COMMERCIAL REAL ESTATE SERVICES INC.

September 29, 2014

David M. Wadholm
Realty 2000
Office # - (701)-298-0000

RE: PROPOSAL TO LEASE SPACE AT 202 S 8TH ST. MOORHEAD, MN

Dear David,

We are pleased to provide you with the following Letter of Intent to lease space in the above referenced property. Please confirm that Eight Street Investment, LLC is willing to proceed in good faith to negotiate a mutually acceptable lease agreement by executing a copy of this LOI where indicated below and returning it to the undersigned. Execution of this LOI shall not obligate either party to accept any particular terms. It is expressly agreed the form and content of the lease agreement must be mutually acceptable to both parties and their respective counsel and that if a mutually acceptable lease agreement is not agreed to and executed by both parties, neither party shall have any further obligation to continue negotiating with the other.

Minnesota Medical Solutions, LLC, with an address of 5200 Wilson Road, Suite 150 Edina, MN 55424 ("Tenant"), hereby agrees to lease from Eight Street Investment, LLC, ("Landlord") the space described below under the terms set forth.

The proposed terms are as follows:

ADDRESS:	202 S 8th Street Moorhead, MN
PREMISES:	A free-standing building with approximately 2,664 square feet of building area
PERMITTED USE:	A medical cannabis dispensary licensed by the State of Minnesota
TERM:	Five years
POSSESSION DATE:	December 1, 2014.
RENT COMMENCEMENT:	Earlier of 1) February 1st, 2015 or 2) The date tenant opens to the public
EXPIRATION:	January 31, 2020
RENEWAL OPTIONS:	Tenant shall have two options to renew this Lease for term of 3 years. Tenant must provide Landlord a one hundred twenty (120) day advance written notice indicating intention to exercise.
BASE RENTAL RATE:	per square foot / year First Option period psf / year Second Option period : psf / year
SECURITY DEPOSIT:	Tenant shall pay a security deposit of one month's rent, due three work days (3) after Tenant receives copies of a fully executed lease.
UTILITIES:	Tenant pays electrical, gas, water, sewer, and garbage.

CAM CHARGES: Landlord shall be responsible for common area maintenance charges which include, but not limited to heating, ventilating and cooling, real estate taxes and special assessments, parking lots, lighting, maintenance, snow removal, grounds maintenance and cleaning, and property and liability insurance.

MAINTENANCE: Tenant shall maintain and repair the interior of the premises. Such maintenance and repair shall include, but shall not be limited to glass windows and doors, including door closing and locking mechanisms, pest control services, the repair of any damage resulting from the movement of furniture, fixtures, merchandise or supplies, and all floor coverings. Landlord to maintain roof and structure elements of the building, parking lot and common areas of the building, the mechanical systems, plumbing lines, and unexposed electrical within the premises.

SIGNAGE: Subject to Landlord's approval, all signage fabrication and installation shall be at the expense of the Tenant unless otherwise specifically agreed to in writing by both parties. Tenant shall be allowed to install a nameplate on any monument sign and building signage.

PARKING: Tenant employee and customer parking shall be provided at no additional cost to the Tenant.

LEASEHOULD IMPROVEMENTS: Landlord shall complete the work described in Exhibit A at its sole cost and expense. Work shall be completed before Tenant is required to take possession of the space.

OTHER CONDITIONS: This Letter of Intent shall be subject to Landlord and Tenant agreeing to final floor plans, specifications and costs associated with the leasehold improvements described. Agreement shall be deemed given by the Tenant and Landlord through initialing or signing the construction bid.

Contingent upon Tenant obtaining a Medical Cannabis a Manufacturers license from the Minnesota Department of Health Office of Medical Cannabis Manufacturers. More information on the application review and approval process is available here: http://www.health.state.mn.us/topics/cannabis/mfrfinalrfa.pdf

By signing this Letter of Intent, I certify that I have the authority to enter into this agreement on behalf of the Landlord and Tenant.

The terms of this proposal are approved this September day of 22, 2014.

TENANT
Minnesota Medical Solutions, LLC

By: Dr. Kyle Kingsley
Its: Chief Executive Officer

LANDLORD
Eight Street Investment, LLC

By: David Wadholm
Its: Agent

Sincerely,

/S David Schlossman

September 25, 2014

M. Joshua O'Neill
3717 W. Fuller Street
Edina, MN 55410

Dear Mr. O'Neill,

2K Health LLC as the Landlord of 1101 37th Street E., Hibbing, MN 55746 looks forward to the tenancy of Minnesota Medical Solutions LLC in our building and approves the use of the premises for a medical cannabis dispensary licensed by the State of Minnesota.

Sincerely,

Name: Kyle Kingsley_____

Its:CEO_____

The Dungannon Group LLC
3717 W. Fuller Street
Edina, MN 55410

September 29, 2014

Dr. Kyle Kingsley
CEO
2K Health LLC

RE: PROPOSAL TO LEASE SPACE AT 1101 37TH STREET E., HIBBING, MN 55746

Dear Dr. Kingsley,

We are pleased to provide you with the following Letter of Intent to lease space in the above referenced property. Please confirm that 2K Health LLC is willing to proceed in good faith to negotiate a mutually acceptable lease agreement by executing a copy of this LOI where indicated below and returning it to the undersigned. Execution of this LOI shall not obligate either party to accept any particular terms. It is expressly agreed the form and content of the lease agreement must be mutually acceptable to both parties and their respective counsel and that if a mutually acceptable lease agreement is not agreed to and executed by both parties, neither party shall have any further obligation to continue negotiating with the other.

Minnesota Medical Solutions, LLC, with an address of 5200 Wilson Road, Suite 150 Edina, MN 55424 ("Tenant"), hereby agrees to lease from 2K Health LLC ("Landlord") the space described below under the terms set forth.

The proposed terms are as follows:

ADDRESS:	1101 37th Street E., Hibbing, MN 55746
PREMISES:	Approximately 2,567 rentable square feet
PERMITTED USE:	A medical cannabis dispensary licensed by the State of Minnesota
TERM:	Five years
POSSESSION DATE:	January 1, 2014.
RENT COMMENCEMENT:	Earlier of 1) March 1st, 2015 or 2) The date tenant opens to the public
EXPIRATION:	60 months after Rent Commencement
RENEWAL OPTIONS:	Tenant shall have two options to renew this Lease for term of 3 years. Tenant must provide Landlord a one hundred twenty (120) day advance written notice indicating intention to exercise.
BASE RENTAL RATE:	per square foot / year
SECURITY DEPOSIT:	Tenant shall pay a security deposit of one month's rent, due three work days (3) after Tenant receives copies of a fully executed lease.
UTILITIES:	Tenant pays electrical, gas, water, sewer, and garbage.
CAM CHARGES:	Tenant shall be responsible for common area maintenance charges which include, but not limited to heating, ventilating and cooling, real estate taxes and special assessments, parking lots, lighting, maintenance, snow removal,

grounds maintenance and cleaning, and property and liability insurance.

MAINTENANCE: Tenant shall maintain and repair the interior of the premises. Such maintenance and repair shall include, but shall not be limited to glass windows and doors, including door closing and locking mechanisms, pest control services, the repair of any damage resulting from the movement of furniture, fixtures, merchandise or supplies, and all floor coverings. Landlord to maintain roof and structure elements of the building, parking lot and common areas of the building, the mechanical systems, plumbing lines, and unexposed electrical within the premises.

SIGNAGE: Subject to Landlord's approval, all signage fabrication and installation shall be at the expense of the Tenant unless otherwise specifically agreed to in writing by both parties. Tenant shall be allowed to install a nameplate on any monument sign and building signage.

PARKING: Tenant employee and patient parking shall be provided at no additional cost to the Tenant.

LEASEHOULD IMPROVEMENTS: Landlord shall detail the scope of work they shall complete in an Exhibit to the Lease.

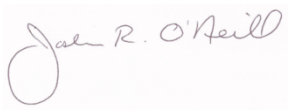
OTHER CONDITIONS: This Letter of Intent shall be subject to Landlord and Tenant agreeing to final floor plans, specifications and costs associated with the leasehold improvements described. Agreement shall be deemed given by the Tenant and Landlord through initialing or signing the construction bid.

Contingent upon Tenant obtaining a Medical Cannabis a Manufacturers license from the Minnesota Department of Health Office of Medical Cannabis Manufacturers and the property sale to 2K Health LLC. More information on the application review and approval process is available here: http://www.health.state.mn.us/topics/cannabis/mfrfinalrfa.pdf

By signing this Letter of Intent, I certify that I have the authority to enter into this agreement on behalf of the Landlord and Tenant.

The terms of this proposal are approved this 25th day of September, 2014.

TENANT
Minnesota Medical Solutions, LLC



By: Joshua O'Neill
Its: Agent

LANDLORD
2K Health LLC

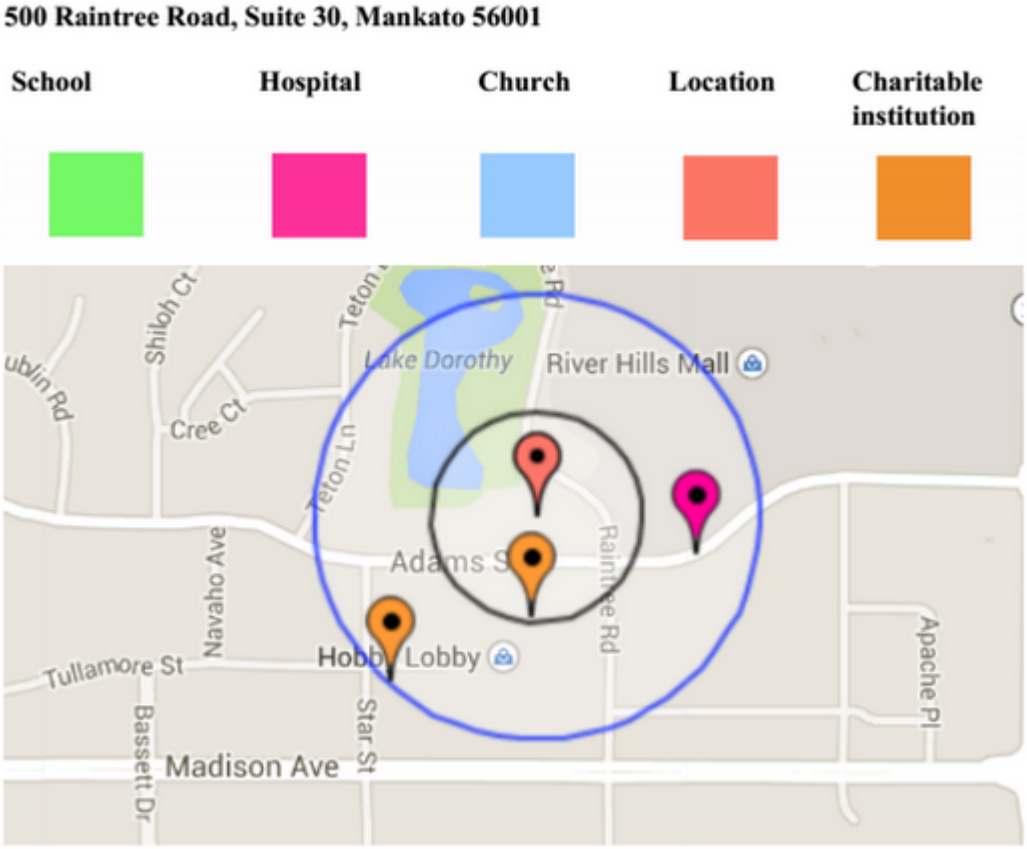
By: Dr. Kyle Kingsley
Its: CEO

h. A map that identifies all places used primarily for religious worship, public or private schools, convents, charitable institutions, whether supported by private or public funds, hospital or veterans' homes, or any camp or military establishment that are within 1000 feet of the proposed distribution facility location

Please see the below maps identifying all known places used primarily for religious worship, public or private schools, convents, charitable institutions, hospitals or veterans' homes, or any camp or military establishment within 1000 feet of the distribution facilities.

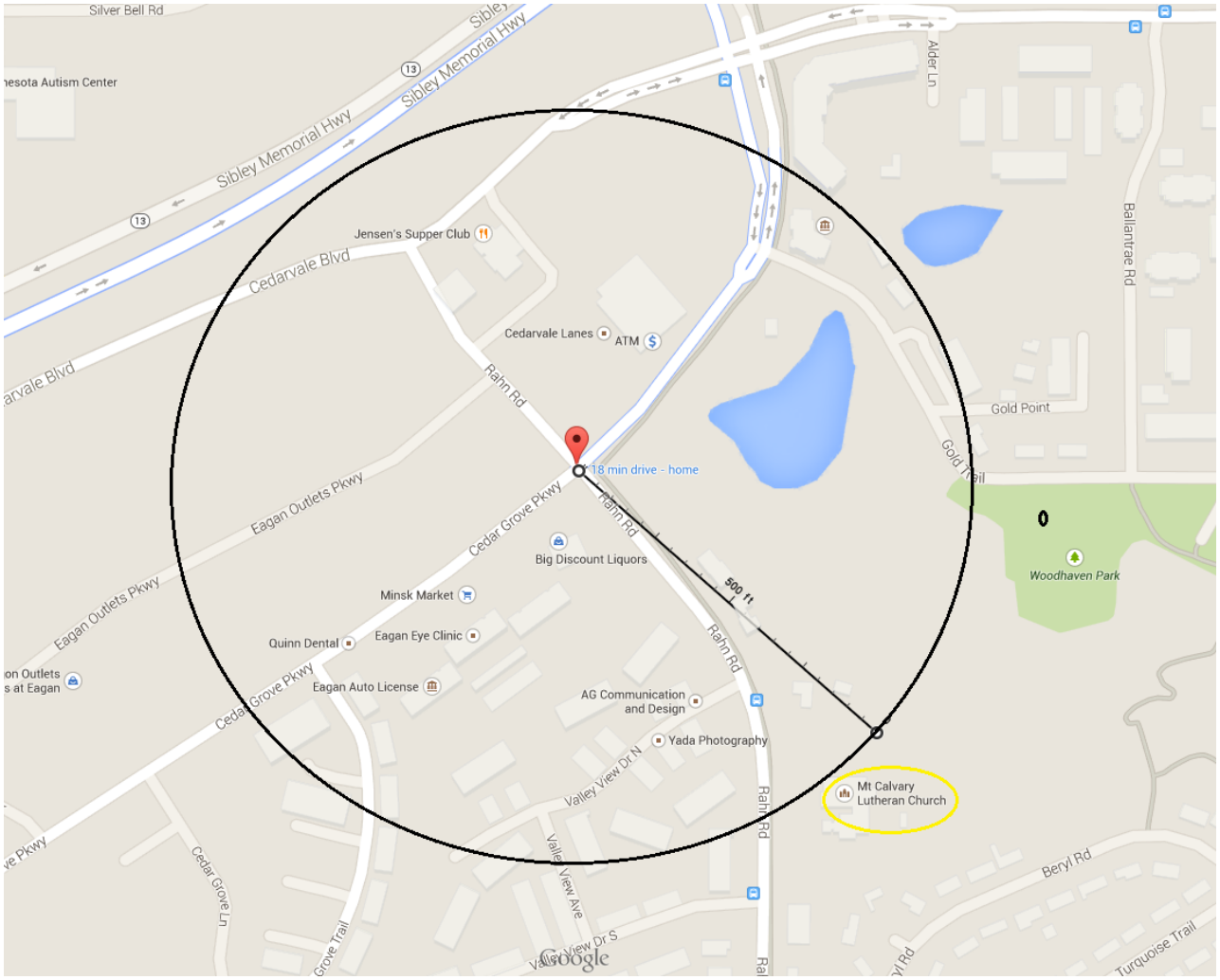
District 1, Mankato-- 1000 foot radius. No known buildings in the above categories. MinnMed will continue to vet all dispensary areas yet to be cleared by city officials.

500 Raintree Road, Suite 30, Mankato 56001



First Circle = 500ft radius
Second Circles= 1000ft radius

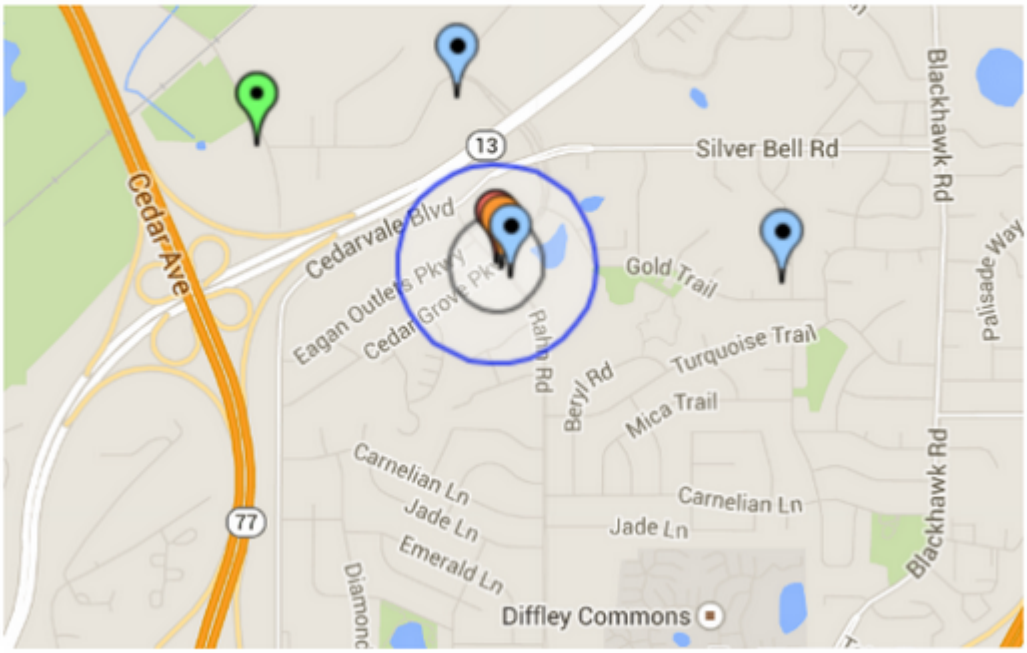
District 2, Eagan-- 1000 foot radius. Church noted within 1000 feet from the proposed dispensary site. MinnMed will continue to vet the area.



B3i. Attachment: Radius of Facility

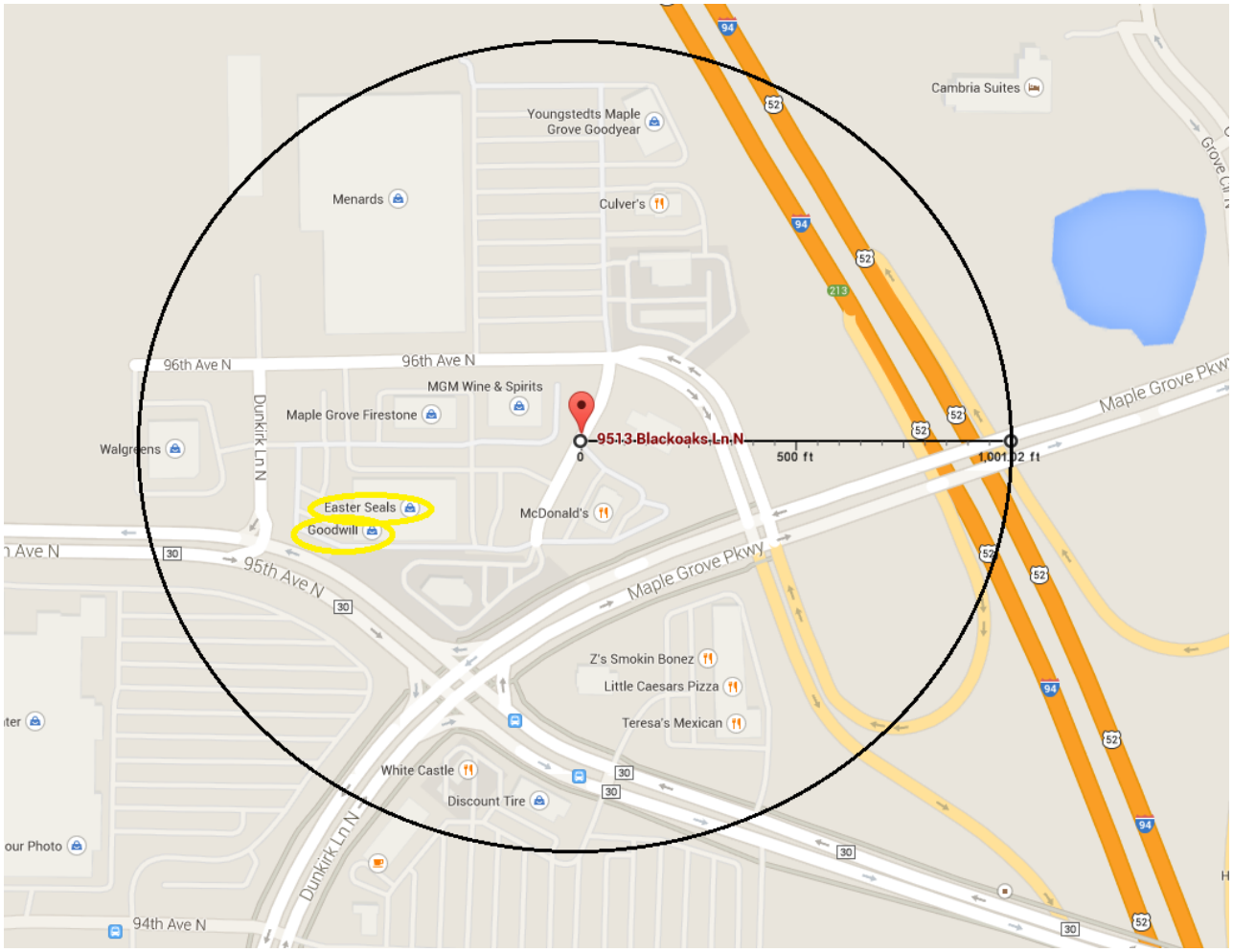
Cedar Grove Business Center, 3900 Cedar Grove Parkway, Eagan, MN 55122

School	Hospital	Church	Location	Charitable institution



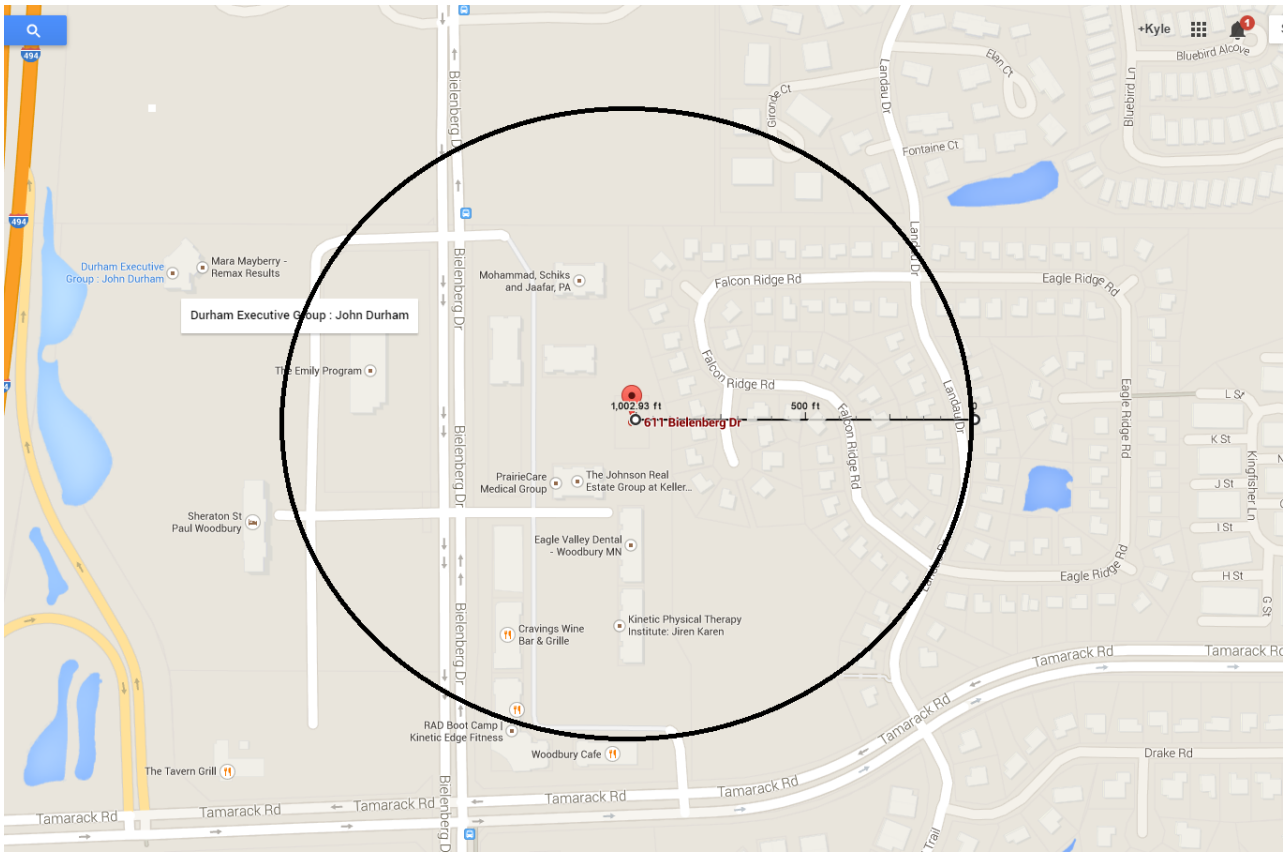
First Circle = 500ft radius
Second Circles= 1000ft radius

District 3, Maple Grove-- Two charitable organizations within 1000 feet.

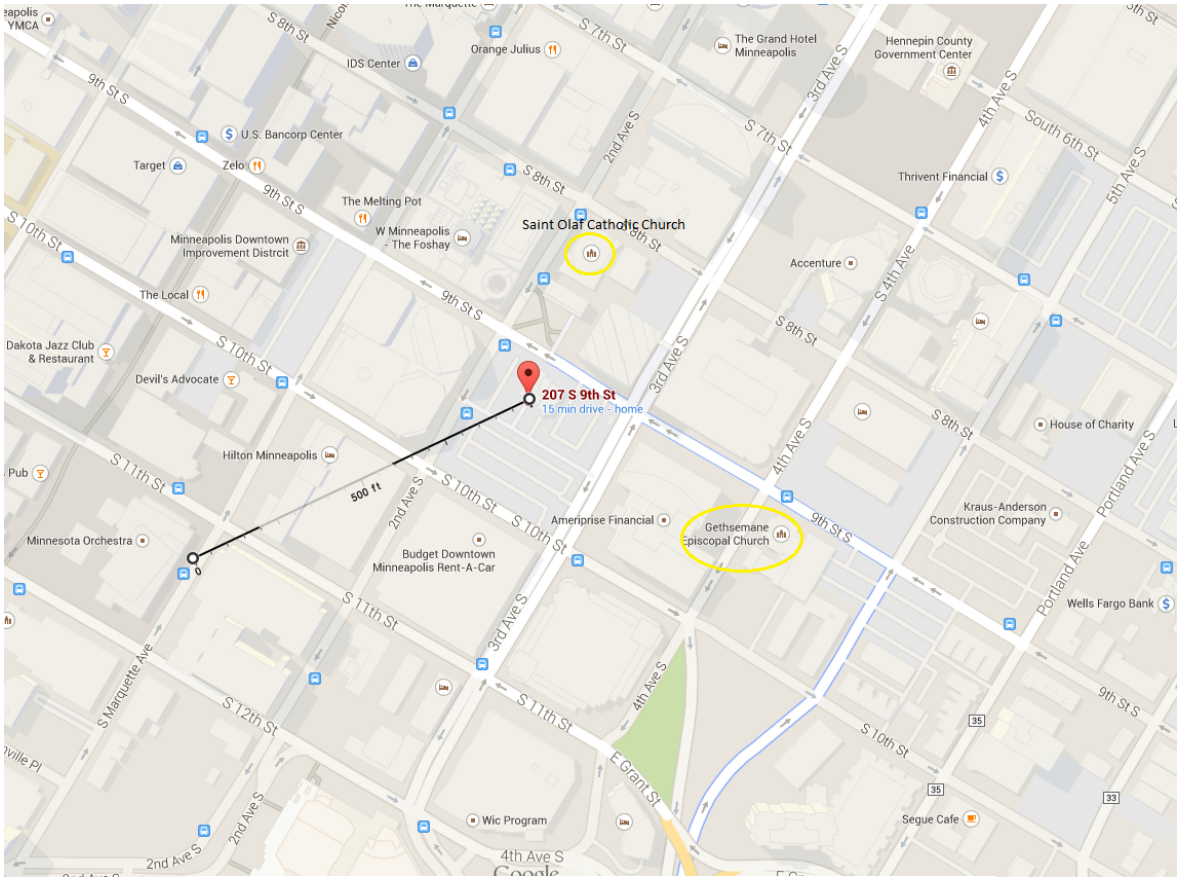


B3i. Attachment: Radius of Facility

District 4, Woodbury-- 1000 ft radius. No known buildings from the above categories. MinnMed will continue to vet the area.

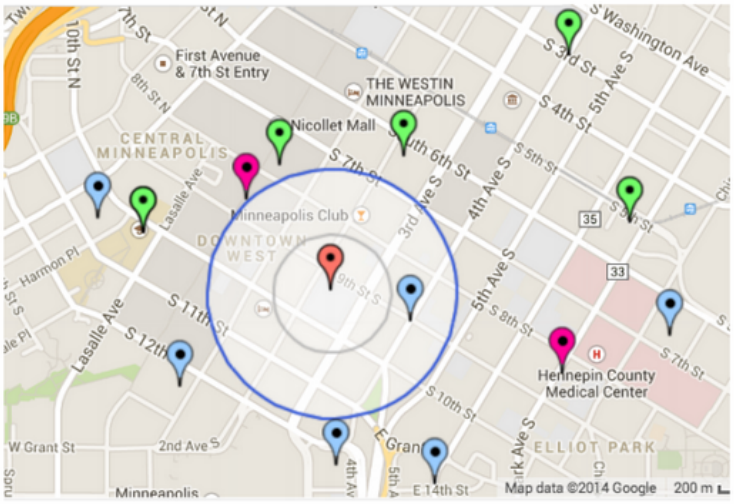


District 5-- Maps showing known churches within 1000 feet of proposed dispensary site. MinnMed will continue to vet the area.



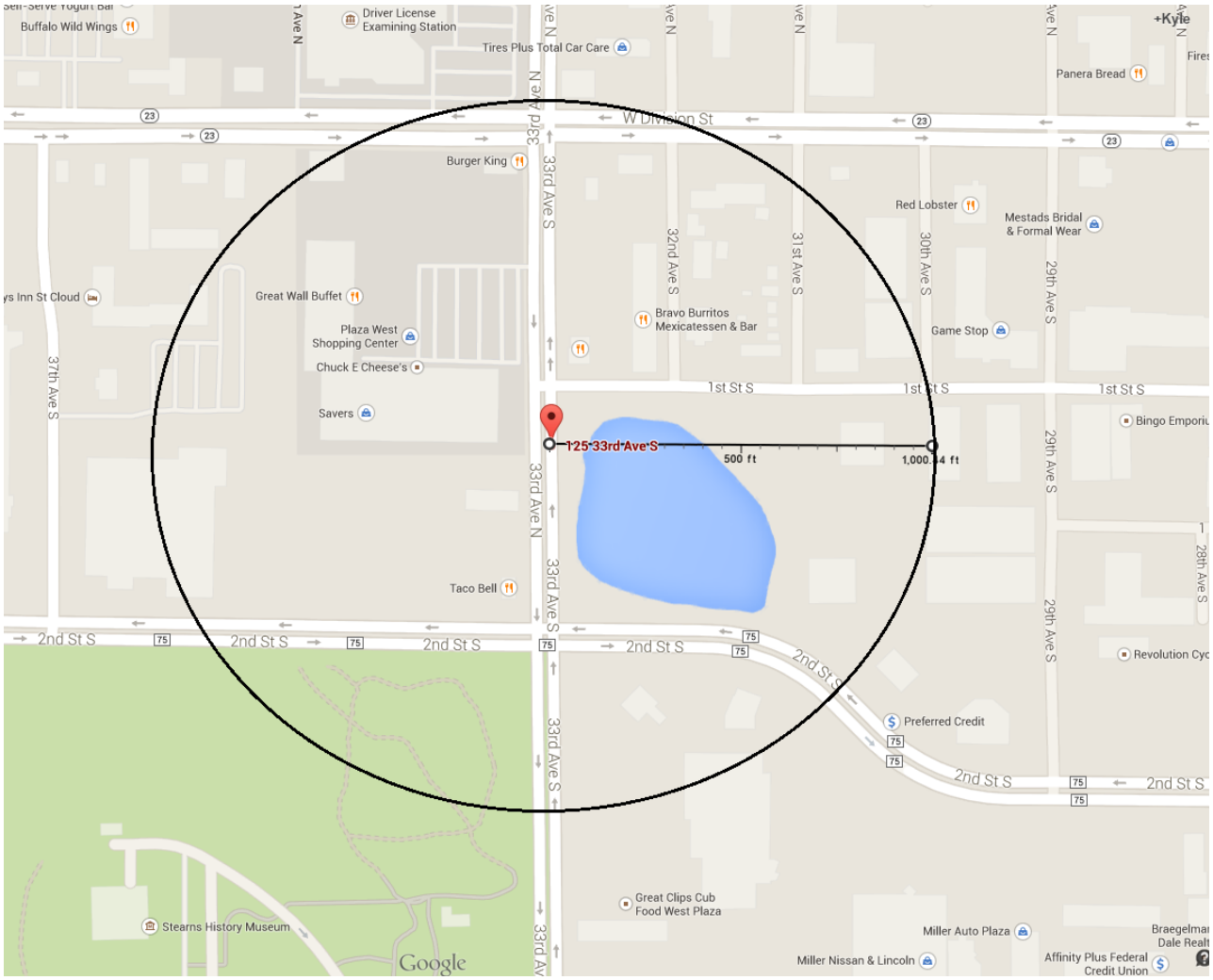
207 S 9th St, Minneapolis, MN 55402

School	Hospital	Church	Location	Charitable institution



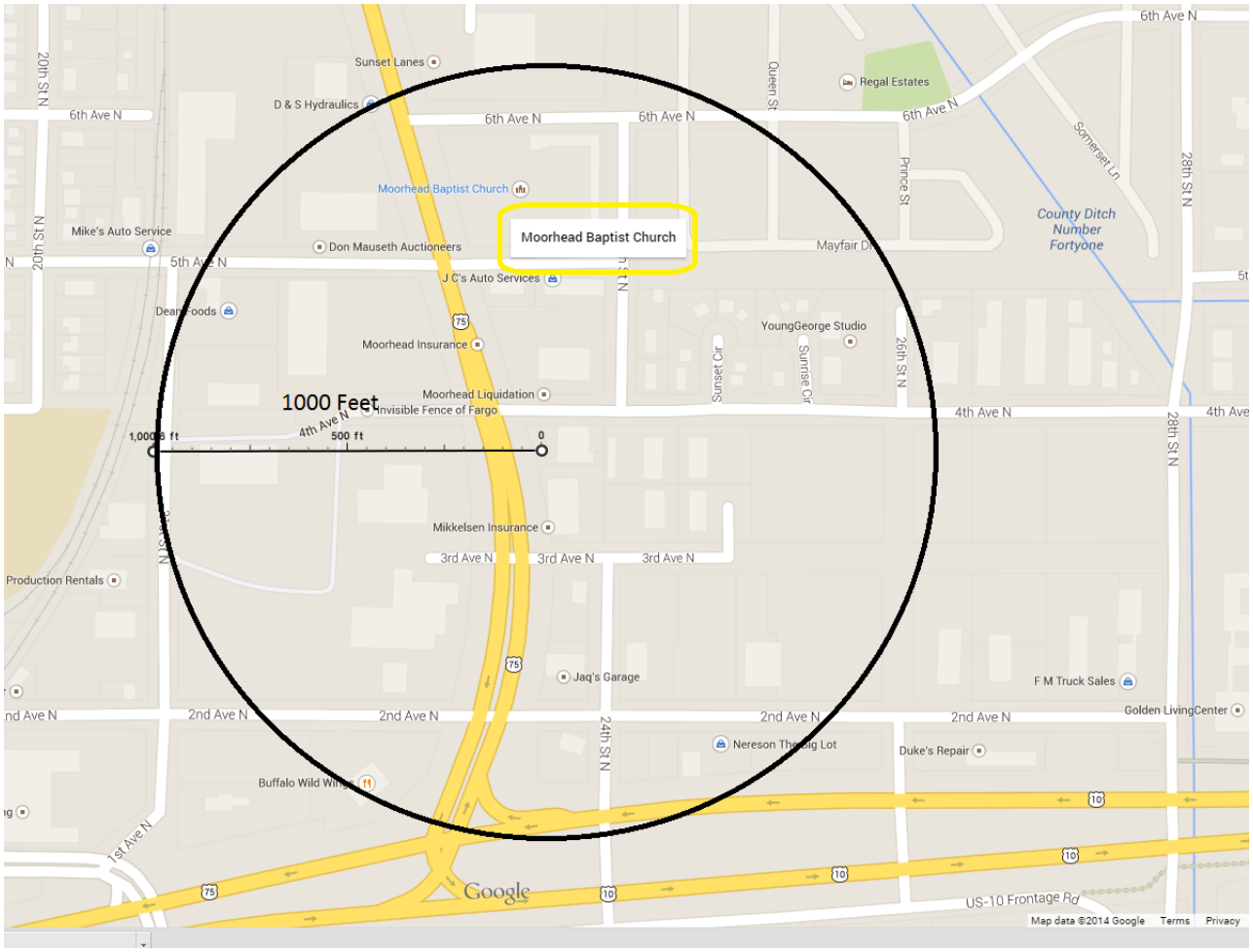
First Circle = 500ft radius
Second Circles= 1000ft radius

District 6, Saint Cloud-- Map showing 1000 foot radius, no known buildings from the above categories. MinnMed will continue to vet the area.



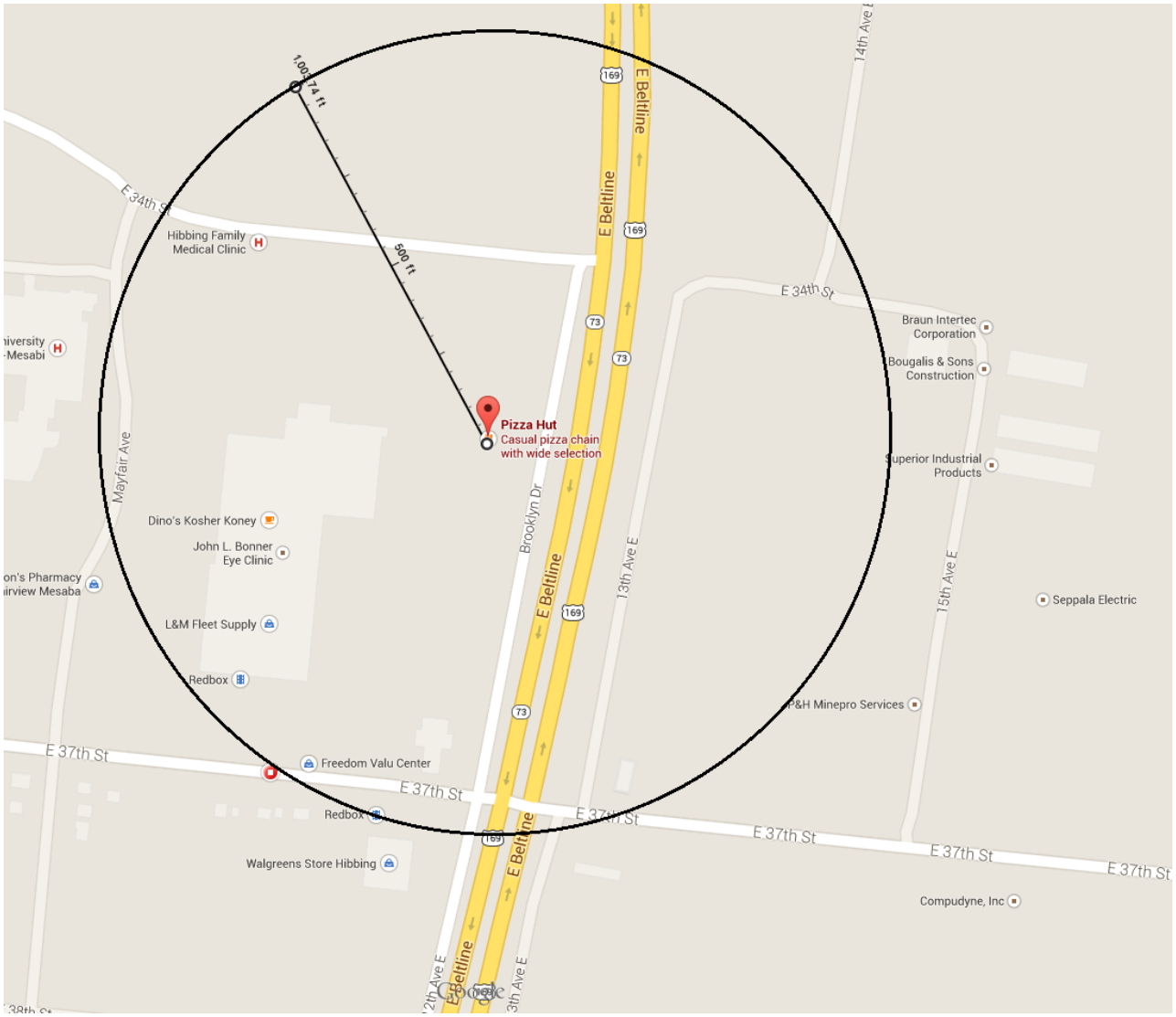
B3i. Attachment: Radius of Facility

District 7, Moorhead-- Church within 1000 feet of proposed dispensary site in Moorhead.



B3i. Attachment: Radius of Facility

District 8, Hibbing-- Buildings within 1000 foot radius of proposed dispensary site.



i. A site plan, drawn to scale, of the proposed distribution facilities showing all streets, property lines, buildings, parking areas, and outdoor areas, if applicable, that are within a 500 foot radius of the distribution facility

MinnMed does not have site plans for distribution facilities as of now, but is developing these documents as we secure locations and buildings for distribution facilities. MinnMed will produce one or more site plans in each service area and provide this to MDH prior to November 14.

j. A blueprint or floor plan, drawn to scale, of the proposed distribution facility, which shows and identifies the following information:

Below is a 'prototype' blueprint for MinnMed distribution facilities. The schematic diagram below will be the 'prototype' for all distribution facilities, but may need some revisions and modifications depending on what properties are secured by MinnMed. This blueprint will show all the different rooms/areas of the distribution facility along with their respective square foot on the legend/key. The attached blueprints should suffice to answer questions *(i)* through (vii). MinnMed will develop two or more site-specific blueprints using this template, one for each service are prior to November 14. Please see the attachment of the blueprint diagram provided which is a full page for easier viewing.

i. The square footage of the overall distribution facility

The overall square footage of MinnMed distribution facilities will be approximately 3,000 square feet. Please see the previous dispensary narratives for additional details on each potential site.

k. A site development and construction plan identifying the start date, duration of the construction and the completion date)

Shown below is the approximate "Project Timeline for the MinnMed Dispensaries" which outlines the projected construction timeline for our first two distribution facilities. The second two dispensaries will be started approximately one month later-- allowing all 4 dispensaries to be completed well before July 1, 2015.

Project Timeline for the MinnMed Dispensaries

Task	Task Duration	Start Date	Finish Date
Demo	5d	Mon 2/2/15	Fri 2/6/15
Floor Plan Layout	4d	Mon 2/9/15	Thu 2/12/15
Wall Framing	7d	Wed 2/11/15	Thu 2/19/15
Rough Electrical	5d	Wed 2/18/15	Tue 2/24/15
Rough Plumbing	5d	Wed 2/18/15	Tue 2/24/15
Rough HVAC	5d	Wed 2/18/15	Tue 2/24/15
Framing Inspection	1d	Wed 2/25/15	Wed 2/25/15
Wall Insulation	2d	Thu 2/26/15	Fri 2/27/15
Install Drywall	5d	Mon 3/2/15	Fri 3/6/15
Tape & Sand Drywall	5d	Mon 3/9/15	Fri 3/13/15
Install Door Frames	1d	Mon 3/16/15	Mon 3/16/15
Install Floor Finishes	3d	Mon 3/16/15	Wed 3/18/15
Paint Walls	3d	Thu 3/19/15	Mon 3/23/15
Trim out Electrical	5d	Tue 3/24/15	Mon 3/30/15
Trim out Plumbing	5d	Tue 3/24/15	Mon 3/30/15
Trim out HVAC	5d	Tue 3/24/15	Mon 3/30/15
Trim out Doors and Windows	5d	Tue 3/24/15	Mon 3/30/15
Install Doors and Hardware	3d	Wed 3/25/15	Fri 3/27/15
Paint	5d	Mon 3/30/15	Fri 4/3/15
Install all Equipment	5d	Mon 4/6/15	Fri 4/10/15
Install all Furniture	5d	Mon 4/6/15	Fri 4/10/15
Final Inspection	and 1d	Mon 4/13/15	Mon 4/13/15

Completion Date 4/13/15

Total duration of construction: Approximately 10 weeks

l. Explanation of how the distribution facilities will be secured to minimize the potential for theft or diversion of medical cannabis products both usable and expired

MinnMed will ensure that all distribution facilities are properly secured to minimize the potential for theft or diversion of medical cannabis products both usable and expired. This will be accomplished through a variety of processes and procedures

m. The process that the manufacturer will take to ensure that access to the distribution facility premises will be limited only to employees and patients and caregivers

Employee/Authorized Personnel Access

MinnMed will ensure proper measures are taken to limit access to the distribution facility premises to employees, authorized personnel patients, and caregivers.

Patient/Caregiver Access

Patients and caregivers wishing to patronize MinnMed distribution facilities will need to have a valid state medical cannabis registration.

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n. Explanation of how the distribution facilities will be made to be a safe environment of employees working in and around the facilities

Safe Environment

MinnMed will ensure that the distribution facilities will be safe for employees working in and around the facilities. This will be done through various measures, policies, and procedures.

These measures will help create a safe working environment for employees. Safety also goes beyond physical safety. No-harassment and other employee policies will directly contribute to a desirable work environment that is truly safe for all employees.

o. Explanation of previous experience developing new product distribution sites

MinnMed has partnered with a Colorado consulting firm, American Cannabis Company Inc. (ACC) that has years of experience developing cannabis distribution and cultivation facilities for the regulated cannabis industry. Members of American Cannabis Company Inc. bring 30+ years of experience in general contracting and construction management. MinnMed has retained the services of American Cannabis Company Inc. to help with organizational efforts, operations, and goals. American Cannabis Company Inc. has guided MinnMed during the design and construction phase of our current, under construction state-of-the-art greenhouse manufacturing facility.

ACC has designed, remodeled, and built numerous regulated and compliant distribution facilities throughout the U.S. Each site has been specifically designed with efficiency and efficacy in mind. In 2010, ACC team members worked with architects and engineers to design two distribution centers and two organic manufacturing centers. Both distribution centers were designed with a patient-centric approach: make patients feel comfortable, educate patients effectively, and serve patients high quality medical cannabis in a timely manner.

In 2013, ACC was formed, and the team began helping people throughout the nation and Canada, build successful cultivation and distribution facilities. To date the team has built, remodeled, and designed multiple facilities in Colorado (over 10), Canada (1), Connecticut (1), Massachusetts (3 designs), Illinois (3), and Washington (2).

C. OPERATIONS

1. General

a. Describe the training that will be provided to all staff

Prior to beginning employment with Minnesota Medical Solutions Inc., all employees will be required to complete orientation training including but not limited; to sexual harassment, discrimination, disabilities, drug/alcohol abuse, company security policies, safety policies, employment rights and laws, workplace violence, client/patient confidentiality, HIPAA, and customer service. The training tools will reference our company's operation manual and operational supplements so that all employees are consistently and properly trained in these areas. The documentation of the employee understanding and comprehension of policies, procedures, and expectations will be maintained by management.

MinnMed will ensure that adequate training is provided to all employees prior to working at the medical cannabis cultivation facility or distribution facility(s). The organization shall utilize multiple training and educational materials to aid in the training process as well as hands-on training at facility locations from experienced professionals and/or consultants.

All staff employed with Minnesota Medical Solutions will undergo a robust training process that includes an online training system provided by Clover Leaf University, with whom MinnMed has an exclusive training contract. Please see the MinnMed educational section of the employee handbook attached to Section E (2).

In addition, the American Cannabis Company has developed extensive training systems and manuals for employees of cultivation facilities and distribution facilities. MinnMed has retained the consulting services of American Cannabis Company Inc., and all MinnMed employees will be required to read and agree to the policies set forth within the Employee Handbook, Code of Conduct, Personal Hygiene Policy, and the Standard Operating Procedures. All of these documents are included as an attachment in Section E (2) of the application.

b. Describe how you will ensure that employees and staff are at least 21 years of age and have not been convicted of a disqualifying felony offense.

MinnMed will ensure not to employ any person under the age of 21 or any person who has been convicted of a disqualifying felony offense per Section 9 (i) [152.29] of Minnesota Laws Chapter 311. This will be accomplished by requiring potential employees to pass background checks and age verification. All employees within the Minnesota medical cannabis industry will be required

to submit to and pass state required background checks in order to work within the medical cannabis industry. The state required background checks will determine if potential employees are able to work within the medical cannabis industry. Background checks will reveal any criminal offenses, charges or convictions that would prevent an individual from being able to work within the industry. All MinnMed employees will also be required to submit a copy of a current and valid photo ID and will also be required to provide proof of eligibility to work within the United States. MinnMed will require all employees to fill out an I9 employment form to verify right-to-work eligibility. Employees will also be required to fill out a W2 form for tax reporting purposes.

c. Describe the process for any employee to report the suspected or confirmed diversion of medical cannabis plants, in process product and finished product

Diversion from the Minnesota Medical Solutions manufacturing facility and distribution sites will not be tolerated. The requirement to secure medical cannabis products is a responsibility shouldered by the company and all who work within MinnMed facilities.

[redacted]

[redacted]

2. Cultivation

a. Describe the experience of the applicant in agriculture required to produce pharmaceutical grade cannabis. For purposes of this response, you may include the experience of any person employed by the applicant, including the person's name and position with the applicant.

Eco-Friendly Cultivation Plan

Minnesota Medical Solutions LLC intends to cultivate medical cannabis with the highest regard for environmental conservation and pharmaceutical grade production methods. We will utilize multiple environmentally friendly elements within the manufacturing facility and at distribution facility locations including: cultivating in a greenhouse utilizing the sun as the primary energy source; the use of energy efficient supplemental lighting; reuse and recycle strategies for water and growing medium; environmentally friendly organic based cultivation methods; and other methods, equipment, policies and procedures. Initially, MinnMed will employ True Living Organics (TLO) as its primary cultivation method. TLO creates a living environment and utilizes beneficial bacteria to make macro and micronutrients readily available for the plants. With the proper nutrient balance, the plant is provided with everything it needs to thrive. TLO also allows for a healthier plant immune system reducing the need for pesticides. Finally, this organic based cultivation method produces consistent patient-centric pharmaceutical grade medicines that have passed stringent testing in established medical cannabis markets. Conservation efforts and focus on environmentally friendly business practices are highlighted within MinnMed's Environmental Plan, which is attached to section E, #7 of this application.

Cultivation Experience-- Experience within the Regulated Medical Cannabis Industry

MinnMed has contracted American Cannabis Company Inc. (ACC), a Colorado consulting firm to provide consulting, training, and operational procedures based on their tenured experience in the regulated cannabis industry. The firm has a combined 40 years of cultivation experience utilizing multiple cultivation mediums, techniques, and strains of cannabis.

ACC Consultant Experience/Expertise

ACC is a fully reporting publicly traded company, owns and operates two vertically integrated

businesses which deliver end-to-end business solutions for clients within the regulated cannabis industry. ACC provides industry specific advisory and consulting services; the management of cultivation facilities and the management of cannabis-infused products manufacturing; management of distribution sites; and manages a strategic group partnership that supplies ancillary products. The ACC consulting team consists of seasoned professionals from diverse industries such as healthcare, agriculture, construction, and engineering. The ACC team members have owned several businesses that were among the first licensed and regulated cannabis cultivation and distribution facilities in Colorado. ACC has extensive experience cultivating hundreds of medical cannabis varieties including indica, sativa, hybrid and high-CBD strains.

The consultants have numerous notable accomplishments including:

- The identification of new mite species
- Numerous publications
- The first operating cultivation license in Boulder, CO
- Manufacture multiple solutions for the industry including an organic soil line and child safety packaging solution
- Operates in nine U.S. states and Canada
- First cannabis to past rigorous Canadian testing and be approved for sale
- Helped multiple clients implement successful cultivation methods
- CO_2 only MIPS extraction brand focused on clean, safe delivery systems and consistency in dosage

MinnMed believes that the strategic partnership with ACC will provide an advantage over competitors and accelerate operations deployment. ACC's experience and knowledge will help MinnMed's speed to market, patient adoption ramp-up, cultivation techniques, and overall facility operations within the cultivation and distribution facility(s). Retaining of consultants with industry experience within the regulated medical cannabis market will ensure that MinnMed will be ready to commence cultivation operations well before the state mandated deadline of July 15, 2015.

MinnMed Team Members

Brooke Gehring -- Chief Operating Consultant

Ms. Gehring has a banking/regulatory background and is managing partner of Patient's Choice Medical, which runs several medical cannabis and cultivation facilities in Colorado. She has extensive experience in medical cannabis operations and cultivation.

Greg Goldston -- Vice President of Operations

Mr. Goldston developed Options Medical Center, which runs two medical cannabis dispensaries and a large cultivation facility in Colorado. He also developed Boulder Organic Food Group LLC, a large producer of CO_2-extracted cannabis oils. He has been involved in the medical cannabis industry since 2009. His expertise in starting, operating, and expanding cannabis facilities and extraction will prove important in the first months of MinnMed.

Jared Penman -- Vice President of Operations, Greenhouse

Mr. Penman is the president of Rino Supply Company Incorporated and currently is a large-scale cultivator of cannabis in a greenhouse setting. He has been growing medical cannabis legally since 2001. He will be a major contributor to the design and function of the new greenhouse cultivation facility started in July by MinnMed. He will also be instrumental in future expansion and function of our facilities.

Corey Hollister and ACC

Mr. Hollister is the CEO of ACC, and his team of experts is currently active in nine states and Canada. Collectively, ACC has decades of medical cannabis and botanical experience. Their medical cannabis experience, including implementation and scalable operations, is fundamental to the immediate, industry standard function of MinnMed. Mr. Hollister and his team have helped to integrate the MinnMed cultivation team with its leading industry experts.

Joe Schaffer -- Head Cultivator

Mr. Schaffer is president and founder of Minnesota Native Landscapes, Inc. In 1998, he began building a unique company in Minnesota that focuses on the implementation and management of responsible land use practices that maintain the ecological integrity of the environment in the upper Midwest. In addition to the ecological restoration services, his company also operates a large seed and plant nursery and greenhouse that cultivates over 150 species of herbaceous perennials indigenous to the upper Midwest. Mr. Schaffer is the perfect fit as lead cultivator for MinnMed.

Dan Totushek -- Greenhouse Supervisor

Mr. Totushek owns and operates Dan and Jerry's Greenhouses. Currently Mr. Totushek runs this very large cold weather greenhouse company in three states. Mr. Totushek has attended numerous classes at industry conferences on all aspects of the business including business management, crop production and management, best growing practices based on university research and other growers experience, pest and disease management, and industry trends. Additionally, he has over 35 years of hands-on experience managing and growing a greenhouse business, currently with over $14,000,000 in annual sales of greenhouse grown bedding plants.

Jerry Quaal -- Greenhouse Supervisor

Mr. Quaal is co-founder and manager of Dan and Jerry's Greenhouse in Monticello MN.

Aaron Peterson and Mitch Michaelson -- Cultivation Supervisors

Mr. Peterson is the fourth generation owner and operator of Peterson Farms, a fixture in Minnesota since the 1890s, and Mr. Michaelson is his brother-in-law. They also own and operate Sever's Farm Market which encompasses 17 roadside retail markets where fresh produce is sold, primarily sweet corn which they have come to be known for over the years. Mr. Peterson and Mr. Michaelson have a true passion for growing with hundreds of acres of crops. For many years, they also grew over an acre of tomatoes, cucumbers, and peppers in high tunnel greenhouses. In order to ensure the highest quality of the finished products both in production and distribution, they became certified in Good Agriculture Practices, also known as GAP, through the United States Department of Agriculture. This program focuses on sustainability, traceability, and ethical practices in agriculture. This is truly a "farm to table" experience as this stringent process begins when the seed is planted and ends when the final product reaches the consumer.

b. A detailed description of the applicant's cultivation process, with a focus on minimizing the risk of exposure to contaminants

Detailed SOPS, for each production area, are available for viewing in the attached MinnMed Operations and Management SOPs.

Our cultivation process has been designed to limit contamination, including, but not limited to mold, fungus, bacterial diseases, rot, pests, non-organic pesticides, mildew and other contaminants. We will utilize a perpetual batch based production method subdividing the flowering area into nine sections harvesting one section per week. This perpetual harvest cycle ensures a consistent flow of medicine to the patients, reduces the potential significant crop lost as batches are segmented and mitigates the risk of theft as the amount of on-hand finished product is restricted. Each zone is structured in line with the perpetual harvest cycle resulting in a consistent workflow throughout the facility.

Biosecurity measures shall be implemented and maintained at all times to prevent pest and disease and minimize exposure of plants and staff to contaminants. In order to prevent pest and disease infestations, the manufacturing facility has been designed with levels of biosecurity. Upon entering the building, all persons shall step on a sanitation mat and pass through an air shower. All employees must then enter locker rooms where they change into clean uniforms and scrub arms and hands thoroughly. Each section of the warehouse will be compartmentalized to prevent any cross contamination between departments. There shall be adequate screening or other protection against the entry of pests wherever airflow is permitted within the cultivation center. In addition, within each department there shall be redundant compartments to ensure small outbreaks can be contained. The vegetative department will have three distinct phases each with two compartments; flower department will have 6 separate flowering compartments; the refining shall be located in separate and distinct compartments; and all product processing shall be contained within distinct compartments for drying, curing, secured storage, packaging and transportation. Each compartment will be equipped with its own cooling and heating source to prevent air exchange between compartments and maintain strict environmental controls. All employees shall remain within their designated working areas to further prevent potential chances for cross-contamination. All walls between compartments shall be adequately sealed, and all air entering the cultivation center shall be screened through a high-micron filtering system. Ethical pest and disease management (EPDM) practices shall be integrated and followed at all times. Our integrated EPDM program will include protocol for preventing pest and disease infestations, daily monitoring for pest and disease, and safe mitigation and application protocols.

EPDM shall only utilize pest and disease controls form the USDA organic guidelines.

Facility Compartmentalization: All areas of the cultivation facility shall be compartmentalized based on function with a focus on reducing the risk of exposure to potential contaminates for both employees and plants. Access to each compartment shall be restricted to agents who must work directly within the compartment.

The cultivation facility will be segregated into the following compartments:

- **All Access:** Secured entry with mantrap
- **Security:** Security rooms
- **Management:** Offices
- **All Access:** locker rooms, break room
- **Vegetative Rooms:** Cultivation staff
- **Propagation:** Designated cloning agents
- **Flowering:** Designated flowering agents
- **Harvest/Trim:** Designated processing agents
- **Cure:** Processing management
- **Vault:** Processing management
- **Refining Department:** Designated agents only

Each production area shall have an open aisle on all sides of each plant group to allow for unobstructed travel, observation and inventory of each plant group. All production areas shall be maintained free of debris.

General Sanitary Requirements: Maintaining a high standard of sanitization within compartments is mandatory in order to minimize the risk of exposure to contaminants. The manufacturing facility staff will take all reasonable measures and precautions to ensure the following sanitary conditions are met:

- That any person who, by medical examination or supervisory observation, is shown to have, or appears to have, an illness, open lesion, including boils, sores, or infected wounds, or any other abnormal source of microbial contamination for whom there is a reasonable possibility

of contact with preparation surfaces for medical cannabis or cannabis medicine products, shall be excluded from any operations which may be expected to result in such contamination until the condition is corrected;

- That hand-washing facilities shall be adequate and convenient and be furnished with running water at a suitable temperature. Hand-washing facilities shall be located in the licensed premises and/or in medical cannabis medicine products preparation areas and where good sanitary practices require employees to wash and/or sanitize their hands, and provide effective hand-cleaning and sanitizing preparations and sanitary towel service or suitable drying devices;
- That all persons working in direct contact with preparation of medical cannabis or cannabis medicine products shall conform to hygienic practices while on duty, including but not limited to:
    - Maintaining adequate personal cleanliness;
    - Washing hands thoroughly in an adequate hand-washing area(s) before starting work, prior to engaging in the production of a medical cannabis concentrate or manufacture of cannabis medicine products and at any other time when the hands may have become soiled or contaminated; and
    - Refraining from having direct contact with preparation of medical cannabis or cannabis medicines if the person has or may have an illness, open lesion, including boils, sores, or infected wounds, or any other abnormal source of microbial contamination, until such condition is corrected.
- Litter and waste will be properly removed and the operating systems for waste disposal will be maintained in an adequate manner so that they do not constitute a source of contamination in areas where cannabis is exposed.
- Floors, walls and ceilings will be constructed in such a manner that they may be adequately cleaned and kept clean and in good repair.
- There will be adequate lighting in all areas where cannabis is stored and where equipment or utensils are cleaned.
- There will be adequate screening or other protection against the entry of pests. Rubbish shall be disposed of so as to minimize the development of odor and minimize the potential for the waste becoming an attractant, harborage or breeding place for pests.

- Any buildings, fixtures and other facilities will be maintained in a sanitary condition.
- Toxic cleaning compounds, sanitizing agents, and solvents used in the production of cannabis concentrates shall be identified, held and stored in a manner that protects against contamination of cannabis, and in a manner that is in accordance with any applicable local, state or federal law, rule, regulation or ordinance.
- All contact surfaces, including utensils and equipment used for the preparation of cannabis or cannabis medicine products shall be cleaned and sanitized as frequently as necessary to protect against contamination. Equipment and utensils shall be designed and shall be of such material and workmanship as to be adequately cleanable, and shall be properly maintained.
- The water supply shall be sufficient for the operations intended and shall be derived from a source that is a regulated water system. Private water supplies shall be derived from a water source that is capable of providing a safe, potable, and adequate supply of water to meet the facility's needs.
- Plumbing shall be of adequate size and design, and adequately installed and maintained, to carry sufficient quantities of water to the required locations throughout the facility. Plumbing shall properly convey sewage and liquid disposable waste from the facility. There shall be no cross connections between the potable and waste water lines.
- All operations in the receiving, inspecting, transporting, segregating, preparing, producing, packaging, and storing of medical cannabis and cannabis medicine products shall be conducted in accordance with adequate sanitation principles.
- Each manufacturing facility shall provide its employees with adequate and readily accessible toilet facilities that are maintained in sanitary condition and good repair.
- Cannabis that can support the rapid growth of undesirable microorganisms shall be held in a manner that prevents the growth of these microorganisms.

All operations in the receiving, inspecting, transporting, segregating, preparing, production, packaging, and storing of medical cannabis or medical cannabis medicines shall be conducted in accordance with adequate sanitation principles. Medical cannabis and plant material that can support the rapid growth of undesirable microorganisms shall be held in a manner that prevents the growth of these microorganisms.

Chemical Storage: Toxic cleaning compounds, sanitizing agents, solvents used in the

production of medical cannabis concentrates, and pesticide chemicals shall be identified, held and stored in a manner that protects against contamination of cannabis, and in a manner that is in accordance with any applicable local, state or federal law, rule, regulation or ordinance.

Environmental conditions within production compartments shall be strictly monitored and controlled in order to provide the right conditions for plant growth and processing plant material. Optimal cultivation conditions will reduce chances for pest and disease infestations by producing healthy crops that are naturally resistant to such problems. Maintaining the right growing environment is essential for reducing the exposure of plants to contaminants.

It is the goal of the cultivation facility team to deliver the highest quality, purest cannabis with consistency of dosage. To achieve these high standards, the manufacturing facility shall be engineered for year-round production. Our growing rooms are all capable of maintaining constant environmental conditions including temperature, humidity, and CO_2. In addition, we introduce fresh air through an advanced smell-eliminating air flow system that works in conjunction with other controls such as UV light to avoid all mold, bacteria, mildew and fungal outbreaks. Our closed loop ventilation system will lessen the potential of pest contamination and reduce the need for any organic pesticides.

The microclimate within each section of the cultivation facility must be constantly maintained in order to prevent pest and disease and achieve the highest and purest quality. In order to maintain an optimal environment, the cultivation manager shall ensure that the following conditions are constantly maintained:

Temperature Control: Room temperature in all vegetative and flowering areas should be maintained at 78 F/25.5 C. Each growing room will be equipped with adequate HVAC in order to maintain required temperatures. Temperature shall be monitored daily by the cultivation staff.

Humidity: Relative humidity levels must be kept at or below 55% humidity in vegetative areas and at or below 45% in flowering sections of the cultivation facility. Humidity level in the propagation area shall be maintained at 80%. Humidity shall be monitored daily by the cultivation staff.

Air Circulation: Circulation fans are used to improve air quality, strengthen plants, and prevent pest and disease. Circulation fans will be placed every four to six feet throughout all growing and drying areas of the manufacturing facility. We will keep fans running 24 hours a day.

UV Filtration: Environmental scrubbers will be used throughout the cultivation facility to clean harmful contaminants found in the air. EVS systems work to combat mold, diseases, and odor. EVS systems are not harmful and are highly effective in removing VOCs, and preventing mold and germs.

Air Exchange: In order to further reduce odor and maintain a fresh environment, air will be removed periodically from each growing space through an activated carbon filter via a main trunk line.

Scrubbing: After air leaves each compartment, it shall be scrubbed through carbon and treated with UV a second time before leaving the building through a roof top stack.

Detailed description of air treatment systems that will reduce off-site odors: The cultivation facility will contain a three-phase odor reduction system to eliminate odor within and around our production facility. Cannabis production is organized into a series of separately sealed zones including but not limited to: vegetative, flowering, trimming, curing, storage, processing and hallways connecting rooms. Within each zone, a predetermine number of activated carbon filters will circulate and scrub the air at a flow rate calculated to filter all the air in the room every 15 minutes. Each zone will maintain neutral air pressure created by exhausting the air through one point at the same rate fresh air enters the zone. The exhaust from each zone is filtered a second time through an activated carbon filter before entering a sealed ducting system to be transferred to a common air bank. Before exiting the building through a stack system, all exhaust is filtered a third time through a series of activated carbon filtration screens thoroughly reducing odor emission rates.

Odor Reduction Plan:

Step 1: Create sealed zones

Step 2: Exhaust system with neutral pressure

Step 3: Three-Phase odor reduction system:

- Air within zone filtered through activated carbon every 15 minutes and constant EVS with UV
- Air exhausted from rooms filtered through activated carbon, transferred through sealed ducting system
- All exhaust collected in a common air-bank where it is filtered a third time and treated with UV before leaving the building through an engineered stack system

Carbon Dioxide: CO_2 levels shall be maintained at 1,000 ppm in all vegetative areas and 1450 ppm in all flowering areas. CO_2 levels shall be monitored daily by the cultivation facility staff.

Supplemental Lighting: Vegetative lighting will consist of florescent lighting for mother plants, clones, and early vegetation. Larger vegetative plants will be placed under LED or 600-1,000 watt Blue Metal halide lamps to achieve appropriate size to be transferred into the flowering area. Flowering plants will be grown using 1,000 watt E-Papillion with high-frequency adjustable strength ballasts or equivalent Gavita lighting. Lighting shall be monitored daily by the cultivation facility staff and intensity verified and logged monthly.

Drainage: All plants not in auto-pot or hydroponic systems will need appropriate drainage. Drainage shall be achieved through the plumbing of each growing surface and will be brought to a central floor drain located in each section of the cultivation facility. Drainage shall be monitored daily by the cultivation facility staff.

Environmental Zone Specifications for Each Room Within The Facility: The cultivation facility manager shall ensure the following room environments are held at these specifications:

- **Soil processing area**: soil storage, soil recycling, and soil preparation shall take place within the soil processing room.
  - Temp: 68-72° Fahrenheit
  - Humidity: Below 50%
  - Air movement: Wall fans
  - Air pressure: Neutral
  - Air quality: UV scrubber
  - Water: R/O + Cleaning
  - Equipment and supplies: soil mixer, soil recycling

- **Transplant Room**: All clones and vegetative plants within the facility will be transplanted into larger containers within this zone.
    - Temp: 72° Fahrenheit
    - Humidity: Below 50%
    - Air movement: Wall fans
    - Air pressure: Neutral
    - Air quality: UV scrubber
    - Odor reduction: Carbon filtration system
    - Water: R/O + cleaning
    - Equipment and supplies: shovels, pots

- **Cloning/Nutrient Storage Kitchenette**: All cuttings will be processed in this zone prior to entering the hot house.
    - Temp: 72-78° Fahrenheit
    - Humidity: 40-50%
    - Air pressure: Neutral
    - Air quality: UV scrubber
    - Water: R/O + Cleaning
    - Equipment and supplies: rapid rooters, razor blades, rooting hormone

- **V1 Mother Zone**: All mother plants will vegetate within this zone.
    - Temp: 72-78° Fahrenheit
    - Humidity: Below 50%
    - Air movement: Wall fans
    - Air pressure: Neutral
    - Air quality: UV scrubber
    - Odor reduction: Carbon filtration system
    - Water: R/O + Cleaning
    - Drain: Floor drain in center of room or sub pump
    - Equipment and supplies: 1 level of T5 lighting or comparable, cover entire footprint
    - CO_2: 500-1450 ppm

- **V1 Hot House**: All cuttings will be rooted within this zone for 10-14 days prior to being transplanted into one-gallon pot and moved to V2.
    - Temp: 80° Fahrenheit
    - Humidity: 80%
    - Air pressure: Neutral
    - Air quality: UV scrubber
    - Odor reduction: Ozone generator

- Water: R/O + Cleaning
- CO_2: 900 ppm

- **V2**: Plants will vegetate in one-gallon pots for three to four weeks within this zone prior to being transplanted into larger pots and moved into V3 pre-flowering.
  - Temp: 78° Fahrenheit
  - Humidity: 35-50%
  - Air movement: Wall fans
  - Air quality: UV scrubber
  - Odor reduction: Carbon filtration system
  - Water: R/O + Cleaning
  - Drain: Floor drain in the center of the room
  - CO_2: 1000-1450 ppm
  - Equipment and supplies: Two- to three-level racking system, three feet wide and spaced 36 inches apart and 180 8-bulb t5 light fixtures

- **V3 Pre-Flower**: Plants will vegetate for two weeks within this zone prior to being transferred into the final flowering zone.
  - Temp: 78° Fahrenheit
  - Humidity: 35-50%
  - Air movement: Wall fans
  - Air quality: UV scrubber
  - Odor reduction: Carbon filtration system
  - Water: R/O + Cleaning
  - Drain: Floor drain in the center of floor
  - CO_2: 1000-1450 ppm
  - Equipment and supplies: 108 1,000-watt metal halide light fixtures affixed to metal frame system from light hanger. Light footprint to 3.5 x 3.5 per light.

- **Flowering areas**: Each flowering room shall contain 40-50 flowering lights with the exception of F9, which may have just below 40 lights.
  - Temp: 78° Fahrenheit
  - Humidity: Below 35-45%
  - Air movement: Wall fans
  - Air pressure: Neutral

- Air quality: UV scrubber
- Odor reduction: Carbon filtration system
- Water: R/O + Cleaning
- Drain: Each room shall have a floor drain for cleaning and irrigation purposes.
- CO_2: 1450 ppm
- Equipment and supplies: E-pappillon supplemental lighting, benches

- **Drying, Curing, and Pre-Testing Storage**: All these functions will take place in the secured areas. The drying zone shall contain a shelving system and a hanging system for drying product. The curing and storage area shall contain a shelving system where storage vessels containing nearly finished and finished product will be cured and then stored in a secured fashion while awaiting test results.
  - Temp: 62-72° Fahrenheit
  - Humidity: 20-65%
  - Air movement: Fans
  - Air pressure: Neutral
  - Air quality: UV scrubber
  - Odor reduction: Carbon filtration system

- **Small Vault**: The small vault shall be used for storing approved tested products prior to transportation to the retail store location.
  - Temp: 62-72° Fahrenheit
  - Humidity: 40-50%
  - Air pressure: Neutral
  - Air quality: UV scrubber
  - Odor reduction: Carbon filtration system
  - Equipment and supplies: Storage shelves, temperature control
- **Breeding**: The breeding room shall contain a series of smaller rooms; each one shall have a LED lighting system.
  - Temp: 78° Fahrenheit
  - Humidity: Below 50%
  - Air quality: UV scrubber
  - Odor reduction: Carbon filtration system
  - Water: R/O + Cleaning

- Air pressure: Negative air pressure within the breeding room, and positive air pressure in the barrier entry room

- **Trimming and Processing**: All products shall be rough trimmed in this area prior to being dried in the drying vault. All products shall be processed (packaged) within this area after passing all testing protocol and prior to being stored in the small vault.
    - Temp: 70-72° Fahrenheit
    - Humidity: 40-65%
    - Air pressure: Neutral
    - Air quality: UV scrubber
    - Odor reduction: Carbon filtration system

c. Describe the cultivation methods that are expected to be employed, including the growing medium and the approach to cultivate consistent medical cannabis

Methods of Planting, Harvesting, Drying, and Storage of Medical Cannabis

MinnMed shall utilize TLO (True Living Organic) methodology and approach to cannabis cultivation that combines proven ancient wisdom with the newest technologies to achieve maximum efficiencies in energy and space. The results of this organic growing method are healthier plants that produce larger yields, higher quality, increased terpene content and profile, and consistent medical cannabis products.

The goal of MinnMed is for every plant to achieve Maximum Genetic Potential (MGP): When a plant receives everything it needs and nothing it doesn't, it will achieve MGP. MGP plants yield up to 80% more than normal plants, which greatly helps economically and environmentally, as the energy, time and space that go into production are greatly offset by the abundant harvest. Plants need air, water, and light to produce glucose for energy. Cannabis will only grow as fast as its most limiting factor. As each element increases in strength, so shall the other elements to reach its maximum genetic potential. A perfect balance of each element shall be maintained so each plant produces a consistent product. The cultivation manager shall work with each zone manager to achieve the appropriate balance of each element of plant growth to achieve maximum genetic potential.

MinnMed shall take an environmentally conscience approach to cannabis cultivation by capturing the sun's energy in an advanced year-round greenhouse. In order to cultivate consistent cannabis year-round, the greenhouse will utilize the most advanced supplemental lighting on the market; Phillips e-pappillon high frequency doubled ended HID lamp.

Selecting Cannabis Strain Varieties

Planning strain varieties to produce is essential to meet patient demands for medicine, produce quality cannabis, and to ensure consistency of dosage. Feedback from patients and the cultivation team shall be combined with comprehensive test results to set production goals for the cultivation facility. In addition, a given strain's ease of propagation and overall yield must be taken into account in order to reach production goals, create a consistent end product, and maximize energy and space efficiency within the cultivation facility. The cultivation manager will plan a cultivation calendar in order to cultivate multiple cannabinoid varieties that meet demand and production goals. The following represent other important strain differentiations that will be taken into account by the cultivation manager:

Synergies Between Terpenes and Cannabinoids: Terpene and cannabinoid profiles of strains shall be taken into account in order to provide the most effective and desirable medicine for patients.

Terpenes: Terpenes are compounds that constitute a large and diverse class of natural products. The majority of these compounds are found in plants. They provide the flavor and the smell to cannabis, but also may provide an array of medicinal benefits. The cultivation manager shall plan production of a wide range of strain varieties in order to produce multiple terpene profiles and combinations in order to treat the varying conditions within multiple patients. The following are examples of terpenes commonly found in cannabis and their medicinal benefits:

- **Linalool:** Lily, floral, spicy. Treats anxiety and acts as a sedative.
- **Caryophyllene**: Rich spicy, sweet, woody, clove, camphor, pepper. Anti-septic, anti-tumor, anti-inflammatory, anti-fungal, anti-bacterial.
- **Myrcene**: Clove, earthy, citrus, mango, mint. Antiseptic, anti-tumor, analgesic, anti-depressant, muscle relaxant. Most common terpene in cannabis, found in higher levels in indicas. Makes cell walls more permeable thus increasing the effect of cannabinoids.
- **Limonene**: Citrus, rosemary, juniper, peppermint. Increased circulation, pain relief.
- **Humulene**: Hoppy, coriander. Common in sativa. Anti-inflammatory, anti-tumor, anti-bacterial.
- **Pinene**: Pine, rosemary, dill, basil. Mental focus, energy, bronchodilator, anti-inflammatory.

- **Delta3Carene**: Pungent, sweet, pine, woodsy, cedar. Can help dry excess fluids such as runny nose and perspiration.
- **Cineole/Eucalyptol**: Spicy, camphor, minty. Increased circulation, pain relief.

Cannabinoids: There are over 480 natural components found within the cannabis plant, of which at least 85 have been determined to be cannabinoids. Cannabinoids are chemicals found in animals and other plants as well, but nowhere are they more abundant and effective than in the cannabis plant. The most well-known and researched of these is THC or delta-9-tetrahydrocannabinol. THC is the substance primarily responsible for the psychoactive effects of cannabis.

Like opiates and opiate derived pharmaceuticals, cannabinoids affect the user by binding with receptors within the cells of the body and different parts of the central nervous system. There are at least two kinds of cannabinoid receptors found to date, termed CB1 and CB2. Anandamide is a cannabinoid-like substance found within the brain commonly referred to as the "Bliss Molecule." Naturally occurring anadamide binds to CB1 receptors. Other naturally occurring substances that bind to CB1 have recently been discovered, and these, together with the receptors, have been termed the endogenous cannabinoid system or endocannabinoid system.

The effects of THC are heavily influenced by the other components of the plant, most particularly, other cannabinoids. Differences between the cannabinoids found within the cannabis plant are determined by the extent to which they are psychologically active and the other medicinal benefits they correspond with. For example, CBG, CBC and CBD are not known to have a psychological effect, however they have been proven to have multiple medicinal benefits, while THC and CBN are cannabinoids often associated with the psychological effect of cannabis. Most cannabinoids are multifaceted with a wide array of effects and benefits.

The cultivation manager shall review test results for every batch in order to ensure that multiple strains are produced with varying cannabinoid profiles in order to properly and accurately provide medicines to treat multiple patients with different needs. By combining different cannabinoids and different terpene profiles, the possibilities for medicinal healing are vast. The cultivation manager shall utilize cannabinoid profiles when planning for strain production at all

times. The following cannabinoids are all known to provide different effects and medicinal benefits:

- **THC**: Delta 9 Tetrahydrocannabinol is the cannabinoid that gives cannabis the majority of its psychoactive affects. Cannabis has been bred for high levels of THC, and we are only now starting to breed for complimentary cannabinoids. THC can be used to treat pain, nausea, tumors, and ADHD.
- **THC-A**: THC-A is the most common cannabinoid found in cannabis. It is not psychoactive and has an array of medicinal effects including anti-tumor, anti-insomnia, anti-inflammatory, and anti-spasmodic.
- **CBN**: (Cannabinol) As THC oxidizes from exposure to heat and light, it turns into CBN. CBN is only mildly psychoactive and highly sedative.
- **CGB**: Cannabigerol is a non-psychoactive cannabinoid that stimulates brain cell development and bone growth. It is also antibacterial, anti-insomnia, and anti-tumor.
- **CBC**: Cannabichromene has been shown to be 10 times more effective than CBD for treating anxiety. CBC also stimulates bone growth. It is non-psychoactive.
- **CBD**: Highly effective in treating epilepsy and MS, cannabidiol is non-psychoactive. CBD is as effective at treating tumors and pain as THC, however very useful for children and to others whom do not wish for the psychoactive effects of THC. CBD can treat diabetes by lowering blood sugar and is very effective in treating stress and insomnia.
- **CBD-A**: CBD-A is more commonly found in the ruderalis varieties, which are often bred with sativa and indica varieties for their auto flowering abilities. CBDA has been linked to anti-tumor and anti-inflammatory effects.

Varieties of Cannabis

Cannabis Sativa: Cannabis sativa is the tallest variety of cannabis. All other varieties most likely evolved from the sativa plant. Most hemp is actually sativa. Sativa varieties are thin and wispy, most likely from evolving in hotter regions of the world where adequate airflow between branches was necessary to remain disease free. 100% sativa strains take up to six months to flower and can grow extremely tall making true sativa unsuitable for indoor and commercial production. The sativa strains commonly grown for medicine are actually hybrids that have been bred with indica varieties to shorten both their height and flowering time. Sativa produces a

cerebral effect that can be energizing, followed by an increase in appetite. Sativa hybrids are very helpful for anyone experiencing loss of appetite such as those undergoing chemotherapy or patients with HIV/AIDS.

Cannabis Indica: Cannabis indica is short and bushy with thick stems. Most likely evolving in the cooler regions of Asia and Afghanistan, cannabis indica has a short flowering time, most likely to complete its reproductive cycle prior to freezing conditions. Most medicinal varieties of cannabis are a derived form of indica, and its cannabinoid profiles are well balanced producing significant levels of THC, CBD, and CBN. Indicas produce a body-centered effect that allows relaxation, quality rest, and pain relief for patients.

Cannabis Ruderalis: Cannabis reuderalis is of very poor quality and is only grown in hybrid form with sativa or indica due to its auto flowering capabilities. For the most part, ruderalis hybrids should be avoided in indoor cultivation. Ruderalis is the shortest cannabis variety, and it has minimal branching. Avoid all seeds and strains that state they are auto flowering.

CBD Varieties: CBD varieties are now being bred as they offer many of the medicinal benefits of cannabis with little to no psychological effects making them suitable for children and adults who wish to remain clear headed. CBD effects on THC can be noticed with as little as 1% CBD, however, the ratio of THC to CBD can be widely influenced and tailored to create the desired effect for a particular ailment or specific patient. One-to-one ratio strains often have the best of both worlds where the psycho effects of THC are diminished by CBDs; however, all the medicinal effects from THC remain intact.

Growing Medium (Substrate): The growing medium is where the plant's root system thrives, and healthy roots form the foundation for healthy plants. Selecting the best growing medium is one of the most important considerations in cannabis plant production. A growing medium can be defined as a substance through which roots grow and absorb hydrogen, oxygen, and nutrients. Roots want to live in moist humid air pockets, which is important to keep in mind when placing media in a container as it can produce an environment drastically different from those of soil found in nature.

Plants living in containers have access to a limited amount of growing medium. This limited rooting volume means that cannabis plants only have access to small amounts of water and

mineral nutrients. Additionally, water and nutrients in this limited space can be used very quickly. Most traditional containers only drain from the bottom so proper drainage must be established within the container by utilizing rocks on the bottom layer of all containers.

Soils in nature contain microorganisms, such as bacteria and fungi, which do not exist in artificial growing media. The texture of any growing medium should contain structures that create porosity; think of all the tiny rocks and other additions to naturally occurring soil. Texture and porosity of all cannabis mediums should allow drainage while maintaining the proper balance of moisture resulting in flourishing root zones that can absorb ample amounts of nutrients.

The cultivation team shall always strive to achieve optimal root zone conditions. The cultivation manager will train each zone manager in proper media building in order to meet the needs of the plants within the facility.

Characteristics of a Perfect Growing Medium: Naturally occurring soils are truly a living microenvironment. All mediums except for hydroponic should possess the following physical, chemical, and biological properties in order to grow the healthiest plants and reach maximum genetic potential (MGP).

Physical Properties of Growing Medium: The cultivation manager shall ensure each zone manager has an appropriate balance of physical properties to achieve the best structure for root development and growth. Management will ensure proper training and educational materials are provided to employees.

- **Aeration/Porosity:** Naturally occurring soils contain textured materials such as rocks and shells that provide adequate drainage, pockets of oxygen, and chelate into usable nutrients. Microbes thrive in tiny porous holes that are provided by substrate additions such as perlite and lava rocks. Use an array of different size and textured materials to create humid air pockets for roots and numerous porous surfaces to hold oxygen and grow microbes.

- **Aeration/Porosity Components of Soil:** The following components of growing media will provide aeration and porosity thus allowing drainage, oxygenation, and microbial growth resulting in a healthy root zone and robust plant:
    - Perlite
    - Lava rocks
    - Hydroton
    - Worm castings
- **Moisture/Water Holding Capacity:** A good growing medium will have ample water holding capacity and still be porous enough to allow excess water to drain away. In cannabis gardening, coconut coir is a perfect inert substrate that will hold water. It is imperative to strive towards the perfect balance between water holding capacity and drainage by utilizing a mix of absorbent substrates and porous substrates.
- **Moisture Water Holding Components of Soil Blends:** The following components will provide water-holding capacity and should be used in balance with porous additions to maintain the proper moisture/oxygen/nutrient balance with in the root zone:
    - Coco coir
    - Potting soil
    - Peat moss
    - Humus soil

Chemical Properties of Growing Medium: The cultivation manager shall work with each zone manager to ensure that all growing medium has the correct chemical properties.

- **pH**: pH of growing medium is a measure of its relative acidity or alkalinity. pH values range from 0 to 14. Growing mediums below 7 are acidic, and those above 7 are alkaline. Cannabis thrives in a substrate pH of 6.0-6.5. The substrate pH affects the plant's ability to utilize nutrients within the root zone. For example, phosphorus availability is less in low pH conditions where it can bind with iron and aluminum. At high pH levels, phosphorous will bind with calcium hindering the plant's ability to use the nutrient effectively. The effects of poor pH conditions can show up as common nutrient deficiencies or

diseases and also can have devastating effects on the microbial life within the substrate. Each zone manager shall monitor substrate pH regularly and whenever adverse conditions appear with in the cultivation facility.

- **CEC/Cation Exchange Capacity:** CEC refers to the capacity to which a growing medium can hold positively charged ions thus resulting in the nutrient storage capacity within a given medium. Because most artificial growing media are inert, CEC capacity must be considered. Within the growing medium, plants absorb nutrients through roots via a process in which excess charged ions are exchanged for charged nutrient ions. Once cation exchange has occurred, nutrients are transported to the foliage, where they are used for growth and development by the plant. Because the CEC of a growing medium reflects its ability to hold nutrients for plant uptake, substrates with a relatively high CEC are recommended for cultivating cannabis. The cultivation manager shall adopt a medium with the appropriate CEC for optimal plant growth.

Biological Properties of Growing Medium: A common dilemma with soil-based growing media is that it can contain a variety of pests, such as pathogenic fungi, insects, nematodes, and weed seeds. All naturally occurring soil based media shall be pasteurized with heat prior to being used in the cultivation facility. Composts and humus soils are an exception, as they remain pest free due to high temperatures that occur during composting. Compost can be added back to inert or sterilized media for their beneficial microbial components as well as trace minerals. The cultivation manager shall work with each zone manager to ensure the biology of the growing media does not promote disease or insect proliferation, however, the media shall remain healthy and stable for the development of microbial life.

- **Microbes**: Bacteria and fungus feed on each other and excrete pure humus into the soil. It is imperative to use at a minimum of 15-20% soil in planting mediums in order to provide a solid foundation for beneficial bacteria and fungal growth. These beneficial organisms provide all the aspects needed within the growing substrate to ensure plants reach MGP. The cultivation facility manager and each respective zone manager shall manage the application of organic soil composts and teas.

- **Humus**: Nature's perfect plant food, humus has all necessary macro and micronutrients to support vigorous root growth and a healthy plant life cycle. The soil component of all media should contain a good source of humus. Each zone manager shall utilize humus soil within the growing media.
- **Worm Compost**: Made up from the excretions of the earthworm, worm castings are a great amendment for both the porosity of the media and the microbial life within the media. Each zone manager shall utilize worm castings in all transplant media and in the creation of compost teas to be fed throughout the plant's life cycle.

Coco Coir: Coco coir with a top drip-feeding system is the recommended replacement for hydroponic gardening as it solves every problem associated with hydroponics and can achieve similar results. Hybrid system utilizes coco coir as a component while still utilizing an organic base for additional terpene profile and overall plant vigor and health. These semi-soil strategies may be deployed on an as needed basis.

TLO: True Living Organics produces the highest quality cannabis with the best terpene and flavor profiles. TLO consists of building a super soil and feeding beneficial microbes. Plants take the nutrients they need directly from the soil as time and microbial feeding and excretion release make micro and macronutrients bio-available.

Building the TLO Soil: The recommended substrate for cultivating medical cannabis is the TLO. TLO combines all three properties of perfect media and results in an easy-to-use substrate that maximizes a plant's growing potential while mitigating the risks often associated with hydroponic gardening. Each zone manager shall prepare and utilize TLO for cultivating cannabis within their respective zone prior to transplanting plants at all stages of life with the exception of cloning.

Tools: Mixing tub (large kiddie pool, thick tarp, wheel barrow, or soil mixer), flat nosed mixing shovel

Ingredients: Fox Farm Ocean Forrest soil, Fox Farm Big and Chunky Perlite, Plagron Coco Coir, humus soil, worm castings. (All brands can be exchanged for other high quality brands that meet the above listed requirements for cannabis growing media).

Ratios: 25% soil, 25% coco coir, 7.5% humus soil, 7.5% worm castings, 35% chunky perlite

Directions: Starting with perlite, measure and place in mixing area. Measure and add coco coir. Measure and add humus and worm castings. Measure and add soil. Mix all ingredients with shovel or soil mixer until evenly mixed.

Organic nutrients: Traditional organic nutrients are then mixed into the soil so they can break down over time providing the full spectrum of nutrients required for plant growth. Microbial life plays an essential role in breaking down organic matter in soils and making fresh humus that contains all elements for healthy root systems and plants. Teas are highly utilized to supply fresh microbes and nutrients needed throughout the plant's life cycle. Top packs and spikes can also be utilized to provide nutritional components for plant growth later in the life cycle. Newer bottled organic nutrients will be used for corrective actions as they provide readily bio-available nutrients along with soil enhancers.

Making Organic Compost Teas: Compost teas should be used bi-weekly to ensure there is a healthy microbial life within the growing medium. Each zone manager shall utilize the appropriate tea recipe for each phase of the cannabis life cycle. Teas shall be applied on a two-week schedule. Teas feed the microbial life in the soil and create healthy plants that resist disease, yield more, and produce consistent cannabis with an excellent terpene profile.

> **Basic tea requirements**: 5-gallon bucket, living water, air pump, worm castings, humic acid, sea kelp, earth worm castings
>
> **Procedure for making compost teas**:

1. Fill bucket half way with water.
2. Place air pump (bubbler) in bucket and turn on

3. If water is not already alive (see living water) allow water to bubble for a minimum of 24 hours to de-chlorinate.
4. Place the following ingredients into the water: two tablespoons molasses, two ounces sea kelp, and two ounces humic acid.
5. Place 1 pound earth worm casting into a sock or similar tea bag, and place bag into the water.
6. Allow water to bubble and brew for 24-48 hours.
7. Dilute tea into 40-50 gallons of living water and apply to soil or as a foliar spray.

Top Packs: Mitigating plant deficiencies and increasing production capacity can be done organically through the use of top packs. Super soils with organic nutrients built in will only maintain maximum plant growth until the plant has used up the nutrients. Top packs can be applied halfway through the flowering cycle to ensure the plant has all nutrient needs met and produces the highest quality end product.

Procedure for applying top packs:

1. Determine appropriate amount for container size. ¼ cup per gallon of substrate.
2. Mix three bat guanos together to equal appropriate measurement.
3. Apply to the top of the soil mixture.
4. Water with living water.

Spike: Spikes are small compact nutrient zones in which roots can grow into in order to use additional nutrients as needed by the plant. Flavor bombs are pre-made spikes and are a good way to prevent deficiencies and provide maximum growth, quality, and consistency.

Procedure for adding spikes: Add spikes when transplanting into final container for flowering phase.

1. Determine the appropriate amount for container size: 1 spike (flavor bomb) per gallon.
2. Place spikes evenly throughout the planting medium.
3. Water in as plant needs.

Organic Bottled Nutrients: Organic bottled nutrients can be used to maintain nutrient needs as the plant grows larger and nutrient requirements increase. In 100% organic growing, all nutrients shall be OMRI listed organic nutrients.

Standard Operating Procedures: Steps will be taken throughout the cultivation process to ensure the production of consistent medical cannabis and the quality of the medical cannabis and cannabis medicines, including purity and consistency of dose, and the presence of potential contaminants.

Starting From Seed: There are several methods of germinating cannabis seeds. The vegetative zone manager will work with the cultivation facility manager to determine when and which varieties of seeds to germinate. Only stable seed varieties shall be utilized to produce medical cannabis.

- Determine variety to germinate.
- After the vegetative manager has determined which cannabis varieties will be germinated, he/she shall prepare the necessary tools for seed germination. You will need a clean container that will hold at least 8 oz. of filtered room temperature water.
- Soak the seeds in the water for 24 hours. The seeds will float on the surface of the water at first, but as the seeds begin to germinate, their surfaces will open allowing them to take on water and sink to the bottom. The seeds on the bottom of the container are germinated and can now be planted in an appropriate medium. Log results.
- After soaking, place the seeds between two paper towels and place the paper towels within two plates turned to face each other. Place the plates in the propagation cabinet in propagation portion of the cultivation facility and wait 24-48 additional hours. The seeds will be visibly germinated at this point and can be transplanted. Log results.
- Once a seed in germinated, it shall be given a unit number, batch number, RFID tracking tag, and will be logged and entered into the SIS so tracking can begin.

Planting Seedlings: Once a seed has germinated, the vegetative manager shall plant the seed in a prepared medium. Seeds should always be planted in small containers to establish a basic root system before being transplanted into larger containers.

- Prepare planting medium.
- Fill 12 oz. container three quarters of the way full with medium.
- Remove a pinch of medium from the center leaving a whole .25 inches deep.
- Water the medium with living water.
- Place germinated seed in the small hole and cover lightly with moist medium.
- Container is labeled with RFID and location, and all pertinent data is recorded into the SIS.
- Place planted containers on shelves under T5 lighting.
- Check daily for sprouts.
- Once the plant is one inch tall, add .5 inches of medium.
- Repeat additional medium applications up to two times, until the plant has a sturdy base.
- Water seedlings when they feel dry at the surface.
- Transplant when plants require water daily.

Determining Sex of a Cannabis Plant: Cannabis is a dioecious plant species, meaning its flowers are either male or female. The zone manager responsible for the flowering of genetics from seed shall monitor flowering plants daily for signs of being male. It is important to note that even if a plant has shown white pistols coming from its branches, it could still be hermaphroditic especially if the seed origins were of a feminized variety. If a plant is determined to be male, it is either returned to vegetative for future breeding or destroyed or disposed of in a manner consistent with waste disposal procedures, and logged accordingly. Determining the sex of a cannabis plant is detailed within the Standard Operating Procedures (SOPs).

Instructions for Sexing a Cannabis Plant: All cannabis started from seed shall be flowered in a separate and distinct section of the cultivation facility where pollen is not able to travel into other flowering sections of the facility and potentially contaminate other batches of cannabis. The designated flowering zone manager will oversee the flowering of all plants from seed within their designated batch.

- Plants must be monitored daily for sign of being male.

- Once a plant has been determined to be male, it must be removed from the flowering room and destroyed. If the plant is determined to be good for breeding, it may be cloned prior to being destroyed.
- Remove a male by placing a plastic trash bag over the entire plant and secure the bag tightly at the bottom of the stem by the base of the plant. Cut at the base and follow green waste procedures.
- Remove male plant from plant inventory.
- Dispose of the plant following green waste procedures.
- Continue to monitor remaining plants, even females, for signs of being male or hermaphroditic.
- All hermaphroditic plants should be treated just as males and disposed of in the same manner.

Seed Storage: All seeds shall be labeled, logged, sealed in airtight containers, and stored in the genetics storage cooler. The vegetative zone manager is responsible for seed storage.

Feminized vs. Regular: Feminized seeds are seeds that have been bred by forcing a female plant to become hermaphroditic and fertilize itself in order to produce an all-female crop. These seeds have a greater propensity to hermaphrodite and must be monitored closely when flowering.

Starting from a Mother Plant (Cloning): A mother plant is a female plant reserved in a continuous vegetative state for the purpose of taking cuttings. The cuttings from the mother plant are grown and flowered to produce the final product. Through the following procedures, the vegetative manager shall ensure that healthy mother plants are maintained at all times to ensure healthy clones:

- Mother plants shall be watered with a well-balanced nutrient formula that is high in nitrogen.
- The mother plant shall be sufficient in size prior to cloning.
- Super cropping and topping techniques shall be followed to increase the number of cloning sites on each mother plant.

- Avoid taking too many cuttings from a mother plant; leave at least 2/3 for future cloning, and allow at least one week between cloning sessions for the mother to recover from stress.

Cloning Method: Cloning is essential for producing a consistent crop. Clones are genetic copies of the mother plant, therefore all mother plants must be determined suitable for cloning by the vegetative manager. The vegetative manager shall be responsible for selecting strains to be cloned in order to meet the demands of each flowering zone. Any terminal shoot at least three inches long can be turned into a clone; however, the top of the mother plant will have the freshest, softest material for cloning, and cloning from top down helps avoid mother plants that are too tall for the ceiling height within the growing space.

Materials Needed for Cloning: Rubbing alcohol, cutting board, scissors, new razor blades, cloning gel (for organic use honey), small container, distilled or RO water, vinyl work gloves, and cloning medium

Cloning Mediums: Rockwool cubes, rapid rooter cubes, coco coir cups, aeraponic systems

Procedure for Taking Clones: The vegetative manager shall train a dedicated zone manager for the propagation of all clones.

- The vegetative manager shall identify and approve a mother plant to be cloned.
- The cloning manager shall prepare all tools and surfaces by wiping them clean with 90% rubbing alcohol.
- Fill clean empty glass with distilled or RO water.
- Prepare cloning medium by moistening with filtered water.
- Take clean scissors and place them into the cloning medium 1.25 inches deep to ensure a clean hole for planting the cutting.
- Place the cutting board on a clean stainless steel-working surface. Place the cloning medium next to the cutting board. Place several brand new razors near the cutting board.
- Select suitable cuttings. Suitable cuttings shall be a minimum of three to four inches in length and have at least three leaf nodes.

- Using scissors, remove several suitable cuttings from the mother plant. Quickly cut and remove lower leaf nodes and place in the cup of water. Place cup with cuttings next to the cutting board.
- Remove cutting from the water and prepare to make a final clean cut with the razor blade. Place the cutting on the cutting board and slice the base at a 45-degree angle directly below a leaf node for best results. Cut and remove all lower fan leaves. Any large fan leaves near the top should be cut in half.
- Immediately dip the cut end of the clone into the cloning gel (rooting hormone), and place into the prepared growing medium. If using an aeraponic cloner, skip the dip, and place the bare stem into the cloning machine.
- Place the finished tray of cuttings into the hot house or under a propagation dome. Lighting should be t5 florescent or similar.
- Ensure humidity remains at 80% and temperature remains at 80 degrees.
- After seven days, remove all weak cuttings. Cuttings that are standing strong shall enter the tracking system.
- As soon as a cutting is removed from the mother plant, it will be given a unit number, batch number, RFID tracking tag, and will be logged and entered into the SIS so tracking can begin.

Watering Clones: 10-14 days after cuttings have been taken, the root system should be established enough to allow the uptake of nutrients. From this time until transplanted into containers, the cloning manager shall ensure proper care is taken to ensure healthy plants for transplanting.

- When cloning medium begins to dry out, the first watering shall consist of beneficial microbes. Mix microbial mixture (Rhysotonic, or great white shark) into living water. Lightly water clones each time the growing medium achieves 50% moisture level. Aeraponic clones shall have Rhysotonic added to the reservoir after visible roots appear.
- When the substrate begins to show sign of dryness a second time, a light vegetative nutrient shall be applied at 25-50% strength.

Cloning Hot House: A minimum of one room within the vegetative area of the cultivation facility shall be maintained as a hot house. The hot house shall meet all environmental standards and be fully enabled to maintain a room temperature of 80° Fahrenheit and a humidity level of 80%.

Planting Method--Transplanting Clones: Once a clone is fully rooted, it is ready to be transplanted and moved into the V2 zone of the cultivation facility. The vegetative manager shall ensure all clones are transplanted, labeled, tagged with RFID and that each transfer is logged and tracked in the SIS, and data recorded. The following procedures shall be followed whenever transplanting:

The designated vegetative zone manager will prepare all materials needed for transplanting and perform transplanting procedures.

Materials for Transplanting Clones: .5-2 gallon pots (size to be determined by cultivation facility manager), TLO soil, small shovel, vinyl work gloves, great white shark or similar mycorrhizae product.

- Ensure entire working area is clean.
- Determine number of clones to be transplanted.
- Fill clean pots half way with planting medium.
- Sprinkle .25 tsp. of GWS onto surface of planting medium; lightly stir with fingers.
- Gently place the clone into the pot, and cover the root zone and the bottom of the stem with additional soil. The stem could be covered .5 to 1.5 inches and there should be at least one inch of space remaining between the top of the soil and the top of the planting container. Do not pack the substrate; soil should be light and fluffy for the fastest root growth.
- Ensure each plant is tagged with RFID tracking, labeled and logged into SIS, data recorded.

Watering Transplants: Post transplanting, plants require special attention in watering to ensure proper root development. The vegetative manager shall ensure all new transplants are given water and nutrients by the following process:

- Prepare vegetative nutrient solution.
- Water plant's current root zone.
- Wait until nearly dry, water entire container.
- Wait until nearly dry, add GWS to nutrient solution, water entire container.

Vegetative Phase--Setting up for Success: The vegetative phase is incredibly important for the final outcome of the plant. During this phase, plants must create healthy root zones, a strong healthy stem, and a robust branching system. This supportive plant architecture will allow the plant to reach maximum genetic potential (MGP) producing large beautiful flowers.

Timeliness and consistency throughout the vegetative process will allow for accurate planning throughout the cultivation facility and enable patient needs to be met. The vegetative manager is responsible for preparing the plants for all future flowering zones. Each plant should reach its pre-determined full size prior to being transferred into its designated flowering zone. The vegetative manager must have full awareness of the timeliness and demands set forth by the flowering schedule and plan accordingly.

Early Vegetative (V2): During the early vegetative phase the main focus is establishing an inner root ball within a smaller container and pruning the plants to achieve a robust branching system.

All plants in V2 will be in one-gallon containers for a three to four week period. Lighting in the V2 stage shall consist of t5s, 315 ceramics, 600 watt metal halides w blue spectrum, or induction lighting.

All plants shall be tracked by scanning RFID tags and documented into the SIS upon being transferred from V2 to V3. Record data.

Late Vegetative/Pre-Flowering (V3): As the cannabis plant grows in size, the root zone will need to expand. When seeking to achieve maximum genetic potential (MGP), the substrate

demands increase to allow for larger, more robust root zones. The vegetative manager shall ensure pre-flowering vegetative plants are transplanted so that there will be 25-30 gallons of substrate per 33 sq. ft. of green house space. During the pre-flowering stage, plants are transplanted into the final container size to allow for larger growth. Conditions in pre-flowering need to mimic flowering conditions so plants can be prepared to produce large healthy flowers in their final phase of growth.

Transplanting Vegetative Plants: Once the root zone has matured, a plant is ready to be transplanted into a larger container. A plant can only flourish while its root's zone is healthy and growing. The vegetative manager shall transplant into the final phase container a minimum of two weeks prior to flowering.

Container Size: The vegetative manager shall utilize 20- 30 gallons of substrate per light for final phase growth in order to achieve maximum genetic potential (MGP).

Choosing Container Size:

- Determine how many plants will be grown under each light in the flowering zone. Plant numbers are based on a plant's growth speed; i.e. if a cannabis strain grows very slowly then the number of plants must be increased to meet the timeline of the cultivation facility. Indicas typically grow slower so it is assumed there may be smaller plants per light, whereas sativa plants grow quicker so there may be fewer larger plants per light.
- Once the plant amount per light is determined, the amount of substrate and container size shall be calculated:
    - 7-9 plants: 3 gallon
    - 6 plants: 4 gallon
    - 5 plants: 5 gallon
    - 3-4 plants: 7 gallon

Materials: Containers, substrate (TLO), small shovel

Transplanting Process: The vegetative manager shall oversee the transplanting process as follows:

- Thoroughly clean the transplanting area and any containers that are not new.
- Move the batch of plants to be transplanted into the transplant area.

- Fill several containers halfway with substrate.
- Sprinkle mycorrhizae onto surface of substrate and mix with fingers.
- Place the stem of the plant between your fingers and turn the plant upside down.
- If the plant does not slip out of the container with ease, gently squeeze the sides of the container.
- Once the plant slips out, place your fingers under the root ball in the center and gently spread the roots.
- Place the plant in the large container.
- Using the small shovel, cover the small plant until the stem is covered a minimum of one inch by substrate. There should be 1.5-2 inches of space left at the top of the pot.
- Hand water with vegetative nutrient solution.
- Scan RFID tag and move into the V3 zone designated for the batch. Record data.

Pre-Flowering (V3): The pre-flowering phase is the final phase of vegetative growth. During this phase we are focused on creating a full canopy before plants enter the flowering zone. The vegetative manager shall ensure plants have strong lighting, CO_2, quality nutrients, and ample space in order to gain sufficient size. 1,000-watt metal halide lamps with blue spectrum bulbs are currently recommended for this phase of growth.

Prior to being transferred from V3 to any flowering zone, all plants must have their RFID scanned and location moved within the SIS. All data is recorded at the time of transfer.

Flowering: The designated flowering zone is where a batch will be induced into a flowering state by receiving 12 hours of un-interrupted darkness. The flowering manager shall ensure all lighting is of the highest quality, the environmental controls are perfectly set and working, and each zone remains clean. The flowering manager shall ensure proper plant manicuring and fertilization occur within each flowering zone. Flowering zones are separated into nine distinct rooms based on the average length of time plants spend producing flowers.

Late Flowering: During the late flowering stage, the flowering zone manager shall prepare the plant for harvest via the following processes:

- **Pruning**: In preparation for harvest all plants shall have large fan leaves removed to allow light to penetrate the lower canopy thus reducing the risk for molds and other contaminates.
- **Flushing:** During the flushing phase the flowering zone manager shall stop giving plants all nutrients and instead seek to purge all remaining nutrients from the substrate by forcing fresh water through the plant's root system. The following process shall be used through each flowering zone to prepare plants for harvest and ensure the highest quality finished product.
    - **Materials for Flushing Finished Plants:** Two gallons of living water for every gallon of substrate within each zone.
        - Determine the plants to be flushed a minimum of 14 days prior to harvest.
        - Water each plant at its normal watering schedule with an abundance of fresh water.
        - Sufficient run-off should be attained during each flushing session in order to strip away all remaining sugars and salts.

Harvesting Method: The flowering zone manager will work with the cultivation manager to determine a timeline for each batch within the flowering zone. Once a batch has a confirmed harvest date, the processing manager shall initiate the harvest of that particular batch. The processing manager shall ensure that upon harvest each batch is RFID scanned, weighed, transferred and data recorded.

Post-Harvest: The following process will be used post harvest for each batch.

Batch Segregation: The processing manager will ensure each batch remains segregated to avoid cross contamination and in order to maintain strict inventory control. Each batch will be clearly labeled and tagged with RFID and its exact location will be clearly defined and tracked at all times.

Drying Method: Immediately after harvest all products from a selected batch are processed for drying. Processing staff shall wear uniforms, hairnets, and latex gloves to mitigate the risk of medical cannabis being exposed to contaminate. The processing manager shall follow the following process for trimming all cannabis:

- First, all fan leaves shall be removed by the processing staff.
- Second, each plant shall be separated into small branches and hung to dry in the secured drying room. The drying room shall have a humidity level below 40% and adequate airflow to allow plants to dry slowly enough to not interfere with the terpene profile, while ensuring they dry quickly enough to avoid contamination from molds.
- Plants will continue to dry until their moisture level is below 5% and then proceed to testing, milling, and further drying in an off-gassing oven.

Stage 1 Testing: Prior to being milled and off-gassed, all products will be quarantined until initial test results come back from our internal laboratory. All samples to be tested will be randomly selected by a laboratory personnel. Once the test result come back, all medical cannabis that does not meet qualifications for further processing shall be quarantined and destroyed in accordance with the process for medical cannabis waste. All medical cannabis that passes initial testing shall be further refined. MinnMed will conduct in-house sample testing as well as third-party sample testing. Testing procedures and protocols are detailed within this application and within the SOPs.

Storage of Medical Cannabis and Plant Material: In order to prevent contamination, the manufacturing facility processing staff shall keep and store all plant material and medical cannabis in the process of cultivation, processing, transport, and testing and all saleable medical cannabis as follows:

- Under conditions that will protect it against physical, chemical, and microbial contamination as well as against deterioration of the product and its container;
- In areas that must be maintained in a clean, orderly and well ventilated condition; and
- In storage areas that must be free from infestation by insects, rodents, birds, and pests of any kind.

The manufacturing facility staff shall maintain a separate secure storage area for medical cannabis that is returned, outdated, damaged, deteriorated, mislabeled, or contaminated, or whose containers or packaging have been opened or breached, until such products are destroyed.

d. Describe the documentation of a plant or batches of plants through the growing process to allow for product traceability to support product recalls or notifications in the event an issue is found with a plant or batch of plants

BioTrackTHC: MinnMed will utilize BioTrackTHC™ software programs and hardware devices for inventory management, sales procedures, seed-to-sale tracking, documentation and other related operating functions. BioTrackTHC™ provides effective cutting-edge technology solutions for the emerging legal cannabis industry that (1) prevents product theft; (2) assists business owners with running their cultivating, packaging, and retail operations more profitably and to better comply with the law; (3) all without leaving sensitive business and consumer data vulnerable in the cloud. Specifically, BioTrackTHC™ is the industry's only true seed--to--sale software system with enterprise resource planning, complete inventory tracking, point -of -sale, marketing, financial reporting and regulatory compliance features. Because it is a server based system with advanced security features, patients can rest assured that no one, not even the BioTrackTHC™ team can access their business or consumer information without their permission. Please see the BioTrackTHC attachment to this section for more information.

Prior to the inception of a plant within the system, the user will setup strain specific information including, but not limited to strain names, strain types, strain notes and plant groups. Upon propagation, BioTrackTHC™ automatically assigns a globally unique non-repeatable 16-digit barcode number to every plant. This barcode follows the plant through its entire product life cycle. The system will also track the precise location of every given plant within a designated room, bed or plant table using an 'abc, 123' grid base. Throughout the production process, the licensed producer may enter production notes into the plant-specific inventory record (i.e. events or any required notations that do not currently have pre-defined fields within the system). Upon harvest the system will batch designated plants together and assign a unique barcode to the collection, although the plants are grouped together during the harvest the individual plant barcodes are associated and cataloged within the batch inventory details. All flower, waste, sugar leaf, and other material will be collected, measured and associated appropriately. These weights are also entered using vertically integrated scales to diminish the possibility of human error or manual manipulation. The system can also record both the wet and dry weights of flower material to track moisture loss percentages. The product can be notated and sampled at this juncture for testing purposes. Once testing results are retrieved, they can be directly associated with the product batches. Even after product has been converted into pre-packaged containers or other forms (i.e. oils or edibles) the barcodes for all prior forms or stages will be readily available for continuous uninterrupted traceability. The reporting functionality enables licensed establishments to retrieve real-time data pertaining to all current and historical inventories for any specified time frame. BioTrackTHC™ does not delete data or plant records. All data is preserved for regulatory review and taxation purposes on an indefinite basis. In the event of a recall, specified users can quickly pull reports of all products and transactions associated with a specific plant(s), batch or strain. All recalled products should be safely destroyed and logged in the BioTrackTHC™ system.

Industry Best Practices

Seed-to-Sale Tracking: All cannabis tracking shall begin when a seed or part of the parent plant is removed and a propagating plant or clone is created. At this point a unique plant RFID identification number shall be assigned, labeled, and recorded by the vegetative zone manager which then will be used to track the history and data throughout the entire plant lifecycle: propagation, vegetation, flower, harvest, processing, cure, and final packaged inventory.

At the time of planting, all plants shall be accounted for as a batch with a unique batch number that must remain with the batch through final packaging. Each batch number shall be a unique numeric or alphanumeric identifier assigned to a batch by a manufacturing facility when the batch is first planted. All batch numbers shall contain the manufacturing facility number and a sequence to allow for inventory and traceability. Any removal of plants from the batch shall be recorded, and the record shall be maintained at the manufacturing facility for a minimum of five years. A batch number shall be displayed on all approved labels of the product designated for distribution for traceability purposes in the event of a product recall.

In accordance with 4700.0200, each batch will be a specific quantity that is uniform and intended to meet specifications for identity, strength, purity and composition, and that is manufactured, packaged, and labeled during a specified time period according to a single manufacturing, packaging, and labeling batch record. Batches shall consist of plants of the same variety and strain, grown in the same contiguous area, and on the exact same cultivation time frame.

Each plant shall be tracked by its physical grid location in the premises at all times. All significant dates and observations will be recorded as key data points for referencing needs throughout the plant's life cycle in the SIS. This information can be used to recall any contaminated medium, nutrient, or issue that may occur during the stages listed above to allow for easy removal of any product from production or inventory that does not meet the requirements of the state.

During the cultivation process, the physical location of all batches will be broken up into a grid system, and each square will have a designated number of plants. Auditing the inventory of all plants shall be effectively and efficiently accomplished with spot checks done daily to mitigate

any diversion during cultivation, processing and/or packaging, as well as detecting any human error that may have occurred while entering information during the plant's life cycle.

After the flowering cycle has been completed and the plant is harvested, inventory shall be transitioned from the flowering zone to the processing department, and prepared for trimming. During this transfer, all product is scanned, tracked and logged. At this point a pre-trimming weight is determined and logged. After being weighed and logged, all flowers will be cleaned, trimmed, and prepared for drying in the secured vault. Each batch is transferred through each state with the entirety of the batch. All green waste from the trimming process shall be weighed, logged and disposed of according to our policy for managing waste from cannabis plants (see transportation protocol).

After drying and curing, each batch shall be tested for efficacy. Once a batch has passed all regulated testing protocol and our standards set forth by business management, it shall be released for packaging and labeling. Before being transferred to packaging, the entire batch is again weighed, scanned and logged into the SIS via RFID. As each package is wrapped and processed, each individual package is again weighed and reconciled against the total batch weight. Once packaged, all products shall be scanned and logged into the second vault designated for all approved and packaged products and stored until transfer.

Immediately before being transferred to a retail location, all product is again scanned and logged into the SIS via RFID technology. Once arriving at the retail MME, all POs will be inventoried and received by the store processing management team and the information will be logged into the SIS and store inventory via RFID technology. This entire process from seed to sale will be recorded on high definition cameras, and all recordings will be stored for a minimum of 90 days.

Seed to Sale Tagging and Tracking Within the Cultivation Facility: The cultivation facility compliance manager is responsible for coordinating with the cultivation manager and the processing manager to ensure every plant and any amount of cannabis product is tracked throughout the plant and product life cycle within the cultivation facility. The following will represent data collection and product lock down points within the facility in a seed to sale time line:

- **Sprouted seed and clones:** Receive RFID batch number and tag, tracking begins
- **Transfer to V2:** RFID scanned, location changed, data recorded and transferred
- **Transfer to V3:** RFID scanned, location changed, data recorded and transferred
- **Transfer to designated flower zone:** RFID scanned, location changed, data recorded and transferred
- **Harvest:** RFID scanned, weight recorded, location changed, data recorded and transferred
- **Trimmed:** RFID scanned, weight recorded, location changed, data recorded and transferred
- **Drying:** RFID scanned, weight recorded, location changed, data recorded and transferred
- **Curing, pre-testing:** Secured/lock down for testing results, RFID scanned, weight recorded, location changed, and data recorded and transferred
- **Curing, post-testing:** If approved for release; RFID scanned, weight recorded, location changed, data recorded and transferred
- **Processing:** Labeled, RFID scanned, weight recorded, location changed, data recorded and transferred to secured safe to await delivery to store location
- **Delivery:** RFID scanned, weight recorded, location changed, data recorded and transferred to transport vehicle

Product Traceability—Recall Protocol: MinnMed takes patient cannabis medicine products very seriously; they are medicine and will be handled with the same care. MinnMed will treat these products like any other consumer product; the seed-to-sale tracking procedures and protocols will allow for easy product locating if the need for a product recall arises. MinnMed will easily be able to identify where cannabis medicine products currently are in the supply chain, which will enable us to notify dispensaries and/or patients about the product recall.

Product Recall Plan: As a manufacturer and/or distributor of consumer medical cannabis products, MinnMed may need to conduct a product recall in the future. For consumer products the recall process is handled and regulated by the Consumer Product Safety Commission (CPSC). For all intents and purposes, MinnMed's recall plan will follow the guidelines of the CPSC. MinnMed's Product Recall Plan can be viewed in full within the attachments to this section.

Experts have shown the best way to ensure that a product recall is effective is to have a recall plan already in place and to execute the plan as quickly as possible. Our recall plan will be well thought out and well-executed in order to minimize harmful effects, save lives, and prevent injuries.

Facility management will reference the Recall Handbook in order to determine exact protocol for recall and the requirements from the Consumer Product Safety Commission. The Recall Handbook shall be carefully reviewed by manufacturing facility management in order to:

- Become familiar with their reporting requirements under sections 15(b) and 37 of the Consumer Product Safety Act, and Section 102 of the Child Safety Protection Act, Pub. L. 103-267;
- Help learn how to recognize potentially hazardous consumer products as soon as possible; and
- If they discover they have manufactured, imported, distributed, or retailed such products, to develop and implement "corrective action plans" that addresses the hazards.

When to Recall Medical Cannabis Products: The medical cannabis manufacturing facility shall accept at no charge unused, excess, or contaminated medical cannabis from a patient or registered designated caregiver. The manufacturer shall follow these procedures for the mandatory and voluntary recall of medical cannabis:

- Dispose of the returned medical cannabis as provided in subpart 2; and,
- Maintain a written record of disposal that includes:
    - The name of the patient or registered designated caregiver that returned the medical cannabis;
    - The date the medical cannabis was returned;

As a manufacturer, distributor, and/or retailer of consumer products, MinnMed has a legal obligation to immediately report the following types of information to the Consumer Product Safety Commission:

- A defective product that could create a substantial risk of injury to consumers;
- A product that creates an unreasonable risk of serious injury or death;
- A product that fails to comply with an applicable consumer product safety rule or with any other rule, regulation, standard, or ban under the CPSA or any other statute enforced by the CPSC;
- Certain types of lawsuits. (This applies to manufacturers and importers only and is subject to the time periods detailed in Sec. 37 of the CPSA.)

How to Recall Medical Cannabis Products: MinnMed will follow a recall plan including guidance from the Recall Handbook provided by the CPSC and all rules and regulations of the state of Minnesota. Once the need for a product recall has been determined, MinnMed will proceed with the product recall corrective action plan (CAP). If the need for a product recall arises, cultivation centers and dispensing organizations will have inventory management systems in place to determine and pinpoint which products to recall, how many of those products are in the supply chain, and will be able to determine exactly where those products are within the supply chain. The inventory management systems and procedures required by state regulations will ensure a streamlined recall process if ever necessary.

Corrective Action Plan (CAP): A CAP is defined as improvements to an organization's processes taken to eliminate causes of non-conformities or other undesirable situations. The goal of a CAP should be to retrieve as many hazardous products from the distribution chain and from consumers as is possible in the most efficient, cost-effective manner. The CAP outlines the procedures and steps to be taken by MinnMed once a product recall is required.

e. Describe the protocol that will be employed if a fungal or pest outbreak were to occur to both address the issue and resume / restart cultivation

Disease and Pest Control

MinnMed will have developed procedures and protocols to be employed if a fungal or pest outbreak were to occur. The policies will outline a corrective action plan and steps to be taken to address the issue and to resume/restart cultivation activities. In the case of a fungal or pest outbreak, MinnMed will use the developed pesticide documentation form and record any pesticide applications or treatments applied to medical cannabis plants or materials. The pesticide documentation form will be maintained on-site. There is an example of the pesticide application documentation sheet attached with the application.

Pesticide Application and Documentation: MinnMed will comply with all laws pertaining to pesticide application and documentation. Cultivation facility management will ensure that all facility employees are fully trained on all aspects of pesticide application and documentation. Training will include but not be limited to: pesticide education—prevention, causes, discovery, dosage rates, application methods, safety requirements, frequency of application, documentation, etc. Cultivation facility employees must fill out pesticide application log sheets before and after the application of any pesticides. Pesticide application and documentation practices are explained in more detail within the attached SOPs.

EPDM- Ethical Pest and Disease Management: It is best to prevent pest and disease infestations all together; EPDM strives to do exactly this. The cultivation facility manager shall maintain a healthy cultivation environment by ensuring biosecurity measures are implemented and maintained at all times.

The cultivation manager shall keep a schedule for all pest and disease control prevention. All data pertaining to pesticide applications and other crop inputs shall be recorded and the record maintained at the cultivation center for a minimum of five years. All crop input records shall be made available to the Department, DPH or the ISP upon request. The application record shall include the following information:

1. Date and time of application;
2. Date of start of vegetative stage of growth;
3. USEPA Registration Number;
4. Product name;
5. Copy of the label of the applied product;
6. Application site (the site shall be identified by the location legend maintained by the facility);
7. Amount of product applied;
8. Size of the application area;
9. Name of individual making the application;
10. Section for comments or special conditions related to the application.

EPDM is just like integrated pest management programs recommended by the EPA in that they both provide a scientific, common sense based approach to pest management. EPDM differs from IPM (integrated pest management) in that EPDM strives to use only organic means of pest and disease control. EPDM saves money, improves the environment, and protects health.

EPDM Program:

- **Infestation level**: The cultivation manager shall pre-determine an action threshold for each potential pest and disease. The action threshold will determine the type of pesticide and the rate of application.

- **Prevention**: A standard prevention protocol shall be followed at all times by the cultivation team. This shall include preventing pest from entering each growing space, preventing cross contamination from zone to zone, closely following environmental protocol for each zone, maintaining cleanliness standards at all times, using preventive biological/microbial controls, growing pest and disease resistant strains, and growing with organic methods that produce maximum plant health thus remaining resistant to pest and disease.
- **Monitoring**: Plants shall be monitored daily by each zone manager. At the first sign of any pest or disease, the cultivation team shall determine a treatment protocol for the affected zone and the entire of the cultivation facility.
- **Immediate action**: Plants shall be monitored for new signs of pest and disease so they can be treated immediately. Immediate action reduces the chance of complications within the growth cycle that will reduce quality, yield, and consistency of dose. Immediate action also reduces the amount and frequency of pesticide applications.

After the cultivation staff has identified the pest problem and action threshold they shall choose the least toxic pesticide that controls the pest or disease. The first line of defense for most infestation shall be organic controls applied to the growing medium; Examples include bait stations, diatameacous earth, insecticidal soaps and oils, and microbial insecticides such as *Bacillus thuringiensis* (Bt). Once the course of corrective action is determined, the cultivation staff shall take all necessary measures to mitigate the problem including:

- The retesting and product recall of any affected batches
- Biosecurity procedures in the event of a fungal outbreak:
    a. Quarantine of affected areas
    b. Applications of pest and fungus controls
    c. Washing and disinfecting the area
    d. Only essential personnel shall enter affected area
    e. Protective clothing and footwear
    f. Maintaining high standards of sanitation
    g. Identifying, segregating and removing sick plants
    h. Using beneficial

i. Securing environmental conditions

j. Ensuring adequate airflow

Restarting Cultivation: Once the area has been adequately sterilized and all precautionary measures have been taken to ensure the problem has been fully mitigated, cultivation shall resume within the area. In the event that all living genetics must be destroyed, we shall keep medical cannabis seed on hand in order to begin with fresh/unaffected genetics. All steps shall be taken to ensure biosecurity measures and environmental protocols are followed at all times within the manufacturing facility in order to avoid pest and disease outbreaks.

f. Describe the expected usage of any chemicals including fertilizers, fungicides, herbicides, insecticides including the conditions or protocols in which such chemical would be utilized

Medical cannabis of the highest quality and purity can only be produced through organic cultivation methods. During normal medical cannabis cultivation we will not use any chemical fertilizers, fungicides, herbicides, and insecticides. In the event of a major pest or disease outbreak, we will seek to utilize the least toxic pesticide or fungicide available to effectively neutralize the area.

Conditions in which chemical pesticides or fungicides may be used: Powdery mildew outbreaks, russet and other spider mite outbreaks, only during the vegetative phase, never in the flowering phase.

Estimated quantity of all crop inputs used in cannabis plant cultivation:

Organic Crop Inputs:		
Liquid organic fertilizer	~	150 gallons per year
Dry organic fertilizers		~515.1 gallons
Organic pest and disease controls	~	5 gallons per year
Non-Organic Crop Inputs:		
Synthetic nutrients		10 gal<
Pesticides		2 oz<
Fungicides		2 oz<

Herbicides	0

Common conditions that require organic pesticide applications to control outbreak:

- **Insect infestations**: White flies, Aphids, Thrips, Fungus Gnats, and minor spider mite infestations
- **Disease infestations**: Powdery Mildew, Botrytis/mold, Pythium/root rot, Fusarium wilt

Protocols in which chemicals may be utilized: Per chapter 18b of the Minnesota statutes, all pesticides, fungicides and other chemicals shall be applied in accordance with the product label or labeling and in a manner that will not cause unreasonable adverse effects on the environment within limits prescribed by Minnesota statutes 18b and FIFRA. No employee shall be permitted to use, store, handle, or dispose of a pesticide, rinsate, pesticide container, or pesticide application equipment in a manner:

- Inconsistent with labeling;
- That endangers humans, damages agricultural products, food, livestock, fish, wildlife, or beneficial insects; or
- That will cause unreasonable adverse effects on the environment.

In addition:

- A person may not direct a pesticide on property beyond the boundaries of the target site or apply a pesticide resulting in damage to adjacent property.
- A person may not directly apply a pesticide on a human by overspray or target site spray.
- A person may not apply a pesticide in a manner so as to expose a worker in an immediately adjacent, open field.

Approved Active Ingredients for Pesticides and Fungicides: All pesticides applied at the cultivation center shall be from the EPA approved list and shall be OMRI certified. MinnMed will maintain and display in the pesticide storage area of the cultivation facility a list of pesticides approved for use. The cultivation manager shall monitor and post any updates to the approved list from the EPA website. All pesticide products applied in the cultivation center shall be registered, including those products classified as 25(b) pursuant to the Federal Insecticide Fungicide and Rodenticide Act administered by the USEPA. The following criteria shall be followed at all times for selecting pesticides and fungicides for use in conjunction with EPDM:

- The product must only contain active ingredients from the EPA approved list.
- Approved products must only be used in the vegetative stage of growth as noted.
- All ingredients must be listed on the label including both active and inactive. Active must be listed by name and percentage of weight, and inert must be listed by name.
- Labels cannot contain false or misleading statements.

Application Criteria: Only those agents who have been approved by the Commissioner, obtained a license from the Department, and have gone through the full EPDM training process shall be permitted to make pesticide applications at the cultivation center.

All pesticides shall only be applied in the early stages of vegetative growth. Pesticide application shall be strictly prohibited during the flowering phase. When an actionable infestation level is determined during vegetative growth, it is the responsibility of the vegetative lead and trained vegetative staff to act immediately to prevent further contamination. All individuals applying pesticides shall adhere to the agricultural use requirements written on the label and shall employ all personal protective equipment recommended on the product label. All cultivation facility staff members shall be aware of worker protection requirement standards for the Restricted Entry Interval (REI) stated on the each products label prior to application. They will:

- Determine the infestation type
- Determine the appropriate treatment
- Review the instructions for application on the product label
- Ensure the product intended for use is approved by the Department

- Determine weather application methods, i.e. soil or foliar application
    - Atomizer (foliage sprayer)
    - Pesticides application pump and reservoir (soil drench)
- Change into the appropriate protective clothing and equipment
    - Coveralls
    - Water proof spray suit
    - Gloves
    - Boots
    - Goggles and face shield
    - Apron
    - Respirator
- Prepare solution by strictly following the appropriate ratios for each product used
- If the solution is to be applied by spraying on foliage, turn off HID lights and use normal lighting. All HID lights are to remain off until foliage is completely dry to avoid concentrated light burn damage.
- Perform application
- Place signage
- Launder protective wear
- Clean application equipment

Pesticide Application Warning Signs: If the pesticide label prescribes specific hourly or daily intervals for human reentry following application, the person applying the pesticide shall post signage in all areas where the pesticide has been applied. The posting must be done with placards in accordance with label requirements and rules adopted under section 18 b.

Water Source: No employee shall fill pesticide application equipment directly from a public water supply, as defined in section 144.382 of 18 b. unless the outlet from the public water supply is equipped with a backflow prevention device that complies with the Minnesota Plumbing Code under Minnesota Rules, parts 4715.2000 to 4715.2280.

Pesticide Storage (safeguards): Per Minnesota statute 18b. a person may not allow a pesticide, rinsate, or an unrinsed pesticide container to be stored, kept, or to remain in or on any site without adequate safeguards to prevent the escape or movement of the pesticides from the site. MinnMed will ensure proper storage of pesticides, fungicides and other bio-controls in accordance with Minnesota state laws or regulations. The cultivation manager shall maintain the storage of all pesticides in a manner that prolongs the shelf life while protecting cultivation facility employees, the environment, and does not allow for any possible contamination of plants beyond the vegetative phase. All pesticides, fungicides, and other chemicals shall be stored in the following manner:

- In locked, cool, dry and well ventilated cabinet
- In their original containers
- With proper labeling intact
- Dry pesticides stored above liquid pesticides
- Follow all storage recommendations on the label for special needs
- Off the ground in case of flooding
- MSD sheets and emergency numbers on hand at all times

Pesticides, fungicides, and other chemicals shall never be stored:

- In equipment used for application
- In any other container except for the original
- Near food, nutrients, flowering plants or finished products, water, or protective clothing.

Laundering Protective Gear: All protective gear used during the pesticide application process shall be laundered directly after the application process. Protective gear shall be washed separately from the rest of the laundry. Any clothing soaked in pesticide shall be discarded. The sanitation manager shall ensure the following processes are followed at all times when laundering protective gear after pesticide applications:

- Wear rubber gloves when touching clothing
- Wash with hot water
- Use heavy detergent
- Wash twice
- Run washing machine a third time after

Disposal of Pesticide: Disposal procedures for all unused pesticide products shall be in compliance with all state and federal laws and regulations and in compliance with all directions on the product label. A person may only dispose of pesticide, rinsate, and pesticide containers in accordance with chapter 18b. of the Minnesota Statute and FIFRA. The manufacturing facility shall ensure the manner of disposal does not cause unreasonable adverse effects on the environment.

g. Describe the documentation and record keeping of the use of any chemicals

The cultivation manager shall keep a schedule for all pest and disease control prevention. All data pertaining to pesticide applications and other crop inputs shall be recorded and the record maintained at the cultivation center for a minimum of five years. All crop input records will be made available to the commissioner upon request. All crops inputs shall be tracked with the BbioTrackTHC system, forms provided by the commissioner, and company log sheets. Please see the BioTrackTHC attachment to this section for more information. The record of crop inputs shall include at a minimum:

- The date of application;
- The name of the individual making the application;
- The product that was applied;
- The section, including the square footage, that received the application (by group number);
- The amount of product that was applied;
- A copy of the label of the product applied; and
- The batch number of any plants where application was made.

h. Describe how any applied chemicals (fertilizers, pesticides, etc.) will be controlled from becoming part of the final product or how the final product will meet FDA standards for those chemicals

The cultivation team shall prevent chemicals from becoming a part of the final product by minimizing exposure (of flowers) to synthetic nutrients, pesticides and fungicides. It is best to prevent pest and disease infestations altogether; our team will strive for this goal by employing

an ethical pest and disease management system. In addition to EPDM, the cultivation facility manager will maintain a healthy cultivation environment by ensuring biosecurity measures are implemented and maintained at all times.

The cultivation manager shall keep a schedule for all pest and disease control prevention. All data pertaining to pesticide applications and other crop inputs shall be recorded and the record maintained at the cultivation center for a minimum of five years. All crop input records will be made available to the commissioner upon request.

After the cultivation staff has identified the pest problem, they shall choose the least toxic pesticide that controls the pest. The first line of defense for most infestation shall be organic controls applied to the growing medium; examples include bait stations, diatameacous earth, insecticidal soaps and oils, and microbial insecticides such as *Bacillus thuringiensis* (Bt).

In the event of a major pest or disease infestation that would require chemical applications, such application would only be permitted in the vegetative phase, all pesticides would have to approved for food grade agriculture, and no systemic pesticides would be permitted. The cultivation team would avoid all watering after applying garden chemicals unless the label specifically says to do so. Pesticide or fertilizer runoff shall never be permitted to flow into drains.

Each batch will have all information regarding crop inputs recorded and stored for a minimum of five years. All crops that have had chemical inputs shall undergo further testing prior to processing.

Washing Medical Cannabis: Medical cannabis and plant material that has been treated for pest and disease shall be thoroughly rinsed off with distilled or reverse osmosis filtered water prior to being harvested or during the harvesting process. Rinsing medical cannabis and plant material can remove most dirt and chemical residues associated with pesticide or fungicide applications. Medical cannabis and plant materials that have been rinsed off shall be quick dried utilizing a dehumidification system to avoid any potential for molds.

Quality Control Testing Program: The medical cannabis manufacturing facility shall utilize

the following quality assurance program in order to assess the chemical and microbiological composition of medical cannabis. The assessment shall include a profile of the active ingredients, including shelf life, and the presence of inactive ingredients, and contaminants. The medical cannabis manufacturing facility management team shall use these testing results to determine appropriate storage conditions and expiration dates.

After drying and before any processing or packaging, each batch shall be held in a secure manner and the processing manager shall make samples from each batch available to a laboratory for testing. The sample shall be weighed, RFID scanned, and all data shall be recorded on the SIS prior to be removed from the secured curing area. The laboratory employee will select and prepare several random samples from every batch sample in order to ensure the quality, purity, and consistency of dose through a statistical approach. The laboratory staff will then test each random sample for harmful microbiological contaminants, mycotoxins, heavy metals and pesticide chemical residue. In addition, each sample will also be tested for active ingredients including but not limited to cannabinoid profiling for the following: THC, THCa, CBD, CBDa, and CBN. Under no circumstances shall cannabis batches awaiting contamination results and active ingredient analysis be included in a cannabis product or sold to a distribution facility facility prior to the time that the laboratory has provided those results, in writing, to the cultivation facility management team. More information on our testing program and our interactions with external laboratories are detailed below.

Compliant Sampling Method: In accordance with section 4770.0500, the medical cannabis manufacturing facility shall maintain and follow the listed procedures for sampling medical cannabis:

- Sample collection shall be conducted in a manner that provides analytically sound and representative samples;
- Every sampling event shall be documented, and documentation shall be provided to the commissioner upon request;
- Sampling and testing plans shall describe in written procedures that include the sampling method and the number of units per batch to be tested; and
- Random samples from each batch shall be:

- Taken in an amount necessary to conduct the applicable test;
- Labeled with the batch unique identifier;
- Submitted for testing; and
- The results retained for at least five years.

Expectable Limits: If samples from a batch are tested and do not fall within state accepted health and safety levels for any contaminants the state does not deem for distribution or do not fit into the FDA allowable limits, it is the manufacturing facility's policy to destroy and remove all contaminated product in a manner consistent with state compliance for the policy for disposal of green waste.

- The medical cannabis manufacturing facility shall utilize the acceptance criteria from the FDA, Clean Green, the U.S. pharmacopeia, and the state of Minnesota standards to ensure all potential contaminant levels of metals, microbes and other contaminants that are utilized within the cultivation and refining process are within expectable levels. The testing levels shall be subject to approval by the commissioner.
- All medical cannabis sampling and testing criteria for acceptance shall be protective of patient health. Sampling and testing results must assure that batches of medical cannabis meet allowable health risk limits for contaminants before any batch will be released for further processing and/or packaging and labeling.
- Any batch that fails to meet established standards, specifications, and any other relevant quality-control criteria shall be rejected and destroyed in a manner compliant with all state regulations.
- The medical cannabis manufacturing facility shall follow a written procedure for responding to results indicating contamination. The procedure must include destroying contaminated medical cannabis and determining the source of contamination.
- The medical cannabis manufacturing facility shall retain documentation of test results, assessment, and destruction of medical cannabis for at least five years.

Reserve Samples: The manufacturing facility shall retain a uniquely labeled reserve sample that represents each batch of medical cannabis and store it under conditions that will yield the maximum stability. Lot retains will be kept of dried, cured, unextracted cannbis, precursor

extract oil, formulated oil, and finished goods. We will manage these lot retains on first in first out basis. The reserve sample shall consist of at least twice the quantity necessary to perform all the required tests. The reserved sample shall be retained for at least one year following the batch's expiration date.

Retesting: If the commissioner deems that public health may be at risk, the manufacturing facility shall retest any sample of plant material or medical cannabis. As soon as a batch sample passes the microbiological, mycotoxin, heavy metal and pesticide chemical residue test, the entire batch will be released for immediate manufacturing, packaging, and labeling for distribution.

An electronic copy of all test results will be filed by laboratory staff for any batch that does not meet the standards set for microbiological, mycotoxin, heavy metal or pesticide chemical residue tests. These results will also be sent to manufacturing facility staff within the same time frame. The laboratory staff will also maintain a comprehensive record of test results for a minimum of five years and make them available to state and local officials, the commissioner, and or the public, as needed.

The cultivation facility compliance manager will provide test results for each batch of medical cannabis to the distributing facility to be made available upon request to all qualifying patients, primary caregivers, and any physician who has certified a qualifying patient.

i. Describe who will be certified to apply pesticides at the manufacturing facility and how they will be reviewed to ensure that all licenses and recertification requirements are met according to Minnesota Pesticide Laws (Minnesota Statutes Chapter 18B) as well as FDA and EPA regulations

Only those agents who have been approved by the commissioner, obtained a license from the Department, and have gone through the full EPDM training process shall be permitted to make pesticide applications at the cultivation center. All approved staff members shall have their credentials reviewed prior to any making any pesticide or fungicide applications. No staff shall be permitted to make pesticide and fungicide application without all licenses and certifications required by Minnesota Statutes Chapter 18 B. including recertification.

Chemigation: In accordance with Minnesota Statutes Chapter 18 B., no employee of the manufacturing facility shall apply pesticides through an irrigation system without a chemigation permit from the commissioner. Only one chemigation permit is required for two or more wells that are protected from contamination by the same devices. The commissioner may allow irrigation to be used to apply pesticides on crops and land, including agricultural, nursery, turf, golf course, and greenhouse sites. A person must apply for a chemigation permit on forms prescribed by the commissioner. A pesticide used under a chemigation permit must be suitable and labeled for application through an irrigation system. A chemigation system must be fitted with effective antisiphon devices or check valves that prevent the backflow of pesticides or pesticide-water mixtures into water supplies or other materials during times of irrigation system failure or equipment shutdown. The devices or valves must be installed between:

- The irrigation system pump discharge and the point of pesticide injection; and
- The point of pesticide injection and the pesticide supply.

A person initially applying for a chemigation permit must pay a nonrefundable application fee of $50 for each well that is to be used in applying the pesticides by irrigation.

Training: The cultivation manager shall train all vegetative agents in the EDPM practices and the proper application standards for all crop inputs. All individuals responsible for applying pesticides on the premises shall obtain the appropriate license from the Department prior to making any applications. Initial training shall include at a minimum:

- Sanitary requirements for pest and disease prevention
- Recognizing common pests and disease
- Recognizing symptoms of pests and disease
- Ruling out nutrient deficiencies
- Daily monitoring and spot checks
- Determining the infestation level/action threshold
- Approved areas for pesticide applications
- Controlling outbreaks in the vegetative phase
- Adhering to the agricultural use requirements of the label
- Use of personal protective gear
- Use of application equipment and process

- Procedures for spray applications
- Lighting requirements for spray applications
- Procedures for soil drenches
- Handling/laundering protective wear
- Storage
- Disposal
- Approved products
- MSD sheets
    - Cultivation facility employees will go through extensive hands-on training and job shadowing to learn proper pesticide application dosage rates and techniques. The cultivation manager will train facility employees on pesticide application. This process will include manager explaining and demonstrating mix ratios, how to apply pesticides, when to apply pesticides, frequency of pesticide application, protective gear and safety requirements, and maintenance of pesticides.

No employee shall be permitted to use, store, handle, or dispose of a pesticide, rinsate, pesticide container, or pesticide application equipment in a manner:

- Inconsistent with labeling;
- That endangers humans, damages agricultural products, food, livestock, fish, wildlife, or beneficial insects; or
- That will cause unreasonable adverse effects on the environment.

In addition:

- A person may not direct a pesticide on property beyond the boundaries of the target site or apply a pesticide resulting in damage to adjacent property.
- A person may not directly apply a pesticide on a human by overspray or target site spray.
- A person may not apply a pesticide in a manner so as to expose a worker in an immediately adjacent, open field.

j. If the manufacturer proposes to grow organically, it should provide a detailed explanation of what standards it intends to comply with.

The cultivation team shall utilize OMRI based products and the USDA organic standards as guiding principles in our cultivation process. The USDA will not currently certify medical cannabis crops as organic; therefore we will apply for a clean green certification.

The Clean Green Certified program is comprised of three parts: a legal compliance review, a review of the manner in which the crop is grown, and a standard agricultural crop inspection. Taken together, the program helps to ensure a grower's legal compliance as well as distinguishing naturally grown products from others on the market. Clean Green Certified is a program modeled on the USDA National Organic Program, ensuring environmentally clean and sustainable methods. Clean Green inspects all inputs, from seed or clone selection, soil, nutrients, pesticides, mold treatments, dust control, and source of electricity, to methods of harvesting and processing. This program reduces the environmental impact of all crops, ensures legality, and regulates what chemicals go into ingested products. A Certified operation is licensed to use the Clean Green Certified label on their products after an annual review requiring yearly on-site inspections and third-party laboratory pesticide residue testing.

k. Explain how the cultivation operations will be made to be a safe environment of employees working in and around the facilities

The personal safety and health of each employee of our organization is of utmost importance. We believe that our employees are our most important assets and that their safety at the manufacturing facility is our greatest responsibility. Management will provide all mechanical and physical facilities required for the personal safety and health of each of its employees.

To be successful, such a program must embody the proper attitude toward injury and illness prevention on the part of corporate management, supervisors, and employees. It also requires cooperation in all safety and health matters, not only between corporate management, supervisors and employees, but also between each employee and their fellow workers.

We expect every person who conducts the affairs of our company, no matter in what capacity they function, to accept this concern and its responsibility. Employees are expected to use the

safety equipment provided. Rules of conduct and rules of safety and health must be observed. Safety equipment cannot be abused or destroyed. Cooperation between our employees and management in the observance of this policy will ensure safe-working conditions, will help result in accident-free performance, and will work to our mutual advantage.

Management has the authority to procure the necessary resources to execute the objectives of our company's safety and health program. We will hold managers, supervisors and employees accountable for meeting their responsibilities so that essential tasks will be performed.

It is the responsibility of management to eliminate potential hazards by providing appropriate safeguards and safe work tasks; provide necessary personal protective equipment and enforce its use and care; provide effective training, which is required by the "standards", as a minimum for the employees; become familiar and comply with applicable standards as well as all safety and health programs available for employees to review; review, consider for approval, and execute appropriate action on safety policies developed by safety committees or safety director; and to ensure a high level of productivity in safety performance and hold project management staff accountable. Hazard communication, emergency response plan, safety meetings, and standard operating procedures are available in complete detail in the attached employee health and safety plan.

l. Explain the expected resource usage and disposal of power and water any other resources necessary for cultivation

Water Usage:

20,000 gallons per year at 10,000 square feet of production space

40,000 gallons of water per year for 20,000 square feet of production space

One gallon per week per one gallon of growing medium

Power Usage:

ELECTRICAL LOAD CALCULATION - OSTEGO MARIJUANA CULTIVATION

SERVICE VOLTAGE - 480Y/277		TOTAL VA	DEMAND FACTOR	TOTAL DEMAND
GENERAL LIGHTINGS (GROWING MARIJUANA PLANTS)	- 31 VA/SF @ 19,150 S.F.	612,250 VA	1.25	765,312.50 VA
RECEPTACLES (OFFICES)	- 2 VA/SF @ 11,151 S.F.	22,302 VA	1.00	22,302 VA
GENERAL LIGHTINGS (OFFICES)	- 3 VA/SF @ 11,151 S.F.	13,938.75 VA	1.25	17,423.44 VA
HVAC LOADS				
I - (21) 10 TONS RTU	-	265,104 VA	1.00	265,104 VA
II - (5) 5 TONS RTU	-	182,400 VA	1.00	182,400 VA
EXHAUST FANS - (30) 1 HP	-	8,310 VA	1.00	8,310 VA
LARGEST MOTOR				
1 - 10 TONS RTU @ 12,624 VA	-	265,104 VA	0.25	66,276 VA
		TOTAL LOAD	-	1,327,127.94 VA
		TOTAL DEMAND AMPS	-	1,598.18 AMPS
		MINIMUM SERVICE SIZE	-	3,000 AMPS

m. Describe the planned method for disposal of cultivation waste including the growing medium, excess fertilizers and pesticides and plant matter that becomes unusable due to fungal or pest infestations

Medical Cannabis Waste and Plant Material Waste—Destruction and Disposal

All medical cannabis waste and plant material waste shall be stored, secured, and managed in accordance with all applicable federal, state and local regulations, including but not limited to section 4770.1200. The cultivation facility shall maintain a record of all disposals for a minimum of five years. Facility management will ensure proper training and implementation of destruction and disposal procedures and protocols.

Estimated Quantity of Waste Material to be Generated: The majority of the growing medium and plant materials and containers utilized within the manufacturing facility shall be composted or recycled and reused in order to reduce the amount of waste produced and the cost of production. It is estimated that in full production the manufacturing facility shall produce approximately 1500 lbs. of waste per calendar year.

Waste Processing Center: The manufacturing facility shall contain a designated waste holding and processing room designed to keep waste secured and segregated from the rest of the cultivation facility. The entire waste processing center shall be recorded on high definition video and remain locked at all times. The processing center shall contain a shredder/grinding machine,

multiple containment vessels, at least two mixing containers, additional processing medium/substrates, and interior entrance and exterior exit points. Preparation of waste shall be contained within the secured processing center in order to prevent any cross-contamination with any cultivation areas or product processing areas, and avoid any possibility of product diversion.

Secured Waste Collection: The following process explains how the cultivation facility staff will maintain security and avoid diversion. Medical cannabis and plant material waste will be collected throughout the day in designated receptacles that are secured, locked and tracked on video. At the end of the day, the on-site quality control manager along with another staff member will collect all the waste and weigh it out on video. All information will be recorded including, weight, time, date, employee names and signatures. The waste will then be stored within a locked and secured designated waste processing room and continuously monitored on video until the time of disposal. All cannabis shall be rendered unusable prior to disposal by following the methods for disposal set forth in 4770.1200 subpart 2.

Waste Storage: All litter, medical cannabis, and plant material waste including contaminated waste shall be properly removed and the operating systems for waste disposal shall be maintained in a manner so that they do not constitute a source of contamination in areas where plant material and medical cannabis are exposed. Screening or other protection against the entry of pests shall be utilized so as to minimize the development of odor and the potential for the waste becoming an attractant, harborage, or breeding place for pests.

Disposing of Waste: Immediately before the medical cannabis and/or plant material waste is processed for disposal it shall be re-weighed by the quality control manager and at least one other staff member and all information will be recorded including, weight, time, date, employee names and signatures. After capturing all pertinent data, logging, and entering into the company SIS, all waste shall be rendered unusable and prepared for either compostable or combustible disposal. The cultivation facility compliance manager shall oversee the entire waste disposal process and ensure it is done properly and according to 4770.1200 subpart 2. All waste processing and disposal shall be recorded on video surveillance.

Disposal of Medical Cannabis Waste: The manufacturing facility staff shall dispose of medical

cannabis waste by incineration at a Waste to Energy facility according to applicable regulations.

Disposal of Plant Material Waste: The manufacturing facility staff shall dispose of plant material waste by composting as follows:

- At the manufacturing facility, according to applicable law; or
- At an approved composting facility according to applicable law.
- Before transport, plant material waste shall be rendered unusable and unrecognizable by grinding and incorporating the waste with a greater quantity of non-consumable, solid waste including: paper waste, cardboard waste, food waste, grease or other compostable oil waste, compost activators, soil, or other waste approved by the commissioner.

Process for Rendering Cannabis Unusable:

- Place cannabis in grinder and mulch until all pieces are smaller than .5 centimeters in length.
- Mix the cannabis thoroughly with other ground materials so that the resulting mixture is a minimum of 50% non-cannabis waste from the above list or other waste approved by the Department.

Disposal of Cannabis Waste Rendered Unusable: Once waste has been processed in a manner consistent with company policy and 4770.1220 subpart 2., it will be transported to a permitted waste facility for final disposal. All compostable waste will be delivered to compost, anaerobic or other facility approved by the jurisdictional health department. All waste prepared for non-compostable disposal will be delivered to an approved incinerator, or other facility with approval from the jurisdictional health department.

Growing Medium: All non-contaminated organic growing medium shall be composted and reused within the cultivation process. Any non-organic or contaminated growing medium shall be disposed of according to all federal, state, and local laws.

Liquid Waste: The cultivation center compliance manager will ensure all liquid waste, including nutrient waste, generated in the process of cultivating, manufacturing and distributing medical cannabis in accordance with all applicable federal, state and local regulations.

Hazardous Waste: The cultivation center compliance manager will ensure that all hazardous and chemical waste, including chemical pesticides and nutrients, is disposed of in a manner consistent with federal, state, and local laws.

Waste-Tracking Requirements. The manufacturing facility shall use waste forms prescribed by the commissioner to maintain accurate and comprehensive records regarding material that accounts for, reconciles, and evidences all waste activity related to the disposal of medical cannabis waste and plant material waste in accordance with the tracking requirements mandated in 4770.1200 subpart 5. The medical cannabis manufacturing facility staff shall maintain a real time record of its inventory for all medical cannabis waste and plant material waste for disposal. If permitted facility has ability to compost on-site.

Please also see the BioTrackTHC attachment to this section for the 2(m) specific content.

n. Describe the expected hours of operation of the cultivation operations

MinnMed hours of operation will be in accordance with all applicable state and local laws and regulations. The manufacturing facility will have 24-hour security staff on-site in addition to the security surveillance and alarm systems. The manufacturing hours of operation could vary depending on light cycles, time of year, weather, etc. At a minimum, the cultivation facility will operate 7 a.m. to 3 p.m., Monday through Sunday, 365 days a year.

o. Describe the maximum and minimum number of staff expected to be working in the cultivation operations at any one time

In order to maintain sufficient staffing for all cultivation operations and maintain security protocol for loss prevention/prevention of diversion, there will be minimum of two employees within the cultivation area of the manufacturing facility at all off-peak times. We will manage our perpetual harvest to eliminate spikes in "harvest" production staff, thereby leveling the staff requirements over time. We will accomplish this by applying our operating model that is comprised of pharmaceutical production standard manufacturing best practices. Lean operations seek to eliminate inventory buildup and spikes in production by applying lean tools such as Value Stream Mapping, Rapid Process Improvement, Lean Supply Chain, and

According to our staffing plan, we will start with a cultivation staff of five in 2015. Initially, we

will only need two managers to start the cultivation. They will layer in staff as is required by customer demand. The following table links customer demand to requirements for cultivation staffing and number of production facilities.

Table 1. Number of Employees per Greenhouse

12/31 FTE	2015	2016	2017	2018	2019
Head Cultivator	1.0	1.0	1.0	1.0	1.0
Cultivation Supervisor	-	1.0	2.0	2.0	2.0
Production Supervisor	-	1.0	2.0	2.0	2.0
Cultivation Team Staff	3.0	6.0	7.5	7.5	7.5
Production Team Staff	1.0	2.0	2.5	2.5	2.5
Total Production FTE	**5.0**	**11.0**	**15.0**	**15.0**	**15.0**
FTE per Greenhouse	**5.0**	**5.5**	**5.0**	**5.0**	**5.0**

The staffing plan is conservative in that it is linked to a limited number of patients that are allowed under current law and is assume a conservative adoption rate.

p. Describe the experience expectations of staff and whether you expect the staff to be full time employees or part time employees or contractors

Expectations

MinnMed will screen and vet all potential employees to ensure their eligibility to work within the regulated medical cannabis industry. MinnMed will also conduct a formal evaluation of all employees to determine potential employee's previous industry knowledge or experience. The evaluation process will enable MinnMed to place employees within a distinct area of the manufacturing facility that compliments previous experience or talents.

MinnMed has signed a Collective Bargaining Agreement with the Union for the operations and labor force needed to run the facility(s). We intend to utilize a workforce comprised of union workers. MinnMed will offer highly competitive compensation and benefits packages and will offer full-time and part-time positions.

Staff Experience Level: All staff members are required to have an ambition to learn and grow within the company, a sense of urgency, and a desire to improve life quality for those who are suffering.

- **Cultivation management members** are required to have a bachelor's degree and/or at

least three years of management experience preferably in agriculture.

- **Cultivation assistants** are required to have the ability to adapt and learn new ideas, and will preferably have one year of experience working with plants.
- **Harvesting team** will require a minimum of a high school diploma or equivalent.

All staff shall be full time or part time employees of the company or approved contractors. Prior to beginning work, all employees and contractors must pass a background check and acquire an employee identification card that contains:

- The name of the cardholder
- The date of issuance and expiration
- An alphanumeric identification number that is unique to the card holder
- Photographic image of the cardholder

q. Describe the training that will be provided to cultivation staff

Education and Training

All cultivation facility employees will receive training prior to beginning work within the facility. A continuing education program will aid in developing staff members and preparing them for further advancement within the company. It is the responsibility of the facility manager to ensure training takes place for all team members prior to commencing work within the cultivation facility.

MinnMed shall ensure that training is provided to all facility employees before that person begins to work or volunteer at the cultivation facility. The organization shall utilize multiple training and educational materials to aid in the training process as well as hands-on training at facility locations from experienced professionals and contracted consultants. Documents will include the employee hand book, code of conduct, personal hygiene policy, SOPs, log sheets, checklists, inventory templates, etc. Development checklists will be utilized for the purpose of tracking each individual employee's training and progress.

Consulting help from American Cannabis Company Inc. can offer hands-on education and training for MinnMed employees; all cultivation facility team members will be provided with extensive training on all functions of cultivation and manufacturing operations. This will include

training in all applicable laws and regulations, security and safety protocols, inventory management, security measures and controls applying to inventory for the prevention of diversion, theft or loss of cannabis; procedures for responding to an emergency; all state and federal statutes and regulations regarding confidentiality of information related to the medical use of cannabis, and all state regulations regarding the agents' division of employment.

The consultants will advise and help to fully prepare staff on all aspects of the manufacturing facility before commencing any operations. Training and education will be all encompassing and will cover regulatory compliance; seed-to-sale tracking; patient advocacy; point-of-sale training; security and diversion; health, safety and sanitation; and transportation. Training will also include all cultivation/manufacturing processes and applications and front of the house retail operations.

American Cannabis Consulting Inc. provides a wide range of training and educational materials for clients:

- Standard Operating Procedures
- Training Manuals
- Log Sheets and Templates
- On-site Training
    - Educational Information
    - Initial Job Training
    - Job Shadowing
    - Video Conferencing
    - Phone Support
- 24-hour Live Support

Laws and Regulations/Compliance Training: Adhering to all state, local, and company specific regulations is of utmost importance to create an end product with the highest efficacy for patients. All cultivation facility team members will be required to have a general knowledge of all applicable laws and regulations dealing with the regulated cultivation of medical cannabis.

Policies Regarding Regulations: It is the cultivation facility management's duty to ensure regulatory requirements are followed at all times. The cultivation facility management shall maintain a zero tolerance policy for any infractions that would go against state, local, and company regulatory measures.

Current Regulations: The entire staff must be trained in all current regulations. A test shall be administered to all team members by the team supervisor and cover any regulations that pertain directly to team members duties.

New Regulations: All new regulations shall be implemented on the exact date they become effective. Training and testing of new regulatory measures shall take place before the effective date in order to ensure that all team members attain a complete understanding of such measures and can fully and accurately implement new regulations on the effective date.

Training Record: Facility management is responsible for maintaining a training record for each area team member. Such record will include, at a minimum, documentation of all required training, including:

- The name of the person receiving the training;
- The dates of the training;
- A general description of the topics covered;
- The name of the person supervising the training; and
- The signatures of the person receiving the training and the production facility compliance manager.

Development: The cultivation facility management will be responsible for making a commitment to on-going education for facility employees.

On-Going Education: Once commencing work within the facility, there will be multiple opportunities for continuing education and advancement. The facility manager is responsible for establishing a development path where employees learn from experience and working directly with their crew leaders to learn all aspects of their job. Crossover opportunities will be available and encouraged so employees can learn other areas of the business if they wish to advance to another department, such as a trimmer learning the basics of processing or growing. A comprehensive book list is recommended for employees and required for advancement into management positions. Facility management will offer educational clinics to keep all employees current on legal issues, compliance, new innovations, personal development, nutrition and exercise, and other necessary and relevant interests.

Tracking Development: In addition to the comprehensive training record, the management is responsible for tracking employee development. Development will be tracked on a development checklist. The development checklist provides a clear visual of the level of training an employee has received, and their eligibility for greater responsibility. Once minimum training levels have been reached, crew leaders and management will create further development for individual employees. Employees may also view their progress and choose to take a role in their own development through expressing interest in learning new processes and utilizing provided reading materials to advance their knowledge of internal business practices. As procedures and topics are mastered, employees will earn "checks" on the development checklist from their crew leaders and production facility management.

Feedback Policy: In order to sustain a healthy and compliant work environment, the management is responsible for implementing a strong verbal and written feedback policy. Feedback is to be given immediately by all employees to employees at all levels whenever a company policy is broken. Feedback concerning company policies must be given verbally within a 24-hour period for first offenses. Second offenses warrant written feedback for employee improvement. Any concerns regarding compliance, regulation, or health and efficacy of the products in the facility must be given in written and documented form immediately by facility management. Depending on the severity of compliance violation, employees will be given an action plan to implement or released immediately in such instances where theft,

diversion, or health risks occur. If an employee fails to implement an action plan, they will be terminated. All feedback for improvement forms will include, at a minimum:

- The name of the person receiving feedback;
- The date of the incident and date feedback was received;
- A detailed description of incident/violation;
- The name of the supervisor giving feedback;
- A clear action plan so the incident/violation will not reoccur;
- The signatures of the person receiving the feedback, giving the feedback, and the production facility compliance manager.

Periodic Performance Reviews: MinnMed will implement period performance reviews. Performance reviews and disciplinary action is explained in the SOPs. Employee success will be discussed during periodic employee performance reviews, which take place prior to completion of their probation period and bi-annually thereafter. This appraisal of performance is intended to inform employees on their progress and point out areas of opportunity for improvement. Performance appraisals, along with the development checklist, form the basis of merit for wage and responsibility increases. An action plan for performance improvement will be utilized when below average scoring is tabulated on any section of an employee's review form. Action plans will be evaluated periodically and as often as necessary to ensure proper development of all employees. The retail facility manager and the employee's direct supervisors are responsible for all periodic employee reviews, which include at a minimum:

- The name of the person receiving performance review;
- The date of the review, and the dates of the review period;
- A numerical tabulation of performance categories;
- The name of the supervisor giving review;
- If necessary, an action plan for employee improvement;
- The signatures of the person receiving the feedback, giving the feedback, and the production facility compliance manager.

Disciplinary Actions: The Feedback for Improvement (FFI) form is to provide and document feedback given to employees. Within the FFI, there shall be a plan of action laid forth for the agent to fulfill in order to ensure prevention of future occurrences. In the event that an agent from the retail facility receives multiple FFIs on the same topic or fails to implement the plan of action laid forth in the FFI, the employee shall be terminated at the will of his or her direct supervisors**.** Immediate termination shall be considered for all instances involving compliance, security, and product efficacy. Immediate termination shall be implemented in cases involving diversion of cannabis or cannabis products and major compliance violations.

r. To the extent known, provide a list of expected cultivation staff (employees or contractors) and their qualifications

Minnesota Medical Solutions is currently in the process of hiring multiple individuals with agricultural or greenhouse cultivation experience. This recruitment is ongoing via online job postings and other avenues. MinnMed will seek out the best possible candidates for the cultivation positions, and although many qualified applicants have already applied, MinnMed will defer immediate hiring until it is sure of hiring candidates that best fit the positions. In addition, MinnMed has the help of the UFCW to get the best possible candidates into these roles.

Cultivation Staff Consultants: American Cannabis Company

Head Cultivator: Joe Schaffer,

Cultivation Advisors: Dan Totushek and Jerry Quaal, Dan and Jerry's Greenhouse

Cultivation Advisors: Mitch Michaelson and Aaron Peterson, Severs Farm Markets

Security Staff:

Minnesota Medical Solutions LLC seeks part time security personnel that should have the following basic requirements for an Armed Security Guard in Minnesota: Be at least 21 years old, a United States citizen or registered resident alien, successfully pass a background check which includes drug testing, have no mental instability, drug use, or dependency, and no acts of fraud or convictions. Additional criteria should include a high school diploma or GED

equivalency, two years of post-secondary education, or be currently enrolled in a security, law enforcement, or criminal justice undergraduate degree program. If no degree, candidates must have one year of experience in security, law enforcement, military police or a related field. The security personnel must be able to pass a BCA/FBI background check.

Security personnel should have the specific qualifications of excellent verbal and written communication skills as well as basic office computer skills. Essential skills related to the knowledge of verbal and physical de-escalation, use of force continuum, and arrest laws would be highly preferred. Security personnel must be in good physical condition and able to walk and stand for extended periods. Employees must be able to make decisions and act independently without direct supervision when making enforcement decisions and in meeting emergencies.

Security personnel should have proper licenses where applicable, including a current and valid driver's license. MN POST skills such as First Responder, Emergency Medical Technician (EMT), or OSHA first responder certifications would also be preferred. Other valuable certifications such as Certified Fraud Examiner (CFE), Certified Protection Professional (CPP), Certified Forensic Interviewer (CFI), Physical Security Professional (PSP), and Professional Certified Investigator (PCI) would also be considered.

Each security officer will be required to adhere to security policies and procedures. Additional duties could include the greeting, verification, and participation in the initial check in procedures of the patient upon entrance to the distribution facility. Security must and will not be considered just an interior position. Each security officer must ensure that the exterior of each distribution facility to include the parking lot and walkways around each, are safe and clean. Any and all obstructions to the safety expected for our patients will be addressed though security personnel and, if necessary, local law enforcement.

3. Refining

Please provide the following information specific to refining of plant cannabis:

a. Describe the experience of the applicant in creating acceptable forms of statutorily defined forms of medical cannabis. For purposes of this response, you may include the experience of any person employed by the applicant, including the person's name and position with the applicant. In particular, cite any experience the applicant may have in turning raw plant material into medication.

The refining team created by MinnMed is comprised of a wide range of professionals from different fields of expertise. The team consists of consultants, shareholders, contractors, and direct employees. Refining team members have extensive experience and expertise in one or more fields that are required for an efficient pharmaceutical operation. Operations will entail refining, in process analytical, formulations and pharmaceutical manufacturing processes. Team members have extensive expertise in extraction, fracturing, chemical process, manufacturing process, analytical, and quality control procedures.

MinnMed created this super-star refining process team with the intent of changing the medical cannabis industry. The focus of the team and the refining process will be to create cannabis medicine products specifically designed to alleviate symptoms and ailments of medical cannabis patients within the state of Minnesota. MinnMed has already developed products and applied for legal patents on a couple of products that were designed for the medical cannabis industry. These products have the potential to change the way the medical cannabis industry consumes and regulates dosage of medical cannabis, and it is our hope and intent that these products expand into other states' medical cannabis markets. MinnMed has two current patents pending since we were not willing to wait given the importance of these improvements to our patients. At this time the two pending patents are for a novel vaporizer with 1) test dosing, 2) adjustable dosing 3) memory 4) transmitting capabilities. This will allow us to gather patient information if approved by the patient. The second new delivery device will help sick children and the disabled take sublingual or oral tinctures/solutions by mouth. The pending patent documentation is attached to this application.

The following details the background of refining team members:

1. Greg Goldston, Options Medical Center, Founder and Owner

Mr. Goldston is currently a retained operations consultant for Minnesota Medical Solutions. Mr. Goldston has developed Options Medical Center, which encompasses two medical retail facilities with gross sales exceeding $6.5M in 2014, and 1 million watts of indoor grow under 70,000 square feet. Mr. Goldston also founded Boulder Organic Food Group, LLC, a CO_2 cannabis oil processing company for cannabis e-cigarette vaporizers. He is active on state regulatory program development through membership with NCIA (National Cannabis Industry Association), a Colorado based industry political action group.

2. United Science, Exclusive Contractor to Minnesota Medical Solutions

Conor Smith, Ph.D. is the key liaison between Minnesota Medical Solutions and United Science. He holds a Ph.D. in Chemistry. Dr. Smith is currently Process Engineering Manager for United Science and leads chemical manufacturing and production of chemical consumables under an ISO controlled environment. He has over seven years of experience in process chemical sensing and controls and is an expert in GC/MS, LC/UV, and reactor design. Dr. Smith has built many custom reactors and sensor control systems for chemical production. He is also an expert pesticide residue analyst and develops analytical methods for screening over 600 pesticides in edible plant products such as spinach, lettuce, avocado, tea tree oil, and olive oil. His work has led to validated FDA methods for over 600 pesticides in teas and other food matrix and is currently the object of an ongoing FDA sanctioned inter laboratory collaborative study. Dr. Smith has received hands-on training by Waters Corporation on their 2x5000 extractor and has already developed a cannabis extraction method for pesticide residues that we might expect to see in our operation. . Conor Smith reports directly to Jon Thompson, Scientific Director of MinnMed and CEO of United Science.

3. Jon Thompson Ph.D., Scientific Director, MinnMed

Dr. Thompson is currently Scientific Director for Minnesota Medical Solutions. Dr. Thompson is an analytical chemist with a chemical, process, and manufacturing background. He has been trained by Options Medical in their CO_2 and butane extraction processes, decarboxylation, manufacturing, HPLC purification process and lab operations in Washington and Colorado. He has personally conducted cannabis extractions, HPLC and GC separations on active ingredients in the state of Washington and Colorado. Dr. Thompson is also currently a manufacturing executive and has visited several facilities around the country to obtain process, procedure, and

business know-how related specifically to cannabis production and analytical protocols. Since that time, Dr. Thompson has been creating company specific standard operating procedures (SOPs) for extraction, analytical, formulation, stability testing, final inspection, and packaging migration testing. Dr. Thompson has a thorough understanding of manufacturing process from seed to packaging.

4. Jon Berdahl, Arete Quality Consulting, LLC

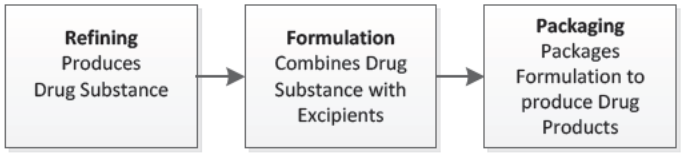
Jon Berdahl is owner and founder of Arete Quality Consulting, LLC and has 13 years of experience in the pharmaceutical industry as QC Technical Services Manager, QC Lab Manager, Quality Engineer, and GLP Study Director. He has worked for large pharmaceutical companies and currently assists companies with auditing and creating quality programs that are compliant with current good manufacturing practice regulations. He is well versed in all pharmaceutical manufacturing and quality functional roles and has successfully managed OOS, OOT, and CAPA investigations. Mr. Berdahl will assist Minnesota Medical Solutions in assuring compliancy with SOPs, regulatory and internal auditing.

5. Adrian Anderson, Ph.D., Associate Director –Quality Control for Gilead Sciences

Dr. Anderson is on the MinnMed Scientific Advisory Board and has a decade long experience in cGMP, quality control, quality assurance, laboratory operations, and regulatory compliance in the pharmaceutical industry. He has held positions of increasing responsibility in major pharmaceutical companies including Abbott, Amgen, Hospira, and Gilead. Dr. Anderson is currently a member of our Scientific Advisory Board and will bring expertise to bear on the production and control of the production of cannabis based pharmaceutical medicine.

b. Describe the extraction method that will be employed to extract the active ingredients from the cannabis plant to produce the medical cannabis oil and liquids. Explain how the process ensures that no residual solvents will remain in the finished product and how the work environment will be made safe for employees.

The Following Figure Shows the Process for Refining:



The purpose of refining is to create drug substances. These are oils or purified oils but are not drug products until they are formulated and packaged. We will refer to this oil as a drug substance. The formulations process combines these drug substances with excipients. The packaging process produces a drug product. Upstream of the refining process, plants are grown, harvested, dried, cured and stored for refining. The batch is weighed, and the data is recorded in BioTrack prior to removal from the harvest batch supermarket. A lot number is assigned to the batch of cured, dried leaf or flower prior to processing by BioTrack and this lot number is entered into our laboratory information management system (LIMS). The LIMS system is a complimentary database that records data and provides traceabilty of that data to each lot of material.

The Refining Method Follows Several Key Steps:

- **Testing:** We test the starting materials in house to provide a value for recovery calculations.
- **Grinding:** Next, the plant material is ground into 300-micron diameter pieces.
- **Extraction:** Next, four lbs. of the plant matter is uniformly packed and extracted in a 5L CO_2 extractor for approximately 90-120 minutes. This process is monitored with HPLC to determine in process extraction recovery
- **In-process testing:** In process testing will monitor the pharmaceutical profile and potency before grinding and during the exract and decarboxylate processes.
- **Refining decarboxylation:** We decarboxylate and fractionate to produce refined usable precursor products.
- **Batch certify the Drug Substance:** We batch certify the in process drug substance for identity, potency, metals, pesticides, toxins against specifications derived from the state using validated methods and qualified instrumentation. Quality Control certifies compliance with drug substance specifications. See below for methods and specifications.

The grinding or communition process involves a first inspection step that insures a clean and safe grinding machine and method. Our SOP calls for inspection of the grinding vessel for operational integrity. We also insure the instrument and receiving vessles are clean and free from

plant matter residual from the previous batch. The equipment will be washed, cleaned, and dried in between use with lab grade water (no surfactants or organic solvents). No standard for critical clean has been set other than a YES/NO visual inspection recorded in the batch record. Initially, we will not validate the cleanliness of the grinder. It is left open for process improvement assessment if an out of specification result occurs downstream.

Safety protocols are built into the SOPs and define personal protective gear required to run the communition mill. The grinding mill is housed in a room separate from the entire operation to prevent carryover or inadvertent manufacturing fumes from being incorporated into the grind. The room in this case is vented with an isolated HVAC system.

Extraction and Collection: We will use supercritical CO_2 as our preferred extraction method. This way we avoid the use of explosive nonpolar extraction solvents such as butane and also prevent the possibility of entrainment of adverse residual solvents into the drug substance extract. Residual CO_2 in the drug substance will be greatly reduced or completely removed during the decarboxylation process and subsequent degassing for storage. The drug substance will be degassed and then stored in a desiccator inside a closed vessel under ultrapure, water free nitrogen. Removal of water and excess CO_2 from the extracted drug substance has been shown to prevent the formation of carbonic acid in the drug substance, which can adversely affect the shelf life.

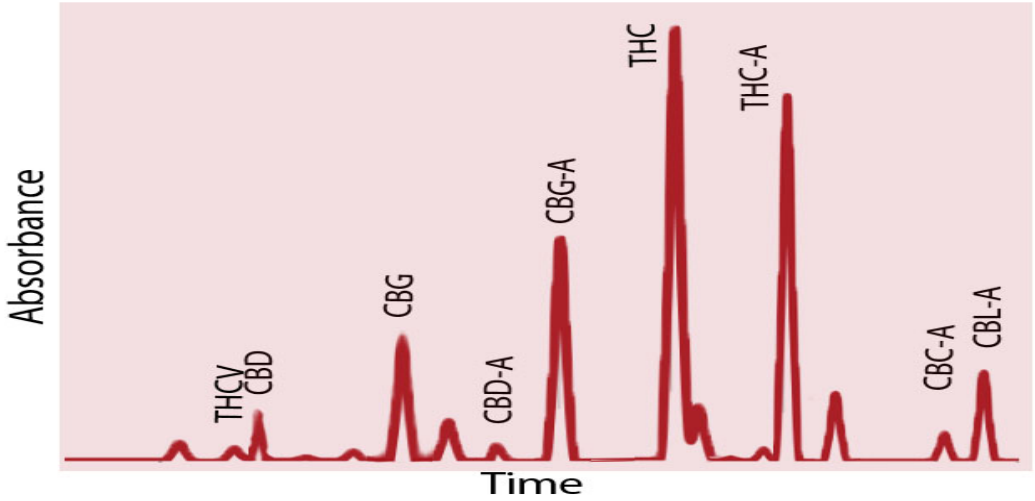
The extraction system is a Waters SFE 2 x 5000 unit that has a scalable capacity and has been sized to allow a production capacity that initially will exceed demand by five times. Four pounds of free flowing plant material is weighed, and packed into the five-liter CO_2 extraction vessel. The system includes a cooled CO_2 reservoir that is fed by a 100-pound tank of compressed 99.9% pure CO_2. We specify gas purity from the vendor and certifications to ensure purity.

The preparative pump that is incorporated into the extractor draws cooled liquid CO_2 from the reservoir and pumps the fluid into a heat exchanger at 100-300 mL/min. The heat exchanger heats the fluid up to about 50-60°C and a backpressure regulator keeps the fluid in the supercritical range at about 5000 psi. The fluid flows across the bed of plant matter and extracts the waxes, terpenes, cannabinoids, and other soluble components. The fluid then enters a first

collection vessel that is held at 50-60°C and 3000-4000 psi. Waxes and lipids and some nonpolar cannabinoids precipitate and the remaining fluid enters a subsequent chamber held at 40-50°C and 2000-3000 psi to precipitate the cannaboids and diterpenes. Finally, the pressure is reduced to less than 1000 psi at 30°C to remove terpenoids and phenolics.

The fraction with the active ingredients will be collected in a dry, sterile clean container. The container shall be certified as such by the vendor. The extraction will be monitored with HPLC until at least 70% of the cannabinoids have been extracted. The waxes will be precipitated overnight at -20°C. The drug substance is then placed in a rotovap under vacuum and is heated to decarboxylate the cannabinoids. Non-decarboxylated cannabinoids are not as pharmaceutically active when taken in liquid form so this step is critical. The final oil is then flushed with 99.9% pure, oxygen-scrubbed nitrogen for five minutes and capped (PTFE seal, non-paraffin), labeled and stored in an opaque glass bottle. The bottle is then stored in a refrigerator desiccator to prevent water intrusion and protect from sunlight.

Fracturing: We will then separate and purify the different components of the drug substance to produce concentrates that are high in specific, single, cannabinoids using a process called high pressure preparative chromatography. The following figure shows a small scale separation of the individual components:



Each peak represents only micrograms of different cannabinoid material. Preparative HPLC scales this process up to provide tens to hundreds of grams of the individual components in a purified form. These highly concentrated and pure components can then be certified and formulated into strain independent drug formulations. Currently, the amount of specific cananabinoid such as THC is controlled by plant genetics and extraction recovery. This allows MinnMed greater control and flexibility when formulating drug products which in turn allows for more precise correlations in clinical outcomes and lower cost CBD medicines. MinnMed aims to become strain-independent in the near future with the ability to produce customized cannabinoid profiles in our drug substances. In this case, CO2 was used with the correct column to produce this separation. Thus, residual solvents are not an issue.

Safety: Safety is addressed in our SOPs taking into account OSHA regulations and good laboratory practice. There are two key safety precautions needed for this process. First, the room needs to be well ventilated and separate from all other processes. The reactor itself should have a hood vent over the exit port so that the excess CO_2 and volatile organic matter can be vented properly. The volatiles will be vented through a carbon column so that the air emerging that is vented will be clean and VOC free. The carbon cartridge will be replaced at quarterly intervals.

Second, the room will have a CO_2 monitor as a safety precaution that will sound when the level of CO_2 in the room reaches an unsafe level.

Third, it is noteworthy that this extraction system is very similar to a typical HPLC system so many of the safety protocols that are used in a lab running HPLC would also be used for this extractor. In the event of a leak, the pressure will no longer be maintained by the system and the pump will shut off. If the pressure were to exceed 5000 psi, the system would leak or the limit in the software would shut down the system. The pump is maintained monthly with new seals and all maintenance events are recorded.

Quality Control is the bedrock of our production facility and forms the basis for better patient outcomes. The following lists the duties and responsibilities of the Quality Control:

Document and report all lab data generated in the course of testing using good documentation practices to ensure data are attributable, legible, contemporaneous, original, and accurate.

Notify Management of out-of-trend or out-of-limit and out-of-specification results.

Notify Management of issues that are potential event such as but not limited to deviations from established procedures or atypical observations.

Submit data for review. Data will be reviewed by individual who is not involved in the generation of the results in any way.

Provide completed notebook (all pages used and reviewed) and corresponding data collection index, and completed logbooks to management for records retention.

Quality Control reports to the VP of Operations

Quality Assurance is a distinct department from quality control. Our quality assurance program will provide internal sufficient oversight of Quality Control (QC), Manufacturing, Warehouse to assure quality protocols are being followed. This oversight includes, but is not limited to, internal audits, procedural controls, process controls, training, validation, and data controls such as audit trail and data review. QA will report to Site Management any deviations, non-conformances, or suspected fraud that are observed. Since MinnMed is a small company, we will hire consultants to fill this role. They will report directly to the Scientific Director.

c. A detailed description of protocol and computer systems used for turning the raw plant into acceptable medical cannabis, including:

i. The equipment the applicant will be using in its manufacturing protocol, including any policies or procedures relating to cleaning and maintenance

List of Equipment Used in the Manufacturing Protocols Includes:

- NPK tester for soils
- Various humidity and temperature sensors throughout the building
- Cryogenic Mill with Sieve controls or equivalent grinding mill
- CO_2 Extractor
- CO_2 safety alarm sensor
- LC/UV/FL

- Preparative LC/UV with Fraction Collector
- GC/MS
- Atomic absorption spectrometer
- Analytical balance
- Desiccator
- Freezer
- Roto evaporator*
- Vacuum oven
- Ultrapure water system
- Production balance
- Various production glassware*
- Automated liquid dispensing system for filling and dispensing formulations into products*
- Packaging equipment*

The equipment designated with an asterisk is subjected to validated cleaning procedures and according to company policy are required to maintain records of compliance.

The Quality Department is responsible for the validation and calibration activities at MinnMed. The members of this department are responsible for establishing and maintaining processes to ensure that monitoring, measurement, and manufacture can be carried out, taking into account the tolerances required for the measurement and the accuracy and precision of the instruments and or equipment. This also forms the basis for our maintenance procedures. Key maintenance items on the extractor are piston seals and the needle valve seal.

Where necessary to ensure valid results, measuring equipment shall be included in the calibration and validation program. The calibration program ensures:

- Critical clean records are followed and maintained for extraction, formulations, and packaging processes.
- Equipment is calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards.

Where no such standards exist, the basis used for calibration or verification shall be recorded.

- Equipment is adjusted or re-adjusted as necessary.
- Equipment is identified to enable the calibration status to be determined.
- Equipment is safeguarded from adjustments that would invalidate the measurement result.
- Equipment is protected from damage and deterioration during handling, maintenance and storage.

In addition, the Quality Department assesses and records the validity of previous measuring results and records them in the BioTrack and LIMS systems. When the equipment is found not to conform to operational or clean requirements, MinnMed will take appropriate action on the equipment and any product affected. Records of the results of calibration and verification shall be maintained.

When used in the monitoring and measurement of specified requirements, the LIMS and BIOTrack software will provide traceability and leave an audit trail according to 21 CFR Part 11. This shall be undertaken before initial use and reconfirmed as necessary. Records of this confirmation shall be maintained with calibrations records through the use of the Control of Monitoring & Measuring Devices procedure. Each piece of equipment that is used in the processing and testing has its own SOP that includes safety and critical clean protocols.

ii. Calculation of yield process

The plant matter will go through a series of processes which will each have their own yield. A mass balance will be maintained by the BioTrack software to insure traceability at each production step. Please see the attached BioTrack materials specific to this section.

The refining process will yield drug substance. To calculate the yield, first the cured plant matter must be measured for identity and potency. Then during and after extraction, the drug substance is measured again. We calculate the yield of this process for each drug substance with the following equation:

%Yield = 100* Amount in Extract/ Amount in Unextracted Plant

Testing of identity and potency is accomplished with an analytical technique called HPLC. In this technique, the drug substance is extracted from plant matter with a method called QuECHERS. The extract is then injected onto an HPLC that separates out the individual drub substance components to measure the amount of each drug substance in the sample. We do the same technique with the oil extract. We have already developed an SOP for measurement of cannabinoids in hemp matrix using a QuEChERS sample preparation method and HPLC/UV analysis. The recovery is 99% or greater with linear recovery over a wide range of concentrations.

The decarboxylation process will also lower yield as CO2 is released off during the process, thus lowering the yield. We use the same process described above to measure and calculate yield. Measure the substance concentration before and after decarboxylation.

The losses in formulations and packaging should not be a major source of loss of drug substance. Yield can be measured during the cleaning process.

Yield processes are tracked by our LIMS system which allows an audit trail and traceability to the actual data so that it cannot be changed by the user. It also tracks the identity of the analyst, date, lot numbers, and other key process information. Neither BioTrack nor cycle counts nor cameras can offer inventory control of yield. A LIMS system is a necessary component to diversion during the extraction process.

iii. Sampling and testing of in-process materials and drug products

Drug Substance (In-process) Testing in Refining and Formulation

- **Cure process**: Moisture content and assay of the cured cannabinoid profile product to determine yield. Data is traceable in LIMS system to prevent yield diversion.
- **Extraction process**: HPLC to determine when to stop extracting
- **Decarboxylation process**: HPLC monitoring during the decarboxylation process to ensure decarboxylation of CBD and THC

- **Drug Substance** is measured before it is formulated and packaged for identity, potency, microbiological contaminants, pesticide residues, and metals.
- **Excipient analysis or certification.**

Drug Product Testing

- **Drug Product** is measured for identity and potency and other tests as required by the state**.**

Drug Substance Testing

Pesticides Pesticide chemical residue test results must show each sample satisfies the most stringent acceptable standard for a pesticide chemical residue in any food item as set forth in subpart C of USEPA's regulations for Tolerances and Exemptions for Pesticide Chemical Residues in Food (40 CFR 180 (2014)).
In the case of pesticide residues, we know which residues could possibly show up in the extract, so we test only for those. We also maintain a robust incoming inspection and supplier control program that will test and control manufacturing inputs to avoid contamination. In the event that we detect an adverse level of pesticide (> 10 ppt), we then sequester the batch in a secure, out-of-specification area and start an investigation as to the cause of the contamination.

Identity and Potency In the case of potency, each sample will also be tested for active drug substance including but not limited to cannabinoid profiling for the following: THC, THCa, CBD, CBDa, and CBN. Under no circumstances shall the batches awaiting contamination results and active ingredient analysis be included in a cannabis product or sold to a dispensary facility prior to the time that the laboratory has provided those results, in writing, to the cultivation facility management team.

This test is performed with an HPLC/UV with a reverse phase C18 column under a 10 min methanol water gradient at 1 mL/min with DAD UV detection from 190-370 mm. Sample prep method is AOAC 2007:01 or EN 5990-4248. Recovery is 99%; linear over wider range.

Microbiological test results for each sample must at least satisfy the recommended microbial and fungal limits for cannabis products in colony forming units per gram (CFU/g) set out in the American Herbal Pharmacopoeia (AHP). These microbiological tests can also be run by real time PCR using standard Taq-man PCR probes.

Mycotoxin test results for each sample must show less than 20 uG/KG of the following Substances: Alfa toxin B1, Alfa toxin B2, Alfa toxin G1, Alfa toxin G2, and Ochra toxin A.

This test is run by HPLC with Fluorescence or MS detection using a reverse phase C18 column and a acetonitrile water gradient. Sample preparation method is QuEChERS AOAC Method 2007:01. Recovery is 99%; linear over wider range.

Residue solvent test results are not relevant for our operation.

Heavy metal test results for each sample must meet the Metal Natural Health Products Acceptable limits showing less than the following amounts of these heavy metals:

- Arsenic 0.14 uG/KG BW/Day
- Cadmium 0.09 uG/KG BW/Day
- Lead 0.29 uG/KG BW/Day
- Mercury 0.29 uG/KG BW/Day

Excipient Testing The drug substances are formulated with excipients into drug products. It is important that excipients are also tested as a drug substance to insure that they are not adding any contamination to the drug substances. In this case, we will test and lot certify each excipient used in the manufacture of drug products. These tests include, HPLC, toxins, pesticides, and metals. The same limits apply.

If a drug substance is tested and does not fall within state accepted health and safety levels for any of the above mentioned contaminants or any additional contaminants the state does not deem for distribution, it is the company policy to investigate the cause of the contamination, and

subsequently destroy and remove any contaminated product in a manner consistent with state compliance for the policy for disposal of green waste.

As soon as work in progress drug substance passes the identity, potency, microbiological, mycotoxin, heavy metal and pesticide chemical residue test, the drug substance will be released for further manufacturing into drug products.

iv. Controls and testing of microbiological contamination

Real Time PCR will be used to test for common microbial contamination. This method was chosen over traditional microbial plating techniques due to its timely results, accuracy and efficacy. Traditional microbiological methods will also be followed using USP guidelines. Media will purchased from an ISO manufacturer for each specific bacteria. Initially we will be testing for E.Coli, Salmonella spp, Total Gram-negative Bacterial, Aspergillus spp, Mucor, Penicillium, Thermophilic Actinomycetes, and filth. Other tests will be conducted as MinnMed sees fit or as state regulations are developed pertaining to specifically required tests.

v. Sampling and testing of final products

Drug Product Testing

Drug products that have been packaged will undergo final testing. Samples will be tested in-house and by an external lab for the following:

Identity and Potency testing of the final packaged drug product will be analyzed by HPLC as stated above except the sample preparation protocol will be changed slightly for those products that are formulated and packaged into a gelatin excipient. Samples of the final drug products will be sent to an external lab for Identity and Potency.

Since our formulations and packaging process is kept under critical clean protocol with validation, we do not intend to re test for toxins, microbial contamination, or pesticide residues after the drug substance has been formulated into a drug product. We will however comply with any regulation or requirement of the state.

Only the Quality Department can release a drug product. Quality's function is to review the batch record, the independent laboratory test results, and in-process and final test results, and then compare to specifications to make a final decision whether or not to release the drug product through a quality sign-off on the batch record and certificate of analysis.

An electronic copy of all test results and investigation records shall be filed by laboratory staff for any batch that does not meet the standards set for microbiological, mycotoxin, heavy metal or pesticide chemical residue test. These results will be sent to the Quality Department for review. The laboratory staff will maintain a comprehensive record of test results and make them available to state and local officials, and or the public as needed.

Lot Retains A lot retain system will be maintained that holds a sample for one year in a location that preserves the integrity of each respective product. Lot retains that are older than one year will be discarded according to company policy.

Timeline for Testing Drug Substances and Drug Products:

- Extraction: In house testing; 0.5 hr HPLC Test, In-house
- Decarboxylation: 0.5 hr HPLC Test, In-house
- Excipient Testing: 3-5 hr. GC/MS HPLC Test, AA, RTPCR, HPLC-FL, In-house
- Drug Substance Testing: 3-5 hr. GC/MS HPLC Test, AA, RTPCR, HPLC-FL, In-house
- Drug Product Testing: In house 0.5 hr; Seven to twenty-one days (industry standard based on comparable example in other regulated markets)
- All pre-transport medicine products will be secured in a vault until transport.
-

Transportation to Approved Laboratory Facilities: All products to be tested shall be selected by the Quality Department according to a written sampling plan and then immediately packaged into sealed tamper proof packaging, labeled with all required information, and clearly marked **TEST SAMPLE**. All test samples shall be tracked in the inventory control system and video surveillance system until they are transported.

Transportation of test samples will follow MinnMed transportation policies, procedures and protocols which shall adhere to all state laws and requirements. MinnMed policies pertaining to the transportation of test samples are outlined and detailed within the SOPS.

The approved laboratory will undergo a rigorous vendor audit.

vi. Packaging and labeling process, including type of container, label used and information contained on the label. Describe the types of child safety packaging you will use for each product sold

Packaging and Labeling

All drug substances will be formulated into drug products which are packaged and labeled appropriately with batch information. The label for the drug substance includes the lot number, date of extraction, and potency information. Only batches that have tested and released by the Quality Department will enter the formulations process. A "QC-approved" stamp will be placed on the bottle before it is placed into the supermarket.

Once the drug substance has been formulated with excipient, the mixture will be packaged into the following products:

Product	Packaging	Child Safety	Reclosable	Number of Doses
Bulk Oil	Glass bottle	Yes	Yes	1-30
Tincture Bottle, 1 mL Syringe	Glass bottle	Yes	Yes	1-50
Vapor Cartridge	Cartridges stored in a plastic bottle	Yes, multiple cartridges enclosed in a child safe package	No	1-50
Pill	Bottle	Yes	Yes	1-50

Finished drug product labels are controlled by part number and revision. Changes to label content are controlled through the ECN System. Product identification labels or tags will at a minimum contain the following information:

- The company's trade or model name for the product

- Complete company name and address
- Country of origin (i.e., "Made in the USA")
- Patent number(s) if applicable
- Lot number
- Potency and purity information
- Date of manufacture
- Safety information pointed to website
- Customer service 800 number

Medical Cannabis Labeling

Purpose

Minnesota Medical Solutions has given careful consideration to the design and content of the labeling for our cannabis based medicine products. All labeling will be in accordance with state laws pertaining to labeling standards and specifications. Labels will accurately describe our products as medicine. The labels will include warnings designed to prevent unauthorized and accidental ingestion. Labels will be clear and consistent which will reliably inform the patients about the medicine. Labels will include design elements that facilitate ease of use for patients with impaired vision or literacy deficits. Labeling will not contain images or marketing aimed at children.

Label Standards & Characteristics: Minnesota Medical Solutions is committed to preventing accidental and unauthorized ingestion of cannabis based medicine. All of Minnesota Medical Solutions' cannabis based medicine products will contain a labeled that provides:

- A clear set of usage instructions for non-edible cannabis based medicine;
- The product's net weight in ounces and grams, or volume as appropriate;
- A set of mandatory statements designed to promote safe usage.

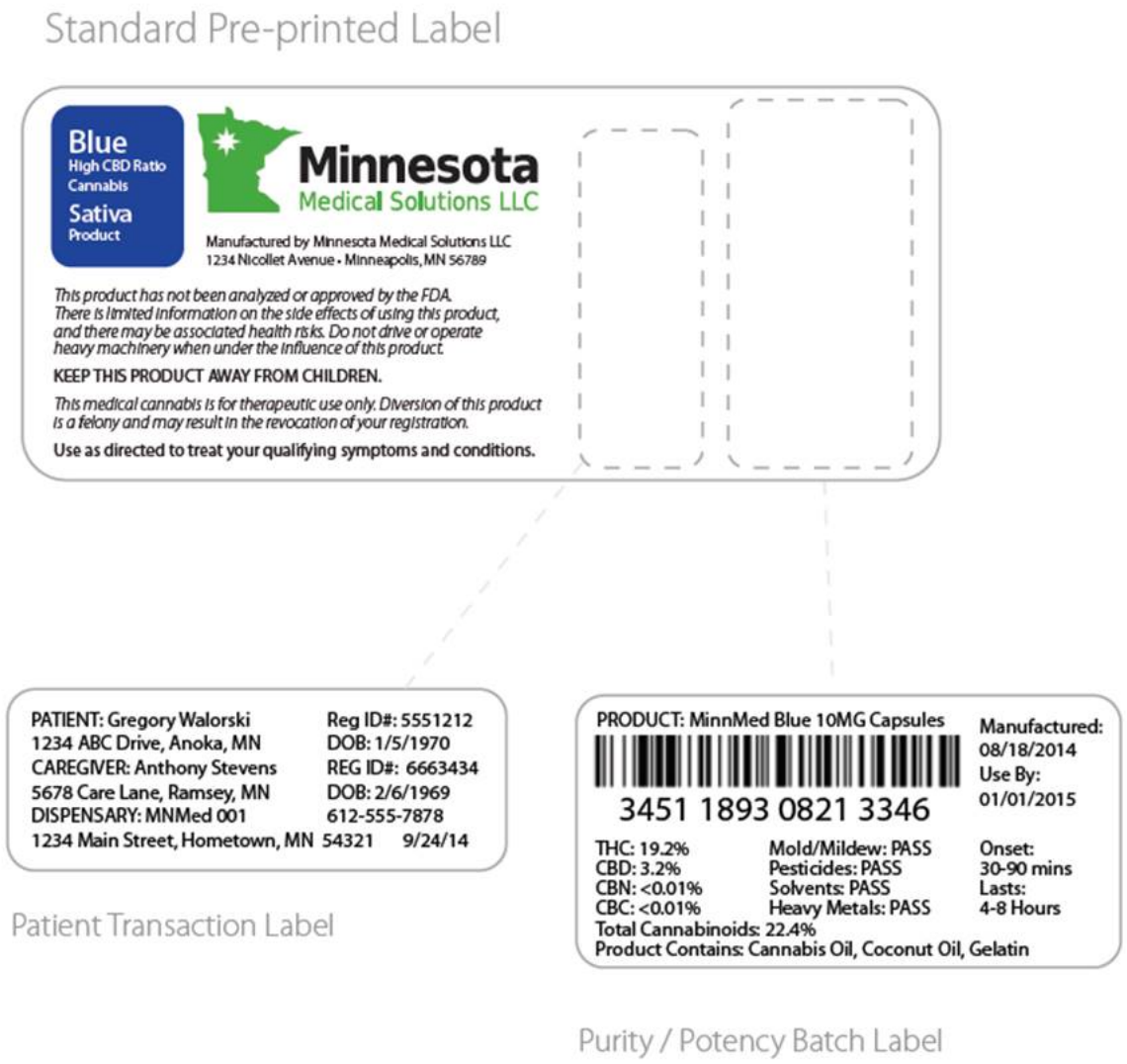
Until specifically guided by the Minnesota Department of Health – Office of Medical Cannabis or other regulatory agency, the following statements are mandatory for Minnesota Medical Solutions' cannabis based medicine product and will appear on every cannabis based medicine product that Minnesota Medical Solutions creates and distributes.

- "This product has not been analyzed or approved by the FDA. There is limited information on the side effects of using this product, and there may be associated health risks."
- "Do not drive or operate machinery when under the influence of this product."
- **"KEEP THIS PRODUCT AWAY FROM CHILDREN"**

The minimum print size for each of the mandatory statements for cannabis based medicine products is 1/16 inch. Labeling text on a cannabis based medicine product label may not make any false or misleading statements regarding health or physical benefits to the consumer.

Minnesota Medical Solutions has developed a novel pictographic to inform and educate patients about the expected onset and duration of the cannabis based medicine.

Minnesota Medical Solutions will produce products with a label that bears color themes. A patient will be able to find a similar product across the various Minnesota Medical Solutions' product lines simply by seeking out the color of their preferred category of medicine characteristics. Please see the content in Section A(2)b to see the full range of labels.



To produce a safe, meaningful, and useful cannabis based medicine product label, a patient must be able to quickly discern important clinical information from the label, while not being distracted with trivial information. Minnesota Medical Solutions will avoid the use of numbers on its labels, except when used to express dose, potency, purity, or weight of the cannabis based medicine. Minnesota Medical Solutions will produce labels that are careful to avoid the use of non-clinical terms like: “Light”, “Mild”, “Medium”, “Average”, “Heavy”, and “Strong”.

A compliant and complete label may need to exceed the size of a retail package size of a cannabis based medicine. In these cases, the cannabis based medicine will be produced and packaged to support the affixing or attaching of a complete and compliant label.

Two small areas of the cannabis based medicine package's label (or the package itself) will be left intentionally blank. These spaces will be reserved for labels generated by the Minnesota Medical Solutions' deployment BioTrackTHC software, upon the production and distribution of the cannabis based medicine. Please see the attached BioTrack content specific to this section.

The label created and affixed during the production process will contain the following information: the concise and exact name of the product; the product strength; date of cannabinoid extracted; best use date (BUD); Minnesota Medical Solutions' batch number and corresponding barcode; concentration or amount of THC, THCA, CBD, including a total of active cannabinoids (potency profile); list of all ingredients and any allergens (including all chemical additives, likely including but not limited to nonorganic pesticides, herbicides, and fertilizers that were used in its cultivation and production); and if a cannabis extract was added to the product, disclosure of the type of extraction process and any solvent, gas, or other chemical used in the extraction process. For cannabis based medicine products meant to be eaten or swallowed, recommended serving size and the number of servings contained within the unit, including total milligrams of active tetrahydrocannabinol (THC) or cannabidiol (CBD) - or both - will be displayed.

The label created and affixed during the completion of the distribution process will contain the following information: date of sale, cannabis patient registration number (CPRN), dispensary license number, dispensary name, dispensary address, dispensary phone number, and the distributing pharmacist's unique identifier.

Attached below are representative label images, including a demonstration of the 'dead space' reserved for secondary and tertiary labeling.

Sustainability: In accordance with Minnesota Medical Solutions' vigilant commitment to sustainability, our labeling solutions will constantly evolve to adopt emerging sustainability trends. MinnMed will adopt and promote the use of recycled/sustainable materials, inks, and adhesives. MinnMed will hold its printing partners and vendors to these high standards. Where permitted and practical, Minnesota Medical Solutions is committed to using reusable and recycled labeling.

Medical Cannabis Packaging: MinnMed will package all of its cannabis based medicine in accordance with all state laws and in packaging that promotes product integrity for our patients while affording protections to non-patients.

MinnMed will take every precaution to prevent accidental ingestion of cannabis based medicine (CBM). Patients will be asked during every encounter if there are children in their homes. Responses will be tracked in our patient's electronic records. Patients will be provided in-depth counseling about preventing accidental ingestion in their homes. Patients will be provided information on the patient's role in preventing diversion of their CBM. MinnMed dispensaries will also sell patients a variety of locking medication cases and safes to help keep CBM away from children, pets, and non-patients. Patients with limited resources will be offered these locking safety devices at a reduced/discounted price.

Standards: All CBM packaging will be in compliance with the regulations of the state and local governments. MinnMed will distribute all CBM products designated for oral, enteral, or inhaled use, in food-grade child resistant packaging (CRP). Products that are not packaged in CRP during the manufacture of the CBM will be secured in exit packaging that is child resistant. CBM products will be packaged in opaque containers that do not allow the product to be seen without opening the packaging material. CBM products that contain multiple doses will be packaged in CRP that is able to maintain its child-resistant characteristics after its initial opening. All exit packages from the MinnMed dispensaries, that contain CBM, will be opaque.

Packaging solutions for the cannabis industry are well established and available through multiple sources. The United States Consumer Product Safety Commission has published on its website, a non-exhaustive list of packages that have met their testing standards. MinnMed will only utilize packaging that meets or exceeds the standards defined by 16 C.F.R. 1700.20 (1995) and ASTM classification standard D3475-13, stating that packages should be significantly difficult for children under five years of age to open and not difficult for normal adults to use properly.

Sustainability: In accordance with MinnMed's vigilant commitment to sustainability, packaging solutions will constantly evolve to adopt emerging sustainability trends. Where permitted and practical, MinnMed is committed to using reusable and recycled packaging. MinnMed will serve as a recycling center for patients' CBM packaging waste.

vii. Stability testing and process for determining expiration dates

Our company will initiate a stability testing program based on the guidance found in ICH A1A (R2) for general drug substances (batch oil, preformulation) and drug products (post formulation, finished goods). The following general case calls for long term, intermediate, and accelerated testing for 12 and 6 months respectively under specified conditions. The guidance states:

- "If long-term studies are conducted at 25°C ± 2°C/60% RH ± 5% RH and significant change occurs at any time during 6 months' testing at the accelerated storage condition, additional testing at the intermediate storage condition should be conducted and evaluated against significant change criteria. Testing at the intermediate storage condition should include all tests, unless otherwise justified. The initial application should include a minimum of six months' data from a 12-month study at the intermediate storage condition."

Significance for our purposes will be tested at the 99% confidence interval. Other guidance on labeling, photostability testing, selection of batches, testing frequency and storage conditions, and issuance of the shelf life are specified in the guidance document.

viii. Timeline of production process

Timeline for Production Processes:

- **Plant propagation:** 14-21 days
- **Vegetative cycle:** 30-60 days
- **Flowering cycle:** 65-120 days (8-12 weeks)
- **Curing:** 7 days
- **Extraction**: 1 day for 42 lbs of dried matter

- **Fracturing**: 20 hrs
- **Formulation**: 10 hrs
- **Packaging**: 1 hr
- **Final release:** 3 days for testing, review, and certification generation.

ix. Record keeping process

All documents required by the quality management system shall be controlled. The Document Control Procedure defines the controls needed to:

- Approve documents for adequacy prior to issue
- Review and update as necessary and re-approve documents
- Ensure that changes and the current revision status of documents is identified
- Ensure that relevant versions of applicable documents are available at points of use
- Ensure that documents remain legible and readily identifiable
- Ensure that documents of external origin are identified and their distribution controlled
- Prevent the unintended use of obsolete documents, and to apply suitable identification to them if they are retained for any purpose

Procedures define appropriate records to be maintained in order to provide evidence of conformity to requirements and of the effective operation and quality requirements. Records shall remain legible, readily identifiable, and retrievable. The Quality Records Procedure defines the controls needed for the identification, storage, protection, retrieval, retention time, and disposition of records. MinnMed will also depend heavily on BioTrack to automate and streamline the record keeping process. Please see the attached BioTrack information specific to this section.

Accurate recordkeeping and documentation is of utmost importance in any business industry, but within the regulated medical cannabis industry accurate recordkeeping and documentation is required by state law. Procedures and protocols pertaining to recordkeeping and documentation will be developed, implemented and maintained by facility management. The use of inventory templates and log sheets will aid in proper documentation. All important and confidential

records will remain on location within a secured area of the facility in a locked file cabinet only accessible by facility management.

d. Explain the intended plan to store, devitalize propagating parts (seeds) and dispose of plant materials left-over after the resources for development of medical cannabis products have been extracted.

MinnMed's waste, including waste composed of or containing finished cannabis products, will be stored, secured, and managed in accordance with all applicable state and local statutes, ordinances, and regulations. In order to properly dispose of waste and avoid diversion, MinnMed staff will follow this strict protocol:

- Each day, MinnMed employees will collect and place green waste in designated receptacles. Their actions will be recorded by surveillance video.
- At the end of the day, the cultivation manager along with another staff member will collect the waste and weigh it out. They will record all information including weight, time, date, employee names and signatures. The on-site quality control manager and staff member will then store the green waste in a locked and secured place until disposal. Their actions will also be recorded by surveillance video.
- Immediately before the green waste leaves the building, the cultivation manager and at least one other staff member will re-weigh and record all information including weight, time, date, employee names and signatures. Their actions will be recorded by surveillance video. The green waste will then be rendered unusable by grinding and mixing with another substrate at a rate of at least 50% and will then be disposed of in accordance with all state and local rules and regulations. MinnMed will accept, at no charge, unused, excess, or contaminated cannabis from a registered qualifying patient or personal caregiver. We will destroy unused, excess, or contaminated cannabis as provided by Minnesota law and will maintain an accurate record of such disposal, which shall include the name of the supplying registered qualifying patient.

Liquid waste from our cannabis or by-products of processing will be disposed of in compliance with requirements for discharge into surface water, groundwater, and sewers, or disposed of in an industrial wastewater holding tank. When disposing cannabis or cannabis infused products,

MinnMed's employees will create and maintain an accurate and comprehensive record of the date, the type and quantity disposed of, the manner of disposal, and the persons present during the disposal, with their signatures. MinnMed will keep disposal records for at least two years.

e. Describe your expected process and interactions with the certified laboratory responsible for testing the accuracy of the final medical cannabis products. Include expected frequency and volume of testing such as how and when you will select samples for laboratory testing, what type of testing you will request from a laboratory, and how you will use this information for best practices. Please include a description of timelines and transportation methods

The external certified laboratory will be vital to MinnMed's ongoing Quality program. MinnMed will select Accredited to International Organization for Standardization (ISO) 17025 labs accredited by A2LA or ACLASS; or certified, registered, or accredited by an organization approved by the Minnesota Department of Public Health.

- MinnMed will contract with the state-approved laboratory for the purposes of testing cannabis.
- No MinnMed executive, or member of organization, will have any financial or other interest in a laboratory providing testing services.
- No employee of a laboratory providing external testing services for MinnMed will receive direct financial compensation from our organization.

The process for interfacing with the laboratory involves:

- Sampling of drug products,
- Filling out the proper paperwork for maintaining chain of custody and ordering analytical tests,
- Transporting the materials to the analytical laboratory, and
- Entering the results into the LIMs system by laboratory personnel.

The sampling interval will be based on our perpetual harvest production cycle based on 1/9 of the flowering stock. There will be a minimum of nine batches that will need to be tested. It is

important to note that a sampling of each separate drug product will undergo separate testing. Since we have six different products with potentially up to four formulations, we expect a minimum number of 216 product samples per year.

HPLC, AA, RT-PCR, and GC/MS of drug products will show potency, metals free, microbial free, and residue free formulations. The methods used will be shown by the vendor to be validated. Tests include:

- Microbiological testing using RT-PCR for genomic testing to look for mold, mildew, fungi, and bacteria
- Atomic absorption spectroscopy to test for Mercury, Cadmium, Copper, Chromium, Lead, Nickel, and Arsenic
- GC-MS detection to certify that the materials are pesticide and chemical residue free.
- HPLC Quantitative test for THC, THCa, CBD, CBDa, CBN

We expect this cycle time for testing to be no more than 7 days. Once the results are obtained by Quality Control, and they pass state mandated quality criteria, final drug product and product release documents will be issued.

f. Explain how the applicant will limit employee exposure to potentially unsafe chemicals or other unsafe conditions

Summary of the MinnMed's Hazard Communication Standard:

- Chemical and physical properties of hazardous materials (e.g., flash point, reactivity) and methods that can be used to detect the presence or release of chemicals
- Physical hazards of chemicals (e.g., potential for fire, explosion, etc.)
- Health hazards, including signs and symptoms of exposure, associated with exposure to chemicals, and any medical condition known to be aggravated by exposure to the chemical
- Procedures to protect against hazards (e.g., personal protective equipment required, proper use, and maintenance; work practices or methods to assure proper use and handling of chemicals; and procedures for emergency response)

- Work procedures to follow to assure protection when cleaning hazardous chemical spills and leaks
- Where MSDSs are located, how to read and interpret the information on both labels and MSDSs, and how employees may obtain additional hazard information

The personal safety and health of each employee of this company is of primary importance. MinnMed's policy is to maintain a safe and healthy working environment at all times, and to comply with Occupational Safety and Health Administration (OSHA) regulations as well as state and local safety requirements.

The prevention of occupationally induced injuries and illnesses is a management priority and will be given precedence in all operational matters. MinnMed will not knowingly allow unsafe conditions to exist, or permit employees to participate in unsafe activities.

MSDSs will be filed in the corresponding part file in the master inventory parts file. The safety coordinator should ensure that an MSDS is available on every substance on the list of hazardous chemicals and should be open to review by employees at all times. The purchasing agent will be responsible for obtaining and updating MSDSs.

The safety coordinator will make a List of Hazardous Chemicals with the operational areas they are used in and the corresponding MSDS for each chemical. The safety coordinator will maintain and update the list as necessary and will post a separate list in each work area. The safety coordinator will work with each department manager to incorporate protective measures for hazardous chemicals used in their area into their safe work procedures.

Safe Work Procedures: Control procedures are the basic means for preventing accidents. Each manager will tailor their department's safe work procedures to the job tasks being performed and the work area environment. Eliminating the hazard from the machine, the method, the material or the plant structure. Safety procedures include:

- Abating the hazard by limiting exposure or controlling it at its source
- Training personnel to be aware of the hazard and to follow safe work procedures to avoid it

- Prescribing personal protective equipment for protecting employees against the hazard

Protective Equipment: Employees are required to wear protective clothing and equipment as indicated by their department's safe work procedures. These procedures should specifically indicate when, where and what types of equipment are to be worn. Evaluation of types of equipment and clothing should include protection against damage to eyesight or hearing, dust or chemical inhalation or ingestion, skin or bodily exposure to caustic or toxic chemicals, falling **Workplace Safety Training:** Department managers should include workplace safety training in their new or transferred employee orientation. Training will include review of the Workplace Safety policy and procedures and the department's specific work safe procedures in accordance with development management. Further, each person will be informed that no employee is expected to undertake a job until he or she has received job instructions on how to do it properly and has been authorized to perform that job, and no employee should undertake a job that appears unsafe.

Reporting and Recordkeeping: All injuries, illnesses, and non-injury accidents that require medical attention other than first-aid and are the result of a work accident or from an exposure in the work environment must be reported to the department manager and the safety coordinator. Further, any incident including fire, explosion, water damage, spill, collapse and any similar event that results or could result in significant personal injury or damage to the building and equipment will be reported as above.

g. Describe the method of documentation of a plant and plant extract through the manufacturing process to allow for product traceability to support product recalls or notifications in the event an issue is found with a plant, batch of plants or plant extract

Our inventory traceability strategy has two components. First, BioTrack seed to sale inventory management that has been discussed in detail in previous sections and is highly applicable to manufacturing and dispensary operations. Basically, the clone is issued a physical RFID that follows it until it is processed. Lot labels are then generated from BioTrack. LIMs systems adds an important layer of traceability onto the BioTrack system that is less capable of handling the instrument data streams that are required for traceability once the RFID tags are no longer on the

individual plants and the plants become lots of drug substances. Please see the attached BioTrack materials specific to this section.

The LIMs provides an audit trail of data streaming right from the instruments and extraction equipment so that yield and quality can be monitored, traced, recorded and fully auditable and recorded. Capabilities include process management, audit trail management, chain of custody, compliance, calibration and maintenance of instruments, and reporting. Importantly, most LIMS have integrated and electronic data exchange so that external labs can upload and manintain traceability of lot certificates. These software solutions work in conjunction to allow for product complete product traceability to drug products.

Our LIMS must comply with, HIPAA and be GLP compliant. One attractive feature of a LIMS is audit logging of all changes to LIMS data, and in some cases a full electronic signature system rigorous tracking of field-level changes to LIMS data.

System requirements:

- Real time audit and electronic signature trail
- Traceability to the plant level and to the data associated with the lot.
- Electronic exchange for integration with BioTrak and accounting sytem.
- HIPAA compliant secure information and data backup
- Integrated accounting for transparency

h. Describe the process to collect, review, analyzes and determine needed actions when adverse event information is discovered

In the event that a drug product is found to be out of specification from internal or external testing results, the product is sequestered in a designated area for out of specification materials. Quality control then investigates the root cause of the out of specification results and issues a corrective action to the respective department manager. The Quality Department will continuously review corrective actions to ensure continuous improvement.

Adverse events can be found not just in testing. Events happen if any processing step is not followed or doesn't go as planned. This includes the deviation from any procedure that is not followed, even outside the lab.

The recall procedure outlines the steps and documents to be used for customer complaints and return of pharmaceutical products. In order to provide adequate control of inventory and timely refunds to customers, all products returned for any reason must be in accordance with the following return procedures:

- Upon notification by the customer of the intent to return goods or by quality assurance of a need to return a defective product, the sales, customer service, or service department will prepare a return goods authorization form and provide the RGA Number to the customer to identify the product upon return.
- If the RGA is for defective product, a customer complaint should also be completed.
- The RGA must be approved by the applicable sales/service or quality assurance department manager.

Receiving Goods and Processing: The RGA will be used as a receiving report for the return. All items received will be inspected, counted and recorded on this report. The individual responsible for receiving the items will sign and date the report. Any damage and discrepancies are to be noted on this report and resolved by customer service. The items will be stored in the returned goods area with a copy of the RGA for identification. Quality assurance (QA) will be notified to conduct the defect analysis.

If any goods are shipped back by the customer without notification, the goods should not be restocked and should be held in receiving until either sales or customer service completes an RGA or otherwise informs receiving of the appropriate disposition. Goods may not be restocked without QA approval.

The investigation will commence with a review of lot data and new analytical data that is generated in response to the return. The data will be compared and if the product falls outside of the specifications provided by the state, the company will issue a batch recall. Every customer who is affected by the recall will be contacted and the product will be replaced at no charge.

Customer service will document all customer complaints and forward copies to the quality assurance manager for analysis. MinnMed will provide at no charge, toll-free telephone support service to customers for as long as they use their equipment. This coverage, within reason, will include answering any question regarding the use, maintenance, service or trouble shooting of the equipment.

i. A detailed description of the controls the applicant will have over the components of the medication and any product containers

MinnMed is dedicated to patient safety. All excipients including glycerine, gel capsules, and coconut oil will be certified by the supplier as food grade or better. We will conduct supplier audits to ensure proper testing of the excipients for contaminants including metals, residues, microbiological content and impurities. We will also file and keep on hand all batch certificates provided by our suppliers so that product traceablity is achieved. We will have in-house analytical capabilities to measure the background on excipients, residues, and microbiological contaminants as well to show that they conform to the manufacturer's specifications.

It is critically important that one-time use vessels that are certified migration-free be used to store and contain the active pharmaceutical ingredient (API). We will use certified glass tincture bottles for bulk and tincture product offerings. Cartridges used for vapor will not be in direct contact with oil to minimize or eliminate any polymer contamination. Pill formulations will be certified by the vendor to be safe for human consumption.

j. Describe the expected hours of operation of the refining operations

Expected hours for the refining operation are from 8 a.m. to 5 p.m. Monday – Friday. The operation will only require one shift based on year one demand. This can be rapidly scaled up as needed in the future.

k. Describe the maximum and minimum number of staff expected to be working in the refining operations at any one time

The minimum and maximum number of employees deployed in the refining operations is determined by customer demand. Demand in year one calls for two employees. We expect to increase the number of refining employees in year two, and three to three and four respectively. The minimum number of workers in the refining operation is two. The maximum number required for five times capacity is five.

l. Describe the experience expectations of staff and whether you expect the staff to be full time employees or part time employees or contractors

Refining staff will be full time employees aided initially by several full time contractors. Contractors and consultants will establish the operation and SOPs and process controls in year one.

m. Describe the training that will be provided to refining staff

It is imperative that training records are maintained. Refining staff will receive training prior to beginning work within the facility. This training will be documented and placed in their employee file. A continuing education program will aid in developing staff members and preparing them for further advancement within the company. It is the responsibility of the facility manager to ensure training takes place for all team members prior to commencing work within the cannabis-infused products facility.

Our organization shall ensure that training is provided to a medical cannabis establishment agent before that person begins to work or volunteer at the medical cannabis establishment. The organization shall utilize multiple training and educational materials to aid in the training process as well as hands-on training at facility locations from experienced professionals. Documents will include log sheets, checklists, and inventory templates. Development checklists will be utilized for the purpose of tracking each individual employee's training and progress.

Other training include instruction on applicable laws and regulations; security and safety protocols; inventory management; security measures and controls applying to inventory for the prevention of diversion, theft or loss of cannabis; procedures for responding to an emergency; all state and federal statutes and regulations regarding confidentiality of information related to the medical use of cannabis; and all state regulations regarding the agent's division of employment.

The organization will fully prepare staff on all aspects of the business before commencing any operations. Training and education will be all encompassing covering regulatory compliance, seed-to-sale tracking, patient advocacy, point-of-sale training, security and diversion, health, safety and sanitation, transportation, and will also include all cultivation processes and applications, manufacturing of edibles and infused products, and front-of-the-house retail operations.

The organization provides a wide range of training and educational materials for employees:

- Standard operating procedures
- Training manuals
- Log sheets and templates
- On-site training
- Educational information
- Initial job training
- Job shadowing
- Video conferencing
- Phone support
- 24-hour live support

n. To the extent known, provide a list of expected refining staff (employees or contractors) and their qualifications

We expect to staff the refining operations with one extractor expert and one laboratory expert who will conduct internal testing and formulate and package products for shipment to the dispensary. The extraction, lab, and formulations experts will initially be Ph.D. chemists and

chemical engineers. They will train B.S. chemist level production personnel on production procedures. The company will always maintain external quality and validation lab services to ensure working qualified equipment.

Potential Start-up Staff includes:

1. Greg Goldston is our industry refining expert. His operation currently produces thousands of grams of oil every month. MinnMed staff, contractors, and consultants are to complete training in his facility in Colorado on all aspects of refining and formulation. Mr. Goldston will appoint a point contact that will travel to Minnesota to aid in start-up extraction and lab functions.
2. Dr. Conor Smith. Dr Smith has a Ph.D. in chemistry and is well versed in lab and chemical processing operations. He holds a bachelor's degree in chemical engineering and has been involved in process chemistry for over 10 years. Dr. Smith will be the first to bring medical cannabis completely through the operation from cured plant to medicine.
3. Doug Fryer. Mr. Fryer holds a BS in chemistry and has 20 years' experience in cGMP laboratory facilities. He holds expert knowledge in HPLC, separations, AA, formulations and quality documentation. Mr. Fryer will aid Dr. Smith in implementation of analytical methods and in process testing.
4. Dr. Jon Thompson. Dr. Thompson will oversee the implementation of the quality function, facilitate laboratory start up, act as a liaison with our bank of pharmaceutical and industry consultants, and also be highly active in implementing MinnMed's Lean Operating Model.
5. Jon Berdahl, Pharmaceutical Consultant who will drive process and quality documentation and creation.

4. Distribution

a. Describe the experience of the applicant in providing care or service to patients and caregivers. In addition, describe any experience in managing the product inventory of high value and potential risk for diversion.

The Minnesota Medical Solutions team, our partners, and our corporate mission, are entirely dedicated to our patients' well-being and optimization of those patients' outcomes. Our well-seasoned team of physicians, pharmacists, and established medical cannabis providers, bring nearly 100 years of combined direct patient care experience to our distribution facility operations. Our physician and pharmacist leaders have worked in a variety of clinical practice settings and bring a broad spectrum of experience in developing and executing best practices and evidence-based medicine.

The Minnesota Medical Solutions pharmacists and medical team [redacted] to the patient's care plan is seamless and effortless.

The pharmacist leaders in Minnesota Medical Solutions have extensive experience monitoring, maintaining, and auditing a 'traditional' controlled-substance inventory in a retail setting. Most every institutional and retail based pharmacy in the state has an inventory of valuable, very potent, and tightly controlled medications. It is a primary duty of a pharmacist to ensure these controlled-substances are stored securely and distributed appropriately to prevent misuse, abuse, and diversion. The Minnesota Medical Solutions pharmacists are determined and dedicated to exceeding the established best practices in the pharmacy industry, for the ardent management of an inventory of cannabis based medicines.

In addition to our pharmacist team, our Chief Operations Consultant, Brooke Gehring, and many of our national cannabis industry expert partners including Greg Goldston, Jared Penman and our

consultants with the American Cannabis Company have extensive, direct experience in preventing the diversion of medical cannabis.

b. Describe the computer systems, tools and information that will be provided to distribution site pharmacists to provide patient and caregiver guidance on medical cannabis products and dosages for their conditions

The distribution facility staff at Minnesota Medical Solutions will receive robust, professional distribution facility training provided by our education partner Clover Leaf University. (Please see the "Minnesota Education Protocol" section of our employee handbook attached to section E, #2). In addition to the extensive in-house training and education regarding the safe and effective use of cannabis based medicines, our providers will be well versed in the latest clinical findings regarding the use of those cannabis based medicines. Our pharmacists will not only complete medical cannabis related continuing education course work, they will also use the experience and expertise they garner though working in the industry to create and provide continuing education opportunities for their fellow clinicians. All of the Minnesota Medical Solutions distribution facilities will maintain connectivity to the vast clinical resources of the internet.

Many of the teachings and knowledge our providers share with patients in our distribution facility will be reinforced through the creation and propagation of patient education materials, including brochures, pamphlets, and videos. These patient education materials will be available to MinnMed's patients in our dispensaries and available online. In addition to producing its own vast library of education brochures and materials, MinnMed is also vetting current nationally available materials.

c. Describe the computer systems, tools and information that will be provided to distribution site pharmacists to provide patients and caregivers information on potential drug interactions and side affects

As detailed in RFA topic 4a and 4b, the Minnesota Medical Solutions pharmacists, through extensive additional training, will become medical cannabis specialists. The topics of identifying potential drug interactions and teaching the patient to identify, mitigate, and report potential side effects are critical components

The teachings and knowledge shared with our patients with regards to potential drug interactions and potential side effects will, again, be backed up with tools such as brochures, pamphlets, and videos available online and in the Minnesota Medical Solutions dispensaries.

d. Describe the processes and training that will be provided to distribution site staff and pharmacists if they suspect a patient or caregiver is diverting medical cannabis

It will be a primary responsibility of every Minnesota Medical Solutions provider and distribution facility employee to safeguard their communities from the risk and threats posed by the intentional diversion of medical cannabis. Our providers and staff also are bound by another primary duty to compassionately serve the health care needs of our patients. It is truly our mission to successfully balance these two demands.

The distribution facility staff of Minnesota Medical Solutions will naturally develop a professional, supportive rapport with their patients, patients' families, and patients' caregivers. It will be incumbent upon the Minnesota Medical Solutions distribution facility staff to know their patients, the conditions that require the patient to seek cannabis based medicines, and the patient dose requirements. Based on our well researched and expertly developed dose recommendation protocols, our providers will maintain oversight of the supply of medication that is distributed to our patients, never exceeding a 30-day supply for well controlled, established patients.

When a patient requests a supply of medication that exceeds these 30-day quantity limitation thresholds, our staff will remind the patient of the statutory constraints, but will also probe the patient's medication usage history, in addition to the patient's symptom reporting history. If it is determined that the patient needs larger individual doses to treat their condition, the total supply can be cautiously adjusted upwards to the new 30-day statutory limit.

If patients verbally express the desire to obtain larger quantity of medication to provide medication to individuals other than themselves, the Minnesota Medical Solutions staff will again remind the patient of the state laws and rules regarding the intentional diversion of cannabis based medicines. A notation will be placed in the patient's profile that alerts staff to the expressed desire to obtain excessive supply, and the staff can react according, but professionally and compassionately, to similar requests in the future.

Additional functionality available within the distribution facility's BioTrackTHC software, will allow the Minnesota Medical Solutions providers to place additional limitations of the quantity of medication, and the types of medications, that a patient may purchase at a single time or cumulative over a defined period of time. The distribution facility management, as an unfortunate last course of action, can sever relationships with a patient.

e. Describe the computer systems, tools, information and training that will be provided to distribution site staff and pharmacists regarding documentation and notification of MDH of adverse events potentially attributable to medical cannabis

Without further statutory guidance, or specific rules from the Minnesota Department of Health – Office of Medical Cannabis, MinnMed will develop its own internal documentation form to capture relevant information regarding any observed or reported adverse effects arising from the use of our cannabis based . A copy of the reporting form will be sent to the Minnesota Department of Health – Office of Medical Cannabis in a timely fashion and a copy of the documentation will be scanned and stored within the patient's profile in the BioTrackTHC software.

Minnesota Medical Solutions would be honored and eager to collaboratively work with the Minnesota Department of Health – Office of Medical Cannabis to develop any other reporting and tracking mechanism to capture information surrounding any adverse effects from cannabis based medicines.

f. Describe the process for handling medical cannabis within the distribution site to minimize the opportunity for theft or diversion

The pharmacists that work in Minnesota Medical Solutions dispensaries are very well versed in maintaining positive controls on high value, very potent, controlled substances. As clinicians, as well as being responsible members of our neighborhoods and communities, we realize the critical importance of identifying and preventing diversion of any type.

The Minnesota Medical Solutions pharmacists and director of security will work collaboratively to execute the distribution facility security plan.

Access points to secure sections of the distribution facility will include signage stating: ***"PERSONS UNDER 21 YEARS OF AGE NOT PERMITTED ON THESE PREMISES"*** and at each entrance in a conspicuous area the following signage ***"THESE PREMISES ARE UNDER CONSTANT VIDEO SURVEILLANCE."***

[redacted]

[redacted]

[redacted]

g. Describe the process for accepting new product into distribution site inventory

While working with the director of security to ensure complete execution of the Minnesota Medical Solutions Distribution facility security plan and keeping in accordance of the Minnesota Medical Solutions transportation plan, the distribution facility staff will transfer inventory into and out of the distribution facility. [redacted]

[redacted]

h. Describe the expected days and hours of operation of each of the distribution sites

The hours of operation of the Minnesota Medical Solutions dispensaries will be structured to accommodate our patients' needs as best we can. We initially plan to staff the dispensaries from 11 a.m. to 7 p.m., six days each week (Monday through Saturday). Based on sales volume, patient feedback, and with consideration for the local zoning and the surrounding community, Minnesota Medical Solutions dispensaries will expand or contract hours of operation and days of operation, to best serve our patients.

Minnesota Medical Solutions will consider many alternative schedules such as later evenings or earlier morning starts to accommodate additional patients. An example of this may be 8 a.m. to 4 p.m. on Monday, Wednesday and Friday and possibly 1 p.m. to 9 p.m. on Tuesday and Thursday. We may also consider less than six days per week in outstate dispensaries if it is more cost effective for our patients. We will work with our patients, patient/parent advisory group and the communities to optimize this schedule for all parties.

i. Describe the maximum and minimum number of staff expected to be working in each distribution site at any one time

[redacted]

The Minnesota Medical Solutions distribution facility workflow is scalable, in accordance to patient demand. There is no maximum number of staff that could work at any given time, except limited by the physical space of the distribution facility. At times, security concerns may dictate the presence of additional security officers; for instance the transfer/delivery of unordinary

amounts of medical cannabis or currency. Only staff scheduled or designated to work during a given shift will be given permission to be in the distribution facility. The distribution facility may be used to hold occasional staff meetings, at which times unscheduled staff might be on-site.

j. Describe the experience expectations of staff and whether you expect the staff to be full time employees or part time employees or contractors

The MinnMed distribution facility staff will be a highly qualified and highly proficient collection of individuals. We will have demanding pre-employment standards to ensure we attract only the people who will allow us to successfully execute our mission. Every distribution facility employee will be at least 21 years of age, and have no history of disqualifying felony convictions. Additional required criteria will include a high school diploma or GED equivalency, excellent verbal and written communication skills, cash handling and management skills, as well as basic office computer skills.

The MinnMed distribution facility staff engaged in direct patient care should have formal training and active and valid state certification in a health related field. We will actively recruit and retain highly qualified licensed pharmacy technicians to staff a variety of roles in our dispensaries. We will also recruit and retain qualified pharmacy interns, concurrently enrolled in the professional curriculum of an accredited college or school of pharmacy. To hold the position of a distribution facility pharmacist, the employee will have obtained and maintain active licensure, in good standing, as a pharmacist in the state of Minnesota. We will preferentially hire licensed pharmacists who are willing to serve in a mentorship role for tomorrow's pharmacists, by having obtained and maintaining certification as a Pharmacy Preceptor from the Minnesota Board of Pharmacy.

To attract and retain the best employment candidates to work in a Minnesota Medical Solutions distribution facility, we must offer work schedules that allow the employee to maintain a harmonious work/life balance. For some employees, this may require full-time employment. For others to maintain a harmonious work/life balance, part-time employment may be the employee’s only option. We will not dilute our resource pool by locking employees into exclusively part-time or full-time employment status. Many employees do not need or desire

permanent or year-round employment to maintain their work/life balance. Exceedingly qualified individuals may be considered for contract assignments, in accordance with the Human Resources Policies of Minnesota Medical Solutions, but we anticipate these cases and circumstances to be rare.

k. Describe the training that will be provided to distribution site staff

All Minnesota Medical Solutions distribution facility employees will receive comprehensive training prior to beginning work within the facility. It is the responsibility of the distribution facility managers to ensure training has taken place for all team members prior to commencing work within the distribution facility. All distribution facility staff will be required to go through our training course with Clover Leaf University. Please see the Minnesota Education Protocol section of the employee handbook attached to part E, #2. Minnesota Medical Solutions will utilize multiple training and educational materials and methods to aid in the training process as well as hands-on training at facility locations from experienced distribution facility professionals. Development checklists will be utilized for the purpose of tracking each individual employee's training and progress.

All distribution facility team members will be provided with extensive training on all functions of front end operations. This will include training in all applicable laws and regulations; security procedures and safety protocol; point of sale (POS) software (BioTrackTHC) training; inventory management; patient advocacy training; security measures and controls applying to inventory for the prevention of diversion, theft or loss of cannabis; procedures for responding to an emergency; all state and federal statutes and regulations regarding confidentiality of information related to the medical use of cannabis; and all state regulations regarding retail medical cannabis operations.

Adhering to all state, local, and company specific regulations is of utmost importance to create an end product with the highest efficacy for patients. Patient confidentiality policies will be in place to ensure patient information is secured at all times. All distribution facility team members will be required to have a general knowledge of all applicable laws and regulations dealing with the retail distribution of medical cannabis. This includes but is not limited to: proper

identification of registered patients through the electronic verification system, allowed patient quantities of medical cannabis to be purchased, on-site consumption laws, hours of operation, etc.

It is the chief distribution facility officer and the chief compliance officer's duty to ensure regulatory requirements are followed at all times. The chief distribution facility officer and the chief compliance officer will maintain a zero tolerance policy for any infractions that would go against state regulations.

The entire staff must be trained in all current regulations. A learning competency test shall be administered to all team members by the chief distribution facility officer and/or the chief compliance officer and cover topics related to any regulations that pertain directly to team members' duties. All regulatory test scores must be 100% before a team member can work within the Minnesota Medical Solutions distribution facility.

All new regulations shall be implemented with the exact date they become effective. Training and testing of new regulatory measures shall take place before the effective date in order to ensure that all team members attain a complete understanding of such measures and can fully and accurately implement new regulations on the effective date.

The chief distribution facility officer and the chief compliance officer will be responsible for ensuring adherence to all state and federal statutes and regulations regarding confidentiality of information related to the medical use of cannabis.

All team members will be adequately trained on the point-of-sale system (BioTrackTHC). Training on the POS system will include how to input properly new inventory items as well as how to take items out of the system; how to input patient records into the system; making a sale and sales entries; end-of-day procedures and cash balancing, etc. Properly training distribution facility employees on the BioTrackTHC POS system will be critical for inventory management and accurate accounting. The POS system will prove vital for proper recordkeeping for the state required seed-to-sale tracking of all cannabis based medicine.

Patients are the core purpose for the medical cannabis industry and therefore proper patient advocacy training is essential in order to have a successful medical cannabis retail operation. Patient confidentiality is of utmost importance; any and all patient information is confidential and is to remain secured on location. Any unauthorized release of patient information will be grounds for immediate job termination.

The chief distribution facility officer is responsible for maintaining a training record for each distribution facility team member. Such record will include, at a minimum, documentation of all required training, including:

- The name of the person receiving the training;
- The dates of the training;
- A general description of the topics covered;
- The name of the person supervising the training; and
- The signatures of the person receiving the training and the distribution facility manager.

Company leadership and distribution facility management will offer educational clinics on subjects within the organization to keep all employees current on legal issues, compliance, new innovations, personal and professional development, and other necessary and relevant interests.

l. To the extent known, provide a list of expected distribution site staff (employees or contractors) and their qualifications

Employee Position Qualifications

R. Brian Harvey, RPh - Chief Pharmacist - Licensed Pharmacist (Mn #117102)

Ron Owens - Director of Security - Licensed Law Enforcement

Harlan Langstraat – Licensed Pharmacist – potentially the Rochester distribution facility head pharmacist if a site in Rochester is chosen over Mankato in district 1.

Total Possible Points-up to 50

5. Transportation

Please provide the following information:

a. Describe the experience of the applicant in transporting product of high value and potential risk for diversion.

The Minnesota Medical Solutions team's director of security, Ron Owens, is a 20-plus year veteran of law enforcement including several years of experience as a special agent with the U.S. Secret Service. His detailed experience in transport, motorcade movements, and security operations are unmatched. His experience includes the protection and transportation of the President, Vice President, and former Presidents of the United States of America, as well as visiting foreign heads of state. Mr. Owens will rely upon his experience of proactive risk assessment and threat analysis to develop security plans and movements before executing them successfully. He is further experienced in organizing, managing, and coordinating with local police counterparts and corporate security to accomplish the transportation of the medical cannabis and to prevent diversion. He is an experienced operator of armored vehicles as well and aware of the inherent dangers in operating such vehicles as related to weight and performance characteristics.

Transportation Plan: Minnesota Medical Solutions will comply with all state and local statues, regulations and ordinances regarding the transportation of medicinal medical cannabis. Minnesota Medical Solutions will have standard operating procedures for transportation and will train all staff accordingly. The following standard operating procedures will be maintained by the MinnMed management in regard to the transportation of medical cannabis between the Minnesota Medical Solutions and other establishments.

MinnMed will ensure that the proper manifest forms are filled out and filed before transporting and cannabis medicines.

Transportation Records/Documentation: MinnMed will ensure compliance with all required state laws and regulations pertaining to recordkeeping and documentation on the transportation of medical cannabis and cannabis-infused products.

Transportation Plan:

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

b. A detailed description of the proposed method of transportation of medical cannabis products including the following:

i. The frequency expected of medical cannabis transport from the manufacturing facility to each of the distribution sites

ii. Explain how you intend to comply with the requirements identified in the draft Manufacturer Rules for transportation of medical cannabis.

iii. The types of vehicles used to transport the medical cannabis

[redacted]

[redacted]

[redacted]

iv. The containers the medical cannabis will be stored in during transportation

[redacted]

v. The number of employees expected to be engaged for transportation activities

[redacted]

vi. The process that should be followed if an emergency (traffic accident, extreme weather, etc.) occurs during transport

[redacted]

vii. The process that should be followed if the transportation staff determines medical cannabis is missing, whether misplaced or intentionally diverted

The Minnesota Medical Solutions team will develop and adopt standard operating procedures for the transportation and will train all staff accordingly. The adoption of such procedures will allow for the quick recognition of missing medical cannabis and provide an equally effective process for the investigation of the missing item(s).

The following standard operating procedures will be maintained by the MinnMed management in regard to the transportation of the medicinal cannabis and/or currency between the production center and distribution facility locations.

[redacted]

c. A description of the proposed method to minimize the risk of diversion or theft of medical cannabis during its transport from the manufacturing site to the distribution sites

The Minnesota Medical Solutions team will develop and adopt standard operating procedures for the transportation and will train all staff accordingly. The adoption of such procedures will allow for the quick recognition of missing medical cannabis and provide an equally effective process for the investigation of the missing item(s).

The following standard operating procedures will be maintained by MinnMed management in regard to the transportation of medicinal cannabis and/or currency between the production center and distribution facility locations.

Prior to the transportation of any medicinal cannabis and/or currency, the MinnMed security officer will complete a detailed manifest that includes the following basic information: name, vehicle used, date, start time, arrival time, route of travel, and detailed description of the medicinal cannabis or currency being transported. The corresponding BioTrackTHC inventory management software system will also be utilized in order for a continuation of the chain of custody. The director of security for Minnesota Medical Solutions will maintain a copy of the trip plan document on file for permanent retention.

d. To the extent known, provide a list of all expected transportation staff (employees or contractors) and their qualifications

Ron Owens - Director of Security - Licensed Law Enforcement

MinnMed is currently evaluating a large number of candidates via online job listing sites and will be completely staffed in December as needed.

6. Inventory Management

Please provide the following information:

Describe the processes and computer systems that will be utilized to manage medical cannabis inputs (including plant matter, chemicals, machinery, etc.) and final product inventory (at all locations including when the final product is in transport). Include the real-time processes to document inventory as well as the schedule and processes to audit the accuracy of inventory.

Inventory Management

BioTrackTHC: MinnMed will utilize BioTrackTHC™ software programs and hardware devices for inventory management, sales procedures, seed-to-sale tracking and other related operating functions.

BioTrackTHC™ provides effective cutting-edge technology solutions for the emerging legal cannabis industry that (1) prevents product theft; (2) assists business owners with running their cultivating, packaging, and retail operations more profitably and to better comply with the law; (3) all without leaving sensitive business and consumer data vulnerable in the cloud. Specifically, BioTrackTHC™ is the industry's only true seed-to-sale software system with enterprise resource planning, complete inventory tracking, point-of-sale, marketing, financial reporting and regulatory compliance features. And because it is a server based system with advanced security features, no one, not even the BioTrackTHC™ team can access business or consumer information without permission. Please see the associated BioTrack attachment.

Chain of Custody: The chain of custody of all medical cannabis and cannabis medicines shall be documented, through RFID scanning and logging as it moves through each process within the cultivation center and/or distribution facility(s), at all times. Chain of custody documentation shall be maintained and be made available to the Department and any law enforcement agency upon request.

All plants within a plant group shall be given a unique batch number during the initial transplant. Batch numbers shall remain with each plant and plant group through final packaging and sale. Transplanting shall occur prior to a plant reaching 18 inches in height. At the time of transplant from clone to the second vegetative phase, all plants shall be assigned a specific number and tagged with an individual tag containing the batch number and plant number. Information pertaining to each plant, and batch of plants, including the strain and location shall be recorded electronically (RFID) or kept in an electronic file until harvest or destruction.

All plants shall be physically inventoried on a daily basis by the cultivation team, and records of the inventory shall be kept at the facility. All batch movements shall be tracked and recorded so their physical location is known at all times during the cultivation process and production process. Any plants removed from a batch shall be recorded on a permanent record which is maintained on-site. All batch numbers shall be included on approved labels for all products designated for distribution to a distribution facility.

Tagging and Tracking within the Manufacturing Facility: The following will represent data collection and product lock down points within the facility in a seed-to-sale time line. Facility management is responsible for coordinating with the manufacturing manager and the processing manager to ensure every plant and any amount of cannabis product is tracked throughout the plant and product life cycle within the MinnMed facilities.

- **Sprouted Seed and Clones:** Receive batch number and tag identifying batch, tracking begins
- **Transfer to V2:** Prior to reaching 18 inches, all plants shall receive a unique plant identification number and be tagged with both the batch number and unique plant number, RFID scanned, location changed, data recorded and transferred.
- **Transfer to V3:** RFID scanned, location changed, data recorded and transferred
- **Transfer to Designated Flower Zone:** RFID scanned, location changed, data recorded and transferred
- **Harvest:** RFID scanned, weight recorded, location changed, data recorded and transferred

- **Trimmed:** RFID scanned, weight recorded, location changed, data recorded and transferred
- **Drying:** RFID scanned, weight recorded, location changed, data recorded and transferred
- **Curing Pre-Testing:** Secured/ lock down for testing results, RFID scanned, weight recorded, location changed, and data recorded and transferred
- **Curing Post-Testing:** If approved for release; RFID scanned, weight recorded, location changed, data recorded and transferred
- **Processing:** Labeled, RFID scanned, weight recorded, location changed, data recorded and transferred to secured safe to await delivery to store location
- **Delivery:** RFID scanned, weight recorded, location changed, data recorded and transferred to transport vehicle

Inventory Control: The following information outlines how the cultivation facility staff will maintain inventory control within the cultivation facility. Management shall oversee the facility inventory control systems at all times in order to ensure that daily inventory documentation, batch specific documentation, product transfers, inventory discrepancies, and recordkeeping are always maintained and up to the minute. The appropriate cultivation facility staff member shall:

- Ensure and document that all weighing and measuring equipment devices used at the cultivation center are licensed pursuant to the Weights and Measures Act and the associated administrative rules (8 Ill. Adm Code 600)
- Complete a shipping manifest using a form prescribed by the Department
- Maintain documentation of the licensure of the commercial device
- Provide a copy of the license of the commercial device to the Department for review upon request
- Ensure and document that all weighing and measuring equipment devices used at the cultivation facility are always calibrated and accurate

Initial Inventory Documentation: Prior to commencing business the cultivation center compliance manager shall:

- Document that the cultivation center has commenced business with no cannabis on hand, and recorded this fact as the initial inventory.
- Establish ongoing inventory controls and procedures for the conduct of inventory reviews

and comprehensive inventories of cannabis, which shall enable the manufacturing facility to detect any diversion, theft or loss in a timely manner.

Weekly Inventory Documentation: Upon commencing business, management shall ensure a weekly inventory of cannabis stock, which shall include, at a minimum:

- The date of the inventory;
- Summary of the inventory findings;
- The name, signature and title of the individuals who conducted the inventory and the agent-in-charge who oversaw the inventory; and
- The product name and quantity of cannabis plants or cannabis-infused products at the facility.

Daily Inventory Documentation: The compliance manager shall establish and implement an inventory control system that documents each of the following:

- Each day's beginning inventory
- Acquisitions
- Harvests
- Sales
- Disbursements
- Disposal of unusable medical cannabis
- Ending inventory

Batch Specific Inventory Documentation: For each batch of cannabis cultivated, the processing manager shall document the following into the inventory control system:

- The batch number
- Whether the batch originated from medical cannabis seeds or medical cannabis cuttings
- The strain of the medical cannabis seeds or medical cannabis cuttings planted
- The number of medical cannabis seeds or medical cannabis cuttings planted
- The date on which the medical cannabis seeds or cuttings were planted
- A list of all chemical additives used in the cultivation, including, without limitation, non-organic pesticides, herbicides and fertilizers
- The number of medical cannabis plants grown to maturity

- Harvest information, including, without limitation: the date of harvest; the final yield weight of processed usable medical cannabis; and the name and medical cannabis establishment agent registration card number of the medical cannabis establishment agent responsible for the harvest
- The disposal of medical cannabis that is not usable, including a description of and reason for the medical cannabis being disposed of including, if applicable, the number of failed or other unusable medical cannabis plants, the date of disposal, confirmation that the medical cannabis was rendered unusable before disposal, the method of disposal, and the name and medical cannabis establishment agent registration card number of the medical cannabis establishment agent responsible for the disposal

Product Transfer Inventory Documentation: When providing medical cannabis to another medical cannabis establishment the following information shall be recorded:

- The amount, strain, and batch number of medical cannabis provided to the medical cannabis establishment;
- The name and medical cannabis establishment registration certificate number of the other medical cannabis establishment;
- The name and medical cannabis establishment agent registration card number of the medical cannabis establishment agent who received the medical cannabis on behalf of the other medical cannabis establishment; and
- The date on which the medical cannabis was provided to the medical cannabis establishment.

Sales and Disposal Records: Management shall ensure documentation of all medical cannabis sold or otherwise disposed, including but not limited to:

- Date of sale;
- Name of the distribution facility to which the medical cannabis was sold;
- Batch number, product name and quantity of cannabis sold; and
- If applicable, the date, quantity, manner in which and reason why any cannabis was destroyed.

Documentation of Inventory Discrepancies: If an agent from any MinnMed facilities identifies a reduction in the amount of medical cannabis in the inventory not due to documented causes, management shall determine where the loss has occurred and take and document corrective action. If the reduction in the amount of medical cannabis in the inventory is due to suspected criminal activity by an employee, facility management shall report the medical cannabis establishment agent to the Department and to the appropriate law enforcement agencies. Any loss or theft of medical cannabis shall be documented and reported from facility management to the appropriate law enforcement agency and to the Department; and the facility head of security shall ensure copies of all documentation are maintained as required and provide copies of the documentation to the Department for review upon request.

Waste Inventory Documentation: All data pertaining to the disposal of all cannabis that is not usable shall be tracked in the inventory control system including:

- Description of and reason for the medical cannabis being disposed of, including, if applicable, the number of failed or other unusable cannabis plants;
- Date of disposal;
- Confirmation that the cannabis was rendered unusable before disposal;
- The method of disposal; and
- The name and medical cannabis establishment agent registration card number of the cultivation facility agent responsible for the disposal.

Product Information: For each batch of medical cannabis products or medicine produced in the manufacturing facility, the following information shall be recorded for internal use and to be made available to the purchasing distribution facility upon or prior to delivery:

- Batch number
- Whether the batch originated from cannabis seeds or medical cannabis cuttings
- Strain of the medical cannabis seeds or medical cannabis cuttings planted
- Number of medical cannabis seeds or medical cannabis cuttings planted
- Date on which the medical cannabis seeds or cuttings were planted
- A list of all chemical additives used in the cultivation, including, without limitation, non-organic pesticides, herbicides and fertilizers

- Number of medical cannabis plants grown to maturity
- Harvest information, including, without limitation:
    - Date of harvest
    - Final yield weight of processed usable medical cannabis
    - Name and medical cannabis establishment agent registration card number of the cultivation facility agent responsible for the harvest

Inventory Record Keeping: The cultivation facility compliance manager shall maintain the documentation required for at least five years after the date on the document and provide the documentation to the Office of Medical Cannabis for review upon request.

Loss or Theft: In the event that any loss or theft of cannabis from the cultivation facility occurs, the compliance manager shall document and report the incident to the appropriate law enforcement agency and to the Office of Medical Cannabis. All records and documentation required shall be maintained for a minimum of five years after the date recorded of the documentation. Copies of the documentation shall be made available to the Office of Medical Cannabis for review upon request.

Annual Inventory Procedure: A complete and accurate record of all plant stock or products of cannabis on hand shall be prepared by management annually on the anniversary of the initial inventory, or another date that the cultivation center agent-in-charge may choose, so long as it is not more than one year following the prior year's inventory.

All inventory procedures and other documents required shall be maintained on the premises and made available to the Department at all times. Inventory control procedures and protocols are also explained in more detail within the SOPs.

7. Technology Usage

Please provide the following information:

Provide a high level description and diagram of the computer systems that will be utilized to manage all of the medical cannabis operations from cultivation to manufacturing to distribution

Technology is one of the critical components of all businesses. As such, Minnesota Medical Solutions understands this and has employed a Chief Technology Officer as well as other leaders

with significant HealthCare specific enterprise level IT experience managing HIPAA and PCI compliant infrastructure and systems. Upon selection Minnesota Medical Solutions will perform thorough assessments and implementations of the required systems to fully meet the finalized requirements detailed in Chapter 4770, Medical Cannabis Registry Program; Manufacturing Requirements.

Cultivation, Inventory Management and Point of Sale Systems.

Minnesota Medical Solutions understands the critical requirement for a comprehensive Seed to Sale system and has selected an industry leader, BioTrackTHC. BioTrackTHC provides enterprise level software created specifically for the cannabis industry. With over 6 years of experience at over 900 locations nationwide, BioTrackTHC has the knowledge and infrastructure to grow with the ever changing cannabis industry. As experts in state government compliance BioTrackTHC understands the need for transparency and accountability in this emerging market. With a product suite encompassing Cultivation Facility Management, Inventory Tracking, and Point of Sale, BioTrackTHC has everything covered from seed to sale. See the attached BioTrackTHC Management Software document for additional technical details and screen shots.

Security Systems.

Access Control Systems.

Upon selection Minnesota Medical Solutions will perform a thorough assessments and selection of a comprehensive access control system to meet the Minnesota requirements. The systems will operate as described in previous sections of the RFA.

Laboratory and Production Systems.

The extraction and laboratory functions of Minnesota Medical Solutions will be tracked within the BiotrackTHC system. Quality inputs such as potency and purity data will be directly entered into the system to produce the necessary product labels and lot certification documentation. In addition, a cloud hosted Laboratory Information Management System and Electronic Laboratory

Notebook which are HIPAA compliant will be utilized to provide a CFR 21 Part 11 compliancy for data audit trails.

Greenhouse Systems.

Minnesota Medical Solutions will utilize a collection of Greenhouse technologies as described within previous sections of the RFA.

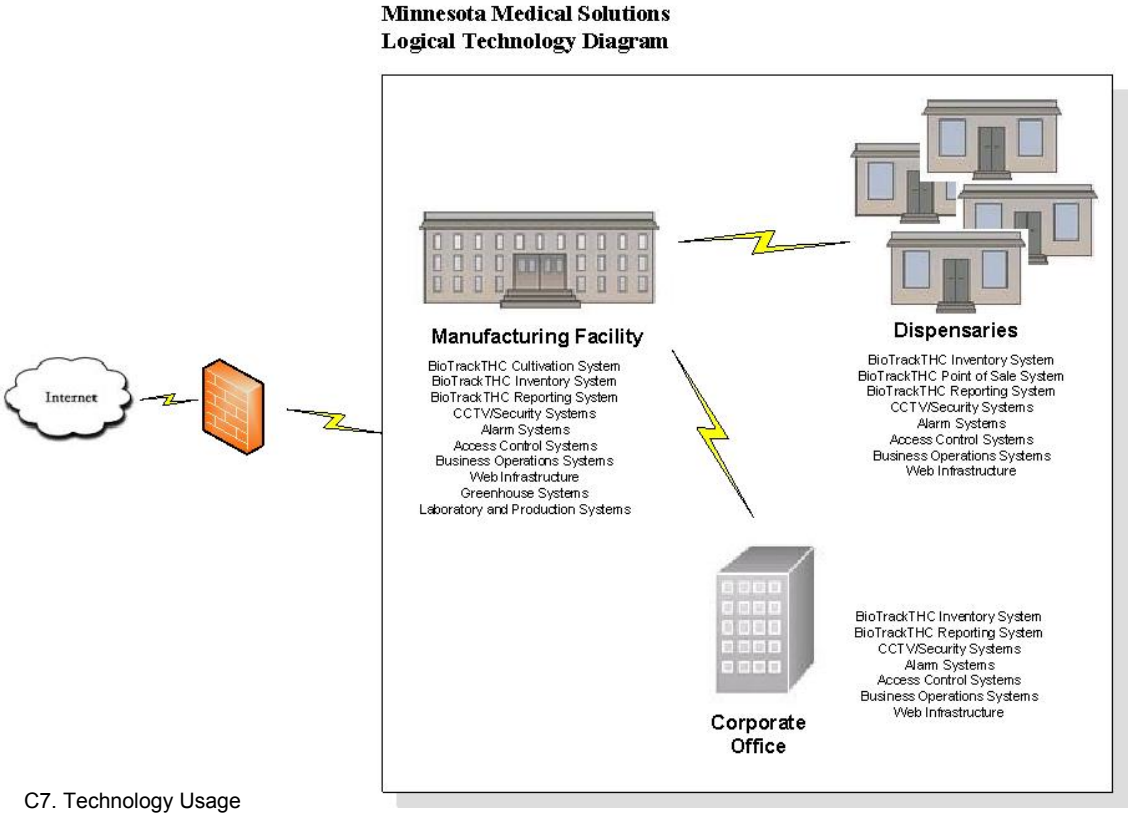
Business Operations Systems.

Minnesota Medical Solutions will require a suite of business operations technology. MinnMed has selected the cloud hosted Microsoft Office 365 for Business as our enterprise office, storage and collaboration solution. We will also utilize the QuickBooks Enterprise Manufacturing Solution for our enterprise accounting software. MinnMed will utilize ADP for our Payroll systems. Upon selection Minnesota Medical Solutions will perform a thorough assessments and selection of a comprehensive internet, telephony and network security providers from regionally available reputable vendors.

Web Systems.

Minnesota Medical Solutions will contract with a reputable internet hosting provider for our website infrastructure.

Computer Systems Diagram.



8. Security Plan

a. All measures employed to provide physical security of the manufacturing facility

The structures and surrounding areas used by the Minnesota Medical Solutions will be the premiere example of security expectations. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

b. Identify all points of entrance and exit at the manufacturing facility.

All points of entrance and exit can be seen on the site diagram layout provided as an attachment to this application.

c. Provide all measures installed to limit access to all restricted entry areas identified on the floor plan

Numerous levels of security will be taken to restrict unauthorized entry into the areas identified as critical or sensitive. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

d. Provide the name and address of any outside contractors hired to provide security

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Making sure that unregistered persons are kept away from the establishment and its premises is another function of MinnMed's security plan. Verification of registered agents will remain the establishment's highest priority and top security policy. The use of properly trained and armed

security personnel is imperative to preventing a violent encounter and projecting a safe environment over the distribution facility site and its adjoining parking lot areas.

Security personnel responsibilities will include responding to all emergencies within the distribution facility site and upon the adjoining property, performing patrols, escorting patients and employees as necessary, responding and investigating calls for service and preparing written reports, staffing and monitoring the communications center, enforcing administrative rules, and serving as a positive representative of the company to patients, community, and law enforcement.

e. Provide the design of the surveillance system that will be installed at the facility. This must include the location of all cameras on a floor plan of the facility

The use/monitoring of a state-of-art digital camera system for internal and external monitoring is crucial to reducing diversion.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

f. Provide the storage capabilities for the onsite retention of historical recordings

The storage of historical electronic recordings will be crucial to maintaining site integrity and in potential diversion loss investigations. The surveillance footage collected during routine operation will be initially retained on-site for 90 days and then systematically and routinely transferred to an offsite storage site for an additional period of no less than 90 days. Critical paper documents can be also stored physically on-site indefinitely as well as electronically processed and stored similarly to the electronic recordings.

g. Should the Minnesota Department of Health request a real time feed of the manufacturing and distribution facilities, describe what capacity and ability the manufacturer has to provide that ability

[redacted]

9. Disaster Recovery and Continuity Planning

In the event a situation disrupts the cultivation, manufacturing or ability to distribute medical cannabis whether due to weather, equipment or product malfunction or any other circumstances, explain the steps and timeline to resume operations and minimize the potential impact to patients.

With over 20 years of enterprise IT experience on staff, Minnesota Medical Solutions understands the need and importance of business continuity and disaster recovery planning. As a part of our business implementation, MinnMed will develop a complete business continuity and disaster recovery plan. As a solution/preventative measure to unforeseen disasters, we will build our manufacturing and distribution facility facilities to include backup power supplies and safety controls on critical systems and building infrastructure. We will establish service level agreements with our infrastructure and facilities support vendors to insure minimal disruption due to infrastructure or equipment malfunction. Additionally, we have and will select our core technologies with enterprise cloud-based solutions when applicable to provide maximum availability, redundancy, security patching, and disaster recovery. For those solutions that are not

appropriate, we will implement automated backup policies at a remote location. We have an established business associate agreement with Dan and Jerry's Greenhouse to provide a disaster recovery location which would be fully operational with the Department of Health approval within three months in the unlikely event of a complete manufacturing facility's loss. These thorough disaster and business continuity plans will minimize the impact to our patient population.

Another unique aspect of the MinnMed disaster recovery is protection for the other manufacturer in the state. MinnMed will always maintain a slight excess capacity in order to act as stock for our fellow manufacturers to use in the event of a catastrophic failure or disaster in their facility. Although this does not help MinnMed directly, it is best for the patients of Minnesota and is complimentary to the MinnMed mission to minimize human suffering.

Minnesota Medical Solutions Management and Operations Plan (Compressed)

The policies, procedures and protocols outlined within this document are based off industry best practices. The documents purpose is to give guidance and direction to facility employees regarding facility operations.

Staffing Plan

The manufacturing of Medical Cannabis in oil and pill form covers a wide range of requirements. Included in the manufacturing facility are multiple functional areas for the cultivation and manufacturing of medical cannabis and cannabis medicines.

The manufacturing facility is a blend of agricultural and industrial manufacturing processes in a food-grade environment. The entire facility will be operated in the same fashion as an industrial kitchen with respect to health, safety, and sanitary measures.

The agricultural aspect of this facility deals with the production of medical cannabis and the manufacturing aspects with the production of medical cannabis into oil and pill form. Safety of employees and proper use of equipment is critical in both processes.

Staffing

The team members are responsible for the cultivation and production of medical cannabis. All potential employees will be required to pass the state required background checks in order to work within the medical cannabis industry. Potential team members for this facility's operation will also be required to complete a competency evaluation for the organization. This evaluation will determine previous knowledge held by potential team members as well as demonstrate how much training and education must be completed. In addition to passing background competency evaluation, all potential team members will also be required to provide proof of eligibility to work within the United States. All team members will be required to agree to and sign the company's Code of Conduct and Personal Hygiene Policy.

Hiring and Job Descriptions

All regular employees within the manufacturing facility shall obtain a medical cannabis establishment agent registration card pursuant to the provisions of regulations set forth by MCRP and shall not be authorized to be on the premises of the manufacturing facility without obtaining an identification badge. In addition to passing the state background check, being licensed by the state and signing the facility employment contract, all employees are required to do complete new hire training before beginning work.

Staff Communication and Resources

Communication is a key factor of success within any organization or entity, and the same is true for our organization. Good communication within each facility as well as communication between each facility will be crucial for the success of our organization. The distribution facility will need to have excellent communication with the cultivation and Medical Cannabis products facilities in order to maintain proper par inventory levels. Without the proper items or inventory par levels, the distribution facility will find it difficult to supply patients with their desired medication. It will be imperative for the Medical Cannabis products and distribution facilities to work closely together to ensure production levels are coordinated with sales and inventory levels at the retail facility.

Team Meetings

Team meetings will be implemented organization-wide and will provide opportunities for team members to discuss current trends and ideas on how to make processes more effective or efficient. Team meeting will at the very least be held once a week for each facility as well as a weekly meeting between facility managers and department heads.

Shift Meetings

Shift meetings will be held on a daily basis between team members and the facility manager or department leads. A shift meeting will be held prior to the start of business each day to discuss workflow and goals for the shift. A meeting will also be held at the closure of business to discuss the day's operations and to determine if shift goals were achieved.

Education and Training

Prior to beginning employment with Minnesota Medical Solutions Inc., all employees will be required to complete orientation training including but not limited; to sexual harassment, discrimination, disabilities, drug/alcohol abuse, company security policies, safety policies, employment rights and laws, workplace violence, client/patient confidentiality, HIPAA, and customer service. The training tools will reference our company's operation manual and operational supplements so that all employees are consistently and properly trained in these areas. The documentation of the employee understanding and comprehension of policies, procedures, and expectations will be maintained by management.

MinnMed will ensure that adequate training is provided to all employees prior to working at the medical cannabis cultivation facility or distribution facility(s). The organization shall utilize multiple training and educational materials to aid in the training process as well as hands-on training at facility locations from experienced professionals and/or consultants.

All staff employed with Minnesota Medical Solutions will undergo a robust training process that includes an online training system provided by Clover Leaf University, with whom MinnMed has an exclusive training contract.

In addition, the American Cannabis Company has developed extensive training systems and manuals for employees of cultivation facilities and distribution facilities. All MinnMed employees will be required to read and agree to the policies set forth within the Employee Handbook, Code of Conduct, Personal Hygiene Policy, and the Standard Operating Procedures.

The organization provides a wide range of training and educational materials for employees:

- Standard Operating Procedures
- Training Manuals
- Log Sheets and Templates
- Secure Information System Training (Seed-to-Sale Tracking and Compliance)
- On-Site Training
    - Educational Information
    - Initial Job Training
    - Job Shadowing
    - Video Conferencing
    - Phone Support
- 24-hour Live Support

Laws and Regulations/Compliance Training

Adhering to all state, local, and company-specific regulations is of utmost importance to create an end product with the highest efficacy for patients. All Medical Cannabis products operation team members will be required to have a general knowledge of all applicable laws and regulations dealing with the retail distribution of medical cannabis. This includes but is not limited to: proper identification of registered patients through the electronic verification system,

allowed patient quantities of medical cannabis to be purchased, on-site consumption laws, hours of operation, etc.

Policies regarding regulations: It is the manufacturing facility's compliance manager's duty to ensure regulatory requirements are followed at all times. The manufacturing facility compliance manager shall maintain a zero tolerance policy for any infractions that would go against state, local and company regulatory measures.

Current regulations: The entire staff must be trained in all current regulations. A test shall be administered to all team members by the team supervisor and shall cover any regulations that pertain directly to team members' duties. All team members must achieve regulatory test scores of 100% in order to work within the facility.

New regulations: All new regulations shall be implemented in coordination with the exact date they become effective. Training and testing of new regulatory measures shall take place before the effective date in order to ensure that all team members attain a complete understanding of such measures and are able to fully and accurately implement new regulations on the effective date.

Training Record

The Medical Cannabis products area manager is responsible for maintaining a training record for each area team member. Such record will include, at a minimum, documentation of all required training, including:

- The name of the person receiving the training;
- The dates of the training;
- A general description of the topics covered;
- The name of the person supervising the training; and
- The signatures of the person receiving the training and the production facility compliance manager.

Development

The Medical Cannabis products area manager is responsible for making a commitment to on-going education for facility employees.

On-Going Education

Once commencing work within the facility, there will be multiple opportunities for continuing education and advancement. The facility manager is responsible for establishing a development path where employees learn from experience and from working directly with their crew leaders to learn all aspects of their job. Crossover opportunities will be available and encouraged so employees can learn other areas of the business if they wish to advance to another department, such as a trimmer learning the basics of processing or growing. A comprehensive book list is recommended for employees and required for advancement into management positions. Medical Cannabis products facility management will offer educational clinics on subjects within the warehouse to keep all employees current on legal issues, compliance, new innovations, personal development, nutrition and exercise, and other necessary and relevant interests.

Tracking Development

In addition to the comprehensive training record, the Medical Cannabis products area manager is responsible for tracking employee development. Development will be tracked on a development checklist. The development checklist provides a clear visual of the level of training an employee has received, and their eligibility for greater responsibility. Once minimum training levels have been reached, crew leaders and management will create further development for individual employees. Employees may also view their progress and choose to take a role in their own development by expressing interest in learning new processes and utilizing provided reading materials to advance their knowledge of internal business practices. As procedures and topics are mastered, employees will earn "checks" on the development checklist from their crew leaders and production facility management.

Feedback Policy

In order to sustain a healthy and compliant work environment, the Medical Cannabis products manager is responsible for implementing a strong verbal and written feedback policy. Feedback is to be given immediately to employees at all levels whenever a company policy is broken. Feedback concerning company policies must be given verbally within a 24-hour period for first offenses. Second offenses warrant written feedback for employee improvement. Any concerns regarding compliance, regulation, or health and efficacy of the products in the facility must be given in written and documented form immediately by facility management. Depending on the severity of compliance violation, employees will either be given an action plan to implement or will be released immediately in such instances where theft, diversion, or health risks occur. If an

employee fails to implement an action plan they will be terminated. All Feedback for Improvement forms will include, at a minimum:

- The name of the person receiving feedback;
- The date of the incident and date feedback was received;
- A detailed description of incident/violation;
- The name of the supervisor giving feedback;
- A clear action plan so the incident/violation will not recur; and
- The signatures of the person receiving the feedback, giving the feedback, and the production facility compliance manager.

Periodic Performance Reviews

Employee success will be discussed during periodic employee performance reviews, which will take place prior to completion of their probation period and bi-annually thereafter. This appraisal of performance is intended to inform employees on their progress and point out areas of opportunity for improvement. Performance appraisals, along with the development checklist, form the basis of merit for wage and responsibility increases. An action plan for performance improvement will be utilized when below average scoring is tabulated on any section of an employee's review form. Action plans will be evaluated periodically and as often as necessary to ensure proper development of all employees. The retail facility manager and the employee's direct supervisors are responsible for all periodic employee reviews, which include at a minimum:

- The name of the person receiving performance review;
- The date of the review, and the dates of the review period;
- A numerical tabulation of performance categories;
- The name of the supervisor giving review;
- If necessary, an action plan for employee improvement; and
- The signatures of the person receiving the feedback, giving the feedback, and the production facility compliance manager.

Disciplinary Actions

The Feedback For Improvement Form (FFI) is to provide and document feedback given to employees. Within the FFI, there shall be a plan of action laid forth for the agent to fulfill in order to ensure prevention of future occurrences. In the event that an agent from the retail facility

receives multiple FFIs on the same topic or fails to implement the plan of action laid forth, the employee shall be terminated at the will of his or her direct supervisors.

Immediate termination shall be considered for all instances involving compliance, security, and product efficacy. Immediate termination shall be implanted in cases involving diversion of cannabis or cannabis products and major compliance violations.

Termination of Duties

Manufacturing facility management shall provide written notice to MDH, including the date of the event, within 10 days after the date on which an owner, officer or board member ceases to serve in that capacity at the medical cannabis establishment.

Operational and Management Practices

Management Review

Our process for reviewing our strengths and weaknesses will be a SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis that will be conducted quarterly for the first year beginning the day the manufacturing facility opens.

- **Strengths**: What goals are we exceeding? Key Performance Indicators (KPI) we will use include: average yields, grams per watt produced, cost per pound, gross revenue, operating expenses, diversion and loss incidence, damaged product statistics and other relevant information that will inform our business.
- **Weaknesses**: What goals are we not meeting? In addition to our KPIs we will also review other relevant non-empirical information such as: How are our community relations? Are our products meeting patient needs? If any pest outbreaks occurred, do we have the proper Corrective Action Plan (CAP) to prevent future occurrences?
- **Opportunities**: Where can we improve? To understand where and how we can improve, we will look internally, but we will also review the market in Minnesota and elsewhere. Are we meeting industry standards for production? Is our genetic portfolio meeting the needs of our patient population? How are the other Minnesota facilities performing? What can we learn from what we are experiencing in our market, and where can we leverage the experiences of other markets? What new patient and market trends are we seeing?

- **Threats**: Risk assessment and mitigation is critical for sustained success in the medical cannabis industry. We face a myriad of challenges from areas such as weather, power outages, pest infestations, regulatory changes and security. Identifying and adapting to these challenges over time is critical to our ongoing success.

MINNESOTA MEDICAL SOLUTIONS - CULTIVATION SECURITY PLAN

SECURITY SURVEILLANCE SYSTEM

Video Monitoring System

This section addresses requirements of sections 4770.0900, 4770.1000 and 4770.1300 of the Medical Cannabis registry Program. The cultivation management is committed to assisting the commissioner in the implementation of his/her duties with regards to ensuring the cultivation facility is secured against loss or theft of medical cannabis or plant material; as well as, the diversion or potential diversion of medical cannabis or plant material.

C2c. Attachment: Management and Operations Plan

C2c. Attachment: Management and Operations Plan_

[redacted]

PRODUCT SECURITY

This section addresses further requirements of sections 4770.0900, 4770.1000, 4770.1300, and 4770.0700 of the Medical Cannabis registry Program. The cultivation management is committed to assisting the commissioner in the implementation of his/her duties with regards to ensuring the cultivation facility is secured against loss or theft of medical cannabis or plant material; as well as, the diversion or potential diversion of medical cannabis or plant material. [redacted]

C2c. Attachment: Management and Operations Plan

C2c. Attachment: Management and Operations Plan_

[redacted]

Systems Maintenance: All equipment and components within this Electronic Security Plan will be covered by a maintenance plan, which will be implemented in order to have appropriate preventative maintenance in place and minimize the possibility of equipment failure. At a minimum, the system will be inspected and all devices tested on an annual basis by the qualified electronic security provider.

Supporting Security Management Policies

This section supports all other areas of this Security Plan, which demonstrate the capability for the prevention of the theft or diversion of cannabis or cannabis-infused products, and compliance with all security requirements of the State of Minnesota.

Documentation Procedures for Product Loss and Destruction

The cultivation facility will utilize its chosen product inventory / point-of-sale tracking system to keep and maintain product records for a five-year period. These records must be made available for inspection if requested by the commissioner, and, when applicable, other entities within the State of Minnesota:

- Production records, including:
  - Planting, harvest and curing, weighing, destruction of cannabis, creating batches of cannabis-infused products, and packaging and labeling; and
  - Disposal of cannabis, cannabis-infused products and waste materials associated with production.
- Records of any theft, loss or other unaccountability of any cannabis seedlings, clones, plants, trim or other plant material, extracts, cannabis-infused products, or other items containing cannabis.

When inputting information regarding product loss or destruction into its product inventory/point-of-sale tracking system, the cultivation facility must provide:

- A description of the product loss or destruction (strain name, product type and description)
- The quantity/volume of the loss/destruction
- The area of the cultivation facility where the loss/destruction occurred
- The date and approximate time of the loss/destruction
- The most reasonable explanation behind the loss/destruction
- A strategy to address the cause to prevent future loss/destruction by similar means

As with all other processes within the cultivation facility, product destruction processes will be captured by the facility electronic security system (access controls and surveillance).

Review & Evaluation of Security System, Policies and Procedures: Once a year, Company management will coordinate the review of all security-related policies and procedures to ensure they remain relevant in terms of risk mitigation, compliance and operational

requirements. Management may perform this review utilizing internal staff as well as third-party assistance.

Security Risk Assessments and Inspections: During the course of Policy and Procedures review, The Company will coordinate the preparation of updated risk assessments which will feed information to the review and evaluation process.

Emergency Response Plan: The dispensary will establish emergency procedures and protocols to be implemented organization wide. Dispensary employees will be fully trained on emergency protocols before beginning employment with the company. The elements of the ERP will include evacuation, robbery or theft, active shooter/workplace violence, severe weather, lockdown, medical emergency, fire emergency, and other potential emergencies. The dispensary shall use a variety of teaching methods which take into account the skills and experience of the individual trainees. The company will also conduct quarterly emergency fire and disaster drills.

Workplace Violence: It is Company policy to promote a safe environment for its employees. The Company is committed to working with its employees to maintain a work environment free from violence, threats of violence, harassment, intimidation, and other disruptive behavior. Such behavior can include oral or written statements, gestures, or expressions that communicate a direct or indirect threat of physical harm. No workplace is immune to such events, however such behavior will not be tolerated in our workplace. All reports of incidents will be taken seriously and will be dealt with appropriately. Individuals who commit such acts may be removed from the premises and may be subject to disciplinary action, criminal penalties, or both. Company management will develop policies and procedures for the implementation of a violence-free workplace.

Functional Areas:

Nutrient Storage Area

All nutrients shall be stored in the nutrient storage area of the manufacturing facility. The manufacturing facility manager is responsible for this area.

Propagation Area

All clones are stored in the propagation area until they are ready to be transplanted and transferred to a vegetative area. The propagation must be maintained at 80°F/26.7°C and 80% relative humidity. The vegetative manager is responsible for maintaining this area.

Vegetative Areas

The vegetative area is where plants are grown to the appropriate size before being transferred to the flowering area. The vegetative area consists of 3 zones: mother plant quarantine (V1), early-veg area (V2), and the pre-flowering area (V3). Lighting remains on for a minimum of 18 hours a day within all vegetative zones. The vegetative manager is responsible for maintaining this area.

Flowering Areas

The flowering area of the manufacturing facility is where full size plants produce flowers. The flowering area is divided into many zones. Plants grow in each zone for 9 weeks before being harvested. All flowering areas must receive 12 hours of uninterrupted darkness in order for plants to produce flowers. Light interruptions will cause plant stress that could result hermaphroditic conditions. Each zone flowering manager is responsible for maintaining his or her designated flowering zones.

Harvesting Area

After flowering plants fully mature, they are cut down by the processing staff and prepared for trimming in the harvesting area of the manufacturing facility. The harvesting area sits adjacent to the drying, curing, and harvesting areas of the manufacturing facility. The processing manager is responsible for the area.

Drying

The drying area consists of an area to hang whole plants as well as an area to screen dry plant material. The temperature, humidity, and airflow must be constantly monitored within the drying area to prevent mold formation and plant material contamination. The Processing manager is responsible for this area.

Curing Area

The curing area is where plants finish the drying process in sealed containers. Humidity within the containers is constantly monitored. Plants remain in the curing area for 7-21 days. The curing area sits adjacent to the drying area. The processing manager is responsible for this area.

Processing Areas

After curing, all medical cannabis products must be processed. The processing area sits adjacent to the curing area and is equipped with scales and containers for weighing and packaging products. The processing manager is responsible for this area.

Concentration Production Room

The concentrate production room will be an area within the facility in which medical cannabis concentrates and hash will be produced. The extraction space in which any medical cannabis concentrate is to be produced is a fully enclosed room and clearly designated on the current diagram of the licensed premises.

Secured Areas

All areas within the manufacturing facility are limited to licensed personnel. The facility manager is responsible for ensuring all areas within the facility remain secured and limited to authorized personnel.

Employee Break Room

The employee break room will be in an area without any cannabis production activities.

Secured Product Storage Area

After cannabis and Medical Cannabis products are processed, the facility manager secures them within the facility safe to wait for testing and shipment. After the Cannabis and Medical Cannabis products pass required testing they will be transferred to the distribution facility or another distribution facility for sale and distribution. These products will be maintained in the secured product storage area in commercial-grade safes.

Quarantined Product Storage Area

Any cannabis or Medical Cannabis products will be stored in a secured, quarantined area within the licensed facility.

Chemical Storage Area

All chemicals for cleaning, as well as pest and disease control, will be held in the chemical storage area of the Medical Cannabis products facility. The facility manager will maintain this area and ensure information about chemicals is readily available by maintaining:

- An on-site chemical list;
- Material safety data sheets (MSDS) for all chemicals; and
- An emergency spill kit.

Inventory Management

Inventory management is a critical factor in every area of the manufacturing facility. The tracking of all medical cannabis from seed-to-sale will be done through an advanced inventory control system with multiple checks and balances in place to allow our staff to have a complete awareness of all inventory including: seedlings and clones, vegetative plants, flowering plants, harvested plants and batches, curing batches, pre-tested dry medical cannabis, pre-tested trim, post-tested approved plant material, all unapproved (quarantined) plant material, extractions, infusions, and waste. All data collected shall be recorded through the use of template log sheets, computer systems, Secured Information Systems (SIS) and Point-of-Sale systems (POS). Physical inventory counts will be done on a daily, weekly, and monthly basis at the Medical Cannabis products facility in addition to scheduled inventory checks random audits will be performed. Inventory control procedures shall be utilized as the primary way of determining whether there has been any product diversion and ensuring that all medical cannabis and Medical Cannabis products are only being distributed to licensed distribution facilities and licensed, valid state medical cannabis patients.

Physical inventory template log sheets will be filled out each morning before the start of business and again at the closure of business. All weekly inventory procedures shall be conducted in full compliance with MCRP. Data collected during daily, weekly, annual and random inventory procedures shall be logged and input into computer, SIS, and POS systems. Inventory figures will be cross-referenced with the POS system inventories and data to determine that there are no quantity discrepancies. In the case of a discrepancy within inventory, we will investigate the root cause of the discrepancy to determine the cause. If the discrepancy is due to employee theft or diversion, we will act quickly to terminate the employment of the perpetrator and contact all necessary authorities for further action. All inventories, procedures, and other documents required by MDH shall be maintained on the premises and made available to MDH at all times.

Inventory Control

Our organization shall designate in writing a medical cannabis establishment agent who has oversight of the inventory control system of the medical cannabis establishment. The compliance manager will be responsible for oversight of the inventory control system. The following

information outlines how the manufacturing facility staff will maintain inventory control within the manufacturing facility.

The compliance manager is the designated agent who shall oversee the manufacturing facility inventory control system at all times in order to ensure that daily inventory documentation, batch specific documentation, product transfers, inventory discrepancies, and record keeping are always maintained and up to the minute. The appropriate manufacturing facility staff member shall document the following items as they occur:

- **Initial Inventory Documentation**: In accordance with MCRP prior to commencing business, the manufacturing facility compliance manager shall:
    - Document that the manufacturing facility has commenced business with no cannabis on hand, and recorded this fact as the initial inventory.
    - Establish ongoing inventory controls and procedures for the conduct of inventory reviews and comprehensive inventories of cannabis, which shall enable the manufacturing facility to detect any diversion, theft or loss in a timely manner.

- **Weekly Inventory Documentation**: In accordance with MCRP upon commencing business, each manufacturing facility compliance manager shall ensure a weekly inventory of cannabis stock, which shall include, at a minimum:
    - The date of the inventory;
    - Summary of the inventory findings;
    - The name, signature and title of the individuals who conducted the inventory and the agent-in-charge who oversaw the inventory; and
    - The product name and quantity of cannabis plants or Medical Cannabis products at the facility.

- **Daily Inventory Documentation**; The compliance manager shall establish and implement an inventory control system that documents each of the following:
    - Each day's beginning inventory
    - Acquisitions
    - Harvests

- Sales
- Disbursements
- Disposal of unusable cannabis
- Ending inventory

- **Batch Specific Inventory Documentation**; For each batch of cannabis cultivated, the processing manager shall document the following into the inventory control system:
  - The batch number;
  - Whether the batch originated from medical cannabis seeds or medical cannabis cuttings;
  - The strain of the medical cannabis seeds or medical cannabis cuttings planted;
  - The number of medical cannabis seeds or medical cannabis cuttings planted;
  - The date on which the medical cannabis seeds or cuttings were planted;
  - A list of all chemical additives used in the cultivation, including, without limitation: nonorganic pesticides, herbicides, and fertilizers;
  - The number of medical cannabis plants grown to maturity;
  - Harvest information, including, without limitation: the date of harvest, the final yield weight of processed usable medical cannabis, and the name and medical cannabis establishment agent registration card number of the medical cannabis establishment agent responsible for the harvest; and
  - The disposal of cannabis that is not usable cannabis, including a description of and reason for the cannabis being disposed of, including, if applicable: the number of failed or other unusable cannabis plants, the date of disposal, confirmation that the cannabis was rendered unusable before disposal, the method of disposal, and the name and medical cannabis establishment agent registration card number of the medical cannabis establishment agent responsible for the disposal.

- **Product Transfer Inventory Documentation**; When providing medical cannabis to another medical cannabis establishment, the following information shall be recorded in the ICS:

- The amount, strain, and batch number of medical cannabis provided to the medical cannabis establishment;
- The name and medical cannabis establishment registration certificate number of the other medical cannabis establishment;
- The name and medical cannabis establishment agent registration card number of the medical cannabis establishment agent who received the medical cannabis on behalf of the other medical cannabis establishment; and
- The date on which the medical cannabis was provided to the medical cannabis establishment.

- **Sales and Disposal Records**: In accordance with MCRP the compliance manager shall ensure documentation of all medical cannabis sold or otherwise disposed, including but not limited to:
  - The date of sale;
  - The name of the distribution facility to which the medical cannabis was sold;
  - The batch number, product name and quantity of cannabis sold; and
  - If applicable, the date, quantity, manner in which, and reason why any cannabis was destroyed.

- **Documentation of Inventory Discrepancies**
  - If an agent from the manufacturing facility identifies a reduction in the amount of medical cannabis in the inventory of the manufacturing facility not due to documented causes, the compliance manager shall determine where the loss has occurred and take and document corrective action. If the reduction in the amount of medical cannabis in the inventory of the manufacturing facility is due to suspected criminal activity by a medical cannabis establishment agent, the medical cannabis establishment shall report the medical cannabis establishment agent to MDH and to the appropriate law enforcement agencies.
  - Any loss or theft of medical cannabis shall be documented and reported from the medical cannabis establishment to the appropriate law enforcement agency and to MDH. The manufacturing facility head of security shall ensure copies of all

documentation are maintained as required for at least 5 years after the date on the documentation and shall provide copies of the documentation to MDH for review upon request.

- **Waste Inventory Documentation:** All data pertaining to the disposal of all cannabis that is not usable shall be tracked in the inventory control system including:
    - A description of and reason for the cannabis being disposed of, including, if applicable, the number of failed or other unusable cannabis plants;
    - The date of disposal;
    - Confirmation that the cannabis was rendered unusable before disposal;
    - The method of disposal; and
    - The name and medical cannabis establishment agent registration card number of the manufacturing facility agent responsible for the disposal

- **Product Information**: For each batch of cannabis produced in the manufacturing facility, the following information shall be recorded for internal use and to be made available distribution facility upon or prior to delivery:
    - The batch number
    - Whether the batch originated from cannabis seeds or cannabis cuttings
    - The strain of the cannabis seeds or cannabis cuttings planted
    - The number of cannabis seeds or cannabis cuttings planted
    - The date on which the cannabis seeds or cuttings were planted
    - A list of all chemical additives used in the cultivation, including, without limitation, nonorganic pesticides, herbicides and fertilizers
    - The number of cannabis plants grown to maturity
    - Harvest information, including, without limitation:
        - The date of harvest
        - The final yield weight of processed usable cannabis
        - The name and medical cannabis establishment agent registration card number of the manufacturing facility agent responsible for the harvest

- **Inventory Record Keeping**
    - The manufacturing facility compliance manager shall maintain the documentation required for at least five years after the date on the document and provide the documentation to MDH for review upon request.

- **Loss or Theft**
    - In the event that any loss or theft of cannabis from the manufacturing facility occurs, the compliance manager shall document and report the incident to the appropriate law enforcement agency and to MDH. All records and documentation required shall be maintained for a minimum of five years after the date recorded of the documentation. Copies of the documentation shall be made available to MDH for review upon request.

In Accordance with MCRP Containment Management and Operations for Cannabis and Cannabis Products:

- All cannabis in the process of production, distribution, transfer or analysis shall only be accessible only to the minimum number of specifically authorized personnel essential for efficient operation, and shall be returned to its secure location immediately after completion of the process or at the end of the scheduled business day. If a production process cannot be completed at the end of a working day, the processing area or tanks, vessels, bins or bulk containers containing cannabis shall be securely locked inside an adequately secured area.

Chain of Custody: The chain of custody of all cannabis and Medical Cannabis product shall be documented, through RFID scanning and logging, at all times as it moves through each process within the manufacturing facility. Chain of custody documentation shall be maintained for five years and shall be made available to MDH upon request. All plants within a plant group shall be given a unique batch number during the initial transplant. Batch numbers shall remain with each plant and plant group through final packaging and sale. Transplanting shall occur prior to a plant reaching 18 inches in height. At the time of transplant form clone to the second vegetative phase, all plants shall be assigned a specific number and tagged with an individual tag containing the

batch number and plant number. Information pertaining to each plant, and batch of plants, including the strain and location, shall be recorded electronically (RFID) or kept in an electronic file until harvest or destruction. All plants shall be physically inventoried on a weekly basis by the cultivation team and records of the inventory shall be kept at the facility for a minimum of five years. All batch movements shall be tracked and recorded so their physical location is known at all times during the cultivation and production processes. Any plants removed from a batch shall be recorded on a permanent record and maintained on-site for a minimum of five years. All batch numbers shall be included on approved labels for all products designated for distribution. See plant inventory for detailed tracking processes. No person, except manufacturing facility agents, local law enforcement, MDH or MDH's authorized representative, MDH inspectors, or other federal, state or local government officials may enter the manufacturing facility except for the following:

- Laboratory staff may enter the manufacturing facility for the sole purpose of identifying and collecting cannabis samples for purposes of conducting laboratory tests.
- Emergency personnel may enter the manufacturing facility when necessary to perform their duties.
- Upon written notice to MDH, the manufacturing facility staff may allow contractors to enter the manufacturing facility when they are working on a job unrelated to medical cannabis, such as installing or maintaining security devices or performing electrical wiring.
- Upon prior written request, MDH or MDH's authorized representative may permit other persons to enter the manufacturing facility.

All persons who are not manufacturing facility agents, but who are permitted on the premises of the manufacturing facility pursuant to MCRP, shall obtain a visitor identification badge from manufacturing facility security personnel prior to entering the manufacturing facility, and shall be escorted and monitored at all times by licensed agents of the manufacturing facility. Visitor identification badges shall be visibly displayed at all times while the visitor is within the manufacturing facility. All visitors must present a valid government issued identification card

with a picture in order to be permitted within the premises. All visitors shall be logged in and out, and that log shall include the date, time and purpose of the visit and shall be maintained and made available to MDH, at any time, for a minimum of five years. All visitor identification badges shall be returned to the manufacturing facility security personnel upon the visitor exiting the manufacturing facility.

The use and/or possession of cell phones, cameras and any other audio or video recording device by any manufacturing facility agent, visitor or other individual shall be prohibited within all production areas of the manufacturing facility, except when used for legitimate manufacturing facility business purposes, such as, but not limited to, communication with employees and the identification of plant disease with off-site experts.

In Accordance with MCRP: All cannabis in the process of production, distribution, transfer or analysis shall be stored in such a manner as to prevent diversion, theft or loss, and shall be returned to its secure location immediately after completion of the process or at the end of the scheduled business day. If a production process cannot be completed at the end of a working day, the processing area or tanks, vessels, bins or bulk containers containing cannabis shall be securely locked inside an adequately secured area. In order to ensure that cannabis is securely stored and avoid any threat of loss and diversion, the manufacturing facility shall:

- Not produce or maintain cannabis in excess of the quantity required for normal, efficient operation;
- Store all cannabis and Medical Cannabis products in a safe, vault or secured room and in such a manner as to prevent diversion, theft or loss;
- Maintain all cannabis that is not part of a finished product in a secure area or location within the manufacturing facility accessible only to specifically authorized personnel, which shall include only the minimum number of employees essential for efficient operation;
- Keep all approved safes, vaults, or other equipment or areas used for the production or storage of cannabis securely locked or protected from entry, except for the actual time required to remove or replace cannabis;
- Keep all locks and security equipment in good working order;
- Not allow keys to be left in the locks and not store or place keys in a location accessible to

persons other than specifically authorized personnel;

- Not allow other security measures, such as combination numbers, passwords or electronic or biometric security systems, to be accessible to persons other than specifically authorized personnel; and
- Keep the manufacturing facility securely locked and protected from unauthorized entry at all times.

Any additional safeguards required by MDH in regard to special security issues, such as extremely large stock of cannabis, exposed handling or unusual vulnerability to diversion, theft or loss, will be complied with immediately.

If a loss, theft or diversion of cannabis has occurred from the manufacturing facility, the manufacturing facility agent in charge shall notify MDH and the nearest district immediately. MDH and shall determine the appropriate storage and security requirements for all cannabis in the manufacturing facility, and may require additional safeguards to ensure the security of the cannabis. If a reduction in the amount of medical cannabis in the manufacturing facility's inventory is due to suspected criminal activity, the manufacturing facility agent in charge shall immediately report the reduction to MDH.

All areas of the manufacturing facility containing cannabis, including any rooms with approved safe or approved vaults, shall have a sign posted at all entryways, which shall be a minimum of 12 inches in height and 12 inches in length and shall state: "Do Not Enter − Limited Access Area – Access Limited to Authorized Personnel Only" in lettering no smaller than one inch in height.

No manufacturing facility agents and/or security policies shall prohibit members of MDH, local law enforcement or other federal, state, local government officials, or persons authorized by MDH from entering any area of the manufacturing facility to perform their governmental duties.

Manufacturing facility agents shall provide current copies of the manufacturing facility floor plan to MDH and any law enforcement that have jurisdiction in the area where the manufacturing facility is located.

Annual Inventory Procedure: In accordance with MCRP a complete and accurate record of all plant stock or products of cannabis on hand shall be prepared by the compliance manager annually on the anniversary of the initial inventory, or other date that the manufacturing facility agent-in-charge may choose, so long as it is not more than one year following the prior year's

inventory.

All inventories, procedures and other documents required by MCRP shall be maintained on the premises and made available to MDH at all times.

Tracking/Logging Workflow and Pertinent Data

All workflow will be tracked and recorded for daily review by the manufacturing facility manager. The following logs will be utilized by designated manufacturing facility employees to track workflow through the manufacturing facility. In addition to logging, all information shall be entered into the Secured Information System (SIS).

Information Recording Logs

The manufacturing facility compliance manager shall work with each department manager (cultivation and processing) to ensure that all logs are utilized and maintained to track all facility workflow.

- **Visitor Log**: The company compliance manager is responsible for ensuring any authorized personnel visiting the manufacturing facility use a visitor log. The visitor log will be located inside the main secured entrance to the manufacturing facility.
- **Cleaning Log:** The manufacturing facility manager is responsible for overseeing the use of a daily cleaning log to track cleaning within all zones of the manufacturing facility.
- **Maintenance Log**: A facility maintenance log will be utilized to track maintenance and upkeep on all equipment within the manufacturing facility.
- **Light Intensity Log**: To ensure all grow lighting is maximized, the light produced by each lamp must be checked on a monthly basis by the manufacturing facility staff. The cultivation manager shall work with each zone manager to measure lighting throughout each growing zone in the manufacturing facility.
- **Pest Control Log**: Plant growth zone managers will be responsible for tracking and logging all pest and disease control measures within the manufacturing facility.
- **Feed Schedule Change Log**: Plant growth zone managers will be responsible for tracking feeding schedules in all growth zones for which they are responsible.

Any change or variance in the respective plant-zone feed schedule must be noted and brought to the attention of the manufacturing facility manager.

- **Transplant Log**: The transfer log tracks all plant movement throughout the manufacturing facility. The vegetative manager is responsible for tracking plant movements before flowering begins.
- **Harvest Log:** All flowering zone harvest schedules are tracked on the manufacturing facility harvest log. The flowering zone management team is responsible for updating this log and noting any variances to the CFM.
- **Daily Inspection Log**: All zone managers are responsible for performing daily inspections and communicating all variances to the manufacturing facility manager. All zones must comply with the information designated in the growing environment and quality control section. The daily inspection log includes:
    - **Room temperature**: zone manager
    - **Humidity**: zone manager
    - **CO_2**: zone manager
    - **Electrical and lighting:** zone manager
    - **Pest and disease:** zone manager
    - **Photoperiod:** zone manager
- **Curing Log**: A curing log shall be maintained by the processing manager to track the time specific strains and batches are in the curing area. In addition to time, environmental conditions such as temperature and humidity are also recorded.
- **Testing Log**: A testing log shall be maintained by the processing manager to keep track of all batches, their respective test dates and results.
- **Finished Batch Log**: The following information shall be collected in order to maintain records for company R&D as well as relaying all pertinent data to the distribution to which any part of a batch is sold.
    - For each batch of cannabis cultivated, the following information shall be collected:
        - The batch number
        - Whether the batch originated from cannabis seeds or cannabis cuttings

- The strain of the cannabis seeds or cannabis cuttings planted
- The number of cannabis seeds or cannabis cuttings planted
- The date on which the cannabis seeds or cuttings were planted
- A list of all chemical additives used in the cultivation, including, without limitation nonorganic pesticides, herbicides and fertilizers
- The number of cannabis plants grown to maturity
- Harvest information, including, without limitation:
    - The date of harvest;
    - The final yield weight of processed usable cannabis; and
    - The name and medical cannabis establishment agent registration card number of the manufacturing facility agent responsible for the harvest.

Consistency of Quality and Dosage

Consistency of quality and dosage is the main goal of the manufacturing facility team and it shall be achieved through consistency in procedure and design of the production facility. The entire manufacturing facility will have a consistent lighting pattern in all flowering rooms based on a 4x5 grid system. All walls will be coated with reflective white paint. HID Lights can only penetrate the canopy two feet so all medical cannabis plant material below two feet from the plant's top is removed because they will not be consistent in strength or visual appeal to medical cannabis plant material on the top of the plant. The medical cannabis plant material on the upper two feet of the plant will be trained through trellising and super cropping techniques in order to receive an equal amount of light to attain consistent cannabinoid production. Fans will also be used to move air and CO_2 through the plant canopy to allow plants equal access to all growth factors. Even lighting patterns, strain selection, plus consistent nutrient, plant health, air quality and curing process, will result in the most consistent final product. Manufacturing of extracts and infused products will follow strict quality control procedures.

Cultivation Procedures

Growing Environment and Quality Control

It is the goal of the manufacturing facility team to deliver the highest quality, purest cannabis with consistency of dosage. To achieve these high standards, the manufacturing facility is

engineered for year-round production. Our growing rooms are all capable of maintaining constant environmental conditions including temperature, humidity, and CO_2. In addition, we introduce fresh air through an advanced smell-eliminating air flow system that works in conjunction with other controls such as UV light to avoid all mold, bacteria, mildew and fungal outbreaks. Our closed loop ventilation system will lessen the potential of pest contamination and reduce the need for any organic pesticides.

The microclimate within each section of the cultivation facility must be constantly maintained in order to prevent pest and disease and achieve the highest and purest quality. In order to maintain an optimal environment, the cultivation manager shall ensure that the following conditions are constantly maintained:

Temperature Control

Room temperature in all vegetative and flowering areas should be maintained at 78 F/25.5 C. Each growing room will be equipped with adequate HVAC in order to maintain required temperatures. Temperature shall be monitored daily by the manufacturing facility staff.

Humidity

Relative humidity levels must be kept at or below 55% humidity in vegetative areas and at or below 45% in flowering sections of the manufacturing facility. Humidity level in the propagation area shall be maintained at 80%. Humidity shall be monitored daily by the manufacturing facility staff.

Air Circulation

Circulation fans are used to improve air quality, strengthen plants, and prevent pest and disease. Circulation fans will be placed every four to six feet throughout all growing and drying areas of the manufacturing facility. We will keep fans running 24 hours a day.

Air Ventilation

Air and humidity will leave each growing space through an activated carbon filter via a main trunk line.

Odor Reduction

After air leaves each working area, it is filtered through carbon a second time and then treated with ozone before leaving the building through a roof top stack.

Detailed description of air treatment systems that will reduce off-site odors: The manufacturing facility will contain a three-phase odor reduction system to eliminate odor within and around our production facility. Cannabis production is organized into a series of separately sealed zones including but not limited to: vegetative, flowering, trimming, curing, storage, processing, infused products, and hallways connecting rooms. Within each zone, a predetermine number of activated carbon filters will circulate and scrub the air at a flow rate calculated to filter all the air in the room every 15 minutes. Each zone will maintain neutral air pressure created by exhausting the air through one point at the same rate fresh air enters the zone. The exhaust from each zone is filtered a second time through an activated carbon filter before entering a sealed ducting system to be transferred to a common air bank. Before exiting the building through a stack system, all exhaust is filtered a third time through a series of activated carbon filtration screens thoroughly reducing odor emission rates. **Odor Reduction Plan: Step 1:** Create sealed zones **Step 2**: Exhaust system with neutral pressure **Step 3**: Three-Phase odor reduction system :Air within zone filtered through activated carbon every 15 minutes Air exhausted from rooms filtered through activated carbon, transferred through sealed ducting system All exhaust is collected in a common air-bank where it is filtered a third time before leaving the building through an engineered stack system.

Carbon Dioxide

CO_2 levels shall be maintained at 1,000 ppm in all vegetative areas and 1450 ppm in all flowering areas. CO_2 levels shall be monitored daily by the manufacturing facility staff.

Lighting Vegetative lighting will consist of florescent lighting for mother plants, clones, and early vegetation. Larger vegetative plants will be placed under LED or 600-1,000 watt Blue Metal halide lamps to achieve appropriate size to be transferred into the flowering area. Flowering plants will be grown using 1,000 watt E-Papillion with high-frequency adjustable strength ballasts or equivalent Gavita lighting. Lighting shall be monitored daily by the manufacturing facility staff and intensity verified and logged monthly.

Drainage

All plants not in auto-pot or hydroponic systems will need appropriate drainage. Drainage shall be achieved through the plumbing of each growing surface and will be brought to a central floor drain located in each section of the manufacturing facility. Drainage shall be monitored daily by the manufacturing facility staff.

UV Filtration

Environmental scrubbers will be used throughout the manufacturing facility to clean harmful contaminants found in the air. EVS systems work to combat mold and other diseases that flourish in humid conditions.

Environmental Zone Specifications for Each Room within the Facility

The manufacturing facility manager shall ensure the following room environments are held at these specifications:

- **Soil Processing Area**: soil storage, soil recycling, and soil preparation shall take place within the soil processing room.
    - Temp: 68-72° Fahrenheit
    - Humidity: Below 50%
    - Air movement: Wall fans
    - Air pressure: Neutral
    - Air quality: UV Scrubber
    - Water: R/O + Cleaning
    - Equipment and supplies: Soil mixer, Soil recycling

- **Transplant Room**: All clones and vegetative plants within the facility will be transplanted into larger containers within this zone.
    - Temp: 72° Fahrenheit
    - Humidity: Below 50%
    - Air movement: Wall fans
    - Air pressure: Neutral
    - Air quality: UV Scrubber
    - Odor reduction: Carbon filtration system
    - Water: R/O + Cleaning

- Equipment and supplies: Shovels, Pots

- **Cloning/Nutrient Storage Kitchenette**: All cuttings will be processed in this zone prior to entering the hot house.
  - Temp: 72°-78° Fahrenheit
  - Humidity: 40-50%
  - Air pressure: Neutral
  - Air quality: UV Scrubber
  - Water: R/O + Cleaning
  - Equipment and supplies: Rapid rooters, razor blades, rooting hormone

- **V1 Mother Zone**: All mother plants will vegetate within this zone.
  - Temp: 72°-78° Fahrenheit
  - Humidity: Below 50%
  - Air movement: Wall fans
  - Air pressure: Neutral
  - Air quality: UV Scrubber
  - Odor reduction: Carbon filtration system
  - Water: R/O + Cleaning
  - Drain: Floor drain in center of room or sub pump
  - Equipment and supplies: 1 level of T5 lighting or comparable, cover entire footprint
  - CO_2: 500-1450 ppm

- **V1 Hot House**: All cuttings will be rooted within this zone for 10-14 days prior to being transplanted into one-gallon pot and moved to V2.
  - Temp: 80° Fahrenheit
  - Humidity: 80%
  - Air pressure: Neutral
  - Air quality: UV Scrubber

- Odor reduction: Ozone generator
- Water: R/O + Cleaning
- CO_2: 900 ppm

- **V2**: Plants will vegetate in one-gallon pots for three to four weeks within this zone prior to being transplanted into larger pots and moved into V3 pre-flowering.
  - Temp: 78° Fahrenheit
  - Humidity: 35-50%
  - Air movement: Wall fans
  - Air quality: UV Scrubber
  - Odor reduction: Carbon filtration system
  - Water: R/O + Cleaning
  - Drain: Floor drain in the center of the room
  - CO_2: 1000-1450 ppm
  - Equipment and supplies: Two- to three-level racking system, three feet wide and spaced 36 inches apart and 180 8-bulb t5 light fixtures

- **V3 Pre-Flower**: Plants will vegetate for two weeks within this zone prior to being transferred into the final flowering zone.
  - Temp: 78° Fahrenheit
  - Humidity: 35-50%
  - Air movement: Wall fans
  - Air quality: UV Scrubber
  - Odor reduction: Carbon filtration system
  - Water: R/O + Cleaning
  - Drain: Floor drain in the center of floor
  - CO_2: 1000-1450 ppm
  - Equipment and supplies: 108 1,000-watt metal halide light fixtures affixed to metal frame system from light hanger. Light footprint to 3.5 x 3.5 per light.

- **F1-F10**: Each flowering room shall contain 40-50 flowering lights with the exception of F9, which may have just below 40 lights.
    - Temp: 78° Fahrenheit
    - Humidity: Below 35-45%
    - Air movement: Wall fans
    - Air pressure: Neutral
    - Air quality: UV Scrubber
    - Odor reduction: Carbon filtration system
    - Water: R/O + Cleaning
    - Drain: Each room shall have a floor drain for cleaning and irrigation purposes.
    - CO_2: 1450 ppm
    - Equipment and supplies: Each room shall have metal growing tables either built from Uni-strut or comparable metal. Each table shall be four feet in width and have an e-pappillion or better light fixture hung every five feet for the length of the table. Tables shall run the length of the room in the direction that allows for the most lights per space. Tables shall be spaced one foot from all walls and 36 inches apart from one another. There will be aisles in each room so employees can move freely from table to table.

- **Drying, Curing, and Pre-Testing Storage**: All these functions will take place in the large secured vault. The vault will be divided into at least two zones roughly the same size. The drying zone shall contain a shelving system and a hanging system for drying product. The curing and storage area shall contain a shelving system where storage vessels containing nearly finished and finished product will be cured and then stored in a secured fashion while awaiting test results.
    - Temp: 62°-72° Fahrenheit
    - Humidity: 20-65%
    - Air pressure: Neutral
    - Air quality: UV Scrubber
    - Odor reduction: Carbon filtration system

- **Small Vault**: The small vault shall be used for storing approved tested products prior to transportation to the retail store location.
    - Temp: 62°-72° Fahrenheit
    - Humidity: 40-50%
    - Air pressure: Neutral
    - Air quality: UV Scrubber
    - Odor reduction: Carbon filtration system
    - Equipment and supplies: Storage shelves, large refrigerator.

- **Breeding**: The breeding room shall contain a series of smaller rooms; each one shall have a LED lighting system.
    - Temp: 78° Fahrenheit
    - Humidity: Below 50%
    - Air quality: UV Scrubber
    - Odor reduction: Carbon filtration system
    - Water: Will contain a water source
    - Drain: If possible
    - CO_2: If possible
    - Air pressure: Negative air pressure within the breeding room, and positive air pressure in the barrier entry room

- **Trimming and Processing**: All products shall be trimmed in this area prior to being dried in the drying vault. All products shall be processed (packaged) within this area after passing all testing protocol and prior to being stored in the small vault.
    - Temp: 70°-72° Fahrenheit
    - Humidity: 40-65%
    - Air pressure: Neutral
    - Air quality: UV Scrubber
    - Odor reduction: Carbon filtration system

Selecting Cannabis Strain Varieties

Planning strain varieties to produce is essential to meet patient demands for medicine, produce quality cannabis, and to ensure consistency of dosage. Feedback from retail distributors and the cultivation team shall be combined with comprehensive test results to set production goals for the manufacturing facility. In addition, a given strain's ease of propagation and overall yield must be taken into account in order to reach production goals and maximize energy and space efficiency within the manufacturing facility. The cultivation manager shall plan a cultivation calendar in order to meet demand and production goals. The following represent other important strain differentiations that will be taken into account by the cultivation manager:

Synergies between Terpenes and Cannabinoids

Terpene and cannabinoid profiles of strains shall be taken into account in order to provide the most effective and desirable medicine for patients.

Terpenes

Terpenes are compounds that constitute what is arguably the largest and most diverse class of natural products. The majority of these compounds are found in plants. They provide the flavor and the smell to cannabis, but also provide an array of medicinal benefits. The cultivation manager shall plan production of a wide range of strain varieties in order to produce multiple terpene profiles and combinations in order to treat the varying conditions within multiple patients. The following are examples of terpenes commonly found in cannabis and their medicinal benefits:

- **Linalool:** Lily, floral, spicy. Treats anxiety and acts as a sedative.
- **Caryophyllene**: Rich spicy, sweet, woody, clove, camphor, pepper. Anti-septic, anti-tumor, anti-inflammatory, anti-fungal, anti-bacterial.
- **Myrcene**: Clove, earthy, citrus, mango, mint. Antiseptic, anti-tumor, analgesic, anti-depressant, muscle relaxant. Most common terpene in cannabis, found in higher levels in indicas. Makes cell walls more permeable thus increasing the effect of cannabinoids.
- **Limonene**: Citrus, rosemary, juniper, peppermint. Increased circulation, pain relief.
- **Humulene**: Hoppy, coriander. Common in sativa. Anti-inflammatory, anti-tumor, anti-bacterial.
- **Pinene**: Pine, rosemary, dill, basil. Mental focus, energy, bronchodilator, anti-inflammatory.

- **Delta3Carene**: Pungent, sweet, pine, woodsy, cedar. Can help dry excess fluids such as runny nose and perspiration.
- **Cineole/Eucalyptol**: Spicy, camphor, minty. Increased circulation, pain relief.

Cannabinoids

There are over 480 natural components found within the cannabis plant, of which at least 85 have been determined to be cannabinoids. Cannabinoids are chemicals found in animals and other plants as well, but nowhere are they more abundant and effective than in the cannabis plant. The most well known and researched of these is THC or delta-9-tetrahydrocannabinol. THC is the substance primarily responsible for the psychoactive effects of cannabis.

Like opiates and opiate derived pharmaceuticals, cannabinoids affect the user by binding with receptors within the cells of the body and different parts of the central nervous system. There are at least two kinds of cannabinoid receptors found to date, termed CB1 and CB2. Anandamide is a cannabinoid-like substance found within the brain commonly referred to as the "Bliss Molecule." Naturally occurring anadamide binds to CB1 receptors. Other naturally occurring substances that bind to CB1 have recently been discovered, and these, together with the receptors, have been termed the endogenous cannabinoid system or endocannabinoid system.

The effects of THC are heavily influenced by the other components of the plant, most particularly, other cannabinoids. Differences between the cannabinoids found within the cannabis plant are determined by the extent to which they are psychologically active and the other medicinal benefits they correspond with. For example, CBG, CBC and CBD are not known to have a psychological effect, however they have been proven to have multiple medicinal benefits, while THC and CBN are cannabinoids often associated with the psychological effect of cannabis. Most cannabinoids are multifaceted with a wide array of effects and benefits.

The cultivation manager shall review test results for every batch in order to ensure that multiple strains are produced with varying cannabinoid profiles in order to properly and accurately provide medicines to treat multiple patients with different needs. By combining different cannabinoids and different terpene profiles, the possibilities for medicinal healing are vast. The cultivation manager shall utilize cannabinoid profiles when planning for strain production at all

times. The following cannabinoids are all known to provide different effects and medicinal benefits:

- **THC**: Delta 9 Tetrahydrocannabinol is the cannabinoid that gives cannabis the majority of its psychoactive affects. Cannabis has been bred for high levels of THC, and we are only now starting to breed for complimentary cannabinoids. THC can be used to treat pain, nausea, tumors, and ADHD.
- **THC-A**: THC-A is the most common cannabinoid found in cannabis. It is not psychoactive and has an array of medicinal effects including anti-tumor, anti-insomnia, anti-inflammatory, and anti-spasmodic.
- **CBN**: (Cannabinol) As THC oxidizes from exposure to heat and light, it turns into CBN. CBN is only mildly psychoactive and highly sedative.
- **CGB**: Cannabigerol is a non-psychoactive cannabinoid that stimulates brain cell development and bone growth. It is also antibacterial, anti-insomnia, and anti-tumor.
- **CBC**: Cannabichromene has been shown to be 10 times more effective than CBD for treating anxiety. CBC also stimulates bone growth. It is non-psychoactive.
- **CBD**: Highly effective in treating epilepsy and MS, cannabidiol is non-psychoactive. CBD is as effective at treating tumors and pain as THC, however very useful for children and to others whom do not wish for the psychoactive effects of THC. CBD can treat diabetes by lowering blood sugar and is very effective in treating stress and insomnia.
- **CBD-A**: CBD-A is more commonly found in the ruderalis varieties, which are often bred with sativa and indica varieties for their auto flowering abilities. CBDA has been linked to anti-tumor and anti-inflammatory effects.

Varieties of Cannabis

Cannabis Sativa

Cannabis sativa is the tallest variety of cannabis. All other varieties most likely evolved from the sativa plant. Most hemp is actually sativa. Sativa varieties are thin and wispy, most likely from evolving in hotter regions of the world where adequate airflow between branches was necessary to remain disease free. 100% sativa strains take up to six months to finish producing medical cannabis plant material and can grow extremely tall making true sativa unsuitable for indoor and commercial production. The sativa strains commonly grown for medicine are actually hybrids

that have been bred with indica varieties to shorten both their height and flowering time. Sativa produces a cerebral effect that can be energizing, followed by an increase in appetite. Sativa hybrids are very helpful for anyone experiencing loss of appetite such as those undergoing chemotherapy or patients with HIV/AIDS.

Cannabis Indica

Cannabis indica is short and bushy with thick stems. Most likely evolving in the cooler regions of Asia and Afghanistan, cannabis indica has a short flowering time, most likely to complete its reproductive cycle prior to freezing conditions. Most medicinal varieties of cannabis are a derived form of indica, and its cannabinoid profiles are well-balanced producing significant levels of THC, CBD, and CBN. Indicas produce a body-centered effect that allows relaxation, quality rest, and pain relief for patients.

Cannabis Ruderalis

Cannabis reuderalis is of very poor quality and is only grown in hybrid form with sativa or indica due to its auto flowering capabilities. For the most part, ruderalis hybrids should be avoided in indoor cultivation. Ruderalis is the shortest cannabis variety, and it has minimal branching. Avoid all seeds and strains that state they are auto flowering.

CBD Varieties

CBD varieties are now being bred as they offer many of the medicinal benefits of cannabis with little to no psychological effects making them suitable for children and adults who wish to remain clear headed. CBD effects on THC can be noticed with as little as 1% CBD, however, the ratio of THC to CBD can be widely influenced and tailored to create the desired effect for a particular ailment or specific patient. One-to-one ratio strains often have the best of both worlds where the psycho effects of THC are diminished by CBDs, however, all the medicinal effects from THC remain intact.

MGP Cannabis

QC gardening is a biodynamic approach to indoor cannabis cultivation that combines proven ancient wisdom with the newest technologies to achieve maximum efficiencies in energy and space. The results of QC are healthier plants and a healthier happier company culture. Additional side effects are larger yields, higher quality, increased terpene content and profile, and an increased employee retention rate.

MGP- Maximum Genetic Potential

When a plant receives everything it needs and nothing it doesn't, it will achieve MGP. MGP plants yield up to 80% more than normal plants, which greatly helps economically and environmentally, as the energy, time and space that go into production are greatly offset by the abundant harvest. Everything that goes into a plant and takes place around a plant affects the plant's ability to achieve MGP. Every day is an opportunity to achieve or subtract from MGP. For example, if a plant wilts from too little water or there is not an optimal amount of CO_2 (air) to breath, the end yield will be slightly decreased.

Short Life

Relative to humans, the cannabis plant lives for a very short period of time. Plants within the manufacturing facility will live an average of 3.5-4.5 months. This short life span means you can see the direct effects associated with the "energy" surrounding them during their life cycle.

Positive Attitude

It is important for the growing facility staff to leave negative energy at the door and come to work positive and happy. Plants can pick up on human energy and are affected by it.

Living Water and Soil

Both soil and water should always be living to reach maximum macro and micro nutrient absorption. See water.

Sun Energy

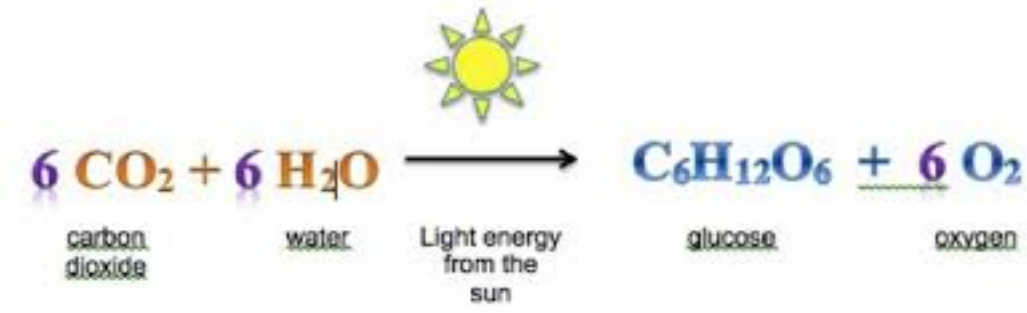
While it would be great to utilize the sun alone, cannabis gardening must be done indoors for security and discretionary purposes. Innovation in lighting plays a key role in MGP cannabis gardening. The QC gardener is always watching the latest technology with a patient eye. In QC gardening, the best light to replace the sun is the light that produces the most grams per watt per sq. ft. and produces excellent quality finished product.

Cannabis Basic Needs

Plants need air, water, and light to produce glucose for energy. Cannabis will only grow as fast as its most limiting factor. As each element increases in strength, so shall the other elements to reach MGP. We strive to maintain a perfect balance of each element so each plant produces a consistent product. The cultivation manager shall work with each zone manager to achieve the appropriate balance of each element of plant growth to achieve maximum genetic potential.

Components of Photosynthesis: Hydrogen, carbon, and oxygen are essential non-mineral elements necessary for plant growth as all play major roles in photosynthesis. Photosynthesis is a

process used by plants and other organisms to convert light energy, traditionally from the sun, into chemical energy that later can be utilized to fuel the organisms' activities. Light energy is used to form glucose from CO_2 taken in by leaves and water taken in through the root system. Oxygen, which humans breathe, is a bi-product of plant respiration.



Air (CO_2, Carbon)

Absorbed by the plant leaf, CO_2 plays an essential role in the photosynthesis process. CO_2 levels must be increased to optimal levels in order for plants to achieve their full potential. 390 ppm is the average amount of CO_2 in the air outdoors, however, indoors, under optimal light and nutrient conditions, plants can benefit from CO_2 levels up to 1500 ppm. Each zone manager is responsible for checking air quality daily and reporting any variances to the manufacturing facility manager.

- **Stomata**: As part of the photosynthesis process, plants take in CO_2 and other nutrients through tiny holes in the leaf surface called stomata. Be aware that spray pesticides can clog up stomata. Each zone manager is responsible for utilizing ethical pest management (EPM) practices.

- **Temperature**: Plants uptake more CO_2 in warmer environments, however, cannabis quality also diminishes at higher temperatures; therefore, we utilize a comfortable mid-range temperature no higher than 78° F/ 25.5° C. Each zone manager is responsible for keeping temperature at the above-mentioned temperatures. All variances shall be reported to the manufacturing facility manager.

- **Humidity**: Plants thrive in humid conditions. To avoid fungal issues, humidity must be kept in the mid-range. Each zone manager is responsible for keeping humidity at

or lower than 55% in vegetative zones, and 45% in flowering zones. Zone managers will report any humidity variances to the manufacturing facility manager.

- **CO_2:** CO_2 level should be maintained at or below 1500 in all flowering rooms and 1,000 in all vegetative rooms unless otherwise dictated by the manufacturing facility manager. Each zone manager is responsible for monitoring CO_2 levels within their respective zone and reporting any variances to the manufacturing facility manager.

Water (H_20, Hydrogen and Oxygen)

Water is taken in through the plant's root system and is a necessary ingredient for photosynthesis. Water provides hydrogen and oxygen, two critical requirements for proper plant health, and works as a transport agent for nutrients. Each zone manager is responsible for preparing water that is ready to be fed directly to or mixed with nutrients, compost teas, beneficial microbes and/or other biological controls.

- **Initial water quality**: The manufacturing facility manager will determine the initial water quality in order to implement an adequate filtration process. Reverse osmosis is only recommended as a last resort as it removes all micronutrients from water. In the event reverse osmosis must be used, the cultivation manager shall ensure an adequate replacement formula to meet all plant requirements.

- **Determining a plant zone's optimal watering schedule**: Over-watering and under-watering can be detrimental to a plant's health. The cultivation manager shall train each zone manager to properly assess the watering needs within each plant zone. In traditional soils, place your finger two inches below the soils surface; if it feels dry, water is needed. In a semi-soilless mix, the medium should maintain a moist feeling without feeling soggy.

- **Under-Watering**: If plants wilt prior to watering, and the soil is dry, plants are severely under-watered. If plants wilt immediately after watering, it is also likely they are being under-watered. There are two solutions to under-watering: increase water amount, or watering intervals. The cultivation manager shall work with each

zone manager to assess the watering requirements within each zone and achieve the proper growing medium moisture level for the purpose of maintaining healthy plants.

- **Over-Watering**: Over-watered plants will also wilt, however, the medium will be very soggy vs. dry. Over-watering plants, in effect, drowns them and stunts overall growth by hindering proper root development. If it is determined a root zone is over-watered, it is imperative to allow the medium to fully dry and then begin to re-moisturize slowly just as if the plant were recently transplanted. The addition of mycorrhizae and nutrient teas can help re-invigorate a plant's root zone and decrease the recovery time after over-watering has occurred. The manufacturing facility manager shall work with each zone manager to avoid and correct over-watering scenarios.

- **Water Prep:** Each zone manager is responsible for preparing the water to be used for plant cultivation within his or her respective zone. Preparing water is a two-part process:

    - **Filtration**: All water should be filtered through, at a minimum, a two-stage filtration process. Water should be filtered a minimum of 24 hours in advance to prepare for aeration.

    - **Living Water**: All water should be brought to "life" by properly aeration. Air-stones shall be placed at the bottom of all water reservoirs after water has been properly filtered. Aeration time is a minimum of 24 hours.

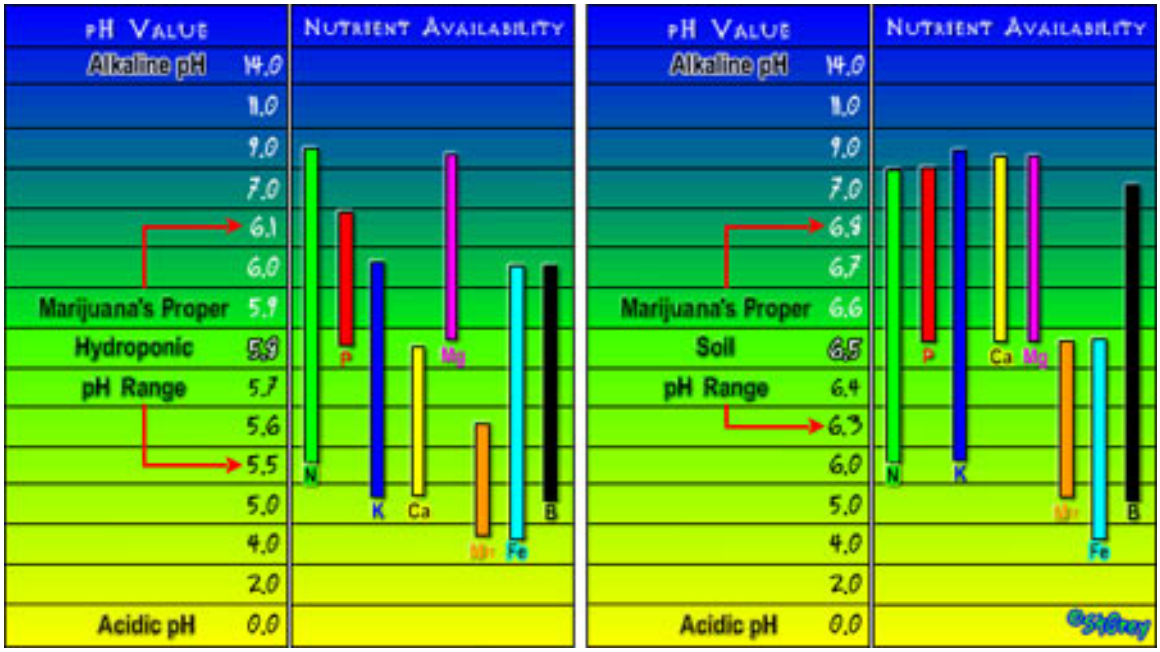
    - **Vortex**: When mixing nutrients, water shall be stirred in an alternating clock-wise and counter clockwise motion. When water is stirred in a vortex motion, it becomes electrically charged and allows for better nutrient absorption. All zone managers shall utilize a vortex motion while mixing solutions to be applied to crops.

Vortex Mixing Instructions:

- Stir 20 seconds until a vortex occurs in one- direction and then reverse the direction

- **pH:** Cannabis absorbs available nutrients best in the pH range of 5.8-6.5. The plants' pH shall be checked before and after mixing nutrients and adjusted accordingly by the zone manager for each respective zone. Cannabis absorbs nutrients better in slightly more alkaline conditions when in soil rather than in hydroponic gardens. See the table below:

pH Range for Hydro vs. Soil:



- **PPM and EC**: Parts per million and electrical conductivity tell you the amount of

Lighting

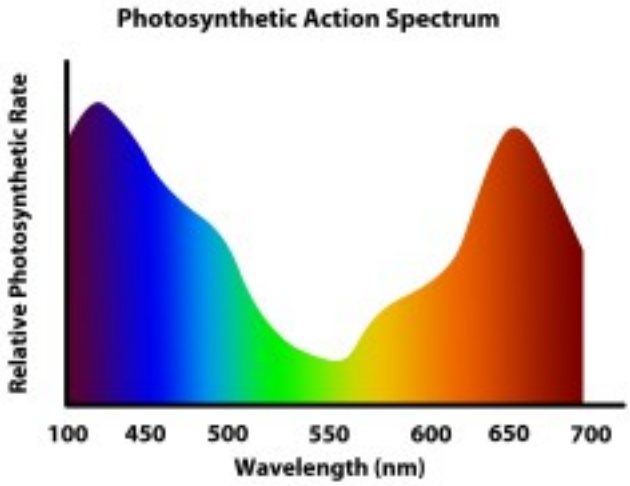
Light provides the energy to turn water and CO_2 into usable plant food (glucose) and oxygen during photosynthesis. When the optimal lighting spectrum and strength combine with CO_2, large amount of nutrients can be taken up through the plant's root system and used for vigorous growth. The cultivation manager shall work with each zone manager to monitor lighting and ensure the intensity and photoperiods are maintained at all times.

- **HID lighting**: High Intensity Discharge (HID) lighting is currently the best replacement for the natural sun, which is by far the best light for production, taste, terpene profile, and root formation. Producers of agricultural lighting products have created HID lighting to attempt to mimic the sun for indoor growing purposes.
- **HPS**: High Pressure Sodium (HPS) lighting has been the go to light for vigorous growth indoors for years. Traditional HPS produces the most intense light and helps plants reach a large size and produce large amounts of resinous medical cannabis plant material Recently LED lighting has proven itself to be a slightly better choice than traditional HPS, however, new HPS technologies have surpassed current LED lights in production capacity.

- **Traditional HID lighting**: Traditional HID lighting is no longer an effective option for the emerging cannabis market where the environment and cost must be taken into account for large cannabis manufacturing facilities.
- **High Frequency HPS lighting**: HF HPS lighting with newer double-ended lamps are currently the most efficient light available for cannabis production. The light produced from lamps such as Gavita and E-Papillion actually registers a slightly higher PAR value than the natural sun. The manufacturing facility shall utilize HF HPS throughout all flowering zones in order to optimize energy consumption and produce the highest quality cannabis with consistent dosage.
- **Metal Halide**: Metal halides have always been an excellent light source for vegetative growth. Metal halides with blue spectrum create dense growth, large green fan leaves, and short internode length. Plants that vegetate under blue spectrum metal halide can easily achieve MGP. 1,000 watt blue spectrum metal halides shall be used for late vegetative growth in the V3 zone in order to prepare plants to go under 1,000 watt HF HPS lighting in their designated flowering zone.
- **T5 Florescent Lighting**: T5 florescent lighting is perfect for areas where heat and ceiling height may be an issue and where small plants, clones, or mother plants are being grown. T5 fluorescents save energy and produce healthy plants. T5s shall be utilized in the hot house for cloning and in mother plant zones of the manufacturing facility.
- **LED lighting**: LED lighting has passed the traditional HPS lighting for flowering cannabis plants, however, it is not quite on par with HF HPS. LED shall be utilized in the V2 section of the manufacturing facility for the second phase of vegetative growth. Additionally, one flowering room will act as a research and development center to continue to test new LED products as they hit the market to determine their efficiency. Once they are proved, the entire facility shall eventually utilize LED lighting.
- **Induction Lighting**: Induction lighting has been developed specifically for plant cultivation and currently is very useful in the vegetative phase. However, due to the high cost associated with it, it is still in the R & D phase and shall be tested in the V2 zone along with LEDS.

Photosynthetic Spectrum

An efficient lamp will turn as much energy as possible into photosynthetic energy. The only light plants use for photosynthesis appears within the PAR (photosynthetic active radiation) region. The PAR region occurs from 400 to 700 nm within the light spectrum. As you can see on the chart below, the main spectrums of usable light for the cannabis plant are blue and red. The light spectrum (color blend) strongly influences the development of the plant.



- **Blue Spectrum Lighting** promotes dense growth and short internode length. Metal halide lights with high quality blue bulbs are recommended for vegetative growth. High intensity fluorescent lights are recommended in the smaller/early stages of vegetative growth and mother quarantine sections to save energy and reduce heat. Newer lights such as LED have a more balanced light spectrum and will soon surpass traditional metal halides for vegetative growth.
- **Red Spectrum Lighting** promotes large plants with big beautiful blooms. Red spectrum lights provide more intensity for the later stages of plant growth and are currently recommended for flowering. Traditionally, HPS lights have

been used. If the manufacturing facility is using traditional HPS, the manufacturing facility manager shall ensure the bulbs are replaced every six months with new high quality bulbs such as the Hortilux 1000-watt HPS bulb.

- **Hybrid Lighting** Plants grow best in a mix of red and blue light. Currently, LED lighting appears to have the best spectrum potential, however, the intensity is still not quite on par with newer high frequency HPS technology. Newer double-ended bulbs designed for lights like the Gavita and e-Papillion have a more balanced spectrum and should be used in all flowering spaces where heat is not an issue.

Light Intensity Requirements

The manufacturing facility manager shall ensure lighting intensity is maintained throughout the plant growing cycle.

Measuring Light Intensity: The manufacturing facility manager shall utilize a light meter that measures light in micromoles such as the apogee to measure lighting intensity.

- **Using a Light Meter**: The light meter shall be placed in the bottom of a cardboard box at least two feet wide. The box must have all the walls intact and no lid. The sidewalls of the box act to block out light from nearby lights so the meter can measure one light at a time. A lighting strength inspection shall be done monthly by the respective manager with in each zone.

    - **Light Meter ex:**

- **Micromoles**: Micromole is a quantum unit, which quantifies the number of photons used in photosynthesis by measuring the amount of photons that fall within one square meter. Plants grow faster and stronger in conditions up to 1500 umol. Plants continue to up take more water up to 2000 umol, however plant health begins to decrease above 1500 umol.

- **DLI**: Daily light integral is the measurement of micromoles plants receive in a 24-hour period. Plants that receive a low DLI typically show delayed growth and development.

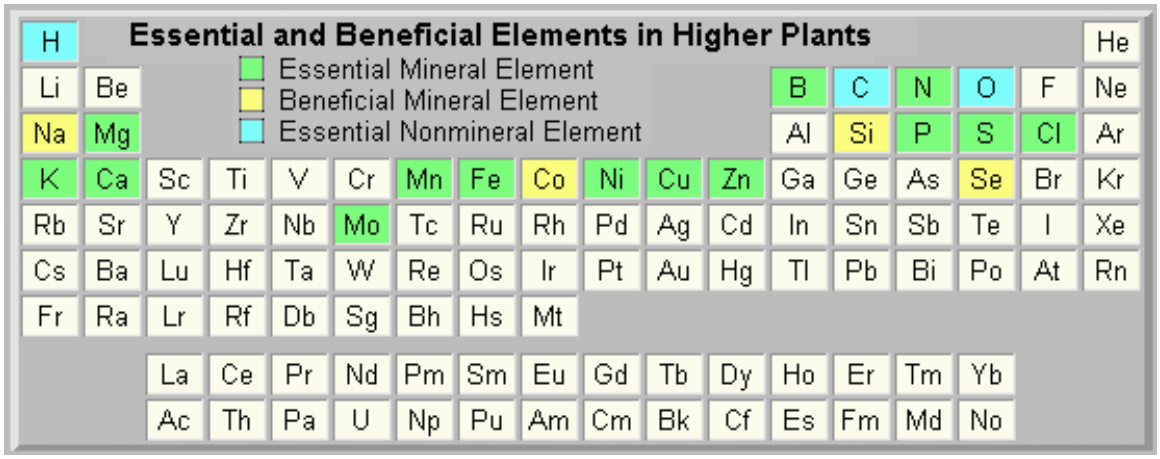
Minimum Lighting requirements: The manufacturing facility manager shall ensure all lamps within each flowering area of the manufacturing facility are providing 1500 umols within the propagation range.

Photoperiod

The photoperiod is the length of the day that plants are exposed to photons. Cannabis flowering is influenced by the photoperiod so it must be constantly maintained to avoid plant stress. The manufacturing facility manager shall work with each zone manager to ensure all flowering zones receive 12 hours of un-interrupted darkness and that each vegetative zone receives a minimum of 18 hours of light throughout each day.

Plant Nutrients

Food (nutrients): While plants can survive on their basic needs alone, cannabis plants grown under optimal conditions will need nutritious food to thrive and reach MGP. It is the manufacturing facility manager's responsibility to utilize a precise feeding schedule to ensure plant nutrient needs are met throughout all growth phases.



Primary Macronutrients

Nitrogen, Phosphorous, and Potassium (NPK) are the three macronutrients required to cultivate healthy cannabis plants. It is the manufacturing facility manager's responsibility to ensure all cannabis plants receive sufficient NPK. NPK can be found in all high quality base nutrients and multiple organic additives such as guano.

- **Nitrogen (N)**: Cannabis uses more nitrogen than any other nutrient. Nitrogen is most important in the vegetative and early flowering phases of the cannabis life cycle. Nitrogen helps plants produce chlorophyll, which gives plants their green color and is essential for photosynthesis. When a plant is deficient in nitrogen, its lower leaves will start to turn yellow and die. The cultivation manager shall work with each zone manager to monitor for nitrogen deficiency.

- **Phosphorous (P)**: Cannabis plants use phosphorous to create necessary chemicals during all stages of plant growth; however, cannabis requires higher phosphorous levels during floral development in the flowering stage. When plants are deficient in phosphorous, the stems will turn purple and growth vigor will decline. The cultivation manager shall work with each zone manager to monitor for phosphorous deficiency.

- **Potassium (K)**: Potassium plays a major role in chemical synthesis and metabolism within the cannabis plant. Having the correct amount of potassium in your plants gives them sturdy and thick stems, makes them disease resistance, and aids in water respiration as well in photosynthesis. Potassium is necessary for water transportation throughout the entire plant, and is utilized during all stages of growth, especially in flower formation. Lack of potassium can make plants vulnerable to diseases such as mold, fungus and mildew. Red stems, declined plant vigor, along with the previously mentioned diseases are all signs of a potassium deficiency. Be careful not to confuse a genetic trait of the plant (red stems) alone as a deficiency. The cultivation manager shall work with each zone manager to monitor for potassium deficiency.

    - **Understanding Nutrient Labeling**: Nutrient containers display nutrient levels in NPK ratios, such as 10-10-10, located on the front label. Nitrogen is always the first number followed by phosphorous and then potassium. A numerical display of 10-10-10 means the solution contains equal parts of all three nutrients and each nutrient is at a concentration equal to 10% of the solution's weight.

Secondary Macronutrients

Calcium, Magnesium, and Sulfur (CaMgS) are necessary in sufficient levels to reach MGP. The secondary nutrients promote plant growth and overall health. CaMgS are generally found in high quality soil, however, soil often lacks sufficient amounts to keep rapidly growing cannabis plants healthy throughout the entire life cycle so supplements and or soil additions are recommended. The cultivation manager shall plan the nutrient feeding schedule and soil mixture accordingly to avoid problems associated with calcium, magnesium, or sulfur deficiencies.

- **Calcium (Ca)**: Calcium is a part of the cell wall development in the cannabis plant. It strengthens the stems and branches of cannabis and helps in the formation of the root and its tip's growth. A calcium deficiency causes rust spotting on leaves and impedes root system development. A high quality calcium supplement is a must to avoid problems before they can adversely affect plant health and overall yields. The cultivation manager shall work with each zone manager to monitor and avoid calcium deficiencies.

- **Magnesium (Mg)**: Magnesium influences the formation of chlorophyll, which gives plants their green color and acts as a light absorber during photosynthesis. Magnesium also affects most enzymatic reactions within plants. The structures within cannabis plants (leaves and the veins) are healthy due to this element. Yellowing combined with leaf curl (especially upward) are signs the plant needs more magnesium. We will include a good magnesium supplement in the feeding schedule to keep plants happy and healthy. The cultivation manager shall work with each zone manager to monitor and avoid magnesium deficiency.

- **Sulfur (S)**: Sulfur participates in the formation of chlorophyll and the growth of the plant. The deficiency is presented by slower rates of growth along with pale green or yellow color on the top of the plant where new growth appears. The leaves on cannabis plants lacking sufficient sulfur will develop a mutation that causes them to round and roll upwards. The cultivation manager shall work with each zone manager to monitor and avoid sulfur deficiency.

Micronutrients (trace elements)

Micronutrients are very important to overall plant health and are necessary when attempting to achieve MGP. The cannabis plant uses micronutrients in very small quantities. Most high quality soils contain micronutrients, however, adding more throughout the growing cycle is a good step towards preventing future health problems that can be hard to troubleshoot. The manufacturing facility manager is responsible for utilizing teas and organic additions within the feeding schedule to meet the cannabis plants' micronutrient needs.

- **Micronutrient List**: Micronutrient deficiencies can be difficult to diagnose, therefore, prevention is the best medicine. The cultivation manager shall utilize the proper soil amendments, compost teas, and/or synthetic additives to ensure that all cannabis produced will have sufficient quantities of the following micronutrients to reach MGP:

    - **Essential Mineral Elements:**
        - Iron
        - Manganese
        - Boron
        - Zinc
        - Copper
        - Molybdenum

    - **Beneficial Mineral Elements**:
        - Silicon
        - Sodium
        - Cobalt
        - Selenium

    - **Essential Non-Mineral Elements:**
        - Hydrogen
        - Carbon
        - Oxygen

Nutrient Sources and Preparations

There are two main ways to meet the nutrients requirements of plants: organic and inorganic fertilizers. These two ways of feeding plants can be used alone or combined to form hybrid formulas. Combining these two methods is recommended when growing indoors under optimal conditions and will help each plant reach its maximum genetic potential. The cultivation manager shall determine the nutrient formula to be used throughout each stage of the cultivation process. It is important to note that plant nutrients, especially nitrates commonly found in cannabis fertilizers, can create problematic issues for natural habitats and for human health if

they leach into groundwater. For this reason and to conserve water, the cultivation manager shall strive to achieve minimal run off throughout the cannabis feeding process.

Inorganic and Synthetic Nutrients

Inorganic and synthetic nutrients meet the plant nutrient requirements through immediate absorption through the plant's root system. These instantly bio-available nutrients have advantages in an indoor growing environment as they can be adjusted to meet a plant's nutrient requirements quickly to avoid and correct nutrient deficiencies, and aid in reaching MGP.

How to Properly Mix Synthetic Nutrients: Always mix nutrients into water one at a time. The appropriate zone manager shall mix all nutrients. The manager will use a reservoir with the appropriate amount of living water, measuring devices, and a stirring rod and will follow these steps:

- Determine nutrient formula to be used
- Make sure lid is closed tightly on nutrient container and shake vigorously to mix nutrients
- Measure and add part A of the base nutrient
- Replace lid on nutrient container
- Stir nutrient solution in a vortex motion; allow nutrient 10-15 minutes to fully mix into water
- Shake, measure and add part B, vortex

- Shake, measure and add any other base nutrients, vortex
- Make sure all nutrient lids are sealed tight
- Check and adjust pH level to 5.8-6.3
- Measure and add remaining supplemental nutrients, enzymes, or beneficial microbes one at a time, and vortex thoroughly

Organic Nutrients

Traditional organic nutrients are mixed into soil and must break down over time providing the full spectrum of nutrients required for plant growth. Microbial life plays an essential role in breaking down organic matter in soils and making fresh humus that contains all elements for healthy root systems and plants. Teas are highly recommended to supply fresh microbes and nutrients needed throughout the plant's life cycle. Top packs and spikes can also be utilized to provide nutritional component for plant growth later in the life cycle. Traditional organic gardening is consistent with TLO or true living organic gardening.

Newer bottled organic nutrients are often further processed and provide readily bio-available nutrients along with soil enhancers. These nutrients can be used alone in an inert substrate or used in combination with traditional organic methods to improve growing time and correct deficiencies.

Making Organic Compost Teas: Compost teas should be used bi-weekly to ensure there is a healthy microbial level within the growing medium. Each zone manager shall utilize the appropriate tea recipe for each phase of the cannabis life cycle. Teas shall be applied on a two-

week schedule. Teas feed the microbial life in the soil and create healthy plants that resist disease, yield more, and produce consistent cannabis with an excellent terpene profile.

Basic Tea Requirements: Five-gallon bucket, living water, air pump, worm castings, humic acid, sea kelp, earth worm castings

Procedure For Making Compost Teas:

- Fill bucket half way with water
- Place air pump (bubbler) in bucket and turn on
- If water is not already alive (see living water) allow water to bubble for a minimum of 24 hours to de-chlorinate
- Place the following ingredients into the water: two tablespoons molasses, two ounces sea kelp, and two ounces humic acid
- Place 1 pound earth worm casting into a sock or similar tea bag, and place bag into the water
- Allow water to bubble and brew for 24-48 hours
- Dilute tea into 40-50 gallons of living water and apply to soil or as a foliar spray

Top Packs: Mitigating plant deficiencies and increasing production capacity can be done organically through the use of top packs. Super soils with organic nutrients built in will only maintain maximum plant growth until the plant has used up the nutrients. Top packs can be applied half way through the flowering cycle to ensure the plant has all nutrient needs met and produces the highest quality end product.

Procedure for Applying Top Packs:

- Determine appropriate amount for container size (¼ cup per gallon of substrate)
- Mix three bat guanos together to equal appropriate measurement
- Apply to the top of the soil mixture
- Water with living water

Spikes: Spikes are small compact nutrient zones into which roots can grow and use additional nutrients as needed by the plant. Flavor bombs are pre-made spikes and are a good way to prevent deficiencies and provide maximum growth, quality, terpenes profile and consistency.

Procedure for Adding Spikes: Add spikes when transplanting into final container for flowering phase.

- Determine the appropriate amount for container size (1 spike (flavor bomb) per gallon)
- Place spikes evenly throughout the planting medium
- Water in as plant needs

Organic Bottled Nutrients: Organic bottled nutrients can be used to maintain nutrient needs as the plant grows larger and nutrient requirements increase. In 100% organic growing, all nutrients shall be OMRI listed organic nutrients.

Hybrid Organic/Synthetic Formulas: Hybrid growing formulas combine aspects from both organic and synthetic growing styles. Hybrid methods are superior to either method separately in producing high yielding cannabis plants that still have great flavor and terpene profiles. Hybrid growing would utilize a light organic potting medium.

Growing Medium (substrate):

Think like a root! The growing medium is where the plant's root system thrives, and healthy roots form the foundation for healthy plants. Selecting the best growing medium is one of the most important considerations in cannabis plant production. A growing medium can be defined as a substance through which roots grow and absorb hydrogen, oxygen, and nutrients. Roots want to live in moist humid air pockets, which is important to keep in mind when placing media in a container as it can produce an environment drastically different from that of soil found in nature. Plants living in containers have access to a very limited amount of growing medium. This limited rooting volume means that cannabis plants only have access to small amounts of water and mineral nutrients. Additionally, water and nutrients in this limited space can be used very quickly. Most traditional containers only drain from the bottom so proper drainage must be established within the container by utilizing rocks on the bottom layer of all containers. Soils in nature also contain microorganisms, such as bacteria and fungi, which do not exist in artificial growing media. The texture of any growing medium should contain structures that create

porosity; think of all the tiny rocks and other additions to naturally occurring soil. Texture and porosity of all cannabis mediums should allow drainage while maintaining the proper balance of moisture resulting in flourishing root zones that can absorb ample amounts of nutrients. The cultivation team should always strive to achieve optimal root zone conditions. The cultivation manager shall train each zone manager in proper media building in order to meet the needs of the plants within the facility.

Earth (living) Characteristics of a Perfect Growing Medium: Naturally occurring soils are truly a living microenvironment. All mediums except for hydroponic should possess the following physical, chemical, and biological properties in order to grow the healthiest plants and reach MGP soil.

Physical Properties of Growing Medium

The cultivation manager shall ensure each zone manager has an appropriate balance of physical properties to achieve the best structure for root development and growth.

- **Aeration/Porosity:** Naturally occurring soils contain textured materials such as rocks and shells that provide adequate drainage, pockets of oxygen, and chelate into usable nutrients. Microbes thrive in tiny porous holes that are provided by substrate additions such as perlite and lava rocks. We will use an array of different size textured materials to create humid air pockets for roots and numerous porous surfaces to hold oxygen and grow microbes.

- **Aeration/Porosity Components of Soil**: The following components of growing media will provide aeration and porosity thus allowing drainage, oxygenation, and microbial growth resulting in a healthy root zone and robust plant:
    - Perlite
    - Lava rocks
    - Hydroton
    - Worm castings

- **Moisture/water holding capacity:** A good growing medium will have ample water holding capacity and still be porous enough to allow excess water to drain away. In

cannabis gardening, coconut coir is a perfect inert substrate that will hold water. We will work diligently to provide the perfect balance between water holding capacity and drainage by utilizing a mix of absorbent substrates and porous substrates.

- **Moisture/water holding components of soil blends**: The following components will provide water-holding capacity and should be used in balance with porous additions to maintain the proper moisture/oxygen/nutrient balance within the root zone:
    - Coco coir
    - Potting soil
    - Peat moss
    - Humus soil

Chemical Properties of Growing Medium

The cultivation manager shall work with each zone manager to ensure that all growing medium has the correct chemical properties.

- **pH**: The pH of growing medium is a measure of its relative acidity or alkalinity. pH values range from 0 to 14. Growing mediums below 7 are acidic, and those above 7 are alkaline. Cannabis thrives in a substrate pH of 6.0-6.5. The substrate pH affects the plant's ability to utilize nutrients within the root zone. For example, phosphorus availability is less in low pH conditions where it can bind with iron and aluminum. At high pH levels, phosphorous will bind with calcium hindering the plant's ability to use the nutrient effectively. The effects of poor pH conditions can show up as common nutrient deficiencies or diseases and also can have devastating effects on the microbial life within the substrate. Each zone manager shall monitor substrate pH regularly and whenever adverse conditions appear within the manufacturing facility.

- **CEC/Cation Exchange Capacity:** CEC refers to the capacity to which a growing medium can hold positively charged ions thus resulting in the nutrient storage capacity within a given medium. Because most artificial growing media are inert, CEC capacity must be considered. Within the growing medium, plants absorb nutrients through roots via a process in which excess charged ions are exchanged for

charged nutrient ions. Once cation exchange has occurred, nutrients are transported to the foliage where they are used for growth and development by the plant. Because the CEC of a growing medium reflects its ability to hold nutrients for plant uptake, substrates with a relatively high CEC are recommended for cultivating cannabis. The cultivation manager shall adopt a medium with the appropriate CEC for optimal plant growth.

Biological Properties of Growing Medium

A common dilemma with soil-based growing media is that it can contain a variety of pests such as pathogenic fungi, insects, nematodes, and weed seeds. All naturally occurring soil-based media shall be pasteurized with heat prior to being used in the manufacturing facility. Composts and humus soils are an exception, as they remain pest free due to high temperatures that occur during composting. Compost can be added back to inert or sterilized media for their beneficial microbial components as well as trace minerals. The cultivation manager shall work with each zone manager to ensure the biology of the growing media does not promote disease or insect proliferation, however, the media shall remain healthy and stable for the development of microbial life.

- **Microbes**: Bacteria and fungus feed on each other and excrete pure humus into the soil. It is imperative to use at a minimum of 15-20% soil in planting mediums in order to provide a solid foundation for beneficial bacteria and fungal growth. These beneficial organisms provide all the quantum aspects needed within the growing substrate to ensure plants reach MGP. The manufacturing facility manager and each respective zone manager shall manage the application of organic soil composts and teas.

- **Humus**: Humus is nature's perfect plant food and has all necessary macro and micronutrients to support vigorous root growth and a healthy plant life cycle. The soil component of all media should contain a good source of humus. Each zone manager shall utilize humus soil within the growing media.

- **Worm Compost**: Made up from the excretions of the earthworm, worm castings are a great amendment for both the porosity of the media and the microbial life within the media. Each zone manager shall utilize worm castings in all transplant media and in the creation of compost teas to be fed throughout the plant's life cycle.

Building a MGP Semi-Soil

The recommended substrate for cultivating cannabis indoors is the MGP Semi-soil. MGP semi soil combines all three properties of perfect media and results in an easy to use substrate that maximizes a plant's growing potential while mitigating the risks often associated with both hydroponic and soil gardening. Each zone manager shall prepare and utilize MGP semi soil for cultivating cannabis within their respective zone prior to transplanting plants at all stages of life except cloning.

Tools: Mixing tub (large kiddie pool, thick tarp, wheelbarrow, or soil mixer), flat nosed mixing shovel

Ingredients: Fox Farm Ocean Forrest Soil, Fox Farm Big and Chunky Perlite, Plagron Coco Coir, humus soil, worm castings. (All brands can be exchanged for other high quality brands that meet the above listed requirements for cannabis growing media).

Ratios: 25% soil, 25% coco coir, 7.5% humus soil, 7.5% worm castings, 35% chunky perlite

Directions: Starting with perlite, measure and place in mixing area. Measure and add coco coir. Measure and add humus and worm castings. Measure and add soil. Mix all ingredients with shovel or soil mixer until evenly mixed.

Hydroponic: Hydroponic gardening can produce vigorous crops, however, it is not recommended for medical cannabis production as it uses high doses of chemicals, is prone to fungus and disease, uses larger amounts of water, has a high nutrient cost disposal of waste water into the environment, and has a high crop failure rate due to dependence on electronic function.

Coco coir: Coco coir with a top drip-feeding system is the recommended replacement for hydroponic gardening as it solves every problem associated with hydroponics and can achieve similar results. MGP semi-soil with a hybrid system utilizes coco coir as a component while still utilizing an organic base for additional terpene profile and overall plant vigor and health.

TLO: True Living Organics produces the highest quality cannabis with the best terpene and flavor profiles. TLO consists of building a super soil and feeding beneficial microbes. Plants take the nutrients they need directly from the soil as time and microbial feeding and excretion release make micro and macronutrients bio-available.

Cannabis Life Cycle + Seed to Sale Tracking

All cannabis tracking shall begin when a seed or part of the parent plant is removed and a propagating plant or clone is created. At this point, a unique plant RFID identification number shall be assigned, labeled, and recorded by the vegetative zone manager which then will be used to track the history and data through propagation, vegetation, flower, harvest, processing, cure and final packaged inventory.

Each plant shall be tracked by its physical grid location in the premises at all times. All significant dates and observations will be recorded as key data points in the SIS for referencing needs throughout the plant's life cycle. This information can be used to recall any contaminated medium, nutrient, or issue that may occur during the stages listed above and allows for easy removal from production or inventory of any product that does not meet the requirements of the state.

An inventory of cannabis in the cultivation stage shall be conducted each week. During the cultivation process, physical location will be broken up into a grid system and each square will have a designated number of plants per grid area.

Auditing the inventory of all plants shall be effectively and efficiently accomplished with spot checks done daily to mitigate any diversion during cultivation, processing and/or packaging, as well as detecting any human error that may have occurred while entering information during the plant’s life cycle.

After the flowering cycle has been completed and the plant is harvested, inventory shall be transitioned from the flowering zone to the processing department, and prepared for trimming. During this transfer, all product will be scanned, tracked and logged. At this point, a pre-trimming weight will be determined and logged.

After being weighed and logged, all plant material will be cleaned, trimmed, and prepared for drying in the secured vault. Each batch is transferred through each state with the entirety of the batch. All green waste from the trimming process shall be weighed, logged and disposed of according to our policy for managing waste from cannabis plants (see transportation protocol).

After drying and curing, each batch shall be tested for efficacy. Once a batch has passed all regulated testing protocol and our standards set forth by business management, it shall be released for packaging and labeling. Before being transferred to packaging, the entire batch will be weighed again, scanned and logged into the SIS via RFID.

As each package is wrapped and processed, each individual package will be weighed again and reconciled against the total batch weight. Once packaged, all product shall be scanned and logged into the second vault designated for all approved and packaged products and stored until transfer.

Immediately before being transferred to a retail location, all product will be scanned again and logged into the SIS via RFID technology.

Once arriving at the distribution facility, all POs will be inventoried and received by the store processing management team, and the information will be logged into the SIS and store inventory via RFID technology.

This entire process from seed to sale will be recorded on high definition cameras, and all recordings will be stored for a minimum of 90 days.

Seed to Sale Tracking

Tagging and tracking within the manufacturing facility: The manufacturing facility compliance manager is responsible for coordinating with the cultivation manager and the

processing manager to ensure every plant and any amount of cannabis product is tracked throughout the plant and product life cycle within the manufacturing facility. The following will represent data collection and product lockdown points within the facility in a seed to sale time line:

Sprouted seed and clones: Receive RFID number and tag, tracking begins

Transfer to V2: RFID scanned, location changed, data recorded and transferred

Transfer to V3: RFID scanned, location changed, data recorded and transferred

Transfer to designated flower zone: RFID scanned, location changed, data recorded and transferred

Harvest: RFID scanned, weight recorded, location changed, data recorded and transferred

Trimmed: RFID scanned, weight recorded, location changed, data recorded and transferred

Drying: RFID scanned, weight recorded, location changed, data recorded and transferred

Curing pre-testing: Secured/lockdown for testing results, RFID scanned, weight recorded, location changed, and data recorded and transferred

Curing post-testing: If approved for release, RFID scanned, weight recorded, location changed, data recorded and transferred

Processing: Labeled, RFID scanned, weight recorded, location changed, data recorded and transferred to secured safe to await delivery to store location

Delivery: RFID scanned, weight recorded, location changed, data recorded and transferred to transport vehicle

Cannabis Life Cycle Standard Operating Procedures

The following steps will be taken to ensure the quality of the medical cannabis, including purity and consistency of dose and the presence of potential contaminants. This includes standard

operating procedures, a description of the testing process and frequency, and plans to engage with a lab to conduct the testing. The following processes also include seed to sale tracking to ensure all cannabis and cannabis products are constantly secured throughout the life cycle.

Starting From Seed: There are several methods of germinating cannabis seeds. The vegetative zone manager will work with the manufacturing facility manager to determine when and which varieties of seeds to germinate. Our process will be as follows:

- Determine variety to germinate Prepare the necessary tools for seed germination starting with a clean container that will hold at least 8 oz. of filtered room temperature water
- Soak the seeds in the water for 24 hours. At first, the seeds will float on the surface of the water, but as the seeds begin to germinate, their surfaces will open allowing them to take on water and sink to the bottom. The seeds on the bottom of the container are germinated and can now be planted in an appropriate medium. Log results.
- After soaking, place the seeds between two paper towels and place the paper towels between two plates turned to face each other. Place the plates in the propagation cabinet in propagation portion of the manufacturing facility and wait 24-48 additional hours. The seeds will be visibly germinated at this point and can be transplanted. Log results.
    a. Once a seed is germinated, it will be given a unit number, batch number, RFID tracking tag, and will be logged and entered into the SIS so tracking can begin.

Planting Seedlings: Once a seed has germinated, the vegetative manager will plant the seed in a prepared medium. Seeds should always be planted in small containers to establish a basic root system before being transplanted into larger containers.

- Prepare planting medium
- Fill 12 oz. container three-quarters of the way full with medium
- Remove a pinch of medium from the center leaving a hole .25 inches deep
- Water the medium with living water
- Place germinated seed in the small hole and cover lightly with moist medium
- Container is labeled with RFID and location and all pertinent data is recorded into the SIS
- Place planted containers on shelves under T5 lighting
- Check daily for sprouts
- Once the plant is 1 inch tall, add .5 inches of medium
- Repeat additional medium applications up to 2 times, until the plant has a sturdy base
- Water seedlings when they feel dry at the surface
- Transplant when plants require water daily

Determining Sex in the Cannabis Plant: Cannabis is a dioecious plant species meaning its flowers are either male or female. The zone manager responsible for the flowering of genetics from seed shall monitor flowering plants daily for signs of being male. It is important to note that even if a plant has shown white pistols coming from its branches, it could still be hermaphroditic especially if the seed origins were of a feminized variety. If a plant is determined to be male, it is either returned to vegetative for future breeding or destroyed or disposed of in a manner consistent with waste disposal procedures, and logged accordingly.

Male Cannabis Plant: Male plants will grow distinct ball-like sacs. Once they open, a fine powder is released (pollen) that is dispersed throughout the room on the slightest breeze. The zone manager will take the most care to eliminate contamination risk when removing and destroying male plants.

Female Cannabis Plant:

Hermaphrodite Cannabis Plant:

Instructions for Sexing a Cannabis Plant: All cannabis started from seed will be flowered in a separate and distinct section of the manufacturing facility where pollen is not able to travel into other flowering sections of the facility and potentially contaminate other batches of cannabis. The designated flowering zone manager will oversee the flowering of all plants from seed within their designated batch.

- Plants will be monitored daily for sign of being male.
- Once a plant has been determined to be male, it will be removed from the flowering room and destroyed. If the plant is determined to be good for breeding, it may be cloned prior to being destroyed.
- Remove a male by placing a plastic trash bag over the entire plant and secure the bag tightly at the bottom of the stem by the base of the plant. Cut at the base and follow green waste procedures.
- Remove male plant from plant inventory.
- Dispose of the plant following green waste procedures.
- Continue to monitor remaining plants, even females, for signs of being male or hermaphroditic.

- All hermaphroditic plants should be treated just as males and disposed of in the same manner.

Seed Storage: All seeds shall be labeled, logged, sealed airtight containers and stored in the genetic storage cooler. The vegetative zone manager is responsible for seed storage.

Feminized vs. Regular: Feminized seeds are seeds that have been bred by forcing a female plant to become hermaphroditic and fertilize itself in order to produce an all-female crop. These seeds have a greater propensity to be hermaphrodite and must be monitored closely when flowering.

Starting From a Mother Plant (Cloning)

A mother plant is a female plant reserved in a continuous vegetative state for the purpose of taking cuttings. The cuttings from the mother plant are grown and flowered to produce the final product. The vegetative manager shall ensure that healthy mother plants are maintained at all times to ensure healthy clones through the following procedures:

- Mother plants shall be watered with a well-balanced nutrient formula that is high nitrogen.
- The mother plant shall be sufficient in size prior to cloning.
- Super cropping and topping techniques shall be followed to increase the number of cloning sites on each mother plant.
- Avoid taking too many cuttings from a mother plant; leave at least 2/3 for future cloning, and allow at least 1 week between cloning sessions for the mother to recover from stress.

Cloning Process

Clones are genetic copies of the mother plant, therefore all mother plants must be determined suitable for cloning by the vegetative manager. The vegetative manager shall be responsible for selecting strains to be cloned in order to meet the demands of each flowering zone. Any terminal shoot at least three inches long can be turned into a clone; however, the top of the mother plant will have the freshest, softest material for cloning, and cloning from top down helps avoid mother plants that are too tall for the ceiling height within the growing space.

Materials needed for cloning: Rubbing alcohol, cutting board, scissors, new razor blades, cloning gel (for organic use honey), small container, distilled or reverse osmosis (RO) water, vinyl work gloves, and cloning medium

Cloning mediums: Rockwool cubes, rapid rooter cubes, coco coir cups, aeraponic systems

Procedure for taking clones: The vegetative manager will train a dedicated zone manager for the propagation of all clones.

- The vegetative manager will identify and approve a mother plant to be cloned.
- The cloning manager will prepare all tools and surfaces by wiping them clean with 90% rubbing alcohol and will then follow this protocol:
    - Fill clean empty glass with distilled or RO water.

- Prepare cloning medium by moistening with filtered water.
- Take clean scissors and place them into the cloning medium 1.25 inches deep to ensure a clean hole for planting the cutting.
- Place the cutting board on a clean stainless steel-working surface.
- Place the cloning medium and several brand new razors next to the cutting board.
- Select suitable cuttings, which are a minimum of three to four inches in length and have at least three leaf nodes.
- Using scissors, remove several suitable cuttings from the mother plant.
- Quickly cut and remove lower leaf nodes and place in the cup of water.
- Place cup with cuttings next to the cutting board.
- Remove cutting from the water and prepare to make a final clean cut with the razor blade.
- Place the cutting on the cutting board and slice the base at a 45-degree angle directly below a leaf node for best results.
- Cut and remove all lower fan leaves, any large fan leaves near the top should be cut in half/
- Immediately dip the cut end of the clone into the cloning gel (rooting hormone), and place into the prepared growing medium. (If using an aeraponic cloner, skip the dip, and place the bare stem into the cloning machine.)
- Place the finished tray of cuttings into the hot house or under a propagation dome. Lighting should be t5 florescent or similar.
- Ensure humidity remains at 80% and temperature remains at 80 degrees.
- After 7 days, remove all weak cuttings. Cuttings that are standing strong shall enter the tracking system.

- As soon as a cutting is removed from the mother plant it shall be given a unit number, batch number, RFID tracking tag, logged and entered into the SIS so tracking can begin.

Watering Clones

10-14 days after cuttings have been taken, the root system should be established enough to allow the uptake of nutrients. From this time until transplanted into containers, the cloning manager shall ensure proper care is taken to ensure healthy plants for transplanting.

- When cloning medium begins to dry out, the first watering shall consist of beneficial microbes. Mix microbial mixture (Rhysotonic, or great white shark) into living water. Lightly water clones each time the growing medium achieves a 50% moisture level. Aeraponic clones shall have Rhysotonic added to the reservoir after visible roots appear. When the substrate begins to show a second sign of dryness, apply a light vegetative nutrient at 25-50% strength.

Cloning Hot House

A minimum of one room within the vegetative area of the manufacturing facility shall be maintained as a hot house. The hot house shall meet all environmental standards and be fully enabled to maintain a room temperature of 80° Fahrenheit and a humidity level of 80%.

Transplanting Clones

Once a clone is fully rooted, it is ready **t**o be transplanted and moved into the V2 zone of the manufacturing facility. The vegetative manager will ensure all clones are transplanted, labeled, tagged with RFID and that each transfer is logged and tracked in the SIS. He/she will prepare all materials needed for transplanting and perform transplanting procedures. The following procedures shall be followed whenever transplanting:

- Collect materials for transplanting clones: Half-gallon to two-gallon pots (size to be determined by manufacturing facility manager), MGP semi-soil or TLO soil, small shovel, vinyl work gloves, great white shark or similar mycorrhizae product.
- Ensure entire working area is clean.
- Determine the number of clones to be transplanted.
- Fill clean pots half way with planting medium.
- Sprinkle .25 tsp. of GWS onto surface of planting medium, lightly stir with fingers.
- Gently place the clone into the pot, and cover the root zone and the bottom of the stem with additional soil. The stem could be covered .5 to 1.5 inches and there should be at least one inch of space remaining between the top of the soil and the top of the planting container. Do not pack the substrate; soil should be light and fluffy for the fastest root growth.
- Ensure each plant is tagged with RFID tracking, labeled and logged into SIS, and the data recorded.

Healthy Roots Prior to Transplanting:

Watering Transplants

Post transplanting, plants require special attention in watering to ensure proper root development. The vegetative manager shall ensure all new transplants are given water and nutrients by the following process:

- Prepare vegetative nutrient solution.
- Water plant's current root zone.
- Wait until nearly dry, water entire container.
- Wait until nearly dry, add GWS to nutrient solution, water entire container.

Vegetative Phase: Setting up for Success

The vegetative phase is incredibly important for the final outcome of the plant. During this phase, plants must create healthy root zones, a strong healthy stem, and a robust branching system. This supportive plant architecture will allow the plant to reach MGP.

Timeliness and consistency throughout the vegetative process will allow for accurate planning throughout the manufacturing facility and enable patient needs to be met. The vegetative manager is responsible for preparing the plants for all future flowering zones. Each plant should reach its pre-determined full size prior to being transferred into its designated flowering zone. The vegetative manager must have full awareness of the timeliness and demands set forth by the flowering schedule and plan accordingly.

Early Vegetative (V2): During the early vegetative phase, the main focus is establishing an inner root ball within a smaller container and pruning the plant to achieve a robust branching system.

All plants in V2 will be in one-gallon containers for a three to four week period. Lighting in the V2 stage will consist of t5s, 315 ceramics, 600-watt metal halides with blue spectrum, or induction lighting. All plants will be tracked by scanning RFID tags and documented into the SIS upon being transferred from V2 to V3. Data will be recorded.

Late Vegetative/Pre-flowering (V3): As the cannabis plant grows in size, the root zone will need to expand. When seeking to achieve MGP, the substrate demands increase to allow for larger more robust root zones. The vegetative manager shall ensure pre-flowering vegetative plants are transplanted so that there will be 25-30 gallons of substrate per flowering light. During the pre-flowering stage, plants are transplanted into the final container size to allow for larger growth. Conditions in pre-flowering need to mimic flowering conditions so plants can be prepared to produce healthy medical cannabis plant material in their final phase of growth.

Transplanting Vegetative Plants

Once the root zone has matured, a plant is ready to be transplanted into a larger container. A plant can only flourish while its root zone is healthy and growing. The vegetative manager will transplant into the final phase container a minimum of two weeks prior to flowering.

Container Size

The vegetative manager will utilize 20-30 gallons of substrate per light for final phase growth in order to achieve MGP.

Choosing container size:

- Determine how many plants will be grown under each light in the flowering zone. Plant numbers are based on a plant growth speed; i.e. if a cannabis strain grows very slowly, the number of plants must be increased to meet the timeline of the manufacturing facility. Indicas typically grow slower so it is assumed there may be smaller plants per light, whereas sativa plants grow quicker so there may be fewer larger plants per light.

- Once the number of plants per light is determined, calculate the amount of substrate and container size:
    - 7-9 plants: 3 gallon
    - 6 plants: 4 gallon
    - 5 plants: 5 gallon
    - 3-4 plants: 7 gallon

Materials: Containers, substrate TLO or MGP semi soil small shovel

Transplanting Process: The vegetative manager will oversee the transplanting process as follows:

- Thoroughly clean the transplanting area and any containers that are not new.
- Move the batch of plants to be transplanted into the transplant area.
- Fill several containers half way with substrate.
- Sprinkle mycorrhizae onto surface of substrate and mix with fingers.
- Place the stem of the plant between your fingers and turn the plant upside down.
- If the plant does not slip out of the container with ease, gently squeeze the sides of the container.
- Once the plant slips out, place your fingers under the root ball in the center and gently spread the roots.
- Place the plant in the large container.
- Using the small shovel, cover the small plant until the stem is covered a minimum of 1 inch by substrate. There should be 1.5-2 inches of space left at the top of the pot.
- Hand water with vegetative nutrient solution.
- Scan RFID tag and move into the V3 zone designated for the batch. Record data.

Pre-Flowering (V3)

The pre-flowering phase is the final phase of vegetative growth. During this phase, we are focused on creating a full canopy before plants enter the flowering zone. The vegetative manager shall ensure plants have strong lighting, CO_2, quality nutrients, and ample space in order to gain sufficient size. 1,000-watt metal halide lamps with blue spectrum bulbs are currently recommended for this phase of growth. Prior to being transferred from V3 to any flowering zone, all plants must have their RFID scanned and location moved within the SIS. All

data will be recorded at the time of transfer.

Flowering

The designated flowering zone is where a batch will be induced into a flowering state by receiving 12 hours of un-interrupted darkness. The flowering manager shall ensure all lighting is of the highest quality, the environmental controls are perfectly set and working, and each zone remains clean. The flowering manager shall ensure proper plant manicuring and fertilization occur within each flowering zone. Flowering zones are separated into distinct rooms based on the average length of time plants spend producing flowers.

Late Flowering

During the late flowering stage, the flowering zone manager will prepare the plant for harvest via the following processes:

Flushing: During the flushing phase, the flowering zone manager will stop giving plants all nutrients and instead seek to purge all remaining nutrients from the substrate by forcing fresh water through the plant's root system. The following process shall be used through each flowering zone to prepare plants for harvest and ensure the highest quality finished product:

Materials for Flushing Finished Plants: 2 gallons of living water for every gallon of substrate within each zone.

- Determine the plants to be flushed a minimum of 14 days prior to harvest.
- Water each plant at its normal watering schedule with an abundance of fresh water.
- Sufficient run-off should be attained during each flushing session in order to strip away all remaining sugars and salts.

Pest Control

Crop Management: The cultivation manager shall ensure that each cultivation team member is thoroughly trained in ethical pest and disease management and other troubleshooting to ensure that any problem within the facility is quickly remedied.

EPDM- Ethical Pest (and Disease) Management

It is best to prevent pest and disease infestations altogether; EPDM strives to do exactly this. The manufacturing facility manager will maintain a healthy cultivation environment by ensuring biosecurity measures are implemented and maintained at all times.

The cultivation manager shall keep a schedule for all pest and disease control prevention. All data pertaining to pesticide applications and other crop inputs shall be recorded and the record maintained at the manufacturing facility for a minimum of five years. All crop input records will be made available to MDH and the commissioner upon request. The application record will include the following information:

- Date and time of application;
- Date of start of vegetative stage of growth;
- USEPA Registration Number;
- Product name;
- Copy of the label of the applied product;
- Application site (the site shall be identified by the location legend maintained by the facility);
- Amount of product applied;
- Size of the application area;
- Name of individual making the application;
- Section for comments or special conditions related to the application.

EPDM is just like integrated pest management programs recommended by the EPA in that they both provide a scientific, common sense based approach to pest management. EPDM differs from IPM (integrated pest management) in that EPDM strives to use only organic means of pest and disease control. EPDM saves money, improves the environment, and protects health.

EPDM Program:

- **Infestation level**: The cultivation manager shall pre-determine an action threshold for each potential pest and disease. The action threshold will determine the type of pesticide and the rate of application.

- **Prevention**: The cultivation team will follow a standard prevention protocol at all times. This protocol will include preventing pests from entering each growing space, preventing cross contamination from zone to zone, closely following environmental protocol for each zone, maintaining cleanliness standards at all times, using preventive biological/microbial controls, growing pest and disease resistant strains, and growing with organic methods and MGP cannabis methods that produce maximum plant health thus remaining resistant to pests and disease.
- **Monitoring**: Plants will be monitored daily by each zone manager. At the first sign of any pest or disease, the cultivation team shall determine a treatment protocol for the affected zone and the entire manufacturing facility.
- **Immediate action**: Plants will be monitored for new signs of pest and disease so they can be treated immediately. Immediate action reduces the chance of complications within the growth cycle that will reduce quality, yield, and consistency of dose. Immediate action also reduces the amount and frequency of pesticide applications.

Only those agents who have been approved by MDH, obtained a license from MDH, and have gone through the full EPDM training process shall be permitted to make pesticide applications at the manufacturing facility.

Training: The cultivation manager will train all vegetative agents in EDPM practices and the proper application standards for all crop inputs. All individuals responsible for applying pesticides on the premises shall obtain the appropriate license from MDH prior to making any applications. Initial training shall include at a minimum:

- Sanitary requirements for pest and disease prevention
- Recognizing common pests and disease
- Recognizing symptoms of pests and disease
- Ruling out nutrient deficiencies
- Daily monitoring and spot checks
- Determining the infestation level/action threshold
- Approved areas for pesticide applications

- Controlling outbreaks in the vegetative phase
- Adhering to the agricultural use requirements of the label
- Use of personal protective gear
- Use of application equipment and process
- Procedures for spray applications
- Lighting requirements for spray applications
- Procedures for soil drenches
- Handling/laundering protective wear
- Storage
- Disposal
- Approved products
- MSD Sheets

All pesticides shall only be applied in the early stages of vegetative growth. Pesticide application shall be strictly prohibited during the flowering phase. When an actionable infestation level is determined during vegetative growth, it is the responsibility of the vegetative lead and trained vegetative staff to act immediately to prevent further contamination. All individuals applying pesticides will adhere to the agricultural use requirements written on the label and shall employ all personal protective equipment recommended on the product label. All manufacturing facility staff members will be aware of worker protection requirement standards for the restricted entry interval (REI) stated on the each product's label prior to application.

- Determine the infestation type
- Determine the appropriate treatment
- Review the instructions for application on the product label
- Ensure the product intended for use is approved by MDH
- Determine application methods, i.e. soil or foliar application
    - Atomizer (foliage sprayer)
    - Pesticides application pump and reservoir (soil drench)
- Change into the appropriate protective clothing and equipment

    - Coveralls
    - Waterproof spray suit
    - Gloves
    - Boots
    - Goggles and face shield
    - Apron
    - Respirator
- Prepare solution by strictly following the appropriate ratios for each product used.
- If the solution is to be applied by spraying on foliage, turn off HID lights and use normal lighting. All HID lights are to remain off until foliage is completely dry to avoid concentrated light burn damage.
- Perform application
- Launder protective wear

Storage: Proper storage of pesticides, fungicides and other bio-controls is imperative to ensure their efficacy over time. The cultivation manager will maintain the storage of all pesticides in a manner that prolongs their shelf life while protecting manufacturing facility employees, and the environment, and does not allow for any possible contamination of plants beyond the vegetative phase and or finished product.

All pesticides will be stored in the following manner:

- In locked cabinet
- Cabinet shall be cool, dry and well ventilated
- In their original containers
- With proper labeling intact
- Dry pesticides above liquid pesticides
- Follow all storage recommendation on the label for special needs
- Off the ground in case of flooding
- MSD sheets and emergency numbers shall be on hand at all times

Never Store Pesticides:

- In equipment used for application
- In any other container except for the original
- Near food, nutrients, flowering plants or finished products, water, or protective clothing.

Laundering Protective Gear: All protective gear used during the pesticide application process will be laundered directly after the application process. Protective gear will be washed separately from the rest of the laundry. Any clothing soaked in pesticide shall be discarded. The sanitation manager shall ensure the following processes are followed at all times when laundering protective gear after pesticide applications:

- Wear rubber gloves when touching clothing
- Wash with hot water
- Use heavy detergent
- Wash twice
- Run washing machine a third time after

Disposal of all unused pesticide product shall be performed in compliance with all state and federal laws and regulations and all directions on the product label.

All pesticides applied at the manufacturing facility shall be from MDH's approved list and shall be OMRI certified. A list of pesticides approved for use shall be maintained and displayed, by the cultivation manager, in the pesticide storage area of the manufacturing facility. The cultivation manager shall monitor and post any updates to the approved list from MDH's website. All pesticide products applied in the manufacturing facility shall be registered with MDH, including those products classified as 25(b) pursuant to the Federal Insecticide Fungicide and Rodenticide Act administered by the USEPA.

Approved Active Ingredients for Pesticides and Fungicides

The following criteria shall be followed at all times for selecting pesticides and fungicides for use in conjunction with EPDM:

- The product must only contain active ingredients from the list below.
- Certain products, as noted, must only be used in the vegetative stage of growth.
- All ingredients, including both active and inactive, must be listed on the label. Active must be listed by name and percentage of weight, and inert must be listed by name.
- Labels cannot contain false or misleading statements.

Approved Pesticides and Fungicides Names and Uses

Azadirachtin: Azadirachtin is clarified hydrophobic extract of neem oil. Combined with cold pressed neem oil, it controls a wide variety of common pests and also acts as a fungicide.

- Uses: Mites, Gnats, Aphids, Whiteflies, Thrips
- Use these products in vegetative and early flowering, and avoid applying directly to flowers.

Neem Oil: Neem oil works well to control most common pest populations. Look for brands that combine neem with Azadirachtin for the most effective applications.

Garlic Oil/Powder: Garlic is antifungal, anti-bacterial, and insecticidal. Garlic spray can be made and used every few days as a preventative.

Cinnamon/Cinnamon Oil: Cinnamon oil can control pest and fungus, though it's not highly effective. Cinnamon spray can be used to keep powdery mildew outbreaks at bay, however it will not completely eliminate the problem.

Copper Octanoate: Copper is a highly effective fungicide and is successful in treating many funguses including powdery mildew, septoria, gray mold, and pythium. Only use in copper in the vegetative growth phase.

Geraniol: Geraniol is a monoterpenoid and a common ingredient in natural insecticides that can be highly effective for battling flying insects when used in conjunction with other natural oils. Avoid spraying flowers.

Kaolin: Kaolin is a type of clay. Products containing kaolin can be used as a pest preventative.

Hydrogen Peroxide (food-grade): Hydrogen peroxide is a highly effective fungicide and algaecide. It can be used on leaves throughout the entire plant life cycle to control powdery mildew, gray mold, pythium and algae. It is also an effective cleaning agent for reservoirs and growing surfaces.

Additional Permitted Pest and Disease Controls:

- Citric acid
- Corn oil
- Cottonseed oil
- IBA
- Iron phosphate
- Jojoba oil
- Mineral oil/ petroleum distillate
- Nerolidol
- Clove oil
- Rosemary oil
- Sesame oil
- Thyme oil
- Oregano oil
- Peppermint
- Peroxyacetic acid
- Phosphorous acid mono and di-potassium
- Piperonyl butoxide

- Potassium bicarbonate
- Potassium laurate
- Pyrethrins
- Sodium ferric EDTA
- Sorbic acid potassium salt
- Sorbitol
- Soybean oil
- Sulfur
- Thyme herbs

Microbial and Biological Pesticides and Fungicides:

Bacillus Pumilus: Strain GB34 grows on roots and is used to prevent soil-born fungus spores from germinating.

Bacillus Subtilis: Colonizes the roots and protects against pathogens by inhibiting spore germination and preventing pathogens from attaching to the plant.

Bacillus Thuringiensis: A bacterial insect disease and when colonized within soil, it can protect against a wide variety of pests and their larvae. BT works great to control fungus gnat populations.

Isaria Fumosorosea: A fungus that infects and kills whiteflies, thrips, aphids, and spider mites.

Pythuium oligandrum DV 74

Streptomyces Griseovirdis Strain k61

Streptomyces Lydicus WYEC 108: When applied to soil, Sl protects against a wide range of root decay fungi.

Trichoderma Asperellum ICC 012: Naturally occurring and helps protect plants from fusarium oxysporum, a pathogenic soil-born fungus.

Trichoderma Gamsii ICC 080: Prevents soil-born fungal pathogens by competing for nutrients and space. Tg also attacks the cell walls of pathogenic fungi by utilizing enzymes.

Trichoderma Harzianum Rifai KRL-AG2: A naturally occurring fungus that is utilized to prevent harmful plant fungi that cause disease.

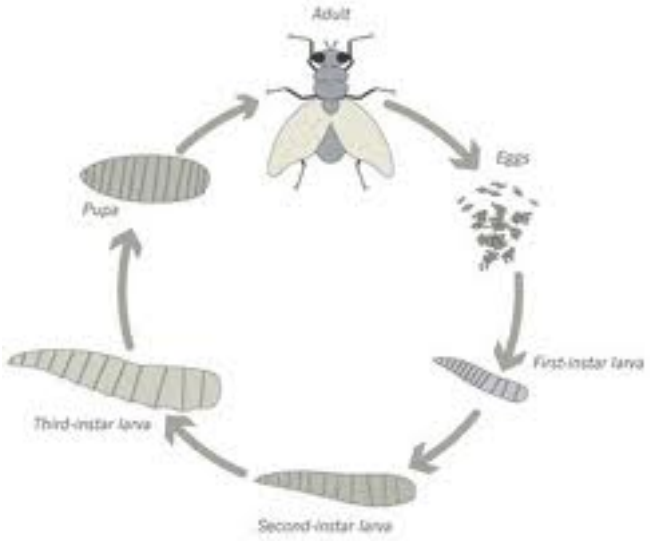
Trichoderma Virens G-41: Inhibits and kills plant pathenogentic fungi Rhizoctonia and fusarium.

Reynoutria Sachalinensis: Sprayed on plants in order to activate an internal defense system of several fungi including powdery mildew and gray mold. RS is an extract of giant knotweed.

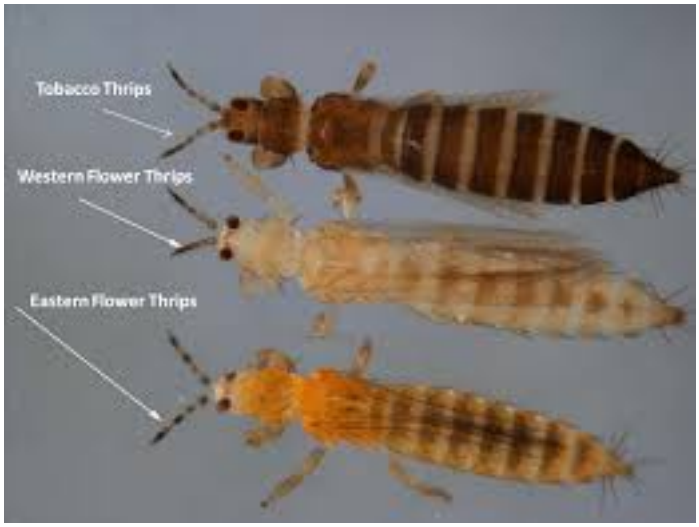
Common Pest Varieties and Symptoms

The following guide has been compiled to aid in troubleshooting plant symptoms and determining infestation varieties in order to implement immediate treatment protocol.

White Flies


Adult
Eggs
First-instar larva
Second-instar larva
Third-instar larva
Pupa

Thrips



Thrips are common in cannabis gardens. They appear in three different colors and are visible with the naked eye. Thrip damage will most likely be seen before the insect is detected. Thrips cut into the leaf and feed off the sap. A heavy thrip infestation will result in shiny silver streaks on fan leaves. A heavy infestation shall require topical treatments, however, they breed in the soil, and so biological/microbial regimens will keep out breaks from having negative effects on crops.

Treatment:

- Foliar- Organic insecticide
- Soil- Beneficial fungi

Spider Mites

Spider mites are by far the most important infestation to avoid. Mites are microscopic therefore plant damage will most likely be the first sign of infestation. Mites double breed very quickly doubling their population daily, so just one mite can easily turn into thousands and thousands into millions. Outdoors spider mites have natural predators that keep their populations from exploding, however, indoors it can be very hard to control outbreaks.

Treatment:

Foliar - Spray miticide

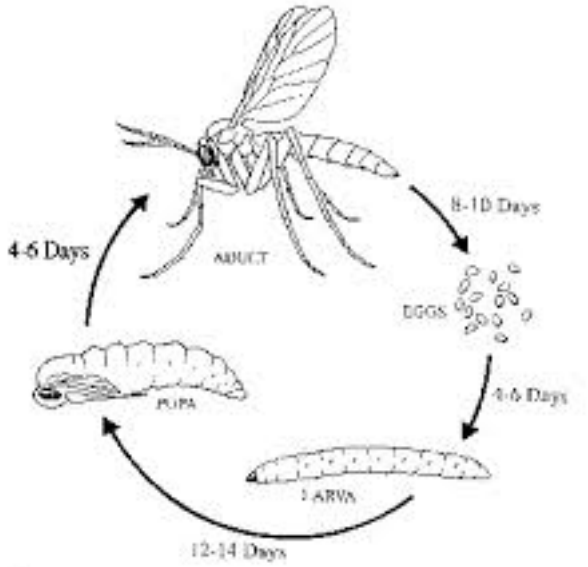
Aphids

Aphids are common in cannabis gardens. They are visible to the naked eye and appear in an array of colors. Aphids are nasty little bugs; heavy infestations will cause serious crop damage rotting large flowers and deeming them waste.

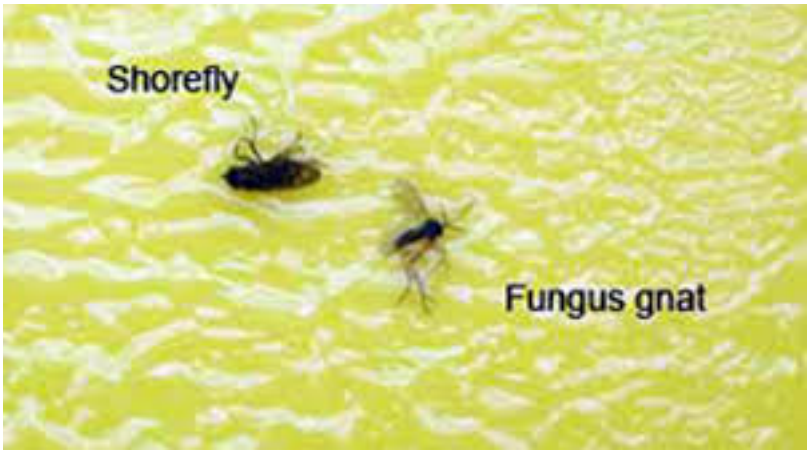
Treatment: Aphids breed in the soil so they are easily prevented through biological/microbial controls in the soil. If aphids become visible, the above ground population should be treated immediately and applications of soil fungi should be increased.

- Foliar: Organic pesticides
- Soil: Beneficial fungi

Fungus Gnats



Fungus gnats eat plant roots and weaken the plant thus reducing the plant's ability to achieve maximum results. Gnats are visible to the naked eye and once spotted, it is essential to increase the beneficial fungi applied to the soil. Adult gnats do not need to be sprayed; simple sticky traps will collect the majority, and the rest should be controlled in the soil.



Treatment:

Soil: Biological/microbial beneficial bacteria

Nematodes

Air: Sticky fly traps

Common Plant Diseases

The cultivation manager shall follow every environmental control set forth to prevent such diseases, however, in the event that such a disease still occurs, it is important to catch it and eliminate it immediately to prevent contamination of other batches within the manufacturing facility. The following guide can help determine common problems and solutions in order to eliminate potential for further contamination and crop destruction.

Powdery Mildew

Mold/Botrytis

Root Rot/Pythium:

Fusarium Wilt:

Environmental Stresses

The following environmental stresses can affect the growth of cannabis. It is imperative to maintain a consistent environment in order to prevent the following:

- Over-feeding (nutrients)
- Deficiencies
- Light burn
- Over-watering

- Under-watering
- Heat burn
- CO_2 burn
- pH

Advanced Growing Techniques

Both the vegetative and flowering team shall use the following techniques in a timely manner to ensure plants reach MGP, maintain product efficacy, and create consistency in dosage:

Topping

Topping a plant consists of removing the top shoot or shoots in order to force a plant to send its energy to lower branches. When a plant is topped, each lower branch becomes a main stem, thus turning one plant into multiple smaller plants that share one main stem and root system. All topping occurs in the V2 and V3 stages of plant growth. The vegetative manager will ensure all plants are topped in order to achieve the appropriate branching structure. Correct topping procedure follows:

Materials for topping plants: Sharp, clean scissors

1. The first topping shall be done when the plant has achieved 3-4 nodes.
2. With scissors, snip off the tip of the plant between the 3rd and 4th node.
3. Remove the bottom nodes so that four branches remain.

The finished product should look like this:

Super Cropping

Super cropping is similar to topping a plant in that the goal is to slow down the growth of an aggressive stem in order to allow the lower foliage to catch up, resulting in a bushier plant with more overall colas. The vegetative manager shall utilize super cropping after the plant has been

topped several times, i.e. in the pre-flowering stage of growth to prepare the plant for SCROGing in the flowering stage.

Super cropping process: Super cropping involves the bending of the highest stems in order to equalize the plant's energy between branches resulting in an even upper canopy. The vegetative manager shall super crop plants in the pre-flowering phase by the following process:

1. Determine the desired canopy height.
2. While wearing gloves, take one of the tallest branches and massage it between two fingers until it starts to weaken and bend. Shaking, pinching, and rolling between the fingers may all be necessary to achieve the proper bend.
3. Try not to snap the stem, but instead weaken it away from the light in order to expose lower tops so they can catch up to the upper canopy.

SCROG

"Screen of green" is a variant of the traditional "sea of green" where the goal is to have an all cola garden. The main difference between the two methods is in sea of green, each plant only has one cola, where as in SCROG, plants are encouraged to have multiple colas. Both methods have their place in cannabis gardening as certain varieties reach their MGP under different conditions; meaning, some plants cannot reach MGP unless they are grown to a large size and some plants will reach MGP at smaller sizes.

Each flowering zone manager will ensure that the plants within their designated zone are properly SCROG'd by the following processes:

Netting: The first step in SCROGing is preparing the screen. Two flowering zone employees shall install a net from the frame surrounding each table in the zone.

Materials for Netting: Nylon net, zip ties

Process for Netting:

1. Unwrap netting material and unwind it along the side of the table to be netted.
2. One person on each end will stretch the net open at its width.
3. Carry the net over the top of the plants on both ends.

4. Wiggle the net down into the canopy so that the upper five inches are exposed.
5. Affix the net evenly to the framing using zip ties.

SCROGing: The SCROGing process involves weaving the plants through the net so that each flowering top receives an equal amount of light in the optimal light zone. The flowering zone manager will SCROG each area so that the maximum numbers of flowering tops receive optimal lighting. SCROGing occurs during the early flowering phase (weeks two to three).

Materials for SCROGing: Vinyl gloves

SCROGing process:

1. Wearing gloves, gently begin to super crop each plant by weaving the tallest branches towards the edge of the light zone so that lower branches can reach up towards the light.
2. Repeat the process each day as new taller branches emerge during the stretching phase in early flowering.

Product Handling

Harvest, drying, and curing must all be handled with the utmost care to prevent contamination from mold and foreign substances. When a plant is harvested at the manufacturing facility, it is carefully placed in a clean carrying vessel to be moved to the laboratory grade trimming and processing room. All plants shall immediately have their leaves removed to allow adequate airflow around the medical cannabis plant material while it is hung to dry in a room with a humidity level below 50%. Fans move the air while humidity is reduced further over the next few days allowing all flowers to decrease their moisture content to below 15%. medical cannabis plant material is then safe to place in containers where their moisture content is reduced to less than 10%. During this time, the medical cannabis plant material is slowly turned allowing all plant terpenes to be released and evenly coat the entire batch creating a consistent smell and flavor profile.

Prior to being trimmed and cured, the processing team will segregate all harvested medical cannabis plant material into designated pre-determined homogenized batches. All segregated batches will be maintained in a secure, climate-controlled location suitable for the prevention of product contamination or efficacy loss.

Harvesting

The flowering zone manager will work with the cultivation manager to determine a timeline for each batch within the flowering zone. Once a batch has a confirmed harvest date, the processing manager shall initiate the harvest of that particular batch. The processing manager shall ensure that upon harvest each batch is RFID scanned, weighed, transferred and data recorded. The following process will be used to harvest each plant within a batch:

Materials/Tools for Harvesting: Harvest sheers, vinyl gloves, large capacity scale, harvest table (stainless steel table with casters)

Process for Harvesting:

1. Scan RFID for harvest.
2. Cut the plant at the base as close to the soil as possible.
3. Weigh the entire plant and record in the log.
4. Place plant on the stainless steel table.
5. Repeat the process until the table is full.
6. Transfer the product to the processing room and record new location and all other pertinent information.

Phase 1 Processing

Post Harvest

Batch Segregation

The processing manager will ensure each batch remains segregated to avoid cross contamination and in order to maintain strict inventory control. Each batch will be clearly labeled and tagged with RFID and its exact location will be clearly defined and tracked at all times.

Processing/Trimming

Immediately after harvest all products from a selected batch are processed for drying. The processing manager shall follow the following process for trimming all cannabis:

Materials/tools for trimming and processing: Sharp/clean spring loaded scissors, vinyl gloves, stainless steel working tables, rubbing alcohol, hanging rack, hangers, etc.

- Designate staff members that will trim the given batch.
- Cut the plant into individual stems no longer than 1.5 ft.
- Remove all fan leaves and place in fan leaf drying oven.
- Remove sugar trim with sharp/clean scissors, and place all sugar trim in the proper sugar trim drying section to be prepared for the extraction process. Place the stem between two fingers and slowly spin each flower toward the scissors to remove fan leaf.
- Hang each trimmed stem from a hanger.
- Once the batch is trimmed, move each hanger into the designated drying room for the particular batch. Scan RFID and record data. Record weights of all components after trimming and prior to drying.

Drying

The drying process consists of slowly removing the majority of moisture from finished cannabis in a manner that preserves and increases the efficacy of each batch. Harvested cannabis has moisture content of approximately 80%. During the drying process the moisture is slowly reduced to 15% and then moved into the curing phase to further reduce the moisture content to 8% so it can be safely sealed.

Stem drying cannabis: Cannabis that has been trimmed on the stem can also be dried on the stem. Stem drying ultimately creates the highest quality finished product.

Materials for stem drying: Hangers, vinyl gloves, wall hanging system

- Prepare hanger by labeling with batch RFID and all pertinent information including strain.
- After trimming, hang individual stems on a hanger until the hanger is loosely full.
- Hang hangers on wall rack designed for stem drying.

- Scan batch RFID and record location and all pertaining data in SIS.

Screen Drying Cannabis: When it is necessary to trim medical cannabis plant material off the stem, the processing manager will utilize a screen drying system to remove moisture from the medical cannabis plant material and prepare each batch for final curing.

Materials for Screen Drying: Drying screen system, vinyl gloves.

1. Label screen with batch RFID and all pertinent information including strain type and harvest date.
2. After medical cannabis plant material is trimmed, place on drying screen and insert screen into racking system.
3. Scan batch RFID and record location and all pertaining data in SIS.

Curing

Curing is the process of slowly removing moisture content from 15% down to 8% in order to remove the remaining chlorophyll and sugars from medical cannabis plant material and prepare them for packaging or processing into extraction form. The processing manager will utilize the following process to ensure cannabis is cured properly:

Materials for Curing: QualCure curing containers, vinyl gloves.

1. Label QualCure container with batch RFID and all pertinent information including strain and harvest date.
2. Place cannabis into container no higher than the fill line.
3. Seal the container and log moisture level.
4. Scan Batch RFID and record location and all other pertinent information.
5. When moisture level increases by 10 points, open the valve on the lid and allow moisture level to reduce. May take one to five hours.
6. When moisture level holds firm at pre-determined level for two days, cannabis is properly dried.
7. Open lid valve every two days for remaining days in the 14-day period.
8. Rotate container daily.
9. After 14 days, cannabis shall be sealed to await testing and test results.

Secured Storage

After the processing manager has determined that a batch has been fully dried and cured, that batch will be weighed, sealed, and secured within the storage vault until the batch has been tested and approved for distribution. The processing manager shall scan each batch and record all data in the SIS.

Sealing Product

Each batch of cannabis must be sealed and stored after it has dried and cured in order to maintain optimal moisture content. The processing team will seal each batch of dried and cured cannabis through the following process:

Materials for Sealing: Vacuum, cannabis containers, large capacity scale

1. Prepare a sample from each batch prior to sealing. See testing.
2. Place empty storage vessel on scale and determine tare weight.
3. Fill vessel with cannabis.
4. Record weight and location of cannabis in the SIS.
5. Label container with batch, strain, and weight.
6. Place lid tightly on container.
7. Insert vacuum into insertion hole on container lid.
8. Turn on vacuum for the appropriate amount of time to remove all air from the vessel.

Testing

After curing and before any processing or packaging, the processing manager shall make samples from each batch available to a laboratory for testing. The sample shall be weighed, RFID scanned, and all data shall be recorded on the SIS prior to be removed from the secured curing area. The laboratory employee will select and prepare several random samples from every batch sample in order to ensure the quality, purity, and consistency of dose through a statistical approach. The laboratory staff will then test each random sample for harmful microbiological contaminants, mycotoxins, heavy metals and pesticide chemical residue. In addition, each sample will also be tested for active ingredients including but not limited to cannabinoid profiling for the following: THC, THCa, CBD, CBDa, and CBN. Under no circumstances shall cannabis batches awaiting contamination results and active ingredient analysis be included in a cannabis product or sold to a distribution facility prior to the time that

the laboratory has provided those results, in writing, to the manufacturing facility management team.

If samples from a batch are tested and do not fall within state accepted health and safety levels for any of the above mentioned contaminants or any additional contaminants the state does not deem for distribution, it is the manufacturing facility's policy to destroy and remove any contaminated product in a manner consistent with state compliance for the policy for disposal of green waste.

As soon as a batch sample passes the microbiological, mycotoxin, heavy metal and pesticide chemical residue test, the entire batch will be released for immediate manufacturing, packaging and labeling for transport and sale to a distribution facility.

An electronic copy of all test results will be filed by laboratory staff for any batch that does not meet the standards set for microbiological, mycotoxin, heavy metal or pesticide chemical residue tests. These results will also be sent to manufacturing facility staff within the same time frame. The laboratory staff will also maintain a comprehensive record of test results and make them available to state and local officials, and or the public, as needed.

The manufacturing facility compliance manager will provide test results for each batch of cannabis used in any product purchased by a distribution facility to that distribution facility to be made available upon request to all qualifying patients, primary caregivers, and any physician who has certified a qualifying patient.

Phase 2 Packaging

The manufacturing facility shall not release or sell any part of a lot of usable cannabis until all required assurance testing has been completed. All cannabis is to be held in the secured pre-testing storage vault while awaiting test results.

Post Testing

The compliance manager will review all test results and determine if a batch is to be released or disposed of. Those results shall then be sent to the processing manager who will re-check test results with the compliance manager's findings and respond accordingly. All batches that do not

meet the approved standards of the state and local authorities will be immediately disposed of following the green waste disposal procedure and tracked by scanning the RFID and all pertinent data and recording in the SIS. All approved batches will be RFID scanned and all pertinent data will be recorded into the SIS and then scheduled for further processing.

Packaging

All batches that have been approved for processing will be packaged within three working days and RFID scanned and moved to secure post-testing storage; location and all pertinent data will be logged into the SIS. The processing manager will plan and oversee all packaging procedures.

Final Weight

Before packaging, the entire batch will be weighed. The processing team will then package the entire batch into pre-determined weights. After the weighing process, the processing team will determine a final weight for each individual package and the cumulative weight of all packages will be compared to that of the entire batch weight. The processing manager will check each batch to ensure there are no discrepancies between the cumulative package weight and the entire batch weight. If there are any discrepancies in weight, the processing manager will alert the compliance manager and investigate the matter until it is resolved. All data shall be recorded and entered into the SIS.

Pre-determined Weights: Each batch will be weighed and individually sorted into a variety of pre-determined weights based on feedback from each distribution location.

Packaging Container Specifications: All usable cannabis shall be packaged in child-resistant packaging. All containers used for packaging usable cannabis shall protect the contents from contamination, be approved for food storage, and will not impart any toxic or deleterious substance to the usable cannabis or cannabis product.

Infused Products Procedures

Daily Infused Products Processes

At the start of each business day, cannabis-infused products team members will arrive to the facility and be screened and checked in by a security team member or by management. At that time, the employees will clock in for their scheduled shifts and proceed with normal business operations. Each work-day will begin and end with a shift meeting between team members and facility managers and/or department leads. Team members of the facility will have opening and

closing responsibilities to ensure a smooth shift and workflow as well as tasks and chores to be completed during each shift.

Opening Responsibilities

The opening responsibilities will primarily be comprised of getting the cannabis-infused products facility ready for the day's production. This will consist of the following:

- Prepping production areas for the day
- Determine which products are to be produced
- Pull medical cannabis products from safe in secured access area

Closing Responsibilities

The closing responsibilities will primarily be comprised of closing the cannabis-infused products facility and securing product for safe storage throughout the night. Closing responsibilities will consist of the following:

- Filling out daily production log sheet
- Inventory management
    - Recording ending daily inventory on log sheets
    - Having manager verify inventory quantities are correct
        - Inventory reconciliation - If there is a discrepancy, management will determine how to proceed.
- Pulling all medical cannabis products to be stored in a safe in a secure access area for nightly storage
- Close and secure facility for nightly closure

Medical Cannabis Products Preparation

Preparation In Accordance with MCRP :

Medical Cannabis products for sale and distribution at a distribution facility must be prepared by an approved staff member of a registered manufacturing facility. A manufacturing facility that prepares Medical Cannabis products for sale or distribution at a distribution facility shall be under the operational supervision of a certified food service sanitation manager.

Sanitation and Health Hazards

Health, safety and sanitation are critical components of the cannabis-infused products facility and all applicable laws and regulations must be strictly adhered to. General health, safety and sanitary standards will be discussed in this section.

A cultivation facility may be subject to inspection by the local fire department, building inspector, or code enforcement officer to confirm that no health or safety concerns are present. A cannabis-infused products manufacturer that manufactures Medical Cannabis products will comply with all kitchen-related health and safety standards of the relevant local licensing authority and, to the extent applicable, with all MDH regulations applicable to retail food establishments. As an industry, we are not held to these standards as of yet. Preparation for the future is critical; we anticipate new regulation and laws where a cannabis-infused products facility will need to meet new requirements of MDH of Public Health and/or other state or local authorities.

State Regulations

The cannabis-infused products facility will be in full compliance with all applicable state and local laws and regulations regarding health, safety and sanitation. It will be the responsibility of the cannabis-infused products facility manager to insure the creation and implementation of policies for regulatory compliance.

General Standards

Sanitation Standards In accordance with MCRP:

- MDH of Public Health may at all times enter every building, room, basement, enclosure, or premises occupied or used or suspected of being occupied or used for the production, preparation, manufacture for sale, storage, sale, distribution or transportation of Medical Cannabis products, to inspect the premises and all utensils, fixtures, furniture, and machinery used for the preparation of these products.
- If a local health department has a reasonable belief that a manufacturing facility's Medical Cannabis product poses a public health hazard, it may refer the manufacturing facility to MDH of Public Health for inspection.

Sanitation Standards In Accordance with MCRP:

- General Sanitary Requirements. Our cannabis-infused products facilities will take all reasonable measures and precautions to ensure the following:
    - That any person who, by medical examination or supervisory observation, is shown to have, or appears to have, an illness, open lesion, including boils, sores, or infected wounds, or any other abnormal source of microbial contamination for whom there is a reasonable possibility of contact with preparation surfaces for

medical cannabis or Medical Cannabis product shall be excluded from any operations which may be expected to result in such contamination until the condition is corrected;

- That hand-washing facilities shall be adequate and convenient and be furnished with running water at a suitable temperature. Hand-washing facilities shall be located in the licensed premises and/or in Medical Cannabis product preparation areas and where good sanitary practices require employees to wash and/or sanitize their hands, and provide effective hand-cleaning and sanitizing preparations and sanitary towel service or suitable drying devices;
- That all persons working in direct contact with preparation of medical cannabis or Medical Cannabis product shall conform to hygienic practices while on duty, including but not limited to:
    - Maintaining adequate personal cleanliness;
    - Washing hands thoroughly in an adequate hand-washing area(s) before starting work, prior to engaging in the production of a medical cannabis concentrate or manufacture of a Medical Cannabis product and at any other time when the hands may have become soiled or contaminated; and
    - Refraining from having direct contact with preparation of medical cannabis or medical cannabis-infused product if the person has or may have an illness, open lesion, including boils, sores, or infected wounds, or any other abnormal source of microbial contamination, until such condition is corrected.
- Litter and waste will be properly removed and the operating systems for waste disposal will be maintained in an adequate manner so that they do not constitute a source of contamination in areas where cannabis is exposed.
- Floors, walls and ceilings will be constructed in such a manner that they may be adequately cleaned and kept clean and in good repair.
- There will be adequate lighting in all areas where cannabis is stored and where equipment or utensils are cleaned.
- There will be adequate screening or other protection against the entry of pests. Rubbish shall be disposed of so as to minimize the development of odor and

minimize the potential for the waste becoming an attractant, harborage or breeding place for pests.

- Any buildings, fixtures and other facilities will be maintained in a sanitary condition.
- Toxic cleaning compounds, sanitizing agents, and solvents used in the production of cannabis concentrates shall be identified, held and stored in a manner that protects against contamination of cannabis, and in a manner that is in accordance with any applicable local, state or federal law, rule, regulation or ordinance.
- All contact surfaces, including utensils and equipment used for the preparation of cannabis or Medical Cannabis product shall be cleaned and sanitized as frequently as necessary to protect against contamination. Equipment and utensils shall be designed and shall be of such material and workmanship as to be adequately cleanable, and shall be properly maintained. Only sanitizing agents registered with MDH pursuant to the Minnesota statute chapter 18 b. shall be used in cultivation; they shall be used in accordance with labeled instructions.
- The water supply shall be sufficient for the operations intended and shall be derived from a source that is a regulated water system. Private water supplies shall be derived from a water source that is capable of providing a safe, potable and adequate supply of water to meet the facility's needs.
- Plumbing shall be of adequate size and design, and adequately installed and maintained, to carry sufficient quantities of water to the required locations throughout the facility. Plumbing shall properly convey sewage and liquid disposable waste from the facility. There shall be no cross connections between the potable and waste water lines.
- All operations in the receiving, inspecting, transporting, segregating, preparing, producing, packaging and storing of cannabis and Medical Cannabis products shall be conducted in accordance with adequate sanitation principles.
- Each manufacturing facility shall provide its employees with adequate and readily accessible toilet facilities that are maintained in a sanitary condition and good repair.

- Cannabis that can support the rapid growth of undesirable microorganisms shall be held in a manner that prevents the growth of these microorganisms.

- The permittee must request MDH to conduct a pre-operational inspection at a registered manufacturing facility to determine whether the facilities, methods, practices and controls used in the manufacture, processing or holding of Medical Cannabis products conform to or are operated or administered in conformity with good manufacturing practices to ensure that food products for human consumption are safe and have been prepared, packed and held under sanitary conditions.
- Permitted manufacturing facility shall immediately allow MDH to inspect the premises and all utensils, fixtures, furniture, machinery and devices used for preparing manufactured Medical Cannabis products.
- MDH will conduct inspections of registered manufacturing facility with regard to the manufacture and preparation of Medical Cannabis products under the authority of the Food Service Sanitation Code and in accordance with MDH's medical cannabis products rules.
- In order to prepare medical cannabis products for sale or distribution at a distribution facility organization shall be under the operational supervision of a certified food service sanitation manager.

Health Hazards

Health Hazards In Accordance with MCRP. MDH may at all times enter every building, room, basement, enclosure, or premises occupied or used or suspected of being occupied or used for the production, preparation, manufacture for sale, storage, sale, distribution or transportation of Medical Cannabis products, to inspect the premises and all utensils, fixtures, furniture, and machinery used for the preparation of those products.

- If a local health department has a reasonable belief that a manufacturing facility's Medical Cannabis product poses a public health hazard, it may refer the manufacturing facility to MDH of Public Health for inspection.
- Upon inspection of a manufacturing facility based on a referral that a cannabis- infused product poses a public health hazard, MDH may, without administrative procedure to bond, bring an action for immediate injunctive relief to require that action be taken as a court may deem necessary to meet the hazard posed by the manufacturing facility.

Medical Cannabis Refining

Medical cannabis concentrates and hash are becoming more popular within the medical cannabis industry and will generate nice revenues for the organization. This section will outline the processes involved with the production of concentrates/hash. This section will also outline quality control measures and safety/emergency protocol.

Types/methods of concentrate production

- Water extraction (bubble hash)
- Solvent extraction (alcohol based)
- CO_2 extraction

Standard Operating Procedures

This section will give a step-by-step guide on how to safely and appropriately perform safety checks, preparation, extraction, purging, cleaning and disposing of cannabis concentrate.

Required Steps/Processes:

Safety Checks

Conduct all necessary safety checks prior to commencing production

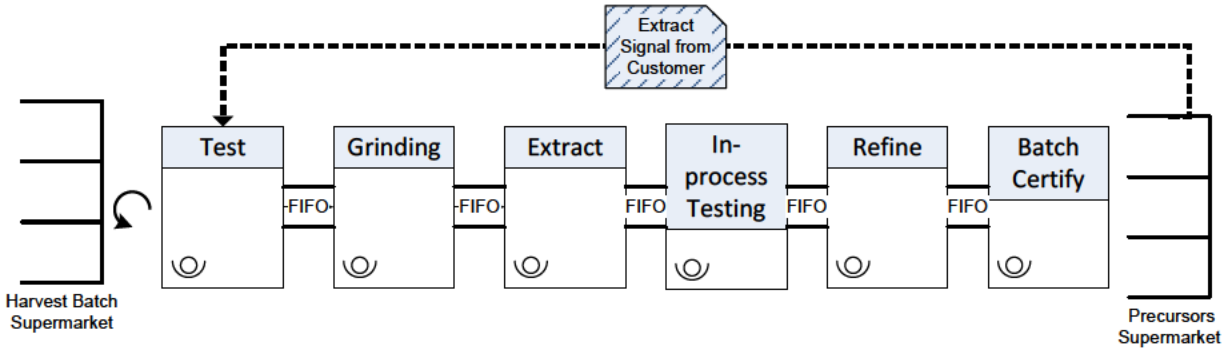
- Review safety checklist before beginning ***ANY*** concentrate extraction

Preparation

Prepare medical cannabis for processing

- Fill out proper production log sheets (what is about to be produced).
    - Quantities and types of cannabis/trim being used to produce concentrate
    - Estimated quantity of concentrate to be produced
    - The estimated concentrate production will be compared with actual production to determine efficiency and production rates.
- Begin preparation for production.
    - Ingredients needed (cannabis to be used)
- Get extraction machine/equipment ready for processing.
- Wash hands and begin extraction processes.

The Following Figure Shows the Process for Refining:



Upstream of the refining process, plants are grown, harvested, dried, cured and stored in a harvest batch supermarket. The batch is weighed, and the data is recorded in Bio Track prior to removal from the Harvest batch supermarket. Processing team members shall utilize BioTrack to assign a lot number to the batch of cured medical cannabis and this lot number is entered into our laboratory information system (LIMS). All subsequent processing, testing, formulation data will be tied back to this lot number for complete data and matter traceability throughout the process.

The Refining Method Follows Several Key Steps:

- **Testing:** In house testing of starting product for recovery calculations.
- **Grinding:** First, the plant material is ground into 300 micron diameter pieces.
- **Extraction:** Second, 4 lbs. of the plant matter is uniformly packed and extracted in a 5L CO2 extractor for approximately 90 minutes. This process is monitored with HPLC.
- **In Process Testing:** is used to monitor before grinding and during extract and decarboxylate processes.
- **Refining Decarboxylation:** we decarboxylate and fractionate to produced refined usable precursor product.
- **Batch Certify:** the oil for potency, metals, toxins, and turpenoid profile using validated methods and qualified instrumentation. We also sample the oil and send for third party testing as required.

The grinding or communition step involves a first inspection step that insures a clean and safe grinding machine and method. Our SOP calls for inspection of the grinding vessel for operational integrity. We also insure the instrument and receiving vessels are clean and free from

plant matter residual from previous batch. The equipment will be washed, cleaned, and dried in between use with lab grade water (no surfactants or organic solvents). No standard for critical clean has been set other than a YES/NO visual inspection. Initially, we will not validate the cleanliness of the grinder. It is left open for process improvement assessment if an out of specification result occurs downstream.

Safety protocols are built into the SOPs and define personal protective gear required to run the commutation mill. The grinding mill is housed in a room separate from the entire operation to prevent carryover or inadvertent manufacturing fumes from being incorporated into the grind. The room in this case is vented with an isolated HVAC system.

Extraction and Collection

We will use supercritical CO2 as our preferred extraction method. This way we avoid the use of explosive nonpolar extraction solvents such as butane and also prevent the possibility of entrainment of adverse residual solvents into the oil extract. Residual CO2 in the oil will be greatly reduced or completely removed during the carboxylation process and subsequent degassing for storage. The finished oil will be bubbled and then stored in a desiccator inside a closed vessel under ultrapure, water free nitrogen. Removal of water and excess CO2 from the extracted oil has been shown to prevent the formation of carbonic acid in the oil, thus adversely affecting the shelf life.

The extraction system is a Waters SFE 2 x 5000 system that has a scalable capacity and has been sized to allow a production capacity that initially will exceed demand by 5x. Four pounds of free flowing plant material is weighed, and packed into the 5 L CO2 extraction vessel. The system includes a cooled CO2 reservoir that is fed by a 100 lb. tank of compressed 99.9% pure CO2. We specify gas purity from the vendor and certifications to ensure purity. The preparative pump draws cooled liquid CO2 from the reservoir and pumps the fluid into a heat exchanger at 100-300 mL /min. The heat exchanger heats the fluid up to about 50-60oC and a backpressure regulator keeps the fluid in the supercritical range at about 5000 psi. The fluid flows across the bed of plant matter and extracts the waxes, terpenes, cannabinoids, and other soluble components. The fluid then enters a first collection vessel that is held at 50-60 oC and 3000-4000

psi. Waxes and lipids and some nonpolar cannabinoids precipitate and the remaining fluid enters a subsequent chamber held at 40-50oC and 2000-3000 psi to precipitate the cannabinoids and diterpenes. Finally, the pressure is reduced to less than 1000 psi at 30oC to remove terpenoids and phenolics.

The fraction with the active ingredients will be collected in a dry, sterile clean container. The extraction will be monitored with HPLC until at least 70% of the cannabinoids have been extracted. The waxes will be precipitated overnight at -20oC. The oil then placed in a rotovap under vacuum and the oil is heated to decarboxylate the cannabinoids. Non-decarboxylated cannabinoids are not as pharmaceutically active when taken in liquid form so this step is critical. The final oil is then flushed with ultrapure nitrogen that has been oxygen scrubbed for 5 minutes and then is capped, labeled and stored in a refrigerator desiccator to prevent water intrusion and protect from sunlight.

Fracturing

T2 Scientific is owned and operated by founders Thompson and Kingsley in conjunction with DMOG. The companies' technology involves separation and purification of the different components of the oil to produce concentrates that are high in specific, single, cannabinoids. These highly concentrated and pure components can then be certified and formulated into strain independent drug formulations. Currently, the amount of specific cannabinoid such as THC is controlled by plant genetics and extraction recovery. This allows MinnMed greater control and flexibility on formulating drug products. MinnMed aims to become strain-independent in the near future with the ability to produce customized cannabinoid profiles in our oils.

Safety

Safety is addressed in our SOPs taking into account OSHA regulations and good laboratory practice. There are two key safety precautions needed for this process. First, the room needs to be well ventilated and separate from all other processes. The reactor itself should have a hood vent over the exit port so that the excess CO2 and volatile organic matter can be vented properly. The volatiles will be vented through a carbon column so that the air emerging that is vented will be clean and VOC free. The carbon cartridge will be replaced at a quarterly interval.

Second, the room will have a CO2 monitor as a safety precaution that will sound when the level of CO2 in the room reaches an unsafe level.

Third, it is noteworthy that this extraction system is very similar to a typical HPLC system so many of the safety protocols that are used in a lab running HPLC would also be used for this extractor. In the event of a leak, the pressure will no longer be maintained by the system and the pump will shut off. If the pressure were to exceed 5000 psi, the system would leak or the limit in the software would shut the system down. The pump is maintained monthly with new seals.

List of Equipment Used in the Manufacturing Protocols Includes:

- NPK tester for soils
- Various humidity and temperature sensors throughout the building.
- Cryogenic Mill with Sieve controls.
- CO2 Extractor
- CO2 safety alarm
- LC/UV/FL
- GC/MS
- Atomic Absorption Spectrometer
- Analytical Balance
- Desiccator
- Freezer
- Roto evaporator*
- Vacuum Oven
- Ultrapure Water System
- Production Balance
- Various production glassware*
- Automated Liquid Dispensing System for Filling and Dispensing API into products*
- Packaging equipment*

The equipment designated with a * are subjected to validated cleaning procedures and according to company policy are required to maintain records of compliance.

The Quality Department is responsible for the Validation and Calibration activities at MinnMed. They are responsible for establishing and maintaining processes to ensure that monitoring, measurement, and manufacture can be carried, taking into account the tolerances required for the measurement and the accuracy and precision of the instruments and or equipment. This also forms the basis for our maintenance procedures. Key maintenance items on the extractor are piston seals and the needle valve seal.

Where necessary to ensure valid results, measuring equipment shall be included in the calibration and validation program. The calibration program ensures measuring equipment is:

- Critical clean records are followed and maintained for extraction, formulations, and packaging processes.
- Calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification shall be recorded;
- Adjusted or re-adjusted as necessary
- Identified to enable the calibration status to be determined
- Safeguarded from adjustments that would invalidate the measurement result
- Protected from damage and deterioration during handling, maintenance and storage

In addition, the Quality Department assesses and records the validity of the previous measuring results and records them in the BioTrack and LIMS systems. When the equipment is found not to conform to operational or clean requirements, Minnesota Medical will take appropriate action on the equipment and any product affected. Records of the results of calibration and verification shall be maintained.

When used in the monitoring and measurement of specified requirements, the STAR LIMS and computer BIO Track software to provide traceability and leave an audit trail according to 21 CFR Part 11. This shall be undertaken before initial use and reconfirmed as necessary. Records of this confirmation shall be maintained with calibrations records through the use of the Control of Monitoring & Measuring Devices procedure. Each piece of equipment that is used in the processing and testing has its own SOP that includes safety and critical clean protocols.

Calculation of Yield Process

The plant matter will go through a series of processes which will each have their own yield. A mass balance will be maintained by the BioTrack software to insure traceability and yield at each step. Processes include: Clone, Vegetate, Harvest, Cure, Extract, Decarboxylate, Formulate, Package, and Ship.

We monitor each process to maximize yield and continuously improve the production process. Losses can occur in the clone, vegetate, harvest and cure stages via plant loss or infestation. This is closely monitored by production personnel.

Since the amount of cannabinoids varies considerably from strain to strain, it is impossible to accurately estimate the gram recovery of the extraction process. Typically, we monitor the extraction process with HPLC to target the yield to at least 70% recovery. Decarboxylation will lose 14% by weight and formulation/packaging will lose another 1-2% of active ingredient. This highlights the need for validated cleaning processes for formulation and production vessels.

Sampling and Testing of In-Process Materials and Drug Products

Random sampling and testing of the in process materials and final pharmaceutical product will take place at five different locations in the manufacturing process. First, we will sample, test, and maintain lot retains between the following processes:

- The cured product entering the grinding/extract process.
- The extracted oil that has not been formulated
- The decarboxylated oil
- The formulated oil.
- The finished products.

In general, a first in first out lot retain system will be maintained that holds a sample for 1 year in a location that preserves the integrity of each respective product. Lot retains that are older than 1 year will be discarded according to company policy.

Two grams of the dried, cured work in progress (WIP) is randomly sampled and lot retains are collected and stored in a clean scintillation vial in the freezer at -20oC. The bottle is labeled and retained for 12 months. Further, HPLC testing of this cured, dried material is completed by HPLC to enable recovery. We have already developed an SOP for measurement of cannabinoids in hemp matrix using a QuEChERS sample preparation method and HPLC/UV.

In Process Measurements Are Made During the Following Processes:

- Grow Process: Temperature, humidity, NPK during the grow process.
- Cure Process: Moisture content and HPLC of the cured product to determine yield
- Extraction Process: HPLC to determine when to stop extracting
- Decarboxylation Process: HPLC monitoring during the decarboxylation process to ensure decarboxylation of CBD and THC.
- Final Inspection: In house HPLC, AA, RT-PCR, and GM/MS of formulated oil to show potency, metals free, microbial free, and residue free formulations
- External testing at the Decarboxylation and Packaging Process as required by the state.

The laboratory staff shall test in house each random sample for harmful microbiological contaminants, mycotoxins, heavy metals and pesticide chemical residue. Our in-house capability includes LC/UV (potency & impurities), LC/FL (toxins), AA (metals), RTPCR (microbiological), and GC/MS (pesticide residues). Only validated methods and operationally qualified instruments will be used in the testing of the extracted oil.

In the case of pesticide residues, we know which residues could possibly show up in the extract, so we test only for those. We also maintain a robust incoming inspection and supplier control program that will test and control manufacturing inputs to avoid contamination. In the event that we detect an adverse level of pesticide (> 10 ppt), we then sequester the batch in a secure out of specification area and start an investigation as to the cause of the contamination.

In the case of potency, each sample will also be tested for active ingredients including but not limited to cannabinoid profiling for the following THC, THCa, CBD, CBDa, and CBN. Under no circumstances shall the batches awaiting contamination results and active ingredient analysis

be included in a cannabis product or sold to a distribution facility prior to the time that the laboratory has provided those results, in writing, to the cultivation facility management team.

If samples from a batch are tested and do not fall within state excepted health and safety levels for any of the above mentioned contaminants or any additional contaminants the state does not deem for distribution, it is the company policy to destroy and remove any contaminated product in a manner consistent with state compliance for the policy for disposal of green waste.

As soon as a batch sample passes the microbiological, mycotoxin, heavy metal and pesticide chemical residue test, the entire batch will be released for further manufacturing, packaging and labeling for transport and sale to a distribution facility.

An electronic copy of all test results shall be filed by laboratory staff for any batch that does not meet the standards set for microbiological, mycotoxin, heavy metal or pesticide chemical residue test. These results will also be sent to cultivation facility staff with in the same time frame. The laboratory staff will also maintain a comprehensive record of test results and make them available to state and local officials, and or the public as needed.

The compliance manager shall provide test results for each batch of cannabis used in any product purchased by a distribution facility to that distribution facility to be made available upon request to all qualifying patients, primary caregivers, and any physician who has certified a qualifying patient.

Controls and Testing of Microbiological Contamination

Real Time PCR will be used to test for common microbial contamination. This method was chosen over traditional microbial plating techniques due to its timely results, accuracy and efficacy. Traditional micro biological methods will also be followed using USP guidelines. Media will purchased from an ISO manufacturer for each specific bacteria. Initially we will be testing for E.Coli, Salmonella spp, Total Gram-negative Bacterial, Aspergillus spp, Mucor, Penicillium, Thermophilic Actinomycetes, and filth. Other tests will be conducted as MinnMed sees fit or as state regulations are developed pertaining to specifically required tests.

Disposal

Dispose of any waste produced during the processing of medical cannabis in accordance with all applicable local, state and federal laws, rules and regulations.

- Disposal of any cannabis product waste must be rendered unusable and unrecognizable through one of the following methods:
    - Grinding and incorporating the cannabis waste with non-consumable, solid wastes listed below such that the resulting mixture is at least 50 percent non-cannabis waste:
        - Paper waste;
        - Plastic waste;
        - Cardboard waste;
        - Food waste;
        - Grease or other compostable oil waste;
        - Bokashi, or other compost activators;
        - Other wastes approved by the State Licensing Authority that will render the medical cannabis and Medical Cannabis product waste unusable and unrecognizable as cannabis; and
        - Soil.
- A licensee shall not dispose of medical cannabis and Medical Cannabis product waste in an unsecured waste receptacle not in possession and control of the licensee.

Quality Control

The quality and consistency of cannabis and Medical Cannabis products is critical for the success of the organization. Facility management shall ensure that only medical cannabis and Medical Cannabis products of the highest, pharmaceutical grade quality are wholesaled, transported and dispensed within the state of Minnesota.

Quality control procedures designed to maximize safety for owners and occupational licensees and minimize potential contamination will be utilized within the manufacturing facility. Quality control procedures will pertain to cultivated raw cannabis and manufactured Medical Cannabis products. Facility employees will be properly trained on quality control measures and protocols. For quality control, facility employees will at a minimum:

- Visually inspect all items produced for any contaminates
    - Foreign objects (plant material, hair, debris, etc.)
- Follow all sanitary measures and procedures
- Send samples to lab for testing

Emergency Procedures

This section will outline steps to be taken in case of an emergency. It will detail actions for owners or occupational licensees in case of a fire, chemical spill or other emergency.

- Fire Emergency
    - If fire is small and isolated, try to exhaust the fire with one of the fire extinguishers.
    - In case of a fire emergency, dial 911 for Fire Department.
- Chemical Spill
    - Try to use chemical spill kit for smaller incidents of chemical spill.
    - If chemical spill is large or you do not know how to handle the situation, escalate to your manager.
- Other Emergencies
    - Contact 911 for break-ins or burglaries.

Record Keeping/Documentation

This section will detail how to maintain clear and comprehensive records of the name, signature, and owner or occupational license number of every individual who is engaged in any step related to the creation/production of a production batch of medical cannabis and the step that individual performed.

Documentation/Records Needed:

- Record and maintain accurate records of employees and owners or occupational license numbers.
    - These records will be kept by the manager and stored in the office.
- Make sure you are following all laws, rules and regulations.
- Fill out daily production logs for our records.
- Fill out daily transfer to center logs for our records.

- Fill out daily wholesale logs for our records.

Laboratory Testing

MinnMed will ensure that all state and local regulations regarding laboratory testing and procedures are implemented and adhered to by all employees involved with laboratory testing. Management shall properly educate and train staff members on laboratory testing laws and procedures prior to an employee's involvement in the testing process.

State Regulations

In Accordance with MCRP

- Immediately prior to manufacturing or natural processing of any cannabis or Medical Cannabis product or packaging cannabis for sale to a distribution facility, each batch shall be made available at the manufacturing facility for an employee of an approved laboratory to select a random sample, which shall be tested by the approved laboratory for:
    - microbiological contaminants;
    - mycotoxins;
    - pesticide active ingredients;
    - residual solvent; and
    - purposes of conducting an active ingredient analysis.
- MDH may select a random sample that shall, for the purposes of conducting an active ingredient analysis, be tested by MDH for verification of label information.
- A laboratory shall immediately return or dispose of any cannabis upon the completion of any testing, use or research. If cannabis is disposed of, it shall be done in compliance with MCRP
- If a sample of cannabis does not pass the microbiological, mycotoxin, pesticide chemical residue or solvent residue test, based on the standards set forth in MCRP, the following shall apply:
    - If the sample failed the pesticide chemical residue test, the entire batch from which the sample was taken shall, if applicable, be recalled as provided for in MCRP.
    - If the sample failed any other test, the batch may be used to make a CO_2

or solvent based extract. After processing, the CO_2 or solvent-based extract must still pass all required tests.

- Microbiological Test: For purposes of the microbiological test, a cannabis sample shall be deemed to have passed if it satisfies the recommended microbial and fungal limits for cannabis products in colony forming units per gram (CFU/g) set out in the AHP American Herbal Pharmacopoeia Monograph Table as follows:

	Total viable aerobic bacteria	**Total yeast and mold**	**Total coliforms**	**Bile-tolerant gram-negative bacteria**	**E. coli (pathogenic strains) and Salmonella spp.**
CO_2 and solvent based extracts	104	103	102	102	Not detected in 1 g

  - Unprocessed materials include minimally processed crude cannabis preparations such as inflorescences, accumulated resin glands (kief), and compressed resin glands (hashish). Processed materials include various solid or liquid infused preparations, oils.
- Mycotoxin Test: For purposes of the mycotoxin test, a cannabis sample shall be deemed to have passed if it meets the following standards:
  - **Test Specification**
    - Aflatoxin B1 <20 µg/kg of substance
    - Aflatoxin B2 <20 µg/kg of substance
    - Aflatoxin G1 <20 µg/kg of substance
    - Aflatoxin G2 <20 µg/kg of substance
    - Ochratoxin A <20 µg//kg of substance

- Pesticide Chemical Residue Test: For purposes of the pesticide chemical residue test, a cannabis sample shall be deemed to have passed if it satisfies the most stringent acceptable standard for a pesticide chemical residue in any food item as set forth in subpart C of USEPA's regulations for Tolerances and Exemptions for Pesticide Chemical Residues in Food (40 CFR 180 (2014)).
- Residue Solvent Test: For purposes of the residue solvent test, a cannabis sample shall be below 10 ppm.
- The laboratory shall file with MDH an electronic copy of each laboratory test result for any batch that does not pass the microbiological, mycotoxin, or pesticide chemical residue test, at the same time that it transmits those results to the manufacturing facility. In addition, the laboratory shall maintain the laboratory test results for at least five years and make them available at MDH's request.
- A manufacturing facility shall provide to a distribution facility the laboratory test results for each batch of cannabis product purchased by the distribution facility , if sampled. Each distribution facility organization shall have that laboratory results available upon request to qualifying patients, designated caregivers and a physician who has certified a qualifying patient.

Best Practice Laboratory Testing Procedures

The processing manager shall make samples from each batch available for laboratory testing. The sample shall be weighed, RFID scanned and all data shall be recorded on the SIS prior to being removed from the secured curing area. The laboratory employee will select and prepare several random samples from every batch sample in order to ensure the quality, purity, and consistency of dose through a statistical approach. The laboratory staff shall then test each random sample for harmful microbiological contaminants, mycotoxins, heavy metals and pesticide chemical residue. In addition, each sample will also be tested for active ingredients including but not limited to cannabinoid profiling for the following: THC, THCa, CBD, CBDa, and CBN. Under no circumstances shall cannabis batches awaiting contamination results and active ingredient analysis be included in a cannabis product or sold to a distribution facility prior to the time that the laboratory has provided those results, in writing, to the manufacturing facility management team.

If samples from a batch are tested and do not fall within state accepted health and safety levels for any of the above mentioned contaminants or any additional contaminants the state does not deem for distribution, it is the cultivation and Medical Cannabis products facility's policy to destroy and remove any contaminated product in a manner consistent with state compliance for the policy for disposal of waste. The Product Recall Plan will be implemented if a batch is found to be contaminated or is likely to cause sickness or serious bodily harm and if the batch has already been released and transferred to dispensing organizations.

As soon as a batch sample passes the microbiological, mycotoxin, heavy metal and pesticide chemical residue test, the entire batch will be released for immediate processing manufacturing, packaging and labeling for transport and sale to a Medical Cannabis products facility or a distribution facility.

An electronic copy of all test results shall be filed by laboratory staff for any batch that does not meet the standards set for microbiological, mycotoxin, heavy metal or pesticide chemical residue test. These results will also be sent to the manufacturing facility staff and/or the Medical Cannabis products facility staff within an adequate time frame. The laboratory staff will also maintain a comprehensive record of test results and make them available to state and local officials, and or the public as needed.

The manufacturing facility and/or Medical Cannabis products facility compliance manager shall provide test results for each batch of cannabis used in any product purchased by a distribution facility to that distribution facility to be made available upon request to all qualifying patients, primary caregivers, and any physician who has certified a qualifying patient.

Packaging and Labeling

Management will ensure full compliance with all applicable regulations relating to packaging and labeling within the manufacturing facility. All medical cannabis products and Medical Cannabis products will be packaged and labeled according to all applicable state and local laws and regulations. Below are state regulations pertaining to packaging and labeling requirements;

management shall ensure that all employees are properly trained on packaging and labeling requirements and procedures.

Packaging and Labeling In accordance with MCRP Packaging and Labeling of Medical Cannabis and Medical Cannabis Products

- If applicable, each cannabis product produced for sale shall be registered with MDH on forms provided by MDH. Each product registration shall include a label and the required registration fee. The registration fee is for the name of the product offered for sale, and one fee shall be sufficient for all package sizes.
- All harvested cannabis intended for distribution to a dispensing organization must be packaged in a sealed, labeled, medical cannabis container.
- Packaging of any product containing cannabis shall be child-resistant and light resistant consistent with current standards, including the Consumer Product Safety Commission standards referenced by the Poison Prevention Act.
- Each cannabis product shall be labeled by the manufacturing facility prior to sale to a distribution facility , and each label shall be securely affixed to the package and shall state in legible English:
    - The name and P.O. Box of the registered manufacturing facility where the item was manufactured;
    - The common or usual name of the item and the registered name of the cannabis product that was registered with MDH pursuant to MCRP rules and regulations
    - A unique serial number that will match the product with a producer batch and lot number to facilitate any warnings or recalls MDH or producer deems appropriate;
    - The date of final testing and packaging, if sampled, and the identification of the independent testing laboratory;
    - The date of manufacture and "use by" date;
    - The quantity (in ounces or grams) of cannabis contained in the product;
    - A pass/fail rating based on the laboratory's microbiological, mycotoxins, and pesticide and solvent residue analyses, if sampled;
    - Content List

        - A list of the following, including the minimum and maximum percentage content by weight:
            - delta-9-tetrahydrocannabinol (THC);
            - tetrahydrocannabinolic acid (THCA);
            - cannabidiol (CBD);
            - cannabidiolic acid (CBDA); and
            - any other ingredients besides cannabis.
- The acceptable tolerances for the minimum percentage printed on the label for any of subsections of MCRP shall not be below 85% or above 115% of the labeled amount;
- A statement that the product is for medical use and not for resale or transfer to another person.

Medical Cannabis Products Packaging and Labeling In Accordance with MCRP:

Packaging and Labeling of Medical Cannabis and Medical Cannabis Products

- Medical Cannabis Products: All items shall be individually wrapped or packaged at the original point of preparation. The packaging of the Medical Cannabis product shall conform to the labeling requirements of MCRP and chapter 311 the Laws of Minnesota, shall include the following information in English on each product offered for sale or distribution:
    - All ingredients of the item, including any colors, artificial flavors and preservatives, listed in descending order by predominance of weight shown with common or usual names;
    - The following phrase: "This product was produced in a medical cannabis manufacturing facility not subject to public health inspection that may also process common food allergens.";
    - Allergen labeling as specified in the Federal Food, Drug and Cosmetics Act, Federal Fair Packaging and Labeling Act. The pre-mixed total weight (in ounces or grams) of usable cannabis in the package (the pre-mixed weight of medical cannabis used in making a Medical Cannabis product shall apply toward the limit on the total amount of medical cannabis a registered qualifying patient may possess at any one time);

- A warning that the item is a Medical Cannabis product and not a food must be distinctly and clearly legible on the front of the package;
- A clearly legible warning emphasizing that the product contains medical cannabis and is intended for consumption by registered qualifying patients only;
- Ingredients List
    - A list of the following ingredients, including the minimum and maximum percentage content by weight for:
        - delta-9-tetrahydrocannabinol (THC);
        - tetrahydrocannabinolic acid (THCA);
        - cannabidiol (CBD);
        - cannabidiolic acid (CBDA); and
        - any other ingredients besides cannabis.
- The acceptable tolerances for the minimum percentage printed on the label shall not be below 85% or above 115% of the labeled amount.
- THC and CBD Container Content and Restriction: Each individually packaged Medical Cannabis product, even if comprised of multiple servings, shall include the total milligram content of THC and CBD and may not include more than a total of 100 milligrams of active THC.
- The label shall not contain any of the following information:
    - Any false or misleading statement or design;
    - Any seal, flag, crest, coat of arms or other insignia likely to mislead the qualified patient to believe that the product has been endorsed, made or used by the State of Minnesota or any of its representatives; or
    - Depictions of the product, cartoons or images other than the manufacturing facility's logo. Medical Cannabis products shall not bear a reasonable resemblance to any product available for consumption as a commercially available candy.
- It is a violation for anyone other than the end user to alter, obliterate or destroy any label attached to a medical cannabis container to administer the product.
- For each commercial weighing and measuring equipment device used at a facility, the manufacturing facility must:

- Ensure that the commercial device is licensed pursuant to the Weights and Measures Act and the associated administrative rules
- Maintain documentation of the licensure of the commercial device; and
- Provide a copy of the license of the commercial device to MDH for review upon request.

Medical Cannabis Products Packaging In Accordance with MCRP: All items shall be individually wrapped or packaged at the original point of preparation. Smaller like items such as hard candies or cookies may be packaged into larger quantities in a single wrapped package.

- The packaging of the Medical Cannabis product shall conform to the labeling requirements of MCRP and shall include the following information in English on each product offered for sale or distribution:
    - The name and address of the registered manufacturing facility where the item was manufactured;
    - The common or usual name of the item;
    - All ingredients of the item, including any colors, artificial flavors, and preservatives, listed in descending order by predominance of weight shown with common or usual names;
    - The following phrase: *"This product was produced in a medical cannabis manufacturing facility, not subject to public health inspection, that may also process common food allergens."*
    - Allergen labeling as specified in the Federal Food, Drug and Cosmetic Act, Federal Fair Packaging and Labeling Act,
    - The pre-mixed total weight (in ounces and or grams) of usable cannabis in the food product;
    - A warning that the item is a Medical Cannabis product and not a food must be distinctly and clearly legible on the front of the package;
    - A clearly legible warning emphasizing that the product contains medical cannabis and is intended for consumption by registered qualifying patients only; and
- Date of manufacture and "use by" date.
- Signage may be translated into additional languages as needed.

- MDH may institute additional labeling requirements for Medical Cannabis products, including, but not limited to, measures of potency.

Storage

Storage of medical cannabis and Medical Cannabis products will comply with all applicable state and local regulations. All medical cannabis and Medical Cannabis products will be stored in a secure access area for nightly storage at the close of operations each day. All storage areas will have adequate lighting. This is also explained in the facility layout section. After medical cannabis plant material and Medical Cannabis products are processed, the facility manager secures them within the facility safe to wait for testing and shipment. After the cannabis and cannabis-infused products pass required laboratory testing, they will be transferred to the retail facility or another retail facility for sale and distribution. These products will be maintained in the secured product storage area in commercial grade safes until transportation. This area shall be restricted to the retail manager.

Manufacturing Facility Storage

Storage In Accordance with MCRP:

- The manufacturing facility shall:
    - Not produce or maintain cannabis in excess of the quantity required for normal, efficient operation;
    - Store all cannabis and Medical Cannabis products in a safe, vault or secured room and in such a manner as to prevent diversion, theft or loss;
    - Maintain all cannabis that is not part of a finished product in a secure area or location within the manufacturing facility accessible only to specifically authorized personnel, which shall include only the minimum number of employees essential for efficient operation;
    - Keep all approved safes, vaults, or other equipment or areas used for the production or storage of cannabis securely locked or protected from entry, except for the actual time required to remove or replace cannabis;
    - Keep all locks and security equipment in good working order;

- Not allow keys to be left in the locks and not store or place keys in a location accessible to persons other than specifically authorized personnel;
- Not allow other security measures, such as combination numbers, passwords or electronic or biometric security systems, to be accessible to persons other than specifically authorized personnel; and
- Keep the manufacturing facility securely locked and protected from unauthorized entry at all times.

- If a manufacturing facility presents special security issues, such as extremely large stock of cannabis, exposed handling or unusual vulnerability to diversion, theft or loss, MDH may require additional safeguards, such as supervised Watchman service.
- If a loss, theft or diversion of cannabis has occurred from a manufacturing facility, the manufacturing facility shall notify MDH immediately. MDH shall determine the appropriate storage and security requirements for all cannabis in the manufacturing facility, and may require additional safeguards to ensure the security of the cannabis. If a reduction in the amount of medical cannabis in the manufacturing facility's inventory is due to suspected criminal activity, the manufacturing facility shall immediately report the reduction to MDH, which may then notify local law enforcement.
- Any manufacturing facility whose permit is revoked or not renewed shall dispose of its entire stock of cannabis under conditions approved by MDH.
- Any area of a manufacturing facility containing cannabis, including a room with an approved safe or approved vault, shall have a sign posted at all entryways, which shall be a minimum of 12 inches in height and 12 inches in length and shall state: "Do Not Enter − Limited Access Area – Access Limited to Authorized Personnel Only" in lettering no smaller than one inch in height.
- Notwithstanding the requirements of MCRP, nothing shall prohibit members of MDH, local law enforcement or other federal, State or local government officials from entering any area of a manufacturing facility if necessary to perform their governmental duties, or persons authorized by MDH
- The manufacturing facility shall provide current copies of manufacturing facility floor plans to MDH and local law enforcement that have jurisdiction in the area where the manufacturing facility is located.

Sale and Distribution

The sale and distribution of all medical cannabis and Medical Cannabis products shall comply with all state and local laws and regulations. Management will properly train and educate all organization employees on proper sales and distribution procedures. All of our employees will be fully trained prior to commencing any sales or distribution activities.

Transportation

All medical cannabis products will be transported in compliance with all applicable state and local laws and regulations. The transportation manager will be responsible for creating and implementing a transportation plan that aligns with all applicable state and local laws and regulations.

The manufacturing facility management team shall ensure total compliance with all state and local statues, regulations and ordinances regarding the transportation of medicinal cannabis. The manufacturing facility compliance manager shall maintain standard operating procedures for the transportation of cannabis and cannabis products and shall train all staff accordingly. The following standard operating procedures shall be maintained by the manufacturing facility management in regard to the transportation of medical cannabis or cannabis medicine products between the manufacturing facility and other establishments or to persons who hold valid registry identification cards or a valid patient's designated primary caregiver:

Trip Plan Prior to the transportation of any medical cannabis a manufacturing facility agent will complete a trip plan including at a minimum:

- The name of the agent who will be transporting;
- The automobile license plate and type,
- The date, start time of the trip and estimated delivery time;
- A description including the exact amount, type and batch of any cannabis products being transported;
- And the route of transportation.

Manufacturing facility management will maintain a copy of the trip plan document at the location of departure, scan all RFID tags prior to transportation and enter all pertinent data into the SIS.

Transportation Protocol During the transportation of medical cannabis or cannabis medicine products pursuant to regulation, all transporting agents will carry a copy of the trip plan with him or her for the duration of the trip; wear their agent card; use a vehicle without any medical cannabis identification which is equipped with a secure lockbox or locking cargo area which will be used to maintain sanitary and secure transportation of the medical cannabis or cannabis medicine products; have a cellular phone as a means of communicating with the establishment for which the agent is providing the transportation; and ensure that the medical cannabis or cannabis medicine products are not at all visible to the public.

Post Transportation Protocol

After transporting medical cannabis or cannabis medicine products, pursuant to the regulations, the agent will complete the trip plan by entering the end time of the trip and any necessary alterations to the trip plan. All products shall be RFID scanned and entered into the receiving entity's inventory system with all weights recorded, and all pertinent data shall be entered into the SIS.

Documentation of Transportation The manufacturing facility shall maintain all documents required by regulation; and provide copies of such documents to Division agents for review upon request.

Transportation Agent Requirements

All agents responsible for transporting medical cannabis or cannabis medicine products will be licensed by State of Minnesota licensing authority and will report all vehicle accidents that occur during the transportation directly to management and MDH within two hours of the incident.

Deviations from Transportation Plan

The transporting agent shall immediately report all diversion due to loss or theft of cannabis or cannabis medicine products that occur while transporting to the compliance manager and to

MDH. The manufacturing facility and distribution facility management shall ensure all such incidences are reported to the appropriate law enforcement agency and to MDH as required in state regulations. Cultivation and distribution facility management shall maintain a log of all reports received pursuant to the regulations.

Product Information

For each batch of medical cannabis sold and/or transported, the following information shall be made available to the purchasing distribution facility upon or prior to delivery:

- The batch number
- Whether the batch originated from cannabis seeds or cannabis cuttings
- The strain of the cannabis seeds or cannabis cuttings planted
- The number of cannabis seeds or cannabis cuttings planted
- The date on which the cannabis seeds or cuttings were planted
- A list of all chemical additives used in the cultivation, including, without limitation, nonorganic pesticides, herbicides and fertilizers
- The number of cannabis plants grown to maturity
- Harvest information, including, without limitation:
    - The date of harvest;
    - The final yield weight of processed usable cannabis; and
    - The name and medical cannabis establishment agent registration card number of the manufacturing facility agent responsible for the harvest.

Transportation In Accordance with MCRP Prior to transporting any medical cannabis or medical cannabis product, our manufacturing facility team shall:

- Complete a shipping manifest using a form prescribed by MDH; and
- Securely transmit a copy of the manifest to the distribution facility that will receive the products and to MDH before the close of business the day prior to transport. The manifest shall be made available to the MDH upon request.
- The manufacturing facility shall maintain all shipping manifests and make them available at the request of MDH.
- Medical Cannabis products that are being transported shall:

    - Only be transported in a locked, safe and secure storage compartment that is part of the motor vehicle transporting the medical cannabis, or in a locked storage container that has a separate key or combination pad; and
    - Not be visible from outside the motor vehicle.
- Any motor vehicle transporting medical cannabis shall travel directly from the manufacturing facility to the distribution facility, or a testing laboratory, and shall not make any stops in between except to other distribution facilities or laboratories, for refueling or, in case of an emergency. In case of emergency, the agents will report the emergency immediately to law enforcement through the 911 emergency system and the manufacturing facility, which will immediately notify MDH.
- Our manufacturing facility shall ensure that all delivery times and routes are randomized.
- Our manufacturing facility shall staff all transport motor vehicles with a minimum of two employees. At least one delivery team member shall remain with the motor vehicle at all times that the motor vehicle contains medical cannabis.
- Each delivery team member shall have access to a secure form of communication with personnel at the manufacturing facility and the ability to contact law enforcement through the 911 emergency systems at all times that the motor vehicle contains cannabis.
- Each delivery team member shall possess his or her department issued identification card at all times when transporting or delivering cannabis and shall produce it for MDH authorized representative or law enforcement official upon request.

Product Recall Plan

Manufacturers, importers, distributors and retailers of consumer goods are liable for the products they provide to consumers and face the potential of product recalls for potentially dangerous or hazardous products. The same is true for Minnesota Medical Solutions as a manufacturer and retailer of consumer medical cannabis products. As a result, Minnesota Medical Solutions may need to conduct a product recall in the future. For consumer products, the recall process is handled and regulated by the Consumer Product Safety Commission (CPSC), for all intents and purposes Minnesota Medical Solutions recall plan will follow the guidelines of the CPSC.

Firms often learn of potential product safety problems at an early stage. For this reason, companies involved in the manufacture, importation, distribution, or sale of consumer products should develop a system for maintaining and reviewing information about their products that might suggest that their product has a defect or poses an unreasonable risk of serious injury or death. Such information includes, but is not limited to, consumer complaints, reports of production problems, product testing, or other critical analyses of products.

Experts have shown that one of the best ways to ensure that a product recall is effective is to have a recall plan already in place and to execute the plan as quickly as possible. A well-thought out, well-executed recall plan can save lives and prevent injuries in addition to limiting damage our company's brand and bottom line.

The Consumer Product Safety Commission (CPSC) has compiled resources to assist companies that manufacture, import, distribute, retail, or otherwise sell consumer products. CPSC has developed a Recall Handbook that can be utilized in case a product recall needs to be ordered. The Recall Handbook details how to recognize potentially hazardous consumer products as soon as possible. The book explains how to develop and implement a "corrective action plan" (called a CAP) to address the hazards; it explains CPSC's Fast Track Program. The Recall Handbook also discusses how to communicate recall information to consumers and how to monitor product recalls. The Consumer Product Safety Commission's Recall Handbook will be a valuable tool utilized by Minnesota Medical Solutions if the need for a product recall ever arises.

The Recall Handbook should be referenced to determine exact protocol for recall and the requirements from the Consumer Product Safety Commission. The Recall Handbook can be obtained online from http://www.cpsc.gov/PageFiles/106141/8002.pdf. Minnesota Medical Solutions will carefully review the Recall Handbook in order to:

- Become familiar with their reporting requirements under sections 15(b) and 37 of the Consumer Product Safety Act, and Section 102 of the Child Safety Protection Act, Pub. L. 103-267;
- Help learn how to recognize potentially hazardous consumer products as soon as possible; and

- Develop and implement "corrective action plans" that address the hazards if we discover we have manufactured, imported, distributed, or retailed such products.

In Accordance with MCRP:

- Manufacturing facilities shall establish, maintain and comply with the policies and procedures contained in the Operations and Management Practices Plan, approved by MDH, for the production, security, storage, inventory and distribution of medical cannabis products. The policies and procedures shall include methods for identifying, recording and reporting diversion, theft and loss, and for correcting all errors and inaccuracies in inventories. We will include in our written policies and procedures a process for the following:
    - Handling mandatory and voluntary recalls of Medical Cannabis products. The procedure shall be adequate to deal with:
        - Recalls due to any action initiated at the request of MDH and any voluntary action to remove from the market defective or potentially defective products, or any product that has failed laboratory testing as required by this Part or has been found to have a reasonable probability that its use or exposure will cause serious adverse health consequences; and
        - Any action undertaken to promote public health and safety by replacing existing Medical Cannabis products with improved products or packaging.

In Accordance with MCRP:

- A dispensing organization must establish a policy for communicating a recall of medical cannabis that has been shown to present a reasonable or a remote probability that use of or exposure to the product will cause serious adverse health consequences. Our policy will include:
    - A mechanism to contact all customers who have, or likely have, obtained the product from the distribution facility. The communication will include information on the policy for return of the recalled product;
    - A mechanism to contact us;

    - Communication with MDH within 24 hours; and
    - Outreach via media, as necessary and appropriate.
- Any recalled medical cannabis product will be disposed of by the distribution facility.

When to Recall Medical Cannabis Products

As a manufacturer, distributor, and/or retailer of consumer products, Minnesota Medical Solutions has a legal obligation to immediately report the following types of information to the Consumer Product Safety Commission:

- A defective product that could create a substantial risk of injury to consumers;
- A product that creates an unreasonable risk of serious injury or death;
- A product that fails to comply with an applicable consumer product safety rule or with any other rule, regulation, standard, or ban under the CPSA or any other statute enforced by the CPSC;
- An incident in which a child (regardless of age) chokes on a marble, small ball, latex balloon, or other small part contained in a toy or game and that, as a result of the incident, the child dies, suffers serious injury, ceases breathing for any length of time, or is treated by a medical professional; and
- Certain types of lawsuits. (This applies to manufacturers and importers only and is subject to the time periods detailed in Sec. 37 of the CPSA.)

Failure to fully and immediately report this information may lead to substantial civil or criminal penalties. Consumer Product Safety Commission's staff advice is "when in doubt, report." Minnesota Medical Solutions will ensure communication with MDH, the DOA within 24 of becoming aware of the need for a product recall. Minnesota Medical Solutions will then proceed to recalling protocol and how to recall the product.

How to Recall Medical Cannabis Products

Minnesota Medical Solutions will develop a recall plan following guidance from the Recall Handbook provided by the CPSC. Once the need for a product recall has been determined, Minnesota Medical Solutions will proceed with the product recall Corrective Action Plan (CAP).

If the need for a product recall arises, we will have inventory management systems in place to determine and pinpoint which products to recall, how many of those products are in the supply chain, and will be able to determine exactly where those products are within the supply chain. The inventory management systems and procedures required by state regulations will ensure a streamlined recall process if ever necessary.

Corrective Action Plan (CAP)

A corrective action plan is defined as improvements to an organization's processes taken to eliminate causes of non-conformities or other undesirable situations. The goal of a corrective action plan should be to retrieve as many hazardous products from the distribution chain and from consumers as is possible in the most efficient, cost-effective manner. The CAP will outline the procedures and steps Minnesota Medical Solutions needs to take once a product recall is required.

Step One: Industry Notification

If Medical Cannabis products are believed to need to be recalled, Minnesota Medical Solutions will contact all wholesale partners and distribution facility to make them aware of the situation and the need for product recall. Minnesota Medical Solutions will also contact MDH, DOA within 24 hours of obtaining reportable information. As the wholesaler of the product needing to be recalled, contacting the end users of the recalled product; medical cannabis patients, will prove difficult if not impossible. At this stage of the recall, distribution facility will need to ensure that they have a proper recall process in place to contact the end users of the product being recalled.

Step Two: Public Notification

Manufacturing facility will post notifications about the product recall on its website as well as making partnering manufacturing facilities and distribution facilities aware of the product recall. The actual recalling processes will be handled by the distribution facility with help and support from the manufacturing facility.

As the distribution facility issuing a recall notice it will be important to reach the end users or the recalled product. Minnesota Medical Solutions will post notification about the recall on company websites and social media as well as post written notices of the recall on location for

patients and customers to view. The recall notice will include all pertinent information regarding the product being recalled, contact information and other information relating to the recall. Information will include but not be limited to:

- Product name
- Product batch number
- Dispensing date range of recalled product
- distribution facility locations

Once the recall notification has been issued to all applicable distribution facility and medical cannabis patients, Minnesota Medical Solutions will wait to receive recalled products from a distribution facility and/or licensed medical cannabis patients. Once recalled products have been received, Minnesota Medical Solutions will properly dispose of all recalled products.

Step Three: Procurement

The distribution facility issuing a product recall to medical cannabis patients will need to be ready to obtain and secure recalled products from patients. Patients should be able to bring in the products being recalled to the distribution facility location. It will be at the distribution facilities discretion whether to issue a refund, replace the recalled product at no cost, or to take other measures.

Step Four: Documentation and Record Retention

Minnesota Medical Solutions will maintain all documentation and records regarding any and all product recalls issued.

Step Five: Disposal

Minnesota Medical Solutions will ensure that any and all recalled medical cannabis products are disposed of according to all state and local regulations. Minnesota Medical Solutions will follow waste destruction and disposal procedures outlined below for proper disposal of recalled medical cannabis.

Medical Cannabis Waste—Destruction and Disposal

All waste, including waste composed of or containing finished cannabis, such as infused products and extracts, will be stored, secured, and managed in accordance with applicable state and local statutes, ordinances, and regulations including but not limited to MCRP. The manufacturing facility shall maintain a record of all disposals for a minimum of five years. Facility management will ensure proper training and implementation of destruction and disposal procedures and protocols.

Waste Processing Center: The manufacturing facility shall contain a designated waste holding and processing room designed to keep waste secured and segregated from the rest of the manufacturing facility. The entire waste processing center shall be recorded on high definition video and remain locked at all times. The processing center shall contain a shredder/grinding machine, multiple containment vessels, at least two mixing containers, additional processing medium/substrates, and interior entrance and exterior exit points. Preparation of waste shall be contained within the secured processing center in order to prevent any cross-contamination with any cultivation areas or product processing areas, and avoid any possibility of product diversion.

Secured Waste Collection: The following process explains how the manufacturing facility staff will maintain security and avoid diversion. Green waste will be collected throughout the day in designated receptacles that are secured, locked and tracked on video. At the end of the day the on-site quality control manager along with another staff member will collect all the waste and weigh it out on video. All information will be recorded including, weight, time, date, employee names and signatures. The green waste will then be stored within a locked and secured designated waste processing room and continuously monitored on video until the time of disposal. All medical cannabis shall be rendered unusable prior to disposal by following the methods for disposal.

Disposing of Waste: A minimum of seven days prior to rendering the secured green waste unusable and disposing of said waste, an agent from the manufacturing facility team shall utilize the traceability system, mandated in MCRP, to notify MDH and that such product shall be rendered unusable and disposed of. Immediately before the green waste is processed for disposal it shall be re-weighed by the quality control manager and at least one other staff member and all information will be recorded including, weight, time, date, employee names and signatures.

After capturing all pertinent data, logging, and entering into the company SIS, all waste shall be rendered unusable and prepared for either compostable or non-compostable disposal. The manufacturing facility compliance manager shall oversee the entire waste disposal process and ensure it in done properly and according to MCRP. All waste processing and disposal shall be recorded on video surveillance.

Materials Needed for Processing Green Waste:

Compostable materials: Food waste, yard waste, vegetable grease or oils, other waste approved by MDH.

Non-compostable materials: Paper waste, cardboard waste, plastic waste, soil or other waste approved of by MDH.

Process for Rendering Medical Cannabis and Plant Material Unusable:

Place cannabis in grinder and mulch until all pieces are smaller than .5 centimeters in length. Mix the cannabis thoroughly with other ground materials so that the resulting mixture is a minimum of 50% non-cannabis waste from the above list or other waste approved by MDH.

Disposal of Cannabis Waste Rendered Unusable: Once waste has been processed in a manner consistent with company policy and MCRP, it will be transported to a permitted waste facility for final disposal. All compostable waste will be delivered to compost, anaerobic or other facility approved by the jurisdictional health department. All waste prepared for non-compostable disposal will be delivered to an approved landfill, incinerator, or other facility with approval from the jurisdictional health department.

Liquid Waste: The manufacturing facility compliance manager will ensure all liquid waste is disposed of in a manner consistent with requirements placed within Federal Environmental Protection Act specific to the substance being disposed of.

Hazardous Waste: The manufacturing facility compliance manager will ensure that all hazardous and chemical waste is disposed of in a manner consistent with federal, state, and local laws.

Destruction of Medical Cannabis:

- All plant material scrap, and harvested medical cannabis not intended for distribution to a medical cannabis organization must be destroyed and disposed of pursuant to state law. Documentation of destruction and disposal shall be retained at the manufacturing facility for a period of not less than five years.
- A manufacturing facility shall, prior to the destruction, notify MDH and the State Police.
- The manufacturing facility shall keep record of the date of destruction and how much was destroyed.
- A distribution facility shall destroy all Medical Cannabis products, which are not sold to registered qualifying patients. Documentation of destruction and disposal shall be retained at the distribution facility for a period of not less than five years.
- A distribution facility shall, prior to the destruction, notify MDH of Financial and Professional Regulation and the State Police.
- Medical Cannabis products shall be destroyed by rendering them unusable following the methods set forth in MCRP.
- The allowable method to render medical cannabis waste unusable is by grinding and incorporating the medical cannabis waste with other ground materials so the resulting mixture is at least 50% non-cannabis waste by volume. Other methods to render medical cannabis waste unusable must be approved by the MDH before implementation. Material used to grind with the medical cannabis falls into two categories, compostable waste and non-compostable waste.
    - Compostable Mixed Waste: Medical Cannabis waste to be disposed as compost feedstock or in another organic waste method (for example, anaerobic digester) may be mixed with the following types of waste materials:
        - Food waste;
        - Yard waste;
        - Vegetable based grease or oils; or
        - Other wastes as approved by the MDH (e.g., agricultural material, biodegradable products and paper, clean wood, fruits and vegetables plant matter).
        - Paper waste;

        - Cardboard waste;
        - Compostable Plastics
        - Soil; or
        - Other wastes as approved by MDH (e.g., non-recyclable plastic, broken glass, leather).
- Medical Cannabis waste rendered unusable following the methods described in this section can be disposed. Disposal of the medical cannabis waste rendered unusable may be delivered to a permitted solid waste facility for final disposition. Examples of acceptable permitted solid waste facilities include:
    - Compostable Mixed Waste: Compost, anaerobic digester or other facility with approval of the jurisdictional health department.
    - Non-compostable Mixed Waste: Landfill, incinerator or other facility with approval of the jurisdictional health department.
- All waste and unusable product shall be weighed, recorded and entered into the inventory system prior to rendering it unusable. Verification of this event shall be performed by an agent-in-charge and conducted in an area with video surveillance.
- Electronic documentation of destruction and disposal shall be maintained for a period of at least five years.

Emergency Protocol

Minnesota Medical Solutions will establish emergency procedures and protocols to be implemented organization wide. Employees of the organization will be fully trained on emergency protocols once employed by the company. Emergencies protocols will be developed for robbery or theft, fire emergency, chemical spill and for other emergencies as needed.

Robbery or Theft

- If being robbed at gunpoint or you feel your life is in danger, comply with all requests from perpetrator. Give them whatever they ask for.
- Try to signal for help through security panic buttons provided or through the panic button or police services button located on the alarm panel.
- Contact police as soon as possible
- Notify any required state or local authorities

Fire Emergency

- If fire is small and isolated, try to exhaust the fire with one of the fire extinguishers.
- In case of a fire emergency, dial 911 for Fire Department or push the symbol on the alarm panel for fire emergency.

Chemical Spill

- Try to use chemical spill kit for smaller incidents of chemical spill.
- If chemical spill is large or you do not know how to handle the situation, get the facility manager to handle the situation.

Other Emergencies

- Contact 911 for break-ins or burglaries.
- Contact any required state or local authority in cases of theft, break-ins or burglaries.

Community Plan

As an organization we realize that when we begin operations we will become a member of the surrounding communities and as such we want to become a valuable and productive member within said communities. Safety for our employees and the surrounding communities is of upmost importance to our organization. The presence of our facility and the security systems planned for the facility and surrounding area, should help to reduce crime. We have plans to develop and implement community outreach programs. Such programs and events will include food and clothing drives for local food banks, churches, and others. A plan to donate a certain percentage of yearly profits to schools and infrastructure of the surrounding community is also in development.

Good Neighbor Policy

The manufacturing facility management team is committed to building and maintaining good relationships with all of its neighbors, including local business improvement districts, building owners, small businesses, and residents alike. The manufacturing facility team will make every

effort to respect the perspectives of our neighbors and to address their concerns. The following steps shall be made to ensure any concerns within the community are addressed:

- Introduction meetings with all surrounding businesses, building owners, and residents
- Educational information sessions to discuss the benefits of cannabis and the company's overall mission and goals
- Open feedback channels so any new concerns can be immediately addressed through our website, telephone, or mail
- Complete compliance with all state and local ordinances
- Non-obtrusive business practices that ensure our business is discreet and operates like any other business
- No blatant signage with offensive symbols or verbiage
- Unmarked discreet transportation vehicles

Environmental Plan

Conservation and the reduction of our carbon footprint within the communities we operate in is a primary objective of the organization. This will be implemented throughout the entire organization and at every facility. We will look for new and innovative ways to reduce our carbon footprint within the manufacturing facility and/or the dispensing organization facility. 'Reduce, Reuse, and Recycle' will be implemented on an organization-wide scale.

Environmental sustainability is of the highest priority in order to promote a sustainable community and ensure the impact of our business is positive and influential in achieving future environmental goals. In order to reach this goal, we have contracted designers, engineers and consultants who will design intelligently, utilize energy intelligently, and strive for procedures that lead to zero waste. Various factors will be considered thoroughly when planning equipment, procedures, and methodology including air quality, climate, ecological health, energy efficiency, water quality, transportation, and waste.

The manufacturing facility management will also create and implement an employee conservation plan. The employee conservation plan will detail specific actions employees can

take for conservation efforts to try and reduce their carbon footprint. A possible reward program may be created and implemented to reward facility employees for conservation efforts.

Air Quality Plan

The Minnesota Medical Solutions shall support and exceed all air pollution requirements through research and applied action. From the date of initial training, all cultivation team members shall be trained in all mandated air quality regulations. In addition, the cultivation team shall eliminate emissions sources through investigation and consistent monitoring of all environments throughout the manufacturing facility. Additional procedures will be used to offset any carbon emission such as only utilizing CO_2 in daytime cycles under closed-loop protocol with minimal air exchange. During nighttime cycles, CO_2 will not be added to growing environments, and air exchanges will increase to allow fresh air in and oxygen out of the growing environment thus offsetting any direct daytime emissions.

Climate Plan

Additional carbon offsetting shall be utilized to ensure that our carbon footprint is fully eliminated.

- **Wind energy** credits shall be purchased in the direct amount needed to offset the total energy consumption of the manufacturing facility.
- **Solar technologies** continue to advance in the ability to produce more energy and are becoming more affordable. Solar shall be utilized in addition to wind energy to offset and eliminate carbon emissions.

Ecological Health Plan

True Living Organics is the only true methodology that adds back to the soil leaving it more fertile with every usage. The cultivation team shall apply TLO in order to increase microbial life and nutrient profile within the soil, which not only increases plant health and product efficacy, but also can enrich the land around and within the community as it is recycled.

Ethical Pest and Disease Management

EPDM is designed around two ideas; create crops of the highest quality and efficacy while leaving zero environmental trace of any pesticide that could harm or alter the ecology within the community. All pesticides utilized with in EPDM have been selected for being non-toxic and environmentally friendly and shall only be applied internally and remain internal to the manufacturing facility.

Sustainable Energy Plan

In addition to the steps presented in the climate plan, the cultivation team will strive to achieve maximum efficiency and reach maximum genetic potential for all crops produced within the manufacturing facility. Current agricultural practices that include high doses of chemical fertilizers and chemical pesticides actually only allow plants to produce 20% of their genetic potential. By using advanced organic techniques, plants can achieve 80-90% of their genetic potential thus decreasing energy expenditure through efficiency by 300%.

Energy Efficient Lighting Plan

The newest technology will be used throughout the manufacturing facility to ensure that all lamps used in the propagation and growth of medical cannabis are the most efficient to date. Ongoing research and development on lighting technology will allow the manufacturing facility staff to switch to more efficient lighting means as they become available. The efficiency of lighting technologies shall be measured in grams of medical cannabis produced per watt and the amount of cannabinoids per gram.

- **High frequency HID**: New high frequency ballast with double-ended HPS bulbs have surpassed all current lighting in production per watt and per square foot. What this means is overall electrical consumption is reduced by 20-30% over traditional HPS technology when utilized within the flowering areas of the manufacturing facility.
- **LED**: LED lights allow you to provide the optimal lighting spectrum for photosynthesis. They are perfect to utilize in vegetative growth and can replace lights such as metal halides, easily reducing vegetative electrical consumption for lighting

by 20-30%. LEDs also produce substantially less heat therefore reducing cooling cost by around 50%.

- **Florescent**: Florescent lighting technologies are perfect for early vegetative growth and mother plants. They use far less electricity and produce very little heat, making them perfect for reducing overall electrical consumption.

Climate Plan

Additional carbon offsetting will be utilized to ensure that our carbon footprint is fully eliminated.

- **Wind energy** credits will be purchased in the direct amount needed to offset the total energy consumption of the manufacturing facility.
- **Solar technologies** continue to advance in the ability to produce more energy and are becoming more affordable. Solar shall be utilized in addition to wind energy to offset and eliminate carbon emissions.

Environmental Transportation Plan

In order to remain environmentally friendly in all aspects of business and lead by example within the community, all transportation for the company will be in energy efficient vehicles. From picking up supplies to delivering finished product, the company will utilize hybrid, electric, and/or best in class fuel consumption vehicles.

Water Plan

Facility procedures utilizing water will be created with conservation in mind.

- **Smart Filtration**: Water filtration is necessary in commercial agriculture to avoid contaminants often found in normal tap water. Such contaminants can destroy microbial life and defeat the purpose of following an organically grown cultivation regimen. All water within the manufacturing facility will be tested and only filtered as needed. When water filtration is necessary, it will be done with the newest filtration technologies that produce minimal wastewater.
- **Re-capturing**: In addition to smart filtration, the manufacturing facility will use an advanced series of pumps and filters to recapture and re-use all water collected within the facility through the HVAC system and de-humidification processes.

- **Wastewater**: TLO gardening requires little to no run off from the watering of plants and little to no additional nutrient needs to be added to the water. All water that does run off from daily watering practices can be captured and filtered along with any water used for cleaning within the facility.

Zero Waste Plans

Plans to reduce waste throughout the facility will be accomplished by recycling and reuse whenever possible. The bulk of waste within the facility will be from used soil and green waste. All soil within the facility will be composted and reused as TLO soil just keeps getting better, and recycling soil is not only better for the environment, but will actually help the cultivation team to achieve maximum genetic potential and efficacy. Composting green waste will also greatly reduce the amount of landfill generated within the facility and produce quality compost that will be used to inoculate soil with microbial life and improve the overall nutrient profile. In addition to composting, the manufacturing facility team shall reuse everything possible through sterilization processes. All cultivation containers, tools, and other potential waste components will be cleaned and reused to their full life span in order to minimize depreciation and waste.

Employee Conservation

Team members within the manufacturing facility will recycle all paper and plastic waste products. Energy efficient lights and equipment will also be utilized within the facility. We will also create programs within the organization that will encourage and reward employees for their personal conservation efforts, such as carpooling and riding a bike to work. Waste products from the facility will be composted on-site or mixed with biodegradable products for disposal.

Detailed Cultivation Standard Operating Procedures

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Pesticide Applications	EPDM		

1. **Purpose/Objectives**

   To accurately describe the safe and effective application of pesticides and fungicides

2. **Scope**

   All plants with actionable infestation levels within the vegetative phase of cultivation

3. **Background**

   All pesticides shall only be applied in the early stages of vegetative growth. Pesticide application shall be strictly prohibited during the flowering phase.

4. **Responsibilities**

   When an actionable infestation level is determined during vegetative growth, it is the responsibility of the vegetative lead and trained vegetative staff to act immediately to prevent further contamination. Only those agents who have been approved, obtained a license, and have gone through the full EPDM training process shall be permitted to make pesticide applications at the manufacturing facility.

5. **Prerequisites**

   All individuals applying pesticides will adhere to the agricultural use requirements written on the label and shall employ all personal protective equipment recommended on the product label. All manufacturing facility staff members will be aware of worker protection requirement standards for the restricted entry interval (REI) stated on the each product's label prior to application.

6. **Procedure**

   - Determine the infestation type
   - Determine the appropriate treatment
   - Review the instructions for application on the product label
   - Ensure the product intended for use is approved by MDH
   - Determine application methods, i.e. soil or foliar application
     - Atomizer (foliage sprayer)
     - Pesticides application pump and reservoir (soil drench)
   - Change into the appropriate protective clothing and equipment
     - Coveralls
     - Waterproof spray suit

- Gloves
- Boots
- Goggles and face shield
- Apron
- Respirator

- Prepare solution by strictly following the appropriate ratios for each product used.
- If the solution is to be applied by spraying on foliage, turn off HID lights and use normal lighting. All HID lights are to remain off until foliage is completely dry to avoid concentrated light burn damage.
- Perform application
- Launder protective wear

7. References

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Compost Tea	Nutrients		

1. Purpose/objective:
To provide steps for making and applying organic compost tea.

2. Scope:

Teas can be made and applied throughout the vegetative and flowering stages of medical cannabis production.

3. Back ground:

Traditional organic nutrients are mixed into soil and must break down over time providing the full spectrum of nutrients required for plant growth. Microbial life plays an essential role in breaking down organic matter in soils and making fresh humus that contains all elements for healthy root systems and plants. Teas are highly recommended to supply fresh microbes and nutrients needed throughout the plant's life cycle.

4. Policy:

Making organic compost teas: Compost teas should be used bi-weekly to ensure there is a healthy microbial level within the growing medium. Each zone manager shall utilize the appropriate tea recipe for each phase of the cannabis life cycle. Teas shall be applied on a two-week schedule. Teas feed the microbial life in the soil and create healthy plants that resist disease, yield more, and produce consistent cannabis with an excellent terpene profile.

5. Pre-requisites:

Basic tea requirements: Five-gallon bucket, living water, air pump, worm castings, humic acid, sea kelp, earth worm castings

6. Responsible party:

Vegetative and flowering department managers are responsible for scheduling and preparing tea applications.

7. Procedure:

Making compost teas:

- Fill bucket half way with water
- Place air pump (bubbler) in bucket and turn on
- If water is not already alive (see living water) allow water to bubble for a minimum of 24 hours to de-chlorinate

- Place the following ingredients into the water: two tablespoons molasses, two ounces sea kelp, and two ounces humic acid
- Place 1 pound earth worm casting into a sock or similar tea bag, and place bag into the water
- Allow water to bubble and brew for 24-48 hours
- Dilute tea into 40-50 gallons of living water and apply to soil or as a foliar spray

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Curing	Processing		

8. **Purpose/Objectives**
   To accurately describe the curing process
9. **Scope**
   After drying all batches of medical cannabis shall be cured
10. **Background**
    Curing is the process of slowly removing moisture content from 15% down to 8% in order to remove the remaining chlorophyll and sugars from flowers and prepare them for packaging or processing into extraction form.
11. **Responsibilities**
    The processing manager will utilize the following process to ensure cannabis is cured properly.
12. **Prerequisites**
    QualCure curing containers, vinyl gloves.
13. **Procedure**

Materials for curing: QualCure curing containers, vinyl gloves.

10. Label QualCure container with batch RFID and all pertinent information including strain and harvest date.
11. Place cannabis into container no higher than the fill line.
12. Seal the container and log moisture level.
13. Scan Batch RFID and record location and all other pertinent information.

14. When moisture level increases by 10 points, open the valve on the lid and allow moisture level to reduce. May take one to five hours.
15. When moisture level holds firm at pre-determined level for two days, cannabis is properly dried.
16. Open lid valve every two days for remaining days in the 14-day period.
17. Rotate container daily.
18. After 14 days, cannabis shall be sealed to await testing and test results.

14. References

Operational management and practices plan; Post harvest production

Standard Operating Procedures

American Cannabis Company Inc.

Pest Control

Crop Management: The cultivation manager shall ensure that each cultivation team member is thoroughly trained in ethical pest and disease management and other troubleshooting to ensure that any problem within the facility is quickly remedied.

EPDM- Ethical Pest (and Disease) Management

It is best to prevent pest and disease infestations altogether; EPDM strives to do exactly this. The manufacturing facility manager will maintain a healthy cultivation environment by ensuring biosecurity measures are implemented and maintained at all times.

The cultivation manager shall keep a schedule for all pest and disease control prevention. All data pertaining to pesticide applications and other crop inputs shall be recorded and the record maintained at the manufacturing facility for a minimum of five years. All crop input records will be made available to MDH and the commissioner upon request. The application record will include the following information:

- Date and time of application;
- Date of start of vegetative stage of growth;
- USEPA Registration Number;
- Product name;

- Copy of the label of the applied product;
- Application site (the site shall be identified by the location legend maintained by the facility);
- Amount of product applied;
- Size of the application area;
- Name of individual making the application;
- Section for comments or special conditions related to the application.

EPDM is just like integrated pest management programs recommended by the EPA in that they both provide a scientific, common sense based approach to pest management. EPDM differs from IPM (integrated pest management) in that EPDM strives to use only organic means of pest and disease control. EPDM saves money, improves the environment, and protects health.

EPDM Program:

- **Infestation level**: The cultivation manager shall pre-determine an action threshold for each potential pest and disease. The action threshold will determine the type of pesticide and the rate of application.
- **Prevention**: The cultivation team will follow a standard prevention protocol at all times. This protocol will include preventing pests from entering each growing space, preventing cross contamination from zone to zone, closely following environmental protocol for each zone, maintaining cleanliness standards at all times, using preventive biological/microbial controls, growing pest and disease resistant strains, and growing with organic methods and MGP cannabis methods that produce maximum plant health thus remaining resistant to pests and disease.
- **Monitoring**: Plants will be monitored daily by each zone manager. At the first sign of any pest or disease, the cultivation team shall determine a treatment protocol for the affected zone and the entire manufacturing facility.
- **Immediate action**: Plants will be monitored for new signs of pest and disease so they can be treated immediately. Immediate action reduces the chance of complications within the growth cycle that will reduce quality, yield, and consistency of dose. Immediate action also reduces the amount and frequency of pesticide applications.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date

IPM	EPDM		

15. Purpose/Objectives

To accurately describe the protocols for EPDM

16. Scope

All plants within all phases of cultivation

17. Background

It is best to prevent pest and disease infestations altogether; EPDM strives to do exactly this. The manufacturing facility manager will maintain a healthy cultivation environment by ensuring biosecurity measures are implemented and maintained at all times. EPDM is just like integrated pest management programs recommended by the EPA in that they both provide a scientific, common sense based approach to pest management. EPDM differs from IPM (integrated pest management) in that EPDM strives to use only organic means of pest and disease control. EPDM saves money, improves the environment, and protects health.

18. Responsibilities

The cultivation manager shall keep a schedule for all pest and disease control prevention.

19. Prerequisites

Daily monitoring, training in EPDM

20. Procedure

EPDM Program:

- **Infestation level**: The cultivation manager shall pre-determine an action threshold for each potential pest and disease. The action threshold will determine the type of pesticide and the rate of application.
- **Prevention**: The cultivation team will follow a standard prevention protocol at all times. This protocol will include preventing pests from entering each growing space, preventing cross contamination from zone to zone, closely following environmental protocol for each zone, maintaining cleanliness standards at all times, using preventive biological/microbial controls, growing pest and disease resistant strains, and growing with organic methods and MGP cannabis methods that produce maximum plant health thus remaining resistant to pests and disease.

- **Monitoring**: Plants will be monitored daily by each zone manager. At the first sign of any pest or disease, the cultivation team shall determine a treatment protocol for the affected zone and the entire manufacturing facility.
- **Immediate action**: Plants will be monitored for new signs of pest and disease so they can be treated immediately. Immediate action reduces the chance of complications within the growth cycle that will reduce quality, yield, and consistency of dose. Immediate action also reduces the amount and frequency of pesticide applications.

7. References

Operational management and practices plan; Crop Control

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Propagation	Cloning		

21. Purpose/Objectives:

To accurately describe the process for cloning from a mother plant

22. Scope

The vegetative team shall start a designated amount of clones per week in order to full fill facility requirements

23. Background

Clones are genetic copies of the mother plant; therefore all mother plants must be determined suitable for cloning by the vegetative manager. Any terminal shoot at least three inches long can be turned into a clone; however, the top of the mother plant will have the freshest, softest material for cloning, and cloning from top down helps avoid mother plants that are too tall for the ceiling height within the growing space.

24. Responsibilities

The vegetative manager shall be responsible for selecting strains to be cloned in order to meet the demands of each flowering zone. The cloning manager shall be responsible for preparing the area and the cloning process

25. Prerequisites

Rubbing alcohol, cutting board, scissors, new razor blades, cloning gel (for organic use honey), small container, distilled or reverse osmosis (RO) water, vinyl work gloves, and cloning medium: Rockwool cubes, rapid rooter cubes, coco coir cups, aeraponic systems

26. Procedure

Cloning Process

Procedure for taking clones: The vegetative manager will train a dedicated zone manager for the propagation of all clones.

- The vegetative manager will identify and approve a mother plant to be cloned.
- The cloning manager will prepare all tools and surfaces by wiping them clean with 90% rubbing alcohol and will then follow this protocol:
    - Fill clean empty glass with distilled or RO water.
    - Prepare cloning medium by moistening with filtered water.
    - Take clean scissors and place them into the cloning medium 1.25 inches deep to ensure a clean hole for planting the cutting.
    - Place the cutting board on a clean stainless steel-working surface.
    - Place the cloning medium and several brand new razors next to the cutting board.

- Select suitable cuttings, which are a minimum of three to four inches in length and have at least three leaf nodes.
- Using scissors, remove several suitable cuttings from the mother plant.
- Quickly cut and remove lower leaf nodes and place in the cup of water.
- Place cup with cuttings next to the cutting board.
- Remove cutting from the water and prepare to make a final clean cut with the razor blade.
- Place the cutting on the cutting board and slice the base at a 45-degree angle directly below a leaf node for best results.
- Cut and remove all lower fan leaves, any large fan leaves near the top should be cut in half/
- Immediately dip the cut end of the clone into the cloning gel (rooting hormone), and place into the prepared growing medium. (If using an aeraponic cloner, skip the dip, and place the bare stem into the cloning machine.)
- Place the finished tray of cuttings into the hot house or under a propagation dome. Lighting should be t5 florescent or similar.
- Ensure humidity remains at 80% and temperature remains at 80 degrees.
- After 7 days, remove all weak cuttings. Cuttings that are standing strong shall enter the tracking system.
- As soon as a cutting is removed from the mother plant it shall be given a unit number, batch number, RFID tracking tag, logged and entered into the SIS so tracking can begin.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Laundering Gear	EPDM		

27. Purpose/Objectives

To accurately describe the process for laundering protective gear

28. Scope

All protective gear used during the pesticide application process will be laundered directly after the application process.

29. Background

Protective gear shall be laundered in order to prevent contamination and prolong gear life.

30. Responsibilities

The sanitation manager shall ensure the following processes are followed at all times when laundering protective gear after pesticide applications:

31. Prerequisites

Washing machine, gloves, detergent

32. Procedure

Protective gear will be washed separately from the rest of the laundry. Any clothing soaked in pesticide shall be discarded.

- Wear rubber gloves when touching clothing
- Wash with hot water
- Use heavy detergent
- Wash twice
- Run washing machine a third time after

33. References

Operational management and practices plan; Cop management

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Pesticide storage	EPDM		

34. Purpose/Objectives

To accurately describe the safe and compliant storage of pesticides

35. Scope

All pesticides utilized within cultivation shall be stored accordingly

36. Background

Proper storage of pesticides, fungicides and other bio-controls is imperative to ensure their efficacy over time.

37. Responsibilities

The cultivation manager will maintain the storage of all pesticides in a manner that prolongs their shelf life while protecting manufacturing facility employees, and the environment, and does not allow for any possible contamination of plants beyond the vegetative phase and or finished product.

38. Prerequisites

Properly designed storage cabinet, MSDS, original containers

39. Procedure

All pesticides will be stored in the following manner:

- In locked cabinet
- Cabinet shall be cool, dry and well ventilated
- In their original containers
- With proper labeling intact
- Dry pesticides above liquid pesticides
- Follow all storage recommendation on the label for special needs
- Off the ground in case of flooding
- MSD sheets and emergency numbers shall be on hand at all times

Never store pesticides:

- In equipment used for application
- In any other container except for the original
- Near food, nutrients, flowering plants or finished products, water, or protective clothing.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Pesticide storage	EPDM		

40. Purpose/Objectives

To accurately describe the safe and compliant storage of pesticides

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All pesticides utilized within cultivation shall be stored accordingly

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44. Prerequisites

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45. Procedure

All pesticides will be stored in the following manner:

- In locked cabinet
- Cabinet shall be cool, dry and well ventilated
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- With proper labeling intact
- Dry pesticides above liquid pesticides
- Follow all storage recommendation on the label for special needs
- Off the ground in case of flooding
- MSD sheets and emergency numbers shall be on hand at all times

Never store pesticides:

- In equipment used for application
- In any other container except for the original
- Near food, nutrients, flowering plants or finished products, water, or protective clothing.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Training	EPDM		

The cultivation manager shall ensure that each cultivation team member is thoroughly trained in ethical pest and disease management and other troubleshooting to ensure that any problem within the facility is quickly remedied.

Only those agents who have been approved by MDH, obtained a license from MDH, and have gone through the full EPDM training process shall be permitted to make pesticide applications at the manufacturing facility.

Training: The cultivation manager will train all vegetative agents in EDPM practices and the proper application standards for all crop inputs. All individuals responsible for applying pesticides on the premises shall obtain the appropriate license from MDH prior to making any applications. Initial training shall include at a minimum:

- Sanitary requirements for pest and disease prevention
- Recognizing common pests and disease
- Recognizing symptoms of pests and disease
- Ruling out nutrient deficiencies
- Daily monitoring and spot checks
- Determining the infestation level/action threshold
- Approved areas for pesticide applications
- Controlling outbreaks in the vegetative phase
- Adhering to the agricultural use requirements of the label
- Use of personal protective gear
- Use of application equipment and process
- Procedures for spray applications
- Lighting requirements for spray applications
- Procedures for soil drenches
- Handling/laundering protective wear
- Storage
- Disposal
- Approved products
- MSD Sheets

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date

Flushing	Late flowering		

46. Purpose/Objectives

To accurately describe how to remove any remaining fertilizers used in the cultivation process form the final medical cannabis plant material.

47. Scope

The last two weeks of medical cannabis flower production all plants shall be properly flushed.

48. Background

During the late flowering stage all nutrients shall be leached form the growing medium so each plant will be forced to use all remaining nutrients within its cellular tissue and the final product will be clean.

49. Responsibilities

During the flushing phase, the flowering zone manager will stop giving plants all nutrients and instead seek to purge all remaining nutrients from the substrate by forcing fresh water through the plant's root system.

50. Prerequisites

Filtered aerated water

51. Procedure

Use 2 gallons of filtered aerated water for every gallon of substrate within each zone.

- Determine the plants to be flushed a minimum of 14 days prior to harvest.
- Water each plant at its normal watering schedule with an abundance of fresh water.
- Sufficient run-off should be attained during each flushing session in order to strip away all remaining sugars and salts.

52. References

Operational management and practices plan; Late flowering

American Cannabis Company Inc.

Title	Function	Approved By	Date
Harvesting	Processing		

53. Purpose/Objectives

To accurately describe the harvesting process

54. Scope

All plants are harvested at the end of the flowering process.

55. Background

Harvest, drying, and curing must all be handled with the utmost care to prevent contamination from mold and foreign substances. When a plant is harvested at the manufacturing facility, it is carefully placed in a clean carrying vessel to be moved to the laboratory grade trimming and processing room.

56. Responsibilities

The flowering zone manager will work with the cultivation manager to determine a timeline for each batch within the flowering zone. Once a batch has a confirmed harvest date, the processing manager shall initiate the harvest of that particular batch. The processing manager shall ensure that upon harvest each batch is RFID scanned, weighed, transferred and data recorded. The following process will be used to harvest each plant within a batch:

57. Prerequisites

Harvest sheers, vinyl gloves, large capacity scale, harvest table (stainless steel table with casters)

58. Procedure

Harvesting:

7. Scan RFID for harvest.
8. Cut the plant at the base as close to the soil as possible.
9. Weigh the entire plant and record in the log and data system.
10. Place plant on the stainless steel table.
11. Repeat the process until the table is full.
12. Transfer the product to the processing room and record new location and all other pertinent information.

59. References

Operational management and practices plan.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Flowering Phase	Flowering		

60. Purpose/Objectives

To accurately describe the macro processes for the flowering phase.

61. Scope

All healthy plants that have reached adequate size shall be moved into an area designated for flowering in order to complete the cannabis life cycle.

62. Background

The designated flowering zone is where a batch will be induced into a flowering state by receiving 12 hours of un-interrupted darkness.

63. Responsibilities

The flowering manager shall ensure all lighting is of the highest quality, the environmental controls are perfectly set and working, and each zone remains clean. The flowering manager shall ensure proper plant manicuring and fertilization occur within each flowering zone.

64. Prerequisites

Flowering zones are separated into distinct rooms based on the average length of time plants spend producing flowers. Each room shall be equipped with all necessary tools for flowering.

65. Procedure

6.1 Flowering

- 12 hours of complete darkness
- Trellis
- Pruning
- SCROG
- Flowering nutrient schedule
- Maximum water uptake

a. **Late Flowering**

During the late flowering stage, the flowering zone manager will prepare the plant for harvest via the following processes

- Flushing
- Harvest

66. References

Operational management and practices plan.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Vegetative	Mother plants		

67. Purpose/Objectives

To describe how to take care of a mother plant

68. Scope

All mother plants within the facility

69. Background

A mother plant is a female plant reserved in a continuous vegetative state for the purpose of taking cuttings. The cuttings from the mother plant are grown and flowered to produce the final product.

70. Responsibilities

The vegetative manager shall ensure that healthy mother plants are maintained at all times to ensure healthy clones.

71. Prerequisites

Daily maintenance, nutrient feedings, advanced gardening techniques

72. Procedure

- Mother plants shall be watered with a well-balanced nutrient formula that is high nitrogen.
- The mother plant shall be sufficient in size prior to cloning.
- Super cropping and topping techniques shall be followed to increase the number of cloning sites on each mother plant.
- Avoid taking too many cuttings from a mother plant; leave at least 2/3 for future cloning, and allow at least 1 week between cloning sessions for the mother to recover from stress.

73. References

Operational management and practices plan, SOPs for advance gardening techniques and nutrients

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Propagation	Planting Seedlings		

74. Purpose/Objectives

Describe the process for planting seedlings post germination

75. Scope

Whenever starting a new crop from seeds

76. Background

Medical Cannabis seeds are valuable and rare; therefore, it is important to ensure their success rate

77. Responsibilities

Once a seed has germinated, the vegetative manager will plant the seed in a prepared medium. Seeds should always be planted in small containers to establish a basic root system before being transplanted into larger containers.

78. Prerequisites

Growing medium, clean planting containers

79. Procedure

- Prepare planting medium
- Fill 12 oz. container three-quarters of the way full with medium
- Remove a pinch of medium from the center leaving a hole .25 inches deep
- Water the medium with living water
- Place germinated seed in the small hole and cover lightly with moist medium
- Container is labeled with RFID and location and all pertinent data is recorded into the SIS
- Place planted containers on shelves under T5 lighting
- Check daily for sprouts
- Once the plant is 1 inch tall, add .5 inches of medium
- Repeat additional medium applications up to 2 times, until the plant has a sturdy base
- Water seedlings when they feel dry at the surface
- Transplant when plants require water daily

7. References: Operations management and practices plan; cannabis life cycle, living water

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Propagation	Seed germination		

1. **Purpose/objective**: To describe the process for effectively germinating seeds
2. **Scope**: Seed germination procedures shall be utilized whenever it is necessary to start new plants from seed. i.e. acquiring new genetics, starting fresh genetics, and breeding purposes
3. **Background**: Seeds are an important part of the cultivation cycle. While it is preferred to start from clone and attain exact genetic copies, the only way to access a new phenotype or cannabinoid profile is to begin from seeds. Seeds are a great way to store genetics over long periods of time.
4. **Responsibilities**: The vegetative manager will work with the manufacturing facility manager to determine when and which varieties of seeds to germinate.
5. **Prerequisites**: Distilled water and sterile containers, plates, and paper towels
6. **Procedure:**

Starting From Seed

There are several methods of germinating cannabis seeds. Our process will be as follows:

- Determine variety to germinate
- Prepare the necessary tools for seed germination starting with a clean container that will hold at least 8 oz. of filtered room temperature water

6.1 Soak the seeds in the water for 24 hours. At first, the seeds will float on the surface of the water, but as the seeds begin to germinate, their surfaces will open allowing them to take on water and sink to the bottom. The seeds on the bottom of the container are germinated and can now be planted in an appropriate medium. Log results.

6.2 After soaking, place the seeds between two paper towels and place the paper towels between two plates turned to face each other. Place the plates in the propagation cabinet in propagation portion of the manufacturing facility and wait 24-48 additional hours. The seeds will be visibly germinated at this point and can be transplanted. Log results. Once a seed is germinated, it will be given a unit number, batch number, RFID tracking tag, and will be logged and entered into the SIS so tracking can begin.

Planting seedlings: Once a seed has germinated, the vegetative manager will plant the seed in a prepared medium. Seeds should always be planted in small containers to establish a basic root system before being transplanted into larger containers.

- Prepare planting medium
- Fill 12 oz. container three-quarters of the way full with medium
- Remove a pinch of medium from the center leaving a hole .25 inches deep
- Water the medium with living water
- Place germinated seed in the small hole and cover lightly with moist medium
- Container is labeled with RFID and location and all pertinent data is recorded into the SIS
- Place planted containers on shelves under T5 lighting
- Check daily for sprouts
- Once the plant is 1 inch tall, add .5 inches of medium
- Repeat additional medium applications up to 2 times, until the plant has a sturdy base
- Water seedlings when they feel dry at the surface
- Transplant when plants require water daily

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Growing Medium	MGP Semi Soil		

1. Purpose/Objective:

Putting together a light-growing medium that has the microbial components of organic soil and the aeration component of hydroponic mediums to support multiple nutrient feedings.

2. Scope:

MGP semi soil can be utilized for growing medium in all phases of medical cannabis cultivation, both indoors and greenhouse.

3. Background:

The recommended substrate for cultivating medical cannabis is the MGP Semi-soil. MGP semi soil combines all three properties of perfect media and results in an easy to use substrate that maximizes a plant's growing potential while mitigating the risks often associated with both

hydroponic and soil gardening. Each zone manager shall prepare and utilize MGP semi soil for cultivating cannabis within their respective zone prior to transplanting plants at all stages of life except cloning.

4. Responsible party:

The cultivation staff shall perform all soil mixing duties

5. Prerequisites:

Tools: Mixing tub (large kiddie pool, thick tarp, wheelbarrow, or soil mixer), flat nosed mixing shovel

Ingredients: Fox Farm Ocean Forrest Soil, Fox Farm Big and Chunky Perlite, Plagron Coco Coir, humus soil, worm castings. (All brands can be exchanged for other high quality brands that meet the above listed requirements for cannabis growing media).

Ratios: 25% soil, 25% coco coir, 7.5% humus soil, 7.5% worm castings, 35% chunky perlite

6. Procedure:

- Prepare the correct ratios of semi soil components in cubic feet
- Starting with perlite, measure and place in mixing area.
- Measure and add coco coir.
- Measure and add humus and worm castings.
- Measure and add soil.
- Mix all ingredients with shovel or soil mixer until evenly mixed.

7. References: Operational management and practices plan.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Propagation	Sexing Cannabis		

80. Purpose/Objectives

To describe the process for determining the sex of cannabis plants

81. Scope

Anytime plants are started from seed their sex must be identified as quickly as possible to prevent pollen from releasing.

82. Background

Determining sex in the cannabis plant: Cannabis is a dioecious plant species meaning its flowers are either male or female. It is important to note that even if a plant has shown white pistols coming from its branches, it could still be hermaphroditic especially if the seed origins were of a feminized variety. If a plant is determined to be male, it is either returned to vegetative for future breeding or destroyed or disposed of in a manner consistent with waste disposal procedures, and logged accordingly.

Male cannabis plant: Male plants will grow distinct ball-like sacs. Once they open, a fine powder is released (pollen) that is dispersed throughout the room on the slightest breeze. The zone manager will take the most care to eliminate contamination risk when removing and destroying male plants.

Female cannabis plant:

Hermaphrodite cannabis plant:

83. Responsibilities

The zone manager responsible for the flowering of genetics from seed shall monitor flowering plants daily for signs of being male.

84. Prerequisites

Daily visual inspections

85. Procedure

Instructions for Sexing a Cannabis Plant: All cannabis started from seed will be flowered in a separate and distinct section of the manufacturing facility where pollen is not able to travel into other flowering sections of the facility and potentially contaminate other batches of cannabis. The designated flowering zone manager will oversee the flowering of all plants from seed within their designated batch.

- Plants will be monitored daily for sign of being male.
- Once a plant has been determined to be male, it will be removed from the flowering room and destroyed. If the plant is determined to be good for breeding, it may be cloned prior to being destroyed.
- Remove a male by placing a plastic trash bag over the entire plant and secure the bag tightly at the bottom of the stem by the base of the plant. Cut at the base and follow green waste procedures.
- Remove male plant from plant inventory.
- Dispose of the plant following green waste procedures.
- Continue to monitor remaining plants, even females, for signs of being male or hermaphroditic.
- All hermaphroditic plants should be treated just as males and disposed of in the same manner.

86. References

Operational management and practices plan

Objective:

Preparation and application of Synthetic Nutrients

Scope:

Whenever synthetic nutrients are used the appropriate member of the cultivation facility staff must first measure and mix all parts into "living Water" in preparation for application.

Prerequisites:

Read all pertinent information provided from the nutrient line manufacturer. Living water must be prepared 24 hours in advance through proper filtering and aeration.

Responsibilities:

Cultivation facility manager is responsible for training staff, determining nutrient formulas, and scheduling watering intervals. The cultivation staff will prepare water, follow nutrient schedule, mix and apply nutrients.

Procedure: The appropriate cultivation staff member will prepare nutrient mixture by mixing nutrients into the water reservoir in appropriate area of the cultivation facility and then apply.

i) Cultivation staff prepares "living water" 24 hours in advance of mixing nutrients.
ii) 1 hour before application, staff member preps for nutrient mixing
iii) Measuring cups must be well cleaned
iv) Determine amount of water to be used.
v) Place nutrient mixing pump into water or attain appropriate stirring device (must be long enough to reach deep into water reservoir.)

vi) Check nutrient calendar and formula to be used.
vii) **Safety:** Put on rubber gloves before handling synthetic nutrients; Properly wash any exposed skin.
viii) Add nutrients 1 at a time, never mix nutrients directly together
  (a) Measure and add part A first and mix thoroughly into solution with pump or by stirring clockwise and then counter clockwise for several minutes.
  (b) Add B and mix
  (c) Check PH and adjust to 5.8 for hydro and 6-6.5 for soil and hybrid
  (d) Add remaining parts of formula one at a time and mix thoroughly.
ix) Once nutrients are mixed thoroughly they can be applied to crops and/or left ready to be applied via automated system.

Contingencies: If living water is not available, make sure the water has been filtered/ properly de-chlorinated and submit information to the cultivation facility manager.

Resources: preparing "living water"; Hand watering; Automated watering systems

Definitions: Living water- water that has been changed at a molecular level through agitation and aeration thus allowing for more nutrient absorption.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Organic nutrients	Spikes		

87. Purpose/Objectives

To accurately describe how to utilize spikes through out the growing medium

88. Scope

Organic growing mediums can contain spikes as additional nutrients sources later in the cultivation cycle

89. Background

Spikes are small compact nutrient zones into which roots can grow and use additional nutrients as needed by the plant. Flavor bombs are pre-made spikes and are a good way to prevent deficiencies and provide maximum growth, quality, terpenes profile and consistency.

90. Responsibilities

The vegetative team members transplanting cannabis into pre-flowering will add spikes as advised from the cultivation manager.

91. Prerequisites

All transplant materials, pre-made spikes

92. Procedure

Adding spikes: Add spikes when transplanting into final container for flowering phase.

- Determine the appropriate amount for container size (1 spike (flavor bomb) per gallon)
- Place spikes evenly throughout the planting medium
- Water in as plant needs

7. References: Operations management and practices plan; Organic sections

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Organic Nutrients	Top Packs		

93. Purpose/Objectives:

To accurately describe how to apply top packs

94. Scope

Top Packs shall be applied during the flowering phase to increase the nutrient profile in the growing medium

95. Background

Mitigating plant deficiencies and increasing production capacity can be done organically through the use of top packs. Super soils with organic nutrients built in will only maintain maximum plant growth until the plant has used up the nutrients. Top packs can be applied half way through the flowering cycle to ensure the plant has all nutrient needs met and produces the highest quality end product.

96. Responsibilities

Each flowering staff member working in organic growing areas shall apply top packs in the flowering phase of cultivation

97. Prerequisites

Bat and sea bird guanos, measuring cup

98. Procedure

Applying top packs:

- Determine appropriate amount for container size (¼ cup per gallon of substrate)
- Mix three guanos together to equal appropriate measurement
- Apply to the top of the soil mixture
- Water with living water

7. References: Operational management and practices plan

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Inventory	Tracking Plants		

1. Purpose/Objective: To tag and track all plants within the cultivation process.

2. Scope: Each plant shall be tracked by its physical grid location in the premises at all times. All significant dates and observations will be recorded as key data points in the SIS for referencing needs throughout the plant's life cycle. This information can be used to recall any contaminated medium, nutrient, or issue that may occur during the stages listed above and allows for easy removal from production or inventory of any product that does not meet the requirements of the state.

3. Background: All cannabis tracking shall begin when a seed or part of the parent plant is removed and a propagating plant or clone is created. At this point, a unique plant RFID identification number shall be assigned, labeled, and recorded by the vegetative zone manager which then will be used to track the history and data through propagation, vegetation, flower, harvest, processing, cure and final packaged inventory.

4. Responsible party: The manufacturing facility compliance manager is responsible for coordinating with the cultivation manager and the processing manager to ensure every plant and any amount of cannabis product is tracked throughout the plant and product life cycle within the manufacturing facility.

5. Prerequisites: SIS system/ BIOTRACK system, Scanning gun, Tags, Logbook

6. Procedure:

The following will represent data collection and product lockdown points within the facility in a seed to sale time line. At each point in a plants life cycle, it shall be inventoried and all data recorded and stored for 5 years.

- **Sprouted seed and clones:** Receive RFID number and tag, tracking begins
- **Transfer to V2**: RFID scanned, location changed, data recorded and transferred
- **Transfer to V3**: RFID scanned, location changed, data recorded and transferred
- **Transfer to designated flower zone**: RFID scanned, location changed, data recorded and transferred
- **Harvest**: RFID scanned, weight recorded, location changed, data recorded and transferred
- **Trimmed**: RFID scanned, weight recorded, location changed, data recorded and transferred
- **Drying**: RFID scanned, weight recorded, location changed, data recorded and transferred
- **Curing pre-testing**: Secured/lockdown for testing results, RFID scanned, weight recorded, location changed, and data recorded and transferred
- **Curing post-testing:** If approved for release, RFID scanned, weight recorded, location changed, data recorded and transferred
- **Processing**: Labeled, RFID scanned, weight recorded, location changed, data recorded and transferred to secured safe to await delivery to store location
- **Delivery**: RFID scanned, weight recorded, location changed, data recorded and transferred to transport vehicle

References: Operational management and practices plan, inventory.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Transplanting Clones	Planting		

99. Purpose/Objectives

To accurately describe the process for transplanting clones

100. Scope

All clones with adequate root mass shall be transplanted following this procedure

101. Background

Once a clone is fully rooted, it is ready to be transplanted and moved into the V2 zone of the manufacturing facility.

102. Responsibilities

The vegetative manager will ensure all clones are transplanted, labeled, tagged with RFID and that each transfer is logged and tracked in the SIS. He/she will prepare all materials needed for transplanting and perform transplanting procedures

103. Prerequisites

Small containers, Pre-mixed semi soil, shovel, Nutrient Solution

104. Procedure

6.1 Transplanting Clones

The following procedures shall be followed whenever transplanting:

- Collect materials for transplanting clones: Half-gallon to two-gallon pots (size to be determined by manufacturing facility manager), MGP semi-soil or TLO soil, small shovel, vinyl work gloves, great white shark or similar mycorrhizae product.
- Ensure entire working area is clean.
- Determine the number of clones to be transplanted.
- Fill clean pots half way with planting medium.
- Sprinkle .25 tsp. of GWS onto surface of planting medium, lightly stir with fingers.
- Gently place the clone into the pot, and cover the root zone and the bottom of the stem with additional soil. The stem could be covered .5 to 1.5 inches and there should be at least one inch of space remaining between the top of the soil and the top of the planting container. Do not pack the substrate; soil should be light and fluffy for the fastest root growth.
- Ensure each plant is tagged with RFID tracking, labeled and logged into SIS, and the data recorded.

Healthy roots prior to transplanting:

6.2 Watering Transplants

Post transplanting, plants require special attention in watering to ensure proper root development. The vegetative manager shall ensure all new transplants are given water and nutrients by the following process:

- Prepare vegetative nutrient solution.
- Water plant's current root zone.
- Wait until nearly dry, water entire container.
- Wait until nearly dry, add GWS to nutrient solution, water entire container.

105. References

Operational management practices plan

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Transplanting	Vegetative		

106. Purpose/Objectives

To accurately describe the transplanting process.

107. Scope

As plants mature in the small vegetative phase they shall be transplanted into their final container for the pre-flowering and flowering stages of cultivation.

108. Background

Timeliness and consistency throughout the vegetative process will allow for accurate planning throughout the manufacturing facility and enable patient needs to be met. The vegetative manager is responsible for preparing the plants for all future flowering zones. Each plant should reach its pre-determined full size prior to being transferred into its designated flowering zone. The vegetative manager must have full awareness of the timeliness and demands set forth by the flowering schedule and plan accordingly.

109. Responsibilities

Once the root zone has matured, a plant is ready to be transplanted into a larger container. A plant can only flourish while its root zone is healthy and growing. The vegetative manager will transplant into the final phase container a minimum of two weeks prior to flowering.

110. Prerequisites

Containers, substrate TLO or MGP semi soil small shovel

111. Procedure

6.1 Container Size

The vegetative manager will utilize 20-30 gallons of substrate per light for final phase growth in order to achieve MGP.

Choosing container size:

- Determine how many plants will be grown under each light in the flowering zone. Plant numbers are based on a plant growth speed; i.e. if a cannabis strain grows very slowly, the number of plants must be increased to meet the timeline of the manufacturing facility. Indicas typically grow slower so it is assumed there may be smaller plants per light, whereas sativa plants grow quicker so there may be fewer larger plants per light.
- Once the number of plants per light is determined, calculate the amount of substrate and container size:
    - 7-9 plants: 3 gallon
    - 6 plants: 4 gallon
    - 5 plants: 5 gallon
    - 3-4 plants: 7 gallon

a. **Transplanting process**

The vegetative manager will oversee the transplanting process as follows:

- Thoroughly clean the transplanting area and any containers that are not new.
- Move the batch of plants to be transplanted into the transplant area.
- Fill several containers half way with substrate.
- Sprinkle mycorrhizae onto surface of substrate and mix with fingers.
- Place the stem of the plant between your fingers and turn the plant upside down.
- If the plant does not slip out of the container with ease, gently squeeze the sides of the container.
- Once the plant slips out, place your fingers under the root ball in the center and gently spread the roots.
- Place the plant in the large container.
- Using the small shovel, cover the small plant until the stem is covered a minimum of 1 inch by substrate. There should be 1.5-2 inches of space left at the top of the pot.
- Hand water with vegetative nutrient solution.
- Scan RFID tag and move into the V3 zone designated for the batch. Record data.

112. References

Operations management and practices plan, Vegetative phase

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Trimming	Processing		

113. Purpose/Objectives

To accurately describe the post harvest trimming process

114. Scope

All plants shall be trimmed and prepared to dry post harvest

115. Background

Immediately after harvest all products from a selected batch are processed for drying. Prior to being trimmed and cured, the processing team will segregate all harvested cannabis flower into their designated pre-determined homogenized batches.

All segregated batches will be maintained in a secure, climate-controlled location suitable for the prevention of product contamination or efficacy loss. Each batch will be clearly labeled and tagged with RFID and its exact location will be clearly defined and tracked at all times.

116. Responsibilities

The processing manager will ensure all trimming procedures are followed each batch remains segregated to avoid cross contamination and in order to maintain strict inventory control.

117. Prerequisites

Sharp/clean spring loaded scissors, vinyl gloves, stainless steel working tables, rubbing alcohol, hanging rack, hangers, etc.

118. Procedure

Processing/Trimming

The processing manager shall follow the following process for trimming all cannabis:

- Designate staff members that will trim the given batch.
- Cut the plant into individual stems no longer than 1.5 ft.
- Remove all fan leaves and place in fan leaf drying oven.
- Remove sugar trim with sharp/clean scissors, and place all sugar trim in the proper sugar trim drying section to be prepared for the extraction process. Place the stem between two fingers and slowly spin each flower toward the scissors to remove fan leaf.
- Hang each trimmed stem from a hanger.
- Once the batch is trimmed, move each hanger into the designated drying room for the particular batch. Scan RFID and record data. Record weights of all components after trimming and prior to drying.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Vegetative phase	Vegetative		

119. Purpose/Objectives

To accurately describe the vegetative process

120. Scope

After transplanting clones or seeds until plant are moved into final flowering

121. Background

The vegetative phase is incredibly important for the final outcome of the plant. During this phase, plants must create healthy root zones, a strong healthy stem, and a robust branching system. This supportive plant architecture will allow the plant to reach MGP producing large beautiful flowers.

122. Responsibilities

Timeliness and consistency throughout the vegetative process will allow for accurate planning throughout the manufacturing facility and enable patient needs to be met. The vegetative manager is responsible for preparing the plants for all future flowering zones. Each plant should reach its pre-determined full size prior to being transferred into its designated flowering zone. The vegetative manager must have full awareness of the timeliness and demands set forth by the flowering schedule and plan accordingly.

123. Prerequisites

Well-built and maintained cultivation facility, nutrients, watering equipment, scissors,

124. Procedure

6.1 Early Vegetative (V2): During the early vegetative phase, the main focus is establishing an inner root ball within a smaller container and pruning the plant to achieve a robust branching system.

All plants in V2 will be in one-gallon containers for a three to four week period. Lighting in the V2 stage will consist of t5s, 315 ceramics, 600-watt metal halides with blue spectrum, or induction lighting.

All plants will be tracked by scanning RFID tags and documented into the SIS upon being transferred from V2 to V3. Data will be recorded.

6.2 Late Vegetative/Pre-flowering (V3): As the cannabis plant grows in size, the root zone will need to expand. When seeking to achieve MGP, the substrate demands increase to allow for larger more robust root zones. The vegetative manager shall ensure pre-flowering vegetative plants are transplanted so that there will be 25-30 gallons of substrate per flowering light. During the pre-flowering stage, plants are transplanted into the final container size to allow for larger growth. Conditions in pre-flowering need to mimic flowering conditions so plants can be prepared to produce large healthy flowers in their final phase of growth.

7. References

Operational management and practices plan.

Standard Operating Procedures

American Cannabis Company Inc.

Title	Function	Approved By	Date
Propagation	Watering Clones		

125. Purpose/Objectives

To accurately describe how to water clones

126. Scope

All clones prior to transplant into a growing medium

127. Background

10-14 days after cuttings have been taken, the root system should be established enough to allow the uptake of nutrients.

128. Responsibilities

The cloning manager shall ensure proper care is taken to ensure healthy root and plants for transplanting.

129. Prerequisites

Light nutrient formula, Beneficial micro-organisms

130. Procedure

- When cloning medium begins to dry out, the first watering shall consist of beneficial microbes. Mix microbial mixture (Rhysotonic, or great white shark) into living water. Lightly water clones each time the growing medium achieves a 50% moisture level. Aeraponic clones shall have Rhysotonic added to the reservoir after visible roots appear. When the substrate begins to show a second sign of dryness, apply a light vegetative nutrient at 25-50% strength.

131. References

Operational management and practices plan

C2c. Attachment: Management and Operations Plan

BioTrackTHC
The Only Seed To Sale Solution

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800.797.4711

September 9,2014

Minnesota Medical Solutions, LLC

5200 Willson Road, Suite 150

Edina, Minnesota 55424

Reference: BioTrackTHC™ Support Document

Dear Minnesota Medical Solutions,

BioTrackTHC™ provides effective cutting-edge technology solutions for the emerging legal marijuana industry that (1) prevents product theft; (2) assists business owners with running their cultivating, packaging, and retail operations more profitably and to better comply with the law; (3) all without leaving sensitive business and consumer data vulnerable in the cloud. Specifically, BioTrackTHC™ is the industry's only true seed-to-sale software system with enterprise resource planning, complete inventory tracking, point-of-sale, marketing, financial reporting and regulatory compliance features. And because it is a server based system with advanced security features, customers can rest assured that no one, not even the BioTrackTHC™ team can access their business or consumer information without their permission. This document confirms BioTrackTHC™'s intentions to enter into a formal agreement with Minnesota Medical Solutions to provide software solutions guaranteed to meet published Minnesota Dept of Health - Office of Medical Cannabis reporting, regulation, and compliance guidelines for medical marijuana producer facilities in the event that you obtain an authorized license. We appreciate your consideration of BioTrackTHC™ and look forward to assisting you in your efforts to secure a license. BioTrackTHC™ is eager to enter into a software solution agreement with you upon your secured license

Yours truly,

Patrick Vo

Chief Operating Officer

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Company Profile

BioTrackTHC™ was formed in 2007 with the goal of developing software solutions that advance public safety in the medical industry by preventing prescription drug fraud and drug diversion. To that end, BioTrackTHC™ created biometric based technologies that provide transparent patient access to treatment and medication. The development of biometric medical software technologies led to securing two U.S. technology patents (US 8,086,720 & US 8,335,697) and a Canadian patent (CA 2,715,969). Further BioTrackTHC™ software has undergone the rigorous SAS 70 internal controls technology audit. Our hands on experience in the industry have led to our consulting and developing systems for the Drug Enforcement Agency (DEA) and the High Intensity Drug Trafficking Area (HIDTA) Program.

Most recently, BioTrackTHC ™ was contracted by the State of Washington for the first legal marijuana state monitoring and inventory tracking system in the United States. Development and implementation for the State of Washington traceability system was completed ahead of schedule. From our experience and understanding of governmental regulations, in 2010 we went on to shift our focus and create and develop the premier commercial seed-to-sale tracking software solution tailored specifically to meet the unique needs of a government regulated industry BioTrackTHC™ was developed specifically for marijuana tracking and is the only seed-to-sale software vetted by a government agency. BioTrackTHC™ is both robust, secure, and feature rich enough to be the complete solution for cultivators, processors, and retailers in over 900 locations in 14 states, the District of Columbia, and Canada. For over four years we have expanded our footing in the industry by continuing to support governmental agencies by adapting and providing software enhancements that guarantee state specific compliance of BioTrackTHC™ clients. Our software allows users to easily remain transparent and accountable by maintaining accurate real-time data and sound reporting through an unbreakable audit chain that can easily track the full lifecycle of legal marijuana from production, testing, transportation, destruction, and sale. To date over 100 million grams of marijuana have been traced from seed-to-sale through BioTrackTHC™ applications.

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Collaborative Clinical Research Alliance Program with Minnesota Medical Solutions

BioTrackTHC™ and Minnesota Medical Solutions have formed a Collaborative Clinical Development Alliance to help facilitate an easy web patient interface for collecting actionable follow up data related to the ever-evolving cannabis industry. BioTrackTHC™ has created iKush.com, the first real-time direct to patient web portal for easily locating cannabis dispensing facilities with accurate inventory levels. After a patient is associated and validated by the respective dispensing facility, iKush allows the patient a simplified way to research and pre-order medical cannabis. BioTrackTHC™ will work closely with Minnesota Medical Solutions to brand a unified iKush-Minnesota platform, the first of its kind. With input from Minnesota Medical Solutions, BioTrackTHC™ will develop a tailored medical marijuana patient portal exclusive to Minnesota Medical Solutions patients.

Each patient will have their own secure personalized Portal dashboard upon logging into the website. Patients will be associated with a specific dispensary and must be authorized by the dispensary in order to participate. The dashboard will display patient history, registration forms, an online refill request capability, and easy to use patient feedback and research information collection forms. These collection forms will create the foundation for unheralded insight into the long term effects of medicinal cannabis. Our intentions are to continue to evolve and grow with Minnesota Medical Solutions while continuing to lead the industry. The required data collection points will produce actionable intelligence creating the first real time patient management platform for the cannabis industry. BioTrackTHC™ is fully HIPAA compliant and has undergone strict SAS 70 DEA certification. Our commitment to excellence, transparency, and accountability are part of our core fundamental infrastructure.

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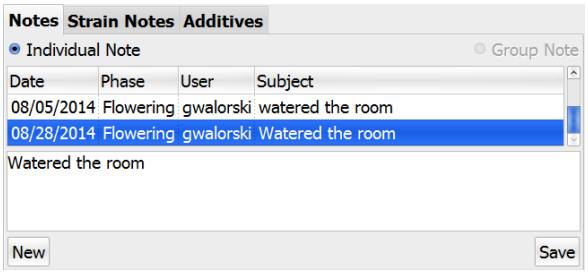
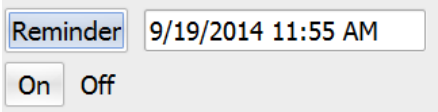
2. Cultivation -

2. d. Describe the documentation of a plant or batches of plants through the growing process to allow for product traceability to support product recalls or notifications in the event an issue is found with a plant or batches of plants.

Prior to the inception of a plant within the system, the user will setup strain specific information including, but not limited to strain names, strain types, strain notes and plant groups. Upon propagation, BioTrackTHC™ automatically assigns a globally unique non-repeatable 16-digit barcode number to every plant. This barcode follows the plant through its entire product life cycle. The system will also track the precise location of every given plant within a designated room, bed or plant table using an 'abc, 123' grid base. Throughout the production process, the licensed producer may enter production notes into the plant-specific inventory record (i.e. events or any required notations that do not currently have pre-defined fields within the system). Upon harvest the system will batch designated plants together and assign a unique barcode to the collection, although the plants are grouped together during the harvest the individual plant barcodes are associated and cataloged within the batch inventory details. All flower, waste, sugar leaf, and other material will be collected, measured and associated appropriately. These weights are also entered using vertically integrated scales to diminish the possibility of human error or manual manipulation. The system can also record both the wet and dry weights of flower material to track moisture loss percentages. The product can be notated and sampled at this juncture for testing purposes. Once testing results are retrieved, they can be directly associated with the product batches. Even after product has been converted into pre-packaged containers or other forms (i.e. oils or edibles) the barcodes for all prior forms or stages will be readily available for continuous uninterrupted traceability. The reporting functionality enables licensed establishments to retrieve real-time data

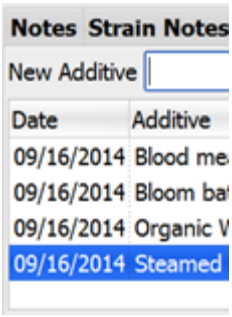


pertaining to all current and historical inventories for any specified time frame. BioTrackTHC™ does not delete data or plant records. All data is preserved for regulatory review and taxation purposes on an indefinite basis. In the event of a recall, specified users can quickly pull reports of all products and transactions associated with a specific plant(s), batch or strain. All recalled products should be safely destroyed and logged in the BioTrackTHC™ system.



2.g. Describe the documentation and record keeping of the use of any chemicals.

BioTrackTHC™ can record a digital blueprint of the plant life cycle using an additive tracking feature built into its plant management module. All nutrients, fertilizers, or chemical additives can be entered into the system. Once entered, the additives can even be barcoded for ease of application and seamless recording. Application of additives can be logged individually, by plant groups or even entire rooms, and all records will be maintained on a plant by plant basis. If necessary the additive information can be directly ported and easily applied to the final inventory labels. It is the responsibility of the cultivator to ensure new additives are approved for use based on regulations prior to use. This feature paired with the system's robust reporting capabilities create complete transparency for cultivators, patients and regulatory authorities alike.



2.m. Describe the planned method for disposal of cultivation waste including the growing medium, excess fertilizers and pesticides and plant matter that becomes unusable due to fungal or pest infestations.

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The BioTrackTHC™ system has a number of removal and disposal tracking mechanisms making waste tracking compliance simple and efficient. Waste is generally collected just prior to, during and after the plants are harvested. However, the waste collection tools can be used at any interval during production. The collected byproducts or other materials can be separated, weighed and accounted for individually.

Waste

Location	Room	Inventory type	User	Date	Quantity
"Grow"House	Drying Room	Stems	gwalorski	06/11/2014 02:18 PM	500.00
"Grow"House	Flowering	Trim	gwalorski	06/11/2014 02:19 PM	250.00
"Grow"House	Drying Room	Stems	gwalorski	06/13/2014 12:01 PM	400.00
"Grow"House	Flowering	Vegetation Trim	gwalorski	06/13/2014 12:02 PM	1000.00
"Grow"House	Drying Room	Sugar Leaf	gwalorski	06/13/2014 01:28 PM	400.00
"Grow"House	Drying Room	Stems	gwalorski	06/13/2014 01:29 PM	400.00
"Grow"House	Flowering	Trim	gwalorski	06/13/2014 01:30 PM	1000.00
"Grow"House	Drying Room	Sugar Leaf	gwalorski	06/19/2014 02:52 PM	700.00
"Grow"House	Drying Room	Stems	gwalorski	06/19/2014 02:54 PM	700.00
"Grow"House	Flowering	Trim	gwalorski	06/19/2014 02:55 PM	400.00

Inventory Adjustments

Location	Product	Barcode	Old qty	New qty
(Quarantine)	Jack Herrer	9178 1766 3400 0879	8000.00	7998.00
"Grow" Dispensary	AK-47	0785 1262 5028 8317	1049	1051
"Grow"House (Processing and Packaging)	Acapulco Gold	4812 3783 1809 8361	3200.00	3198.00
"Grow"House (quality control)	AK-47	3665 9890 3043 3619	3200.00	3198.00
Combination (Quarantine)	AK-47	8447 4914 1682 2905	10000.00	9998.00
"Grow" Dispensary	Bananna Kush	2233 3688 9354 8929	50	48
"Grow"House	Acapulco Gold	2386 3985 5850 6419	2800.00	2798
"Grow"House	Acapulco Gold	9469 7835 0839 7806	2000.00	1998
"Grow" Dispensary (Quality Control)	Acapulco Gold	2621 2624 5246 2027	2150.00	2148.00

Inventory Adjustments

Old qty	New qty	Difference	Percent	Date	User	Reason
8000.00	7998.00	-2.00	-0.02	04/22/2014 01:14 PM	gwalorski	Got Product Tested
1049	1051	2.00	0.19	04/23/2014 07:09 PM	gwalorski	Customer only wanted
3200.00	3198.00	-2.00	-0.06	04/24/2014 02:39 PM	gwalorski	Got product tested
3200.00	3198.00	-2.00	-0.06	04/25/2014 12:22 PM	gwalorski	Got product tested
10000.00	9998.00	-2.00	-0.02	04/25/2014 05:11 PM	gwalorski	Got product tested
50	48	-2.00	-4.00	04/29/2014 09:15 AM	gwalorski	Got product tested
2800.00	2798	-2.00	-0.07	05/12/2014 11:02 AM	gwalorski	Got Product tested
2000.00	1998	-2.00	-0.10	05/12/2014 03:20 PM	gwalorski	Got product tested
2150.00	2148.00	-2.00	-0.09	05/16/2014 10:15 AM	gwalorski	Got products tested

When a plant or plant product is selected for removal or quantity adjustment within the system there are mandatory protocols in place. This includes but is not limited to complete event and employee accountability logging. The system will prompt the employee to justify the reasons for removal or adjustment. In addition to the event itself being fully logged, the employee can notate any required witnesses to the aforementioned event. Directly after submission of the destruction or adjustment information, the employee will be prompted to electronically sign-off on the event using either a unique employee PIN or a biometric fingerprint scan. Plant removal, waste collections, and any adjustments made to either plants or finished plant materials can easily be seen and verified through the reporting module.

system's real-time

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3. Refining

3.c.vi Packaging and labeling process, including type of container, label used and information contained on the label. Describe the types of child safety packaging you will use for each product sold.

BioTrackTHC™'s label creation tool enables licensed establishments to create unified container-product-client labels. Label contents may include, but are not limited to, strain, product, quantity, dosage instructions, any and all testing results, packaging and use-by dates, unique batch numbers, facility identification and logos, dispensing agents, cautions, disclaimers, additional package contents, patient specific and registry information. Custom fields and additional static content can be easily added in moments.

The system-generated labels can be printed on acrylic adhesive allowing the licensed producer to affix them to the child proof and elderly exempt packaging of their choosing in order to also comply with the United States Poison Prevention Packing Act.

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3.C.ii. Calculation of yield process

BioTrackTHC™ has extensive processes in place to calculate and record accurate and appropriate yield information. Examples of the system's yield reporting capabilities are not limited to, but do include, the *Mother Yields* report, *Harvest Yields* report and even a *Yields Forecast* report. The *Mother Yields* feature will track the progress of designated mother plants, including the minimum, mean and maximum yields as well as the number of successful clones propagated from each specimen. This provides insight into exactly which plants are giving the best yield to ensure that only the strongest strain line remain in the inventory for optimal production.

The *Harvest Yield* report will display the harvest and cure dates associated with a specific batch harvest, the products, byproducts and associated waste collections. The flower weights are measured at two intervals, during the initial harvest and again once the product has dried out. This is done to calculate moisture loss percentages on a harvest by harvest basis. Accuracy and legitimacy can be assured, as the weights from the flower and all associated byproducts are submitted to the system directly through the scales themselves. If an employee attempts to divert the systems vertical integration and enter the weights manually, the system will log and report that information. In addition, the system has an inventory Yield Forecast module that can predict

Yields

Barcode	Birthdate	Harvest Date	Cure Date	Strain
1231 7563 3161 1277	09/12/2014 03:05 PM	09/12/2014 03:05 PM	09/12/2014 03:06 PM	Acapulco Gold
8220 4885 0223 8926	08/05/2014 10:43 AM	08/28/2014 11:22 AM	08/28/2014 11:23 AM	Acapulco Gold
9986 9683 0615 4213	08/05/2014 10:43 AM	08/28/2014 11:22 AM	08/28/2014 11:23 AM	Acapulco Gold
8160 7814 8422 0678	08/05/2014 08:52 AM	08/28/2014 11:22 AM	08/28/2014 11:23 AM	Acapulco Gold
7609 4713 7568 4560	08/05/2014 08:52 AM	08/28/2014 11:22 AM	08/28/2014 11:23 AM	Acapulco Gold
8372 5439 9175 2106	08/05/2014 08:52 AM	08/28/2014 11:22 AM	08/28/2014 11:23 AM	Acapulco Gold
9461 6424 7261 6376	08/05/2014 10:43 AM	08/28/2014 11:22 AM	08/28/2014 11:23 AM	Acapulco Gold
9667 7551 8939 9815	08/05/2014 08:52 AM	08/28/2014 11:22 AM	08/28/2014 11:23 AM	Acapulco Gold
7477 5324 1237 7376	08/05/2014 10:43 AM	08/28/2014 11:22 AM	08/28/2014 11:23 AM	Acapulco Gold
7773 4064 4297 9454	08/05/2014 08:52 AM	08/28/2014 11:22 AM	08/28/2014 11:23 AM	Acapulco Gold

Yields

Wet Weight	Bud Weight	Total % Loss	Avg % Loss	Trim	Stems	Destination	Flower Room
1000.00	500.00	50.00	39.37	0.00	0.00	"Grow" Dispensary	Flowering 1 (A1)
1000.00	500.00	50.00	39.37	166.67	166.67	"Grow" Dispensary	Flowering (T10)
1000.00	500.00	50.00	39.37	166.67	166.67	"Grow" Dispensary	Flowering (I10)
1000.00	500.00	50.00	39.37	166.67	166.67	"Grow" Dispensary	Flowering (F10)
1000.00	500.00	50.00	39.37	166.67	166.67	"Grow" Dispensary	Flowering (E10)
1000.00	500.00	50.00	39.37	166.67	166.67	"Grow" Dispensary	Flowering (H10)
1000.00	500.00	50.00	39.37	166.67	166.67	"Grow" Dispensary	Flowering (R10)
1000.00	500.00	50.00	39.37	166.67	166.67	"Grow" Dispensary	Flowering (G10)
1000.00	500.00	50.00	39.37	166.67	166.67	"Grow" Dispensary	Flowering (L10)
1000.00	500.00	50.00	39.37	166.67	166.67	"Grow" Dispensary	Flowering (P10)

future quantities as well. This occurs when the system uses the time-stamps such as date ranges and strain-specific yield information from prior harvests in conjunction with current strain-specific plant inventory counts and current cycle progression by phase. The predictions can go out as far as the expected harvest dates. They cannot be guaranteed due to the plethora of existing variables involved. However, they will gain accuracy with each passing harvest as the information is only pulled from the local cultivator and no outside averages will be used in the algorithm.

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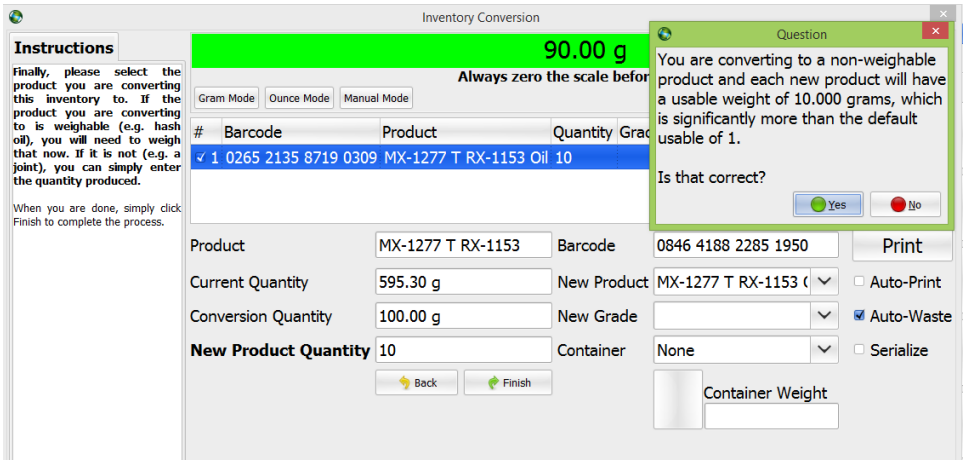
3.ixc. A detailed description of protocol and computer systems used for turning the raw plant into acceptable medical cannabis, including: ix. Record keeping process

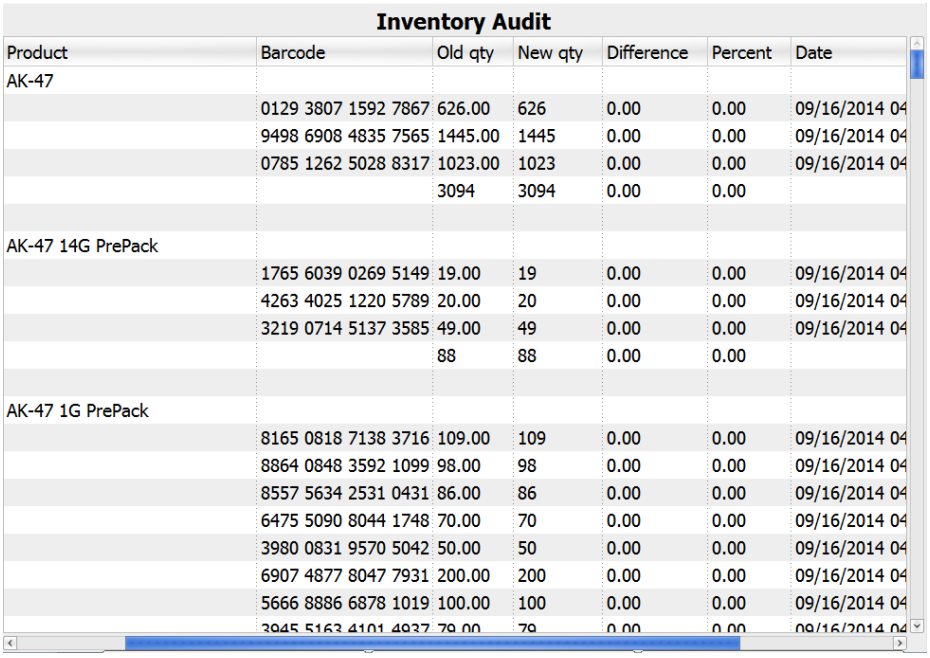
BioTrackTHC™'s industry leading software was designed specifically for the medical cannabis industry. Every transaction is tracked via employee PIN or biometric fingerprint ensuring complete visibility and chain of custody. Every gram is tracked from seed to sale recording the entire plant life cycle and who interacted with it at each step. The tracking continues through plant harvest and processing recording each part of the plant, be it flowers or byproducts to be broken down into extracts or oils. All transactions are archived for future reference ensuring complete security, traceability, and accountability.

While BioTrackTHC™ does not handle the physical processing of the plant material; it does track the plant, and plant material, through the process via the 16 digit non-repeatable barcode. Throughout processing, the system creates new 16 digit barcodes recording the transaction and linking to the previous code. This protocol is repeated at each processing transaction creating an unbroken record of the entire product cycle, from *seed to sale*. Processes, employees, and time stamps are recorded to the 16 digit identifier creating a detailed account of all plant interactions.



Finalized end products and intermediate conversion products can be created though the system's inventory control module. These can be anything from, but not limited to, infused raw oils, edibles, concentrates or prepackaged flower. In addition to entering the product, the

predetermined amounts of marijuana product within each individual item can be selected. Once entered into the system they will be available in a drop down of eligible conversions within the module itself. During the conversion the system will track the end quantities of the new product, associated waste, and even warn the employee if the suspected infusion quantity is below or exceeds the preselected amounts.



Inventory Audit

Product	Barcode	Old qty	New qty	Difference	Percent	Date
AK-47						
	0129 3807 1592 7867	626.00	626	0.00	0.00	09/16/2014 04
	9498 6908 4835 7565	1445.00	1445	0.00	0.00	09/16/2014 04
	0785 1262 5028 8317	1023.00	1023	0.00	0.00	09/16/2014 04
		3094	3094	0.00	0.00	
AK-47 14G PrePack						
	1765 6039 0269 5149	19.00	19	0.00	0.00	09/16/2014 04
	4263 4025 1220 5789	20.00	20	0.00	0.00	09/16/2014 04
	3219 0714 5137 3585	49.00	49	0.00	0.00	09/16/2014 04
		88	88	0.00	0.00	
AK-47 1G PrePack						
	8165 0818 7138 3716	109.00	109	0.00	0.00	09/16/2014 04
	8864 0848 3592 1099	98.00	98	0.00	0.00	09/16/2014 04
	8557 5634 2531 0431	86.00	86	0.00	0.00	09/16/2014 04
	6475 5090 8044 1748	70.00	70	0.00	0.00	09/16/2014 04
	3980 0831 9570 5042	50.00	50	0.00	0.00	09/16/2014 04
	6907 4877 8047 7931	200.00	200	0.00	0.00	09/16/2014 04
	5666 8886 6878 1019	100.00	100	0.00	0.00	09/16/2014 04
	3945 5163 4101 4937	79.00	79	0.00	0.00	09/16/2014 04

Every new conversion is given a new non-repeatable barcode; however it can be easily hierarchically and chronologically linked with the preceding product state. Sublotting batches will also generate additional barcodes; however the previous barcodes as well as any previously associated testing and notation information will still be readily available.

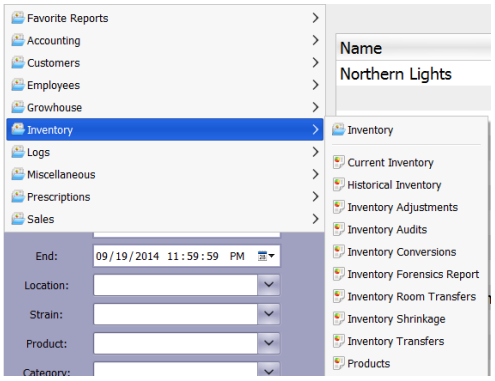
The aforementioned information can be found in both the system's inventory conversion report and inventory forensics report.

3 G. DOCUMENTATION OF PLANT LIFE CYCLE

g. Describe the method of documentation of a plant and plant extract through the manufacturing process to allow for product traceability to support product recalls or notifications in the event an issue is found with a plant, batch of plants or plant extract.

Upon propagation, BioTrackTHC™ automatically assigns a globally unique non-repeatable 16-digit barcode number to every plant. This barcode follows the plant through its entire product life cycle. Throughout the production process, the licensed producer may enter production notes into the plant-specific inventory record (i.e. events or any required notations that do not currently have pre-defined fields within the system). Upon harvest the system will batch designated plants together and assign a unique barcode to the collection, although the plants are grouped together during the harvest the individual plant barcodes are associated and cataloged within the batch inventory details. All flower, waste, sugar leaf, and other material will be collected, measured and associated appropriately. These weights are also entered using vertically integrated scales to diminish the possibility of human error or manual manipulation.

The system can also record both the wet and dry weights of flower material to track moisture loss percentages. The product can be notated and sampled at this juncture for testing purposes. Once testing results are retrieved, they can be directly associated with the product batches. Even after product has been converted into pre-packaged containers or other forms (i.e. oils or edibles) the barcodes for all prior forms or stages will be readily available for continuous uninterrupted traceability. The reporting functionality enables licensed establishments to retrieve real-time data pertaining to all current and historical inventories for any specified time frame. BioTrackTHC™ does not delete data or plant records. All data is preserved for regulatory review and taxation purposes on an indefinite basis.



In the event of a recall, BioTrackTHC™ has built in safety precautions to quickly, securely, and professionally alert impacted parties. The system documents every product sale with the following, but not limited to, records: patient, product, payment type, and return

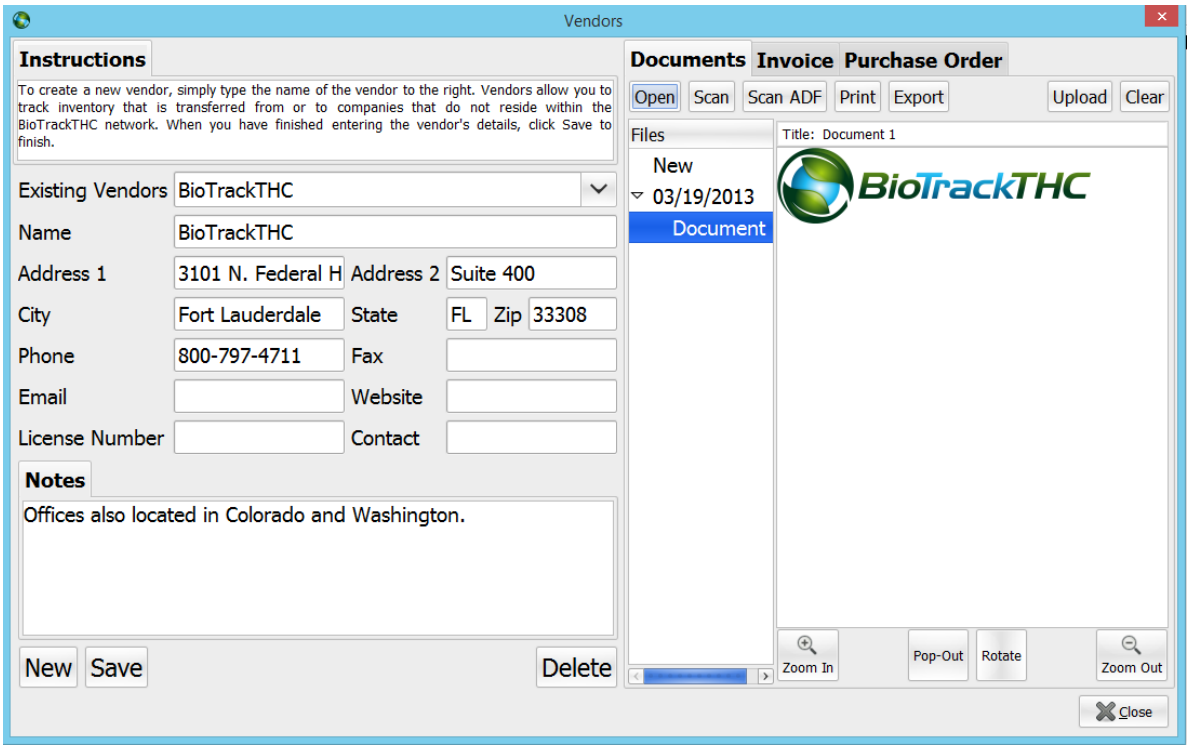
barcode. Licensees can quickly pull a report of all products and transactions associated with a specific plant(s) or strain.

There are also built in notification features that can be used to target and alert potentially affected patients via email, or text message or phone call for maximum information delivery and accountability. All recalled products should be safely destroyed and logged in the system. This creates a complete 'cradle to grave' account for the materials in question.

Distribution

4. G. PURCHASE ORDERS

g. Describe the process for accepting new product into distribution site inventory



The distribution site will start by creating the intended products within the inventory control module. Once the products have been set up they will be available options in the new inventory acceptance module. Prior to accepting product at the distribution site, the site employee will pre-fill all pertinent vendor information.

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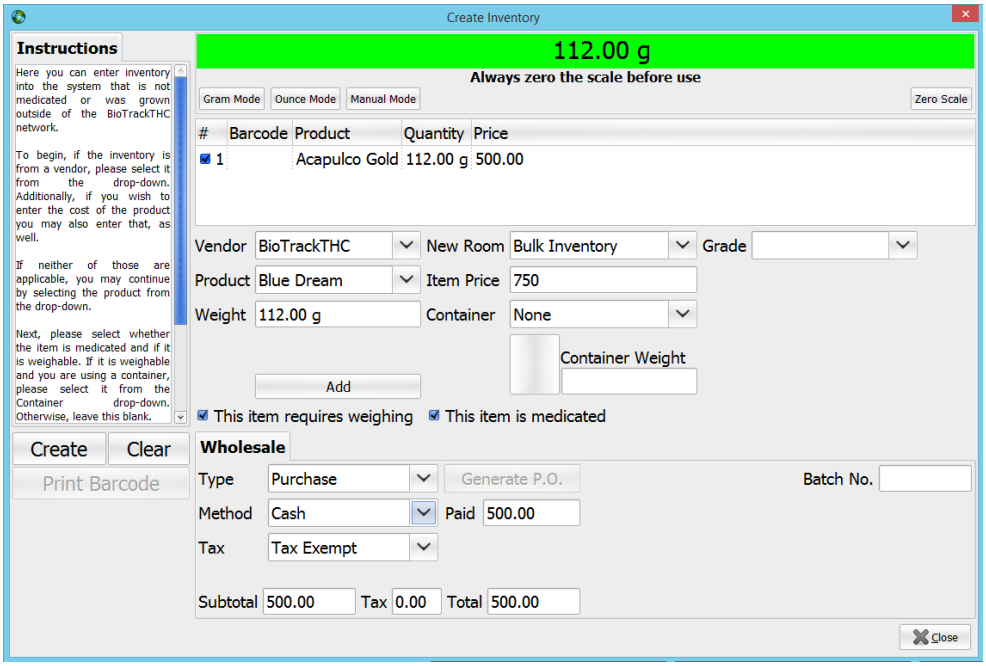
When a wholesale transaction takes place, the user can select the appropriate vendor and BioTrackTHC™ will record the information for the transaction. During the transaction the barcode is associated with the incoming batch of products. The accepting associate will need to take accountability by using their individual PIN or a biometric fingerprint scan. Once the product is successfully entered into the BioTrackTHC™ system, the product is then assigned its barcode, continuing the unbroken chain of custody.



Inventory Transfers

Date	Strain	Cost	Product	Inventory id	Quar
Transfer 1208					
06/11/2014 02:36 PM	Cookie	40	Cookie	5148 0646 0373 6182	20.0
Transfer 1209					
06/11/2014 02:38 PM	Acapulco Gold	500.00	Acapulco Gold	6023 6331 9282 4145	112.
Transfer 1210					
06/13/2014 12:11 PM	Acapulco Gold 1G PrePack	750.00	Acapulco Gold 1G PrePack	3648 1749 8568 9972	50.0
Transfer 1211					
06/13/2014 12:13 PM	AK-47	2500.00	AK-47	4188 3823 0952 6405	500.

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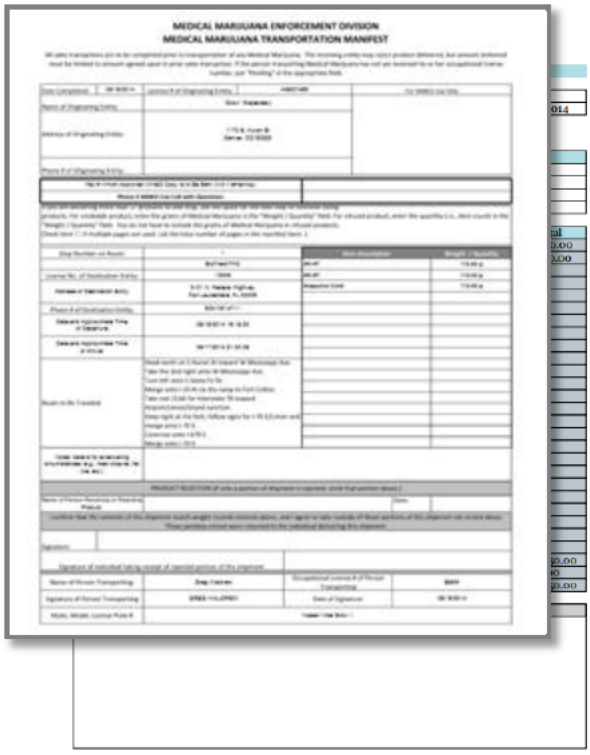
A purchase order will be generated at this point. This document will contain the distribution site's pertinent information and that of the transferring entity as well as the product names, quantities, cost and associated barcodes. Although each purchase order is archived indefinitely in BioTrackTHC™ by date and timestamp through the inventory transfers tab, there is also the ability to scan a copy of any vendor relevant documents into a specified vendor profile. This feature will act as a digital file cabinet and create an additional record keeping contingency.


MEDICAL MARIJUANA ENFORCEMENT DIVISION
MEDICAL MARIJUANA TRANSPORTATION MANIFEST

TRANSPORTATION

5. B. ii TRANSPORTATION

b. A detailed description of the proposed method of transportation of medical cannabis products including the following: ii. Explain how you intend to comply with the requirements identified in the draft Manufacturer Rules for transportation of medical cannabis

BioTrackTHC™ allows for the creation of a Transport Manifests clearly displaying vendor and transferee information. The manifest can be created in advance and sent to the commissioner, law enforcement and distribution site. The manifest will include the driver and license information, vehicle identification number (VIN), origin and destination registration numbers and itemized shipment list. The itemized shipment list contains a detailed record of the plants and/or plant materials in transit. This continues the unique barcode number showing the unbroken chain of custody and transparency. Manifests can also include turn by turn directions and an estimated route time ensuring maximum transparency, diversion and accountability. The manifests provided also contain signature lines creating another level of accountability

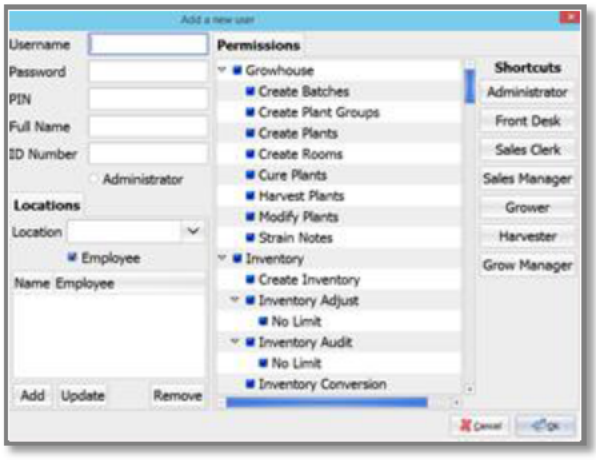
confirming proper receipt has occurred. This information can be maintained, verified and scanned directly into the BioTrackTHC™ system for clerical preservation. The manifest is archived within the system and can be quickly made available upon request by the commissioner law enforcement.

5. C. THEFT AND DIVERSION

c. A description of the proposed method to minimize the risk of diversion or theft of medical cannabis during its transport from the manufacturing site to the distribution sites

BioTrackTHC™ system has multiple ways to ensure security, theft and diversion. BioTrackTHC™ transportation manifest includes turn by turn directions and an estimated route time. This documentation demands adherence and accountability by the vehicle operator. This also allows the transporter to establish a set route that can be viewed based on previously established security permissions. Way points can be generated in the event a transporting party chooses to audit a shipment mid-transport.

BioTrackTHC™ records every plant transaction with an employee PIN or biometric fingerprint scan. Furthermore, the system allows for employee-specific customizable permissions allowing for several layers of added security. This ensures that only specific employees are granted access to permissions such as receiving new inventory, product processing or plant propagation. In reference to internal diversion, the vertical hardware integration with the scales, scanners, barcodes and labels will streamline all processes and diminish the chances of human error or manipulation. Inventory audit logs are also available in the event a discrepancy arises anywhere in the purchase order, transportation or vendor intake process. These reports can be filtered by employee, date, vendor, purchase



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order, product, or plant for complete transparency and accountability. In addition there is an inventory forensics log that will show every inventory action performed. It is so detailed in fact that unless it is filtered by action, product or date range the information becomes too overwhelming for the average person. When every gram of product is accounted for, all invested parties can rest easy.

6. Inventory Management

6. PROCESS and SYSTEM to MANAGE CANNNABIS INPUTS

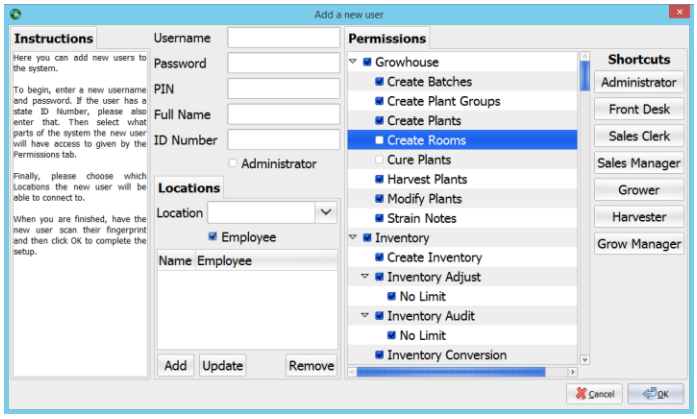
Inventory Forensics Report

Name	Inventory id	Location	Previous quantity	New quantity	Difference	Date	User	Action	New product
AK-47	0129 3807 1592 7867								
		"Grow" Dispensary	626.00	626.00	0.00	08/28/2014 01:29 PM	gwalorski	Inventory Combination Creation	AK-47
		"Grow" Dispensary	626.00	626.00	0.00	08/28/2014 01:29 PM	gwalorski	Inventory Combination Creation	AK-47
AK-47	0785 1262 5028 8317								
		"Grow" Dispensary	1051.00	1037.00	-14.00	08/28/2014 12:01 PM	Greg Walorski	Customer Sale	AK-47
		"Grow" Dispensary	1051.00	1037.00	-14.00	08/28/2014 12:01 PM	Greg Walorski	Customer Sale	AK-47
Acapulco Gold	0807 4387 4280 7830								
		"Grow" Dispensary	1620.00	1620.00	0.00	08/29/2014 01:39 PM	gwalorski	Inventory Details Modification	Acapulco Gold
		"Grow" Dispensary	1620.00	1620.00	0.00	08/29/2014 01:39 PM	gwalorski	Inventory Details Modification	Acapulco Gold
Bananna Kush	0970 2042 5113 2514								
		"Grow" Dispensary	112.00	112.00	0.00	08/28/2014 01:43 PM	gwalorski	New Inventory Screen	Bananna Kush
		"Grow" Dispensary	112.00	112.00	0.00	08/28/2014 01:43 PM	gwalorski	New Inventory Screen	Bananna Kush

Please provide the following information:

Describe the processes and computer systems that will be utilized to manage medical cannabis inputs (including plant matter, chemicals, machinery, etc.) and final product inventory (at all locations including when the final product is in transport). Include the real-time processes to document inventory as well as the schedule and processes to audit the accuracy of inventory.

BioTrackTHC™ automatically assigns a globally unique non-repeatable 16-digit barcode number to every plant upon the sowing of the seed or other propagation (i.e. cloning, tissue, etc). Throughout the production process, the producer may enter production notes into the inventory record for events or information required that do not currently have pre-defined fields or procedures within BioTrackTHC™ All data is processed and recorded in real time, including the employee responsible for the transaction. As a server based solution, BioTrackTHC™ is not limited to internet speed or web page demand. The systems internal network allows for real time reporting across multiple terminals. This eliminates lag time and restricts the opportunity for diversion. Once the flower has been batched after harvest it is given a new barcode, while still being associated with its source barcodes. Each batch of product will be separated within the inventory control module by their individual barcode for maximum accountability a recall protocol. From there all conversions, transfer and adjustments will be fully tracked and documented via the inventory forensics report, dispensed logs and sales reports. Upon initiating a transport manifest and sending it over to a distribution site, the product will be ready to transfer. Once the product is accepted by the distribution site, it can be priced then sold to a patient using the customer point of sale screen within the system. Several audit reports are available within the system creating complete visibility, transparency, and accountability into the entire operation. This makes sure supposed inventory levels within the system match what you physically have.



7. Technology Usage

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7. SOFTWARE TO BE USED

Please provide the following information:

Provide a high level description and diagram of the computer systems that will be utilized to manage all of the medical cannabis operations from cultivation to manufacturing to distribution.

BioTrackTHC™ provides enterprise level software created specifically for the cannabis industry. With over 6 years of experience at over 800 locations nationwide and in 14 states DC and Canada. BioTrackTHC™ has the knowledge and infrastructure to grow with the ever changing cannabis industry. As experts in state government compliance BioTrackTHC™ understands the need for transparency and accountability in this emerging market. With a product suite encompassing Cultivation Facility Management, Inventory Tracking, and Point of Sale, BioTrackTHC™ truly has everything covered from seed to sale.

MinnMed Product Recall Plan

Manufacturers, importers, distributors and retailers of consumer goods are liable for the products they provide to consumers and face the potential of product recalls for potentially dangerous or hazardous products. The same is true for the MINNMED as a manufacturer and/or retailer of consumer medical cannabis products, MINNMED may need to conduct a product recall in the future. For consumer products the recall process is handled and regulated by the Consumer Product Safety Commission (CPSC), for all intents and purposes the MINNMED recall plan will follow the guidelines of the CPSC.

Firms often learn of potential product safety problems at an early stage, for this reason, companies involved in the manufacture, importation, distribution, or sale of consumer products should develop a system for maintaining and reviewing information about their products that might suggest that their product has a defect or poses an unreasonable risk of serious injury or death. Such information includes, but is not limited to, consumer complaints, reports of production problems, product testing, or other critical analyses of products.

Experts have shown that one of the best ways to ensure that a product recall is effective is to have a recall plan already in place and to execute the plan as quickly as possible. A well-thought out, well-executed recall plan can save lives and prevent injuries in addition to limiting damage to your MinnMed's brand and bottom line.

The Consumer Product Safety Commission (CPSC) has compiled resources to assist companies that manufacture, import, distribute, retail, or otherwise sell consumer products. CPSC has developed a Recall Handbook that can be utilized in case a product recall needs to be ordered. The Recall Handbook details how to recognize potentially hazardous consumer products as soon as possible. The book explains how to develop and implement a "corrective action plan" (called a CAP) to address the hazards; it explains CPSC's Fast Track Program. The Recall Handbook also discusses how to communicate recall information to consumers and how to monitor product

recalls. The Consumer Product Safety Commission's Recall Handbook will be a valuable tool utilized by MINNMED if the need for a product recall ever arises.

The Recall Handbook should be referenced to determine exact protocol for recall and the requirements from the Consumer Product Safety Commission. The Recall Handbook can be obtained online from http://www.cpsc.gov/PageFiles/106141/8002.pdf. Companies should carefully review the Recall Handbook in order to:

- Become familiar with their reporting requirements under sections 15(b) and 37 of the Consumer Product Safety Act, and Section 102 of the Child Safety Protection Act, Pub. L. 103-267;
- Help learn how to recognize potentially hazardous consumer products as soon as possible; and
- Assist firms that discover they have manufactured, imported, distributed, or retailed such products to develop and implement "corrective action plans" that address the hazards.

There are many private firms that can assist with creating a recall plan and/or executing a recall. Please visit www.cpsc.gov for more information regarding product recall.

When to Recall Medical Cannabis Products

As a manufacturer, distributor, and/or retailer of consumer products, MINNMED has a legal obligation to immediately report the following types of information to the Consumer Product Safety Commission:

- A defective product that could create a substantial risk of injury to consumers;
- A product that creates an unreasonable risk of serious injury or death;
- A product that fails to comply with an applicable consumer product safety rule or with any other rule, regulation, standard, or ban under the CPSA or any other statute enforced by the CPSC;
- An incident in which a child (regardless of age) chokes on a marble, small ball, latex balloon, or other small part contained in a toy or game and that, as a result of the incident,

the child dies, suffers serious injury, ceases breathing for any length of time, or is treated by a medical professional; and

- Certain types of lawsuits. (This applies to manufacturers and importers only and is subject to the time periods detailed in Sec. 37 of the CPSA.)

Failure to fully and immediately report this information may lead to substantial civil or criminal penalties. Consumer Product Safety Commission's staff advice is "when in doubt, report." MINNMED will ensure communication with the Division, the DOA and the DOH within 24 of becoming aware of the need for a product recall. MINNMED will then proceed to recalling protocol and how to recall the product.

How to Recall Medical Cannabis Products

MINNMED will develop a recall plan following guidance from the Recall Handbook provided by the CPSC. Once the need for a product recall has been determined, MINNMED will proceed with the product recall Corrective Action Plan (CAP). If the need for a product recall arises, cultivation centers and dispensing organizations will have inventory management systems in place to determine and pinpoint which products to recall, how many of those products are in the supply chain, and will be able to determine exactly where those products are within the supply chain. The inventory management systems and procedures required by state regulations will ensure a stream-lined recall process if ever necessary.

Corrective Action Plan (CAP)

A corrective action plan is defined as improvements to an organization's processes taken to eliminate causes of non-conformities or other undesirable situations. The goal of a corrective action plan should be to retrieve as many hazardous products from the distribution chain and from consumers as is possible in the most efficient, cost-effective manner. The CAP will outline the procedures and steps needed to be taken by MINNMED once a product recall is required.

Step One: Industry Notification

If medical cannabis or medical cannabis-infused products is believed to need to be recalled MINNMED will contact all wholesale partners and dispensing organizations to make them aware of the situation and the need for product recall. MINNMED will also contact the Division, DOA and MDH within 24 hours of obtaining reportable information. As the wholesaler of the product needing to be recalled, contacting the end users of the recalled product; medical cannabis patients will prove difficult if not impossible. At this stage of the recall, dispensing organizations will need to ensure that they have a proper recall process in place to contact the end users of the product being recalled.

Step Two: Public Notification

Cultivation center will post notifications about the product recall on its website as well as making partnering cultivation centers and dispensing organizations aware of the product recall. The actual recalling processes will be handled by the dispensing organizations with help and support from the cultivation center.

As the dispensing organization issuing a recall notice it will be important to reach the end users or the recalled product. MINNMED will post notification about the recall on MinnMed websites and social media as well as post written notices of the recall on location for patients and customers to view. The recall notice will include all pertinent information regarding the product being recalled, contact information and other information relating to the recall. Information will include but not be limited to:

- Product name
- Product batch number
- Dispensing date range of recalled product
- Dispensing organization locations
- Etc.

Once the recall notification has been issued to all applicable dispensing organizations and medical cannabis patients, MINNMED will wait to receive recalled products from dispensing organizations and/or licensed medical cannabis patients. Once recalled products have been received, MINNMED will properly dispose of all recalled products.

Step Three: Procurement

The dispensing organization issuing a product recall to medical cannabis patients will need to be ready to obtain and secure recalled products from patients. Patients should be able to bring in the products being recalled to the dispensing organizations location. It will be at the dispensing organizations discretion whether to issue a refund, replace the recalled product at no cost, or to take other measures.

Step Four: Documentation and Record Retention

MINNMED will maintain all documentation and records regarding any and all product recalls issued.

Step Five: Disposal

MINNMED will ensure that any and all recalled cannabis products are disposed of according to all state and local regulations. MINNMED will follow waste destruction and disposal procedures outlined below for proper disposal of recalled cannabis and cannabis-infused products.

Table of Contents

TRADE SECRET INFORMATION

Front End Distribution Operations

The front-end distribution operations are a critical business entity within the organization which is essential for building and maintaining customer and patient relationships, which in turn will generate sales and profits for the organization. Customer service as well as knowledge of all applicable laws and regulations is vital to the success of the front end. A friendly and knowledgeable staff will drive sales and patient loyalty. Throughout this document are detailed industry best practices for operations within a retail medical cannabis distribution facility. Highlighted are Standard Operating Procedures (SOP's) and management operations and practices.

Staffing

Distribution team members are essentially the face of the organization as they are the people who will be interacting with patients and customers on a day to day basis. It will be imperative to hire high quality, knowledgeable customer service oriented team members for distribution operations.

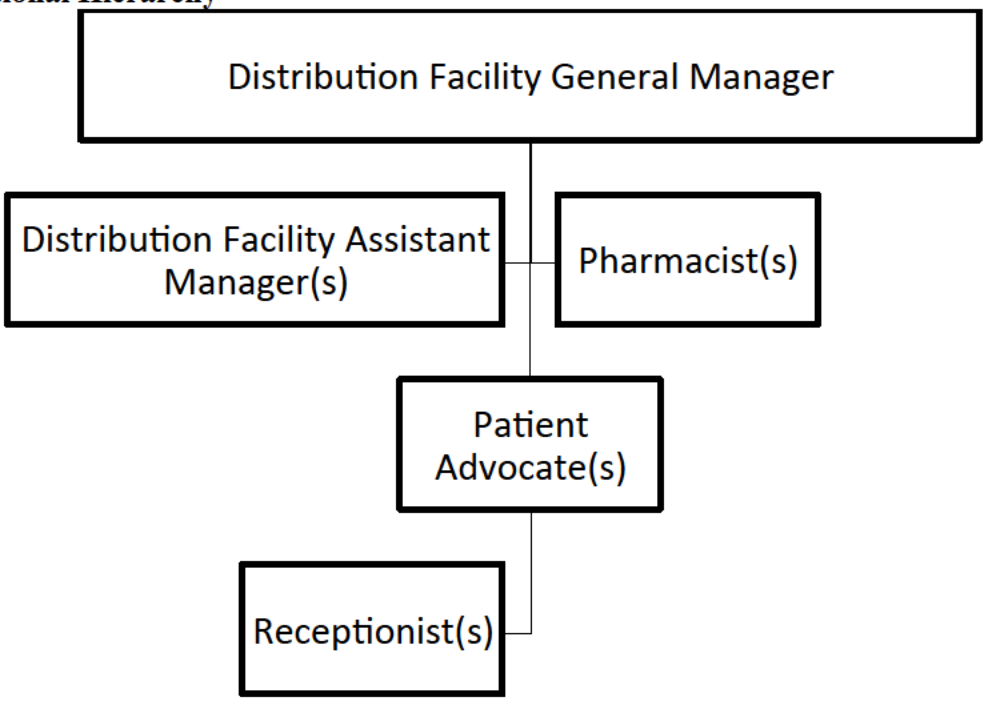
In addition to state required background checks in order to work within the medical cannabis industry, all team members will also be required to complete and pass an additional background and credit history check for our organization.

Potential team members for distribution operations will also be required to complete a competency evaluation for the organization. This evaluation will determine previous knowledge held by potential team members as well as show how much training and education must be completed.

In addition to passing background and credit checks and the competency evaluation, all potential team members will also be required to provide proof of eligibility to work within the United States.

All front end operation team members will be required to agree to and sign the company Employee Handbook, Code of Conduct and Personal Hygiene Policy. All employees of the organization will need to adhere to company policies regarding personal hygiene, health and safety.

Organizational Hierarchy



General Manager—Distribution facility general manager is responsible for the overall operation of the distribution facility. Will ensure compliance with all state laws and regulations, responsible for overall direction and goals of facility, etc.

Assistant Manager(s)—Assistant manager(s) will assist the GM with daily operations, compliance and organizational goals. Responsible for oversight of distribution facility employees, etc.

Pharmacist(s)—Responsible for dispensing medical cannabis products and medicines.

Patient Advocate(s)—Responsible for daily distribution activities and patient consultations, etc.

Receptionist(s)—Responsible for checking the validity of required patient and/or caregiver documents (ID's, valid medical cannabis license, etc.), upon verification the receptionist(s) will allow patients and/or caregivers access to the distribution facility.

Staff Communication and Resources

Communication is a key factor to success within any organization or entity, and the same is true for our organization. Good communication within each facility as well as communication between each facility will be crucial for the success of our organization. The distribution facility will need to have excellent communication with the manufacturing facility in order to maintain proper par inventory levels on the sales floor. Without the proper items or inventory par levels, the distribution facility will find it difficult to supply patients with their desired medication.

Team Meetings: Team meetings will be implemented organization-wide and will provide opportunities for team members to discuss current trends and ideas on how to make

processes more effective or efficient. Team meeting will at the very least be held once a week for each facility as well as a weekly meeting between facility managers and department leads.

Shift meetings: Shift meeting will be held on a daily basis between team members and the facility manager or department leads. A shift meeting will be held prior to the start of business each day to discuss workflow and goals for the shift. A meeting will also be held at the closure of business to discuss the day's operations and to determine if shift goals were achieved.

Patient Advocacy

Medical cannabis patients are the reason for the medical cannabis industry, as such patient advocacy will play a vital role within the organization. A patient advocate's role will be to be in close contact with primary medical cannabis patients of the facility. Patient advocates will provide patients with information on medical cannabis, including benefits to health, cannabis strain education, how to medicate and dosage rates, etc. Patient advocates will also be responsible for providing alternative information such as community outreach information, medical cannabis seminar information, alternative/holistic health information, massage therapy, and to be as helpful to patients as possible.

Patient Education

MinnMed has created educational brochures and documents to aid in patient education. MinnMed has also developed an extensive website with various education materials available for the public.

There is a huge variety of cannabis strains available. Each cannabis strain will differ in the medical benefits produced from the effects of the strain. Although there are many varieties of cannabis strains available, almost all of them are derived from two cannabis family species: cannabis indica and cannabis sativa.

Individual patients will have different reactions to the medical cannabis strains available, so patients will need to be educated about the potential effects of each cannabis strain. A knowledgeable distribution staff will be able to reference patient ailments with the cannabis strains available and ultimately be able to recommend a cannabis strain suitable for the patient.

Cannabis Indica: Indica cannabis strains relax muscles and work as a general analgesics, they can also aid in sleep. A cancer patient looking to relieve pain from chemotherapy treatment would benefit greatly from the effects of cannabis indica.

Cannabis Sativa: Sativa cannabis strains produce more of a euphoric high, uplifting the consumer's mood and therapeutically relieving stress. Patients dealing with depression would benefit from cannabis sativa.

Hybrid: Hybrid cannabis strains will be a blend of cannabis indica and cannabis sativa. These cannabis strains can be a nice 'middle' of the two different cannabis species.

Education and Training

All distribution facility employees will receive training prior to beginning work within the facility. A continuing education program will aid in developing staff members and preparing them for further advancement within the company. It is the responsibility of the distribution facility manager to ensure training takes place for all team members prior to commencing work within the distribution facility.

Our organization shall ensure that training is provided to all employees before that person begins to work or volunteer at the medical cannabis facility. The organization shall utilize multiple training and educational materials to aid in the training process as well as hands-on training at facility locations from experienced professionals. Documents will include log sheets, checklists, and inventory templates. Development checklists will be utilized for the purpose of tracking each individual employees training and progress.

All distribution team members will be provided with extensive training on all functions of distribution operations. This will include training in all applicable laws and regulations, security and safety protocols, Point of Sale (POS)/BioTrackTHC software training, inventory management, patient advocacy training, security measures and controls applying to inventory for the prevention of diversion, theft or loss of cannabis; Procedures for responding to an emergency; all State and federal statutes and regulations regarding confidentiality of information related to the medical use of cannabis, and all state regulations regarding the agents division of employment.

Laws and Regulations/Compliance Training

Adhering to all state, local, and company specific regulations is of utmost importance to create an end product with the highest efficacy for patients. Patient confidentiality policies will be in place to ensure patient information is secured at all times. All distribution operation team members will be required to have a general knowledge of all applicable laws and regulations dealing with the retail distribution of medical cannabis. This includes but is not limited to: proper identification of registered patients through the electronic verification system, allowed patient quantities of medical cannabis to be purchased, on-site consumption laws, hours of operation, etc.

Policies regarding regulations: It is the distribution facilities managers' duty to ensure regulatory requirements are followed at all times. The distribution facility compliance manager shall maintain a zero tolerance policy for any infractions that would go against state, local, and company regulatory measures.

Current regulations: The entire staff must be trained in all current regulations. A test shall be administered to all team members by the team supervisor and cover any regulations that pertain directly to team members duties.

New regulations: All new regulations shall be implemented with the exact date they become effective. Training and testing of new regulatory measures shall take place before the effective date in order to ensure that all team members attain a complete understanding of such measures and can fully and accurately implement new regulations on the effective date.

TRADE SECRET INFORMATION

Patient Confidentiality: The compliance manager will be responsible for ensuring adherence to all State and federal statutes and regulations regarding confidentiality of information related to the medical use of cannabis.

Point of Sale (POS) Training
Once an adequate Point of Sale system is chosen and implemented, all team members will be adequately trained on the system. Training on the POS system will include how to properly input new inventory items as well as how to take items out of the system. How to input patient records into the system, making a sale and sales entries, end-of-day procedures and cash balancing, etc.

Choosing an adequate POS system and properly training employees on that system will be critical for inventory management and accurate accounting. The POS system will prove vital for proper record keeping for the state required seed-to-sale tracking of all medical cannabis. MinnMed will utilize BioTrackTHC software system for inventory tracking and sales procedures.

Patient Advocacy Training
Patients are the reason for the medical cannabis industry and therefore proper patient advocacy training is essential in order to have a successful medical cannabis distribution operation. Patient confidentiality is of utmost importance; any and all patient information is confidential and is to remain secured on location. Any unauthorized release of patient information will be grounds for immediate job termination.

Training Record
The distribution facility manager is responsible for maintaining a training record for each distribution facility team member. Such record will include, at a minimum, documentation of all required training, including:

- The name of the person receiving the training;
- The dates of the training;
- A general description of the topics covered;
- The name of the person supervising the training; and
- The signatures of the person receiving the training and the production facility compliance manager.

Development
The distribution facility manager is responsible for making a commitment to on-going education.

On-going education
Once commencing work within the distribution facility there will be multiple opportunities for continuing education and advancement. The distribution facility manager is responsible for establishing a development path where employees learn from experience and working directly with their crew leaders to learn all aspects of their job. Crossover opportunities will be available and encouraged so employees can learn other areas of the business if they wish to advance to another department, such as a trimmer learning the basics of processing or growing. A comprehensive book list is recommended for employees and required for advancement into management positions. Distribution facility management will offer educational clinics on subjects within the warehouse to keep all employees current on legal issues, compliance, new

innovations, personal development, nutrition and exercise, and other necessary and relevant interests.

Tracking Development
In addition to the comprehensive training record, the distribution facility manager is responsible for tracking employee development. Development will be tracked on a development checklist. The development checklist provides a clear visual of the level of training an employee has received, and their eligibility for greater responsibility. Once minimum training levels have been reached, crew leaders and distribution facility management will create further development for individual employees. Employees may also view their progress and choose to take a roll in their own development through expressing interest in learning new processes and utilizing provided reading materials to advance their knowledge of internal business practices. As procedures and topics are mastered, employees will earn "checks" on the development checklist from their crew leaders and production facility management.

Feedback Policy
In order to sustain a healthy and compliant work environment the distribution facility manager is responsible for implementing a strong verbal and written feedback policy. Feedback is to be given immediately by all employees to employees at all levels whenever a company policy is broken. Feedback concerning company policies must be given verbally within a 24-hour period for first offenses, second offenses warrant written feedback for employee improvement. Any concerns regarding compliance, regulation, or health and efficacy of the products in the distribution facility must be given in written and documented form immediately by cultivation facility management. Depending on the severity of compliance violation employees will be given an action plan to implement or released immediately in such instances where theft, diversion, or health risks occur. If an employee fails to implement an action plan they will be terminated. All Feedback for Improvement forms will include, at a minimum:

- The name of the person receiving feedback
- The date of the incident and date feedback was received
- A detailed description of incident/violation
- The name of the supervisor giving feedback
- A clear action plan so the incident/violation will not reoccur
- The signatures of the person receiving the feedback, giving the feedback, and the production facility compliance manager.

Periodic Performance Reviews
An Employees success will be discussed during periodic employee performance reviews, which take place prior to completion of their probation period and bi-annually thereafter. This appraisal of performance is intended to inform employees on their progress and point out areas of opportunity for improvement. Performance appraisals along with the development checklist form the basis of merit for wage and responsibility increases. An action plan for performance improvement will be utilized when below average scoring is tabulated on any section of an employee's review form. Action plans will be evaluated periodically and as often as necessary to ensure proper development of all employees. The distribution facility manager and the

employee's direct supervisors are responsible for all periodic employee reviews, which include at a minimum:

- The name of the person receiving performance review
- The date of the review, and the dates of the review period
- A numerical tabulation of performance categories
- The name of the supervisor giving review
- If necessary, an action plan for employee improvement
- The signatures of the person receiving the feedback, giving the feedback, and the production facility compliance manager.

Security and Diversion

The distribution facility manager will ensure to implement policies and procedures to deter and prevent unauthorized entrance into the facility and or limited access areas. Security measures, policies and procedures are detailed with the document 'Distribution Facility Security Plan". Security and diversion utilized at MinnMed distribution facilities are including and without limitation to:

Alarm Surveillance

A Licensed Alarm Company will install an advanced security alarm system on all perimeter entry points, perimeter windows, and secured interior rooms. Motion detection equipment and camera equipment will be used to ensure the entire Licensed Premises is continuously safe from intrusion and product diversion. The compliance manager will utilize the services of a Monitoring Company to monitor a signal system interconnected with a radio frequency method, such as cellular, private radio signals, or other mechanical or electronic devices. The monitoring company will ensure immediate automatic or electronic notification of local law enforcement agencies whenever an unauthorized breach of security occurs at the cultivation facility.

Video Surveillance

The Compliance manager will ensure an advanced video surveillance and recording system is installed prior to the first day of operation. All cameras will record in digital format and be maintained to meet the requirements outlined by state and local authorities. Video cameras will be maintained in each room and be used to identify any activity occurring within the room and be capable of recording and viewing in low light conditions. An onsite DVR and an additional off site DVR will be utilized to store all footage for a minimum of 30 calendar days. Video surveillance records and recordings will be stored in a secured area accessible only to authorized distribution facility management, and will be made available upon request to all the state and local licensing authorities, and any other state or local law enforcement agency for purposes authorized by the medical code or any state or local law enforcement purpose. The surveillance system will include a failure notification system that will provide an audible and visual notification if any failure in the electronic monitoring system occurs. All video cameras and recording equipment will be supported by battery backup for a minimum of five minutes of recording in the event of a power outage.

Security Lighting
The company compliance manager will ensure the installation and maintenance of exterior security lights around the entire perimeter of the facility to allow surveillance in low light conditions and deter potential intrusion.

On-Site Electronic Monitoring
The distribution facility security room will include at a large screen call-up monitor and a video printer capable of immediately producing a clear still photo from all video cameras. All distribution facility video cameras will have a minimum of 704 x 480 recording resolution or the equivalent in order to provide coverage of all points of entry and exit from limited access areas within the facility and all points of entry and exit from the distribution facility. It is the distribution facility manager's duty to ensure the video system is maintained and capable of identifying any activity occurring within or around the building.

Commercial Grade Door Locks
The company compliance manager will ensure the use of commercial-grade, non-residential door locks at all points of ingress and egress to the facilities exterior and all limited access areas.

Safes and Product Storage
The company compliance manager will be responsible for the installation of commercial grade safes for product storage. Commercial grade safes will be installed and utilized in a limited access area for the storage of medical cannabis products. Safes will be bolted and anchored to the floor in order to further deter theft. All products containing medical cannabis will be inventoried and stored in the safes each night at the close of business.

Limited Access Areas
Management will maintain policies and procedures that limit access to the areas within the distribution facility to approved authorized personnel. Areas that contain cannabis production or finished cannabis products will require designated signage indicating the activity within the room, identity of authorized persons, and level of security clearance required for entry. All other room entrances within the cultivation facility will also be clearly signed indicating the activity within the room and the level of clearance necessary to gain entry.

Policies and Procedures
Additional policies and procedures will prevent loitering, aid in electronic monitoring, and be utilized to ensure automatic electronic notification of local law enforcement agencies of any unauthorized breach of security at the distribution facility. All applicable records to the surveillance and security system will be maintained on the distribution facility Licensed Premises by the compliance manager. The company compliance manager is also responsible for maintaining a map of the camera locations, direction of coverage, camera numbers, surveillance equipment maintenance activity log, and a user authorization list and operating instructions for the surveillance equipment.

TRADE SECRET INFORMATION

Facility Layout/Site Diagram

A facility layout/site diagram will be maintained on site at the distribution facility which will clearly define each area of the distribution facility. The site diagram will be updated as soon as any changes are made to ensure a current facility layout.

Secured Entry: Before entering the distribution facility all employees must be identified by security or management personnel. All employees shall enter the distribution facility through the main secure entrance. The head security officer shall maintain secured entry.

State registered patients must be identified and their state issued medical cannabis license needs to be verified through the electronic verification system. This verification process will be done by team members and management as needed.

Distribution Sales Floor Area: The distribution sales floor is the area where medical cannabis products will be on display for sale to state licensed medical cannabis patients. The distribution facility manager will be responsible for this area.

Receiving Areas: After medical cannabis products are transferred from the manufacturing facility they must be inventoried and checked in. These products are then assigned an attribute number or ID for inventory tracking and POS identification. These products can then be transferred to the sales floor area for sale to registered patients. The distribution facility manager is responsible for this area.

Secured Areas: All areas within the distribution facility are licensed personnel. The distribution facility manager is responsible for ensuring all areas within the facility remain secured and limited to authorize personnel.

Secured Product Storage Area: After flower products are processed the processing manager secures them within the cultivation facility safe to wait for testing and shipment. After the flower products pass required testing they will be transferred to the distribution facility for sale and distribution. These products will be maintained in the secured product storage area in commercial grade safes. This area is restricted to the distribution manager.

Chemical Storage Area: All chemicals for cleaning, pest and disease control will be held in the chemical storage area of the distribution facility. The distribution facility manager will maintain this area and ensure information about chemicals is readily available by maintaining:

- An on-site chemical list
- Material safety data sheets (MSDS) for all chemicals
- Emergency spill kit

Emergency Protocol

- **Robbery or Theft**
  - If being robbed at gunpoint or you feel your life is in danger, comply with all requests from perpetrator. Give them whatever they ask for.
  - Try to signal for help through security panic buttons provided or through the panic button or police services button located on the alarm panel.
  - Contact police as soon as possible
  - Notify any required state or local authorities
  - Comply with all applicable laws and regulations
- **Fire Emergency**
  - If fire is a small isolated fire, try to exhaust the fire with one of the fire extinguishers
  - In case of a fire emergency dial 911 for Fire Department or push the symbol on the alarm panel for fire emergency.
- **Chemical Spill**
  - Try to use chemical spill kit for smaller incidents of chemical spill
  - If chemical spill is large or you do not know how to handle the situation; get the facility manager to handle the situation
- **Other Emergencies**
  - Contact 911 for break-ins or burglaries.
  - Contact any required state or local authority in cases of theft, break-ins or burglaries.

Daily Distribution Processes

At the start of each business day distribution team members will arrive to the facility and be screened and checked in by a security team member or by management. At which time the employee will clock in for their scheduled shift and proceed with normal business operations. Each work day will begin and end with a shift meeting between team members and facility managers and/or department leads. Team members of the distribution facility will have open and closing responsibilities to ensure a smooth shift and workflow as well as tasks and chores to be completed during each shift.

Opening Responsibilities

The opening responsibilities will primarily be comprised of getting the distribution sales floor ready for the day. This will consist of the following:

- Balancing and assigning cash drawer to each POS terminal
- Inventory management
  - Recording beginning daily inventory on log sheets
  - Having manager verify inventory is correct
- Stocking display cases with various medical cannabis products
- Ensuring the distribution sales floor has sufficient amounts of products for sale during shift

Closing Responsibilities
The closing responsibilities will primarily be comprised of closing the distribution sales floor and securing product for safe storage throughout the night. Closing responsibilities will consist of the following:

- Closing and balancing the POS system(s)
- Cash balancing and reconciliation
- Inventory management
    - Recording ending daily inventory on log sheets
    - Having manager verify inventory quantities are correct
        - Inventory reconciliation—if there is a discrepancy management will determine how to proceed
- Pulling all medical cannabis products in display cases to be stored in a safe in a secure access area for nightly storage
- Close distribution sales floor and secure facility for nightly closure

Patient Intake
Patients wishing to patron our distribution facility will need to have a valid state medical cannabis license. Before entry into the distribution facility team members will verify the validity of each patient's medical cannabis license through the state electronic verification system. After the verification process the patient will be allowed entry into the distribution facility.

The distribution facility manager will create and maintain a database within the POS system for inventory and tracking purposes. This will enable team members to adhere to all laws regarding the quantities of medical cannabis products patients are allowed to have in a given time period.

Product Receiving Procedure
All applicable state and local laws and regulations will be strictly adhered to by all organization team members. The distribution facility manager will be responsible for creating and implementing a process for the receiving of various products from wholesalers and other distribution facilities.

Wholesale Procedure
All applicable state and local laws and regulations will be strictly adhered to by all organization team members. The distribution facility manager will be responsible for creating and implementing a process for the wholesaling of various products to other distribution facilities.

Sales Procedure
The sales procedure needs to be completely accurate for every sales transaction. If sales records are not accurate inventory will have discrepancies and could result in compliance issues. Distribution team members will go through extensive training on the POS system and the sales process before commencing operations.

Electronic Verification: Verification of validity of medical cannabis patients/caregiver license will be completed prior to any sale occurring.

TRADE SECRET INFORMATION

Making a Sale: Prior to initializing a sale, a distribution team member should make sure the current medical cannabis patient information is in the POS system; if it is the patient's first visit to the distribution facility, the team member will need to create a new record for that patient. After verifying the medical cannabis patient's information, the distribution team member should check the POS system to determine how much/many medical cannabis products the patient is allowed to purchase. Once quantity limits are verified the distribution team member will assist the patient in determining what strains or products will be best suited for their ailments.

Weighing Medical Cannabis: All medical cannabis products and/or medicines will be preackegd at the manufacturing facility. Distribution facility employees or pharmacists should never have to physically weight any medical cannabis products or medicines. However, if the need to weigh products does arise, NTEP certified scales should be utilized by the distribution facility for the sale of medical cannabis. Medical Cannabis should be weighed on an NTEP Certified scale and in view of a surveillance camera to ensure proper weights are being sold and to deter theft. NTEP Certified scales will be calibrated and certified by the state agriculture department. These scales are commonly used where items are sold based on weight; such as at butcher shops, delis, for gold and silver sales among others.

Sales Tax: All sales transaction will be subject to applicable sales tax rates. The proper sales tax rates will be programmed into each POS system to ensure sales tax is being collected.

Cash Handling: All cash handling at the POS area should be done in view of a surveillance camera. This will help ensure honesty and reduce theft by employees.

Packaging and Labeling Compliance: All medical cannabis products will be packaged according to all applicable state and local laws.

Transportation

All applicable state and local laws and regulations will be strictly adhered to by all organization team members. The distribution facility manager will be responsible for creating and implementing a process for the transportation of various products to other distribution facilities.

Leaving/Exiting for Business Closure

Upon completion of an employees work shift they will sign out/clock out and exit the building premises through the secured entry/exit.

Inventory Management

Inventory management is a critical factor at every facility within the organization. The tracking of all medical cannabis from seed to sale will be done through inventory management through the use of template log sheets. Physical inventory counts will be done on a daily, weekly, and

monthly basis at the distribution facility. This is the primary way to determine if there has been any product diversion and to ensure that all medical cannabis and cannabis products are only being distributed to licensed patients.

Physical inventory template log sheets will be filled out each morning before the start of business, and then again inventories will be recorded at the closure of business. These inventory figures will be cross-references with the POS system inventories and data to determine that there are no quantity discrepancies. In the case of a discrepancy within inventory we will investigate the root cause of the discrepancy to determine the cause. If the discrepancy came at the hands of employee theft or diversion, we will act quickly to terminate the employment of the perpetrator and contact all necessary authorities for further action.

MinnMed will utilize BIoTrackTHC POS software and hardware for inventory management, seed-to-sale tracking and for the sales procedure. Please view 'BioTrackTHC' educational materials.

Inventory Control: Each medical cannabis establishment shall designate in writing a medical cannabis establishment agent who has oversight of the inventory control system of the medical cannabis establishment. The compliance manager will be responsible for oversight of the inventory control system.

- Each medical cannabis establishment shall establish and implement an inventory control system that documents:
  - Each day's beginning inventory, acquisitions, harvests, sales, disbursements, disposal of unusable cannabis and ending inventory.
  - When acquiring medical cannabis from a person who holds a valid registry identification card or his or her designated primary caregiver:
    - A description of the medical cannabis acquired, including the amount and strain as specified by the cardholder or caregiver, if known;
    - The name and number of the valid registry identification card of the person who provided the medical cannabis or, if provided by a designated primary caregiver, his or her name;
    - The name and medical cannabis establishment agent registration card number of the medical cannabis establishment agent receiving the medical cannabis on behalf of the medical cannabis dispensary; and
    - The date of acquisition.

- Each medical cannabis establishment shall:
  - Establish and maintain a perpetual inventory system which adequately documents the flow of materials through the manufacturing process;
  - Establish procedures which reconcile the raw material used to the finished product on the basis of each job. Significant variances must be documented, investigated by management personnel and immediately reported to the Division and to the medical cannabis establishment that ordered the edible cannabis product or cannabis-infused product; and

- Provide for quarterly physical inventory counts to be performed by persons independent of the manufacturing process which are reconciled to the perpetual inventory records. Significant variances are to be documented, investigated by management personnel and immediately reported to the Division.

- If a medical cannabis establishment identifies a reduction in the amount of medical cannabis in the inventory of the medical cannabis establishment not due to documented causes, the medical cannabis establishment shall determine where the loss has occurred and take and document corrective action. If the reduction in the amount of medical cannabis in the inventory of the medical cannabis establishment is due to suspected criminal activity by a medical cannabis establishment agent, the medical cannabis establishment shall report the medical cannabis establishment agent to the Division and to the appropriate law enforcement agencies.

Community Plan

As an organization we realize that when we begin operations we will become a member of the surrounding communities and as such we want to become a valuable and productive member within said communities. Safety for our employees and the surrounding communities is of utmost importance to our organization. With the presence of our facility and the security systems planned for the facility and surrounding area, should help to reduce crime. We have plans to develop and implement community outreach programs. Such programs and events will include food and clothing drives for local food banks, churches, and others. A plan to donate a certain percentage of yearly profits to schools and infrastructure of the surrounding community is also in development.

Environmental Impact Plan

Conservation and the reduction of our carbon footprint within the communities we operate in will be a primary objective of the organization. This will be implemented throughout the entire organization and at every facility. We will look for new and innovative ways to reduce our carbon footprint within the distribution facility. 'Reduce, Reuse and Recycle' will be implemented on an organization-wide scale.

Distribution Facility: Team members within the distribution facility will recycle all paper and plastic waste products. Energy efficient lights and equipment will also be utilized within the distribution sales floor. We will also create programs within the organization that will encourage and reward employees for their personal conservation efforts; such as carpooling and riding a bike to work.

MINNESOTA MEDICAL SOLUTIONS - CULTIVATION SECURITY PLAN

A) SECURITY SURVEILLANCE SYSTEM

Video Monitoring System

[redacted]

[redacted]

[redacted]

[redacted]

Locations and coverage

[redacted]

[redacted]

B) PRODUCT SECURITY

[redacted]

[redacted]

[redacted]

Employee Break Room: The employee break room will be in an area without any cannabis production activities occurring.

Security Access Tiers

Cultivation center agents shall follow and maintain Department-approved Operations and Management Practices Plan.

All areas in the cultivation center shall be compartmentalized based on function. Access shall be restricted between compartments in order to manage loss prevention, prevent contamination, and maintain strict environmental controls. Cultivation center agents shall maintain and comply with written policies and procedures for secure and proper production of cannabis. As a minimum, the following policies and shall be implemented and maintained at all times.

[redacted]

Systems Maintenance: All equipment and components within this Electronic Security Plan will be covered by a maintenance plan, which will be implemented in order to have appropriate preventative maintenance in place and minimize the possibility of equipment failure. At a minimum, the system will be inspected and all devices tested on an annual basis by the qualified electronic security provider.

Supporting Security Management Policies

This section supports all other areas of this Security Plan, which demonstrate the capability for the prevention of the theft or diversion of cannabis or cannabis-infused products, and compliance with all security requirements of the State of Minnesota.

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1. **Documentation Procedures for Product Loss and Destruction**

   The cultivation facility will utilize its chosen product inventory / point-of-sale tracking system to keep and maintain product records for a five-year period. These records must be made available for inspection if requested by the commissioner, and, when applicable, other entities within the State of Minnesota:

   1. Production records, including:

      a. Planting, harvest and curing, weighing, destruction of cannabis, creating batches of cannabis-infused products, and packaging and labeling; and

      b. Disposal of cannabis, cannabis-infused products and waste materials

associated with production.

2. Records of any theft, loss or other unaccountability of any cannabis seedlings, clones, plants, trim or other plant material, extracts, cannabis-infused products, or other items containing cannabis.

When inputting information regarding product loss or destruction into its product inventory/point-of-sale tracking system, the cultivation facility must provide:

1. A description of the product loss or destruction (strain name, product type and description)
2. The quantity/volume of the loss/destruction
3. The area of the cultivation facility where the loss/destruction occurred
4. The date and approximate time of the loss/destruction
5. The most reasonable explanation behind the loss/destruction
6. A strategy to address the cause to prevent future loss/destruction by similar means

The cultivation facility will also provide information regarding the product loss/destruction to ISP within 12 hours of the observed or reported loss or destruction.

As with all other processes within the cultivation facility, product destruction processes will be captured by the facility electronic security system (access controls and surveillance).

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3. **Review & Evaluation of Security System, Policies and Procedures:** Once a year, Company management will coordinate the review of all security-related policies and procedures to ensure they remain relevant in terms of risk mitigation, compliance and operational requirements. Management may perform this review utilizing internal staff as well as third-party assistance.

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4. **Security Risk Assessments and Inspections:** During the course of Policy and Procedures review, The Company will coordinate the preparation of updated risk assessments which will feed information to the review and evaluation process.

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5. **Emergency Response Plan:** The dispensary will establish emergency procedures and protocols to be implemented organization wide. Dispensary employees will be fully trained on emergency protocols before beginning employment with the company. The elements of the ERP will include evacuation, robbery or theft, active shooter/workplace violence, severe weather, lockdown, medical emergency, fire emergency, and other potential emergencies. The dispensary shall use a variety of teaching methods which take into account the skills and experience of the individual trainees. The company will also conduct quarterly emergency fire and disaster drills.

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6. **Workplace Violence**: It is Company policy to promote a safe environment for its employees. The Company is committed to working with its employees to maintain a work environment free from violence, threats of violence, harassment, intimidation, and other disruptive behavior. Such behavior can include oral or written statements, gestures, or expressions that communicate a direct or indirect threat of physical harm. No workplace is immune to such events, however such behavior will not be tolerated in our workplace. All reports of incidents will be taken seriously and will be dealt with appropriately. Individuals who commit such acts may be removed from the premises and may be subject to disciplinary action, criminal penalties, or both. Company management will develop policies and procedures for the implementation of a violence-free workplace.

MINNESOTA MEDICAL SOLUTIONS - DISTRIBUTION SECURITY PLAN

A) SECURITY SURVEILLANCE SYSTEM

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B) PRODUCT SECURITY

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Systems Maintenance: All equipment and components within this Electronic Security Plan will be covered by a maintenance plan which will be implemented in order to have apropriate preventative maintenance in place and minimize the possibility of equipment failure. As a minimum, the system will be inspected and all devices tested not exceeding every 30 calendar days from the last test date, by the qualified Electronic Security provider.

Supporting Security Management Policies

This section supports all other areas of this Product Security Plan, which demonstrate the capability for the prevention of the theft or diversion of cannabis or cannabis-infused products, and compliance with all security requirements of the State of Minnesota.

1. **Documentation Procedures for Product Loss and Destruction**

The dispensary facility will utilize its chosen product inventory / point-of-sale tracking system to keep and maintain product records for a five-year period. These records must be made available for inspection if requested by the commissioner, and, when applicable, other Minnesota entities:

1. Production records, including:
    a. Planting, harvest and curing, weighing, destruction of cannabis, creating batches

of cannabis-infused products, and packaging and labeling; and

b. Disposal of cannabis, cannabis-infused products and waste materials associated with production.

2. Records of any theft, loss or other unaccountability of any cannabis seedlings, clones, plants, trim or other plant material, extracts, cannabis-infused products, or other items containing cannabis.

When inputting information regarding product loss or destruction into its product inventory / point-of-sale tracking system, the dispensary facility must provide:

1. A description of the product loss or destruction (strain name, product type and description)
2. The quantity/volume of the loss/destruction
3. The area of the dispensary facility where the loss/destruction occurred
4. The date and approximate time of the loss/destruction
5. The most reasonable explanation behind the loss/destruction
6. A strategy to address the cause to prevent future loss/destruction by similar means

The dispensary facility will also provide information regarding the product loss/destruction to ISP within 12 hours of the observed or reported loss or destruction.

As with all other processes within the dispensary facility, Product Destruction processes will be captured by the facility electronic security system (Access controls and Surveillance).

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3. **Emergency Response Plan (ERP):** The dispensary will establish emergency procedures and protocols to be implemented organization wide. Dispensary employees will be fully trained on emergency protocols before beginning employment with the company. The elements of the ERP will include evacuation, robbery or theft, active shooter/workplace violence, severe weather, lockdown, medical emergency, fire emergency, and other potential emergencies. The dispensary shall use a variety of teaching methods which take

into account the skills and experience of the individual trainees. The company will also conduct quarterly emergency fire and disaster drills.

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4. **Workplace violence**: It is dispensary policy to promote a safe environment for its employees. The dispensary is committed to working with its employees to maintain a work environment free from violence, threats of violence, harassment, intimidation, and other disruptive behavior. No workplace is immune to such events; however, violence, threats, harassment, intimidation, and other disruptive behavior in our workplace will not be tolerated; that is, all reports of incidents will be taken seriously and will be dealt with appropriately. Individuals who commit such acts may be removed from the premises and may be subject to disciplinary action, criminal penalties, or both. Company management will develop policies and procedures for the implementation of a violence-free workplace.

D. OWNERSHIP AND FINANCIAL STRUCTURE

All applicants must provide the following documents:

1. Specify the type of business structure the applicant will have. Include the articles of incorporation; articles of association; charter; by-laws; partnership agreement; any agreements between any two or more members of the applying organization that relate in any manner to the assets, property or profit of the applicant; or any other comparable documents that set forth the legal structure of the applicant or relate to the organization, management or control of the applicant.

Overview of Ownership and Financial Structure:

MinnMed is proud to have created a robust operation owned primarily by Minnesotans with diverse backgrounds and abilities. Our investor group consists of doctors, pharmacists, farmers, veterinarians and teachers, as well as other pillars of the community. Our investors are also financially able to insert substantially more capital into MinnMed, and many have already pledged to do so if needed. We do not anticipate, however, the need for additional capital contributions from our investor base, or others, as MinnMed took considerable time in the development of our business structure to ensure we are financially viable regardless of initial patient numbers.

Our hand-picked management team is both driven and talented and our success will be directly tied to the success of the Company. This is because many of our C-level personnel, who hold sizable equity positions in the Company, will forgo salary for at least the first year. We believe it is not appropriate or financially prudent for officers to reduce any amount of resources until MinnMed is generating strong, sustainable revenues.

MinnMed is structured in such a way that our members will have input in the direction of the company while at the same time providing management the flexibility to react quickly and decisively when needed. We understand this is a new industry and a matter of first impression which will yield many unforeseen challenges. We have created a corporate and organizational structure designed to overcome any such obstacles.

Business Structure:

Minnesota Medical Solutions, LLC is a Minnesota limited liability company. It currently consists of 39 Members, a complete list of which is contained herein. As the enclosed Organizational chart shows, the Chief Manager/CEO will oversee the operations of the Company, with various management positions reporting directly to him/her, subject to the direction of a five member Board of Governors.

Attached are the following documents related to the organizational and legal structure of the company:

1. Certificate of Organization for Executive Health Network, LLC, dated November 02, 2012
2. Articles of Organization for Executive Health Network, LLC, dated November 02, 2012
3. Amendment to Articles of Organization changing company name to Minnesota Medical Solutions, LLC, dated June 6, 2014
4. Operating Agreement of Minnesota Medical Solutions, LLC, dated July 2, 2014
5. Minutes of Action, dated July 3, 2014
6. Minutes of Action, dated July 14, 2014
7. Agreement (to authorize purchase of shares to Ross Hussey and for Hussey to agree to be bound to Company's executed agreements), dated July 21, 2014
8. Agreement (to authorize purchase of shares to Jon Thompson and for Thompson to agree to be bound to Company's executed agreements), dated July 21, 2014
9. Minutes of Action, dated July 24, 2014
10. Amended and Restated Operating and Member Control Agreement, dated July 31, 2014
11. Agreement for Partial Redemption of Class B Membership Units Owned by Kyle Kingsley, M.D., dated August 1, 2014
12. Minutes of Action (redemption of membership units), dated August 1, 2014
13. Minutes of Action (transfer of membership units), dated August 2, 2014
14. Special Meeting of Members and Governors (election of Board of Governors), dated September 30, 2014.
15. Certificate of Assumed Name: MinnMed
16. Certificate of Assumed Name: Minnesota Botanical Solutions
17. Schedule B to Operating Agreement (See Tab I)
18. Class A Share Contribution Agreements (See Tab J)
19. Class B Share Contribution Agreements (See Tab K)

Patient, Parent and Caregiver Advisory Board

MinnMed has also formed a "Patient and Parent Advisory Board" that will meet at least quarterly to give us feedback from patients and the parents/caretakers of our patients. Our first few meetings with several patient parents and patients, undisclosed herein for privacy reasons during the application process, have been very fruitful and led to multiple changes to the MinnMed plan. Their direct input is reflected throughout the MinnMed application. This group will meet quarterly to discuss improvements to the MinnMed patient experience and to learn how we can better serve our patients.

Scientific Advisory Board

MinnMed has formed an extensive "Scientific Advisory Board" to provide additional scientific guidance to our team. This board will meet remotely on a quarterly basis and have an annual one-day event. The main purpose of this board will be to drive our research initiatives. We will focus on patient-care oriented initiatives. Please see the bonus materials section E, #10 for a more in-depth outline and the resumes of our scientific advisory board.

Minnesota CannaCare

MinnMed has begun forming Minnesota CannaCare. This organization will be a 501(c) non-profit organization pending formal registration for non-profit status. This organization will focus on several goals:

1) Become the industry trade organization for the state of Minnesota to help coordinate the activities of the two producers in the state. This will be dependent on the other manufacturer and it is possible that the formation of another organization may be necessary to fulfill this role.

2) Strive to lower patient costs by accepting donations from public and private sources to help defer patient costs.

3) Run community programs via MinnMed's donations. MinnMed plans to give 3% of net profits to Minnesota CannaCare.

4) Administration of the MinnMed house, enabling families with ill children to live in Minnesota awaiting their residency status change to use high-CBD or other cannabis-based medications at no or very low cost. We will actively seek industry support and public donations to support this effort.

Currently, Dr. Kingsley and Brian Harvey will be the initial directors of Minnesota CannaCare, but these directorships will be passed to a third party if MinnMed is successful in its bid to obtain a cannabis production license in the state of Minnesota.

Office of the Minnesota Secretary of State
Certificate of Organization

I, Mark Ritchie, Secretary of State of Minnesota, do certify that: The following business entity has duly complied with the relevant provisions of Minnesota Statutes listed below, and is formed or authorized to do business in Minnesota on and after this date with all the powers, rights and privileges, and subject to the limitations, duties and restrictions, set forth in that chapter.

The business entity is now legally registered under the laws of Minnesota.

Name:	Executive Health Network LLC
File Number:	625651900041
Minnesota Statutes, Chapter:	322B
This certificate has been issued on:	11/02/2012

Mark Ritchie

Mark Ritchie
Secretary of State
State of Minnesota

62565190004

LLC 0R

MINNESOTA SECRETARY OF STATE
ARTICLES OF ORGANIZATION FOR A LIMITED LIABILITY COMPANY
MINNESOTA STATUTES CHAPTER 322B

Filing Fee: $160.00

READ THE INSTRUCTIONS BEFORE COMPLETING THIS FORM

1. Name of Company: **Executive Health Network LLC** ✓

(The Company name must include the words Limited Liability Company or the abbreviation LLC)

2. Registered Office Address: (P.O. Box is Unacceptable)

4920 Drew Ave. South, Minneapolis MN **55410** ✓

Complete Street Address or Rural Route and Rural Route Box Number — City — Zip Code

3. Name of Registered Agent (optional): **Kyle Kingsley** ✓

4. Business Mailing Address: (if different from registered office address)

4920 Drew Ave. South, Minneapolis, Minnesota 55410

Address — City — State — Zip Code

5. Desired Duration of LLC: (in years) _____ (If you do not complete this item, a perpetual duration is assumed by law.)

6. Does this LLC own, lease or have any interest in agricultural land or land capable of being farmed?
(Check One) Yes _____ No ✓

7. Name and Address of Organizer(s):

Name (print)	Complete Address (Street, City, State, Zip)	Signature
Karla Figueroa	101 N. Brand Blvd., 11th Floor Glendale, CA 91203	

STATE OF MINNESOTA
DEPARTMENT OF STATE
FILED
NOV 02 2012
Mark Ritchie
Secretary of State

8. List a name, daytime phone number, and e-mail address of a person who can be contacted about this form.

Shikha Chand — Contact Name
(323) 962-8600 x 883 — Phone Number
onlinefilings@legalzoom.com — E-Mail Address

D1. Attachment: Articles of Organiation for Executive Health Network

Office of the Minnesota Secretary of State

Minnesota Limited Liability Company | Amendment to Articles of Organization

Minnesota Statutes, Chapter 322B

Read the instructions before completing this form.
Filing Fee: $55 for expedited service in-person and online filings, $35 if submitted by mail

1. List the name of this company currently on file with the Office of the Minnesota Secretary of State: (Required)

Executive Health Network LLC

2. The articles of organization for this Limited Liability Company are amended pursuant to Chapter 322B.

AMENDMENT OPTIONS: Complete as many amendment options as apply. Complete an option only if you are changing the information related to that option.

3. The company name is changed to:

Minnesota Medical Solutions LLC

4. The registered office address is changed to:

5200 Willson Rd Suite 150	Edina	MN	55424
Street Address *(A post office box by itself is not acceptable)*	City	State	Zip Code

5. The registered agent is changed to:

6. List the date the expiration date has changed to in the jurisdiction of its organization, or list the word "perpetual"

mm/dd/yyyy or Perpetual

7. The business mailing address has changed to:

5200 Willson Rd Suite 150	Edina	MN	55424
Address	City	State	Zip Code

8. The articles of organization are otherwise amended as follows:

9. I, the undersigned, certify that I am signing this document as the person whose signature is required, or as agent of the person(s) whose signature would be required who has authorized me to sign this document on his/her behalf, or in both capacities. I further certify that I have completed all required fields, and that the information in this document is true and correct and in compliance with the applicable chapter of Minnesota Statutes. I understand that by signing this document I am subject to the penalties of perjury as set forth in Section 609.48 as if I had signed this document under oath.

Kyle Kingsley	6/6/14
Signature of Authorized Person or Authorized Agent	Date

Email Address for Official Notices
Enter an email address to which the Secretary of State can forward official notices required by law and other notices:

☒ Check here to have your email address excluded from requests for bulk data, to the extent allowed by Minnesota law.

D1. Attachment: Amendment to Articles of Organization

Office of the Minnesota Secretary of State

Minnesota Limited Liability Company | Amendment to Articles of Organization

Minnesota Statutes, Chapter 322B

List a name and daytime phone number of a person who can be contacted about this form:

Kyle Kingsley [redacted]

Contact Name Phone Number

Entities that own, lease, or have any financial interest in agricultural land or land capable of being farmed must register with the MN Dept. of Agriculture's Corporate Farm Program.

Does this entity own, lease, or have any financial interest in agricultural land or land capable of being farmed?

Yes ☐ No ☒

Work Item 764463300023
Original File Number 625651900041

STATE OF MINNESOTA
OFFICE OF THE SECRETARY OF STATE
FILED
06/06/2014 11:59 PM

Mark Ritchie

Mark Ritchie
Secretary of State

D1. Attachment: Amendment to Articles of Organization

STATE OF MINNESOTA

DEPARTMENT OF STATE

I hereby certify that this is a true and complete copy of the document as filed for record in this office.

DATED 9/11/2014

Mark Ritchie

Secretary of State

By Brenda Rosenack

D1. Attachment: Amendment to Articles of Organization

OPERATING AGREEMENT OF MINNESOTA MEDICAL SOLUTIONS LLC

THIS AGREEMENT of MINNESOTA MEDICAL SOLUTIONS LLC, a single-member Minnesota limited liability company (the "Company"), is made as of July 2, 2014 by and between the Company and Kyle Kingsley (the "Member"), an individual residing in the State of Minnesota.

ARTICLE 1. FORMATION

The Member hereby forms a limited liability company subject to the provisions of the Limited Minnesota Liability Act (the "Act") as currently in effect.

ARTICLE 2. PURPOSES AND POWERS

2.1 Purpose. The Company's purpose is to pursue any lawful purpose for which a limited liability company may be organized under Minnesota law and to undertake activities related to that purpose.

2.2 Powers. The Company will have all of the powers of a limited liability company set forth in the Act.

2.3 Duration. The Company will continue until it is dissolved, liquidated, and terminated under Article 9.

ARTICLE 3. OFFICES

3.1 Principal Office. The Company's principal office will initially be at 5200 Willson Road, Suite 150, Edina, Minnesota, but the Member, in his discretion, may cause the Company to keep and maintain offices wherever the Company's business may require.

3.2 Registered Agent and Office. The Company will continuously maintain a registered office and a registered agent in the State of Minnesota whose business office is identical with the registered office. The initial registered office is at ENTREPARTNER LAW FIRM, PLLC, 4470 West 78th Street Circle, Suite 210, Bloomington, Minnesota, and the initial registered agent at that address is Marshall S. Lichty. The Company may change its registered office, its registered agent, or both, by filing a statement with the Minnesota Secretary of State.

ARTICLE 4.
MEMBER AND CAPITAL

4.1 Sole Member. Kyle Kingsley is the Company's sole Member.

4.2 Capital Contributions. The Member has contributed to the Company the assets as reflected on the Company's books and has obtained the Membership Interest described on Exhibit "A." The Member may contribute additional cash or other assets to the Company as the Member and the Company may agree. No person has the right to enforce any obligation of the Member to contribute capital to the Company.

4.3 Additional Contributions. Except as the Act otherwise provides, the Member is not required to contribute additional capital to the Company. The Member may make additional capital contributions to the Company from time to time as the Member wishes.

4.4 Limited Liability of Member. The Member's liability will be limited to the maximum extent possible as set forth in this Agreement and the Act. A Member will not be personally liable for any of the Company's debts or losses beyond his capital contributions. The Member may, however, voluntarily agree to be liable on the Company's debt or obligation by entering into a separate written agreement or other undertaking, provided, however, that no Member may commit another Member to be liable on the Company's debt or obligation unless the other Member authorizes as much in writing.

4.5 Meetings of Member. Meetings of the Member may be held at such place as the Member determines. There need not be annual meetings.

4.6 Action of Member without a Meeting. Action required or permitted to be taken at a Member meeting may be taken without a meeting if the action is demonstrated by a written consent describing the action taken and signed by the Member. Action taken under this provision is effective as of the date of the Member's signature on the written action unless the action specifies a different effective date, in which case the action will be effective as of the specified date.

4.7 Termination of Member's Interest. The Member will cease to be a member upon the Member's death, incompetency, or bankruptcy, or upon assignment of the Member's entire membership interest. Unless there are one or more other members of the Company, the person who is the holder of the Member's interest immediately after the Member ceases to be a member will become a member. If there are one or more other members of the Company at the time the Member ceases to be a member, the person who holds the Member's interest immediately after the Member ceases to be a member will become a member only with the consent of the other member or members.

4.8 Transferability of Interest. The Member's interest in the Company is transferable, either voluntarily or by operation of law, provided such transfer is accomplished under applicable federal and state securities laws. The Member may dispose of all or a portion of the Member's interest.

(a) Notwithstanding any of the Act's provisions to the contrary, on any disposition of all (but not less than all) of the Member's interest, the transferee will be admitted as a Member when the transfer is complete without further action. By accepting the transfer, the transferee will be deemed to have accepted this Agreement's provisions. On transferring the Member's entire interest (other than a transfer by way of pledge or security interest), the Member will cease to be a Member and has no further rights or obligations under this Agreement.

(b) Upon the transfer of less than all of the Member's interest, the transferee may be admitted as a new Member. A new Member will be required to consent in writing to the provisions of this Agreement, modified to reflect the new Member's admission.

ARTICLE 5.
TAX MATTERS

Under the regulations in § 7701 of the Internal Revenue Code of 1986, as amended, but only for purposes of U.S. federal income and all applicable state and local income tax purposes, the Company elects to be taxed as an S-corporation. Notwithstanding anything to the contrary in this Agreement, the Company will operate in compliance with federal and state tax laws about S-corporations. To the extent any provisions in the Articles of Organization or the Company's agreements, if any, are not in compliance with tax law about the Company's Subchapter S treatment, those provisions are null and void.

ARTICLE 6.
ALLOCATIONS AND DISTRIBUTIONS

6.1 Ownership. Ownership rights in the Company are reflected in Membership Units and include a Member's financial rights and governance rights. A Person who owns a Membership Unit is a Member. The names of the Members, their agreed-upon respective capital contributions, and the number of Membership Units granted are reflected on Schedule A, which is attached to this Agreement. The Company and the Member acknowledge and agree that the Member has made the Capital Contributions and the Company has accepted them. The Company is authorized to issue one thousand (1,000) Membership Units.

6.2 Allocation of Net Profits and Losses. Net profits and net losses for each fiscal year (or portion thereof) will be allocated to the Member.

6.3 Intent of Allocations. The Company and Member intend that allocations of net income and net loss to the Member(s) under to this Agreement will be consistent with the provisions of § 1366 of the Internal Revenue Code dealing with the allocation of net income and net loss to S Corporation shareholders.

6.4 Distributions. Subject to the restrictions under the Act, the Company may make distributions of cash or property from time to time as the Member directs, so long as the Member determines such amounts are not needed and are not reasonably expected to be needed for the Company's normal operating expenses, for payment of Company obligations, or for establishing reasonable reserves for those expenses and obligations.

ARTICLE 7.
MANAGEMENT

7.1 Management. The Member has the sole right to manage and conduct the Company's business. Actions by the Member relating to the Company's management may be memorialized in written resolutions signed by the Member, but written resolutions are not required to authorize action.

7.2 Authority of Member. The Member has the full power and authority to authorize, approve, or undertake any action on the Company's behalf and to bind the Company without the necessity of a meeting. The Member's authority includes, without limitation, the authority to: (a) sell, lease, exchange, mortgage, pledge, or otherwise transfer or dispose of all or substantially all of the Company's property or assets; (b) delegate any and all power and authority related to the Company's business and affairs to any individual or entity; (c) merge the Company with any other entity; (d) amend the Company's Articles of Organization or this Agreement; or (e) change the nature of the Company's business.

7.3 Compensation and Reimbursement. The Member is entitled a salary for services provided to the Company that is reasonable and consistent with industry standards. In addition, the Member is entitled to reimbursement from the Company for reasonable expenses incurred on the Company's behalf, including expenses incurred in the Company's formation, dissolution, and liquidation.

7.4 Duties. The Member will carry out his duties in good faith, in a manner he or she believes to be in the best interests of the Company, and with such care as an ordinary prudent person in a like position would use under similar circumstances.

7.5 Elimination of Fiduciary Duties. The Member will have no fiduciary duties to the Company other than the contractual obligation of good faith and fair dealing. The Member may compete with the Company's business, is not required to refrain from dealing with the Company in the conduct or winding up of the Company's business as or on behalf of a party having an interest adverse to the Company, and is not obligated to account to the Company and hold as trustee any property, profit, or

benefit derived by the Member in conducting or winding up the Company's business or derived from the Member's use of the Company's property, including (without limitation) an appropriation of an opportunity of the Company.

ARTICLE 8.
ADMINISTRATION

8.1 Books and Records. The Company may keep such books and records relating to the Company's operation as are appropriate and adequate for the Company's business. The books and records are to be available for inspection by the Member at the Company's principal office.

8.2 Separate Accounts. The Company's funds, assets, properties, and accounts must be maintained separately, and may not be commingled with the Member's or any other person's.

8.3 Fiscal Year. The Company's fiscal year will be the calendar year.

ARTICLE 9.
DISSOLUTION, LIQUIDATION, AND TERMINATION

9.1 Events of Dissolution. The Company will dissolve on the earlier of (a) the Member's approval of dissolution; or (b) such time as the Company has no members. Neither the Member's death, incompetency, bankruptcy, nor assignment of his entire membership interest will dissolve the Company.

9.2 Winding Up and Liquidation. Upon the Company's dissolution, the Member must wind up the Company's affairs. If the Company's affairs are to be wound up, a full account must be taken of the Company's assets and liabilities, and the Company's assets must then be liquidated. The proceeds must first be paid to Company's creditors in satisfaction of all the Company's liabilities and obligations, including, to the extent permitted by law, liabilities and obligations owed to the Member as a creditor. Any remaining proceeds may then be distributed to the Member. The Company's property may be distributed in kind in the process of winding up and liquidation.

9.3 Negative Capital Account. The Company will make reasonable provision to pay all claims and obligations, including all contingent or conditional claims and obligations, known to the Company. If there are sufficient assets, such claims and obligations will be paid or provided for according to their priority. If the Member has a negative balance in the Member's capital account on the Company's liquidation, the Member will have no obligation to make any contribution to the Company's capital to make up the deficit, and the deficit will not be considered a debt owed to the Company or any other person for any purpose.

9.4 Termination. Upon completion of the winding up of the Company, the Member or such other person or persons required by law to wind up the Company's affairs will file articles of dissolution with the Minnesota

Secretary of State and take such other actions as may be necessary to terminate the Company.

ARTICLE 10.
INDEMNIFICATION AND LIABILITY LIMITATION

10.1 Indemnification. The Company must indemnify the Member to the fullest extent permissible under the law of the State of Minnesota against all liability, loss, and costs (including, without limitation, attorneys' fees) incurred or suffered by the Member by reason of or arising from the fact that the Member is or was a member of the Company, or is or was serving at the the Company's request as a manager, member, director, officer, partner, trustee, employee, or agent of another foreign or domestic limited liability company, corporation, partnership, joint venture, trust, benefit plan, or other enterprise. The Company may, by action of the Member, provide indemnification to the Company's employees and agents who are not members. The indemnification provided in this section is not exclusive of any other rights to which any person may be entitled under any statute, agreement, resolution of the Member, contract, or otherwise.

10.2 Limitation of Liability. The Member is not liable to the Company for monetary damages resulting from the Member's conduct except to the extent that the Act, as it now exists or may be amended in the future, prohibits the elimination or limitation of liability of members of limited liability companies. No repeal or amendment of this section or of the Act will adversely affect any right or protection of the Member for actions or omissions before the repeal or amendment.

ARTICLE 11.
MISCELLANEOUS

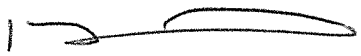
11.1 Notices. Any notice that may be given in connection with the Company's business or that this Agreement provides for is will be given in writing and may be delivered personally, by facsimile, or by mail.

11.2 Amendment and Waiver. No change, modification, waiver or amendment to this Agreement will be valid unless it is in writing and signed by the Member.

11.3 Severability. If any provision of this Agreement is invalid or unenforceable, it will not affect the remaining provisions.

11.4 Governing Law. The laws of the State of Minnesota will govern this Agreement.

The parties hereto have executed this Agreement as of the date first set forth above.

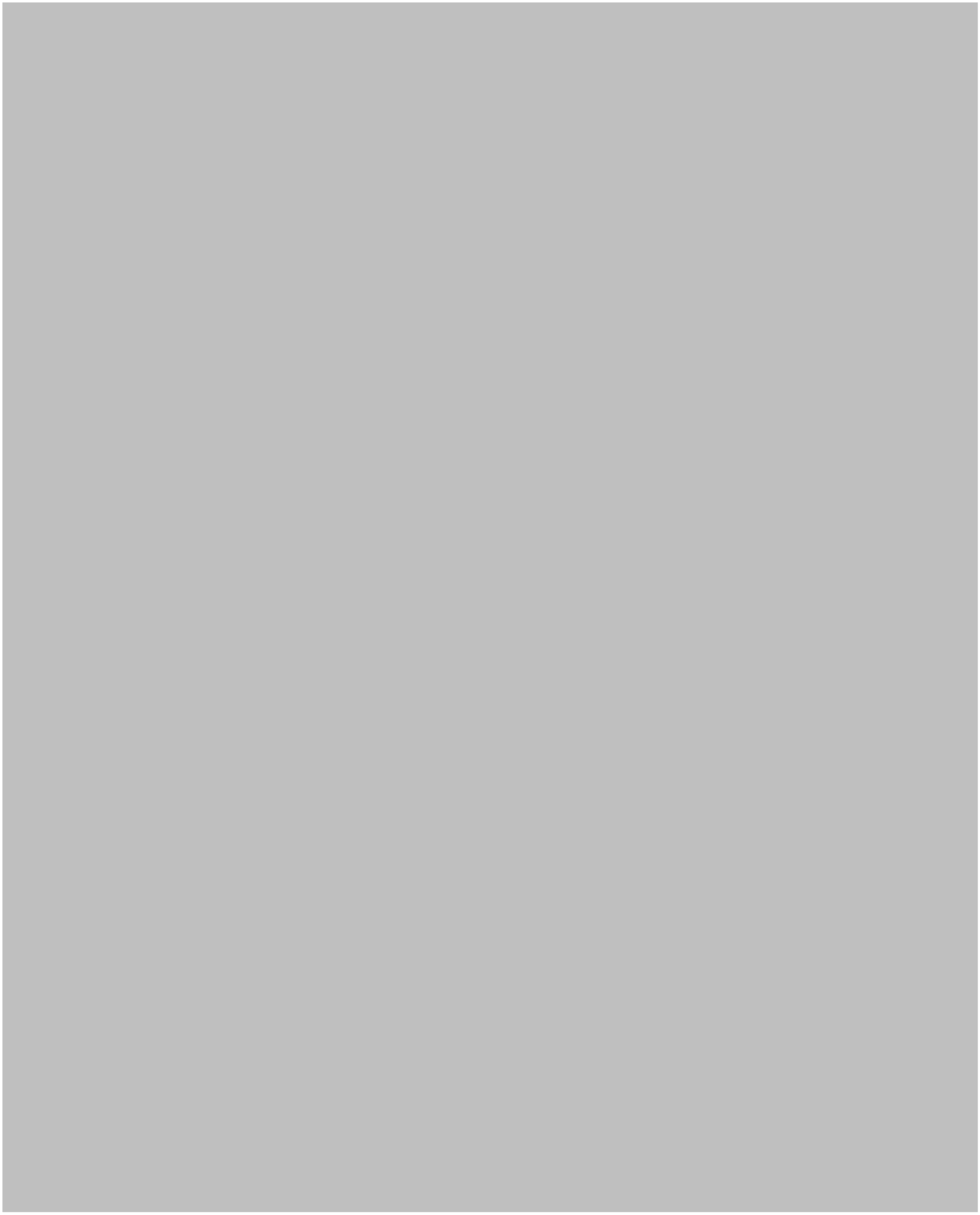


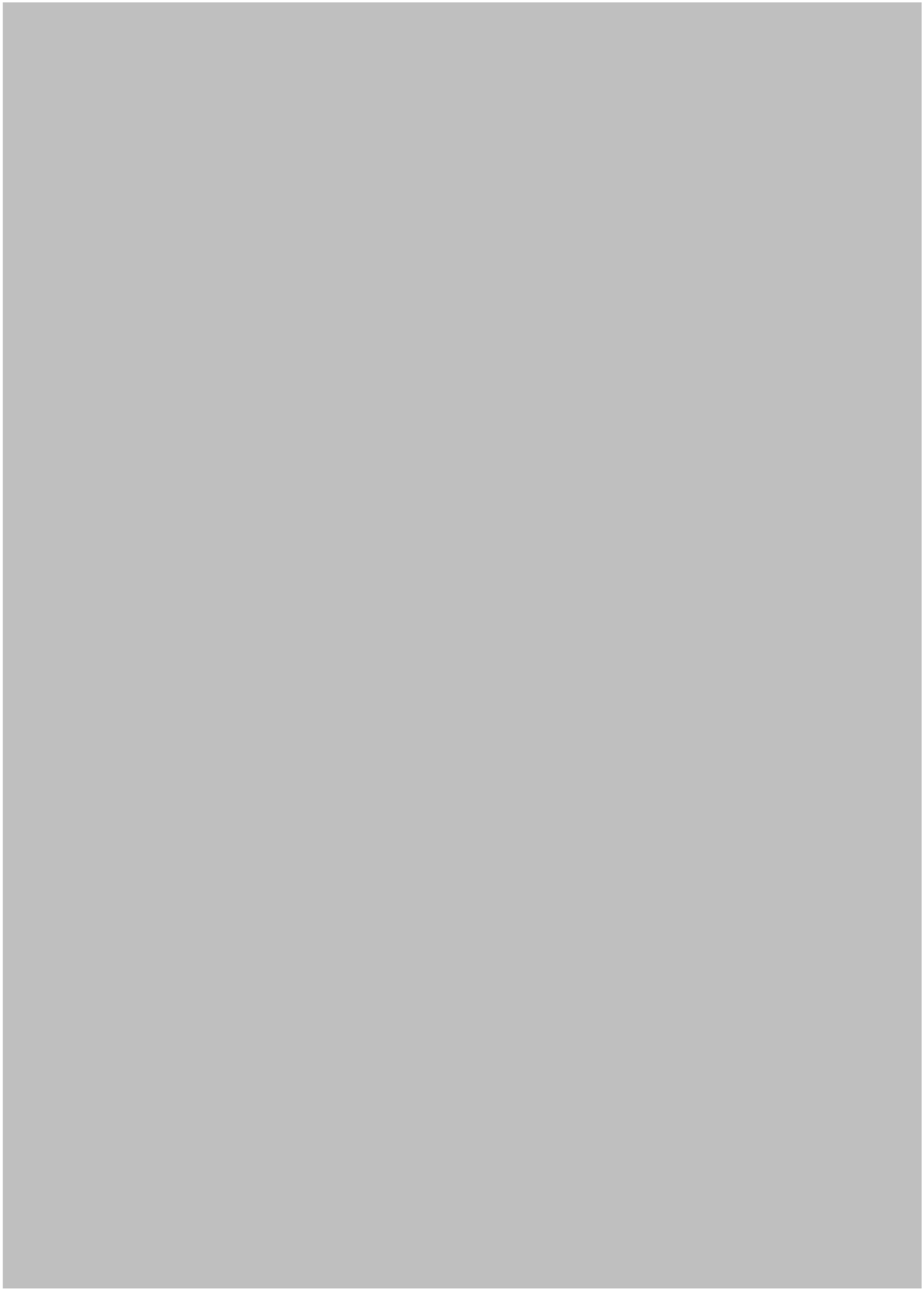
Kyle Kingsley
Sole Member/Chief Manager
MINNESOTA MEDICAL SOLUTIONS LLC

EXHIBIT A
CAPITAL CONTRIBUTIONS
As of July 2, 2014

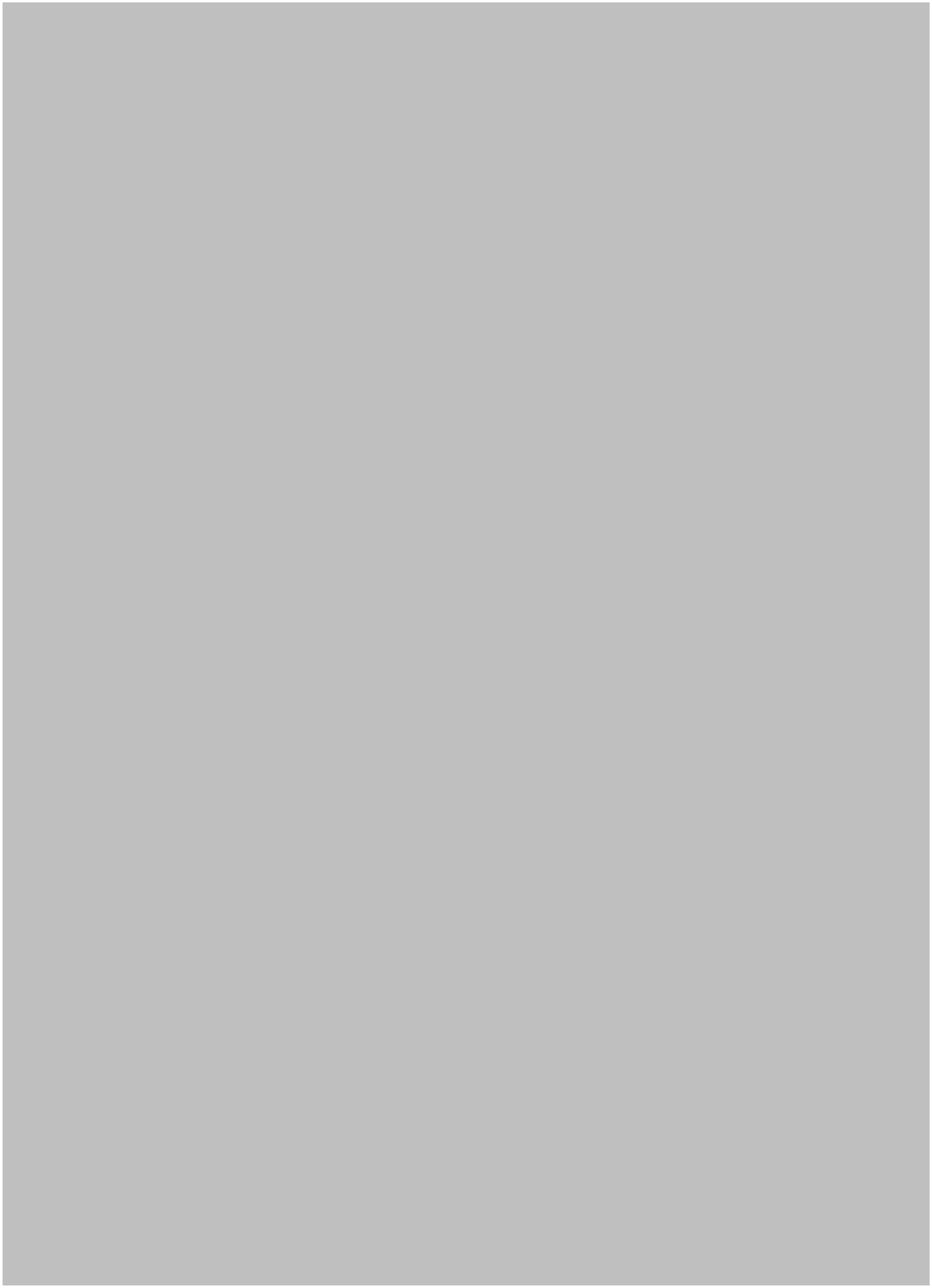
This Exhibit will be amended from time-to-time to reflect the issuance, transfer, or repurchase of Units. Capital contributions will be reflected on the Company's books.

Member's Name & Address	Membership Interest (# Units)	Percentage Interest
Kyle Kingsley	1,000	100%

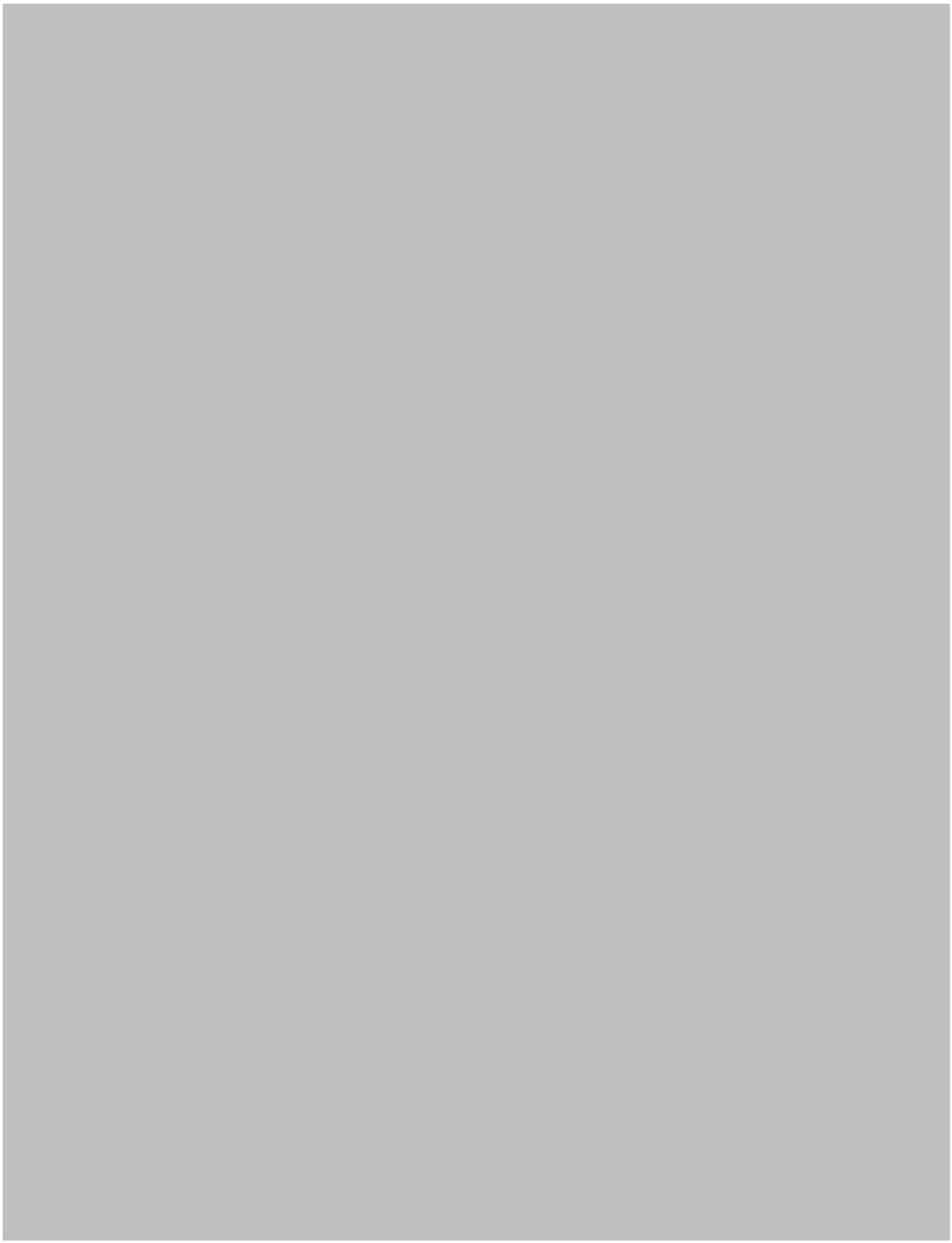




D1. Attachment: Minutes of Action 7/3/14



D1. Attachment: Minutes of Action 7/3/14



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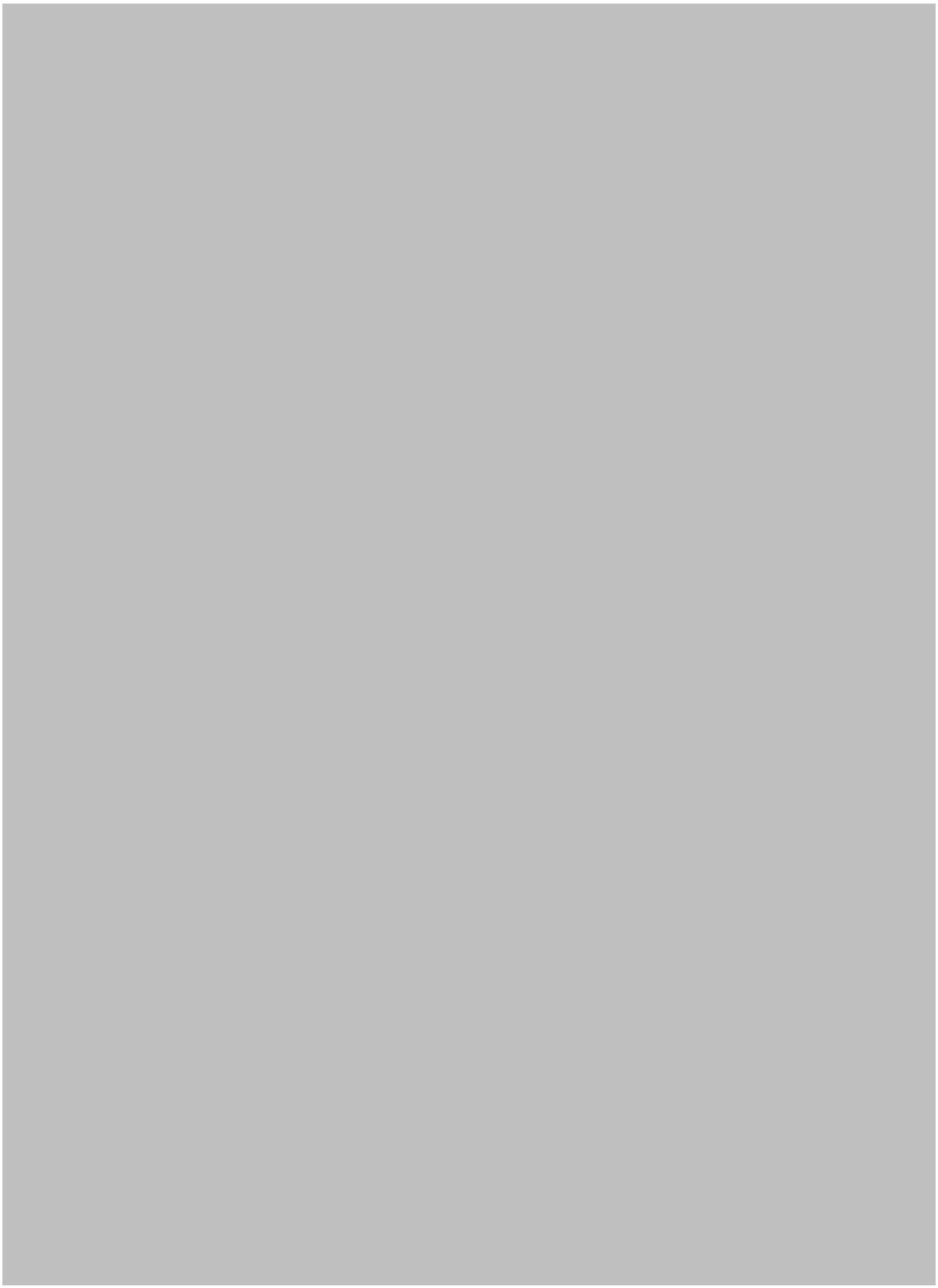

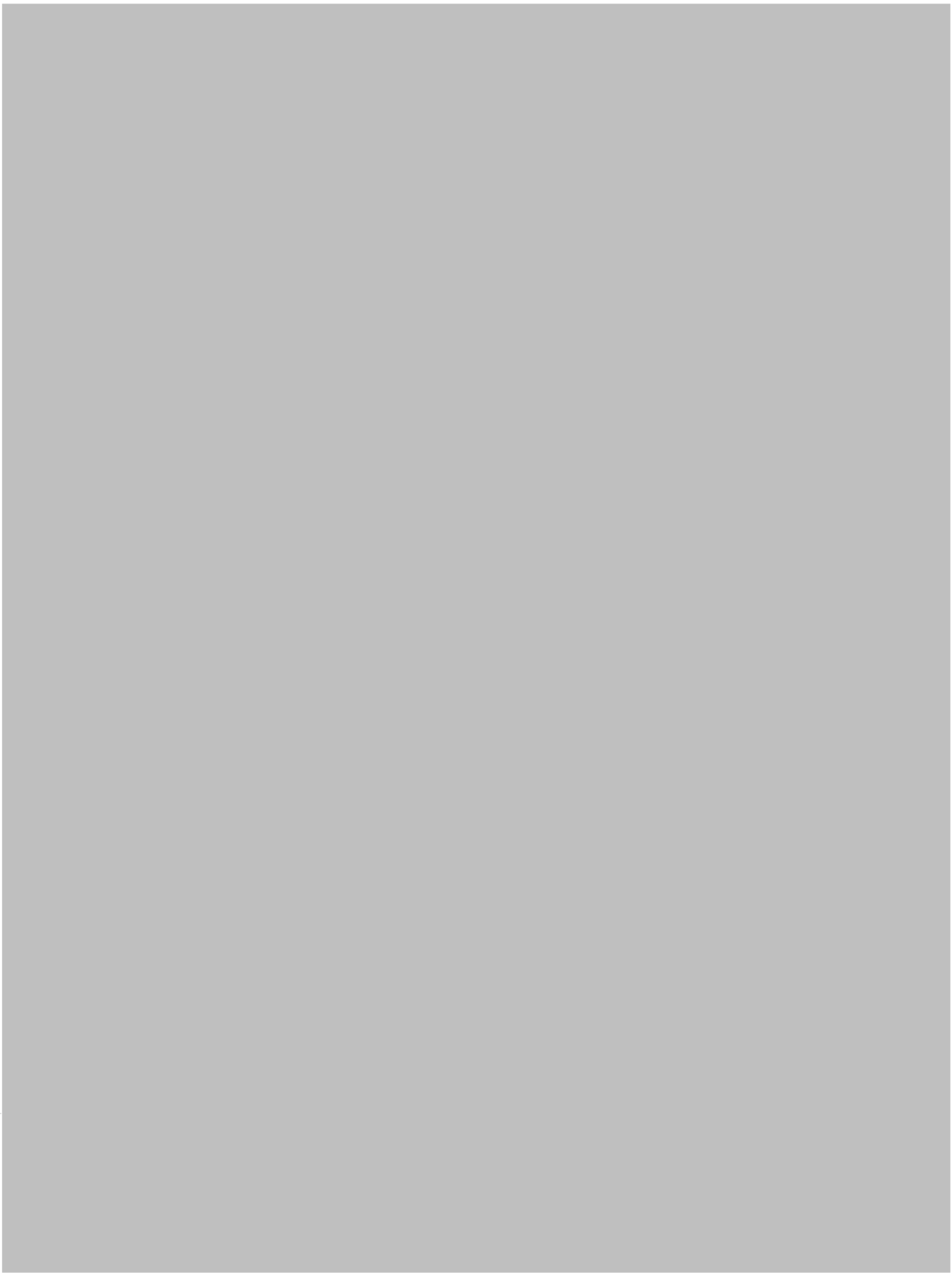

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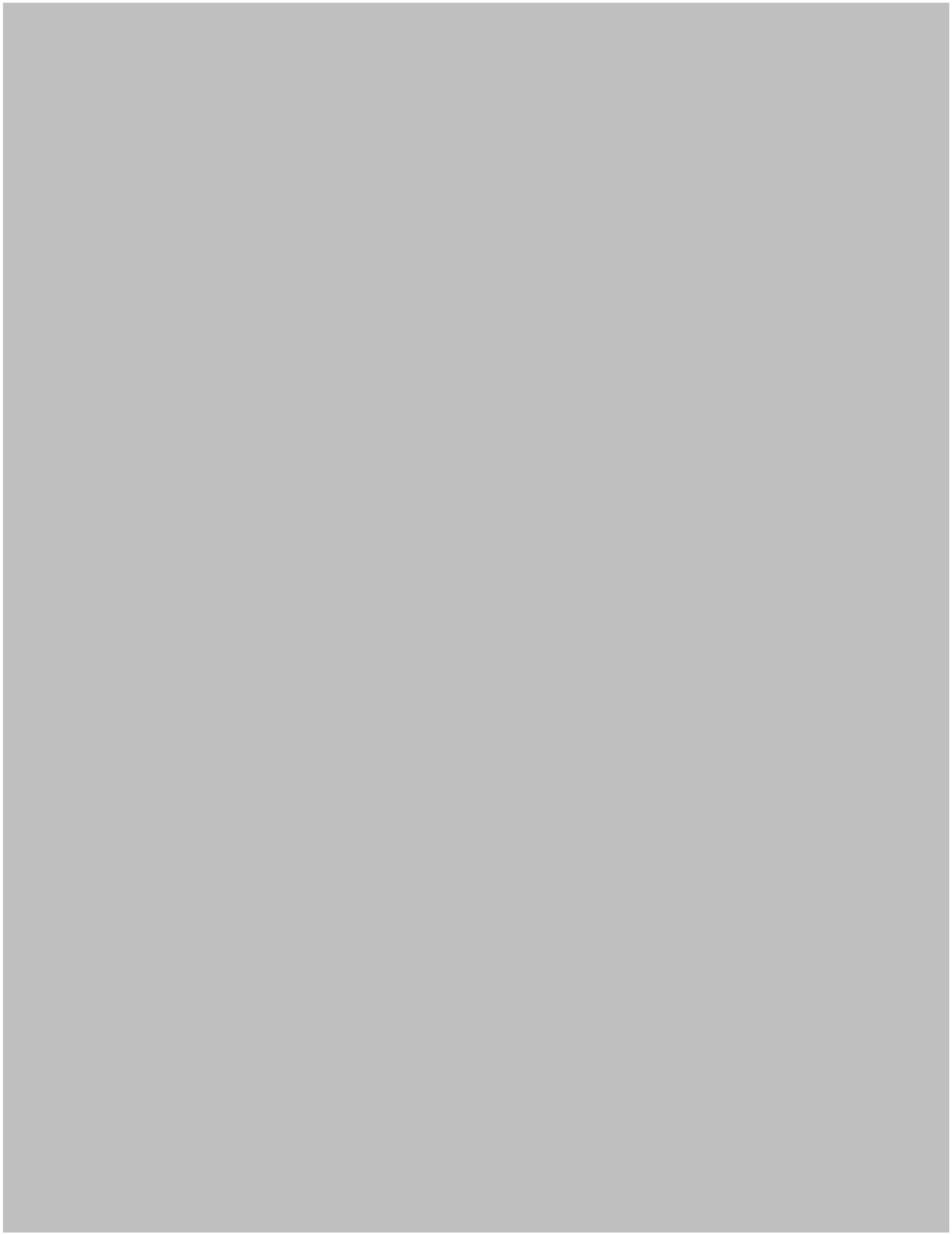
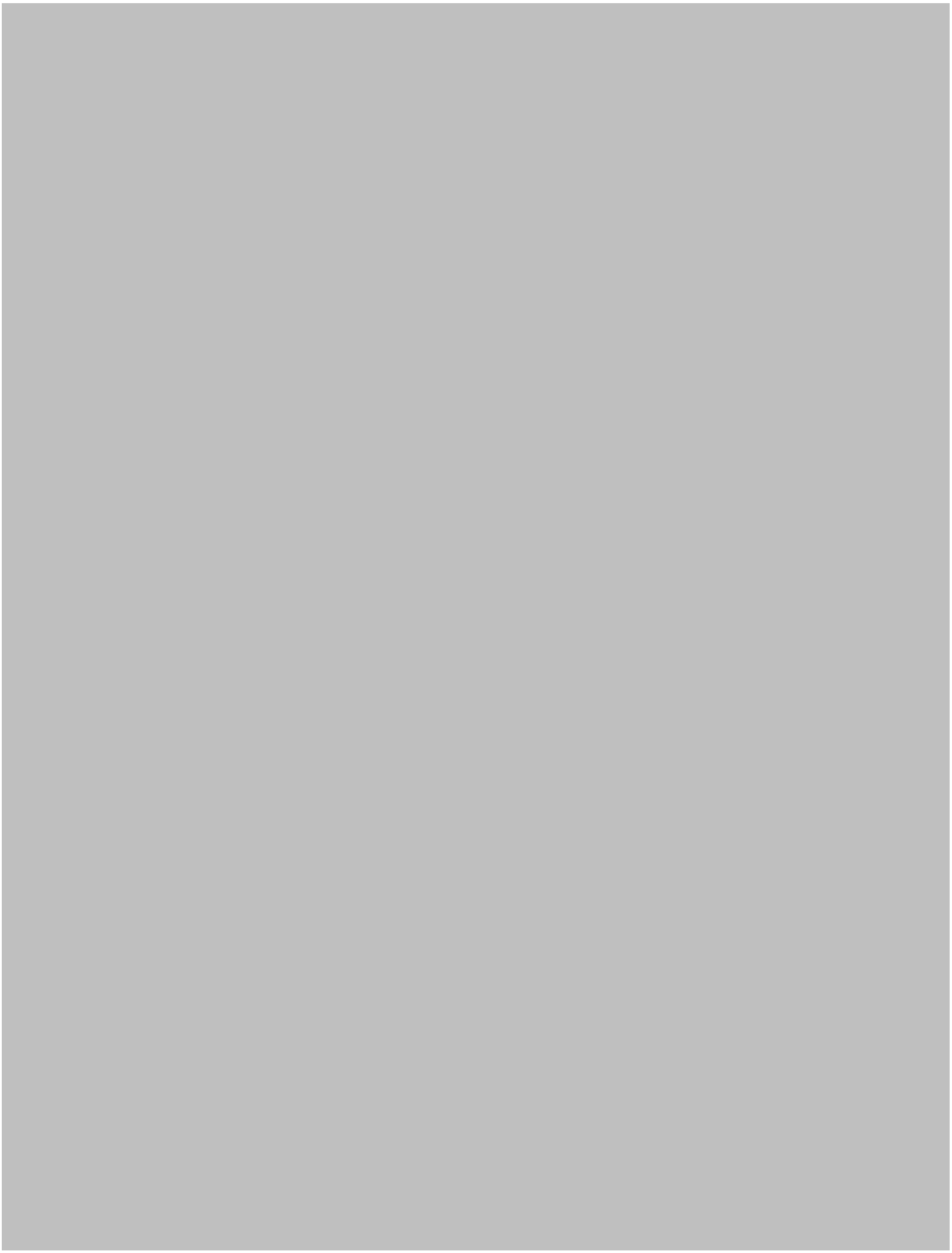
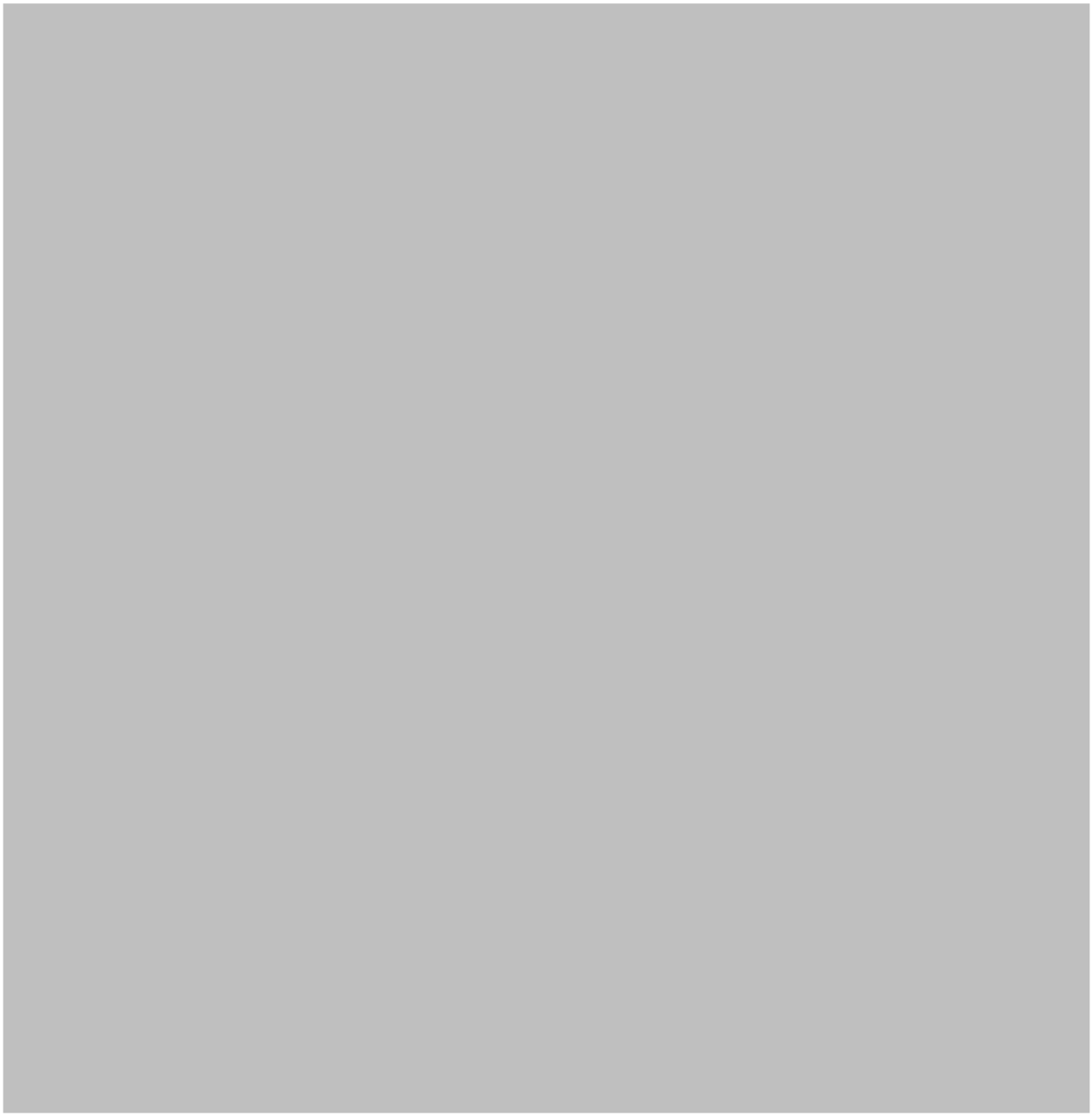
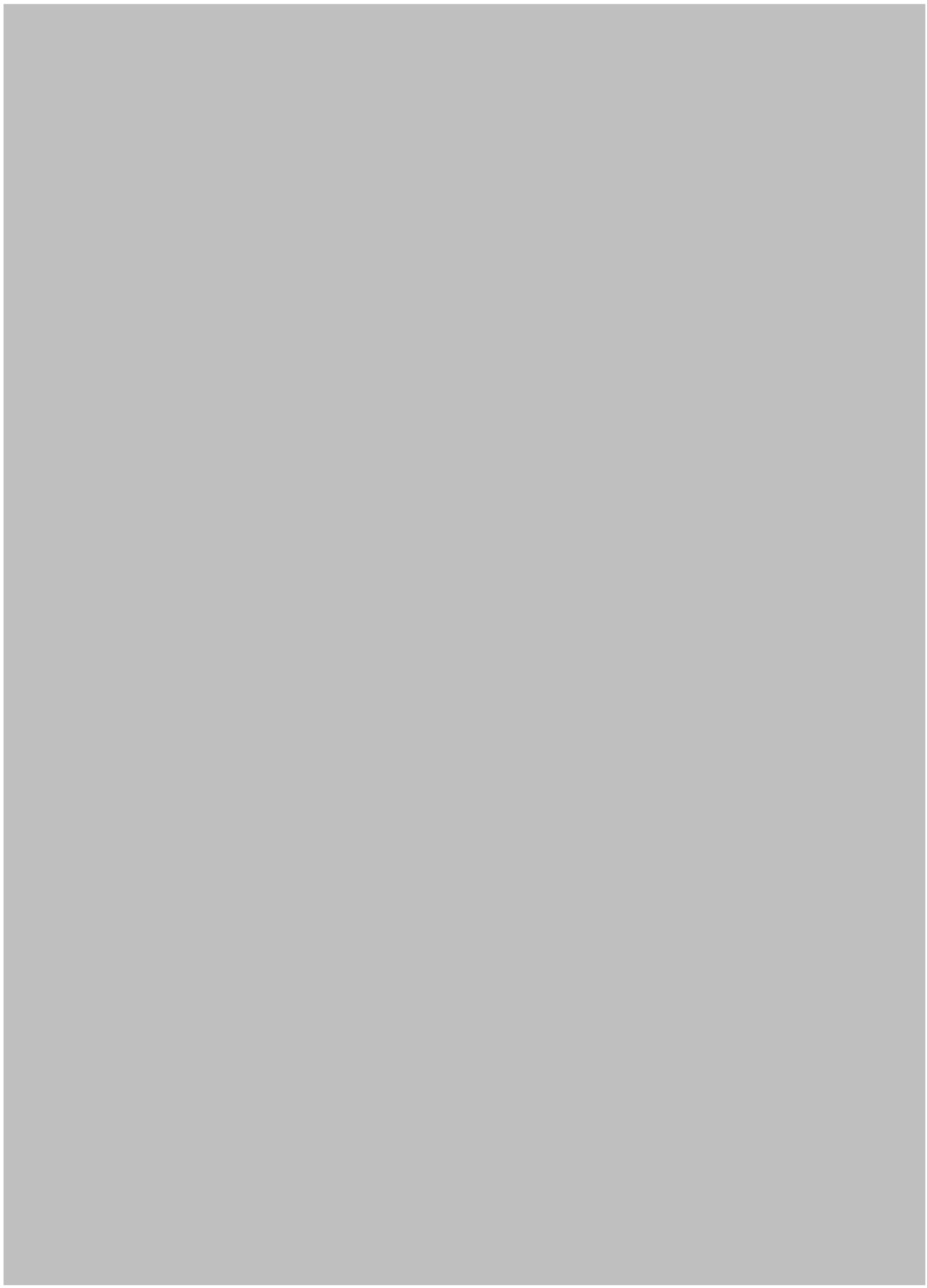
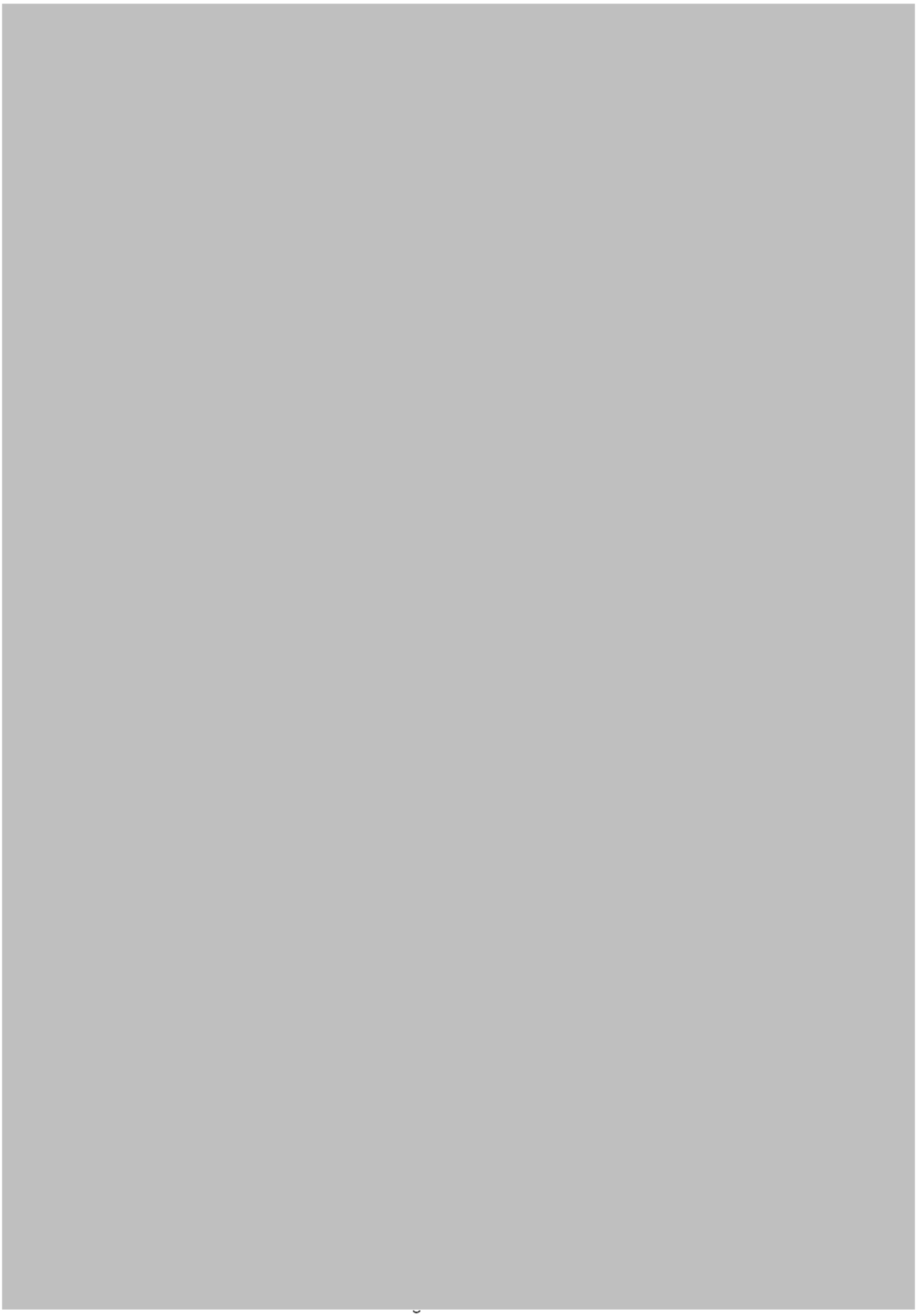
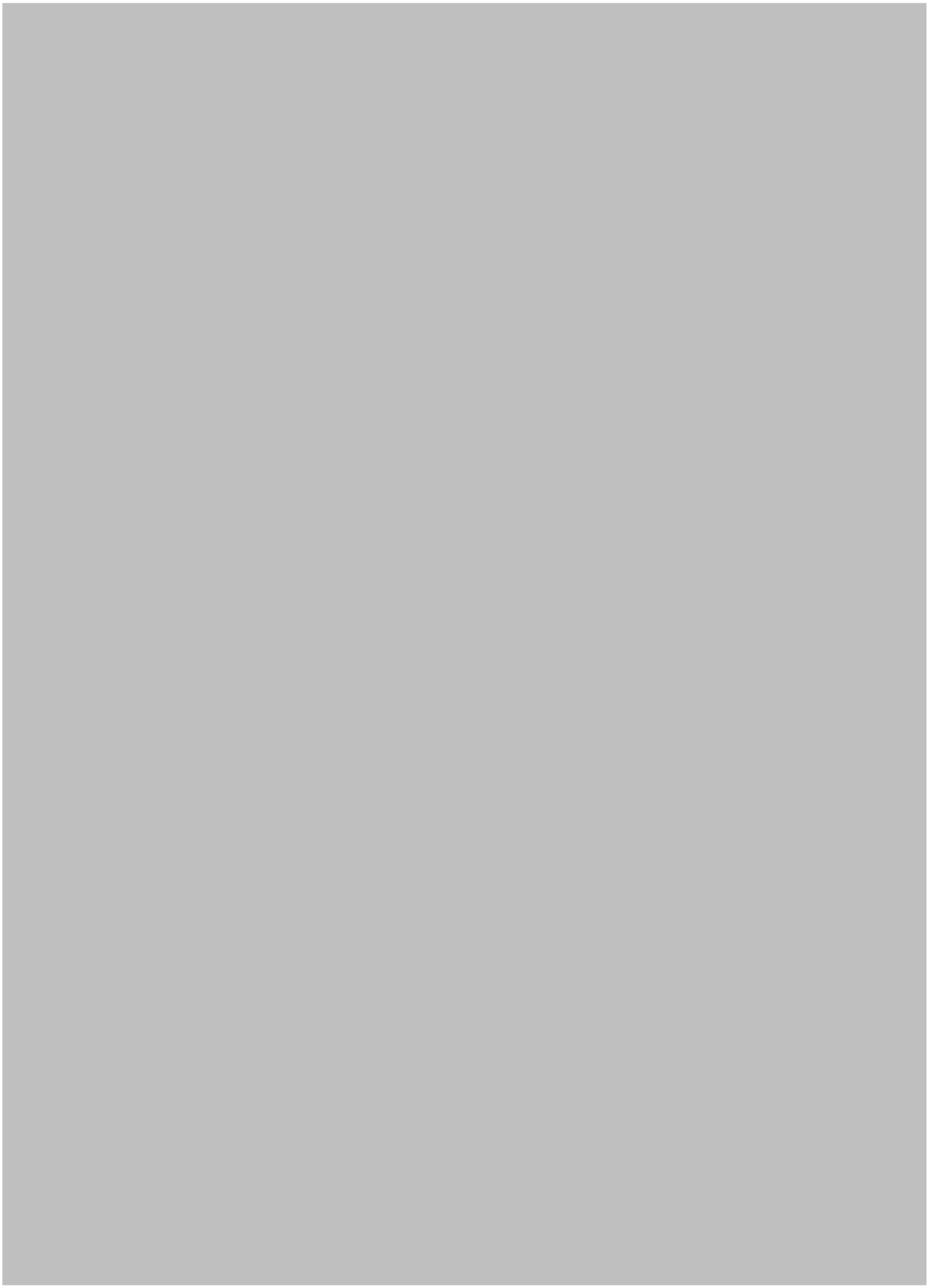


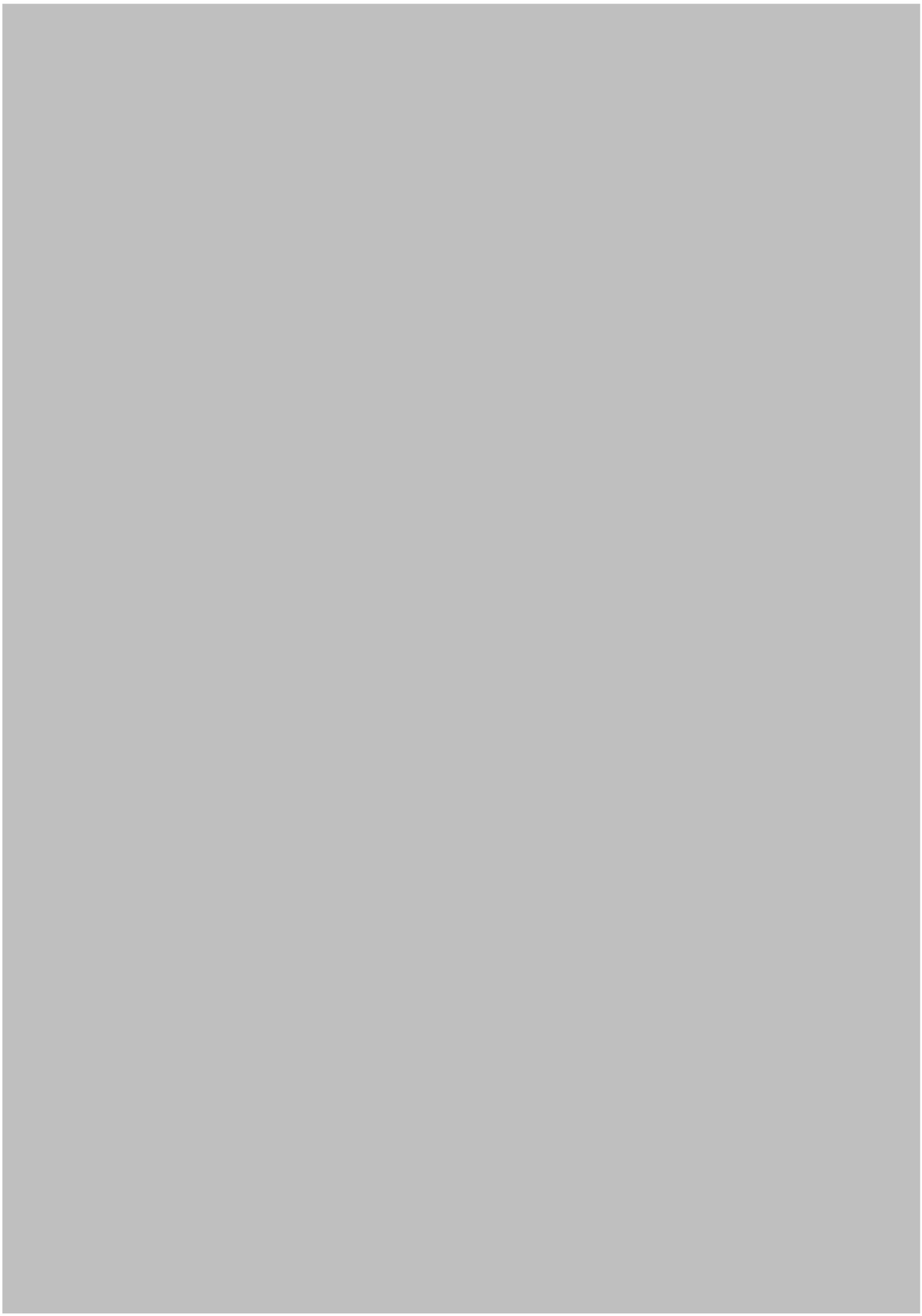


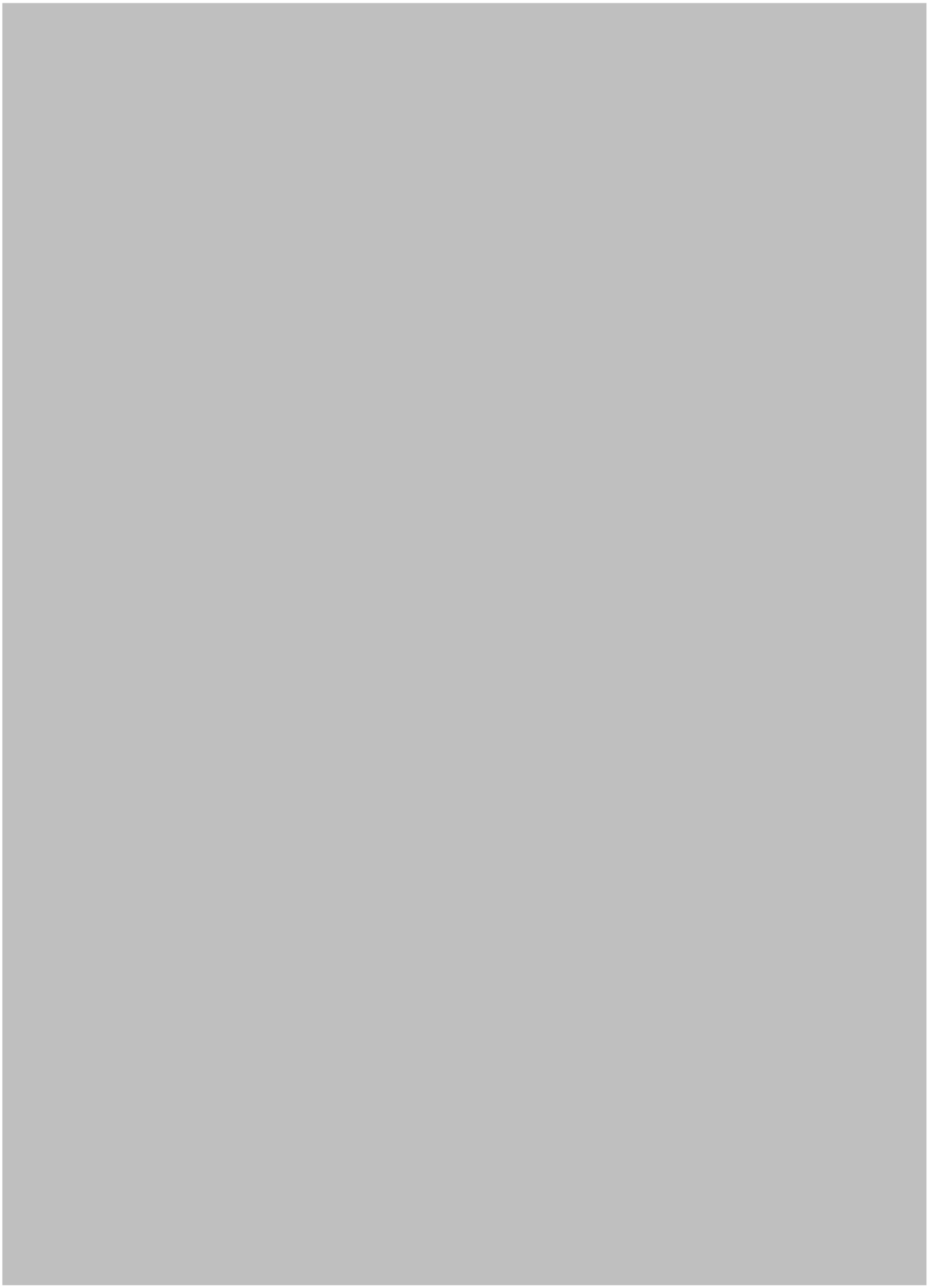


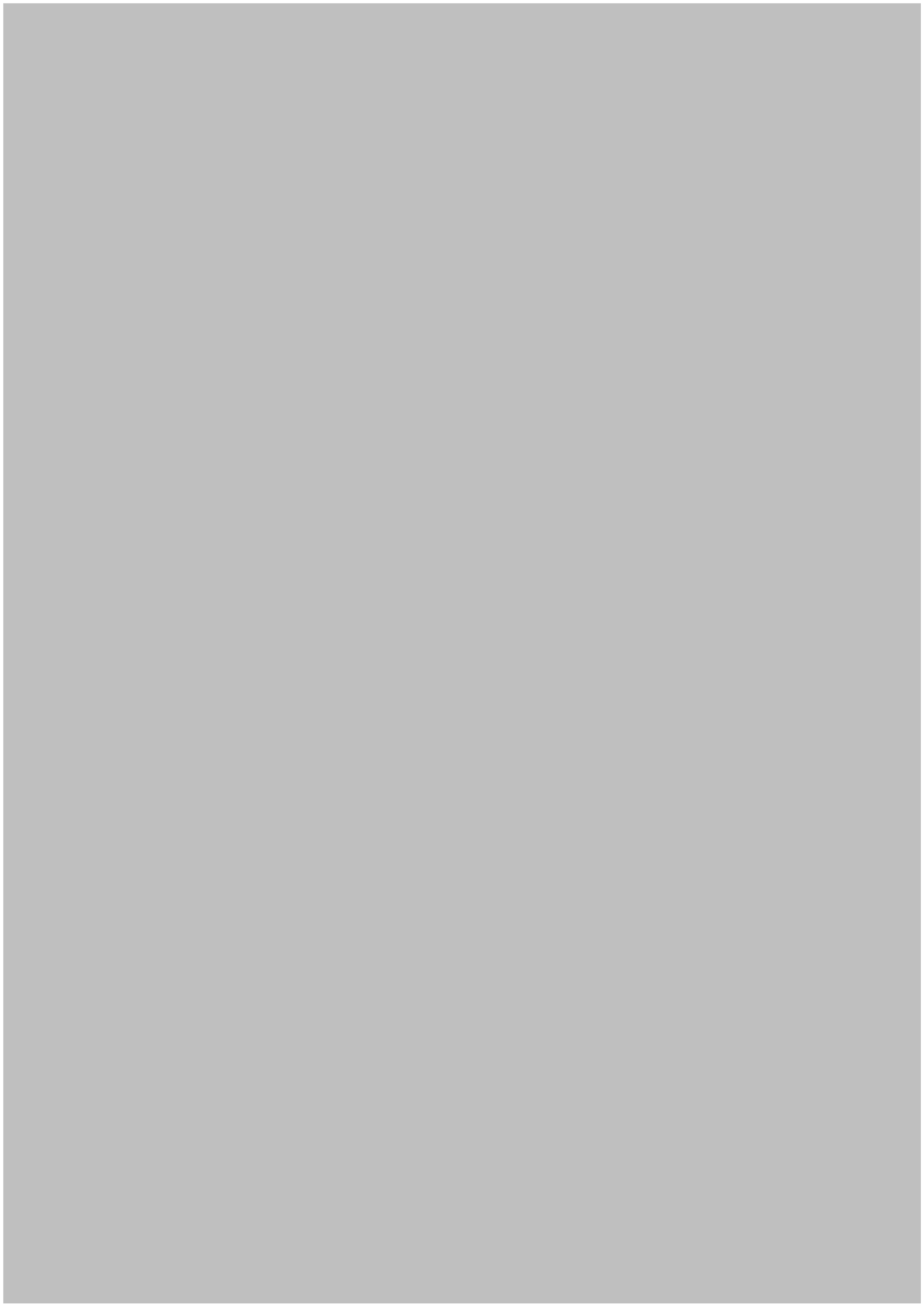


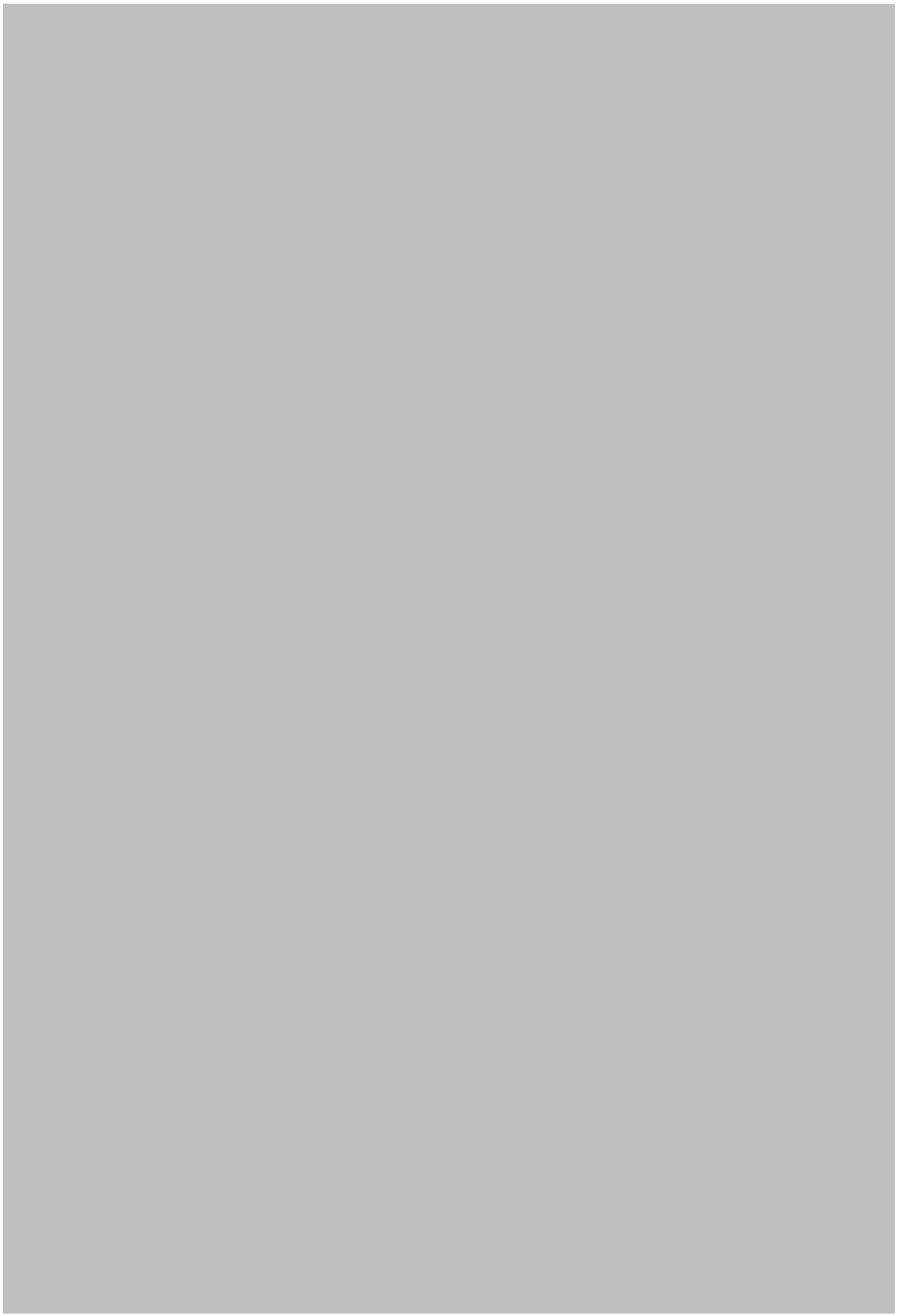


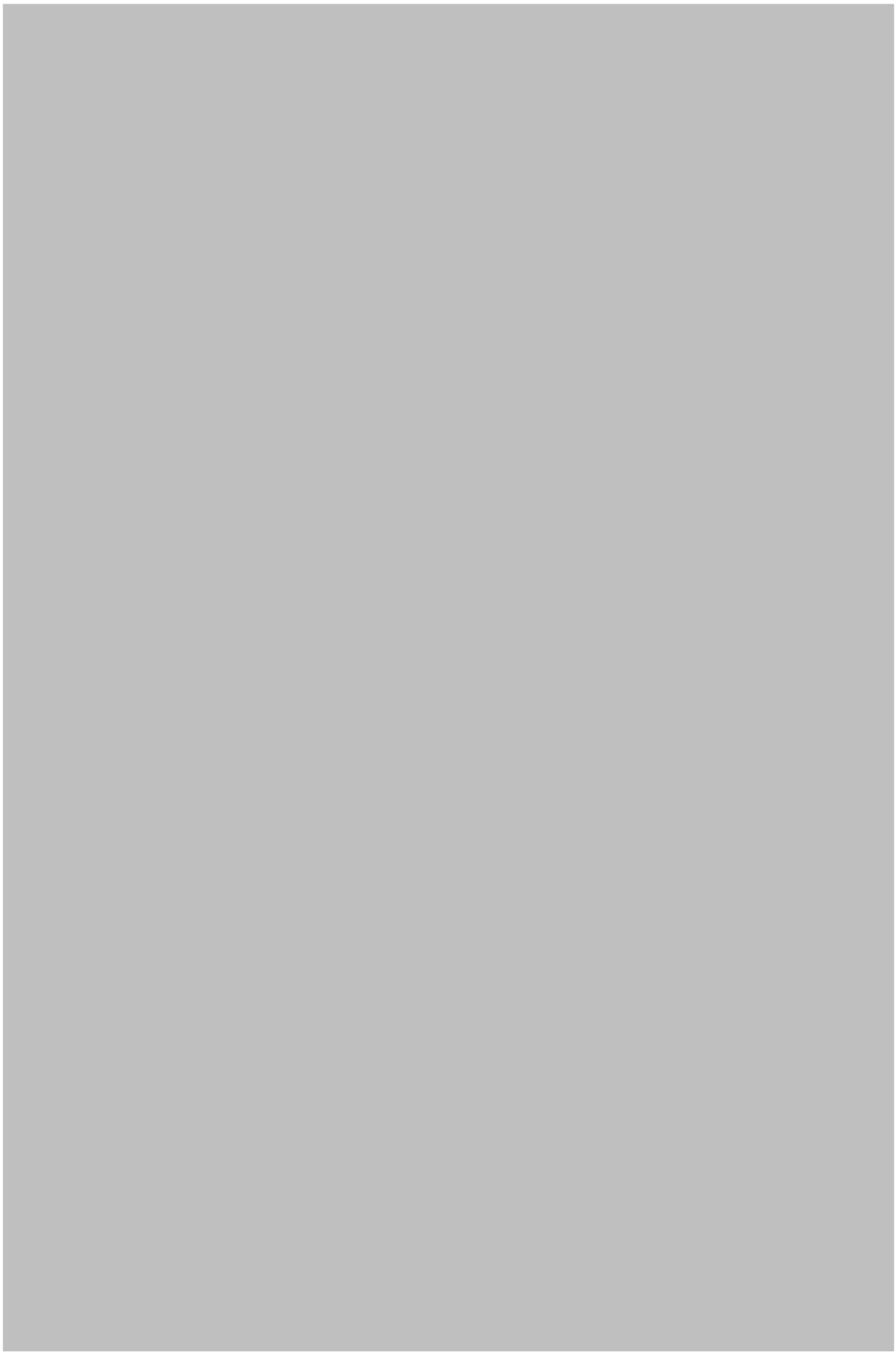


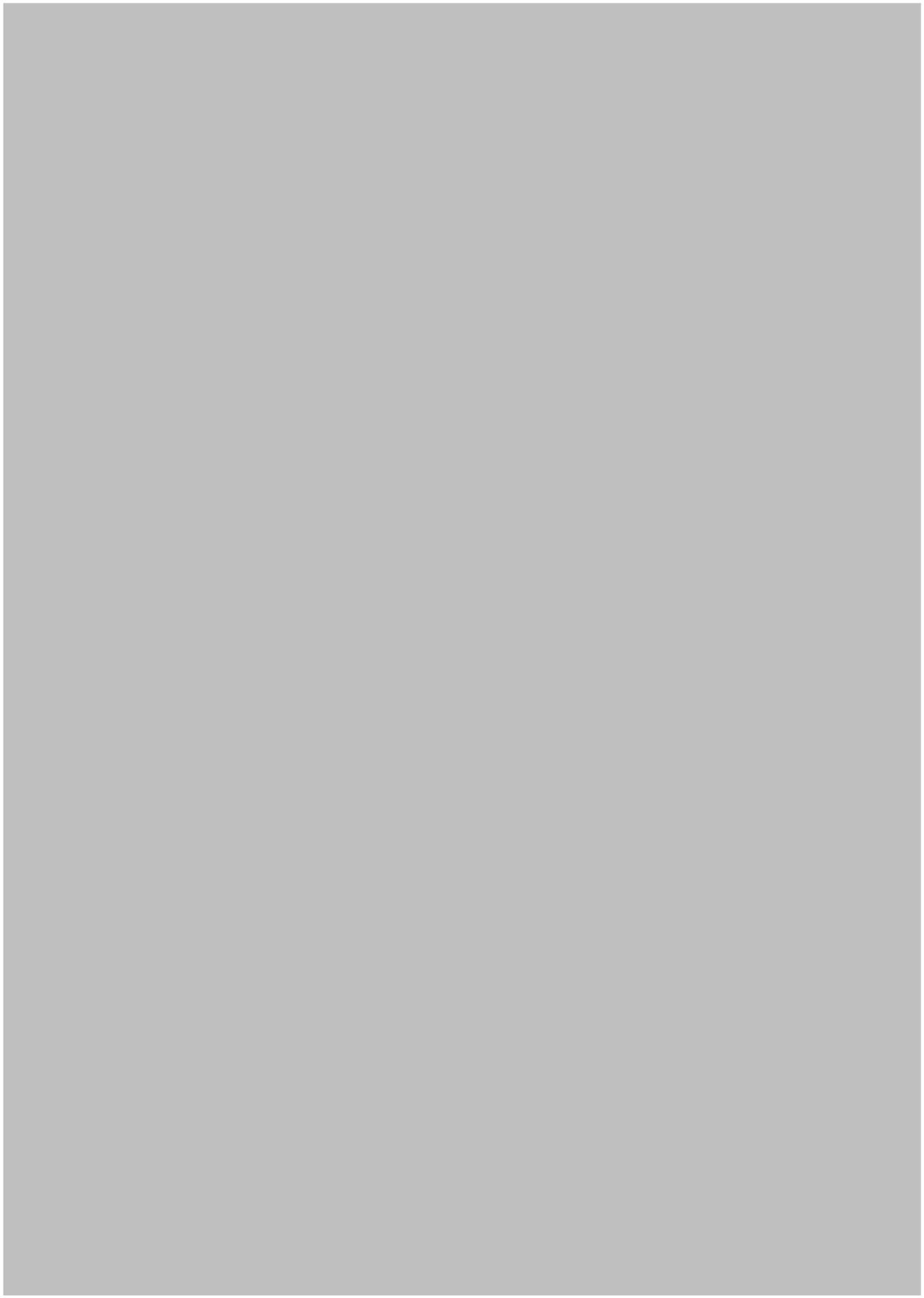


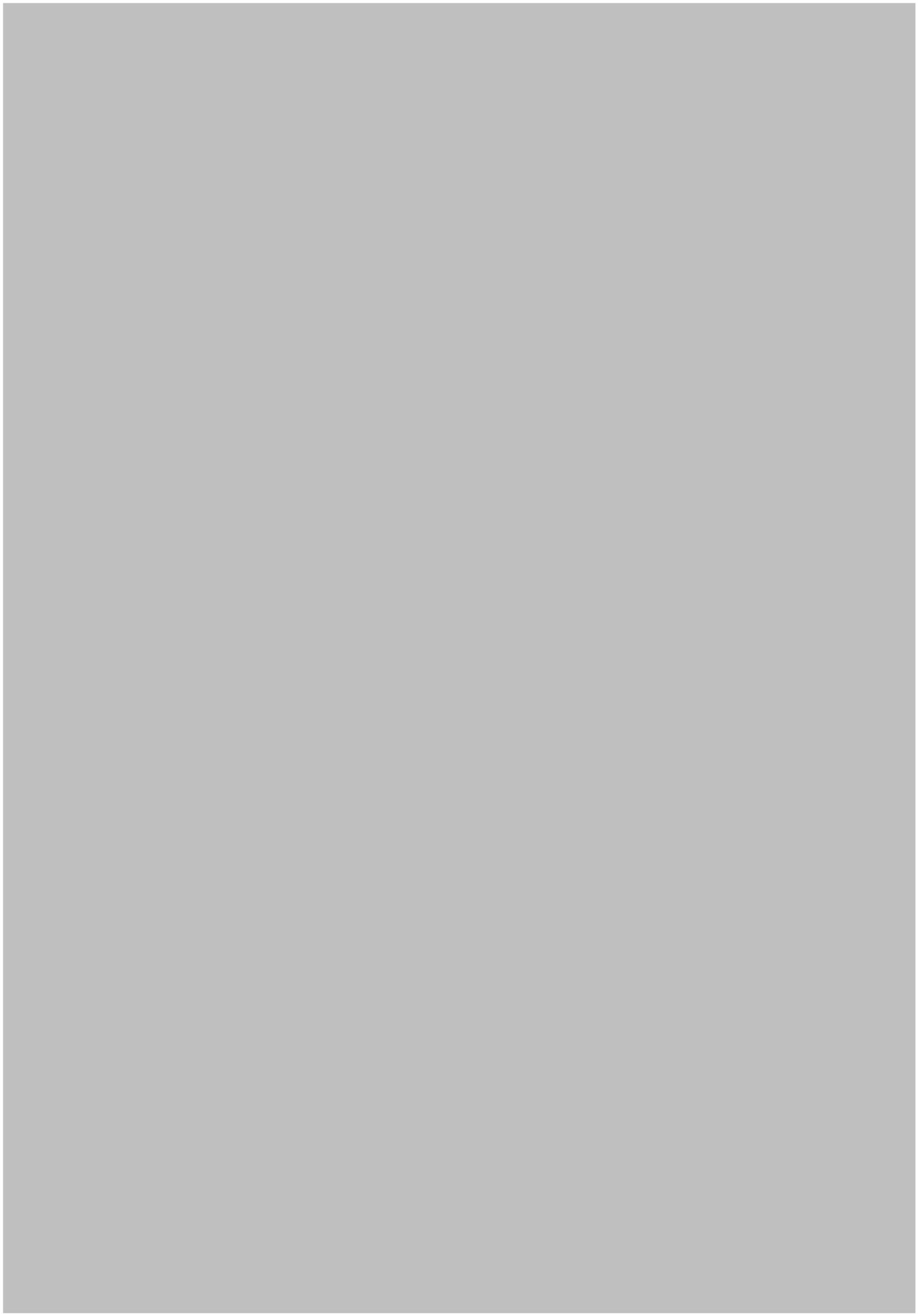


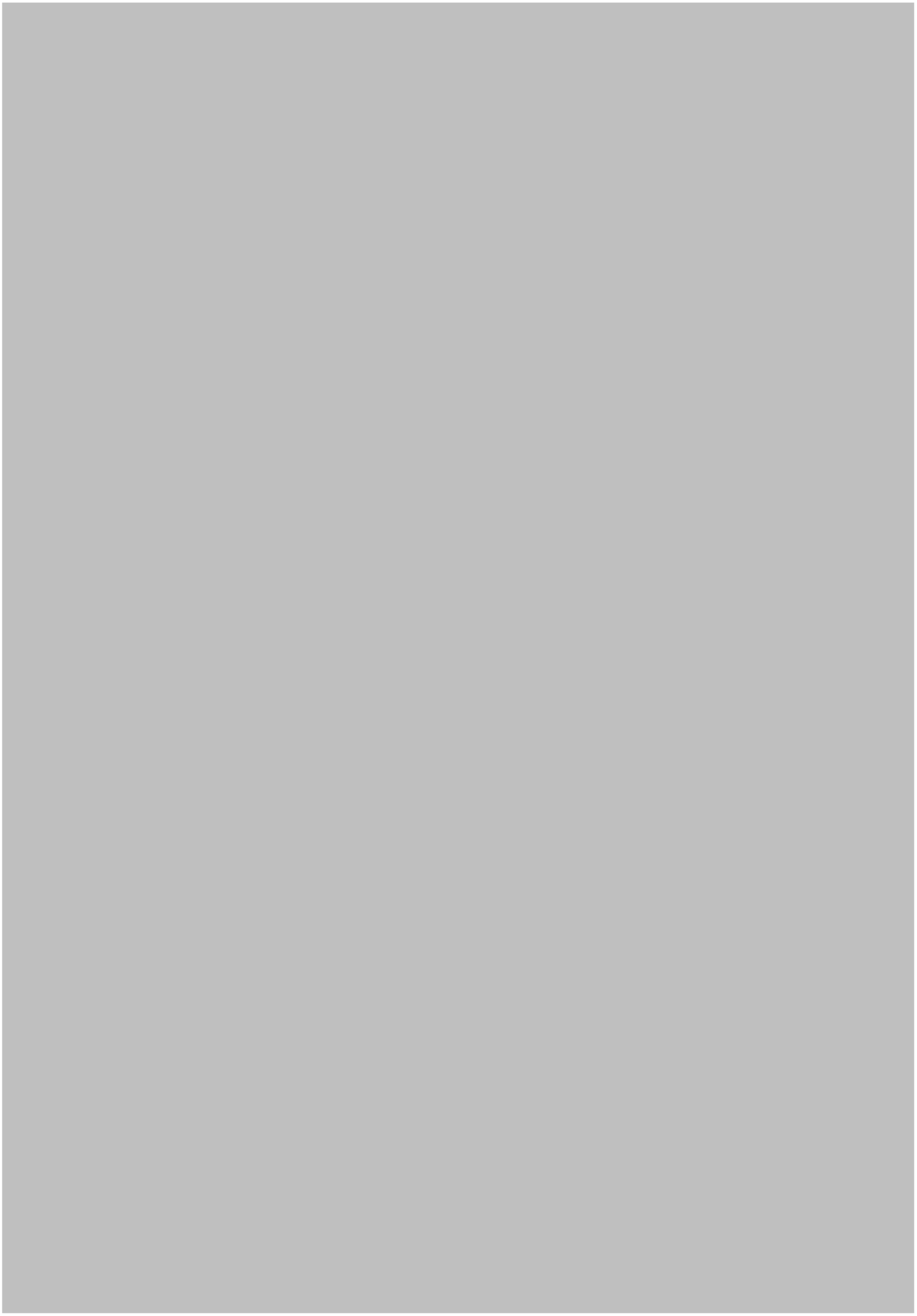


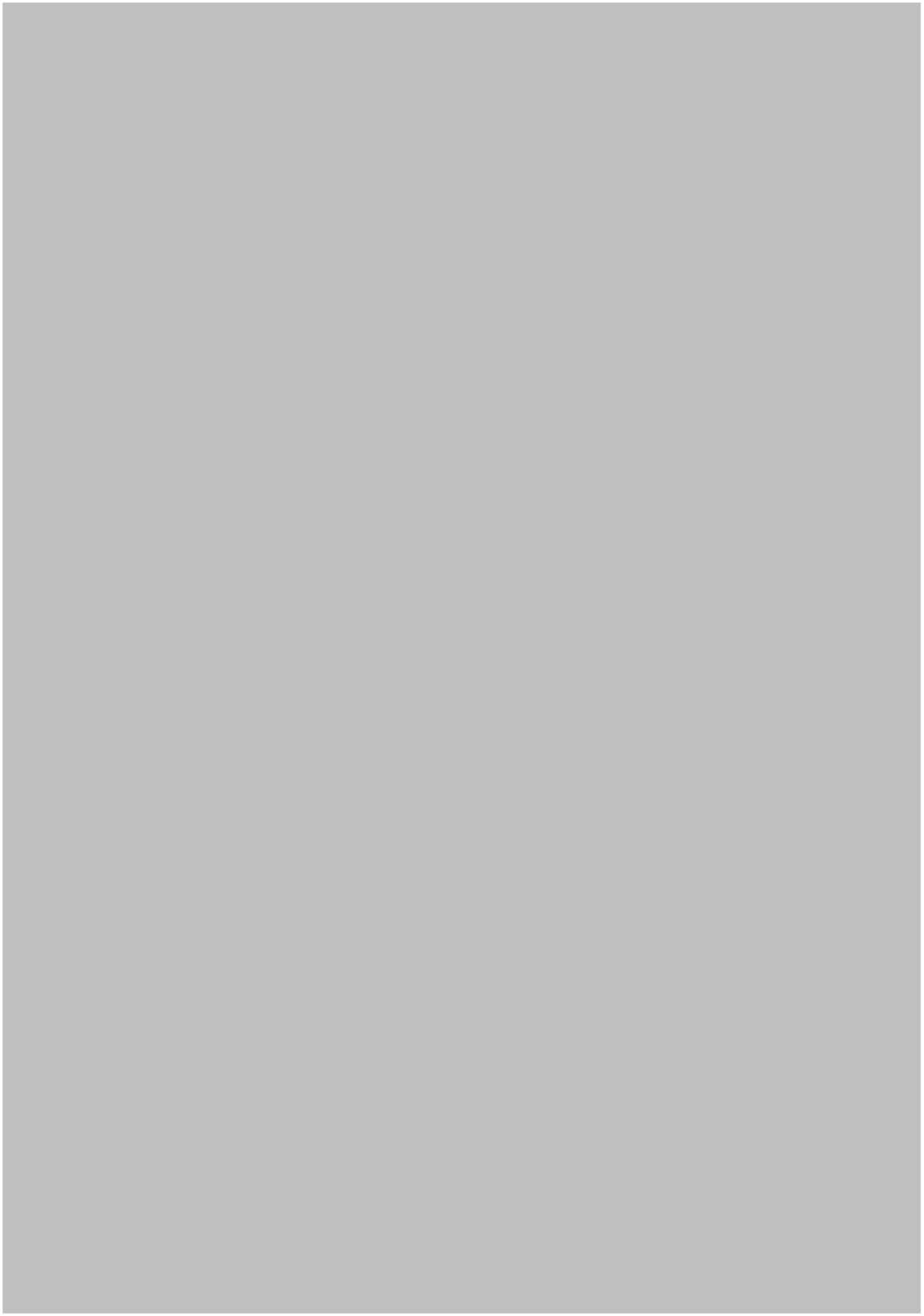


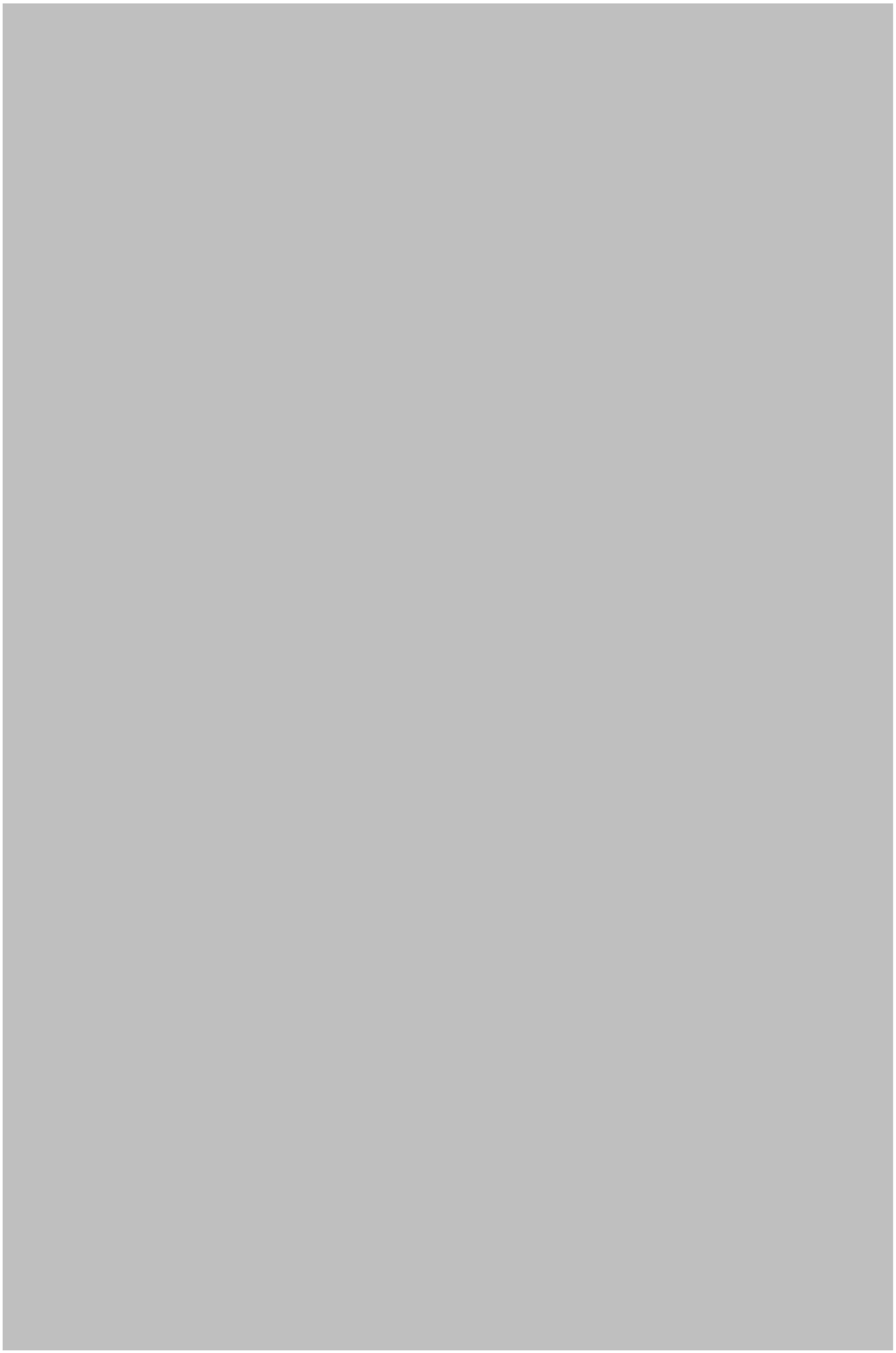


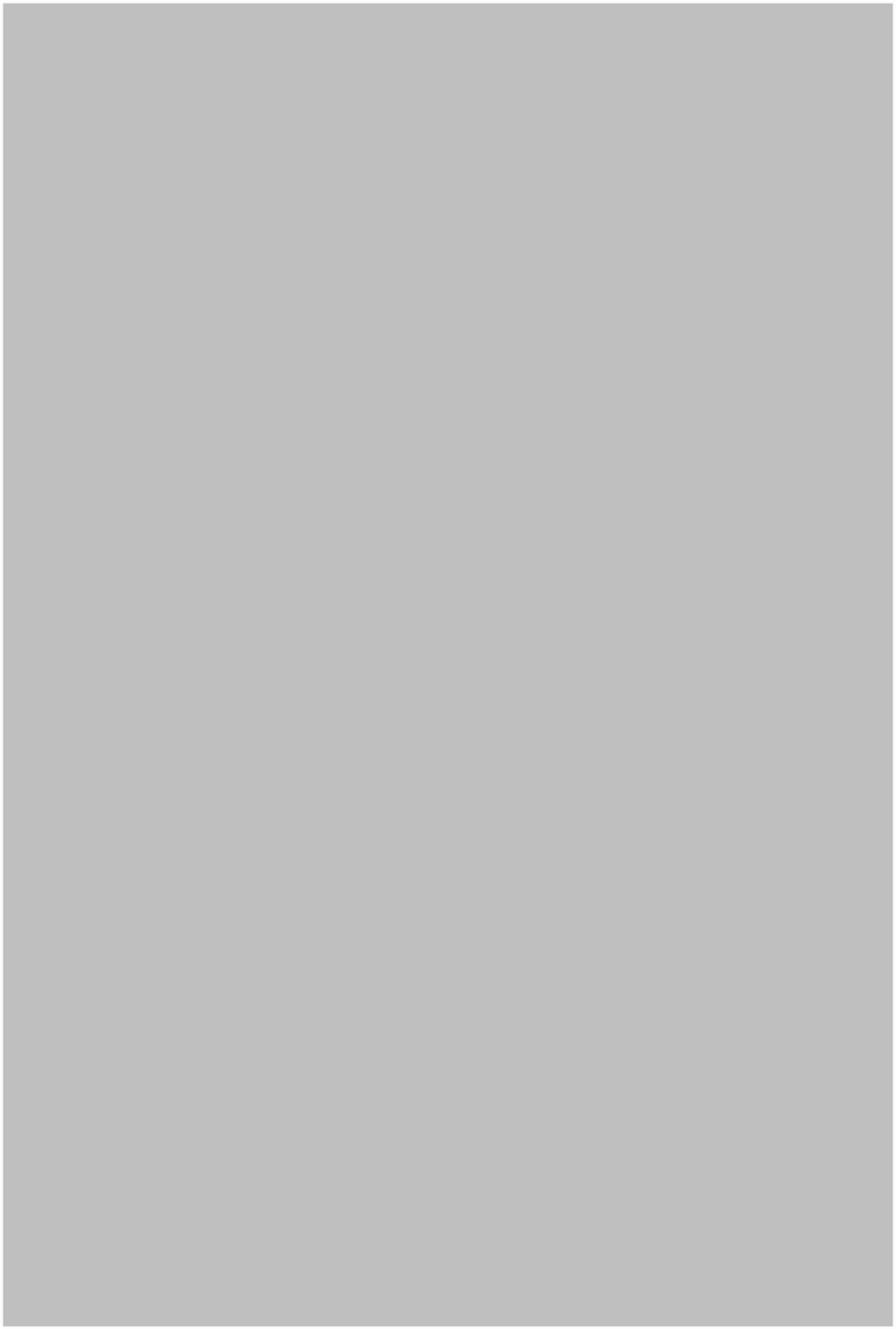


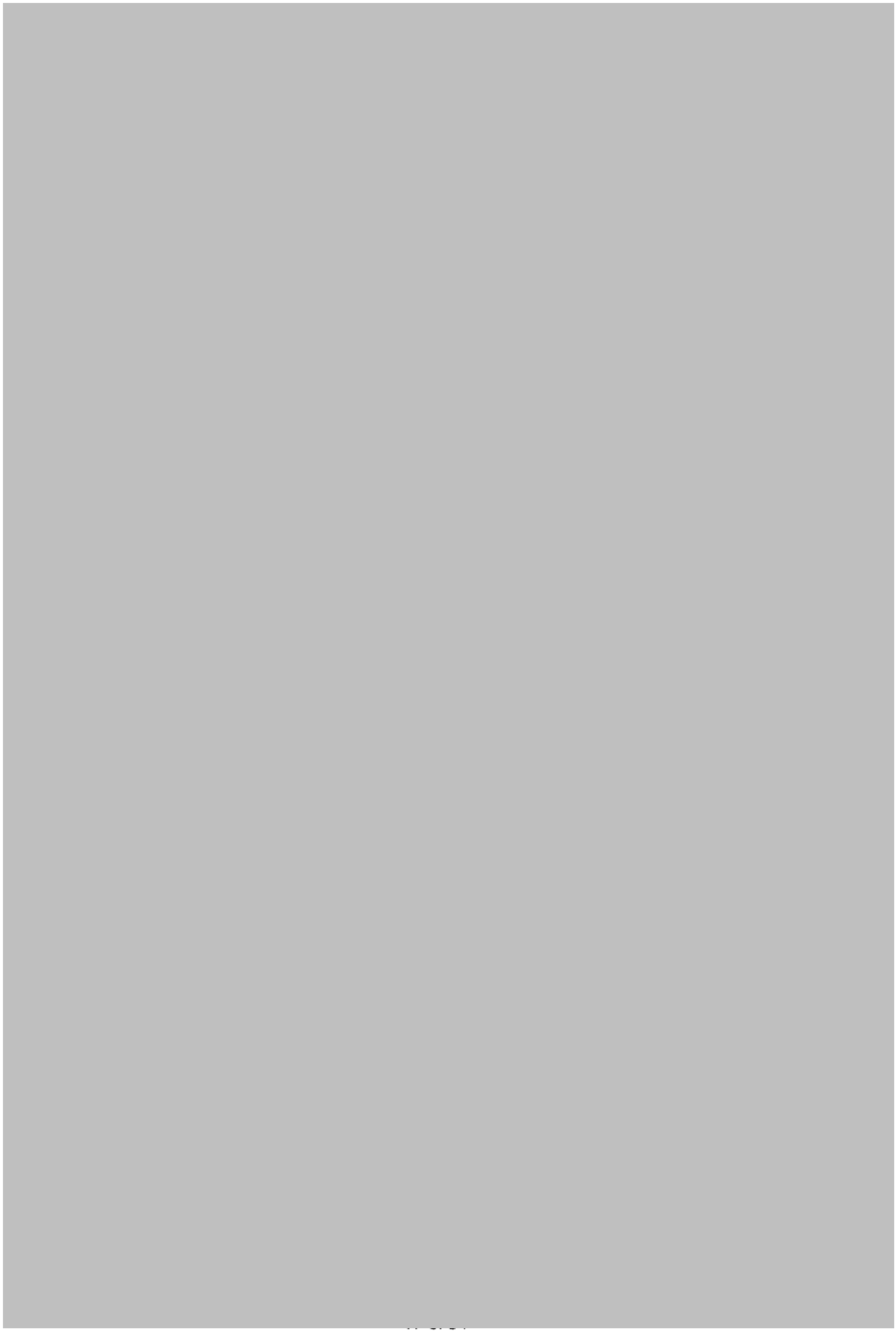


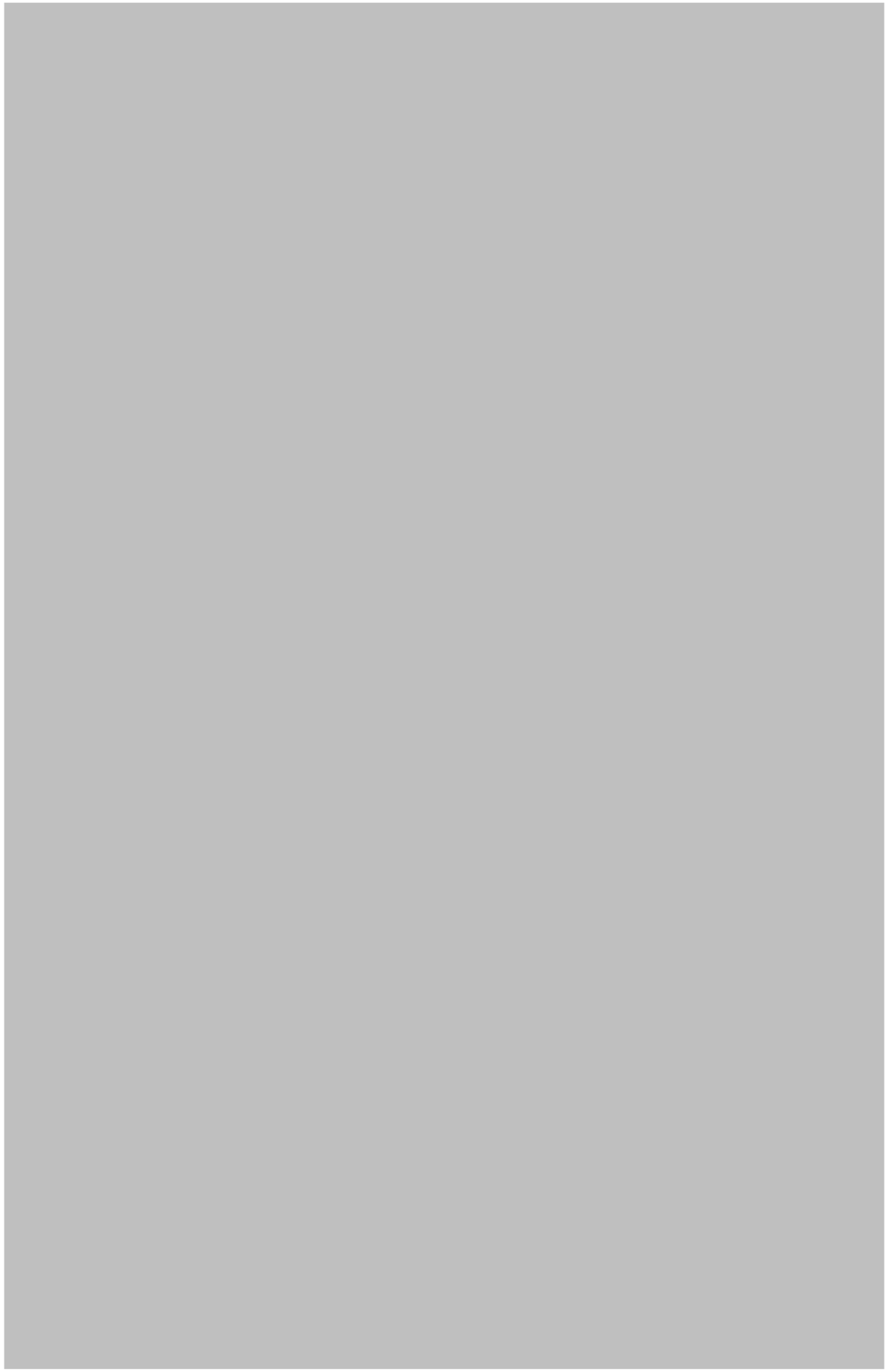


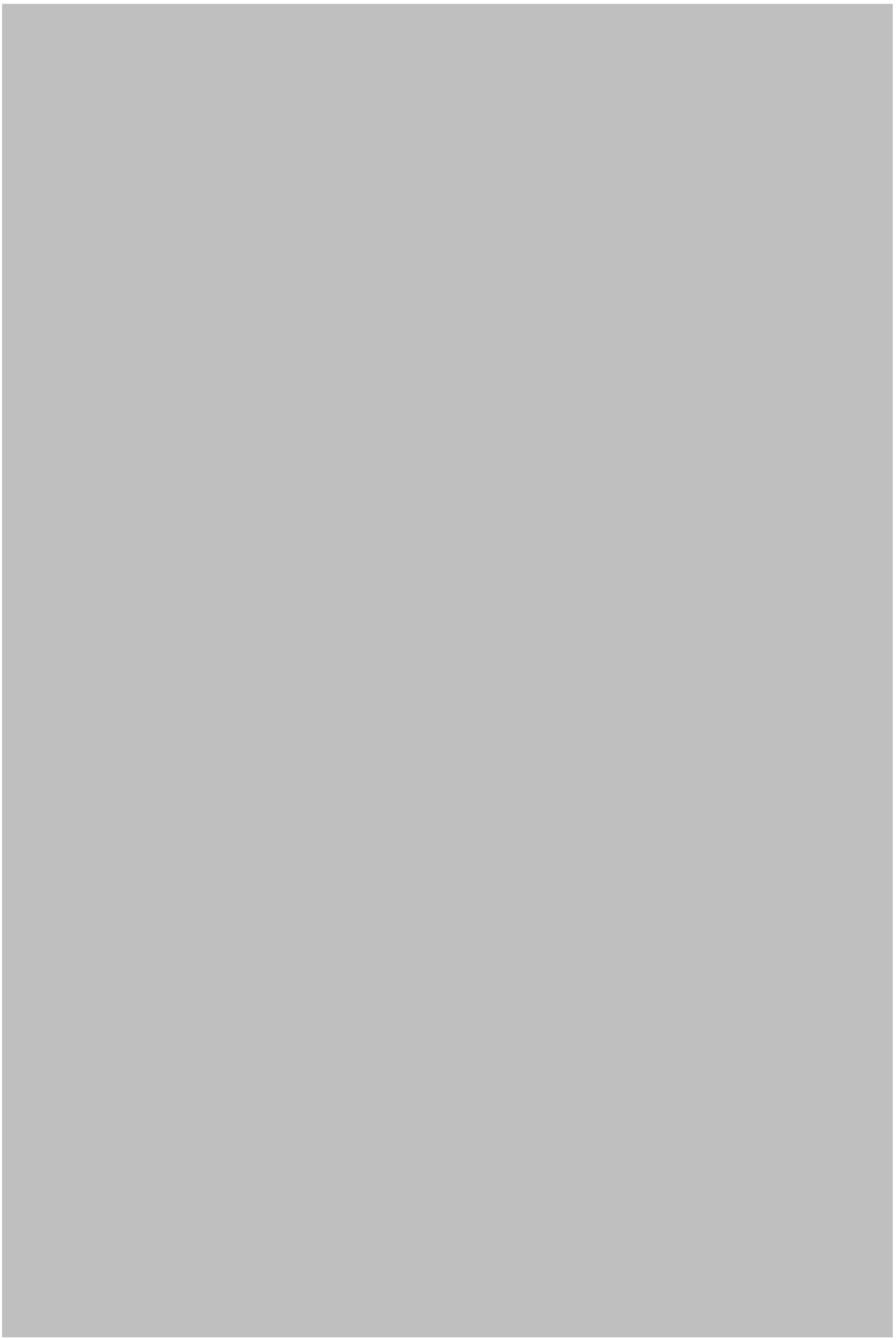


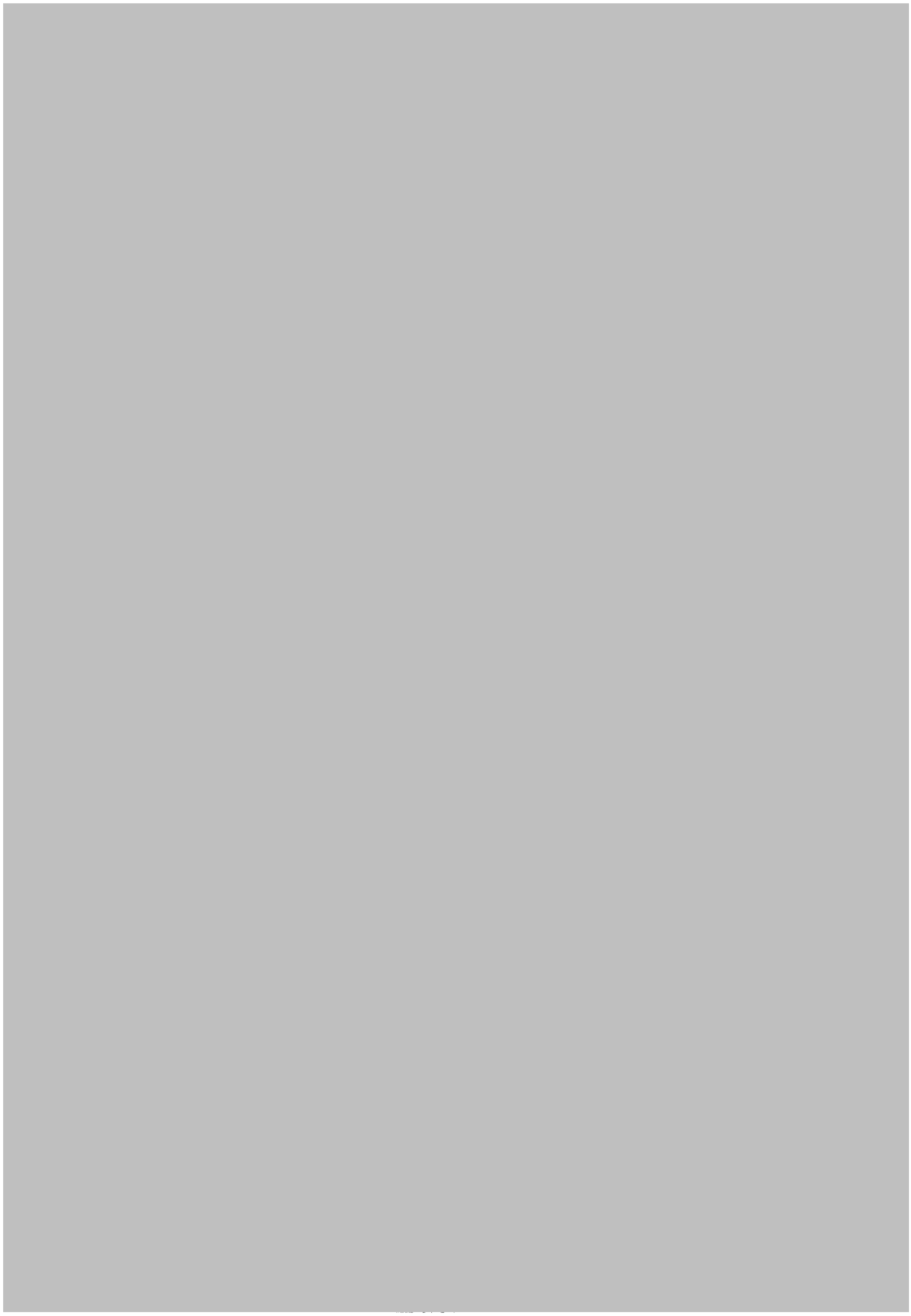


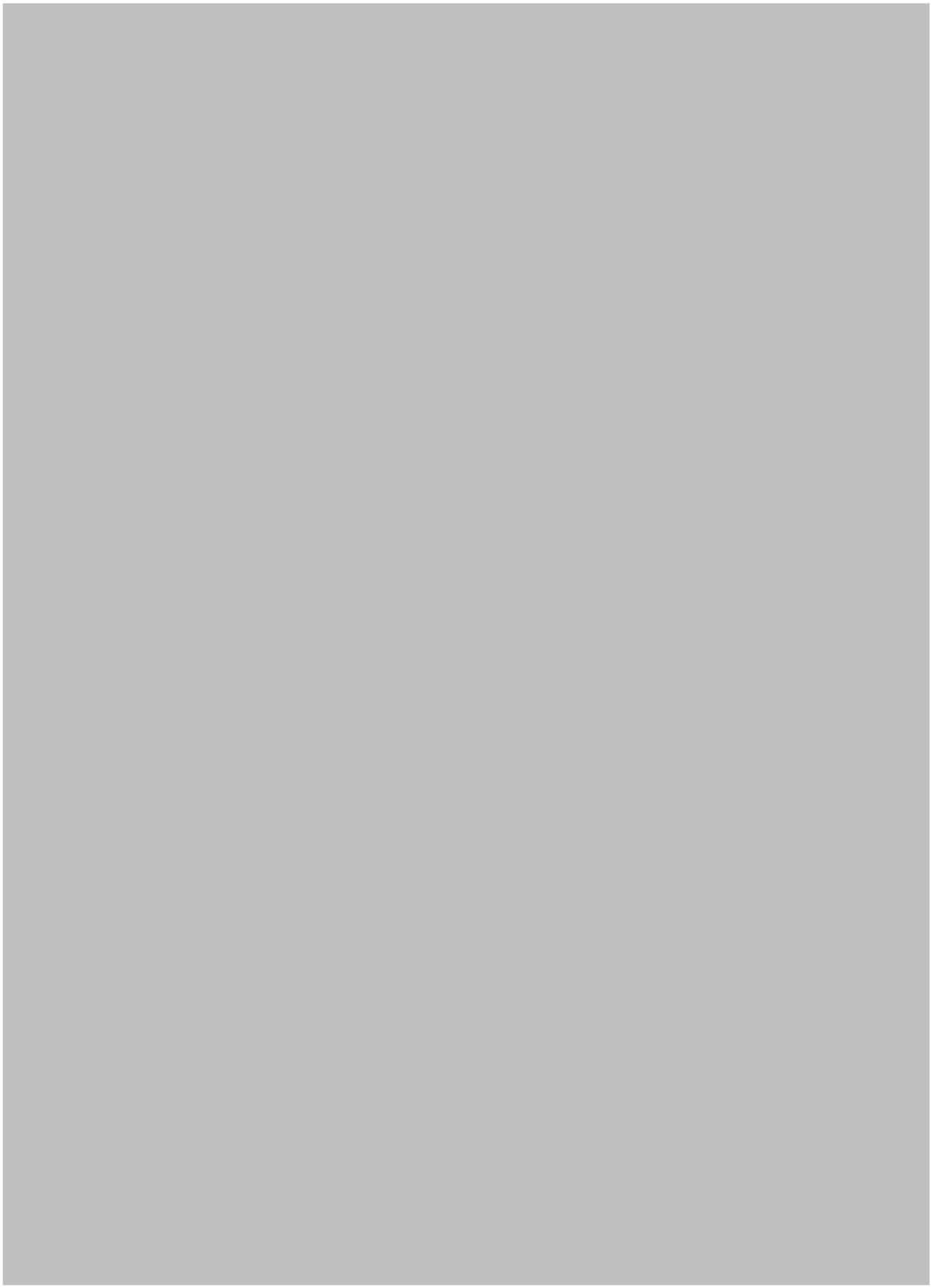


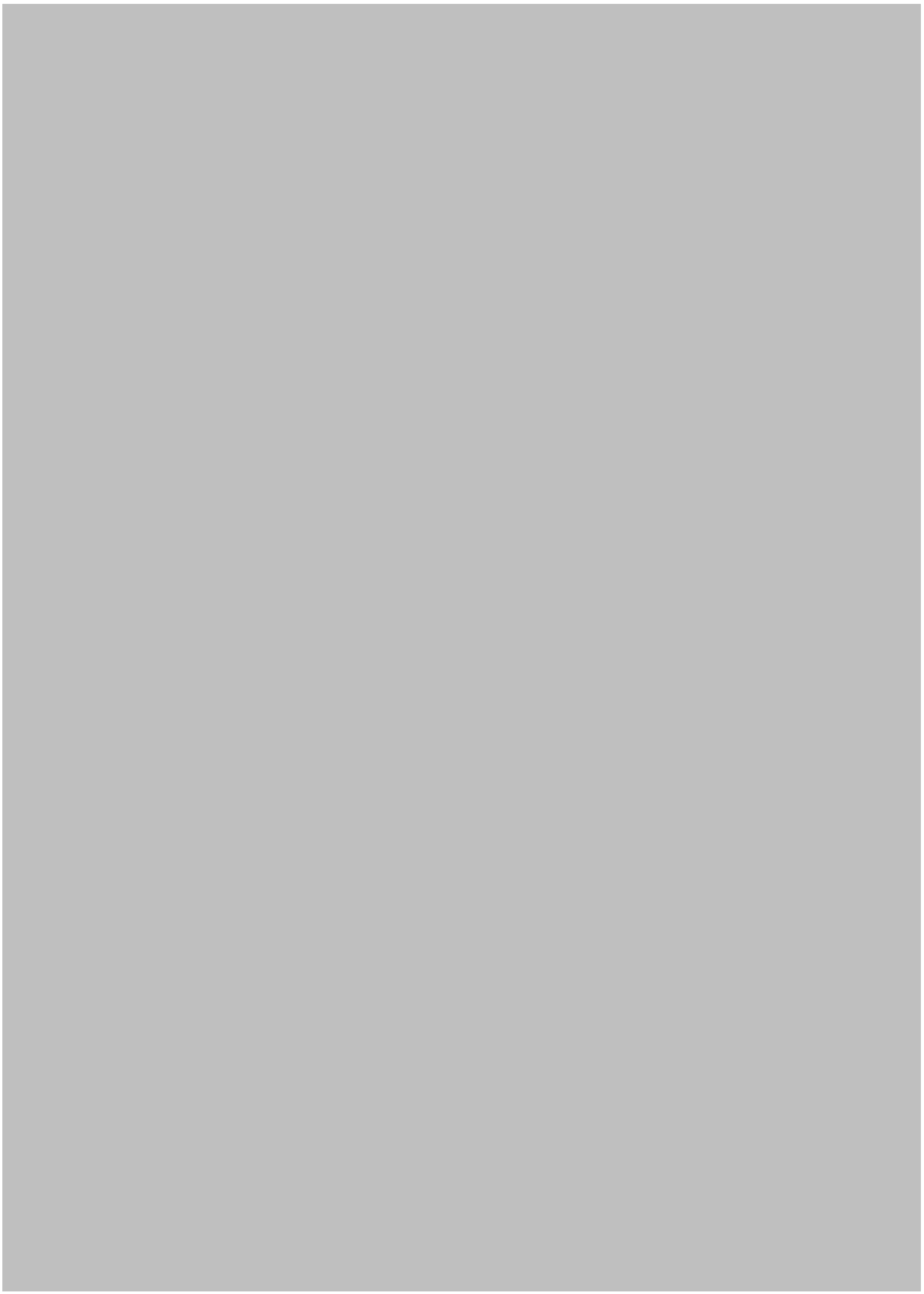


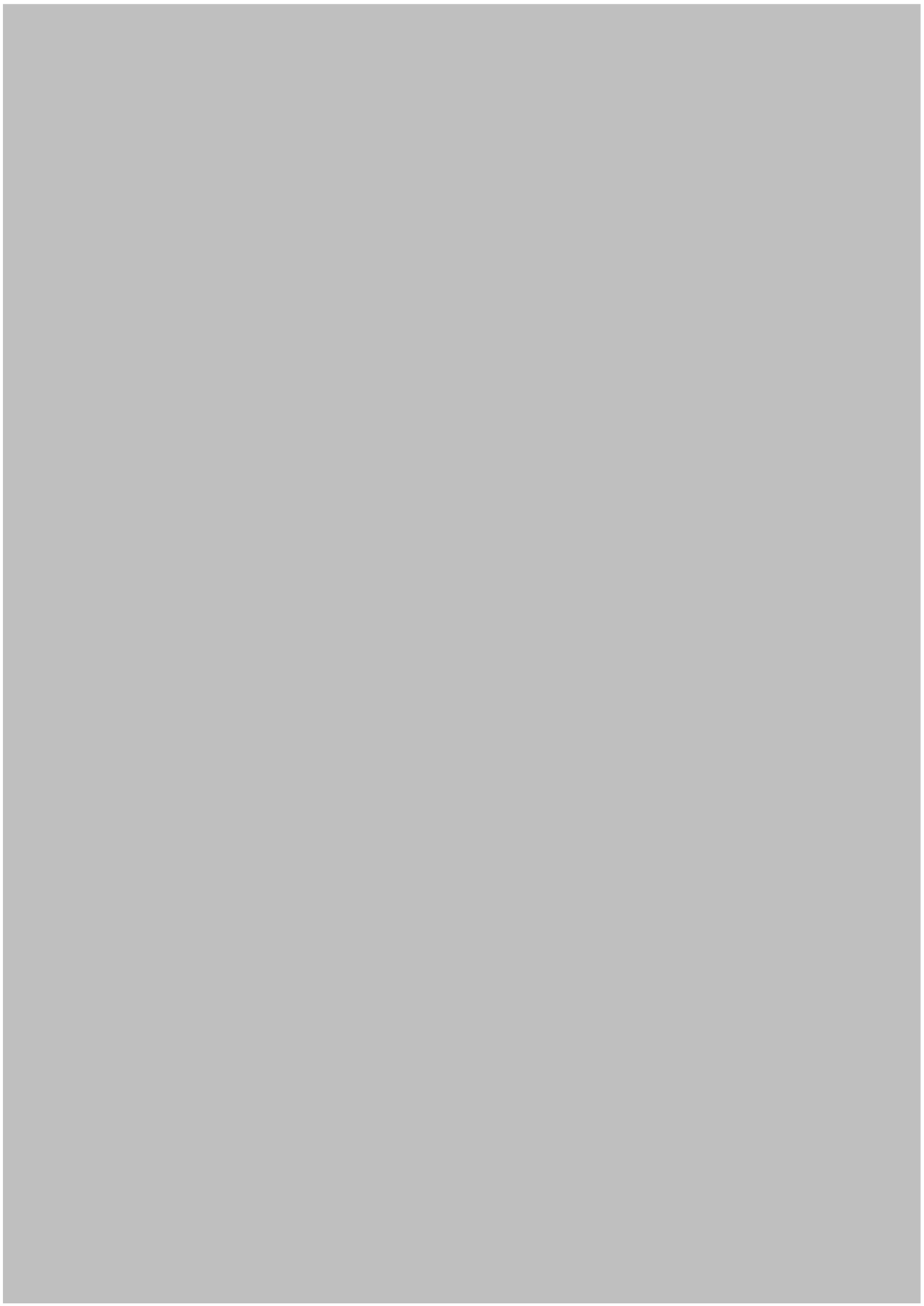


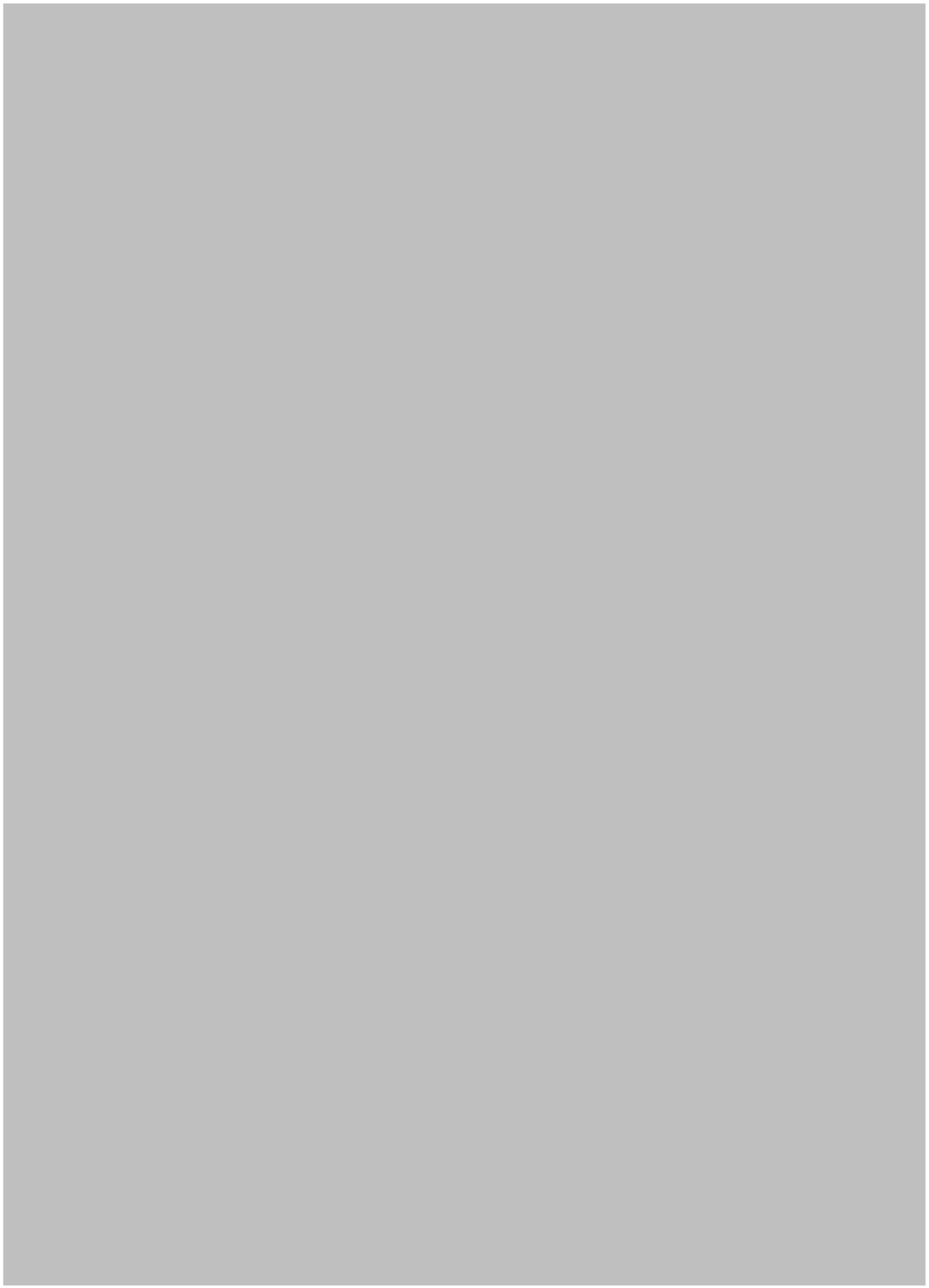


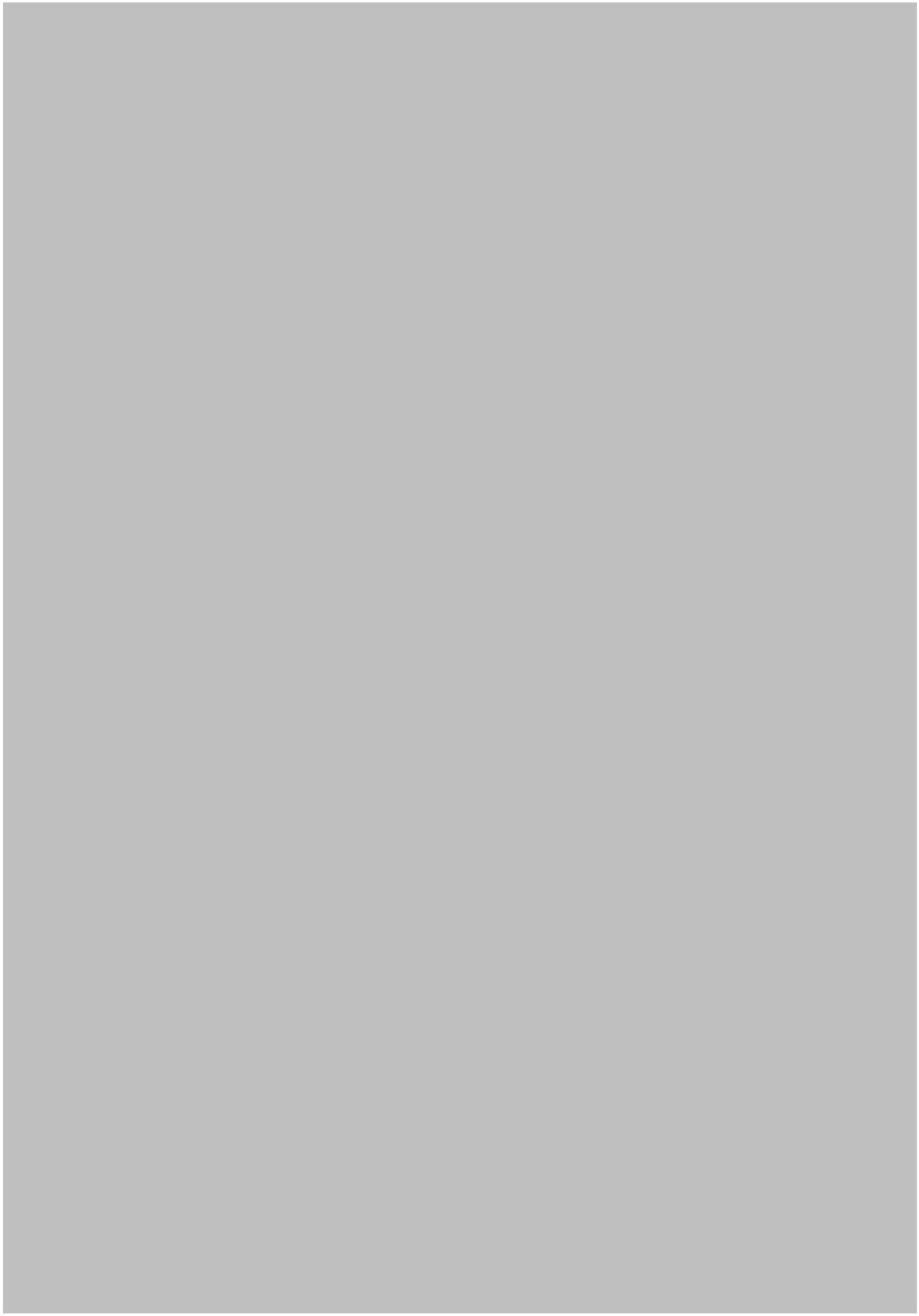


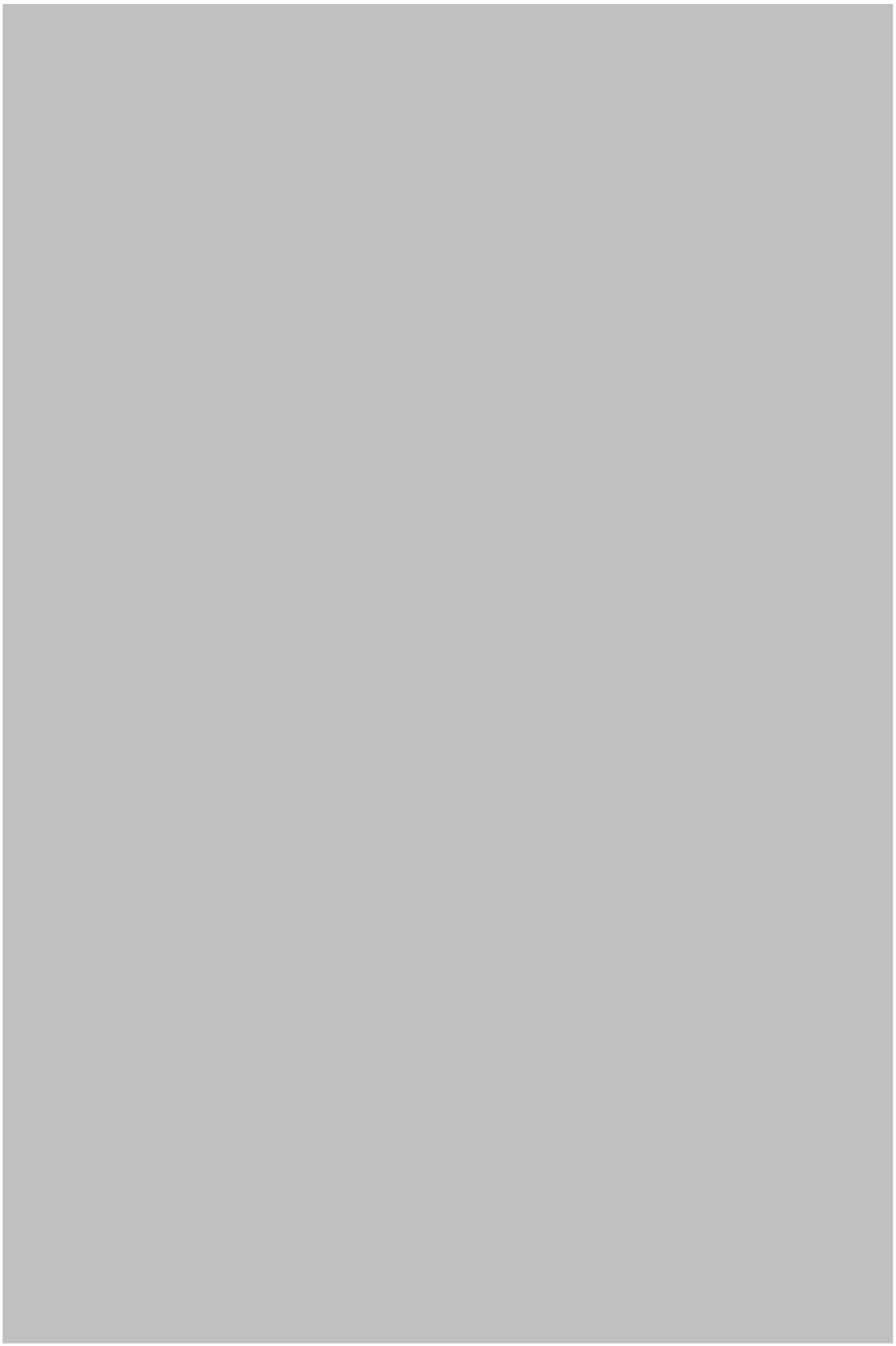


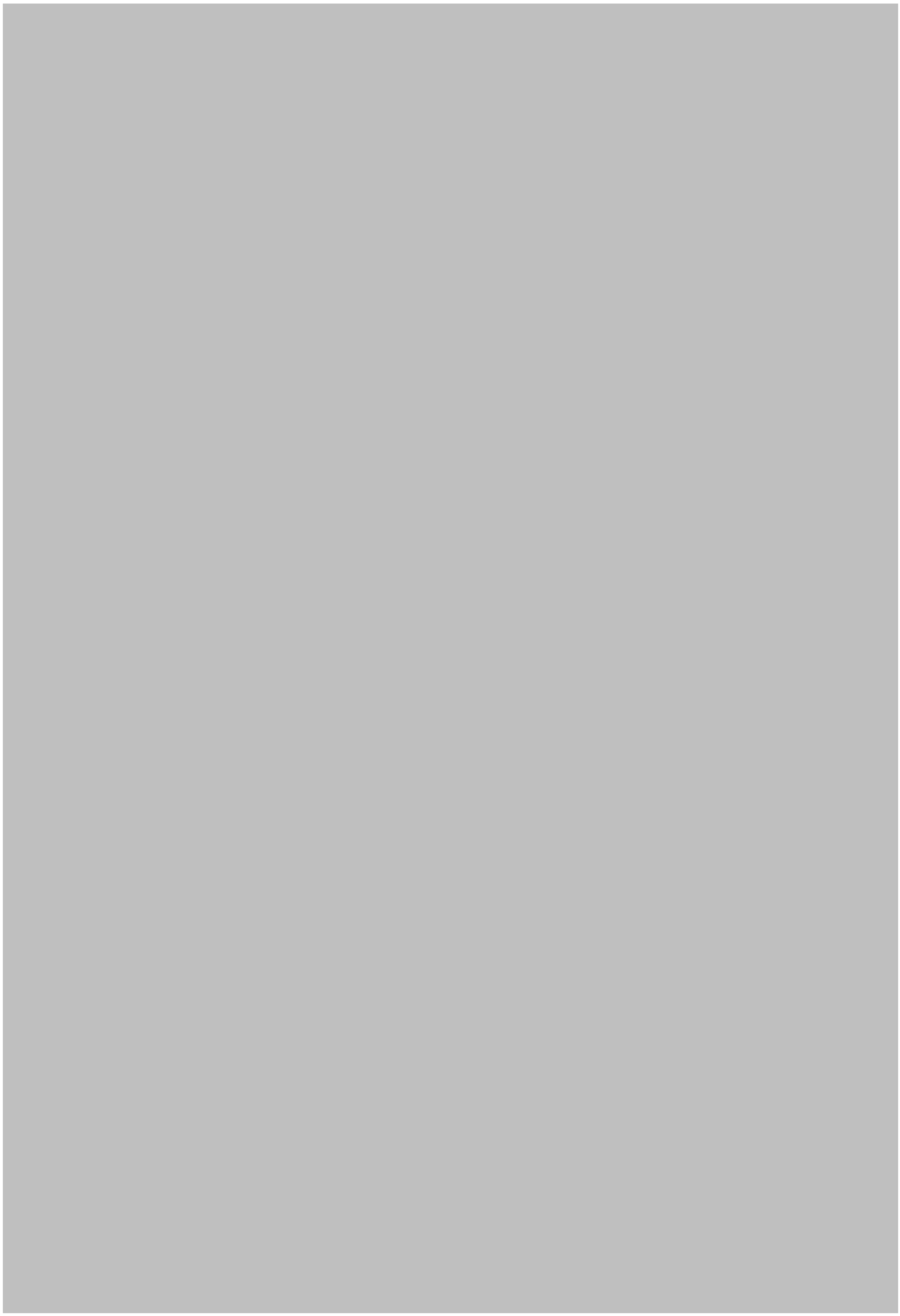












SCHEDULE A
TO THAT CERTAIN AMENDED AND RESTATED
OPERATING AND MEMBER CONTROL AGREEMENT

NAME OF MEMBER	CLASS A UNITS	CLASS B UNITS	[redacted]	VESTING COMMENCEMENT DATE
Kyle Kingsley		201,600	[redacted]	n/a
Jon D. Thompson		43,200		n/a
Ross Hussey		18,000		n/a

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the ____ day of _____, 20____ by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

_____

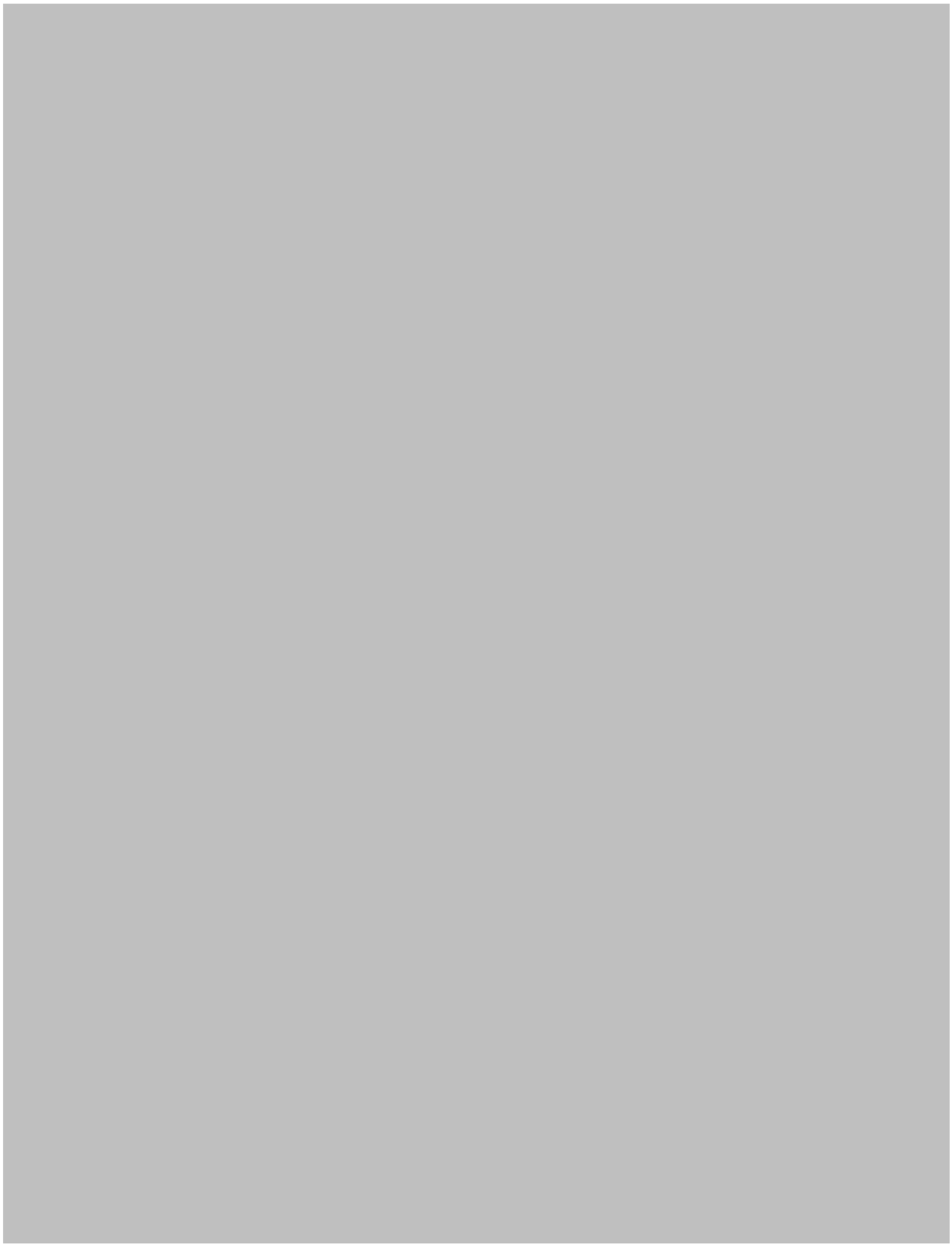
Signature

_____

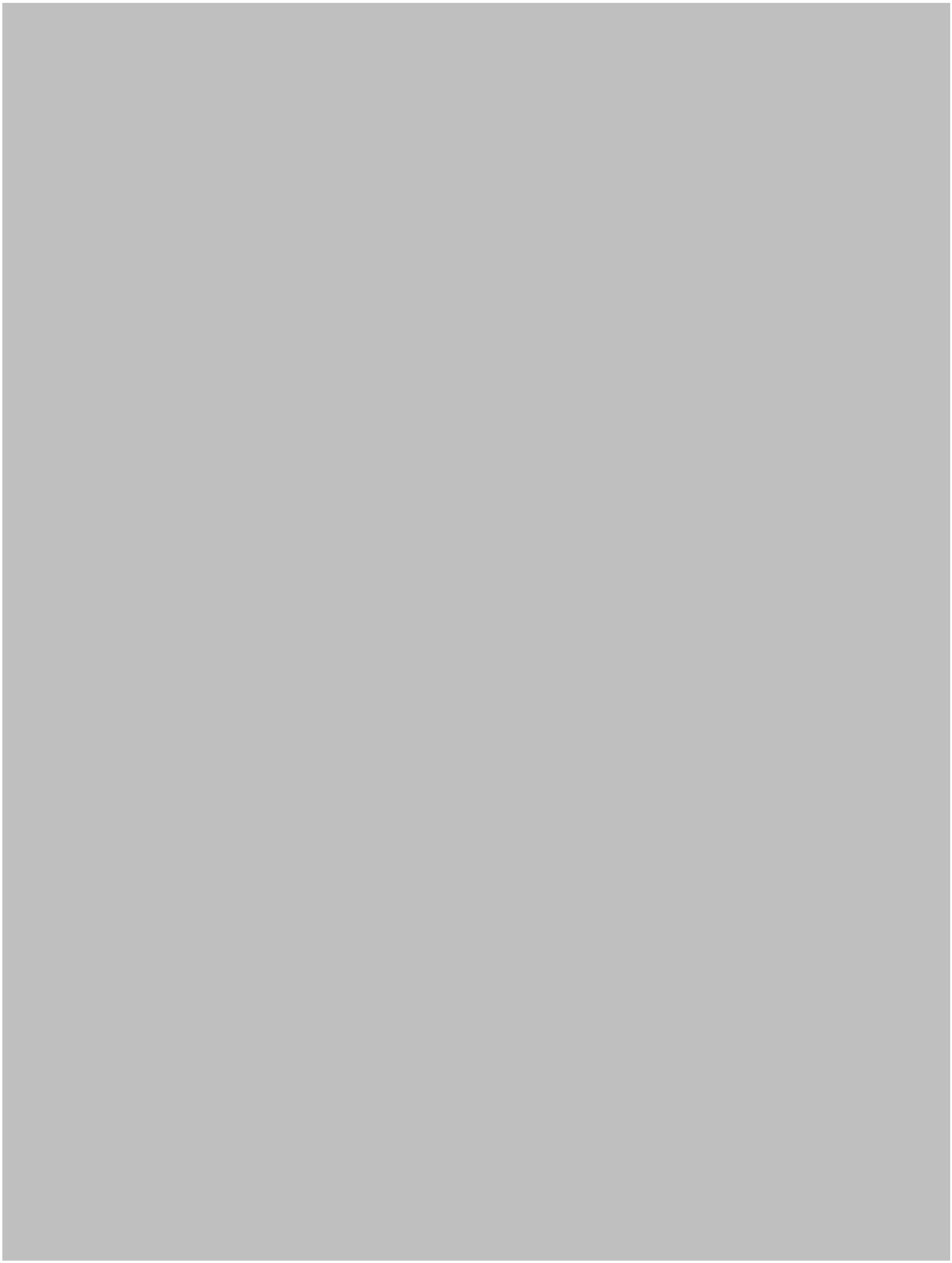
Printed Name

SCHEDULE C
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

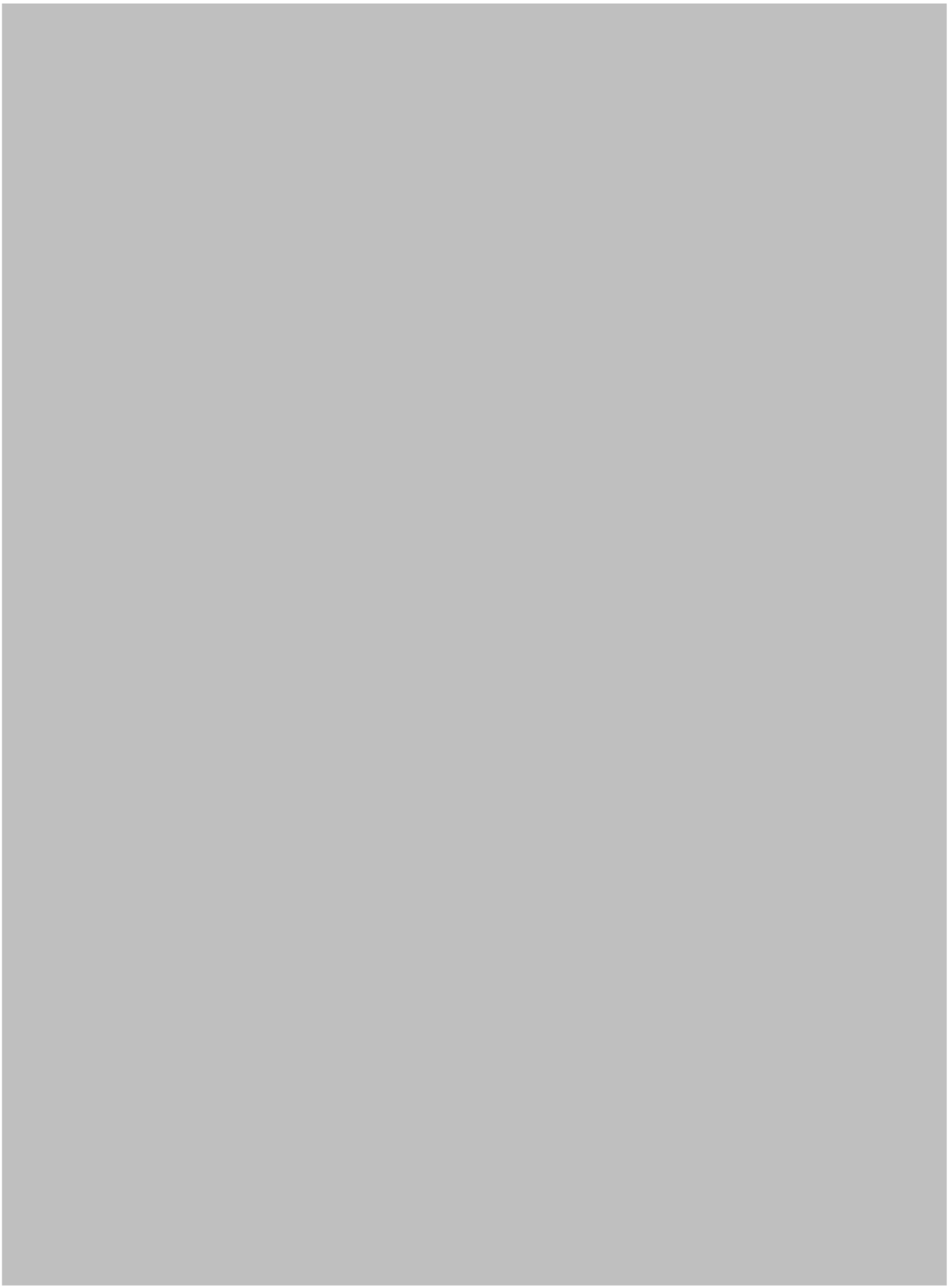
NAME OF GOVERNOR	DATE OF APPOINTMENT	APPOINTED BY MEMBERS HOLDING CLASS A UNITS?	APPOINTED BY MEMBERS HOLDING CLASS B UNITS?
Kyle Kingsley	July 31, 2014	No	Yes
Ross Hussey	July 31, 2014	No	Yes



D1. Attachment: Agreement for Partial Redemption of Class B Membership Units



D1. Attachment: Agreement for Partial Redemption of Class B Membership Units



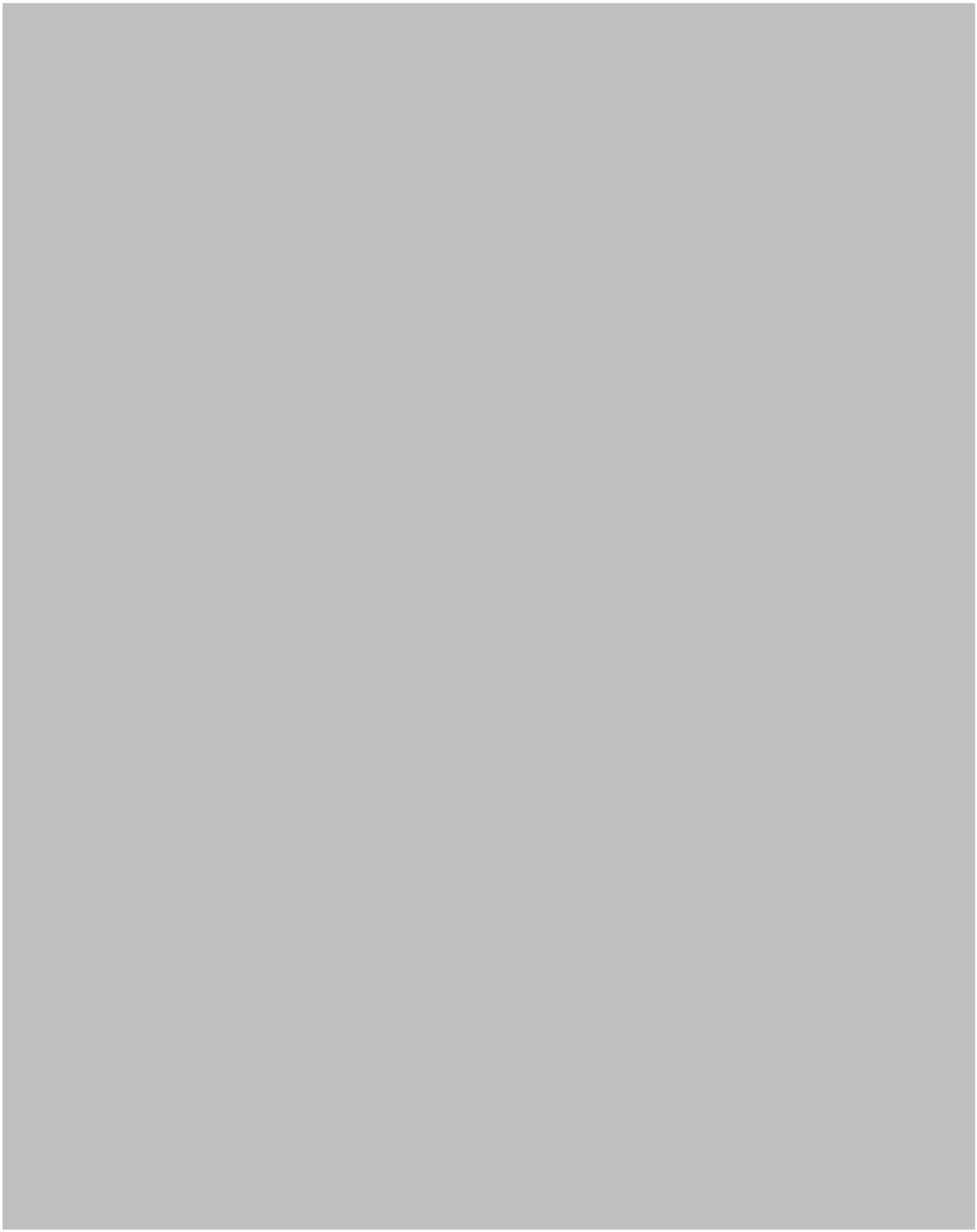


Exhibit A
Membership Transfers

A Unit Membership Transfers

Last Name	First Name	Unit Class
Aug	Charles	A
Berkhof	Greg	A
Bultman	Laura	A
Burgess	Amelia	A
Crutchfield	Charles	A
Gaertner	Ann	A
Gatzke	Michele	A
Haines	Nathan	A
Hewittson	Susan	A
Hussey	Ross	A
Hussey	James	A
Kiehne	Ross	A
Kiehne	Benjamin	A
Kingsley	David	A
Kingsley	Kyle	A
Lathrop	Luke	A
Lederman	Charles	A
Michaelson	Mitchell	A
Overby	Nancy	A
Peterson	Aaron	A
Schaffer	Paul	A
Shimpa	Robert	A
Skaalen	Debra Dowe	A
Soma	Jeffrey	A
Tareen	Basir	A
Todd	Charles	A
Vagts	James	A
Viergever	Susan	A

B Unit Membership Transfers

Last Name	First Name	Unit Class	Units
Bultman	Laura	B	4,000
Duffy	Makea	B	4,000
Gehring	Brooke	B	12,000
Goldston	Greg	B	8,000
Harvey	Brian	B	20,000
Hussey	Ross	B	32,000
Ledermann	Chuck	B	20,000
Michaelson	Mitch	B	3,500
O'Neill	Josh	B	8,000
Owens	Ron	B	11,000
Penman	Jared	B	8,000

Peterson	Aaron	B	3,500
Quall	Jerry	B	4,000
Schaffer	Joe	B	20,000
Shimpa	Bobby	B	12,000
Thompson	Jon	B	8,800
Totushek	Dan	B	4,000
			182,800

MINNESOTA MEDICAL SOLUTIONS LLC
SPECIAL MEETING OF
MEMBERS AND GOVERNORS
30 SEPTEMBER 2014
MINUTES

A Special Meeting of the Members and Governors of MINNESOTA MEDICAL SOLUTIONS LLC, a Minnesota limited liability company (the "Company"), was initiated electronically on September 30, 2014.

Chair and Secretary

Kyle Kingsley, the Company's Chief Manager and Chief Executive Officer, acted as Chair and presided over the meeting, and Ross Hussey, the Company's Secretary, acted as the secretary of the meeting.

Notice

No notice was given because it was not required under the Company's Operating and Member Control Agreement, because of the meeting's electronic format, and because notice was waived by the electronic consent of the Members and Governors without objection to the holding of the electronic special meeting.

Attendance

The Secretary reported that the Members and Governors participation (or non-participation) in the meeting was as reflected below:

MEMBER LAST NAME	MEMBER FIRST NAME	CLASS A UNITS	CLASS B UNITS	PARTICIPATED?
Aug	Charles	10,000	0	Yes
Berkhof	Greg	20,000	0	Yes
Bultman	Laura	10,000	4,000	Yes
Burgess	Amelia	10,000	0	Yes
Crutchfield	Charles	10,000	0	Yes
Duffy	Makea	0	4,000	Yes
Gaertner	Ann	10,000	0	Yes
Gatzke	Michele	10,000	0	Yes
Gehring	Brooke	0	12,000	No
Goldston	Greg	0	8,000	No

Haines	Nathan	25,000	0	Yes
Harvey	Brian	0	20,000	Yes
Hewittson	Susan	15,000	0	Yes
Hussey	Ross	3,000	50,000	Yes
Hussey	James	10,000	0	Yes
Kiehne	Ross	10,000	0	Yes
Kiehne	Benjamin	15,000	0	Yes
Kingsley	David	14,000	0	Yes
Kingsley	Kyle	35,000	148,000	Yes
Lathrop	Luke	5,000	0	Yes
Lederman	Charles	20,000	20,000	Yes
Michaelson	Mitchell	10,000	3,500	Yes
O'Neill	Josh	0	8,000	Yes
Overby	Nancy	10,000	0	No
Owens	Ron	0	11,000	Yes
Penman	Josh	0	8,000	No
Peterson	Aaron	10,000	3,500	No
Quall	Jerry	0	4,000	Yes
Schaffer	Paul	10,000	0	Yes
Shaffer	Joe	0	20,000	No
Shimpa	Robert	6,500	12,000	Yes
Skaalen	Debra Dowe	10,000	0	Yes
Soma	Jeffrey	10,000	0	Yes
Tareen	Basir	30,000	0	Yes
Thompson	Jon	0	52,000	Yes
Todd	Charles	10,000	0	Yes
Totushek	Dan	0	4,000	Yes
Vagts	James	10,000	0	No
Viergever	Susan	12,500	0	Yes
		361,000	392,000	

The Secretary reported that of the 361,000 Class A Units outstanding and entitled to vote on the record date for the meeting, 331,000 were represented by way of their electronic participation.

The Secretary reported that of the 392,000 Class B Units outstanding and entitled to vote on the record date for the meeting, 340,500 were represented by way of their electronic participation.

Nomination and Election of Governors

The Members owning a majority of the 361,000 Class A Units outstanding and entitled to vote on the record date for the meeting ELECTED Laura Bultman, M.D. to the Board of Governors.

The Members owning a majority of the 392,000 Class B Units outstanding and entitled to vote on the record date for the meeting ELECTED Kyle Kingsley, M.D., Jon Thompson, Ph.D., Charles Lederman, and Brooke Gehring to the Board of Governors.

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Adjournment

There being no further business to become before the meeting, the Chair ordered the meeting adjourned.

Dated: September 30 2014

Ross Hussey
Secretary
MINNESOTA MEDICAL SOLUTIONS LLC

Office of the Minnesota Secretary of State

Certificate of Assumed Name

Minnesota Statutes, 333

The filing of an assumed name does not provide a user with exclusive rights to that name. The filing is required for consumer protection in order to enable customers to be able to identify the true owner of a business.

ASSUMED NAME: **MinnMed**

PRINCIPAL PLACE OF BUSINESS: **5200 Willson Rd. Suite 150 Edina MN 55424 USA**

NAMEHOLDER(S):

Name:	Address:
Minnesota Medical Solutions, LLC	**5200 Willson Rd. Suite 150 Edina MN 55424**

If you submit an attachment, it will be incorporated into this document. If the attachment conflicts with the information specifically set forth in this document, this document supersedes the data referenced in the attachment.

By typing my name, I, the undersigned, certify that I am signing this document as the person whose signature is required, or as agent of the person(s) whose signature would be required who has authorized me to sign this document on his/her behalf, or in both capacities. I further certify that I have completed all required fields, and that the information in this document is true and correct and in compliance with the applicable chapter of Minnesota Statutes. I understand that by signing this document I am subject to the penalties of perjury as set forth in Section 609.48 as if I had signed this document under oath.

SIGNED BY: **Ross Hussey**

MAILING ADDRESS: **None Provided**

EMAIL FOR OFFICIAL NOTICES: **rhussey@uthlaw.com**

Work Item 786130600028
Original File Number 786130600028

STATE OF MINNESOTA
OFFICE OF THE SECRETARY OF STATE
FILED
10/01/2014 11:59 PM

Mark Ritchie
Secretary of State

Office of the Minnesota Secretary of State

Certificate of Assumed Name

Minnesota Statutes, 333

The filing of an assumed name does not provide a user with exclusive rights to that name. The filing is required for consumer protection in order to enable customers to be able to identify the true owner of a business.

ASSUMED NAME: **Minnesota Botanical Solutions**

PRINCIPAL PLACE OF BUSINESS: **5200 Willson Road Suite 150 Edina MN 55424 USA**

NAMEHOLDER(S):

Name:	Address:
Minnesota Medical Solutions, LLC	**5200 Willson Rd. Suite 150 Edina MN 55424**

If you submit an attachment, it will be incorporated into this document. If the attachment conflicts with the information specifically set forth in this document, this document supersedes the data referenced in the attachment.

By typing my name, I, the undersigned, certify that I am signing this document as the person whose signature is required, or as agent of the person(s) whose signature would be required who has authorized me to sign this document on his/her behalf, or in both capacities. I further certify that I have completed all required fields, and that the information in this document is true and correct and in compliance with the applicable chapter of Minnesota Statutes. I understand that by signing this document I am subject to the penalties of perjury as set forth in Section 609.48 as if I had signed this document under oath.

SIGNED BY: **Ross Hussey**

MAILING ADDRESS: **None Provided**

EMAIL FOR OFFICIAL NOTICES: **rhussey@uthlaw.com**

Work Item 786127600027
Original File Number 786127600027

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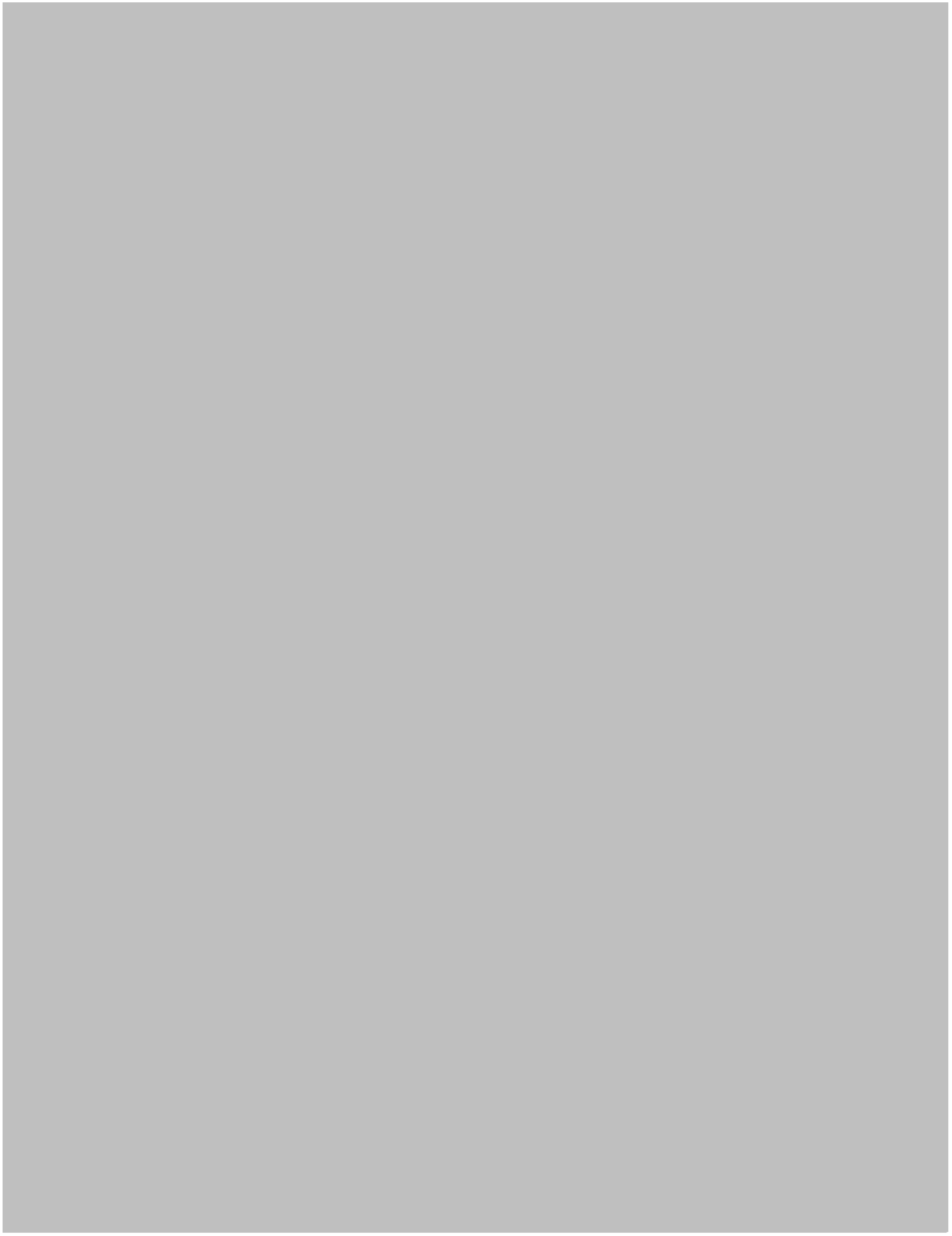
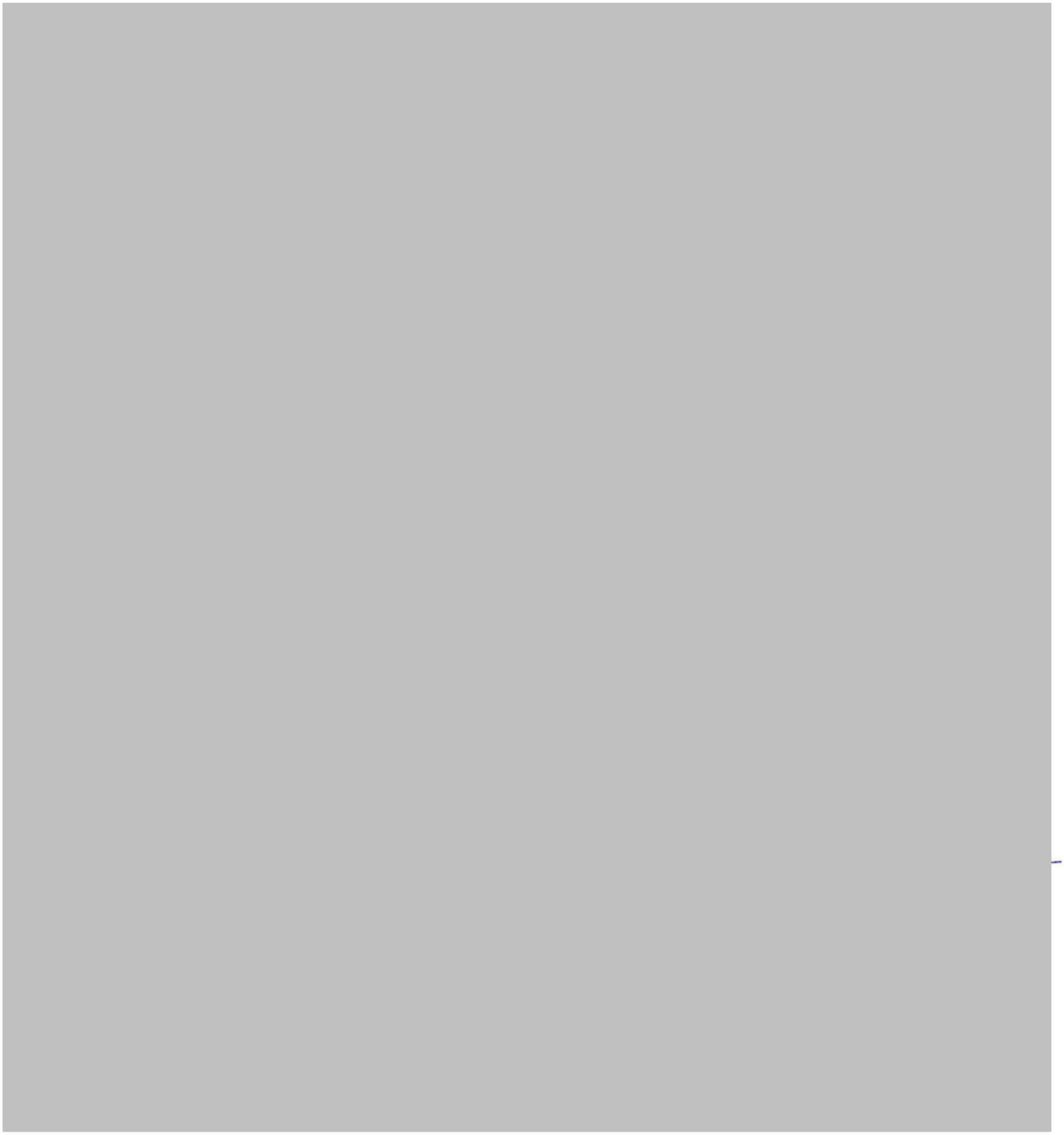
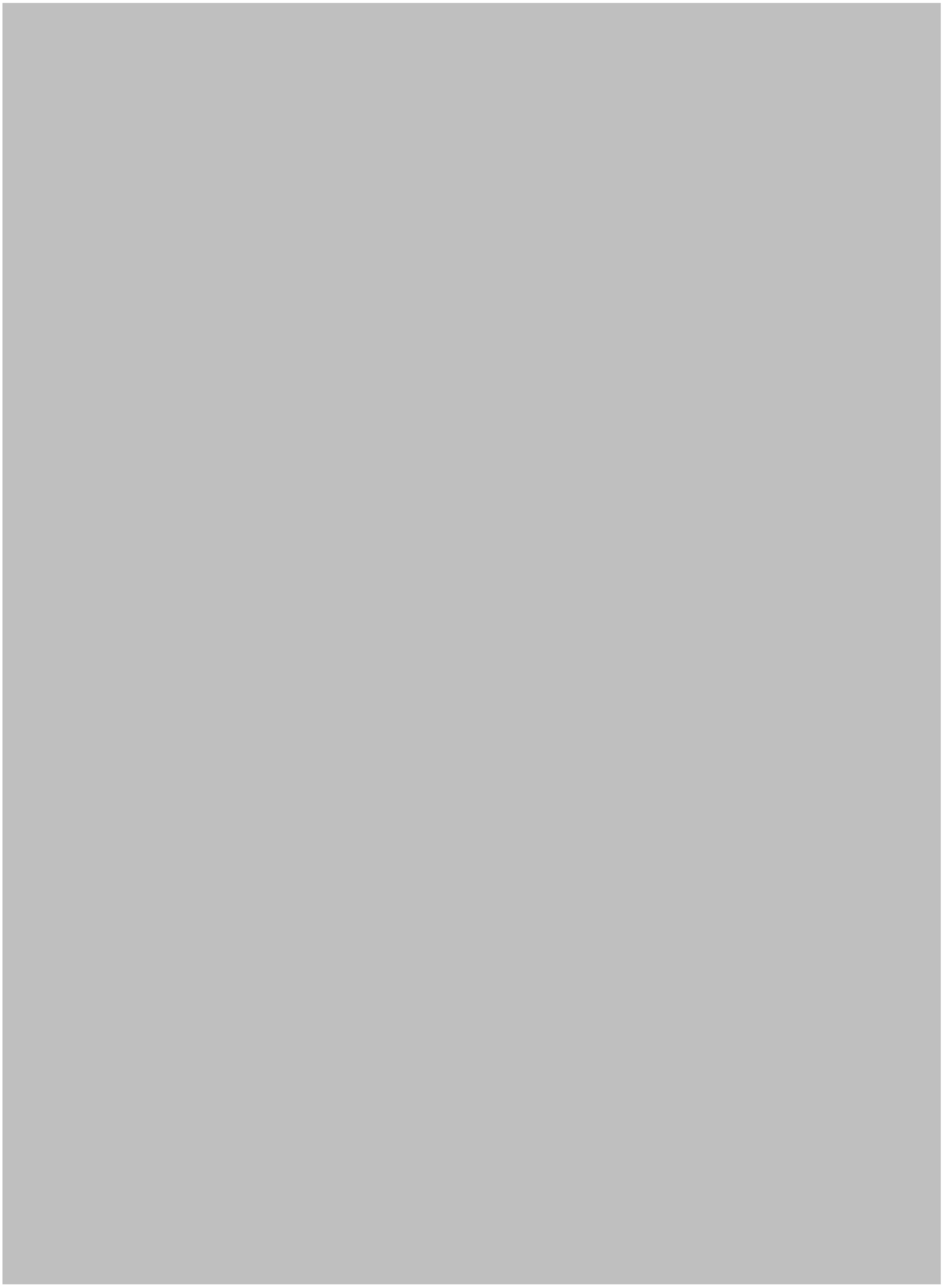
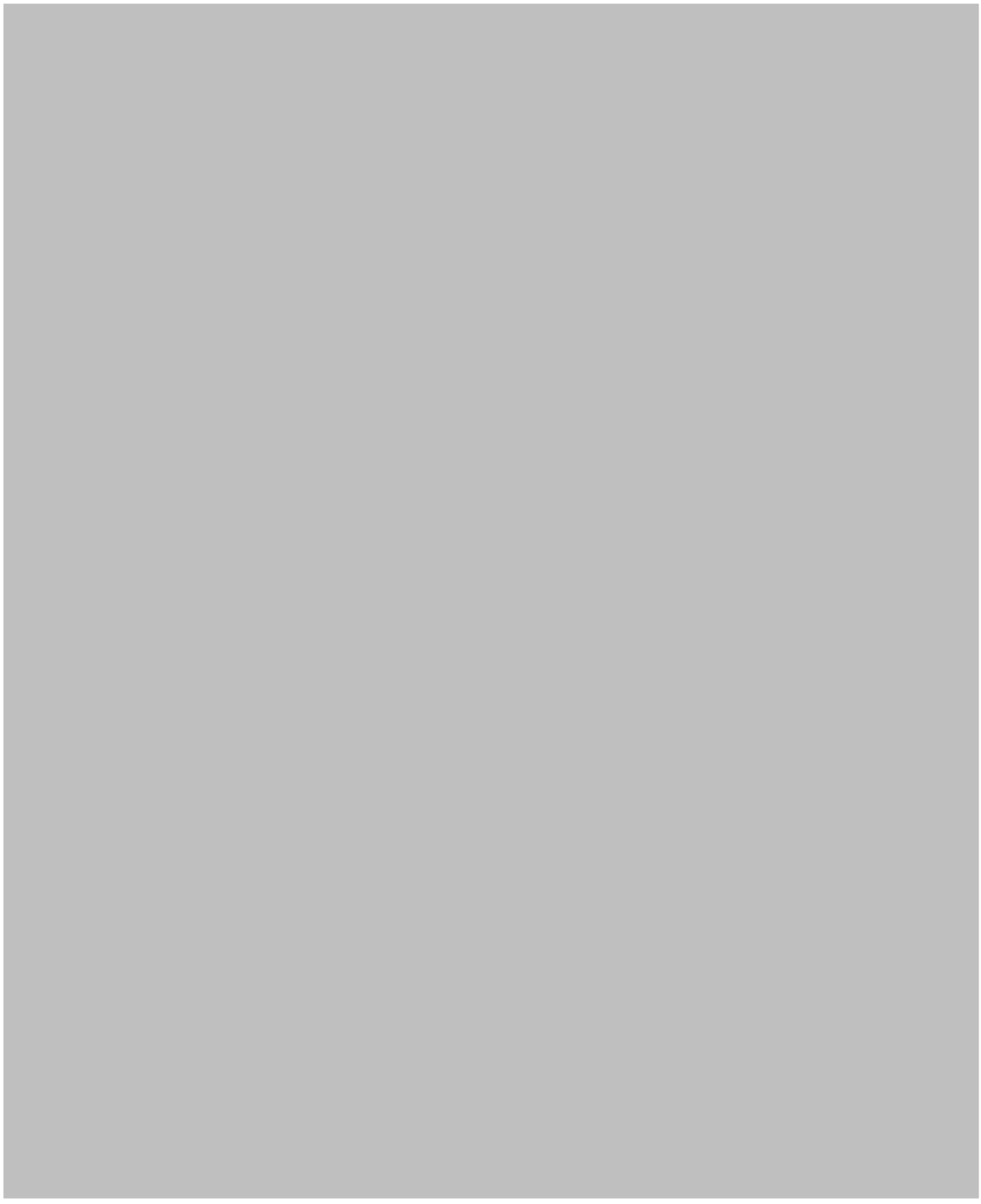
OFFICE OF THE SECRETARY OF STATE
FILED
10/01/2014 11:59 PM

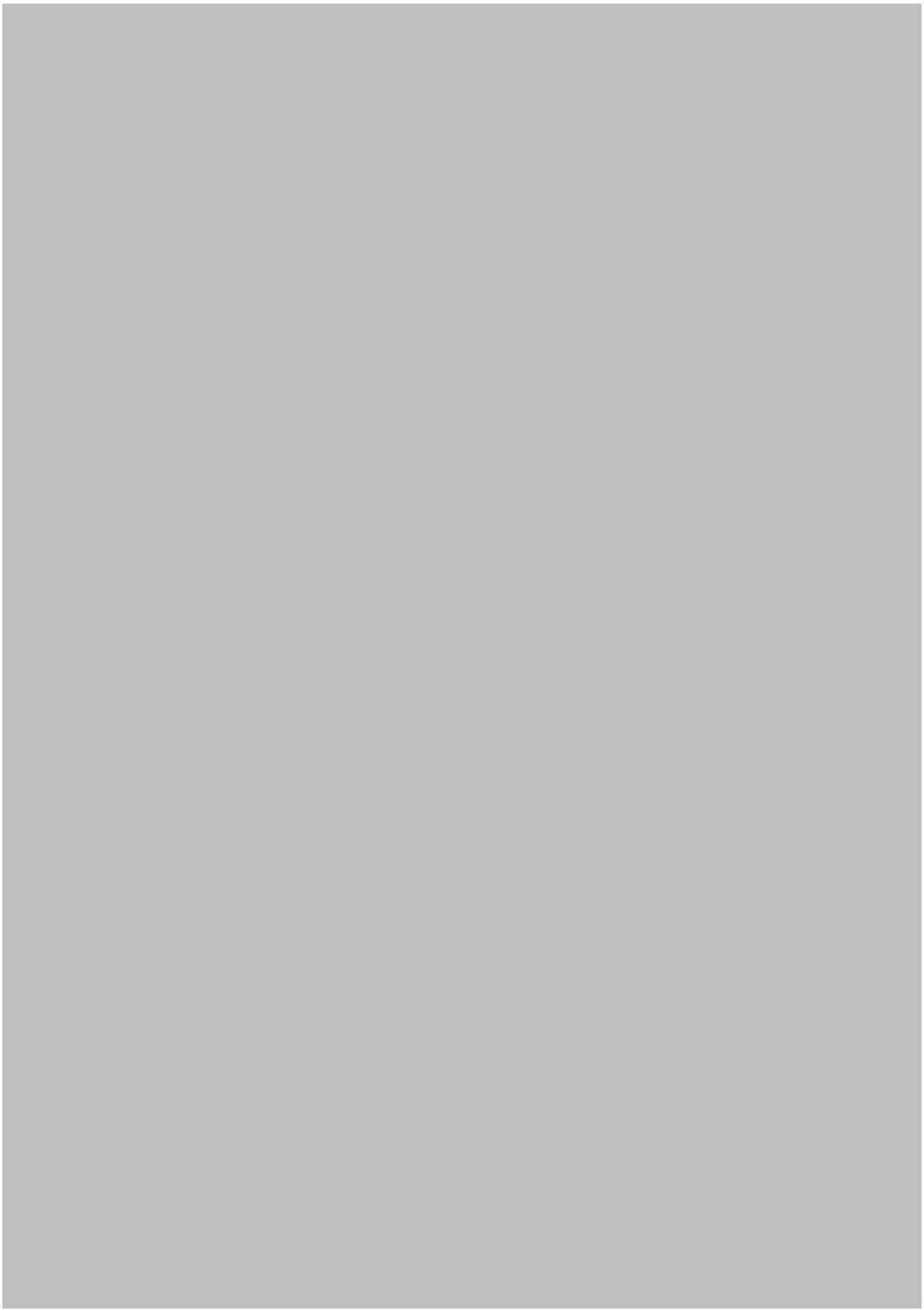
Mark Ritchie
Secretary of State

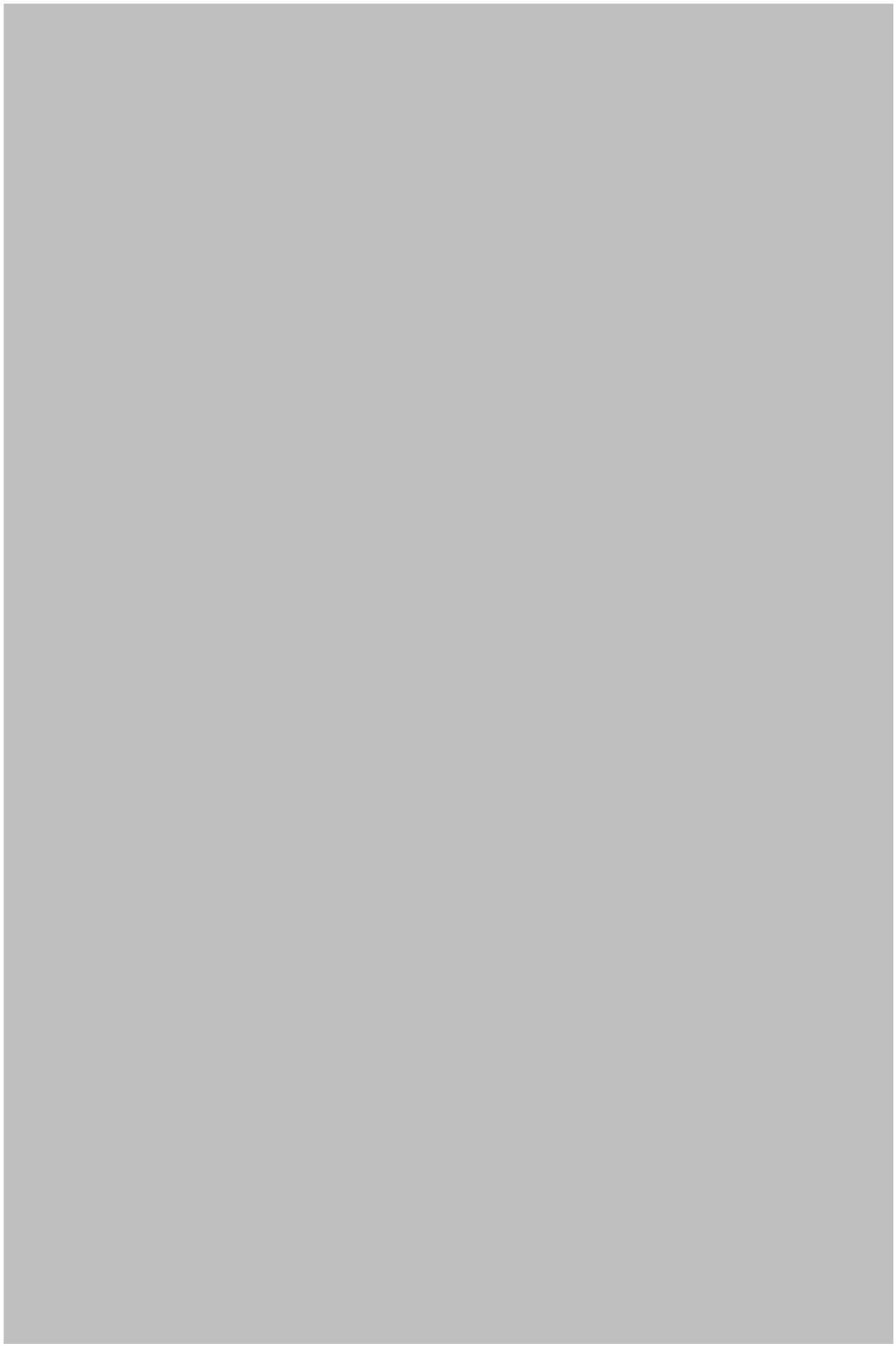


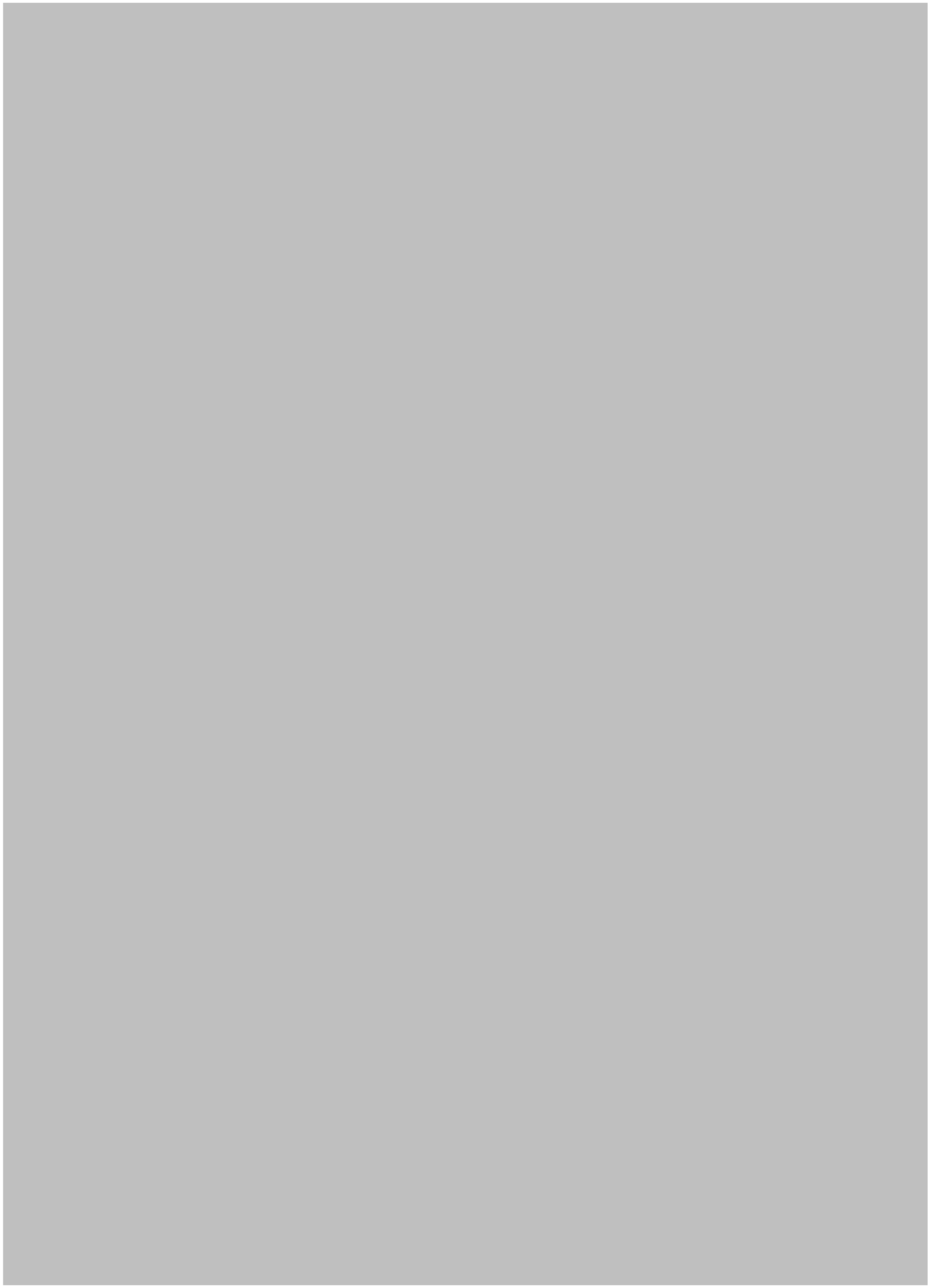


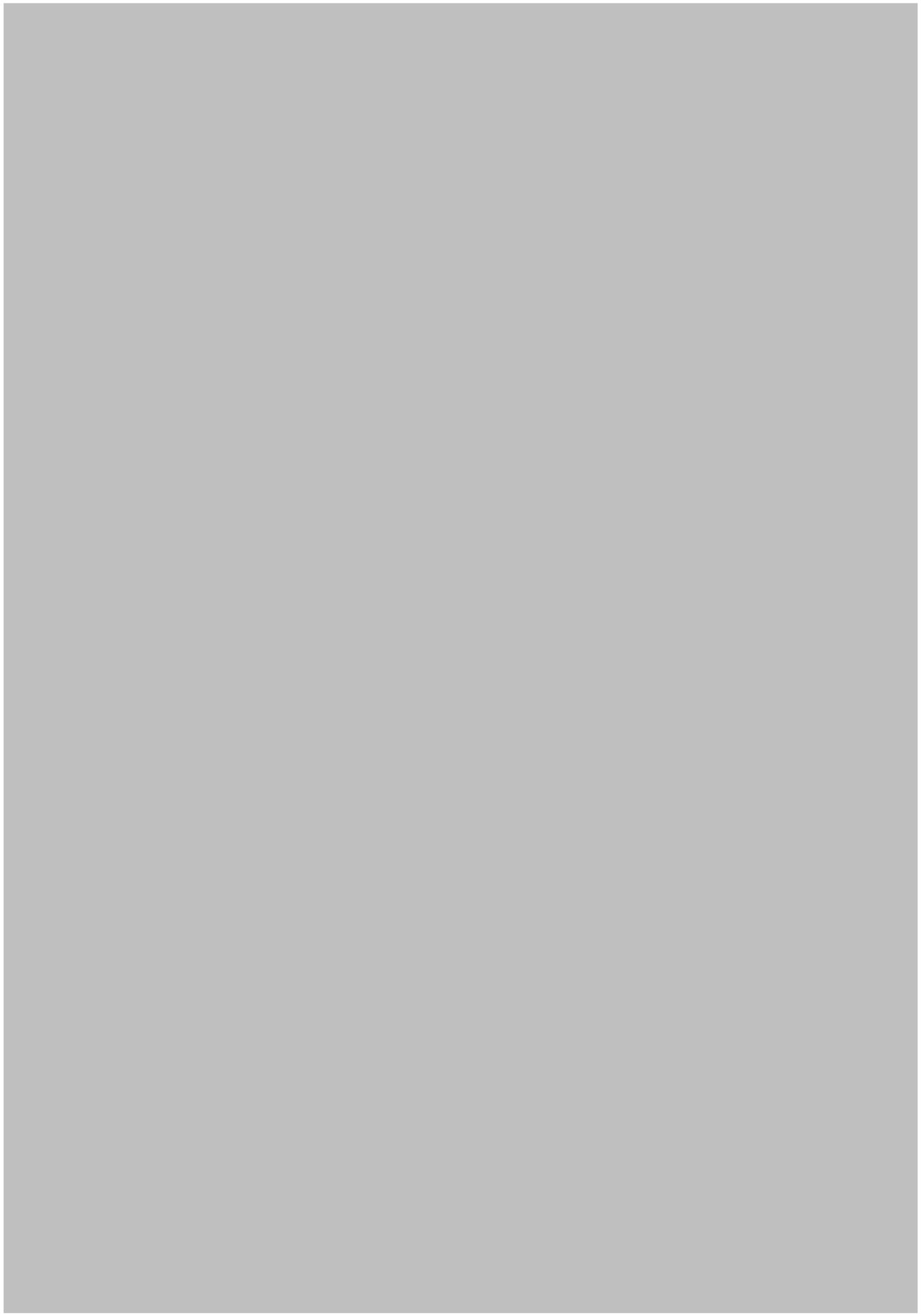


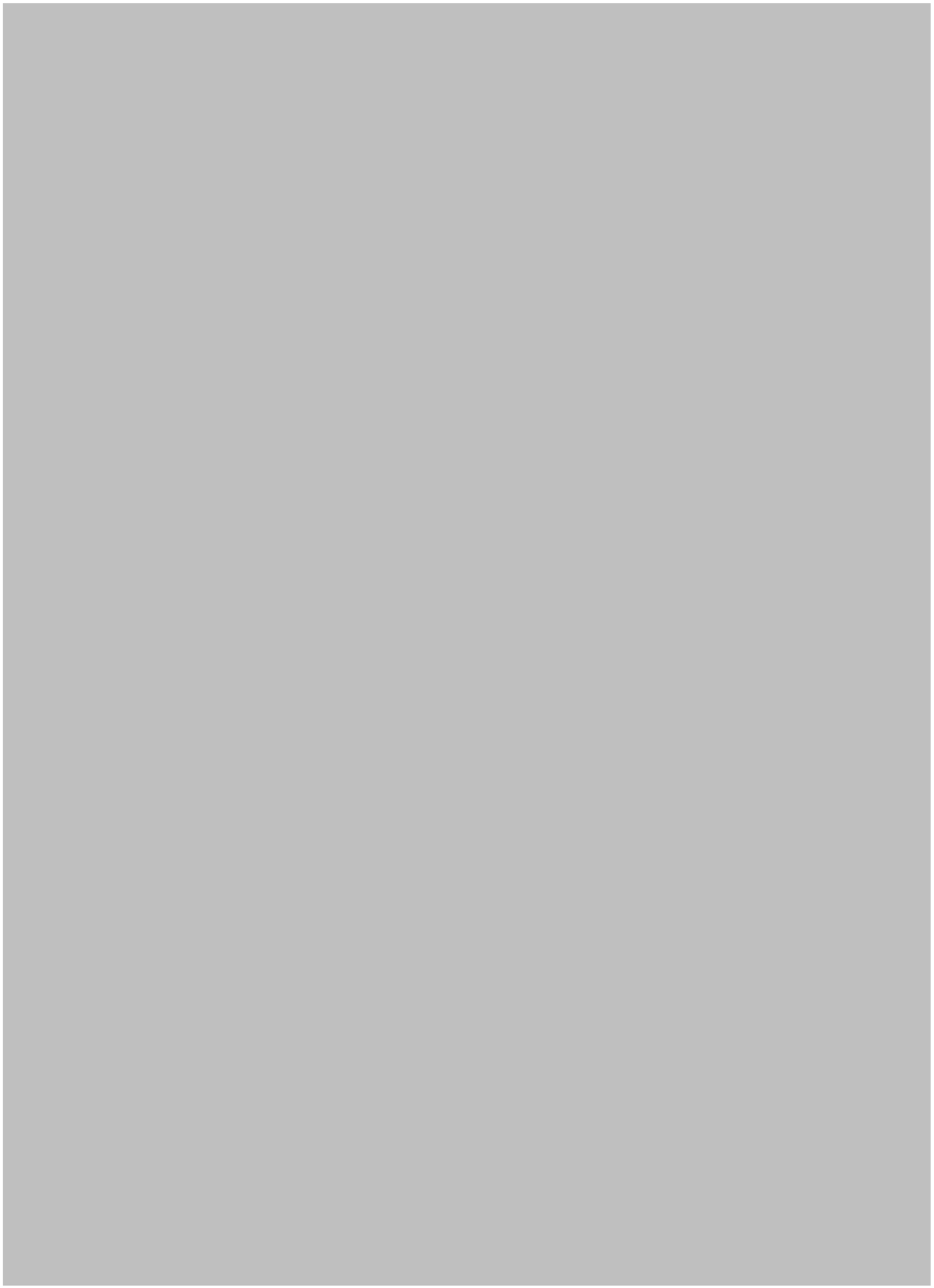


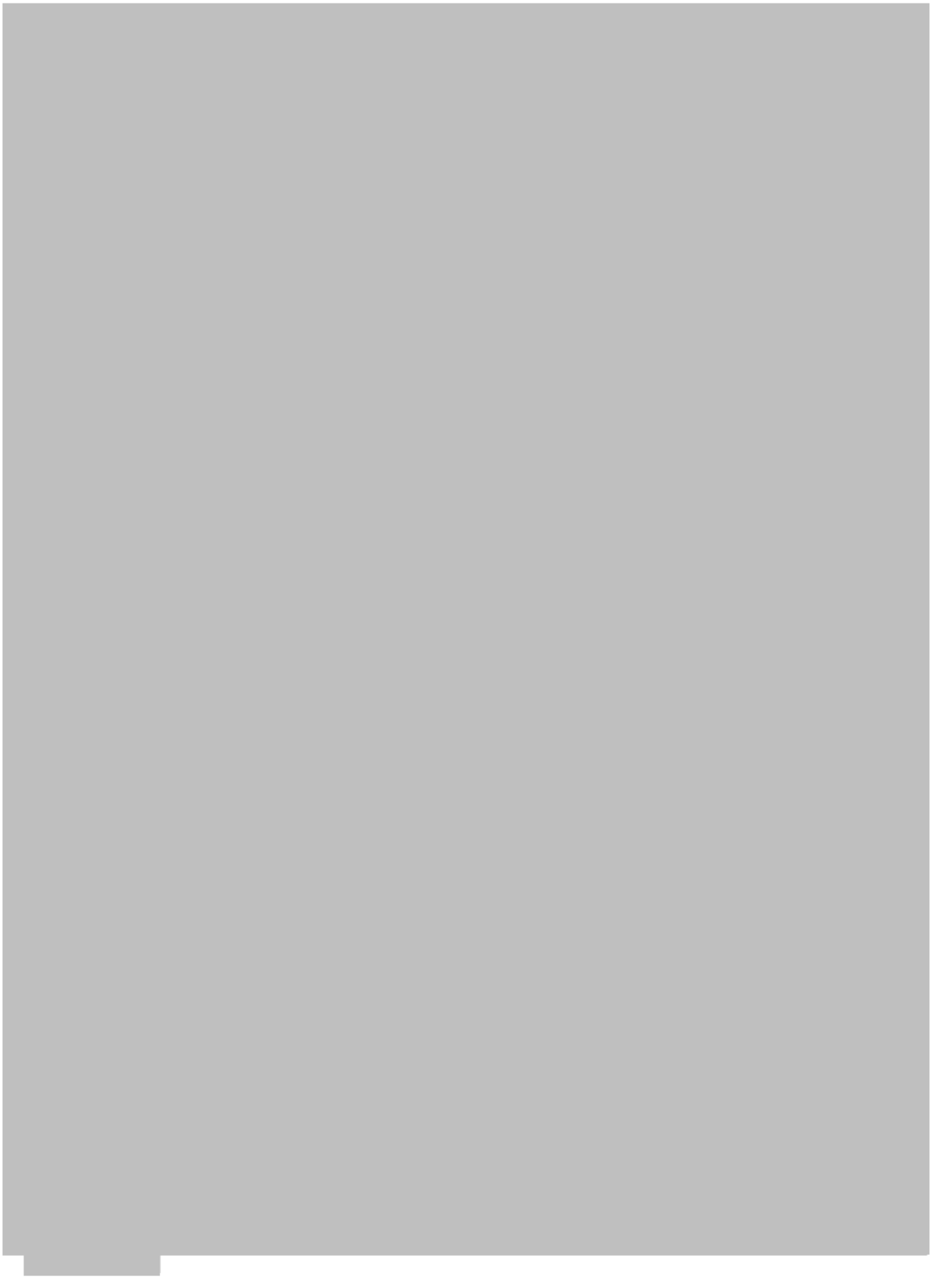


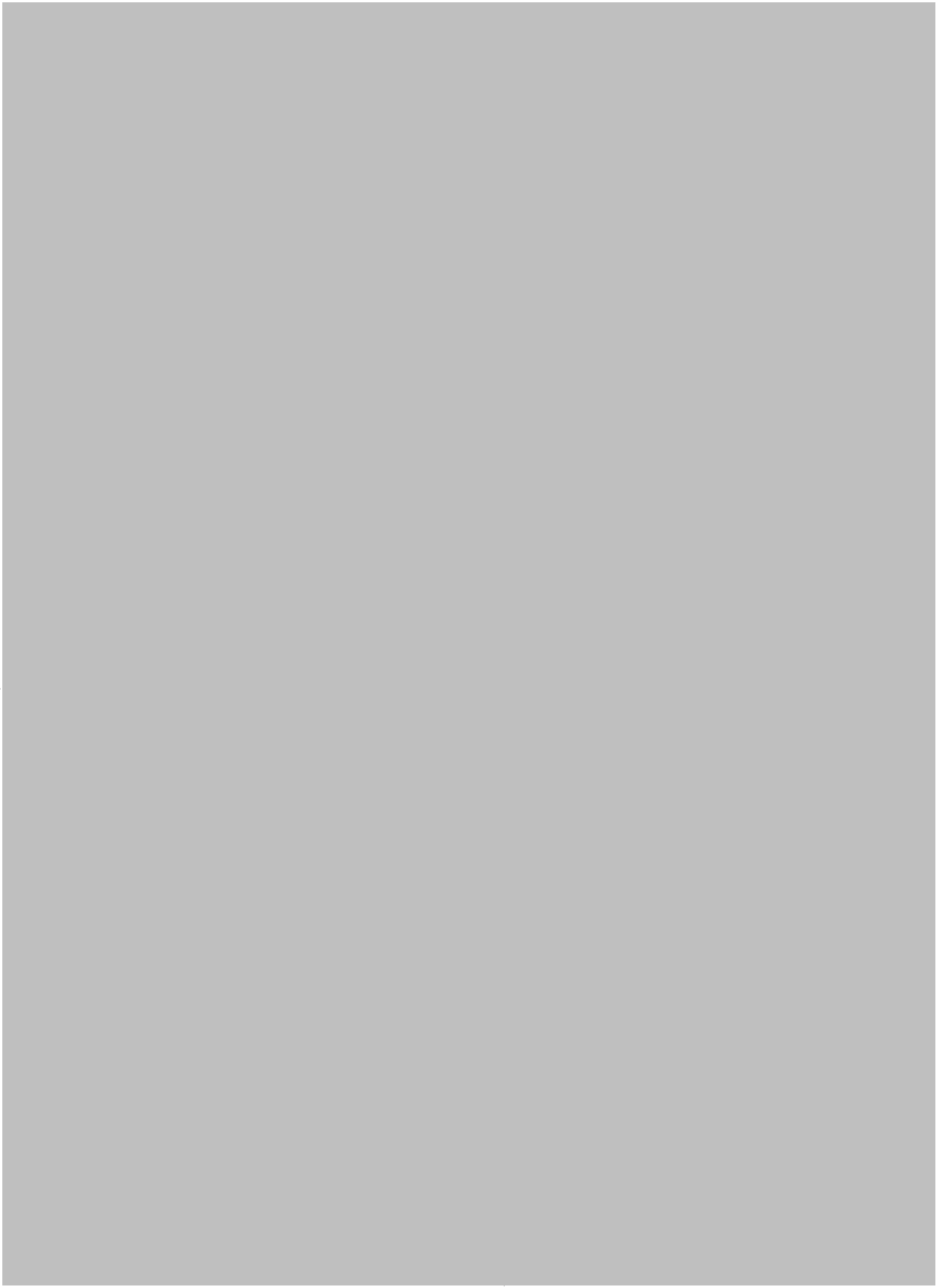


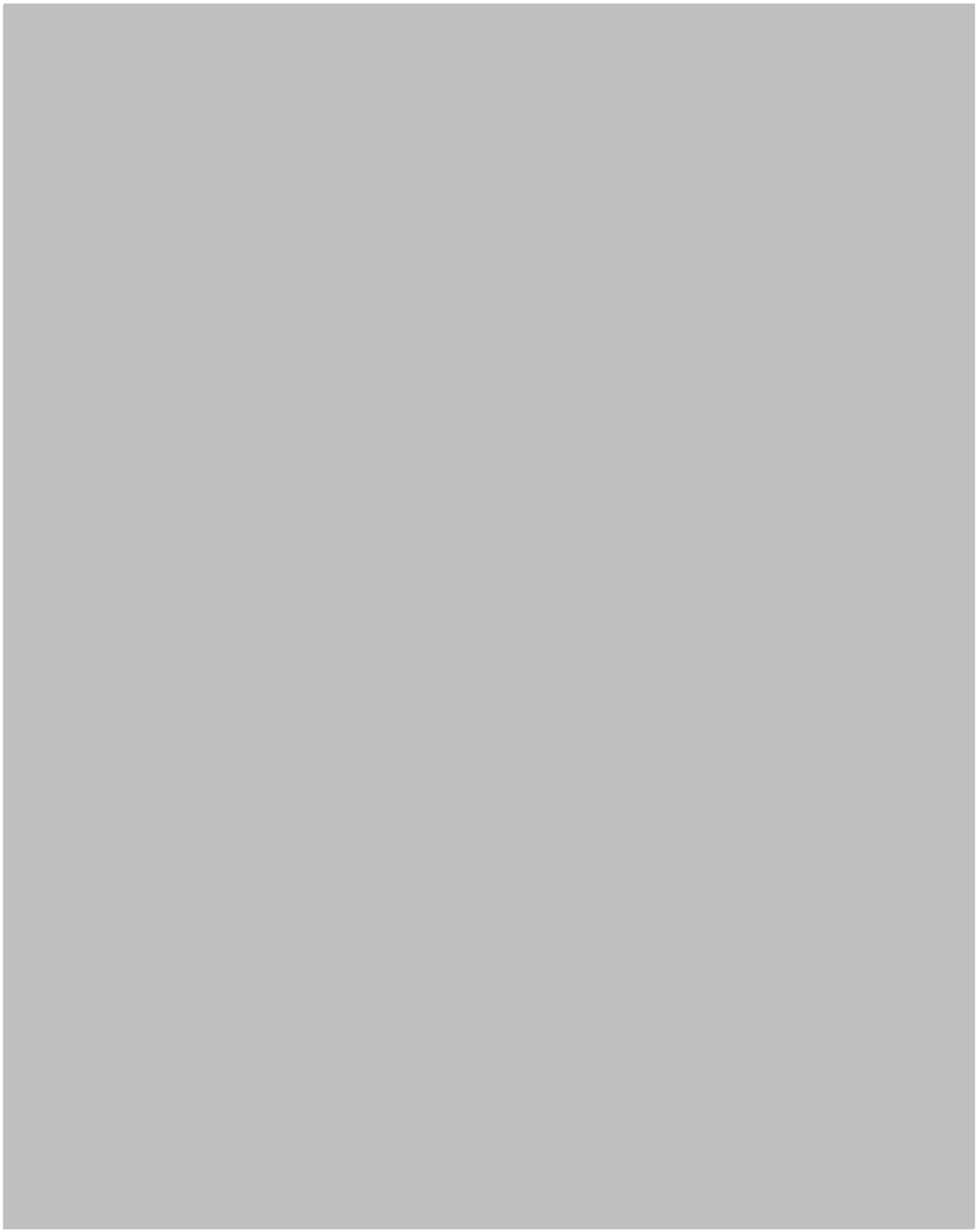


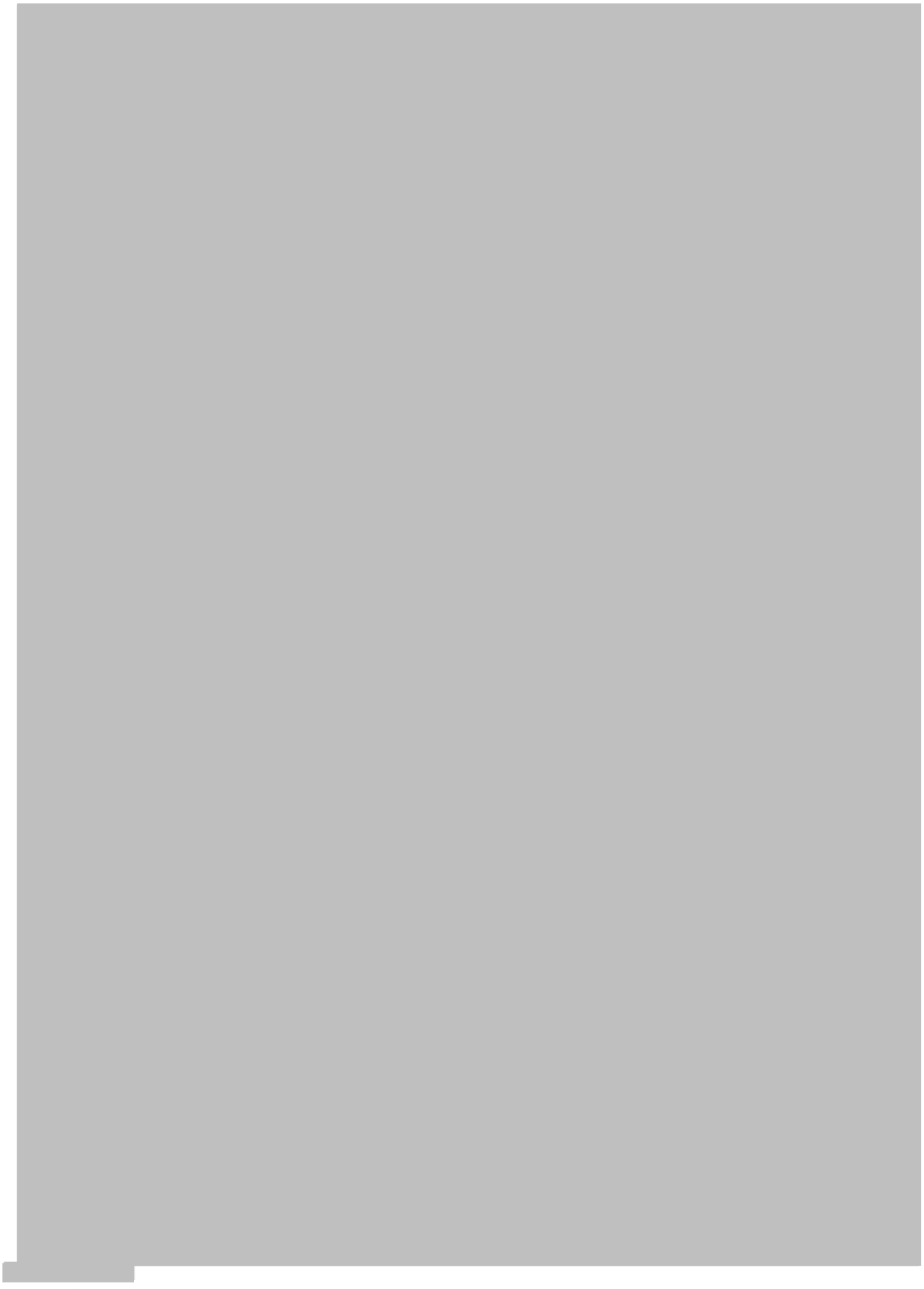


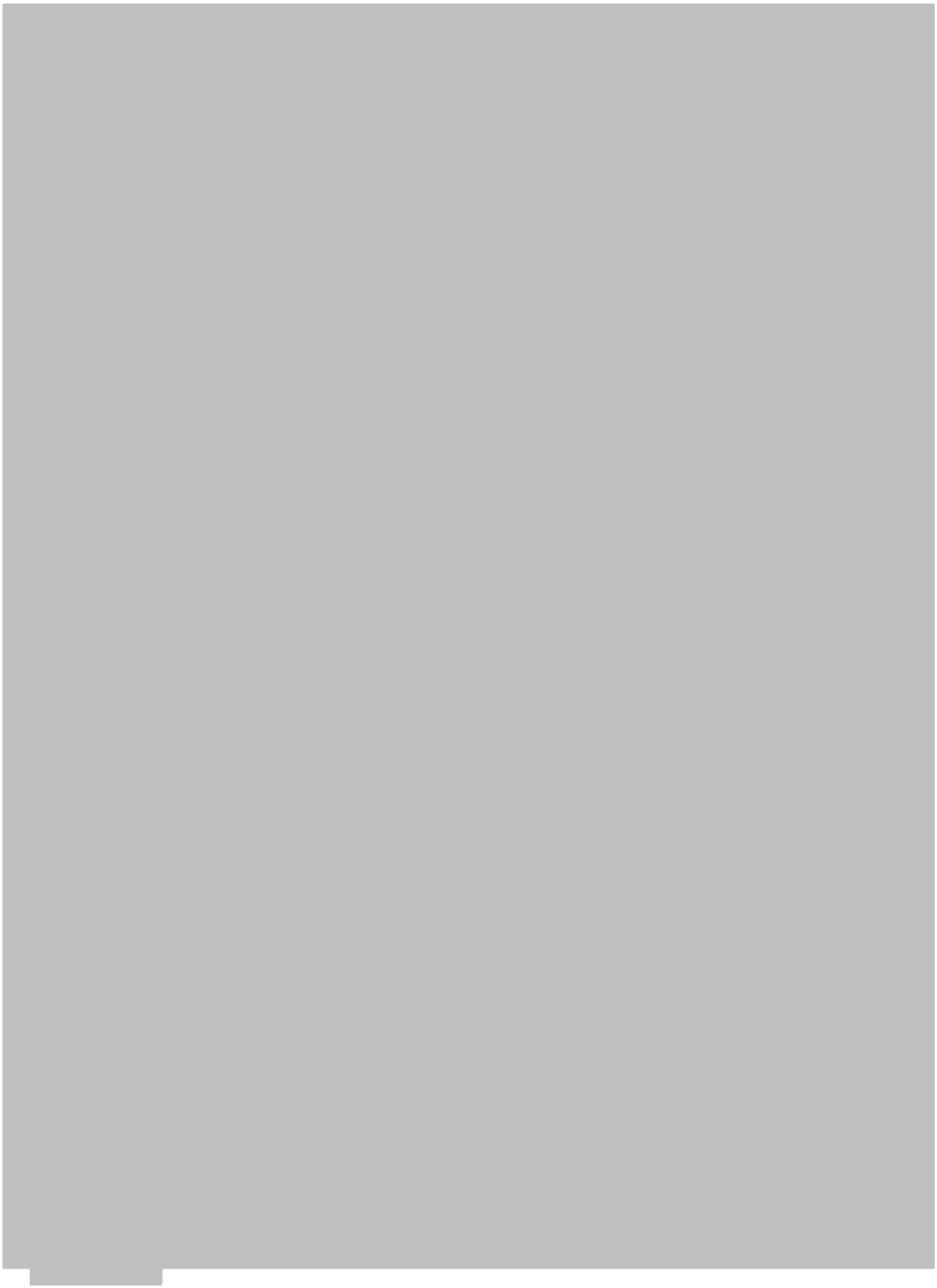


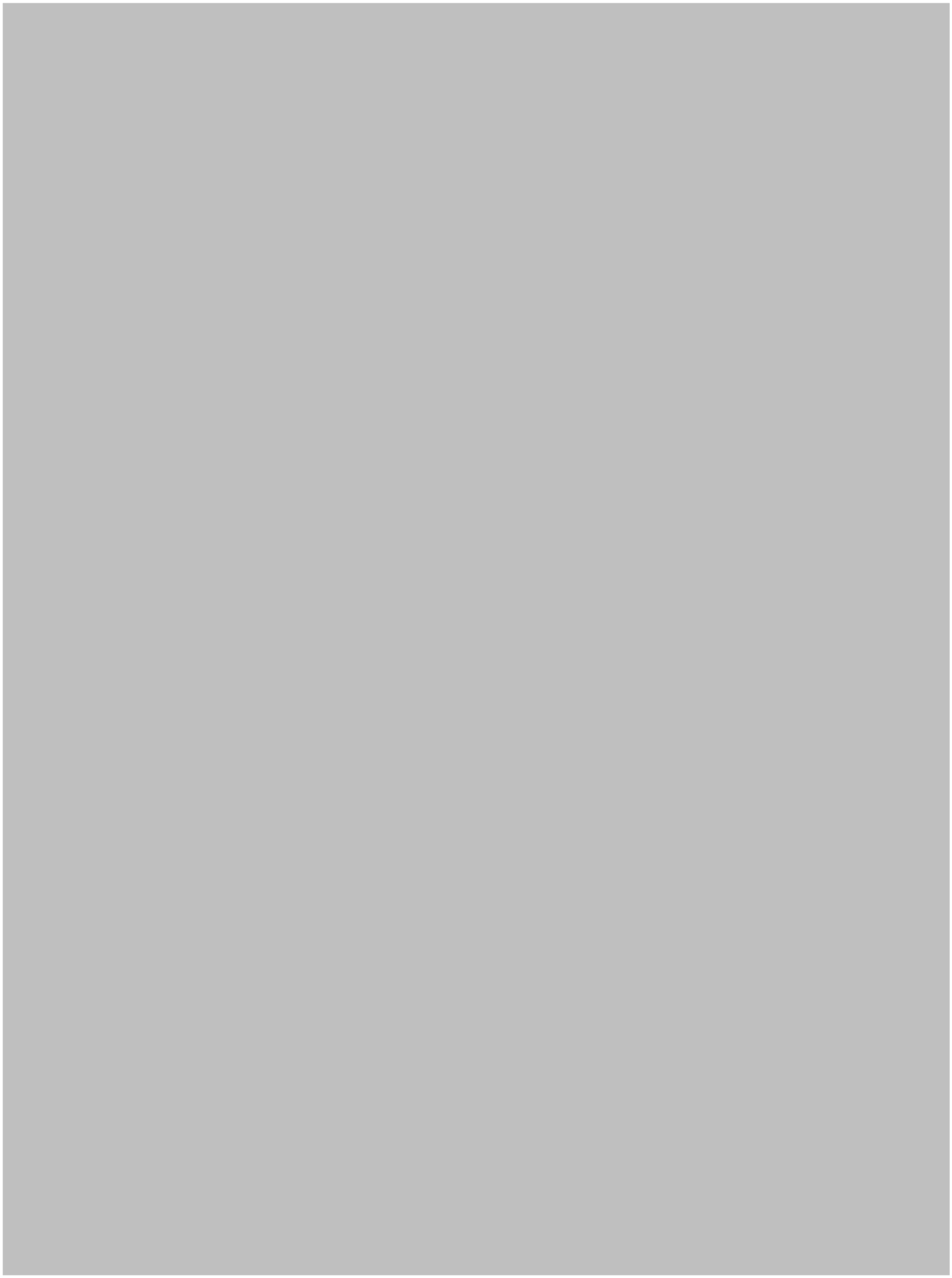


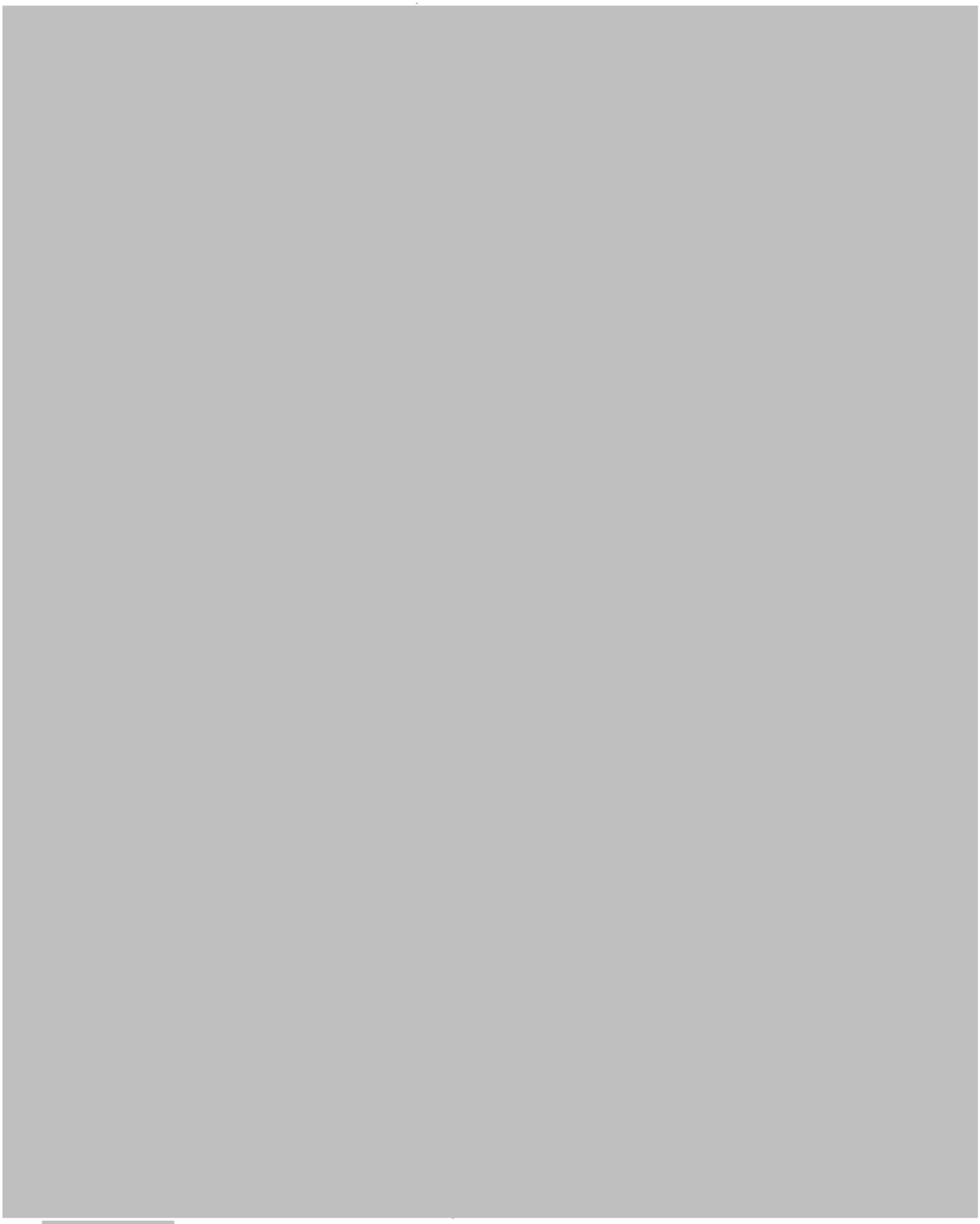


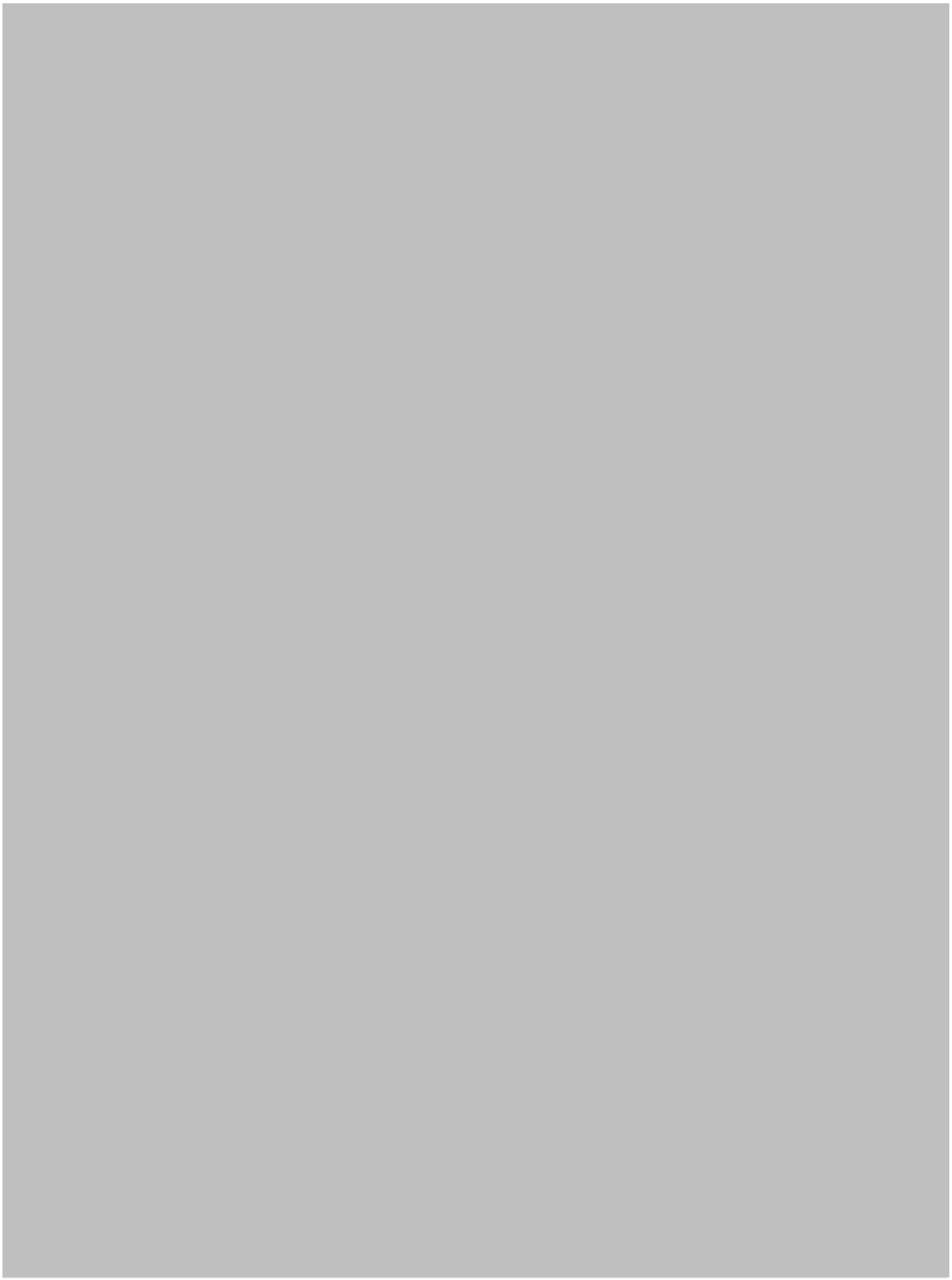


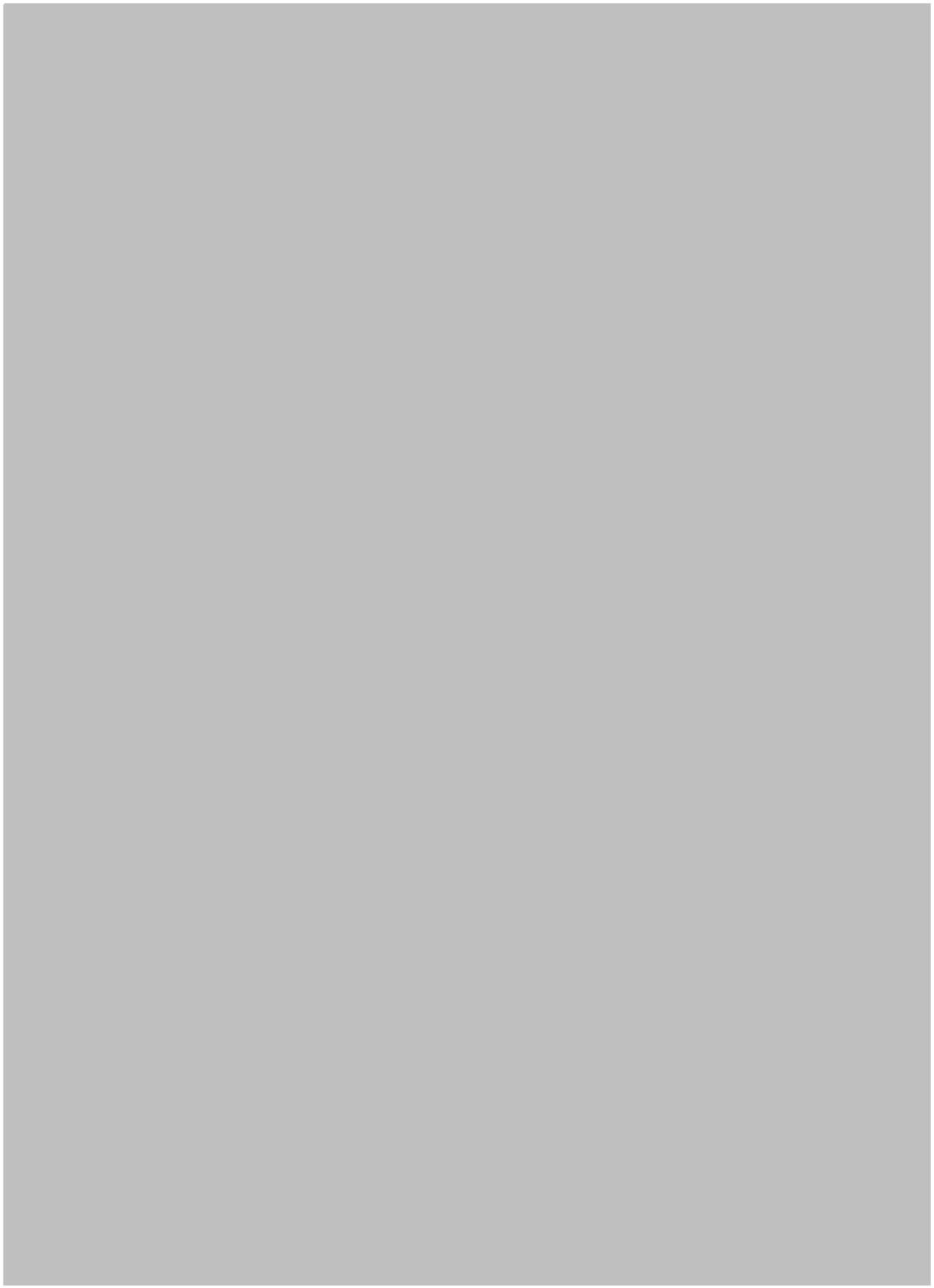


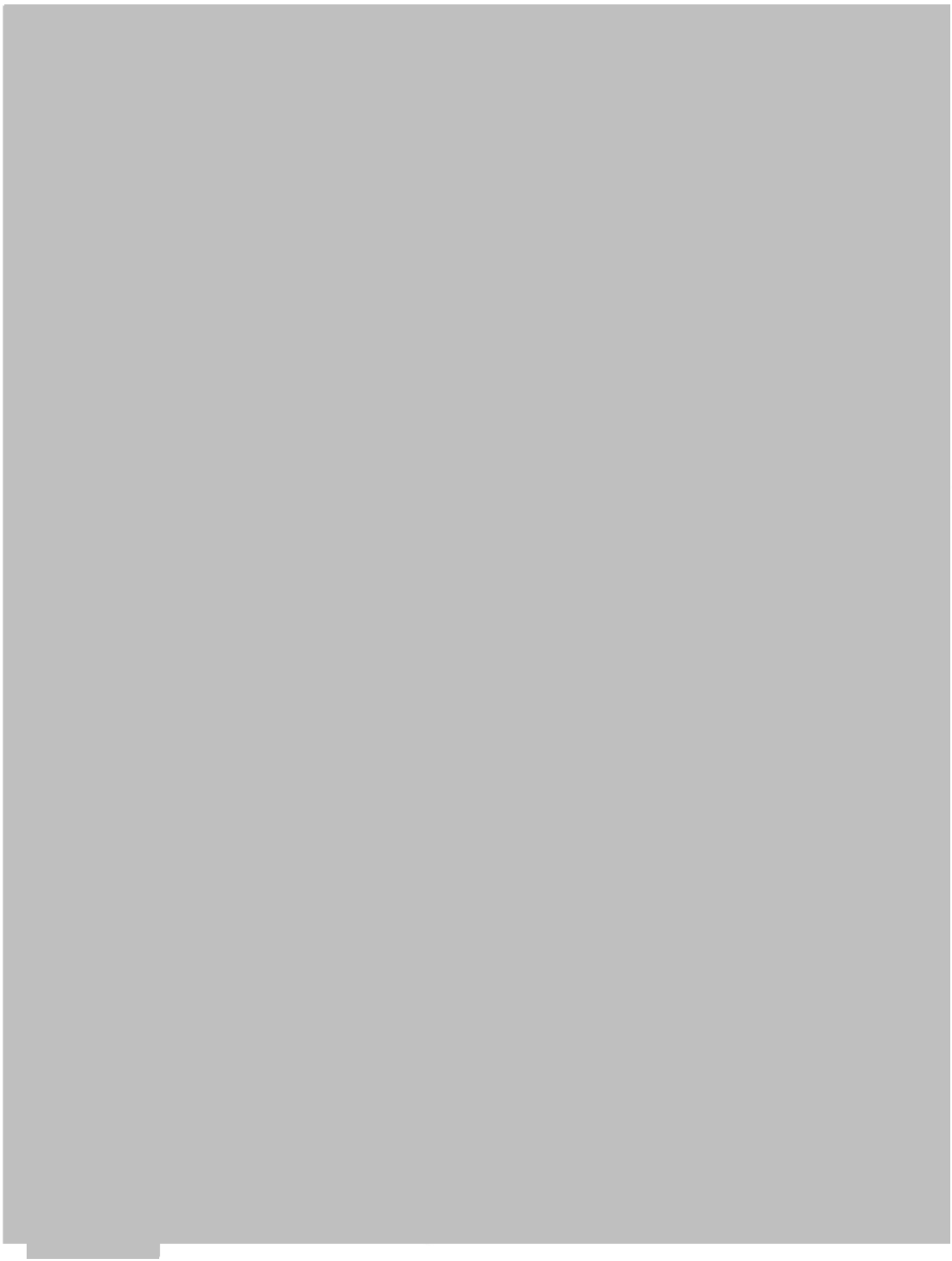


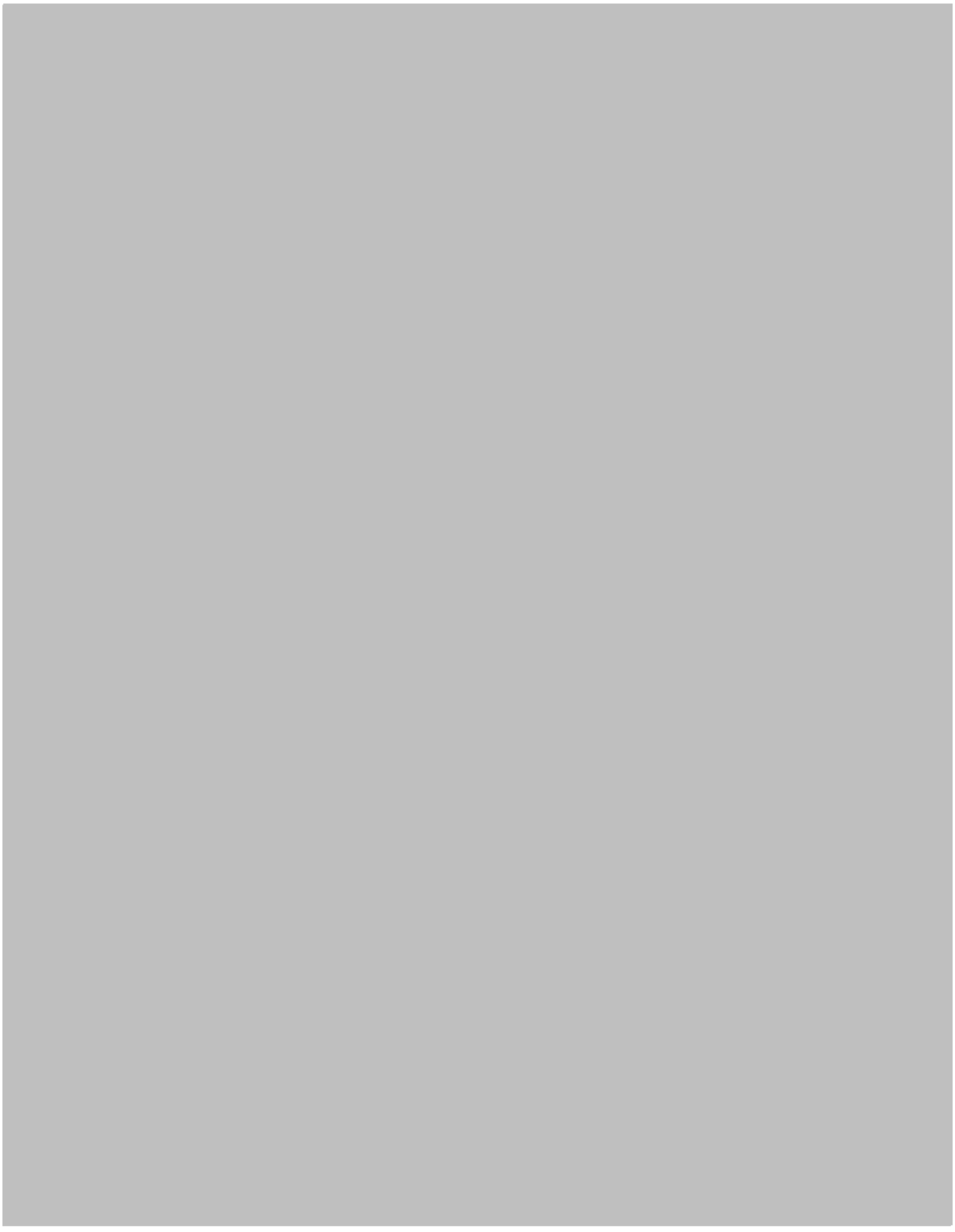


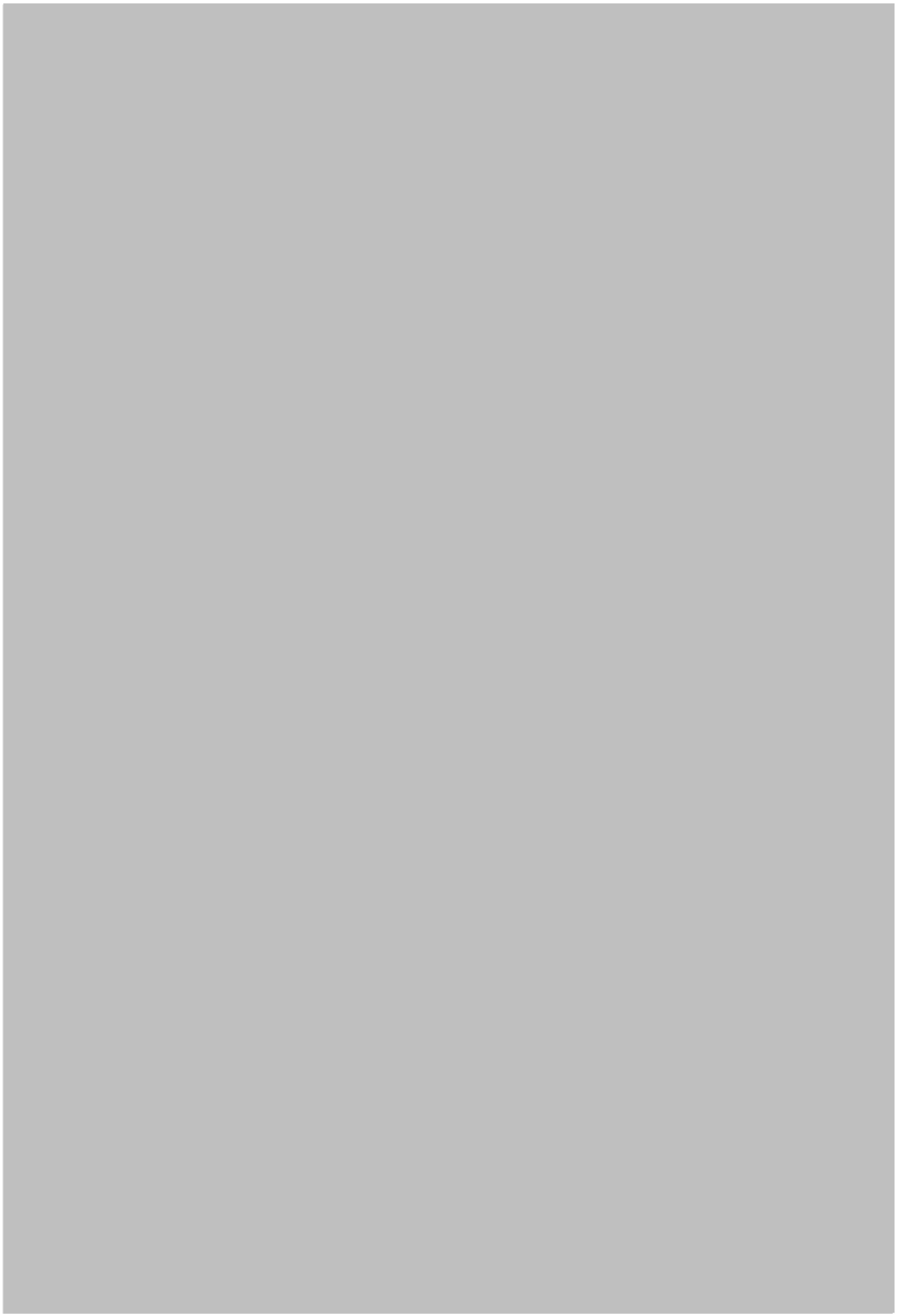


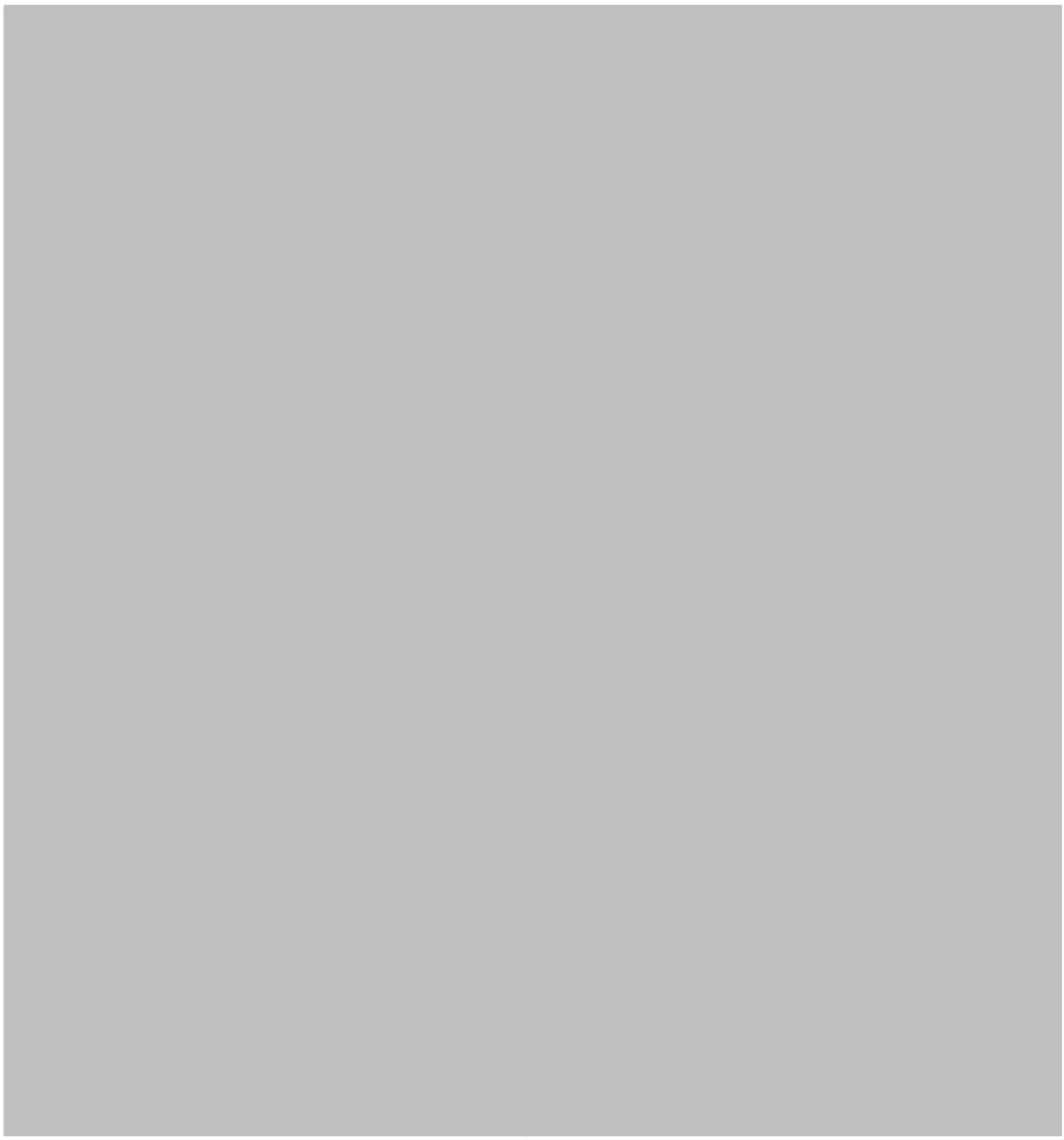


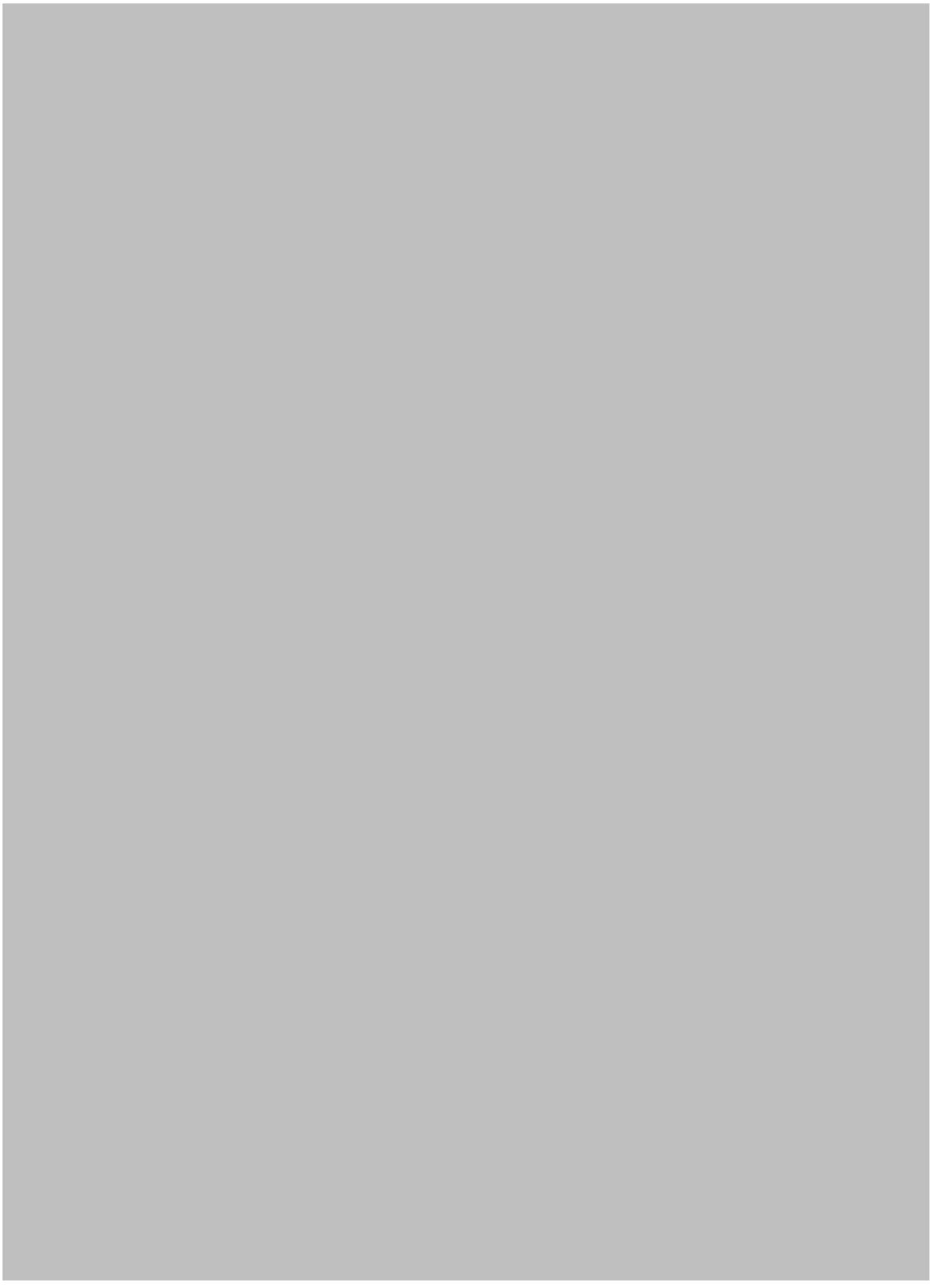


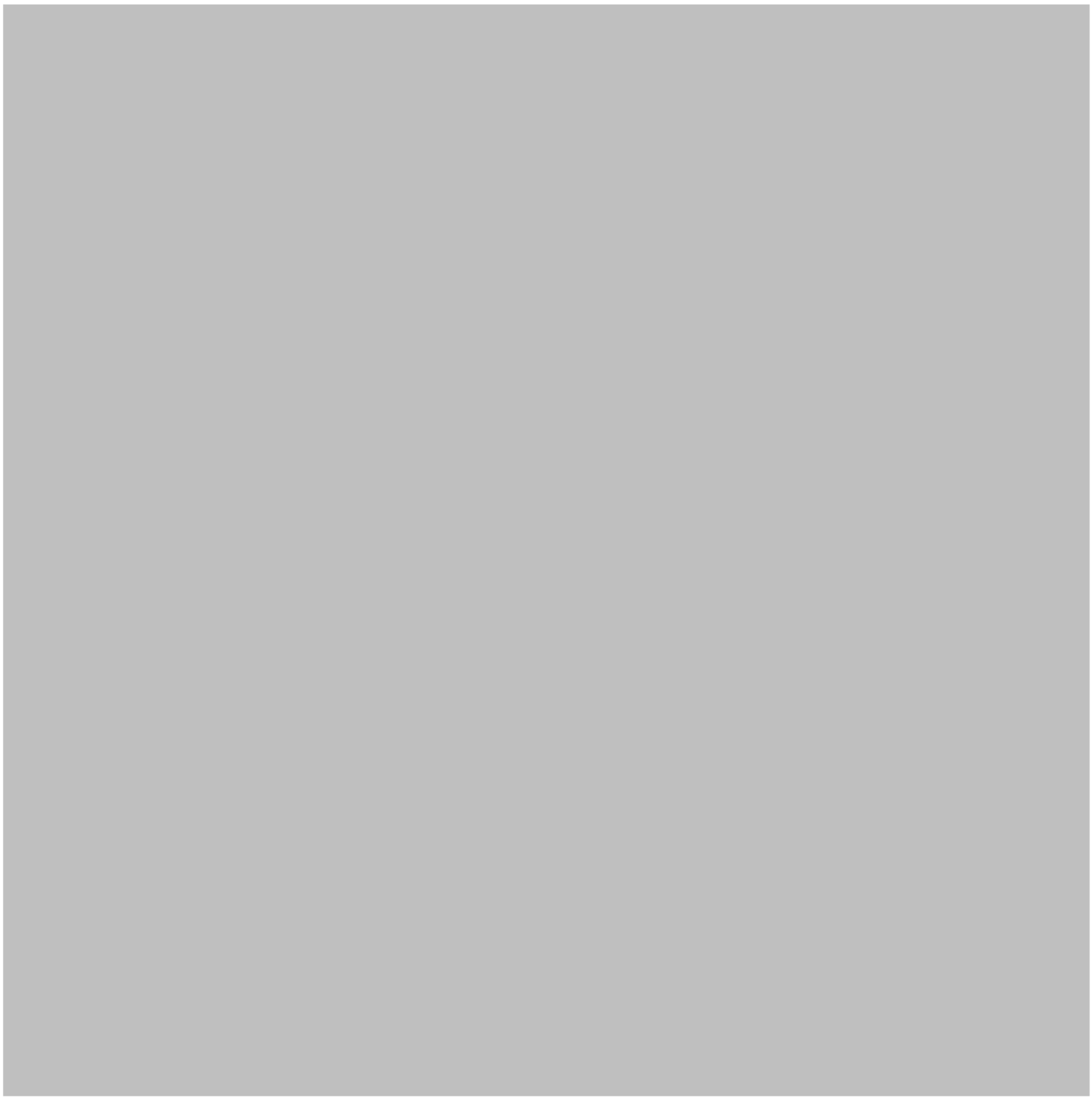


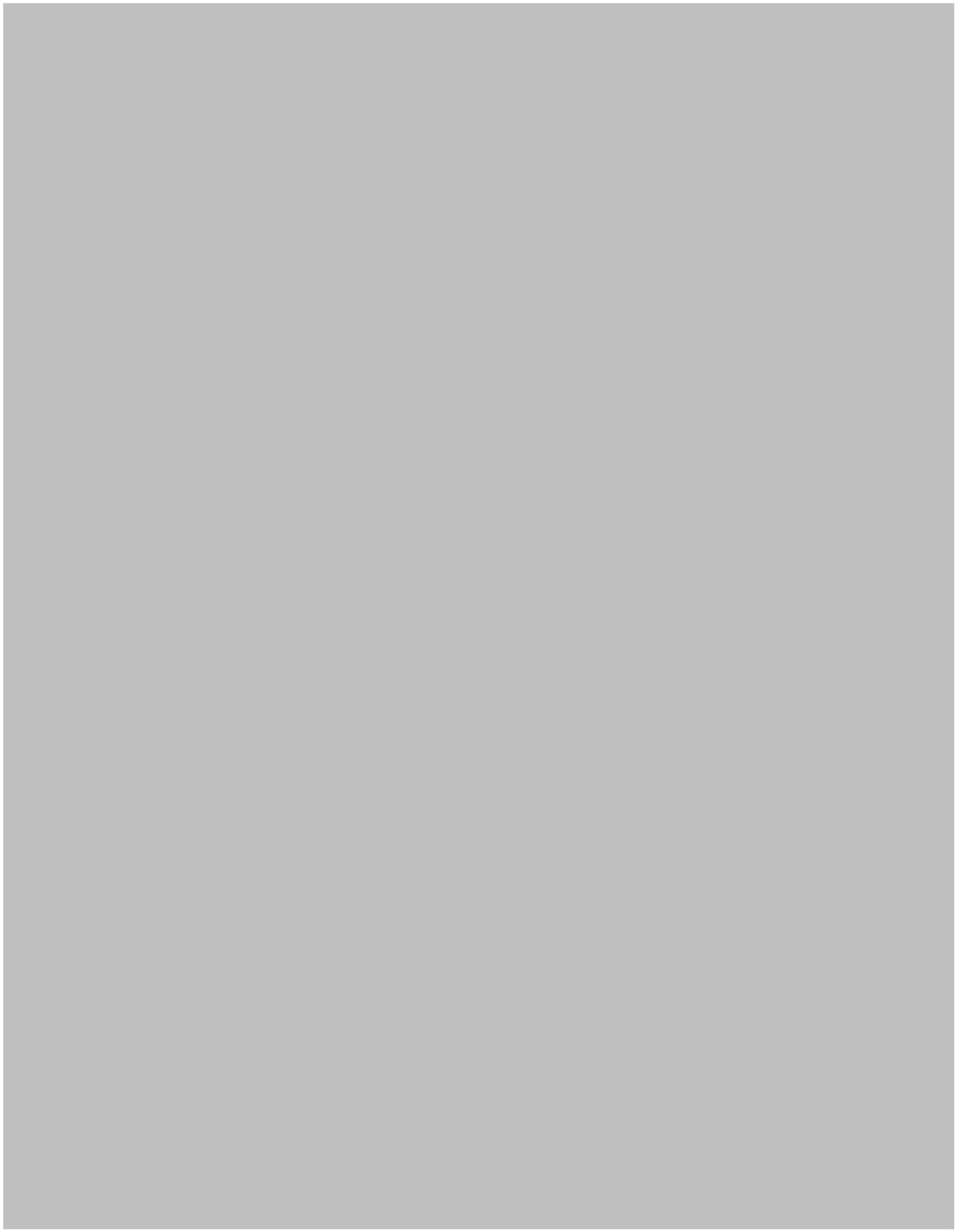


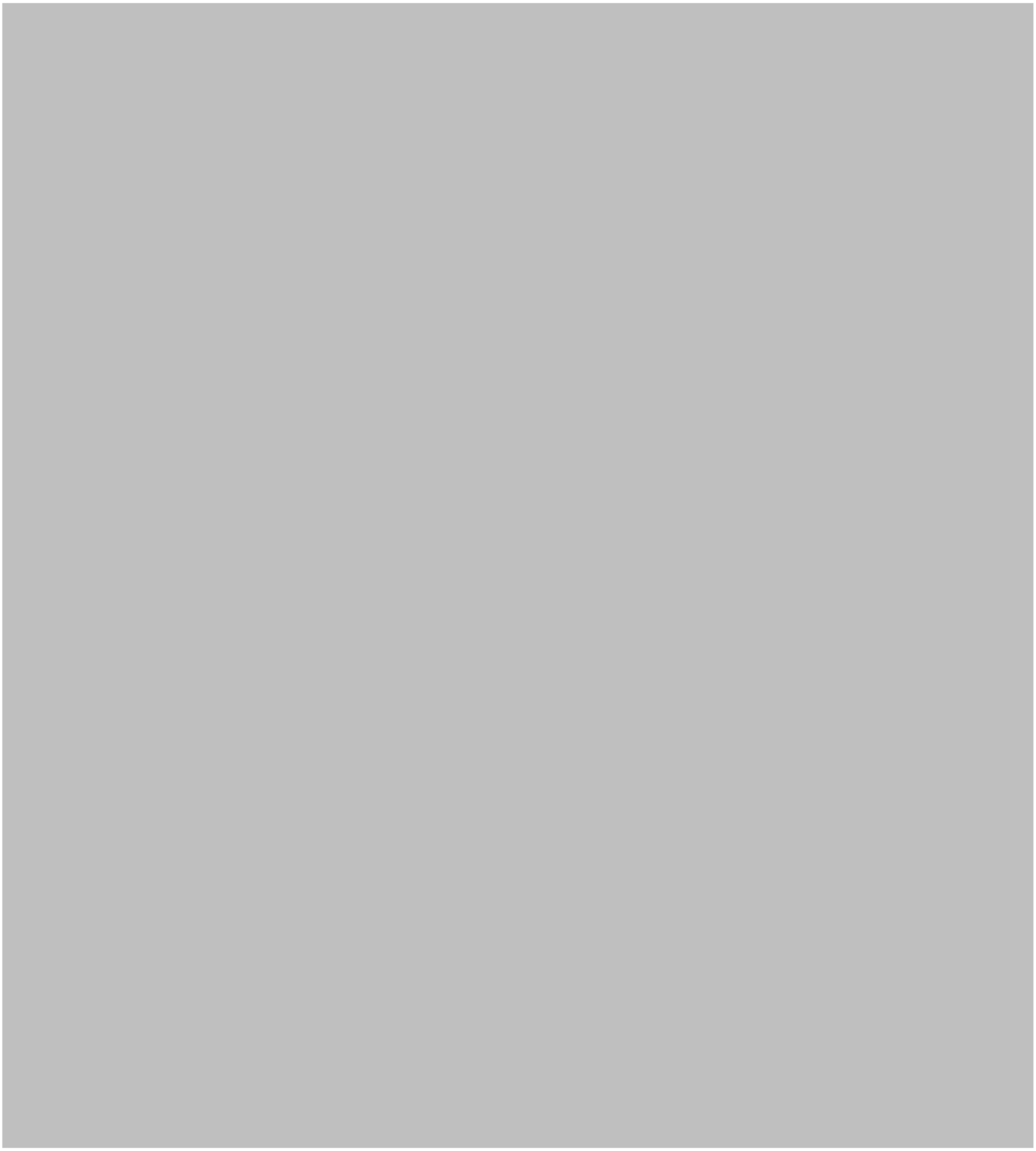


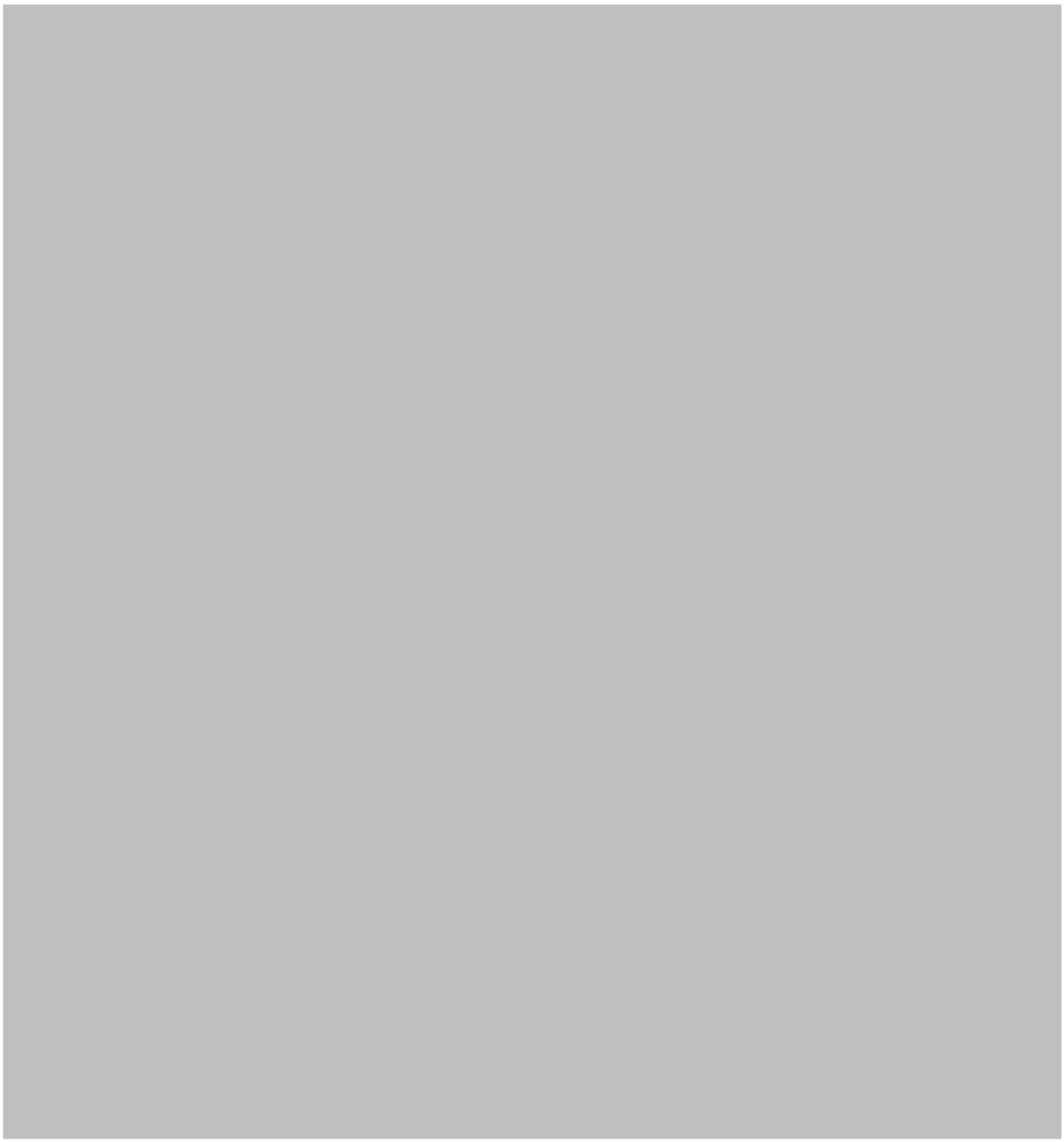


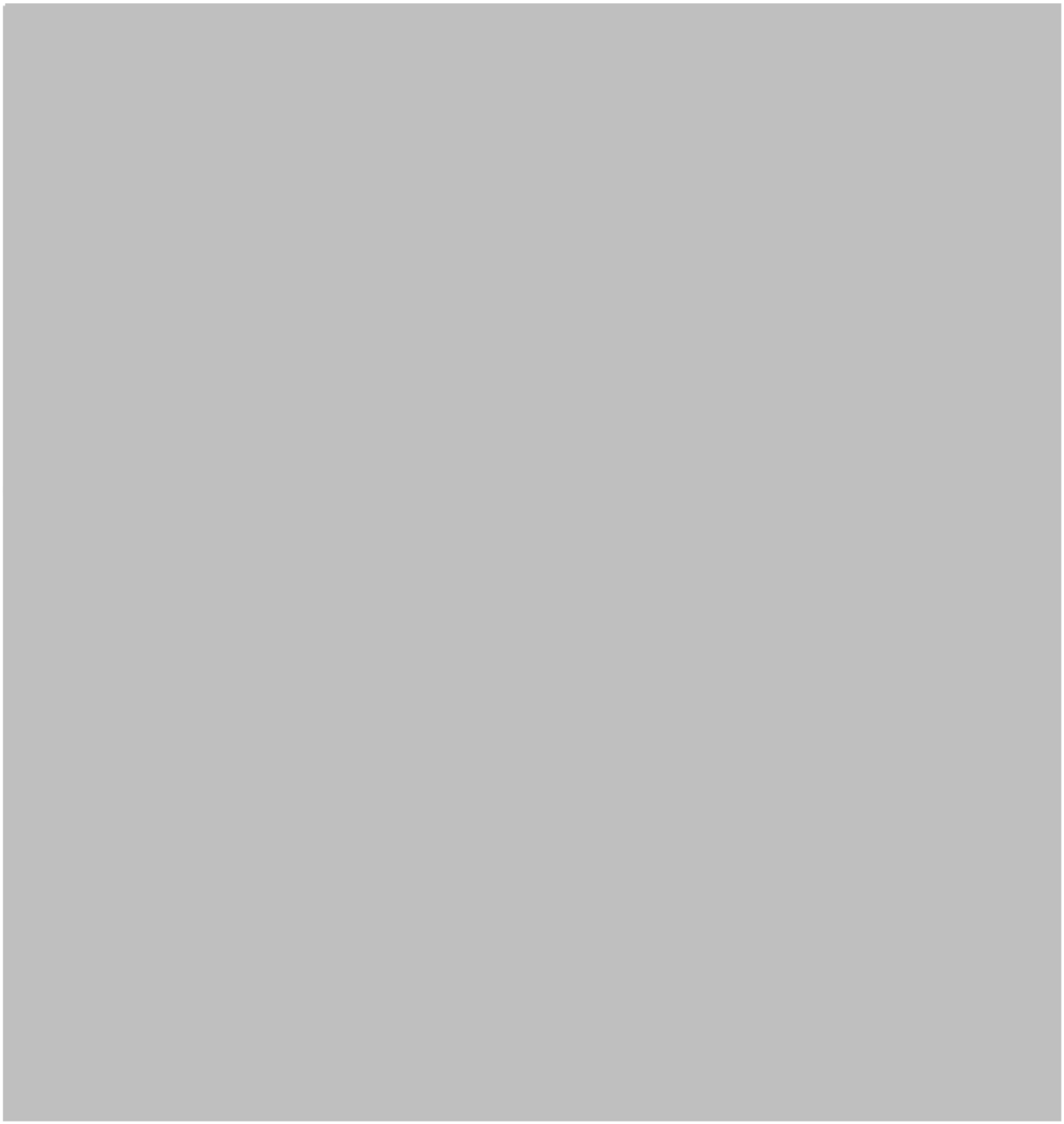


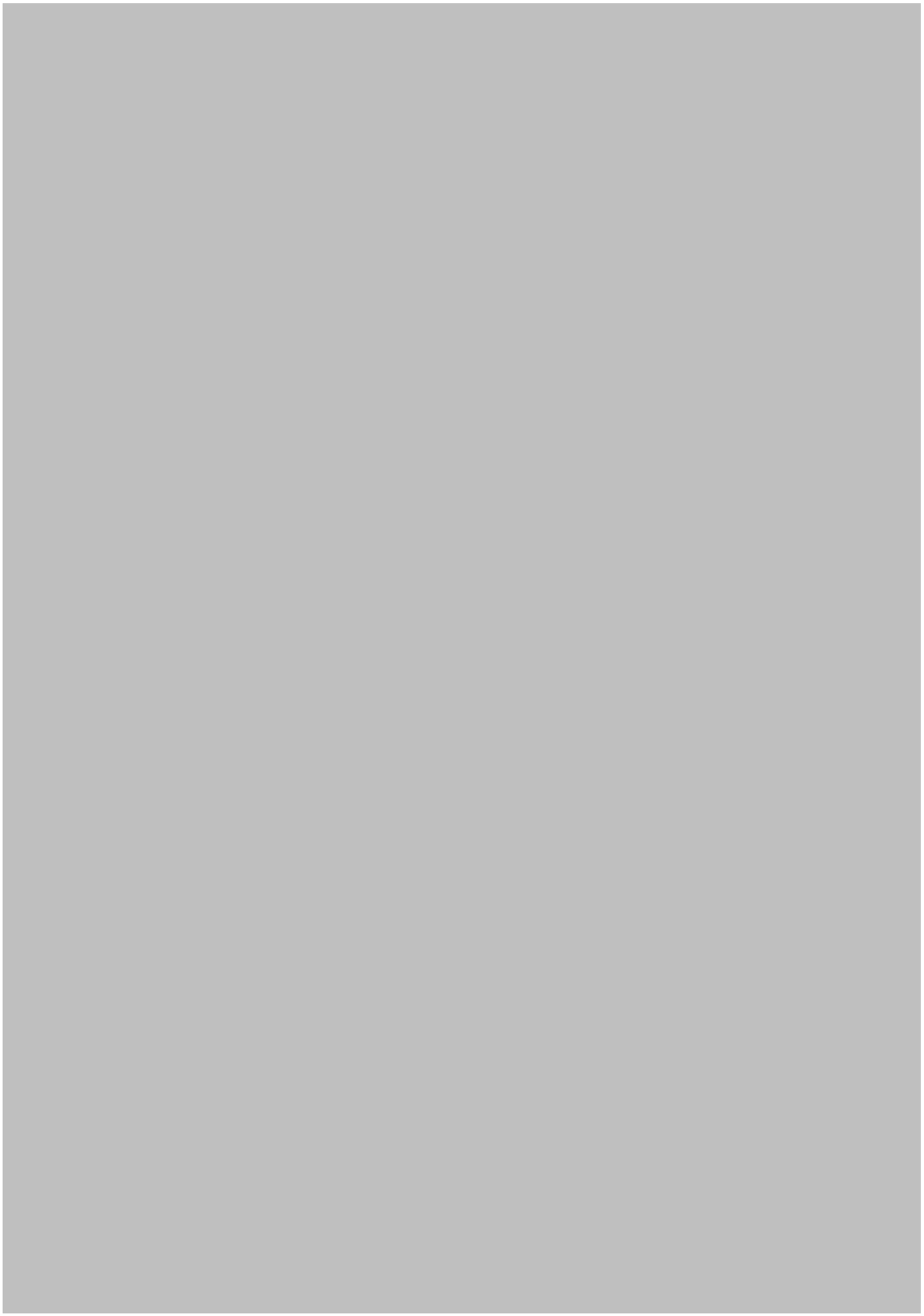


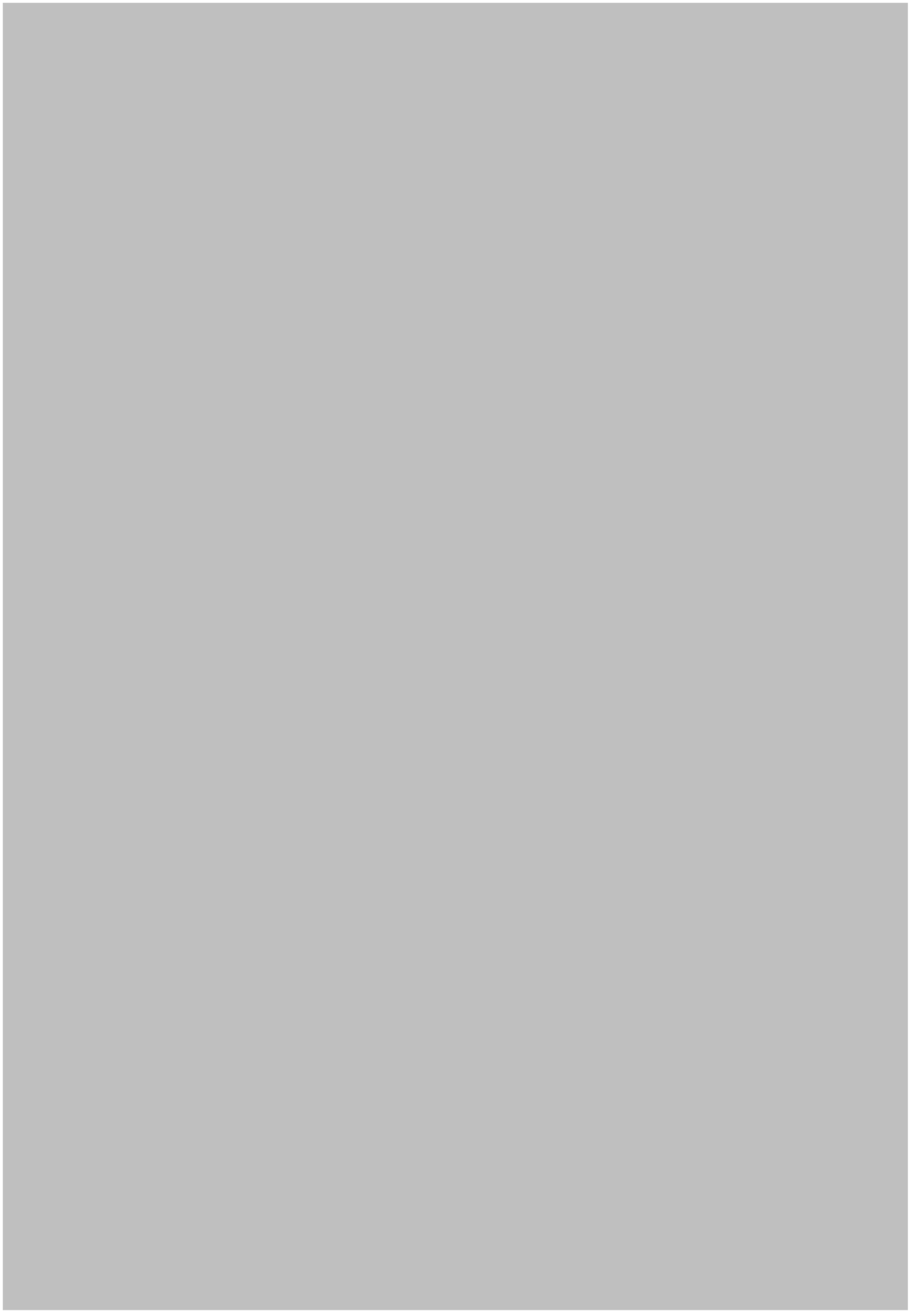


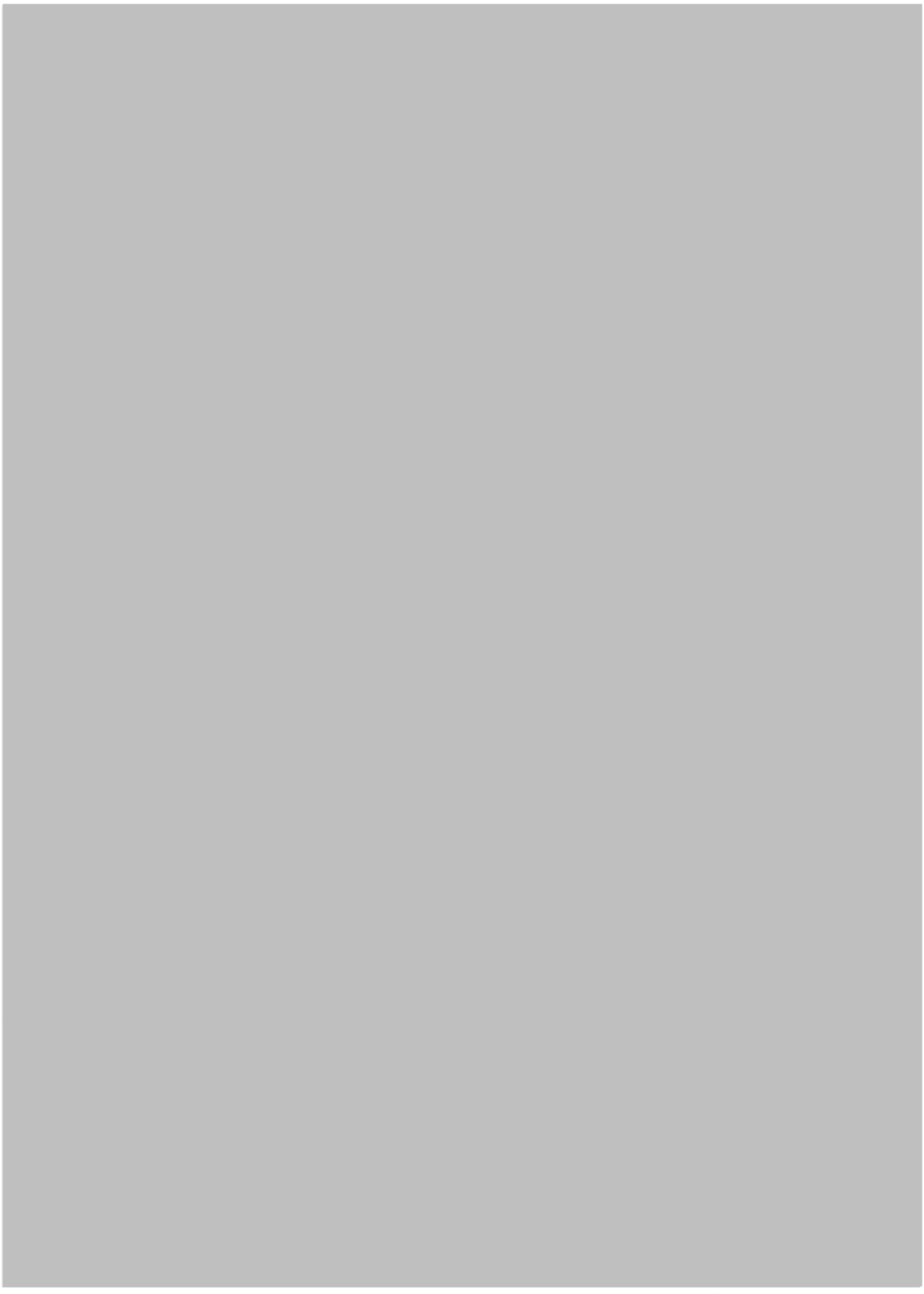


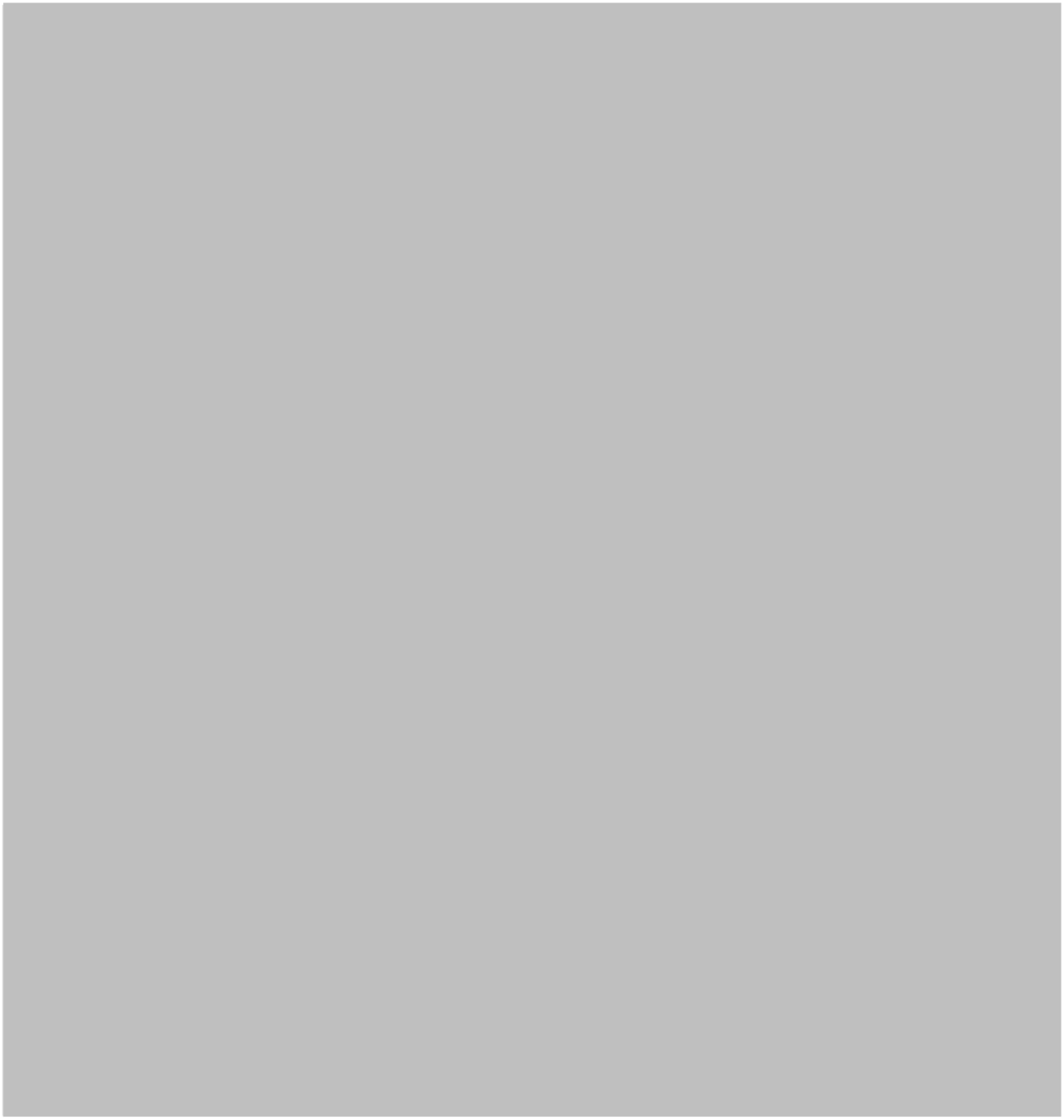


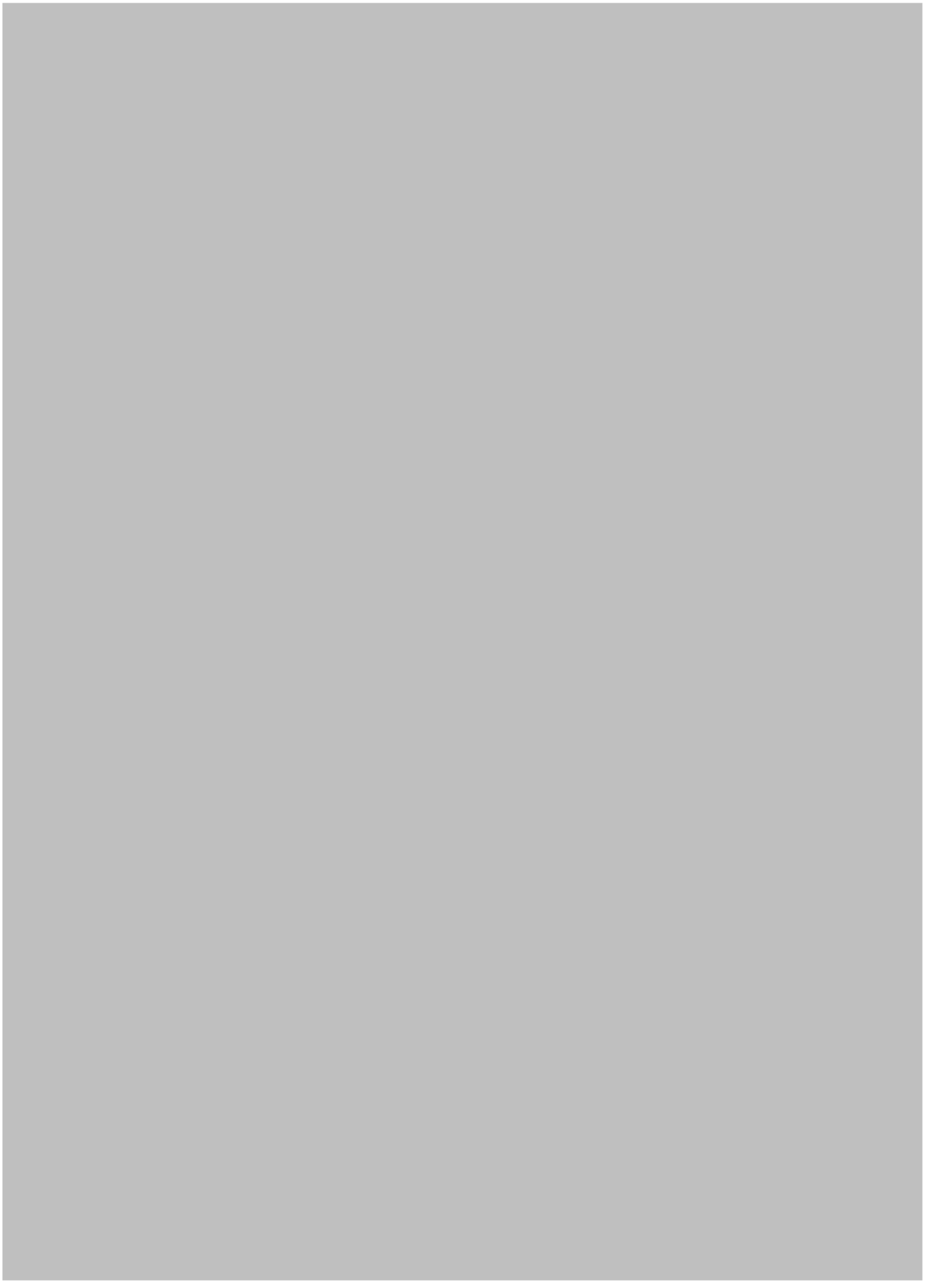


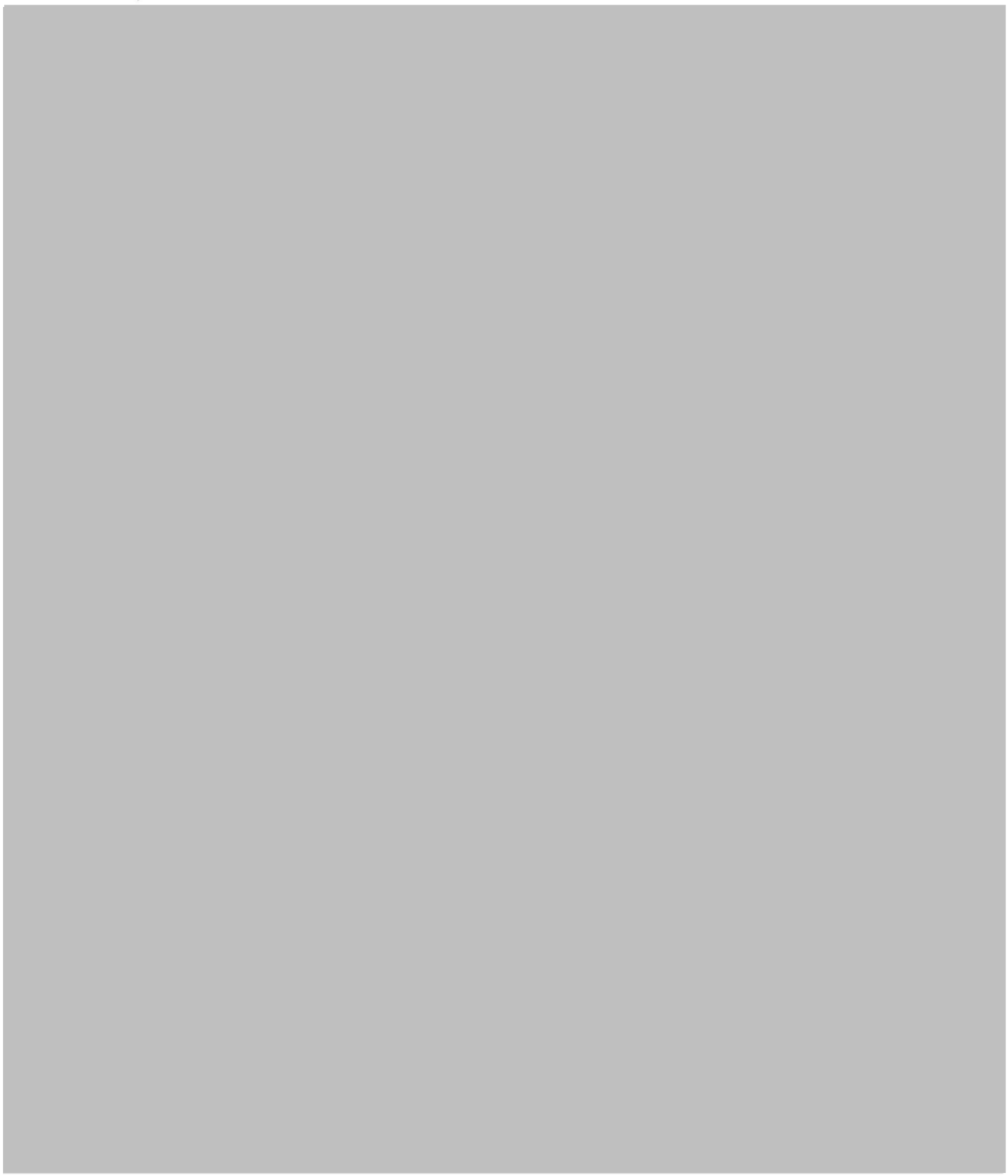


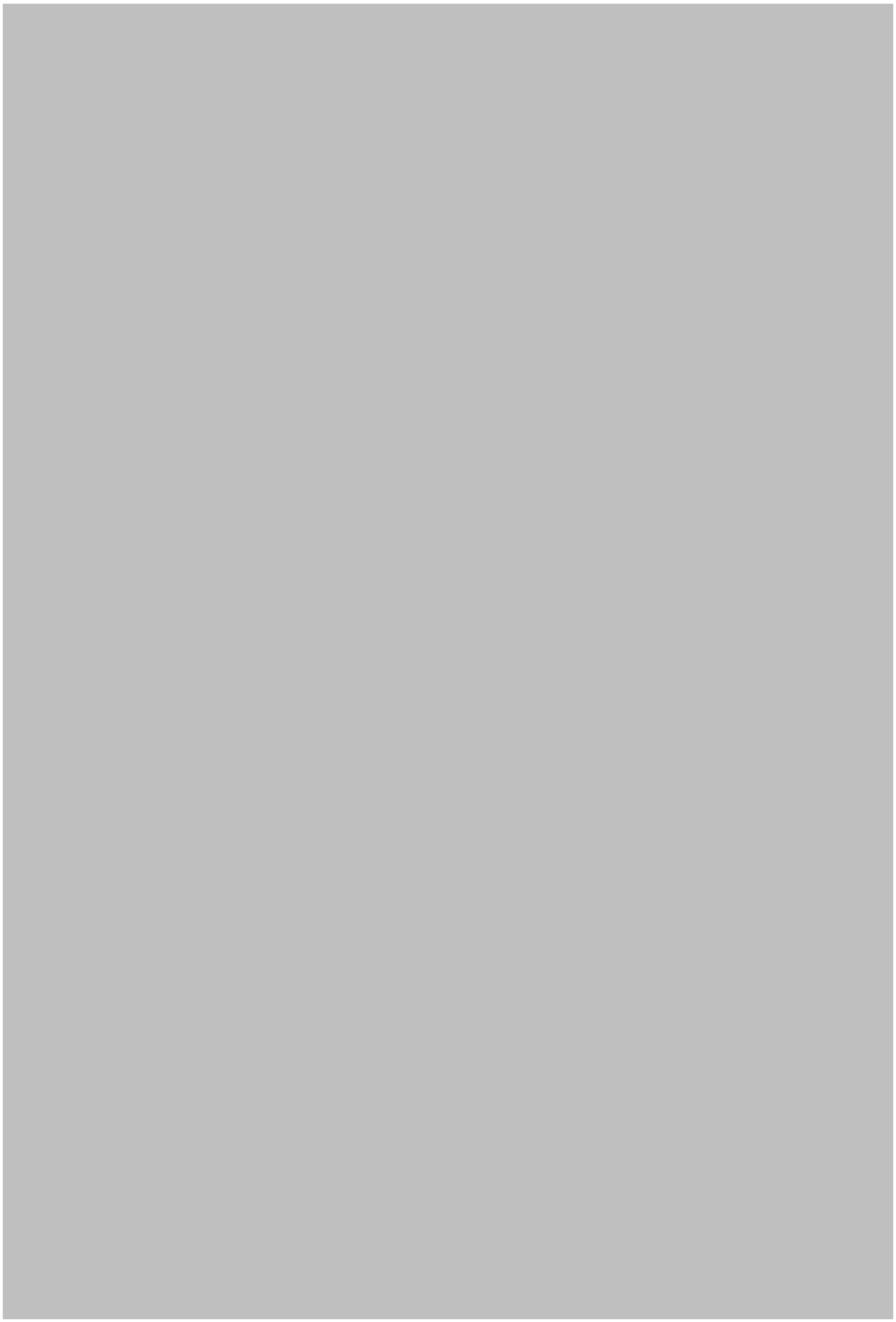


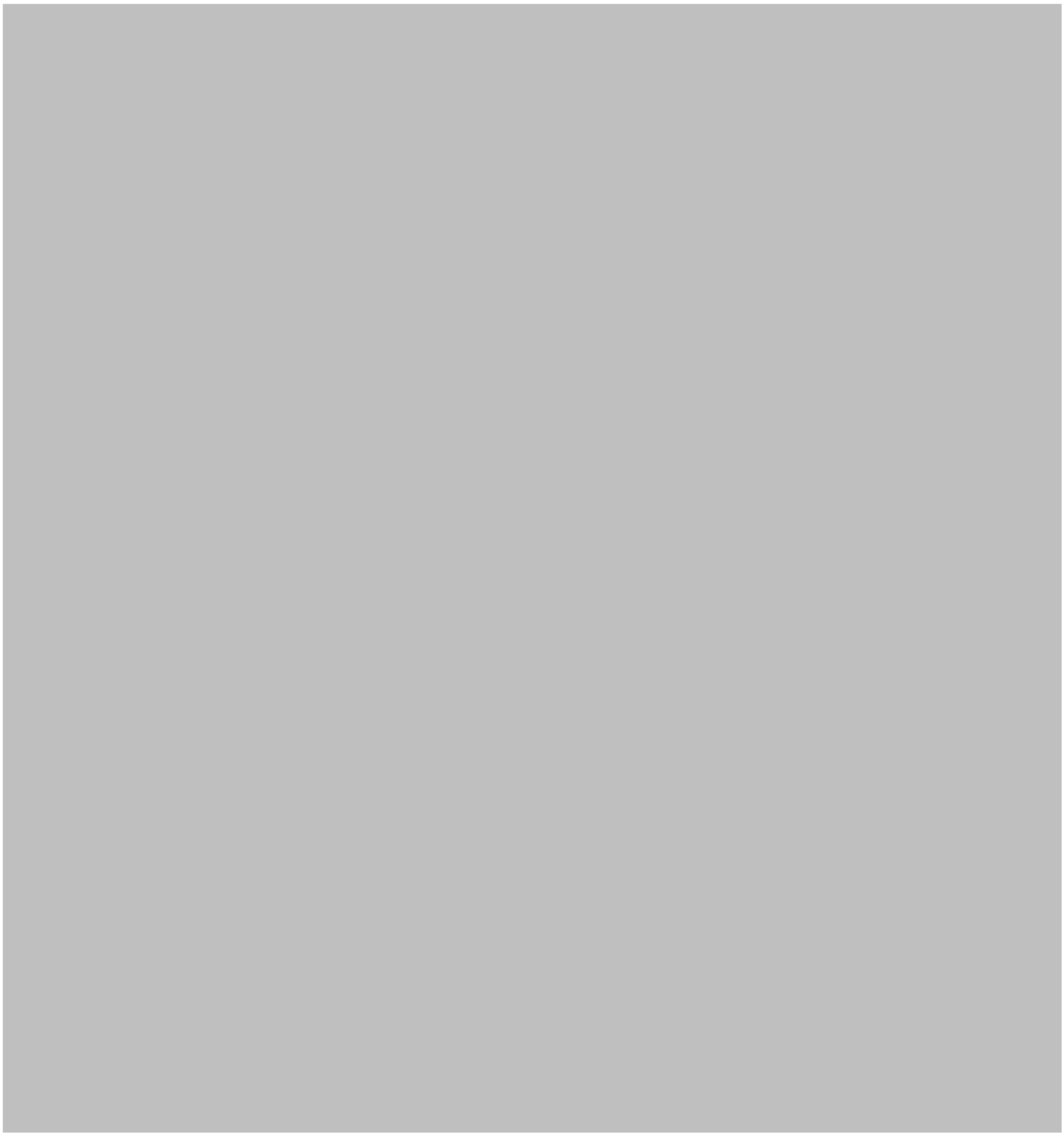


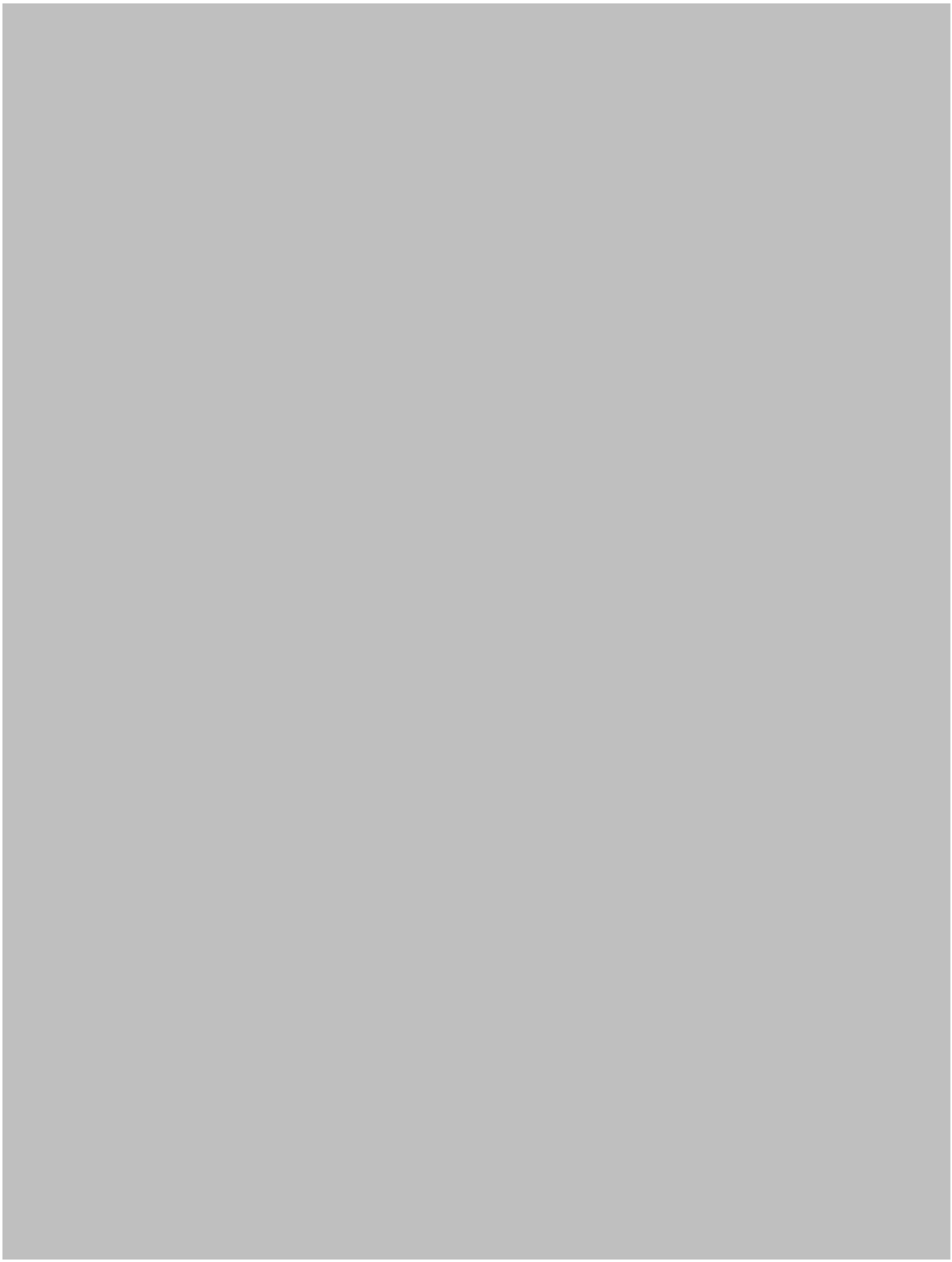


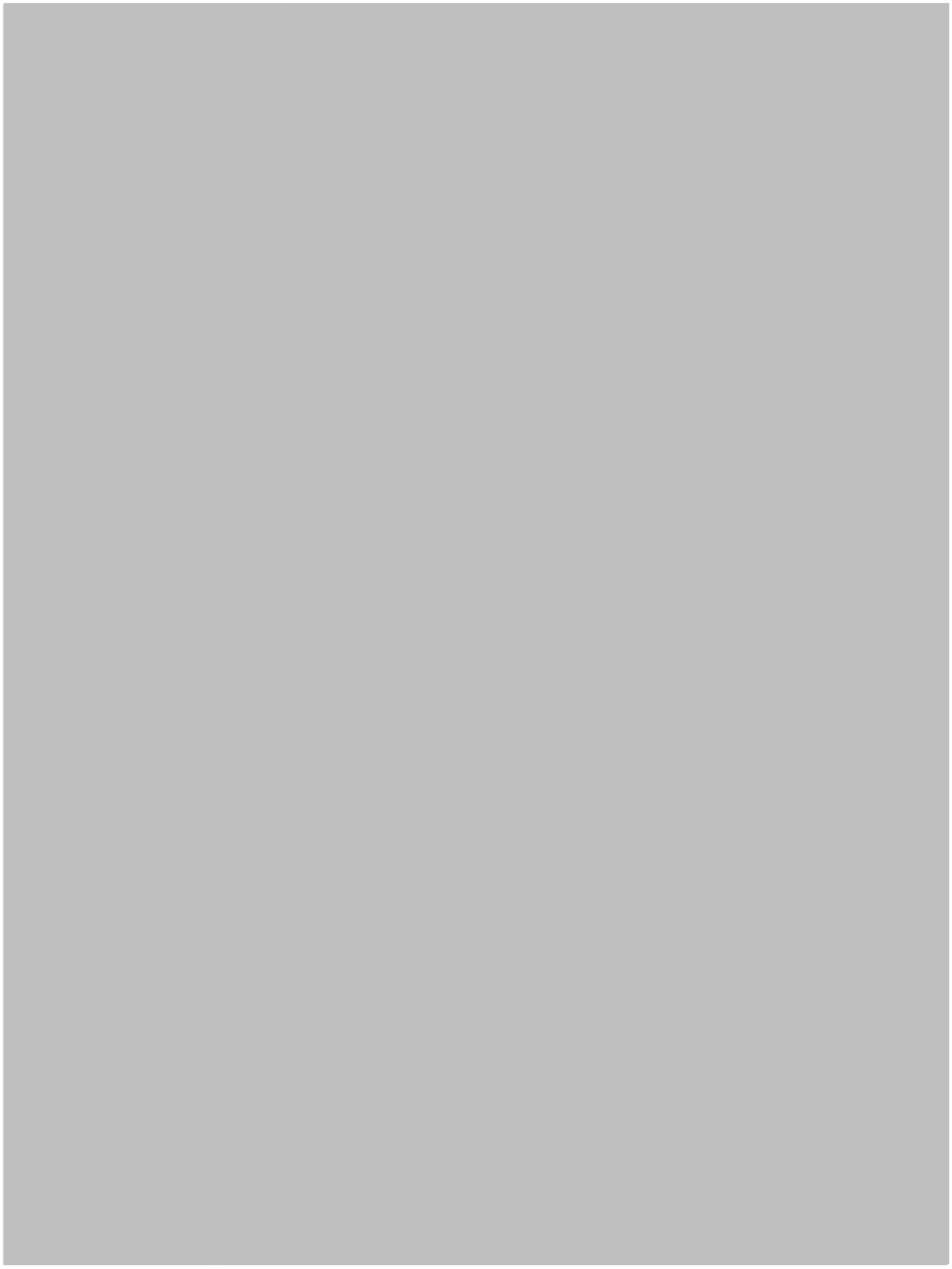


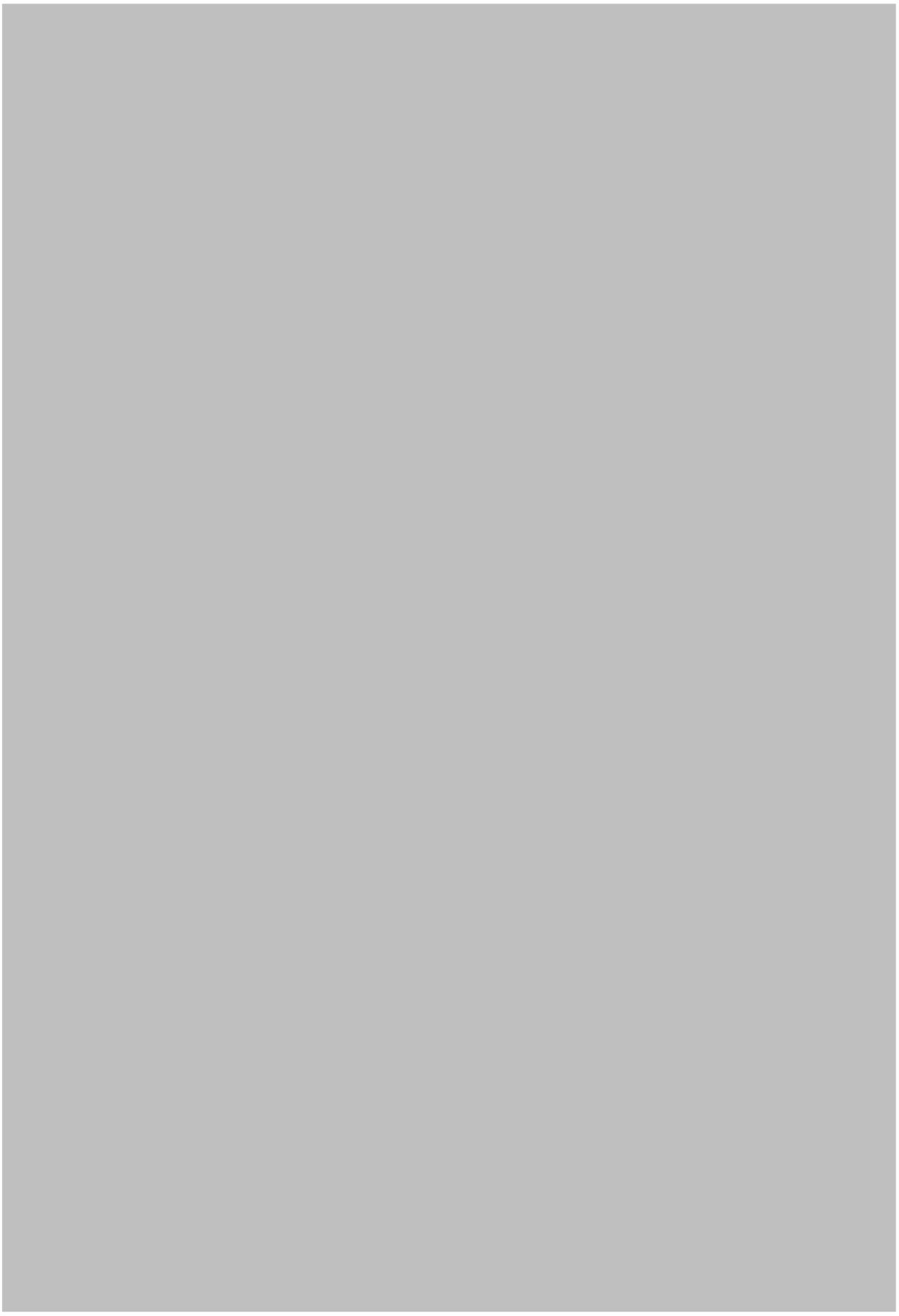


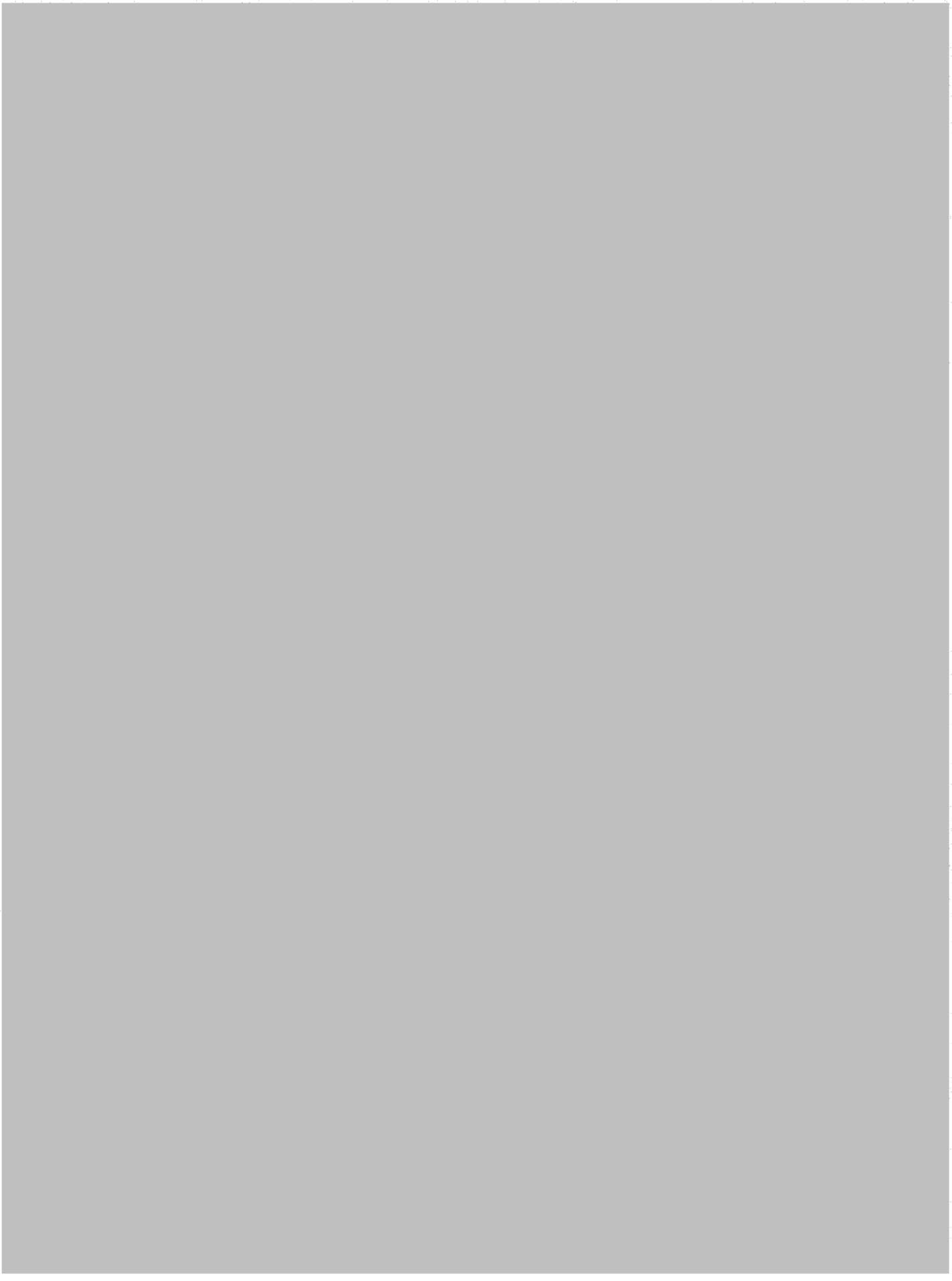


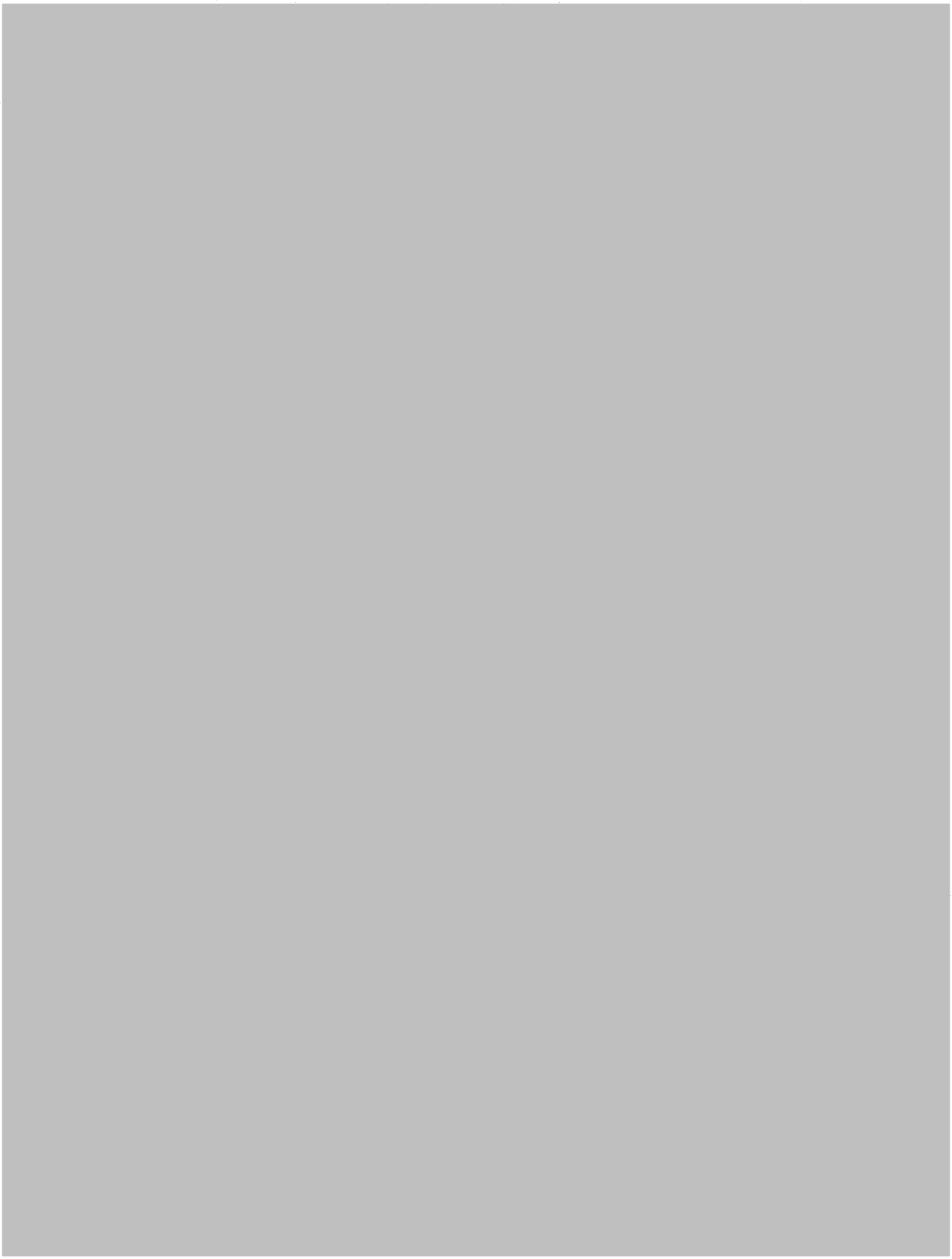


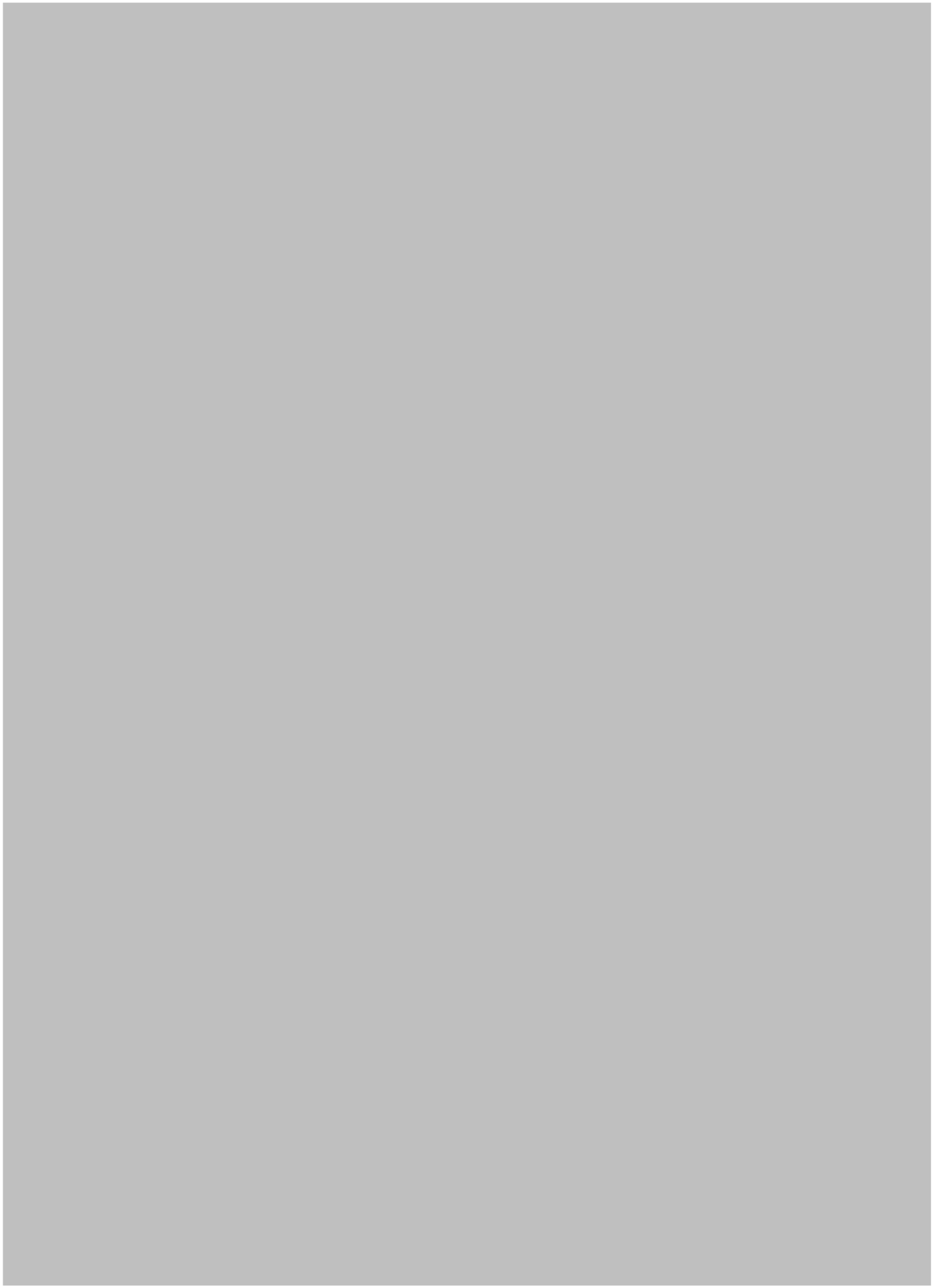


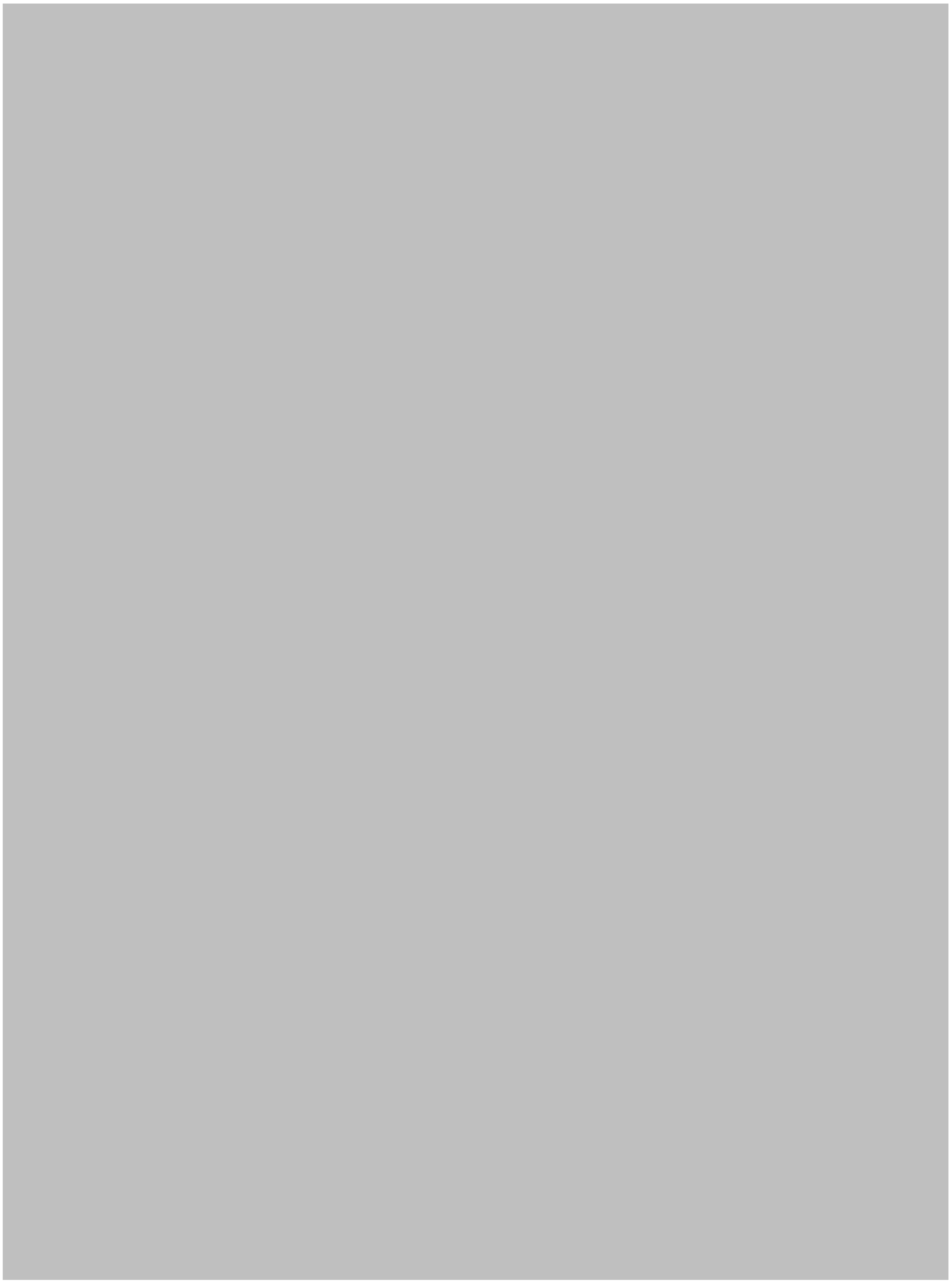


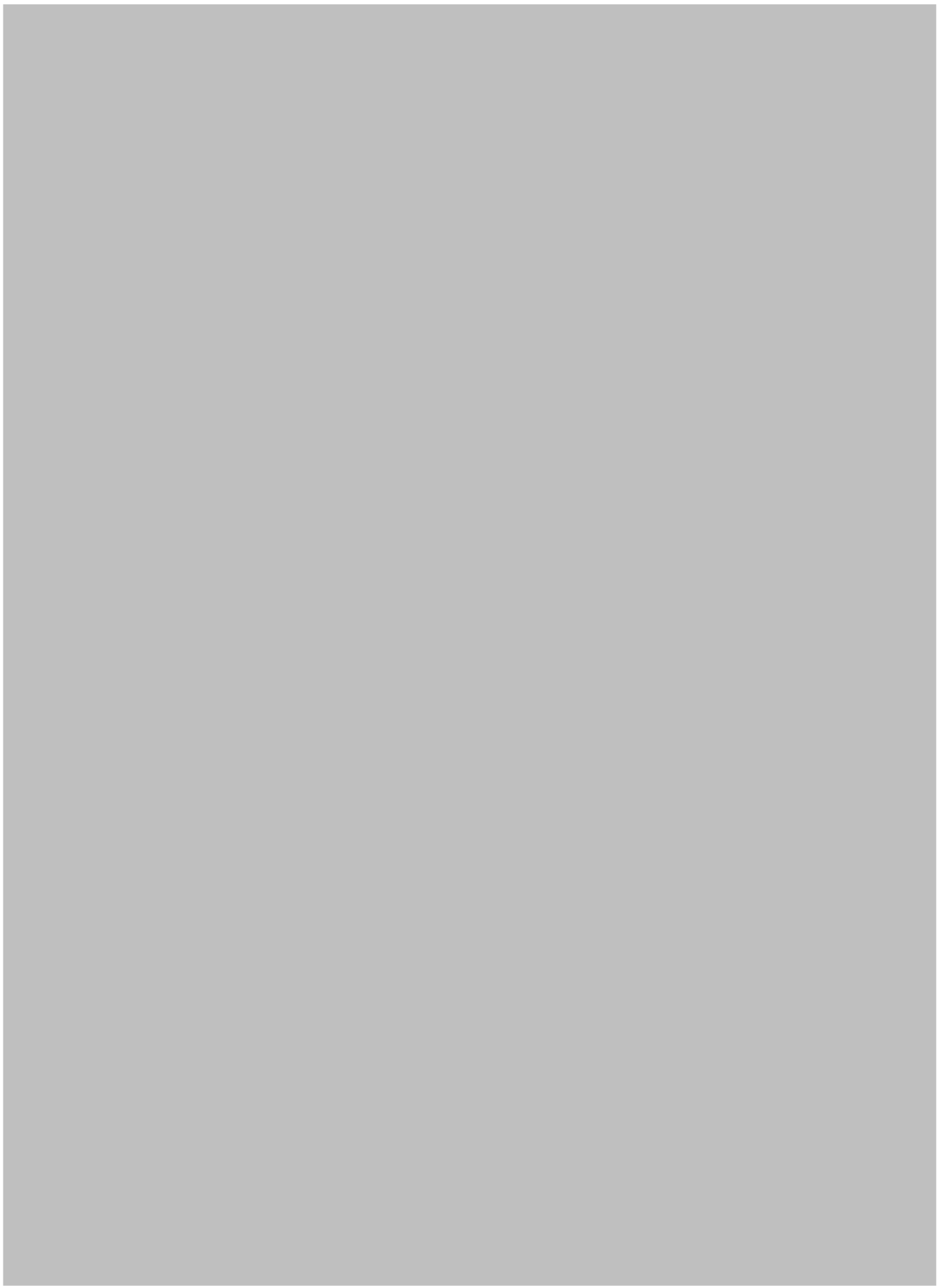


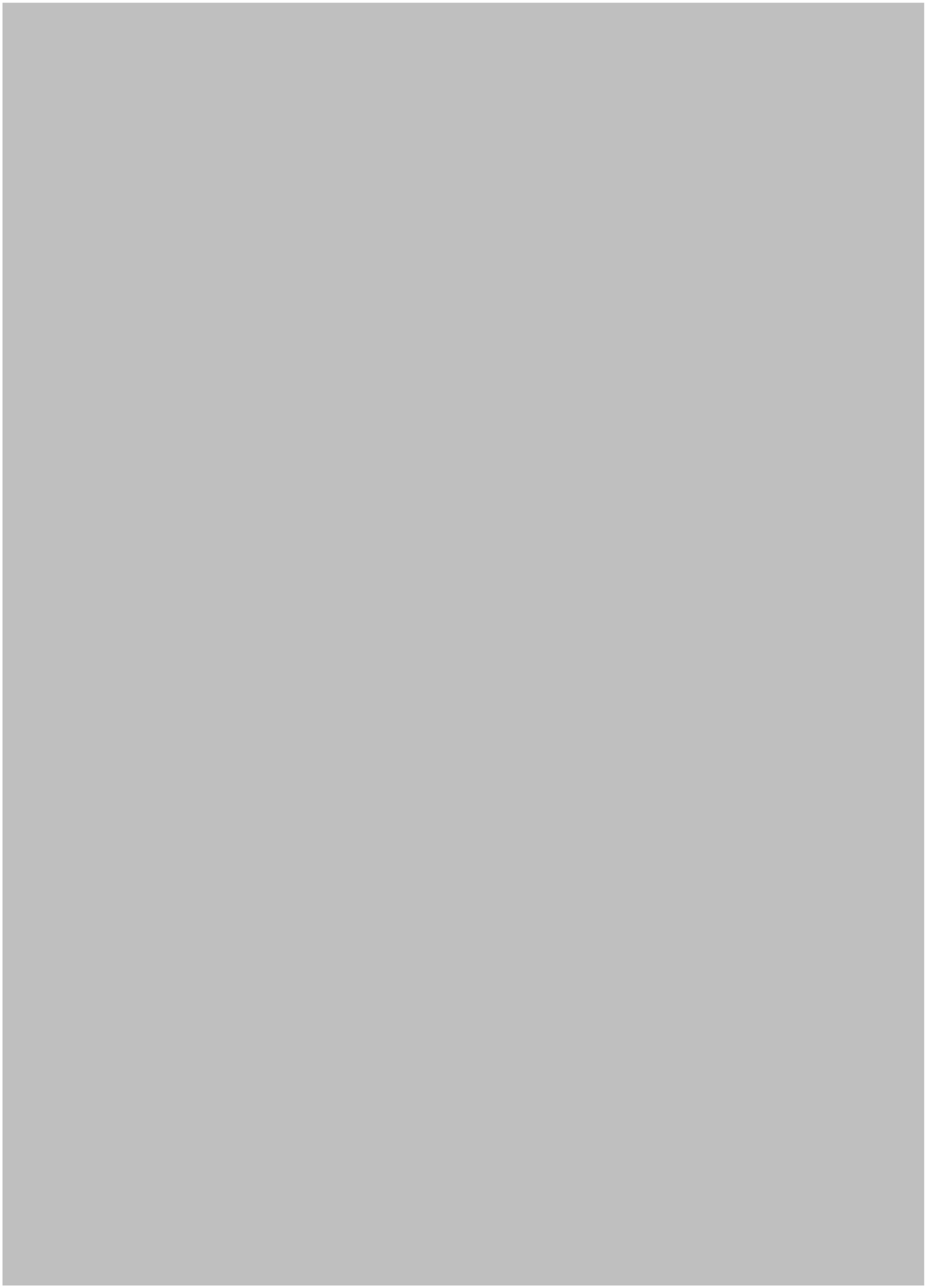


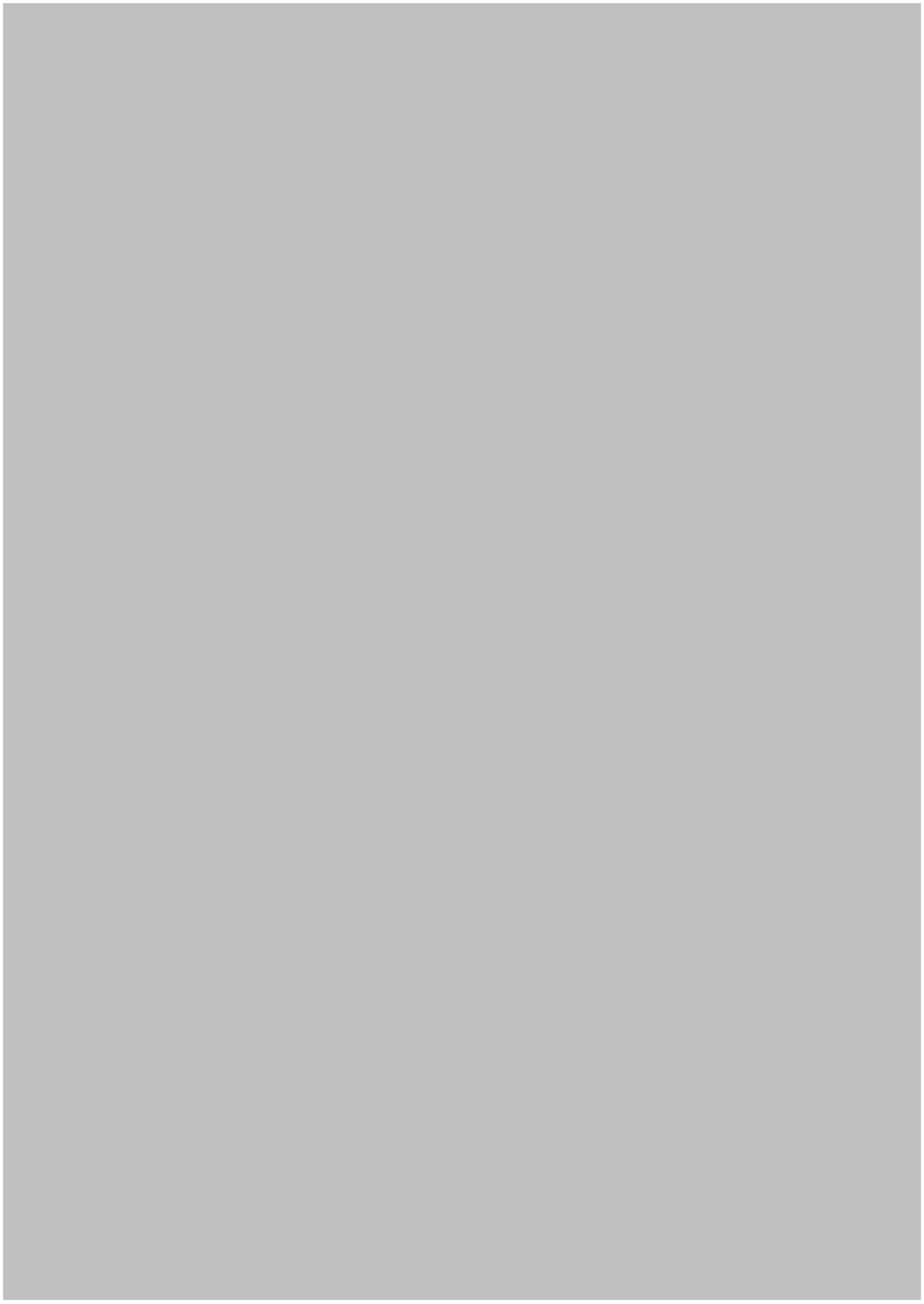


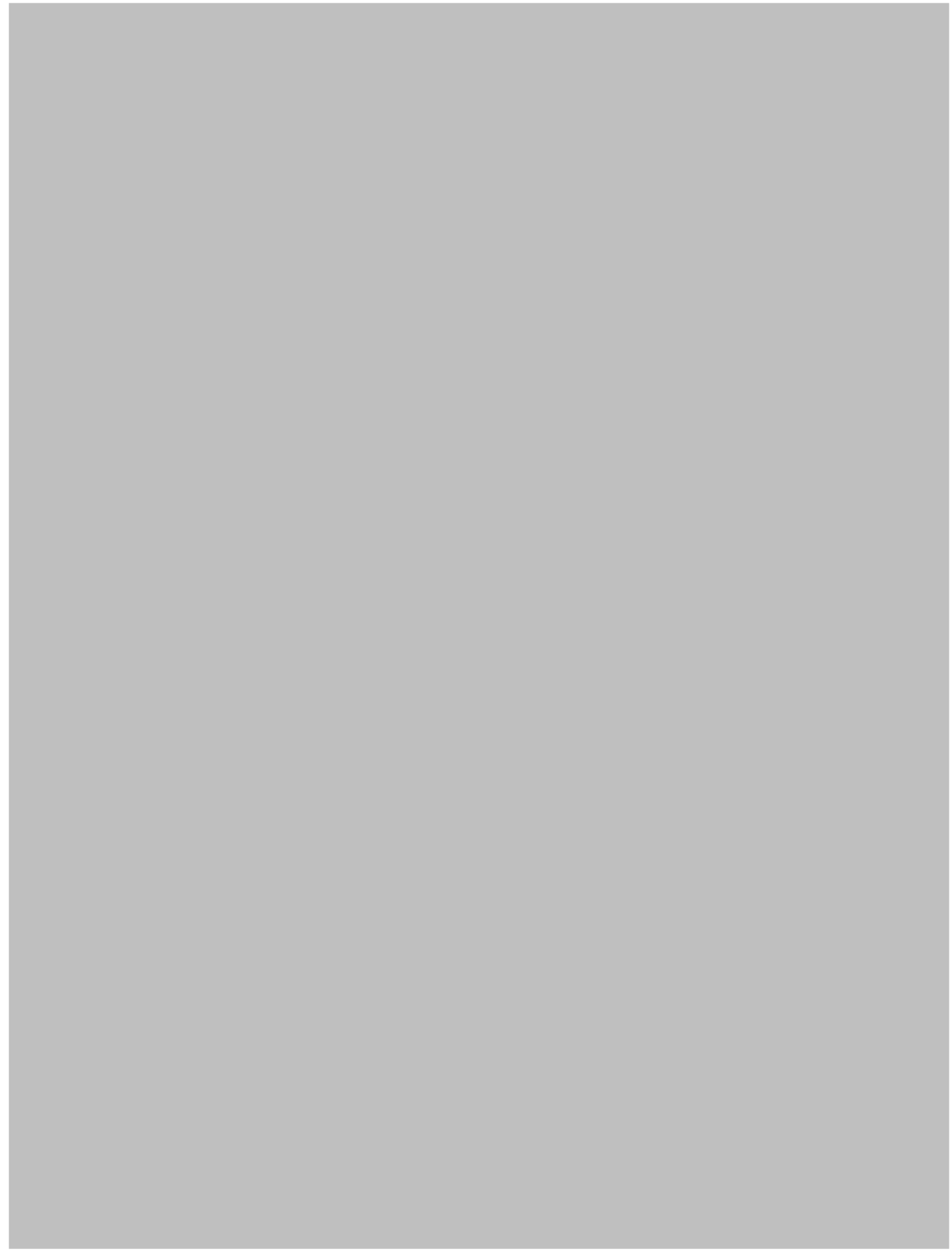


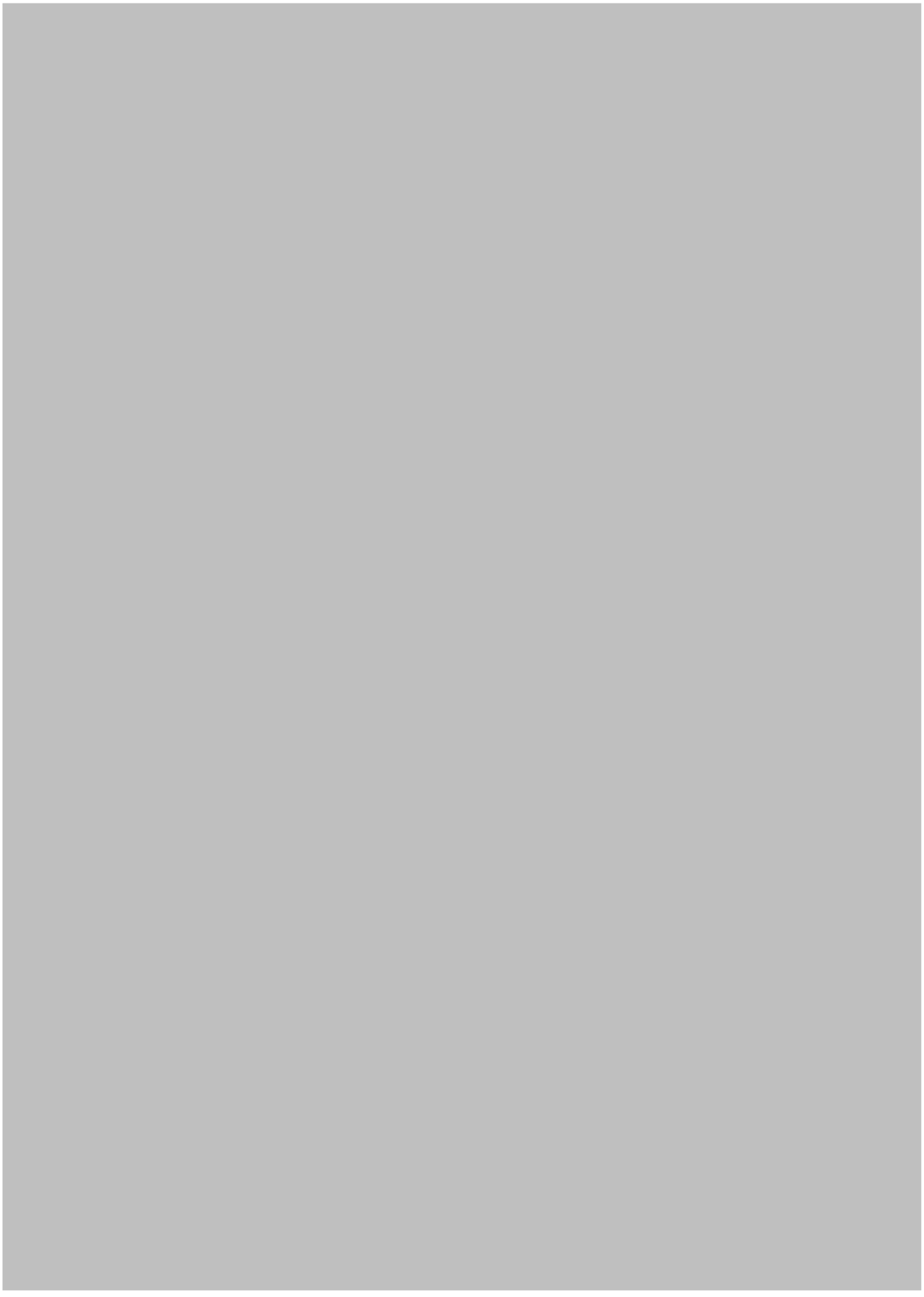


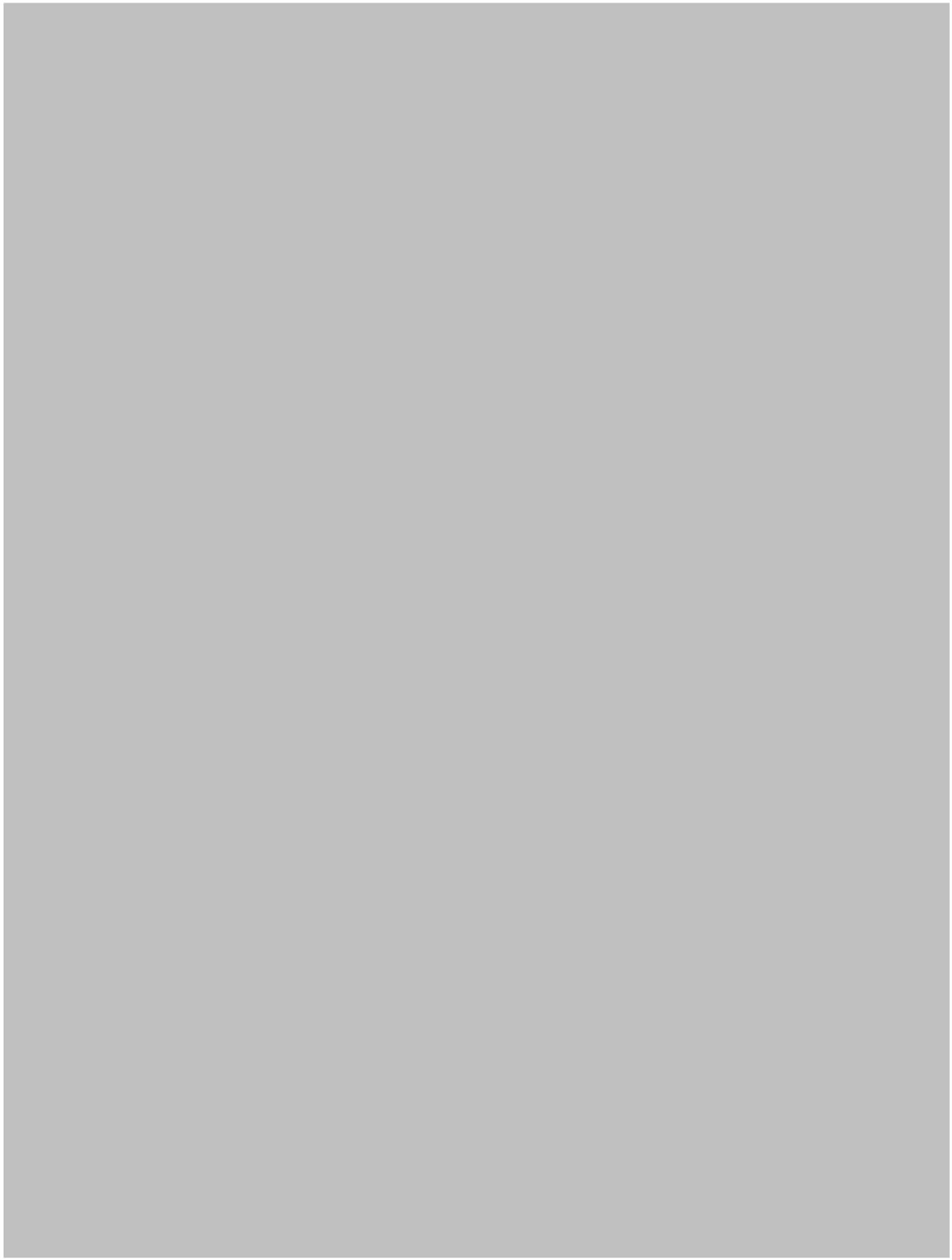


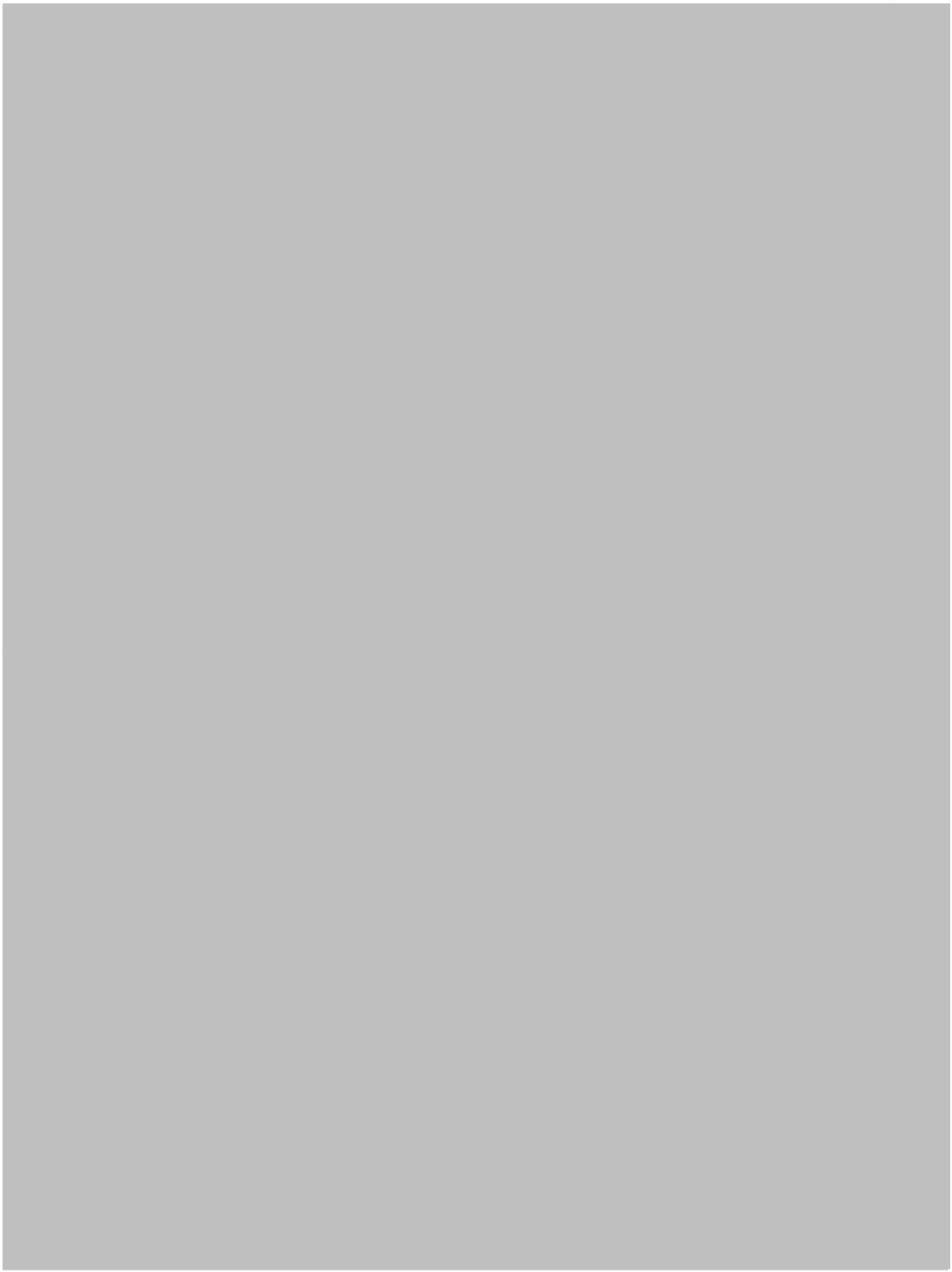


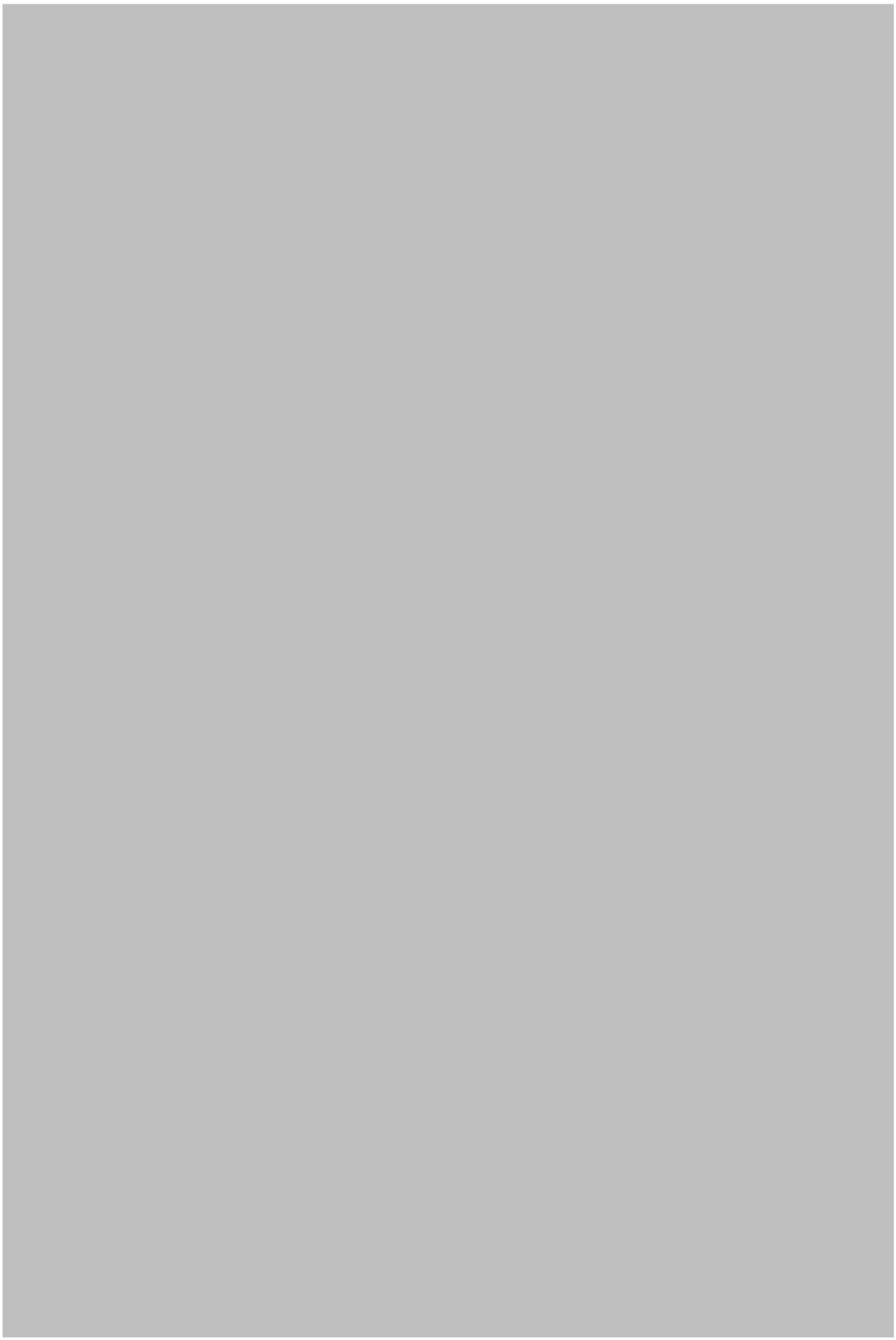


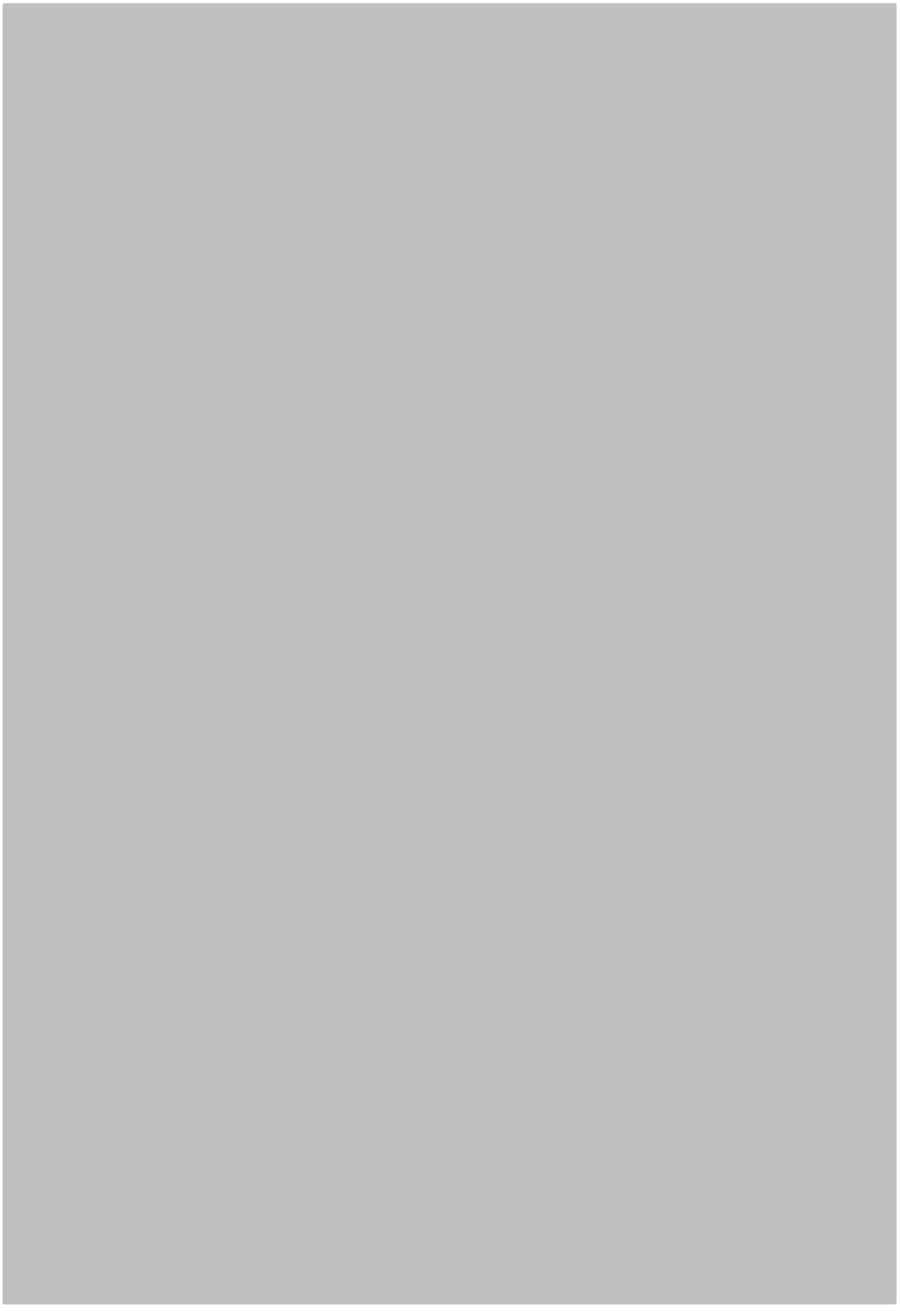


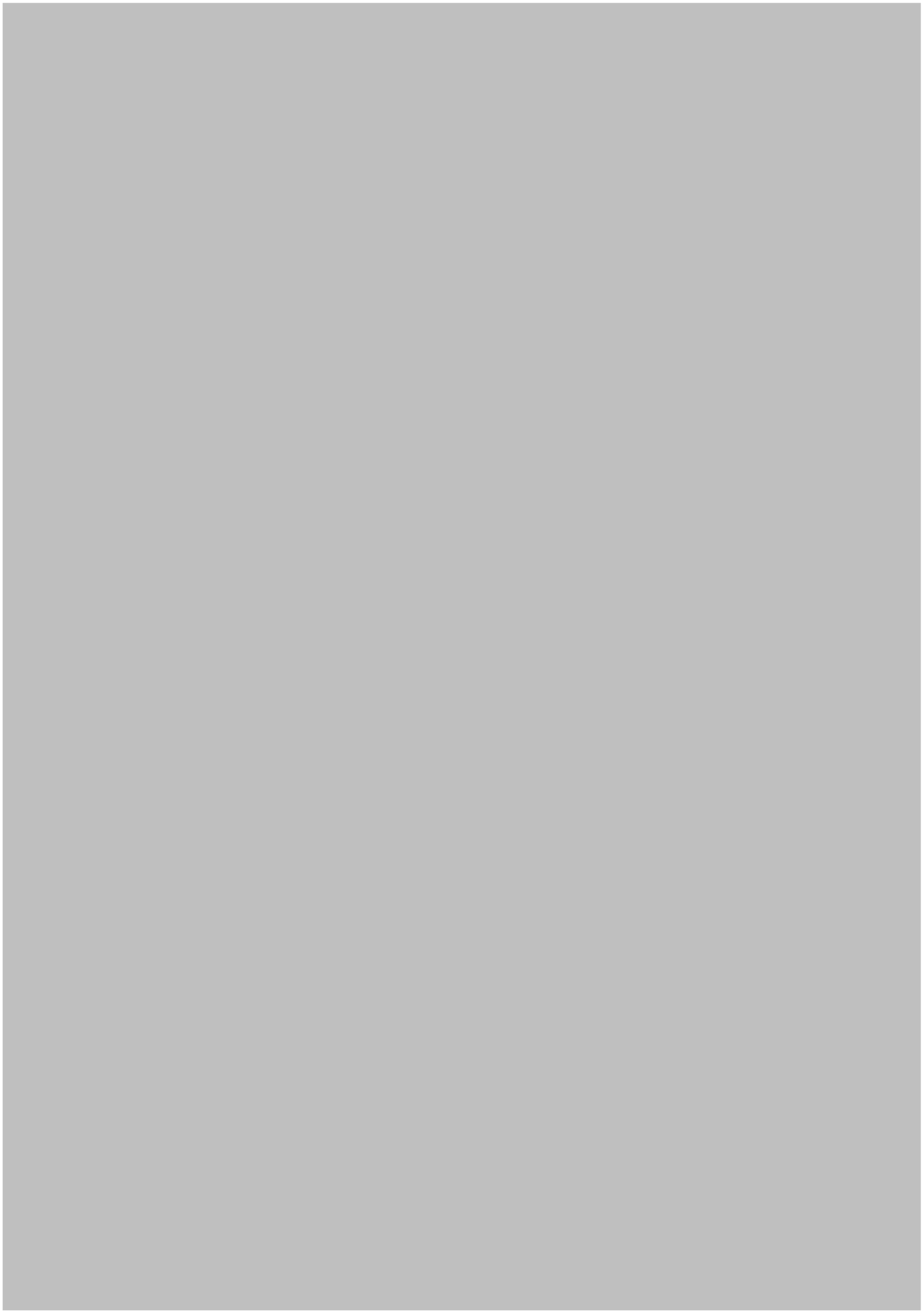


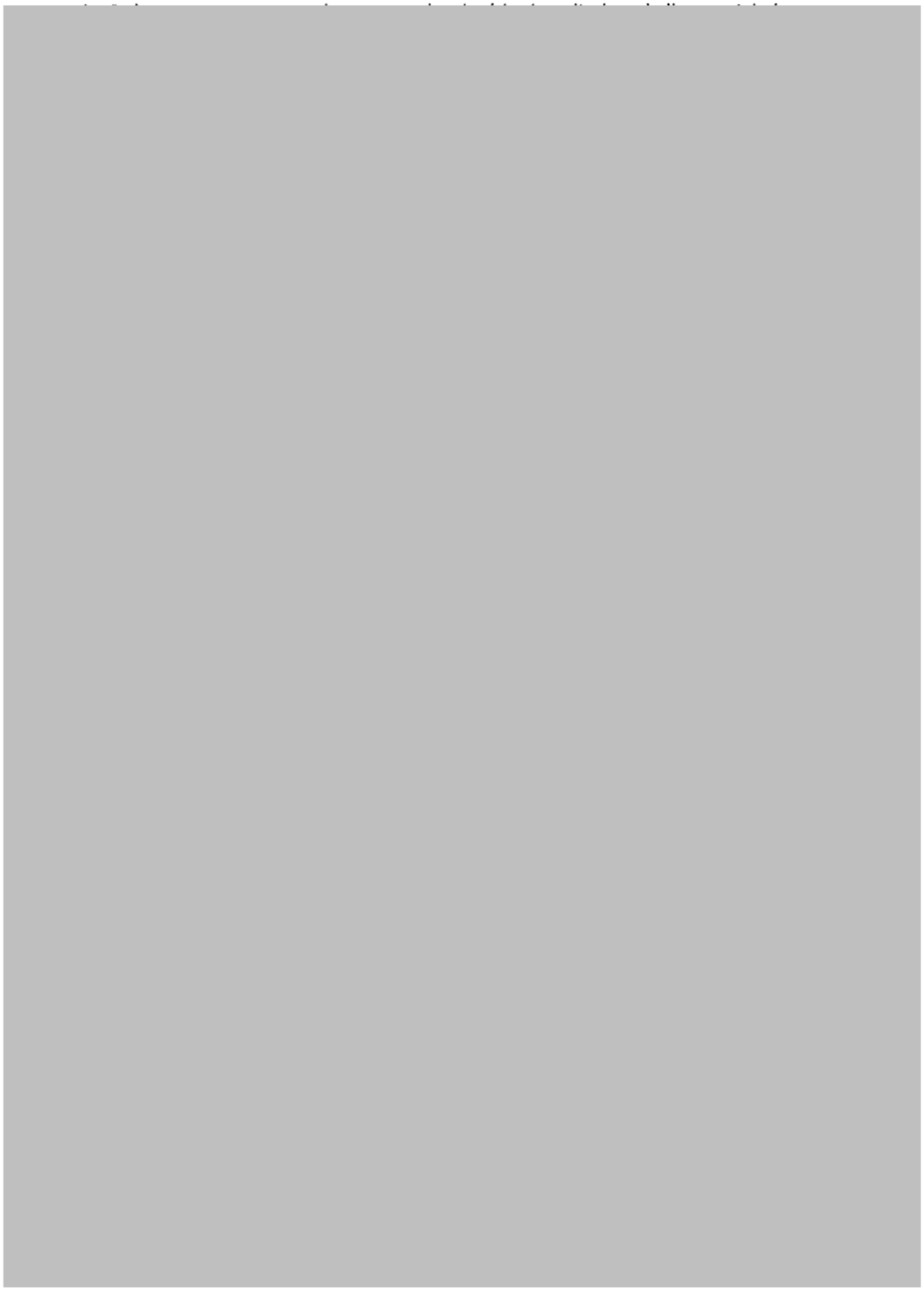


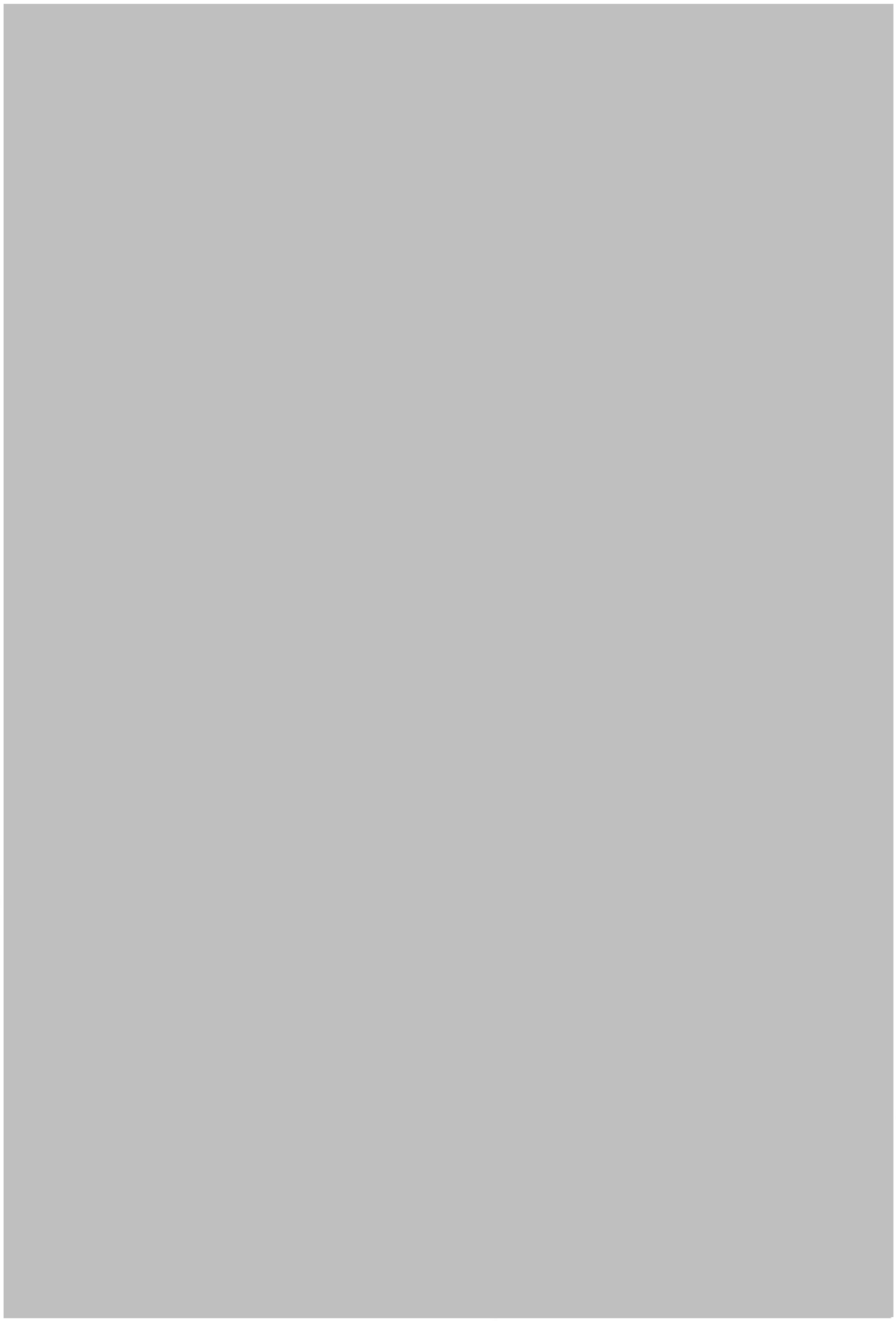


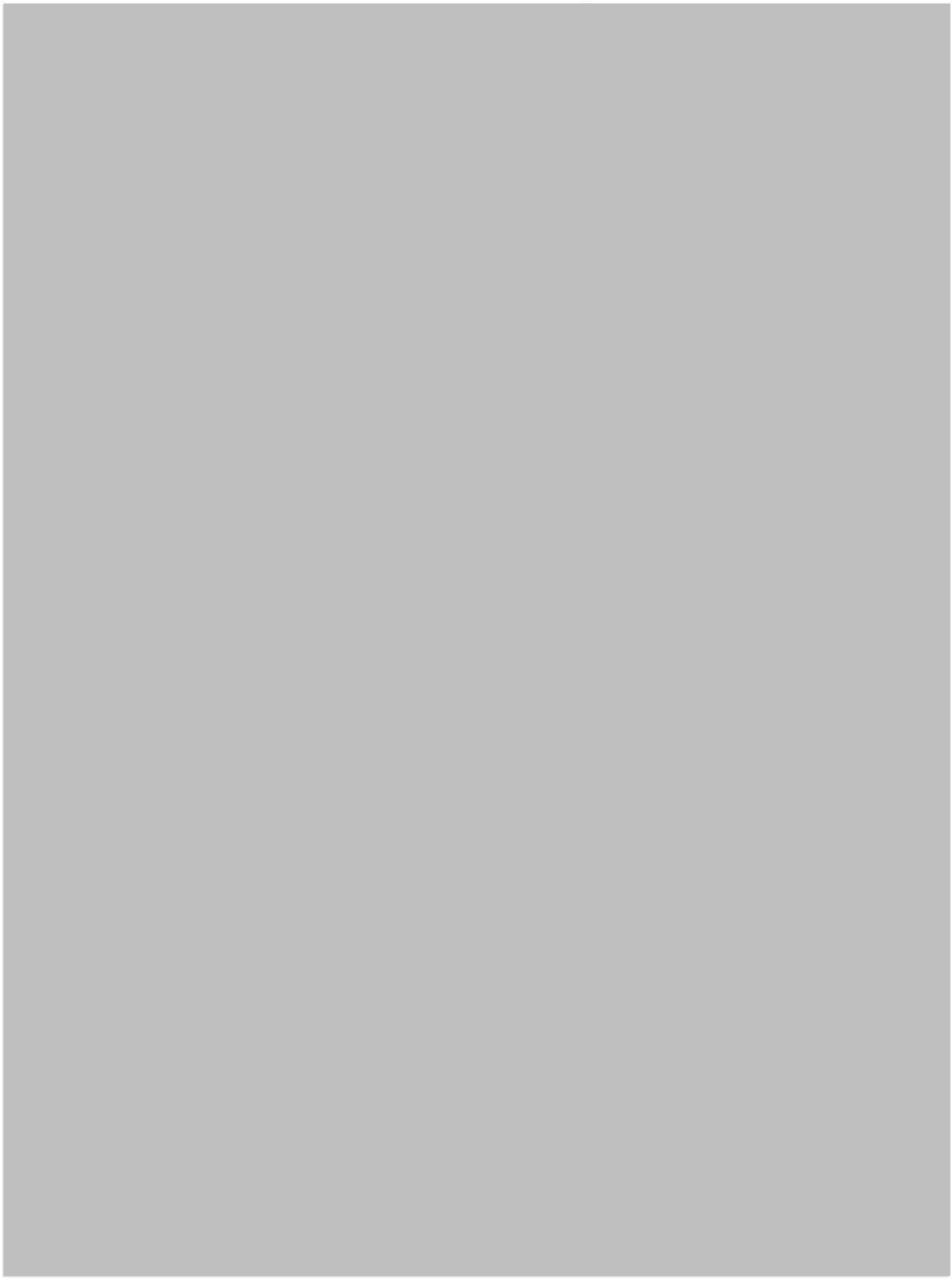


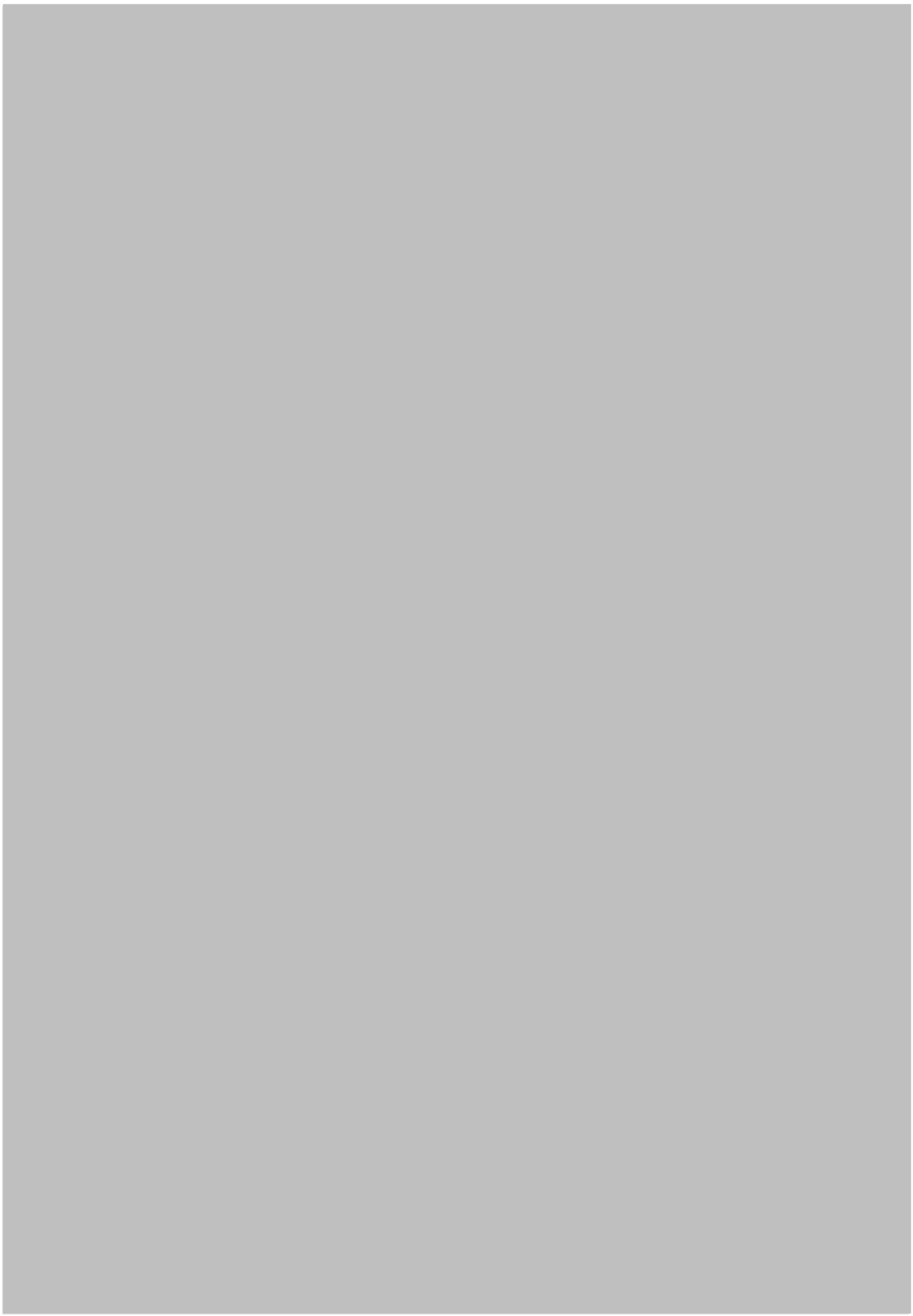


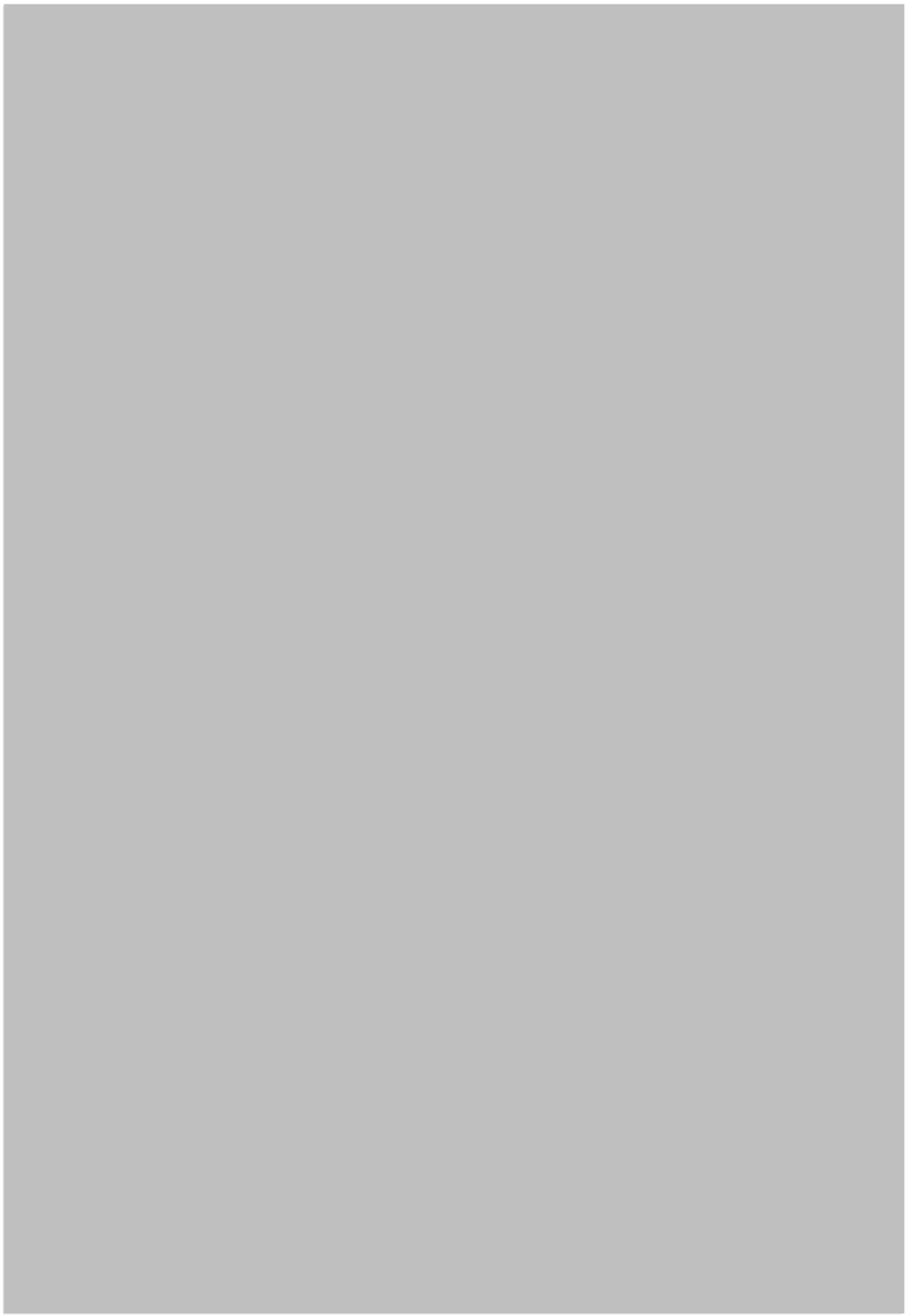


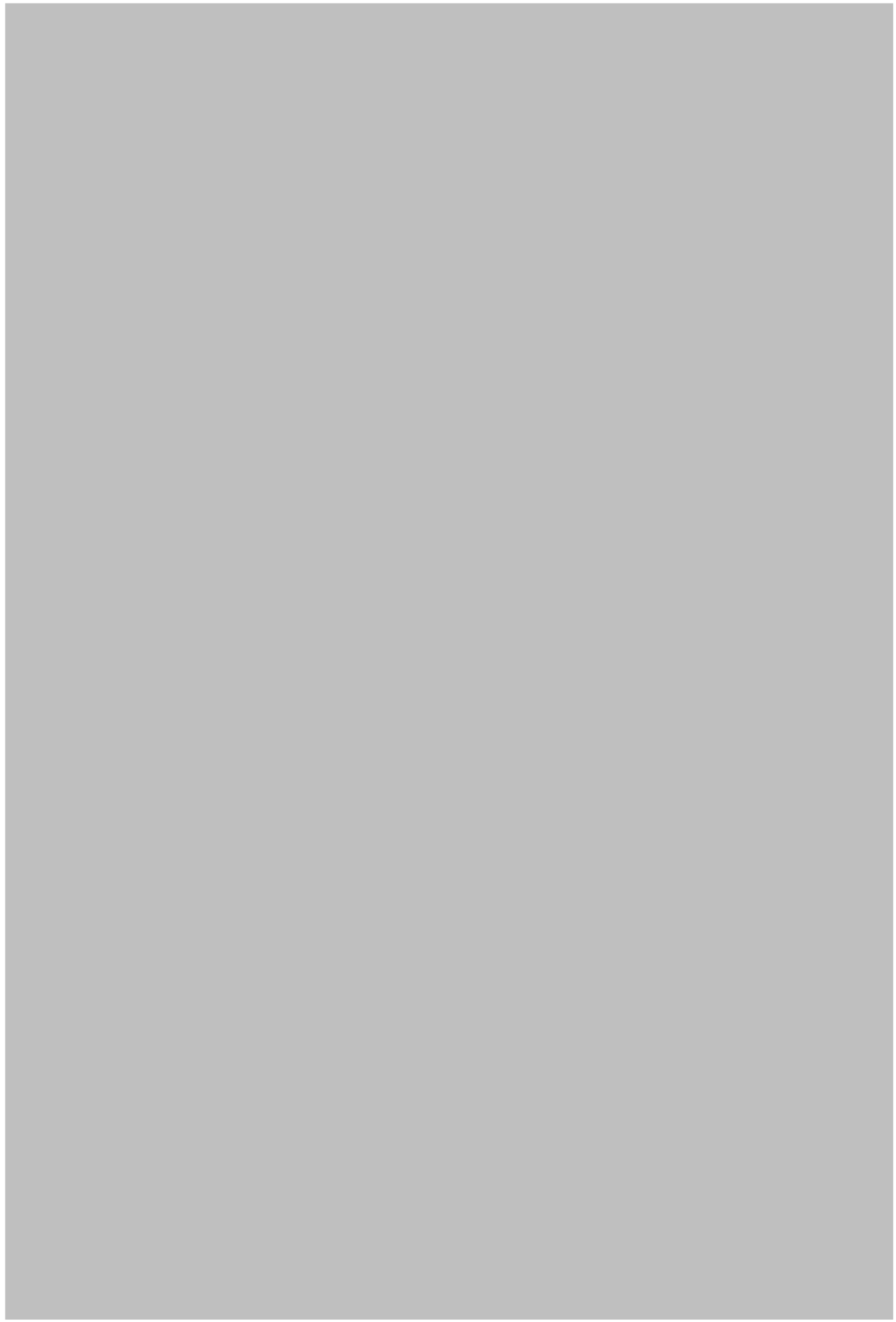


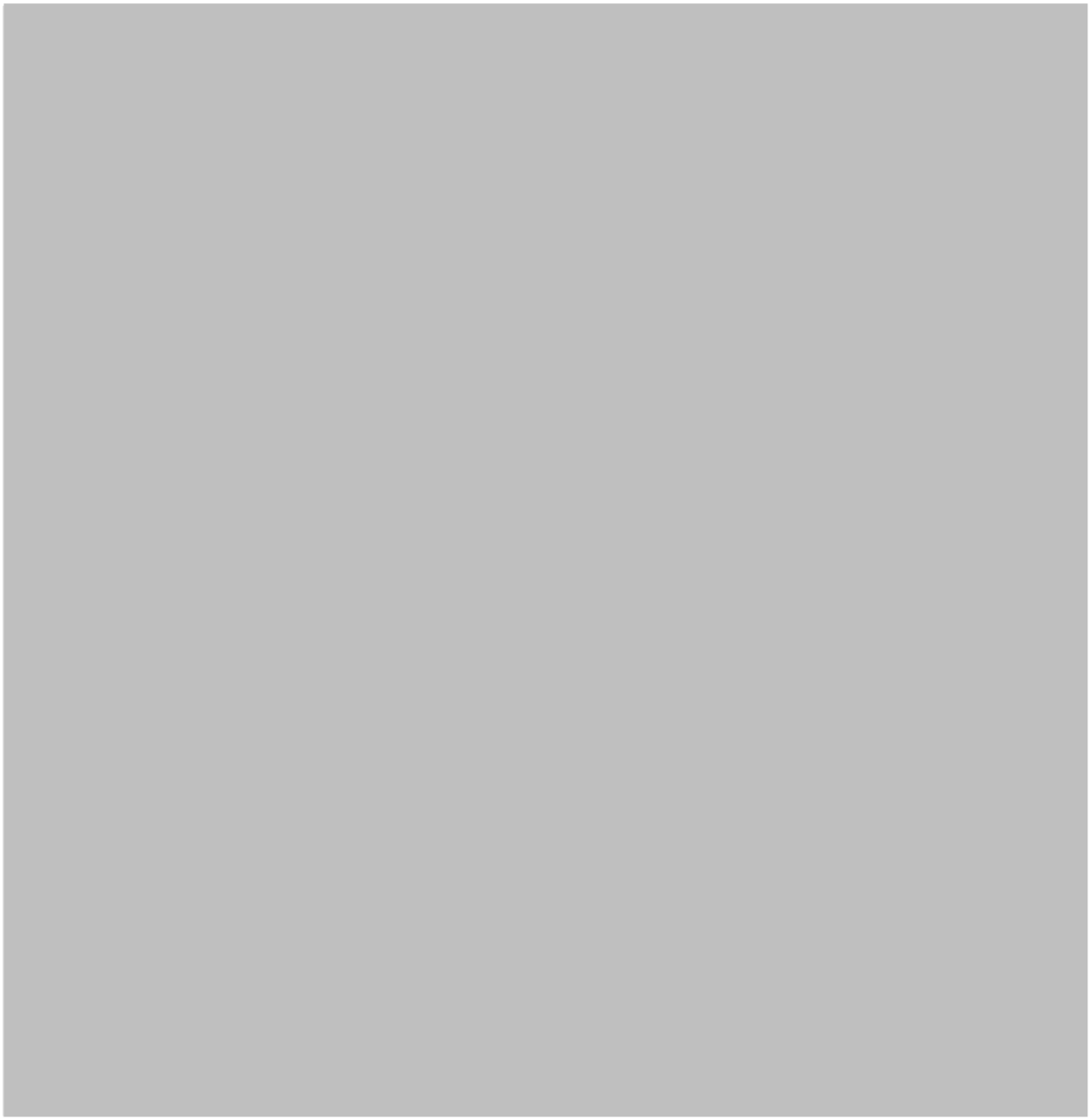


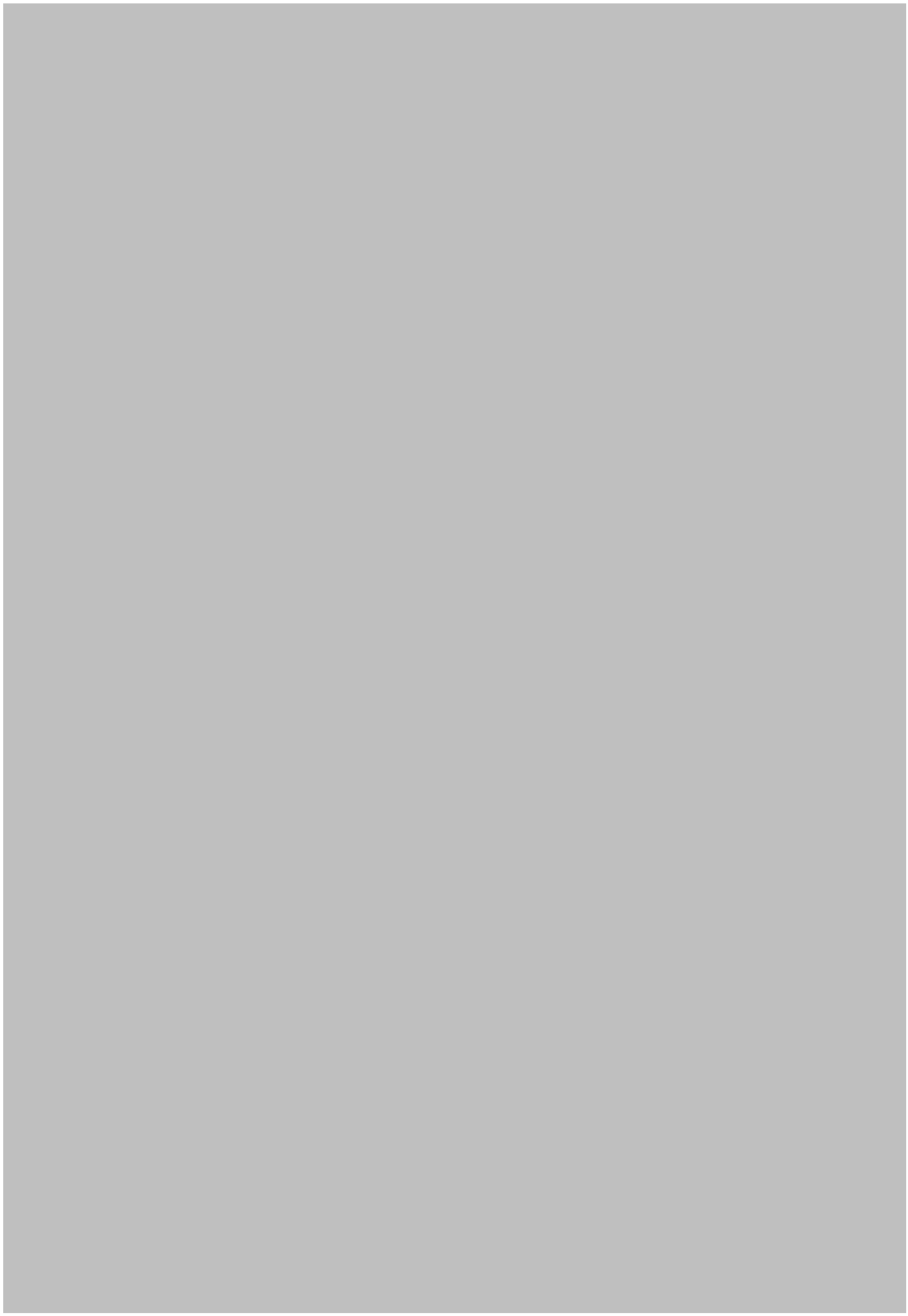


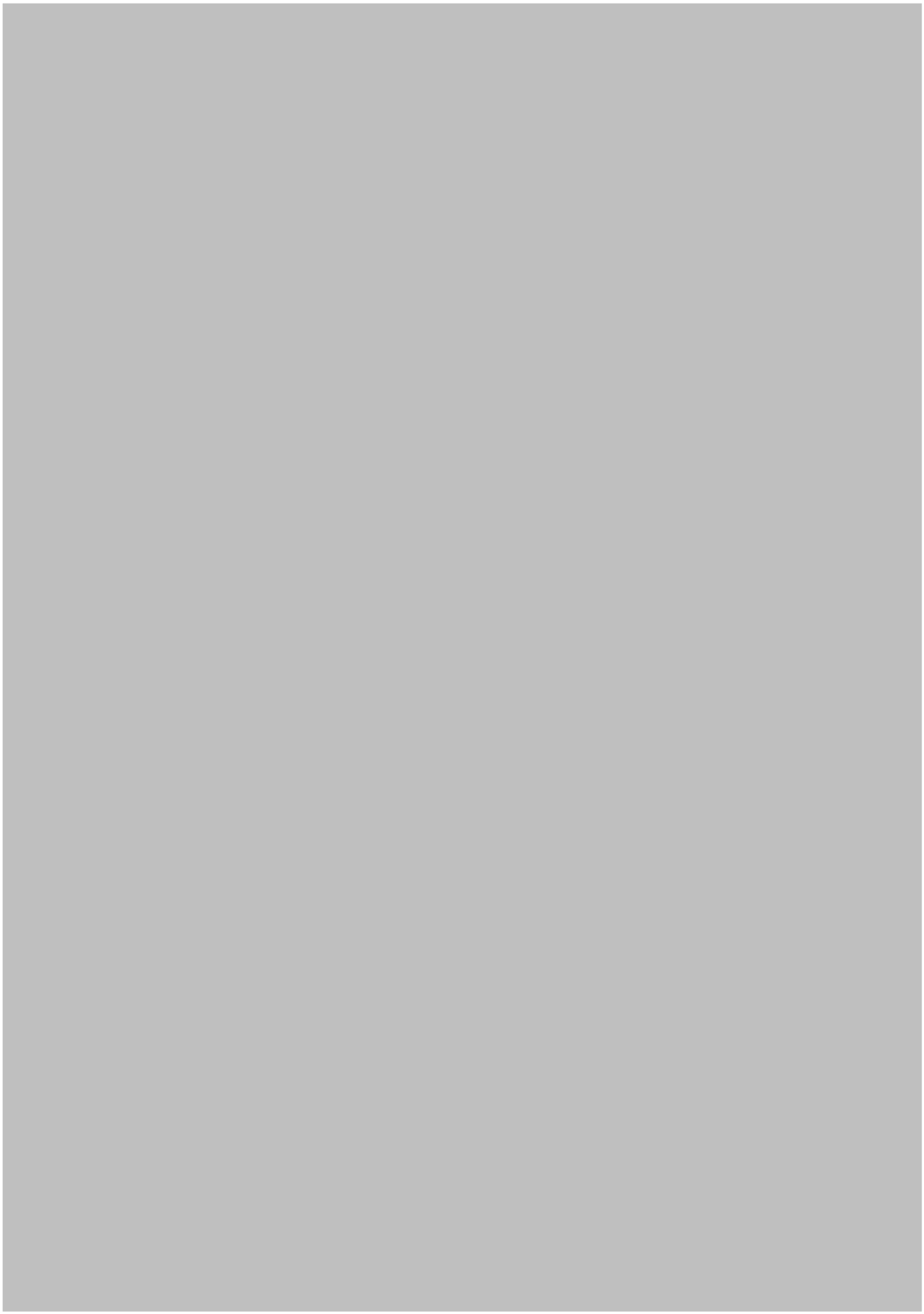


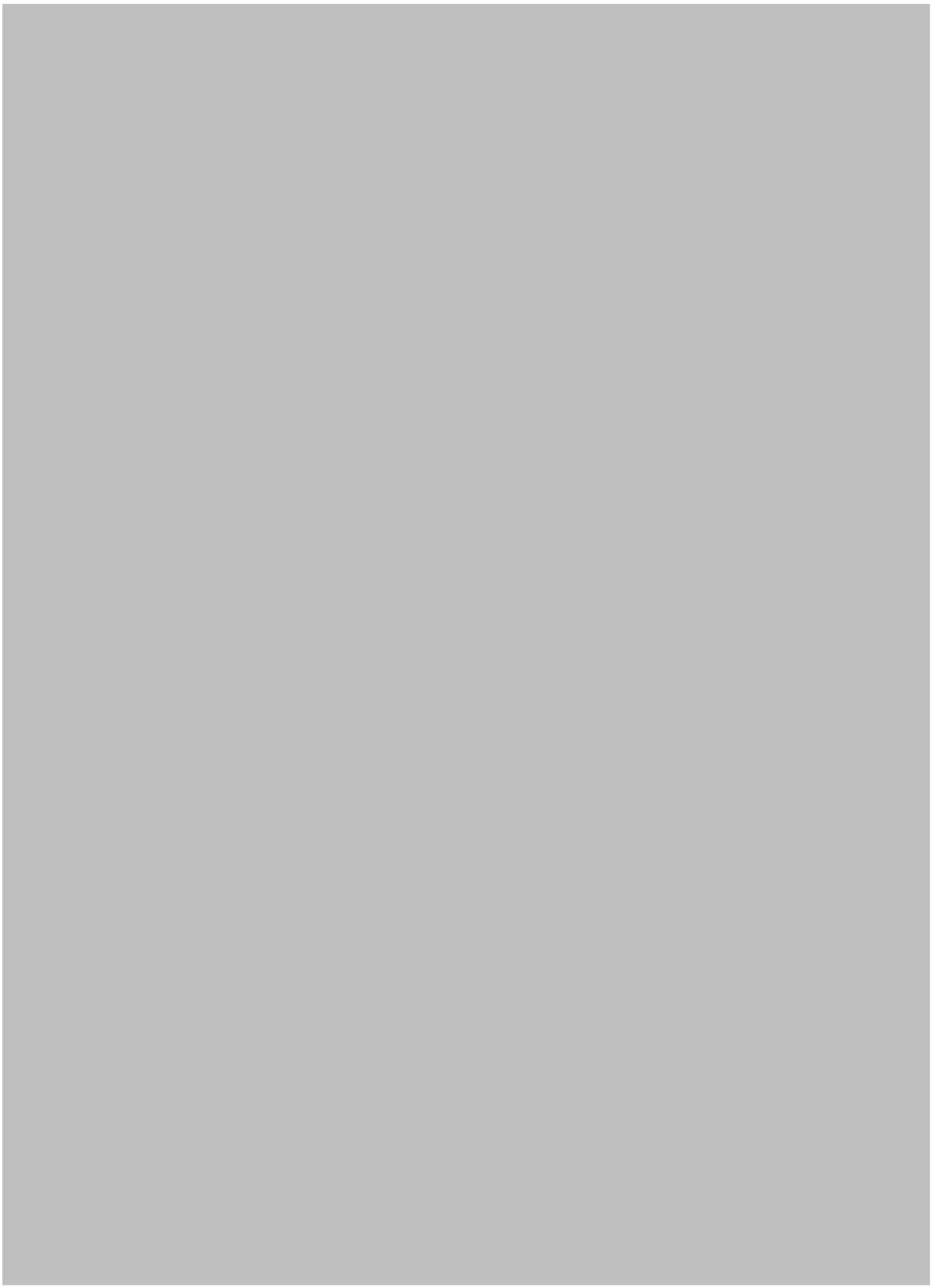


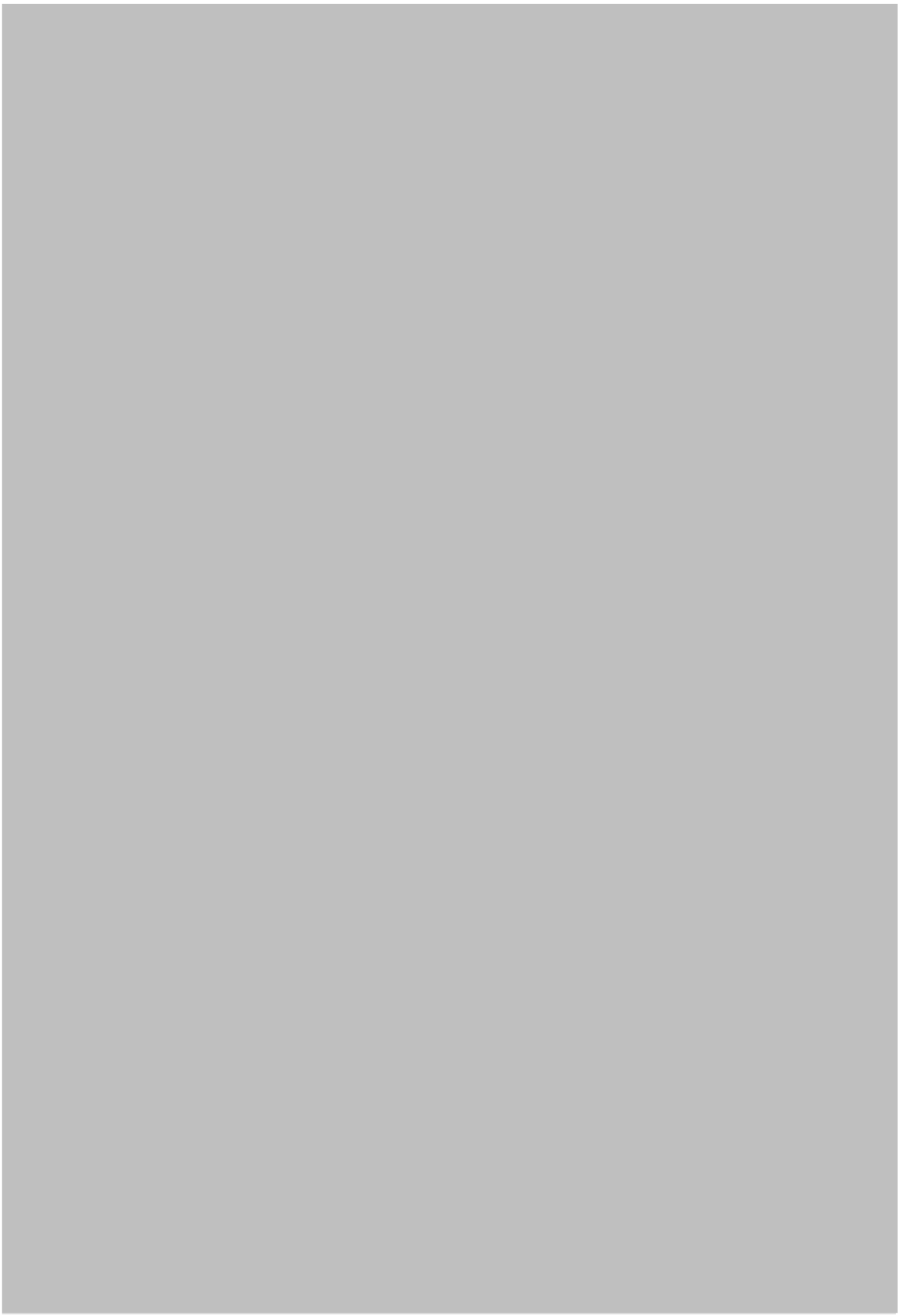


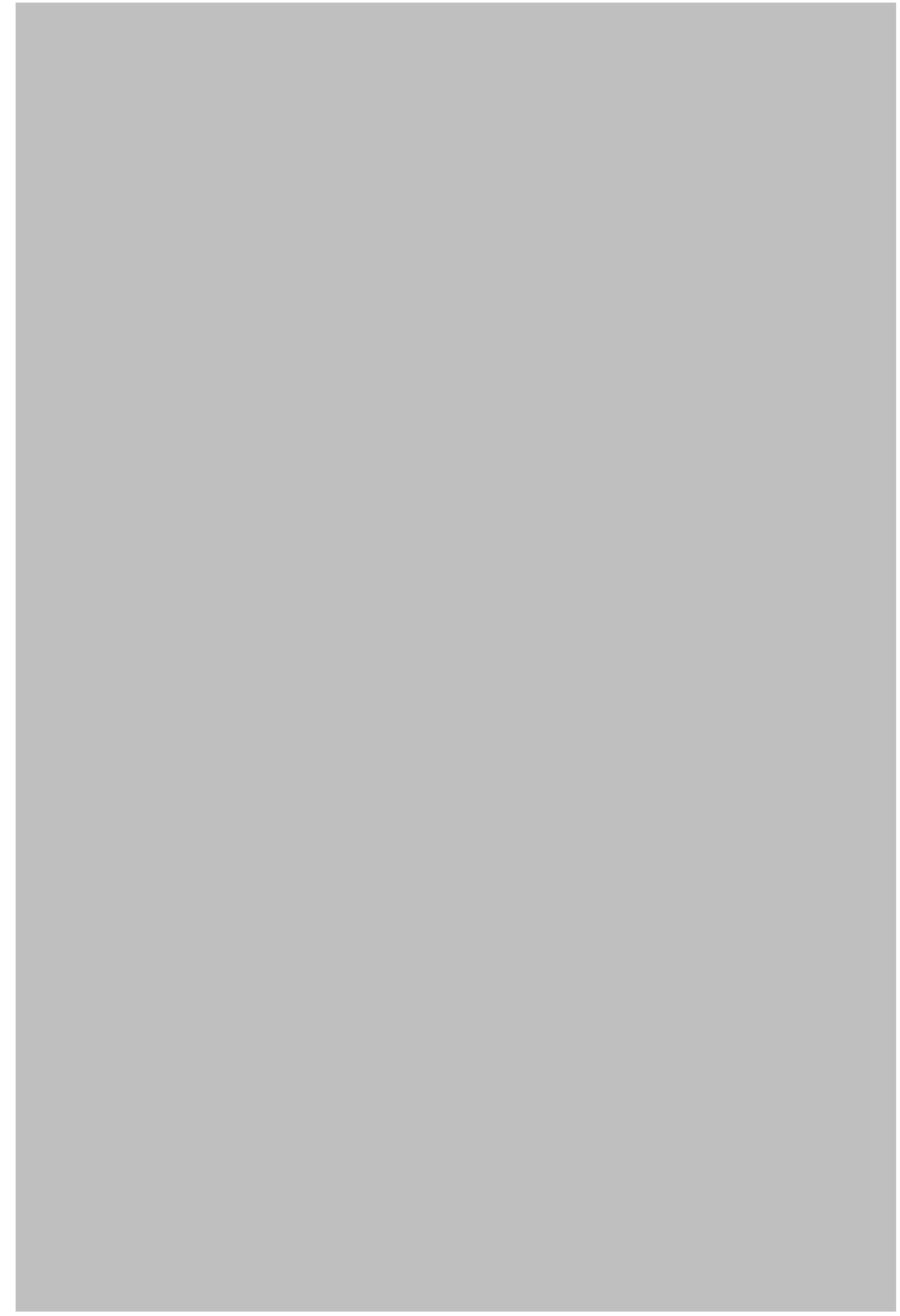


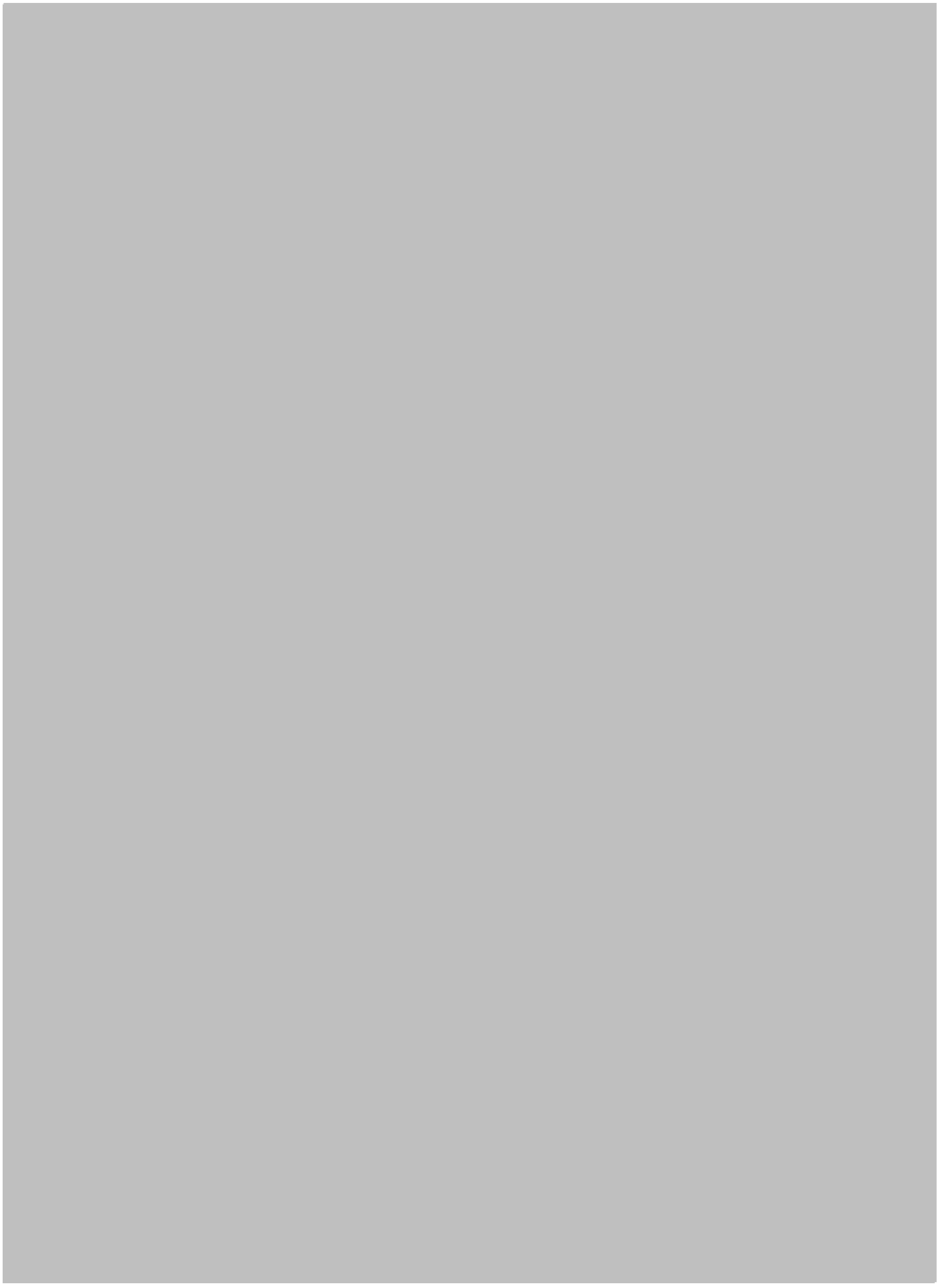


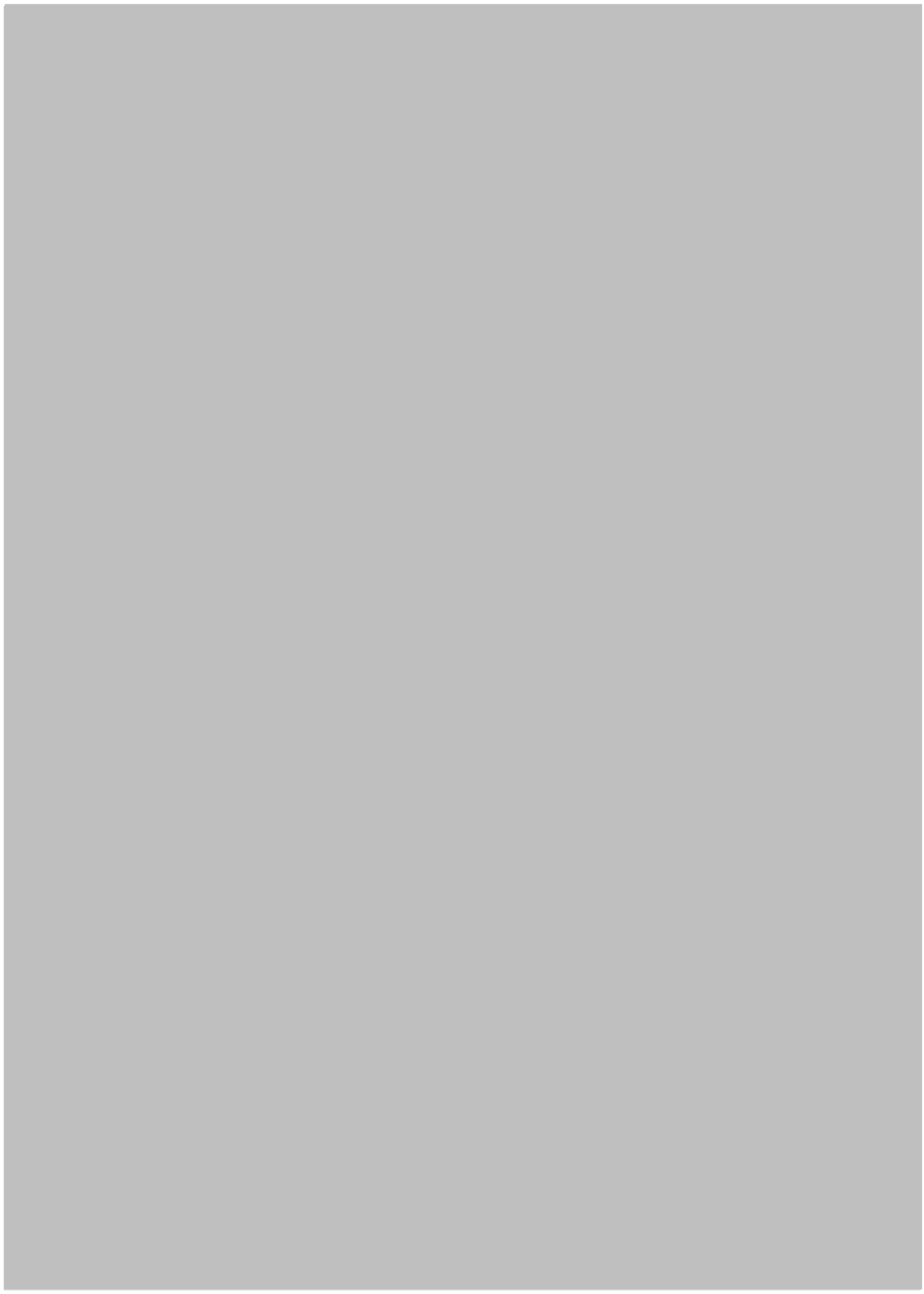


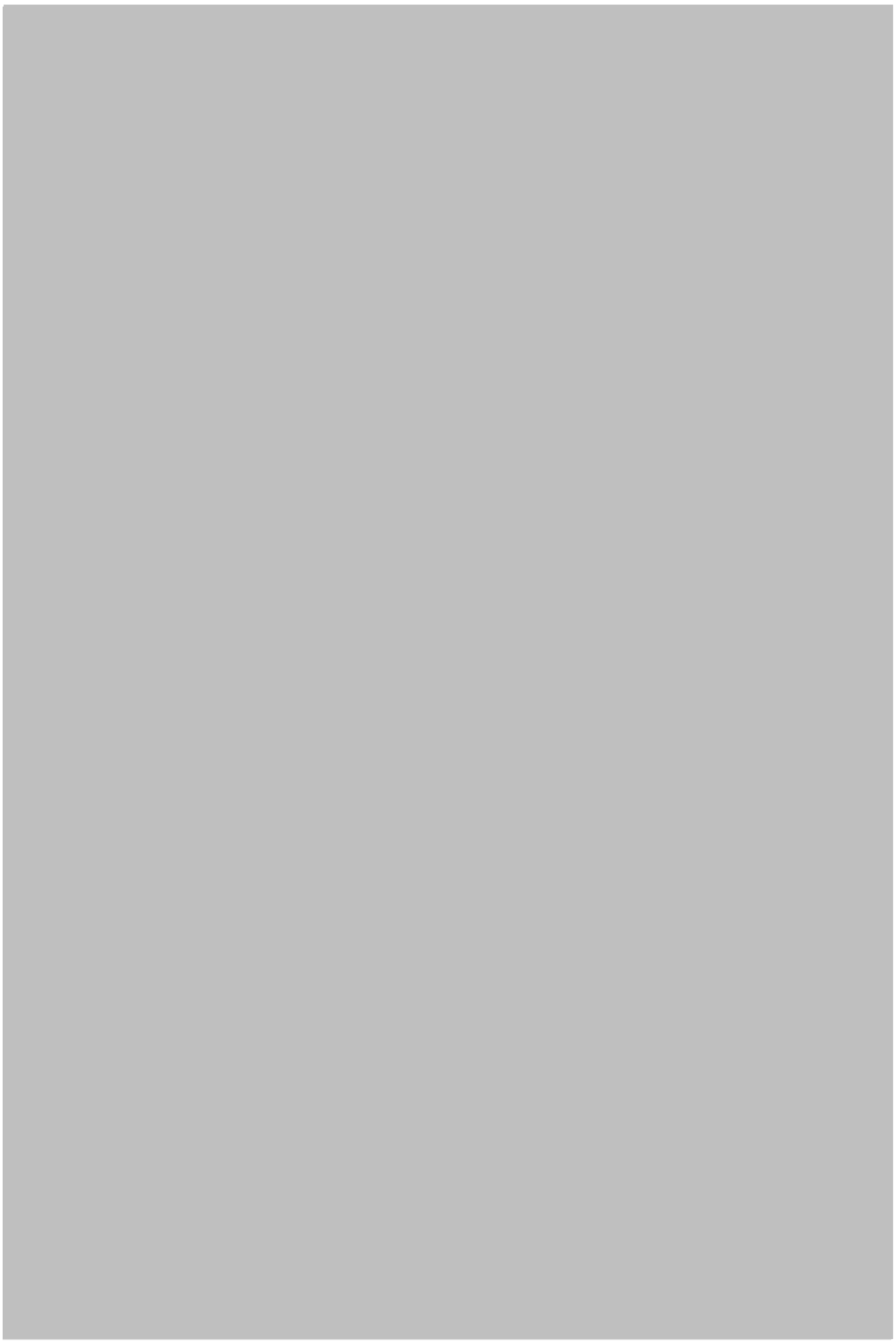


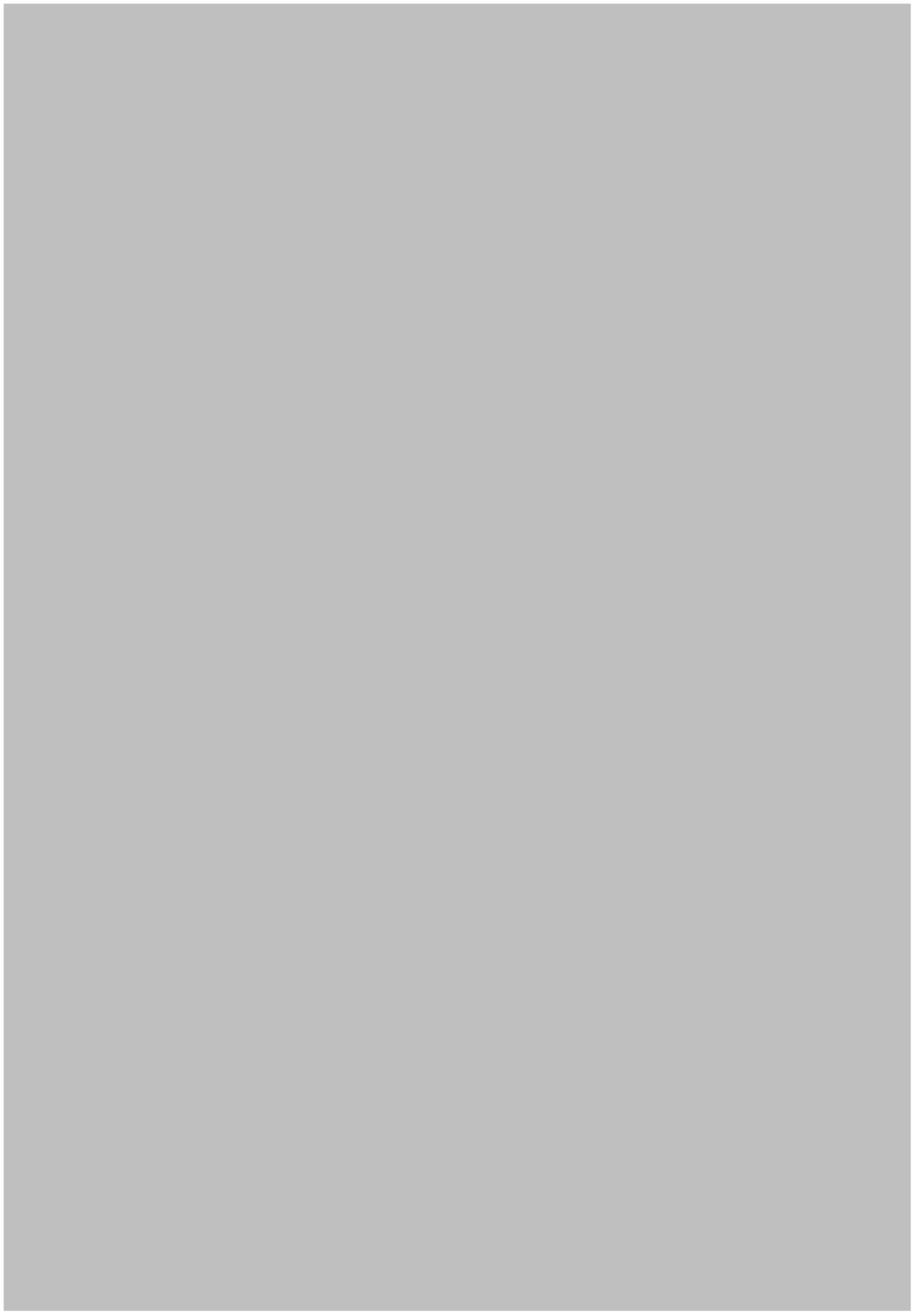


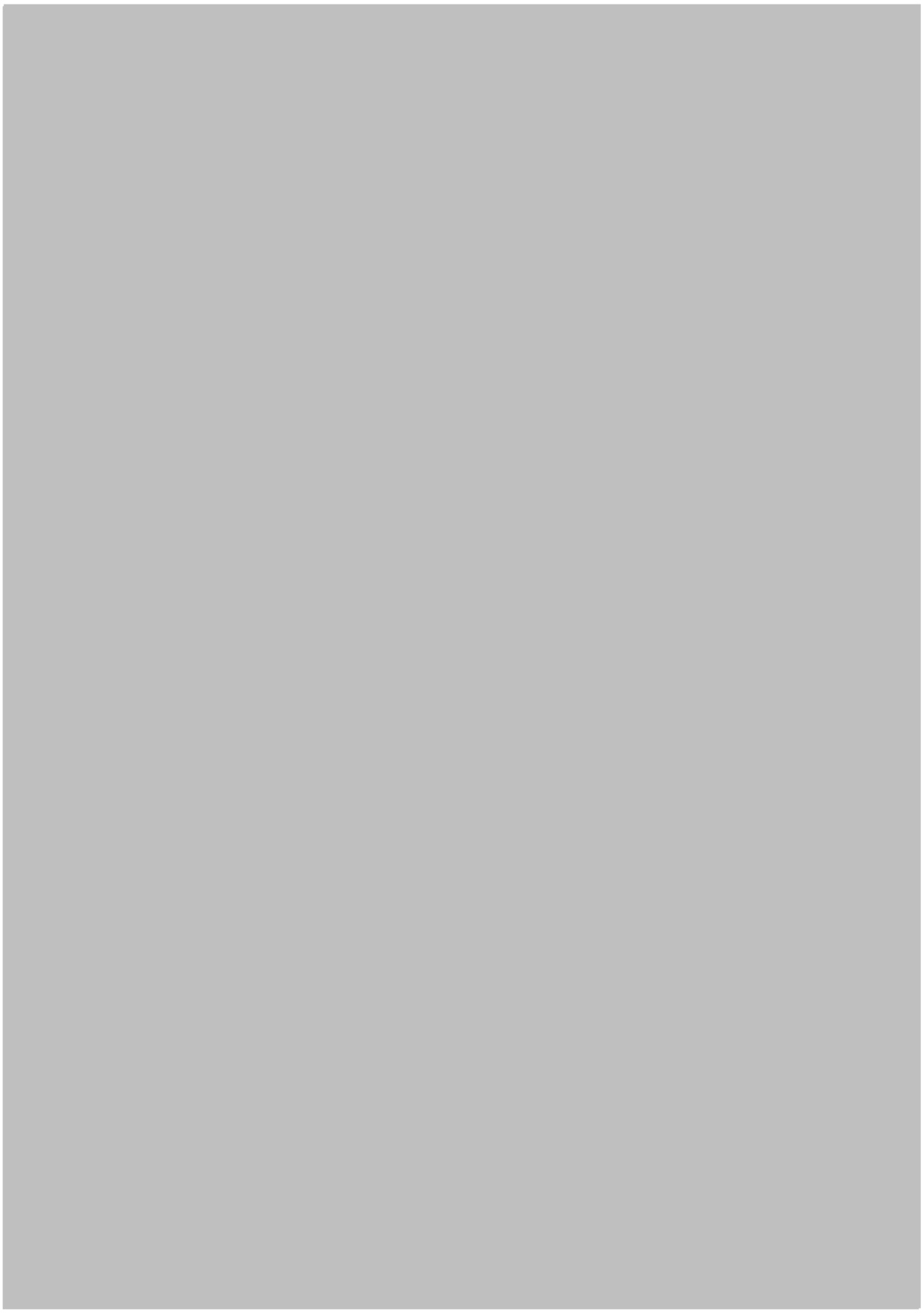


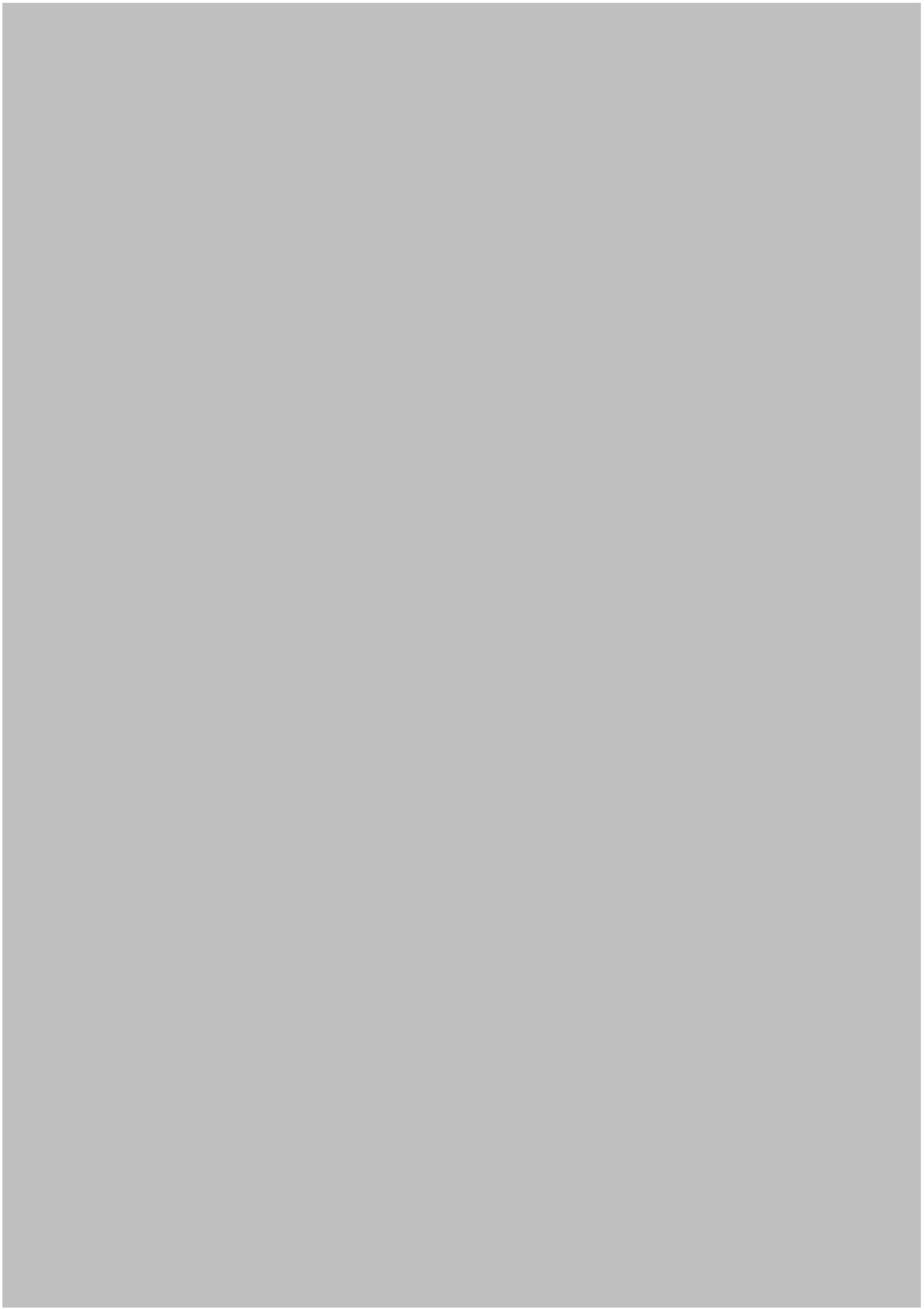


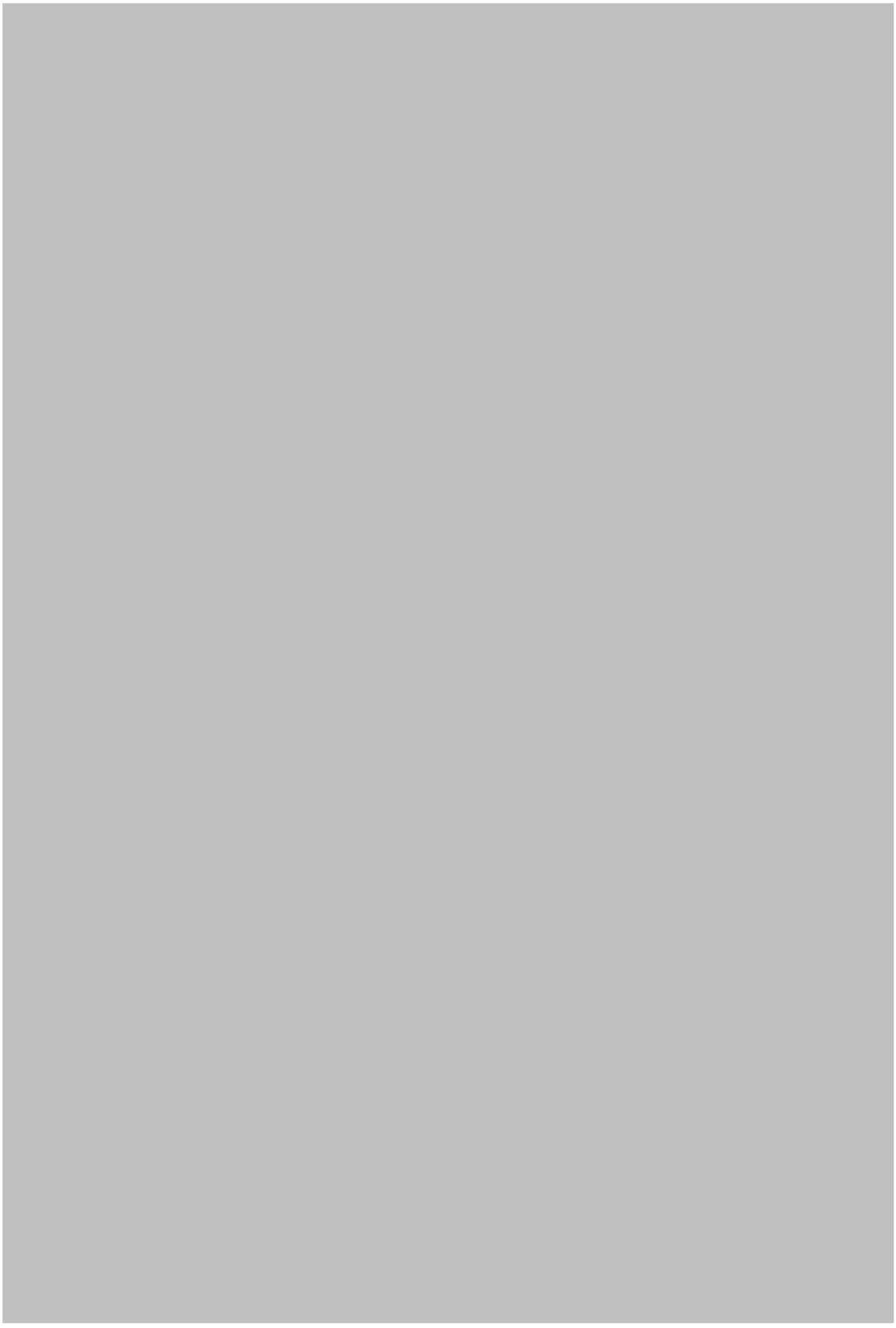


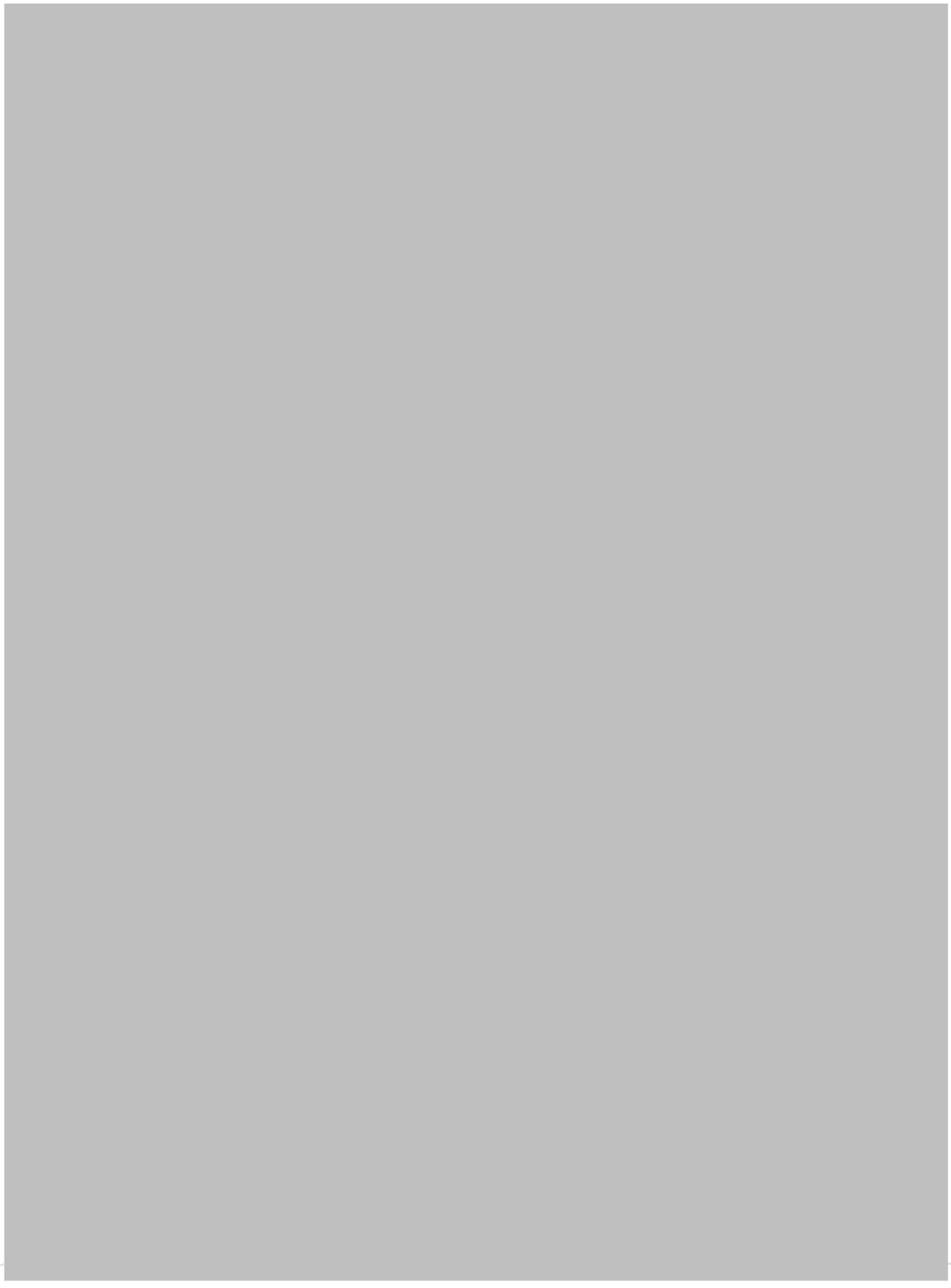


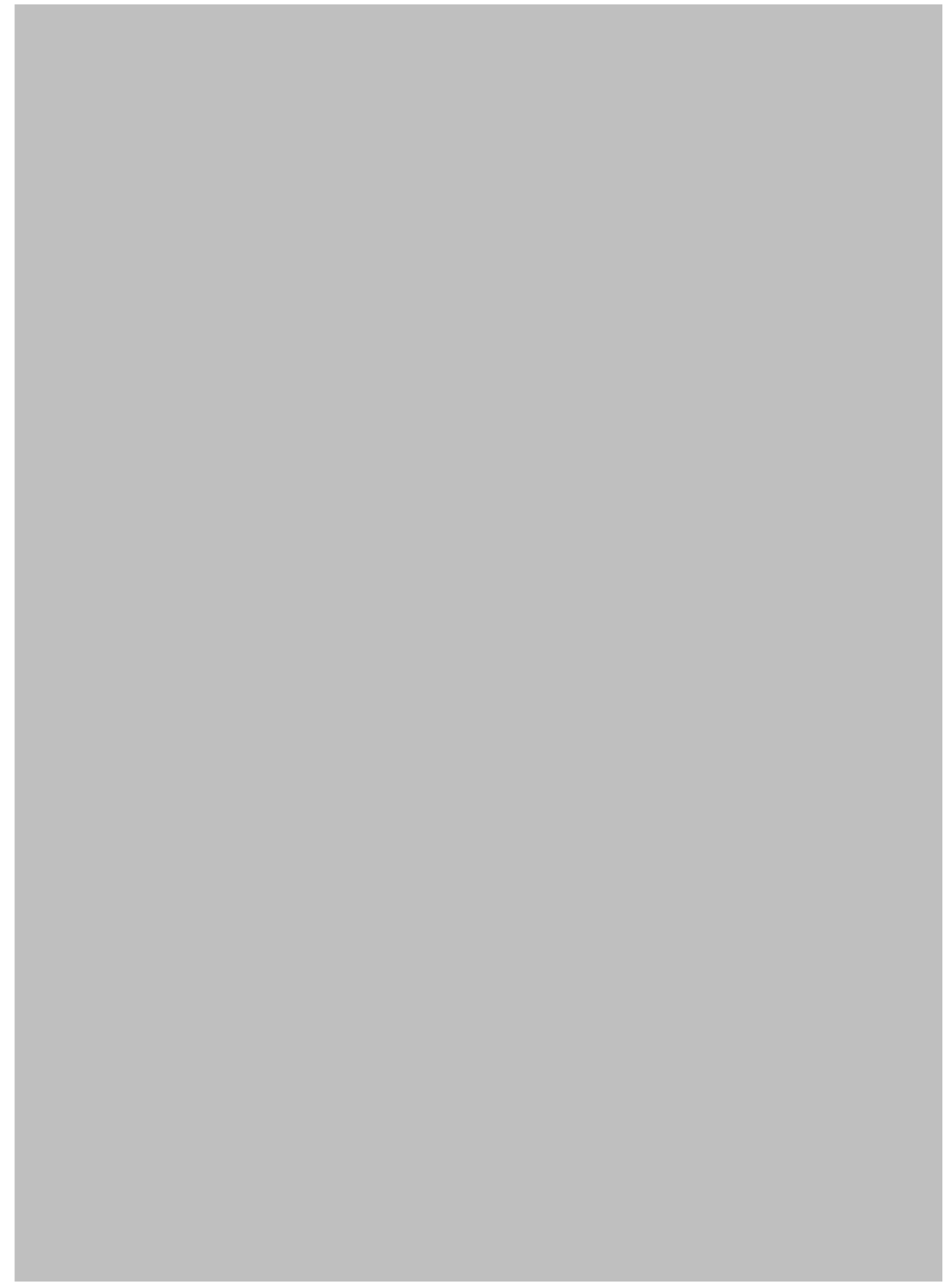


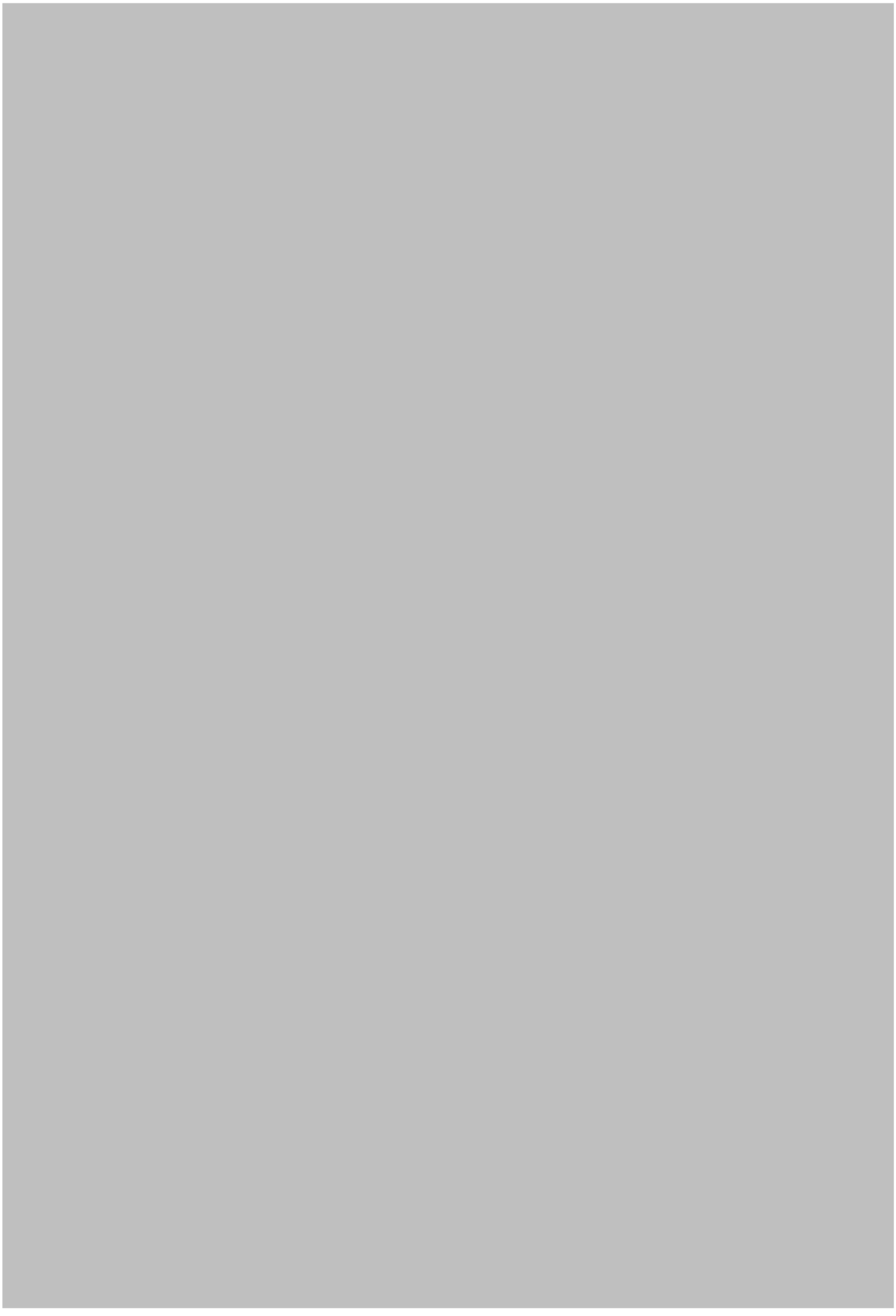


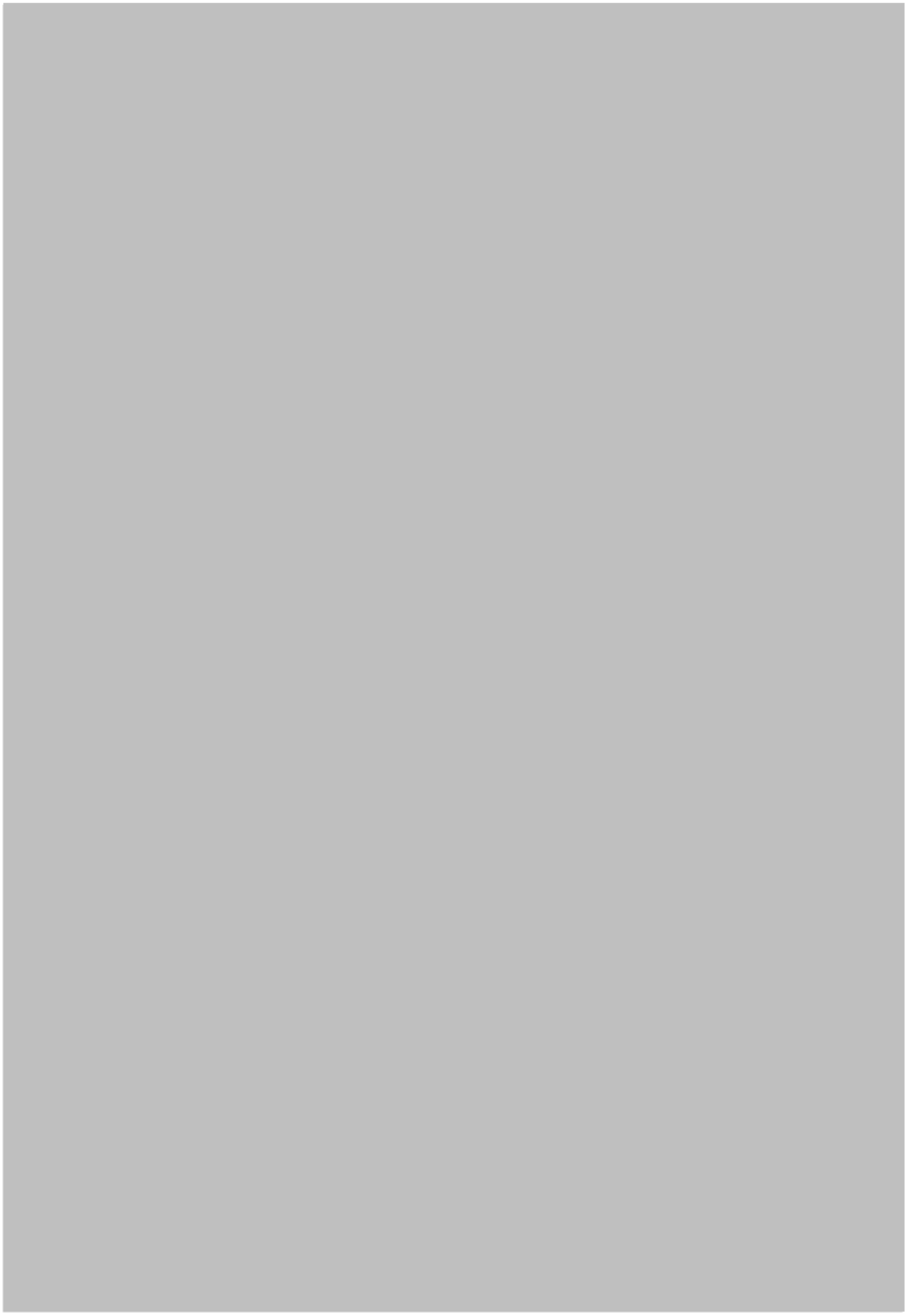


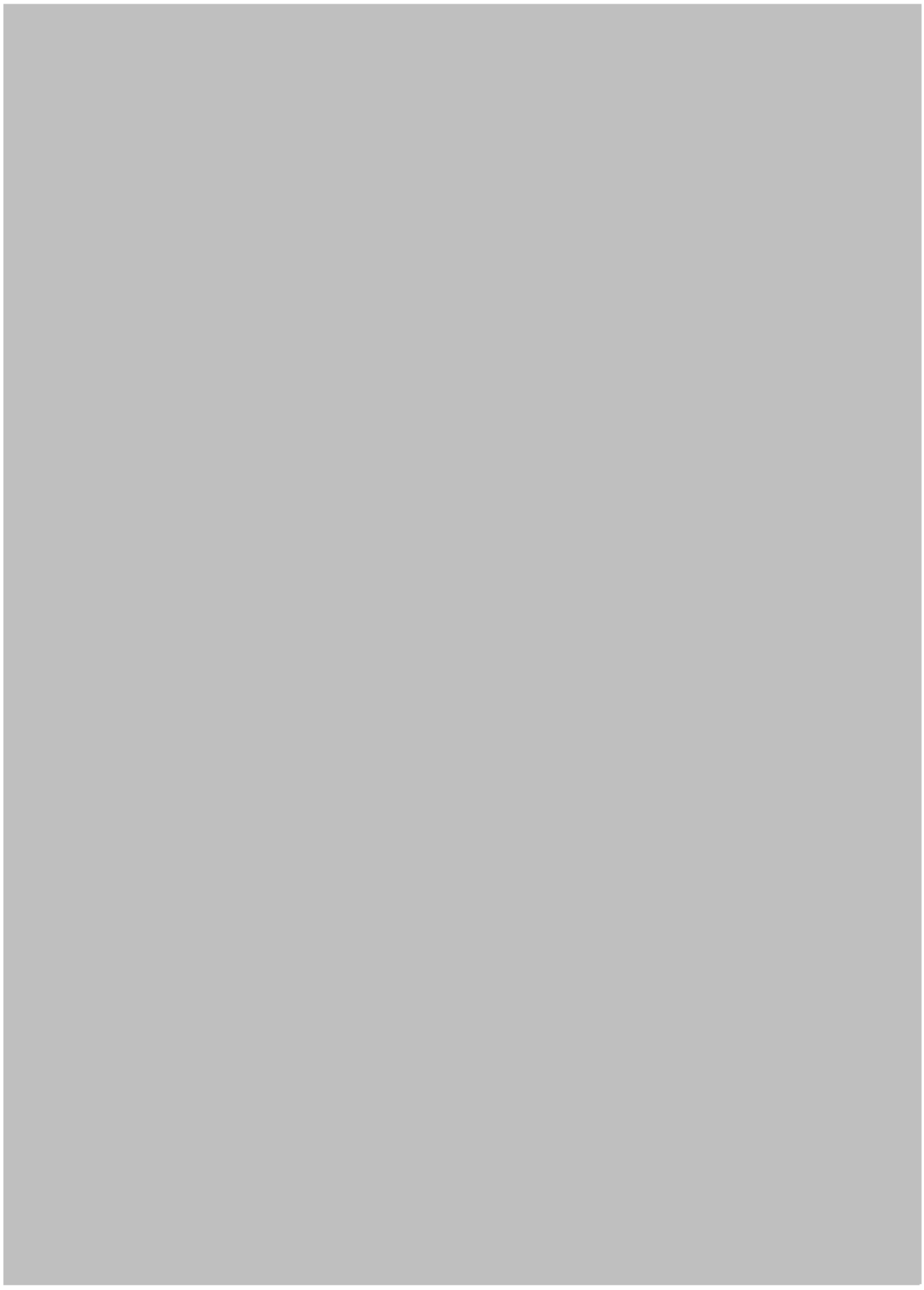


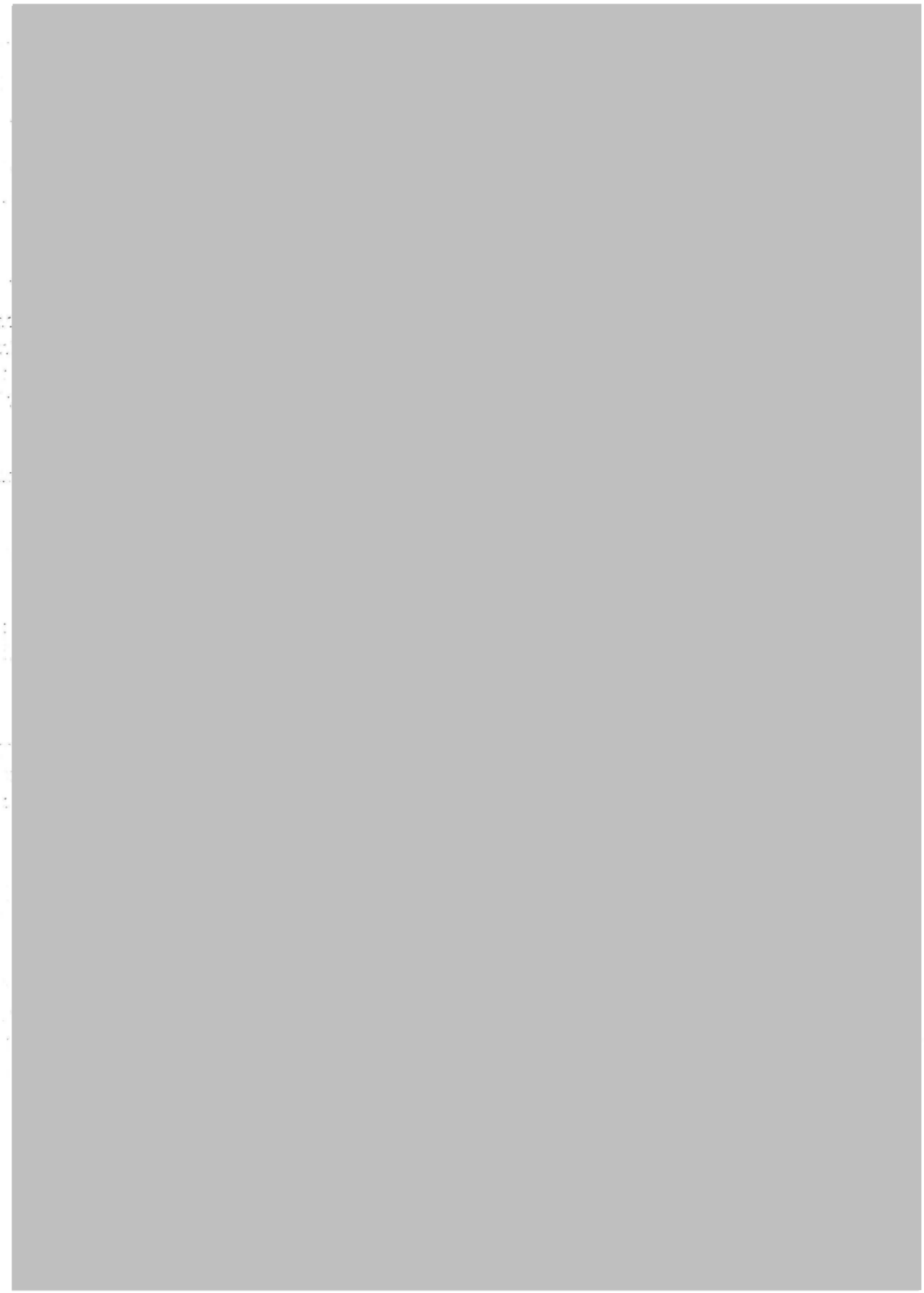


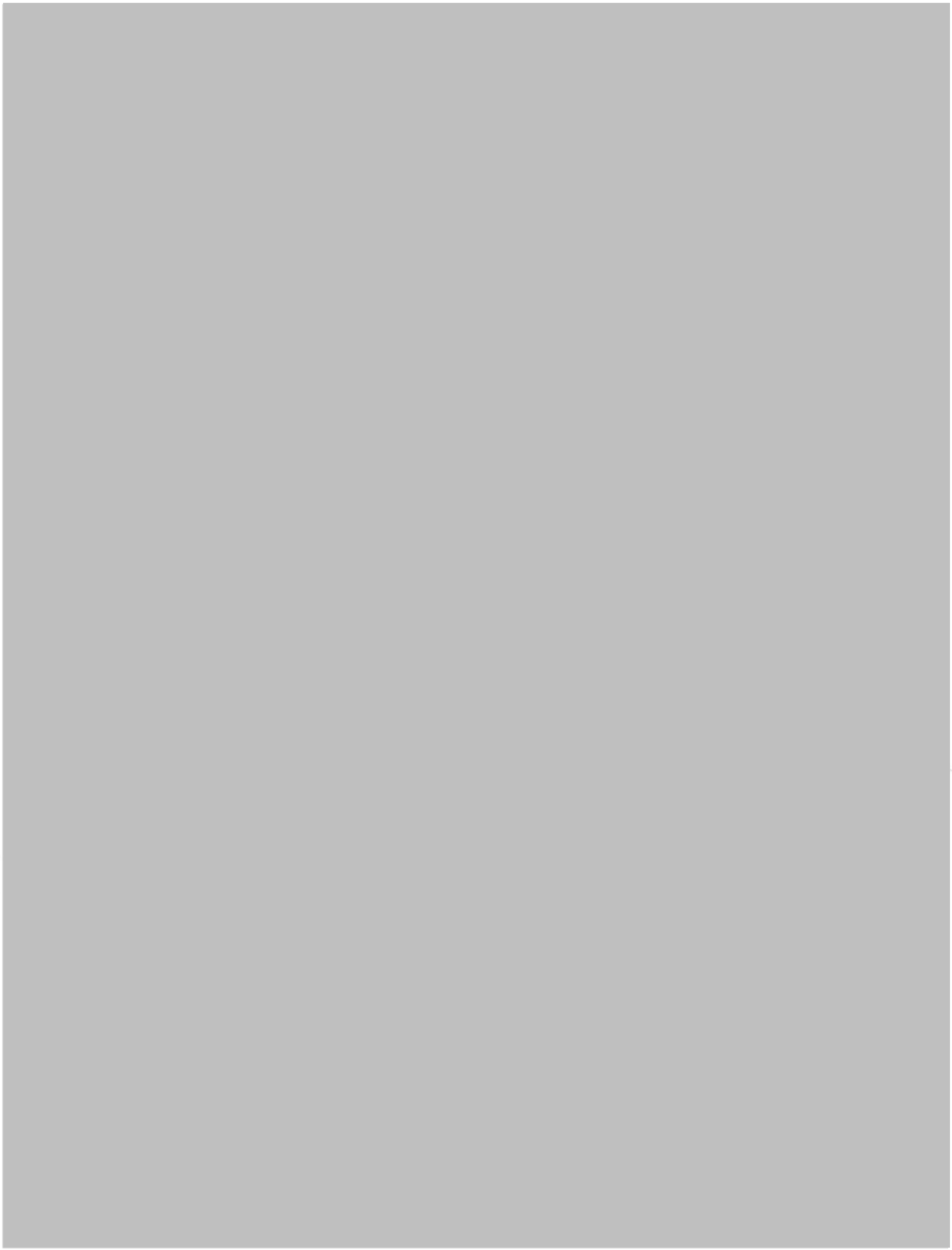


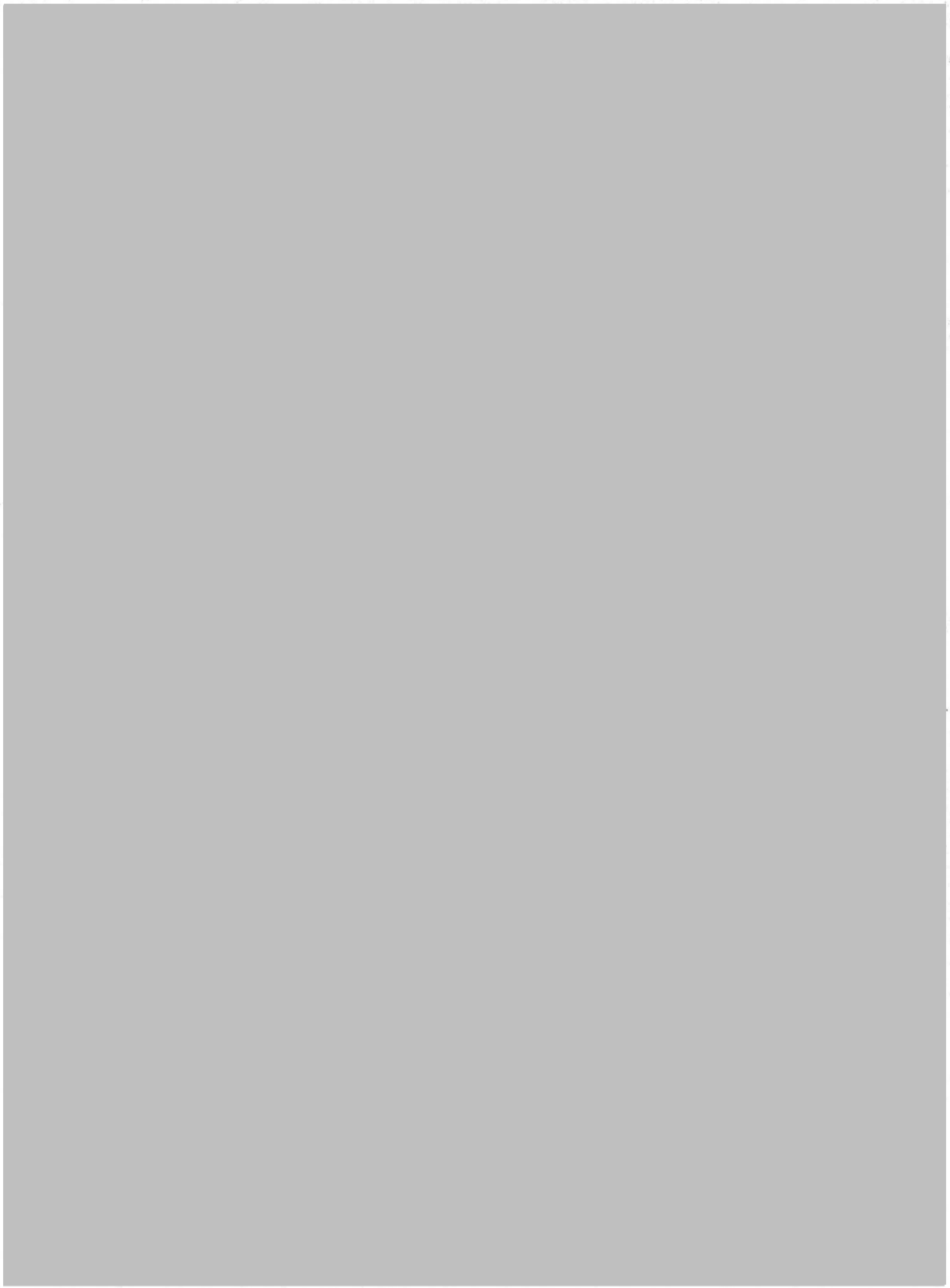


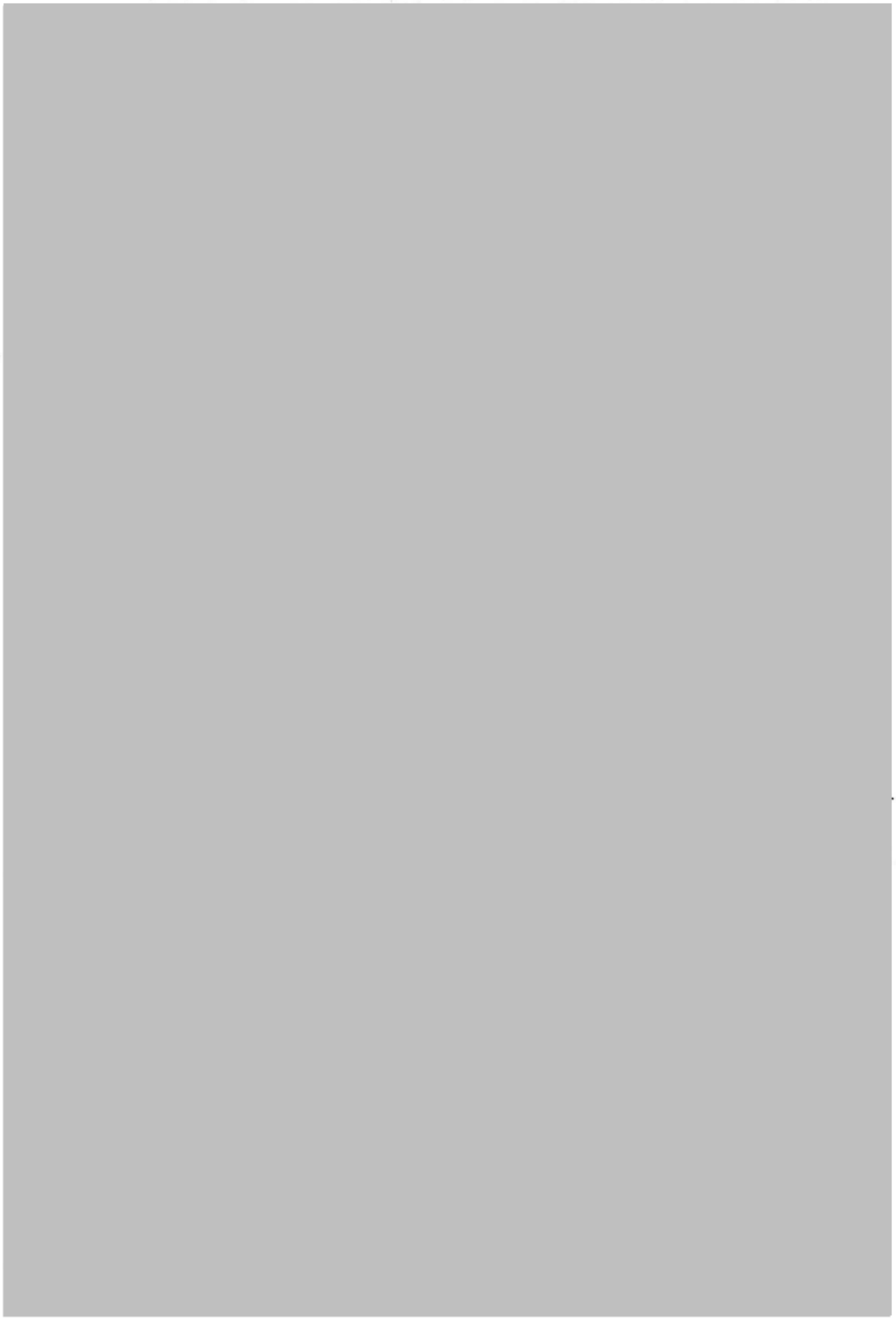


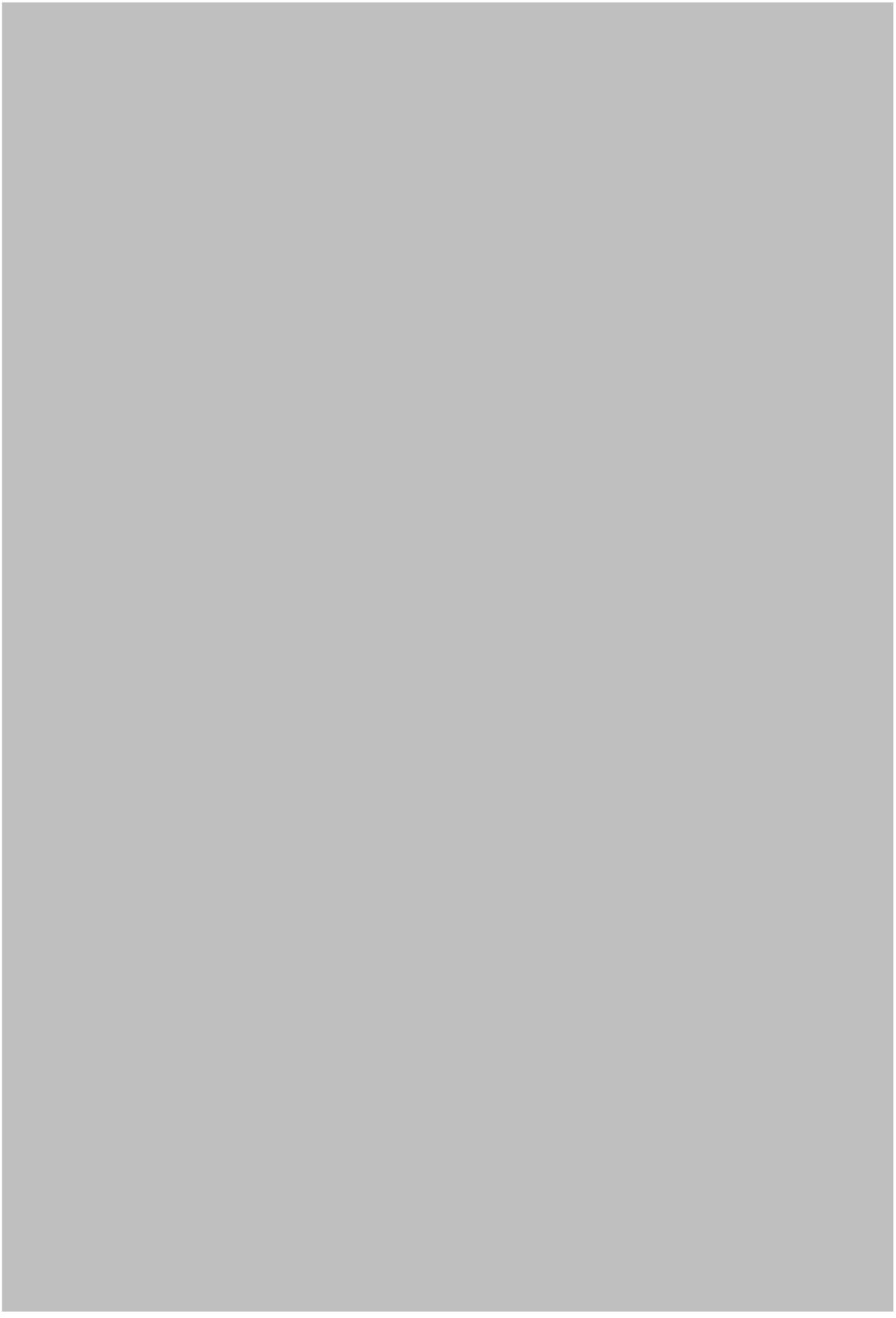


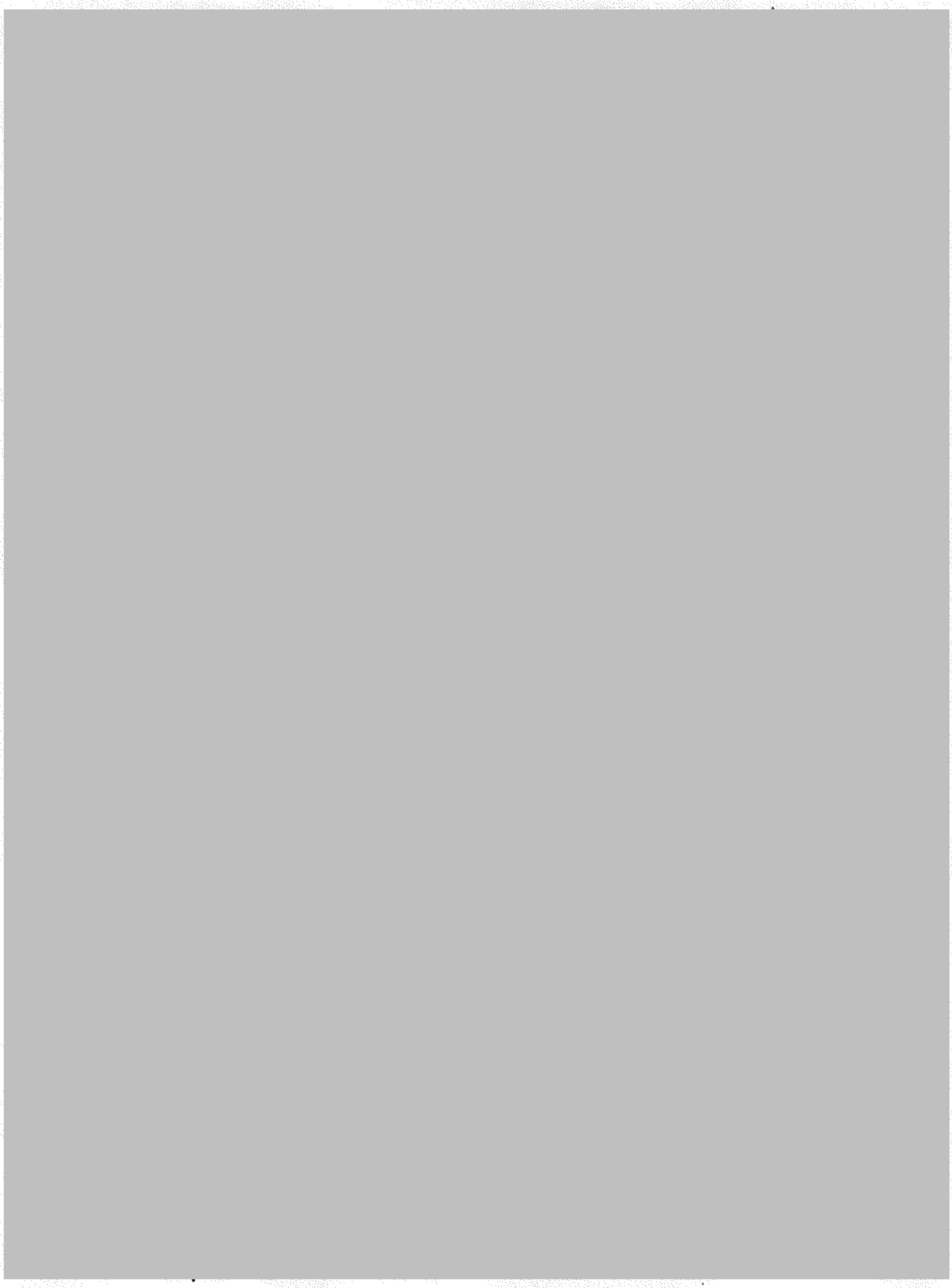


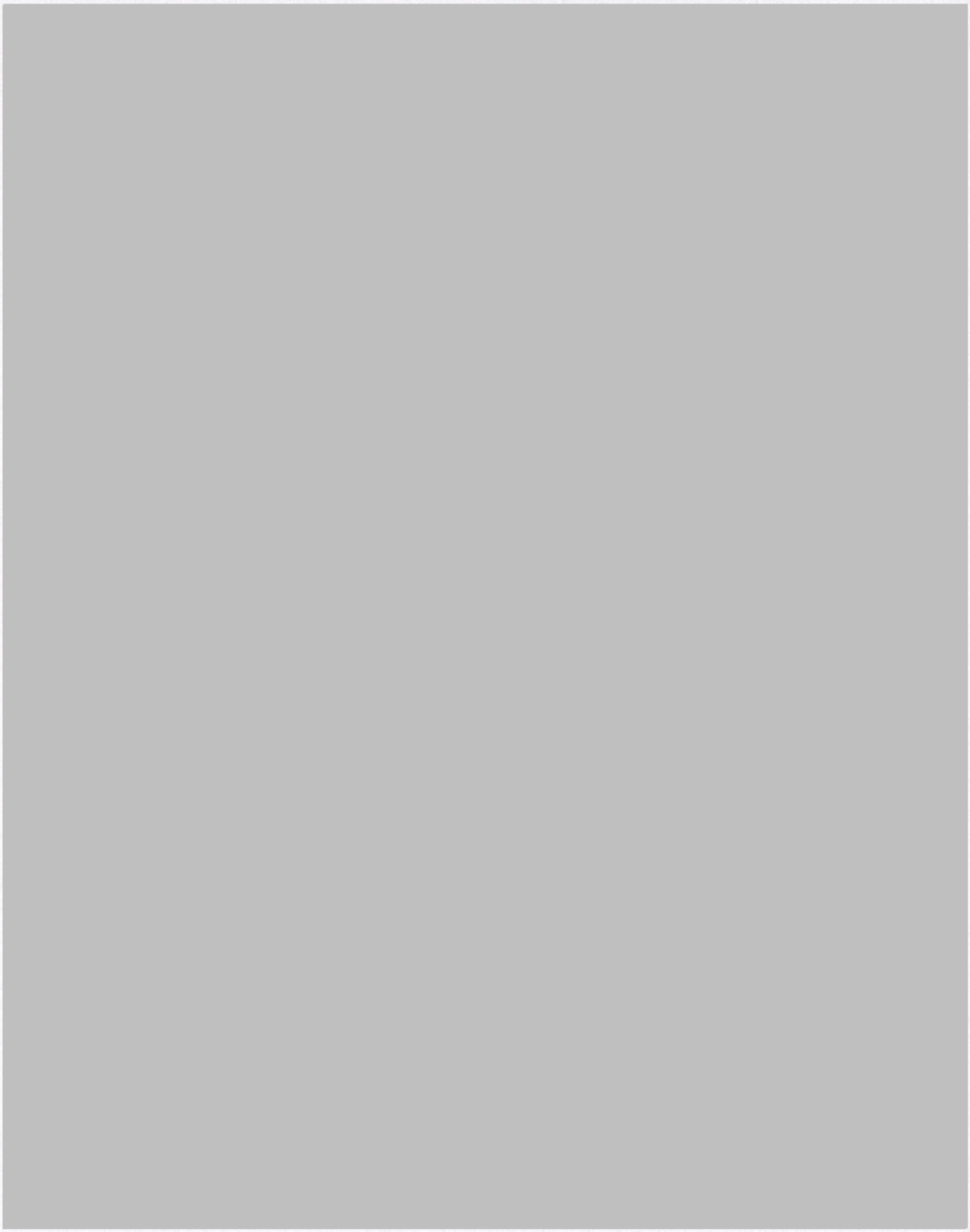


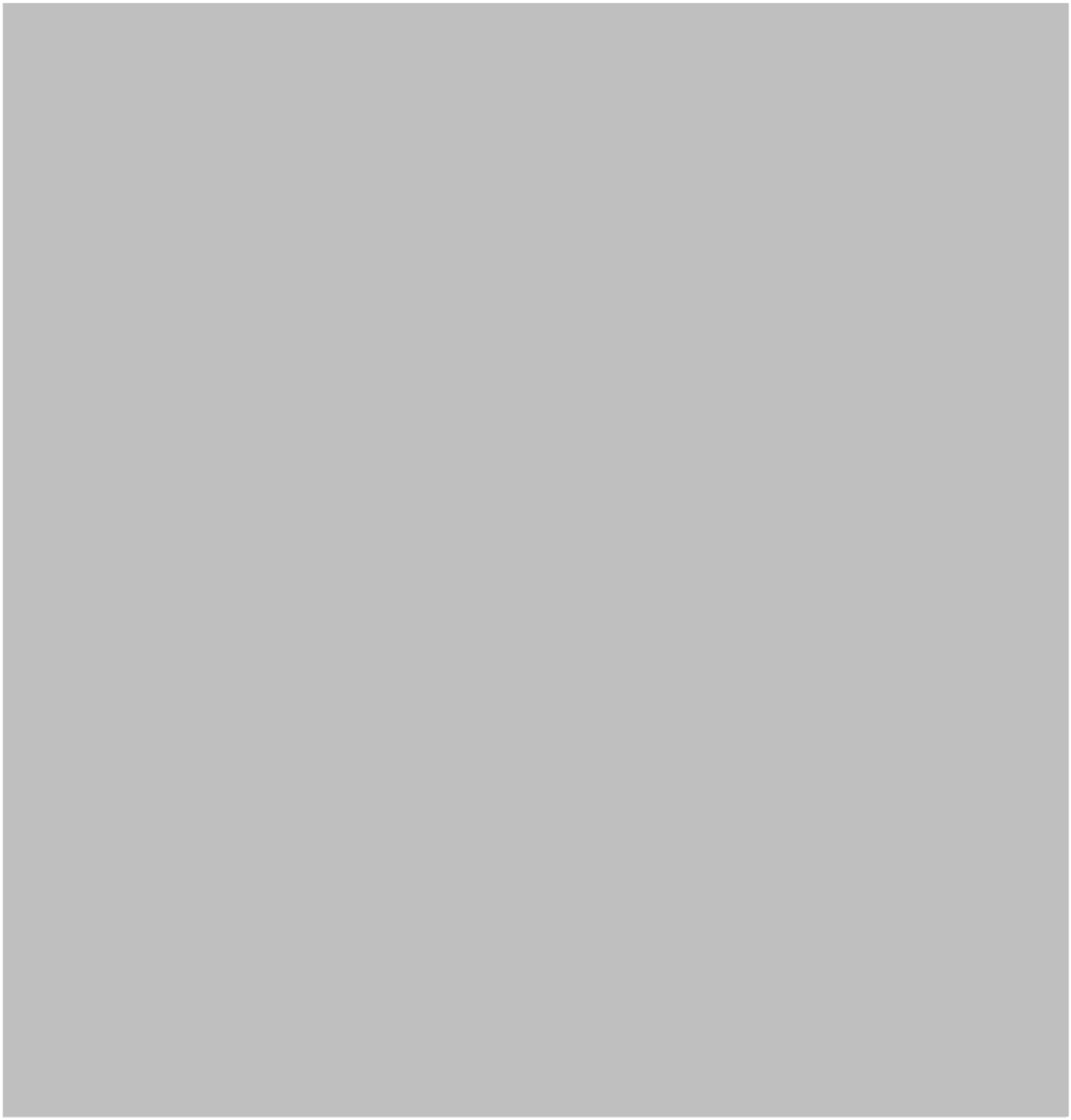












SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED
OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 25th day of SEPTEMBER, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC's business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

CHARLES AVG

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 28th day of August, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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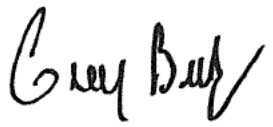
IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.



Signature

Greg Berkhof

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 18 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Laura Bultman

Digitally signed by Laura Bultman
DN: cn=Laura Bultman, o, ou, email=bultmanl@gmail.com, c=US
Date: 2014.09.18 20:50:22 -05'00'

Signature

Laura Bultman

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 31st day of August, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Amelia Burgess

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 9 day of SEPTEMBER, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Charles Crutchfield

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 19TH day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Mekea Duffy

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 25 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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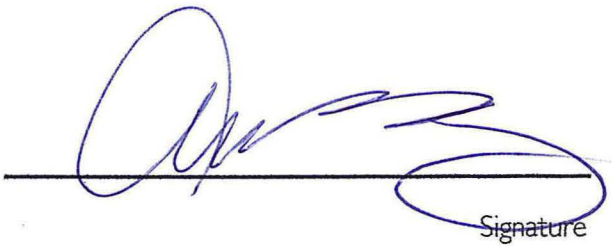
IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.



Signature

Ann Kelly Gaebgoneer

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED
OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 21 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC's business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

MICHELE C. GATZKE

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 23rd day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Brooke E. M

Signature

Brooke E Gehring

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 24 day of September, 20 14 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED
OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 23 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Nathan L. Haines

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 22 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Richard Brian Harvey

Signature

Richard Brian Harvey

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 29 day of August, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of **MINNESOTA MEDICAL SOLUTIONS LLC** dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap **MINNESOTA MEDICAL SOLUTIONS LLC'S** business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees **MINNESOTA MEDICAL SOLUTIONS LLC** has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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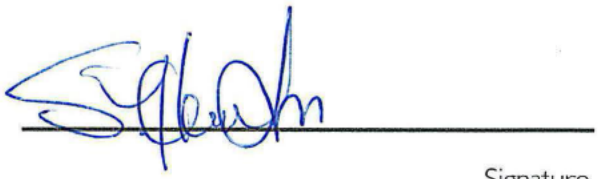
IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.



Signature

Susan Hewitson

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 15 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Benjamin Kiehne

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 22nd day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC's business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Ross W Kiehne

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 26 day of AUGUST, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC's business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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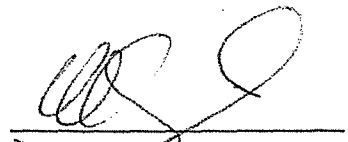
IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.



Signature

Dave Kingsley

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 1 day of Sept, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of **MINNESOTA MEDICAL SOLUTIONS LLC** dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap **MINNESOTA MEDICAL SOLUTIONS LLC'S** business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees **MINNESOTA MEDICAL SOLUTIONS LLC** has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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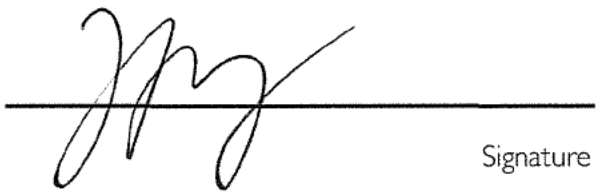
IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.



Signature

Luke Lathrop

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 23rd day of September, 20____ by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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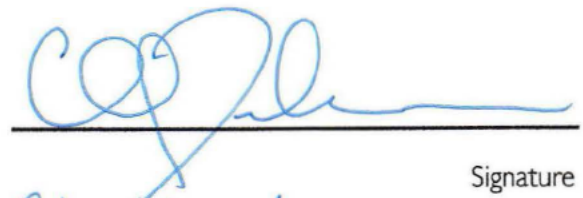

Signature

Charles Ledermann

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 28 day of August, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of **MINNESOTA MEDICAL SOLUTIONS LLC** dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap **MINNESOTA MEDICAL SOLUTIONS LLC'S** business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees **MINNESOTA MEDICAL SOLUTIONS LLC** has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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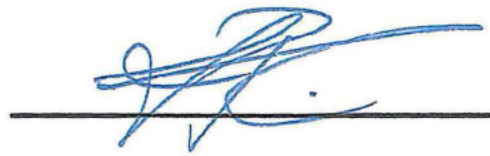

Signature

MITCHELL MICHAELSON

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 21 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC's business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Joshua O'Neill

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED
OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 21 day of Sept., 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Nancy M. Overby

Signature

Nancy M. Overby

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 22nd day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Ronald D. Owens

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 19 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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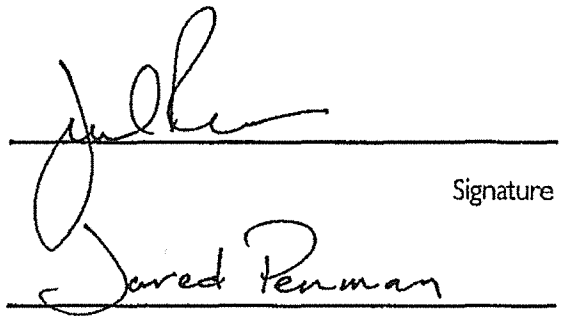
IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.



Signature

Jared Penman

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED
OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 28 day of AUGUST, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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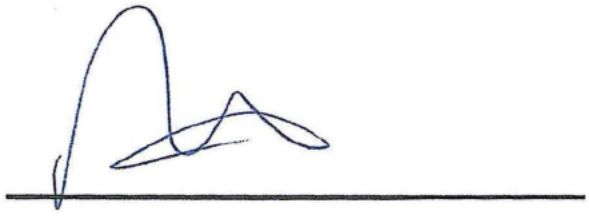
IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.



Signature

Aaron Peterson

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 25 day of SEPTEMBER 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC's business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

JERRY L. QUAAL

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 22 day of September 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC's business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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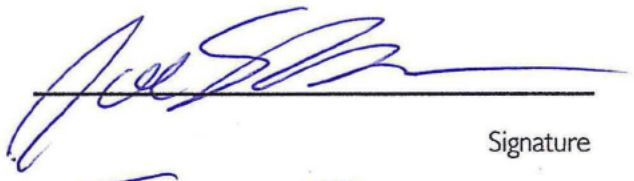
IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.



Signature

Joe Schaffer

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the ~~21~~ 20th day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

The undersigned further represents and warrants that he or she has disclosed all material elements in his or her personal and professional background that might impact, affect, alter, disqualify, or handicap MINNESOTA MEDICAL SOLUTIONS LLC'S business purposes, including its pursuit of—and business activities under—a license under Minnesota Statutes Chapters 152 and 311. The undersigned understands and agrees MINNESOTA MEDICAL SOLUTIONS LLC has reasonably relied upon the Undersigned's representations, warranties, and disclosures in agreeing to accept the Undersigned as a Company Member and that the Undersigned's failure to disclose material elements in his or her personal and professional backgrounds is likely to damage the Company's business and business purposes and renders any transactions contemplated by this Consent null and void.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

PAUL W. SCHAFFER

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 19 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Robert Shimpa

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED
OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 22nd day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Debra A. Dowe Skaalen

Signature

Debra A. Dowe Skaalen

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED
OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

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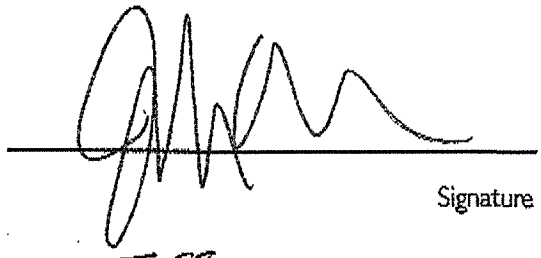

Signature

Jeffrey A. Soma

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 20 day of AUGUST, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

JAREN

8/20/14 Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 21st day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

Charles Todd

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 25 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

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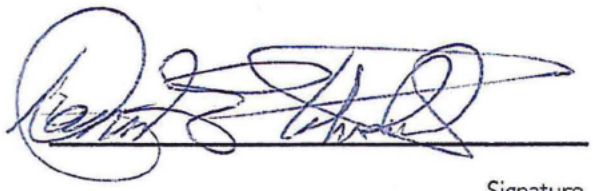

Signature

Daniel E Totushek

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

James Vagts

Signature

JAMES VAGTS

Printed Name

SCHEDULE B
TO THAT CERTAIN AMENDED AND RESTATED OPERATING AND MEMBER CONTROL AGREEMENT

CONSENT

This Consent is executed as of the 17 day of September, 2014 by the undersigned as is required under that certain Amended and Restated Operating and Member Control Agreement of MINNESOTA MEDICAL SOLUTIONS LLC dated as of July 31, 2014 (the "Operating and Member Control Agreement").

The undersigned agrees to be subject to all of the terms and conditions of the Operating and Member Control Agreement and understands that the Operating and Member Control Agreement is a legally binding agreement. Upon execution, the undersigned will be deemed to be a Member of Minnesota Medical Solutions LLC, and, with the exception of the addition of the undersigned, all other provisions of the Operating and Member Control Agreement will remain in full force and effect.

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IN WITNESS WHEREOF, the undersigned has executed this Consent as of the day and year first written above.

Signature

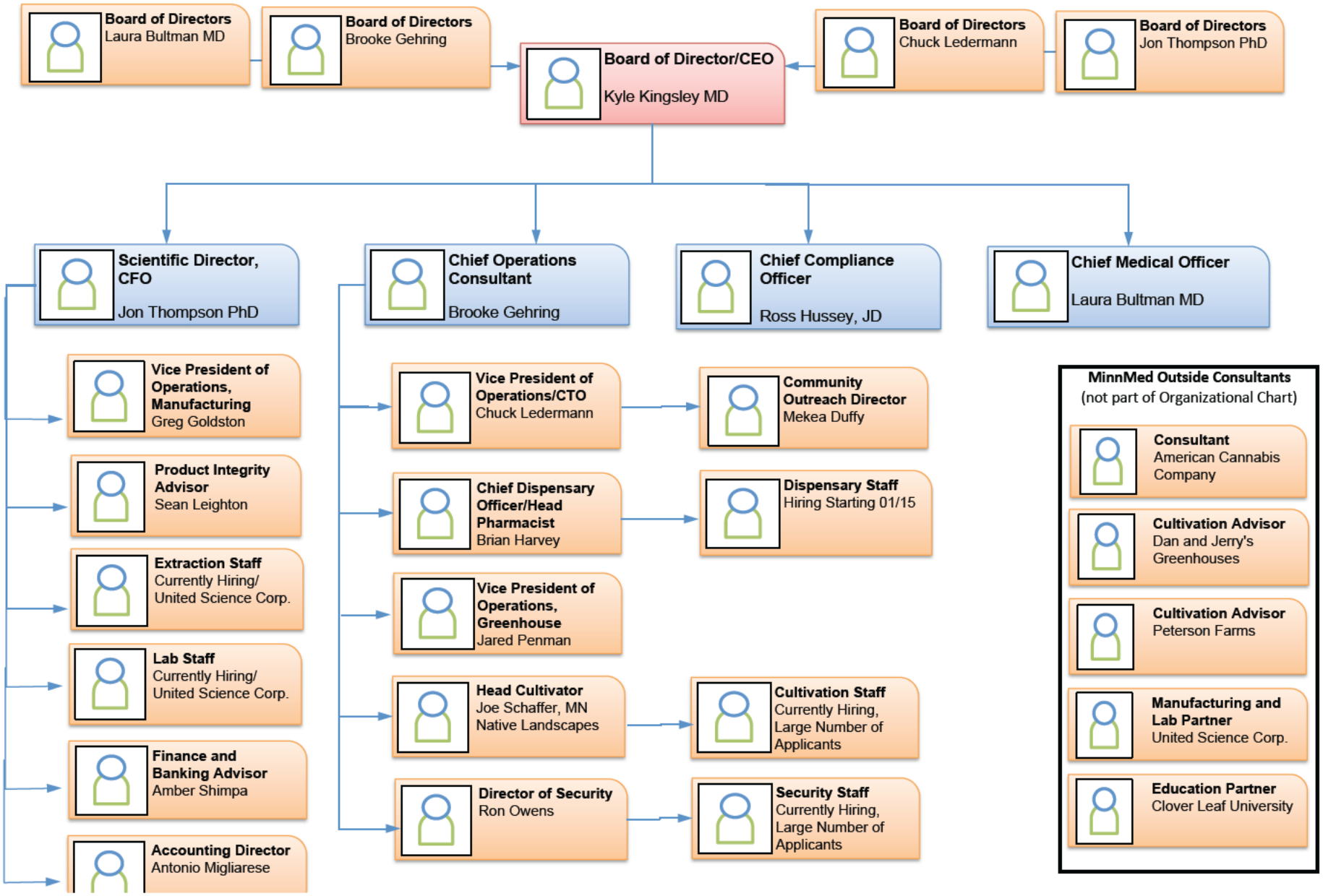
Susan Viergever

Printed Name

2. Current organizational charts that include position descriptions and the names and resumes of persons holding each position to the extent such positions have been filled.

*Please see the attached organizational chart and role descriptions for a larger diagram.

Minnesota Medical Solutions LLC Organization Chart



Minnesota Medical Solutions – Organizational Chart, Position Descriptions

CEO—Kyle Kingsley MD
-Leads the development and execution of MinnMed's long term patient care and business strategy
-Responsible for all day-to-day management decisions
-Implements MinnMed's long and short term plans
-Acts as a direct liaison between the Board and management of the MinnMed
-Communicates on behalf of MinnMed to shareholders, employees, Government authorities, other stakeholders and the public.

Scientific Director—Jon Thompson PhD
- Sets R&D strategy for the company
- Drives outcomes to set business goals
- Builds on external expertise and partnering to create shareholder value.
- Selects Research and Development Talent to meet Objectives
- Builds proforma business cases for new products and assess risk for capital investments
- Chairman of the Scientific Advisory Board

CFO—Jon Thompson PhD
- Sets financial strategy for the company.
- Sets financial goals for the business including the monitoring and analyzes the financial health of company.
- In a start up setting, key job is to manage cash.
- Drives the completion of the annual operating plan including budgeting, allocation of resources and capital expenditures.
- Drives continuous improvement in financial measures.
- Liaison with all financial dealings including banking, accounting, cost accounting, stock holders, and financial reporting.

Chief Operations Consultant—Brook Gehring
-Acts as operations lead for the company over the first several months
-Helps implement systems/SOPs in distribution facilities and the manufacturing facility
-Implements company policies and procedures based on extensive previous experience
-Acts as source of knowledge/expertise for VPO Chuck Ledermann in his transition to COO over the first year
-Develop and implement training programs to improve staff skills and experiences

Chief Dispensary Officer/Head Pharmacist—Brian Harvey
-Develops and improves the MinnMed formulary
-Develops and maintains the MinnMed patient experience and dispensary model
-Works with Scientific Director to drive novel medication formulations and delivery mechanisms
-Head of MinnMed intellectual property team
-Head of MinnMed dispensary team and dispensing staff education programs

Chief Compliance Officer—Ross Hussey JD
-Provide in-house legal counsel for MinnMed
-Ensure compliance with all state regulations

Chief Medical Officer—Laura Bultman MD
-Develop and vet quality medical cannabis educational materials for physicians, professionals and patients
-Act as clinical research director
-Keep executive team abreast of latest scientific research and breakthroughs

Chief Technology Officer—Chuck Ledermann
-Develop and maintain all technological solutions throughout the company
-Assist in data gathering and patient feedback

Vice President of Operations—Check Ledermann
-Transition to full COO over the first year under the direction of Brooke Gehring
-Eventual generalist COO for MinnMed with substantial roles in all operations
-Initial focus on patient-directed initiatives and systems throughout MinnMed

Vice President of Operations, Manufacturing—Greg Goldston
-Assist in all manufacturing and extraction operations based on substantial previous experience

Vice President of Operations, Greenhouse
-Assist with construction, systems and flow in the new greenhouse cultivation facility
-Work with ACC to optimize True Living Organics cultivation in the greenhouse setting

Head Cultivator—Joe Schaffer
-Lead cultivation team
-Directs all cultivation systems
-Cultivation staff training and oversight
-Facility maintenance and expansion director

Director of Security—Ron Owen
-Develop security systems for cultivation facility, transportation and dispensaries
-Oversight of security technology systems
-Hiring and oversight of security staff and contactors

Community Outreach Director—Mekea Duffy
-Acts as community liaison for all MinnMed outreach
-Interfaces with Minnesota CannaCare
-Directs the MinnMed community plan

Finance and Banking Advisor—Amber Shimpa
-Provide high-level financial guidance
-Provide assistant with patient payment solutions

Product Integrity Advisory—Sean Leighton
-Provides input informing MinnMed sustainability initiatives
-Informs Scientific Advisory Board of new environmental research opportunities

Lab and Extraction Staff
-Assist with processing, testing, extracting separating and packaging of medical cannabis products

Dispensary Staff
-Pharmacists and pharmacy technicians or other staff
-Patient care consultants
-Distribution of cannabis-based medicines to registered, eligible patients

Cultivation Staff
-Day-to-day cultivation operations
-Day-to-day plant and facility maintenance

Security Staff
-Provide security for manufacturing and dispensing facilities

Consultants and Other Advisors:

Organic Cultivation Consultant—American Cannabis Company
-Provides skill set to implement clean, organic medical cannabis in a greenhouse setting
-Ongoing expertise for pest control, trouble shooting

Cultivation Advisors—Dan Totushek and Jerry Quall of Dan and Jerry's Greenhouses
-Advisors for cold-weather greenhouse cultivation
-Assistance with nutrients, greenhouse processes and flow
-Critical involvement in expansion of greenhouse facilities

Cultivation Advisors—Aaron Peterson and Mitch Michaelson of Peterson Farms
-Clean, sustainable production oversight based on food industry experience
-Assist with the development of new greenhouse facilities

Manufacturing and Lab Partner—United Science Corporation
-Leases or builds laboratory and separation or extraction equipment
-Provides consultative expertise in the separation sciences, manufacturing processes and quality

Education Partner—Clover Leaf University
-Exclusive educational contract with MinnMed in Minnesota
-Provides robust educational systems on day one for MinnMed

3. The resumes of each person listed on the organizational chart setting out the employee's particular skills, education, experience or significant accomplishments that are relevant to the position.

*Please see the attached resumes.

Laura Bultman, MD

[redacted]

PROFESSIONAL PROFILE

Laura began her career in medicine by completing Emergency Medicine residency training at Hennepin County Medical Center. During an extended training fellowship, she focused on Emergency Medical Services, research, and paramedic education. In academic settings, she embraced the importance of education and training at the heart of practicing medicine as both an art and science.

She has practiced medicine in multiple settings, from small community hospital to busy urban academic center, which provided exposure to a spectrum of patient experiences. The emergency department environment highlights the diverse needs of patients with regards to pain control and substance use, and contributed to her interest in alternative symptom management such as medical cannabis.

More recently, she took her years of clinical experience and problem-solving skills into consulting, specializing in healthcare technology to impact clinical quality, patient safety and satisfaction in struggling healthcare systems.

At Minnesota Medical Solutions, her background in molecular biology will be leveraged to promote understanding of the evolving research field regarding cannabis modulates normal physiology. She will direct collection of patient data aimed toward long-term research goals. With an understanding of educational needs, she will also develop educational materials for both providers and patients.

CORE COMPETENCIES

- Licensed, board-certified physician with research background
- Leverage of technology to promote healthcare information collection
- Leadership and project management experience
- Clinical documentation quality improvement including ICD-10
- Clinical informaticist regarding clinical adoption of EHR suites
- Training, adoption, and change management to enhance healthcare efficiency
- Educational experience with patients and healthcare trainees

PROFESSIONAL EXPERIENCE

Leidos Health
January 2012 – current

Principal in Professional Services Consulting. Clinicians often struggle to embrace technology, and the Clinical Adoption consulting solution is designed to educate and prepare clinicians for productive EHR use. Applying a high-level clinical leadership perspective to technologic implementations enhances change management and reduces risk by integrating the needs of providers, administrators, regulators, payors, IT staff and patients into technology design.

Clinical Emergency Departments, MN

2007 – January 2012

Allina Health Care: St. Francis Regional Medical Center, 2007 to 2012, United Hospital, 2010 to 2011, and Buffalo Hospital, 2012

- Proficient in clinical documentation and template development

Mayo Health System: Immanuel St. Joseph Mankato, 2008 to 2011

- Settings ranged from urban tertiary care to suburban Level III trauma to rural community care to a critical access hospital

Kaiser Permanente, Sacramento, CA

January 2005 – January 2007

Full-time clinical work in the emergency rooms of Sacramento and Roseville locations

Functioning as EMS liaison, designated the Medical Director of the American River College EMS program and educator for Sacramento City Fire Department and local Army Reserve Unit. Successes included the rollout of the City's first pre-hospital 12-lead EKG program and county-wide protocols for pre-hospital STEMI activation.

Served on the Sacramento County EMS council

During large-scale Epic implementation in 2006, trained as super-user and peer training leader

Hennepin County Medical Center, Minneapolis, MN

January 2001 – January 2005

Beginning with residency, from 2001 to 2004, training through 2005 with an EMS fellowship, and continued association in 2011 and 2012 as guest lecturer for the paramedic certification program

During fellowship, served as attending physician in the HCMC emergency room as well as the Fairview Health Services Riverside and University Campuses

Academic pursuits included research publications, student and resident classroom training and research assistance for paramedic candidates at the Inver Hills Community College

Completed the Medical Directors course with NAESMP and presented research abstracts

Obtained ACLS instructor certification to teach training courses through HCMC

Through EMS associations, research was also undertaken through the TASER Corporation in Scottsdale, Arizona as a medical consultant

CREDENTIALS

- Current medical licensure in Minnesota, California, and Wisconsin
- Current board certification in Emergency Medicine
- AHIMA Clinical Documentation Improvement Practitioner
- AMIA Clinical Informatics Course Certificate
- Medical Doctorate, cum laude, University of Missouri-Columbia
- Bachelor of Arts, Biochemistry and Molecular Biology cum laude, Washington University-St. Louis

PUBLICATIONS

Kyle Kingsley MD, Aaron Thompson, Emily O'Brien, Laura Bultman MD (Editor), Jaime Loso (Editor). The Ultimate Medical Scribe Handbook: Emergency Department Edition. Kindle eBook; 3rd Edition (February 15, 2013)

Ho , JD, Dawes, DM, Bultman, LL, Moscati, R, Skinner, L, Bahr, J, Reardon, R, Johnson, M, and Miner, J. 2007. Acad Emerg Med. 2007 May ;14 (5 Suppl 1):S63 17463939 Physiologic effects of prolonged cnducted electrical weapon discharge on acidotic adults

Moscati, R, Ho, JD, Dawes, DM, Miner, J, Reardon, R, Heegaard WG, Johnson, M, and Bultman, LL. 2007. Physiologic effects of prolonged conducted electrical weapon discharge on intoxicated adults. Acad Emerg Med. 2007 May;14 (5 Suppl 1):S63-4 17463938

Ho, JD, Dawes DM, Bultman LL, Thacker JL, Skinner LD, Bahr JM, Johnson MA, and Miner JR. 2007. Respiratory Effect of Prolonged Electrical Weapon Application on Human Volunteers. Academic Emergency Medicine 10.1197/j.aem.2006.11.016

Ho, JD, Miner, JR, Lakireddy DR, Bultman LL, and Heegaard WG. 2006. Cardiovascular and Physiologic Effects of Conducted Electrical Weapon Discharge in Resting Adults. Academic Emergency Medicine 13:589-595

Bultman, L, Mahoney B, and Fringer RC. Effectiveness of prehospital continuous positive airway pressure in treating adult respiratory distress. Abstract presented at 2005 ACEP conference.

Bultman, L and Hick, J. Does START Triage Correspond to ED acuity? Abstract presented at 2005 SAEM Conference

Bultman, L, Ho, JD, and Page, D. Buckle up! EMS Seat Belt Use and Undesignated Patients: Where do they go and why? Abstracts presented at 2005 NAEMSP

Ho, J.D., Lindquist, M., Bultman, L., and Torstenson, C. 2003. Apathy is not welcome here (editorial). Prehospital Emergency Care 7:414-6.

Khalkhali-Ellis, Z., E.A. Seftor, D.R.C. Nieva, R.E.B. Seftor, H.A.M. Samaha, L. Bultman, J.E. DeLarco, A. Ince, T.L. Moore, and M.J.C. Hendrix. 1997. Induction of invasive and degradative phenotype in normal synovial fibroblasts exposed to synovial fluid from patients with juvenile rheumatoid arthritis: role of mononuclear cell population. J. Rheumatol. 24:2451-60

Kirschmann, D.A., E.A. Seftor, D.R.C. Nieva, L.L. Bultman, R.F. Ashman and M.J.C. Hendrix. 1997. Induction of synovial fibroblast-mediated cartilage invasion by synovial T cell culture supernatants. J. Allergy Clin. Immun. 99:A779

References on Request

MEKEA DUFFY
[redacted]

Experience:

Private Tutor, ages 6-11, 2010-2014
Used a variety of techniques, including Orton Gilllingham, to prepare and teach weekly lessons to students in need of remediation.

THE BLAKE SCHOOL, Wayzata, Minnesota
2nd Grade Assistant TA, ages 7-8, 2009
Supported the classroom teacher by leading small groups in literacy and math instruction.
Substitute Teacher, ages 5-12, 2009-2010

RODEPH SHOLOM SCHOOL, New York City
Learning Specialist, ages 7-10, 2006
Conducted literacy assessments and used results to determine learning needs. Planned for and led daily reading groups. Prepared and supervised stations using a Readers and Writers workshop model. Regularly communicated with parents and classroom teachers regarding student progress. Worked with classroom teachers to guide and enhance literacy curriculum.
Head Classroom Teacher, ages 6-8, 2001-2006
Prepared, taught and evaluated all literacy, math and social studies curriculum. Designed literacy curriculum around a Readers and Writers workshop model. Supervised assistant teacher. Collaborated with a team of classroom and specialist teachers. Performed both formal and informal assessments to guide instruction. Engaged in daily dialogue with parents. Implemented a consistent and effective classroom management technique.

MARQUETTE ELEMENTARY SCHOOL, Madison, Wisconsin
Student Teacher, ages 9-10, 2000-2001

ROYAL OAKS ELEMENTARY SCHOOL, Sun Prairie, Wisconsin
Student Teacher, ages 8-9, 2000

COUNTRY VIEW ELEMENTARY SCHOOL, Verona, Wisconsin
Student Teacher, ages 6-8, 1999

Education:

BANK STREET COLLEGE OF EDUCATION, New York City
M.S. in Education, Reading and Literacy Specialty,2005

UNIVERSITY OF WISCONSIN-MADISON, Madison, Wisconsin
B.S. in Elementary Education, Minor in Communication Arts, 2000

Provisional Certification, New York City
Full-time License (1-6), State of Minnesota
Volunteer Work:

Community Involvement:

COLLEGE POSSIBLE
Mentor, 2013-2014
Helped make college admission and success possible for a low-income senior in high school using a year-long intensive coaching and support curriculum.

CHILDREN'S DEFENSE FUND OF MINNESOTA
Beat The Odds Scholarship Selection Committee, 2011-2014
Reviewed applications from seniors in high school that have overcome difficult odds. Worked with a panel to determine three students to receive a CDF scholarship.

Lake Harriet Community School, 2012-2014
Worked with the PTA to develop and facilitate fundraising efforts. Acted as a liason between the teacher and the parents by communicating and organizing important information and events.

BROOKE E GEHRING

SELF-MOTIVATED AND GOAL ORIENTED PROFESSIONAL DESIRING ADVANCEMENT IN MEDICAL CANNABIS CAREER, OFFERING 14 YEARS COMBINED EXPERIENCE IN COMPLIANCE, CONSULTING, MARKETING AND SALES, PROVEN TRACK RECORD OF SUCCESS WORKING IN FAST PACED, HIGHLY REGULATED ENVIRONMENTS DEMANDING STRONG ORGANIZATIONAL, ANALYTICAL, COMPLIANCE AND COMMUNICATION SKILLS. EXTREMELY DETAILED ORIENTED AND CONFIDENT IN PROFESSIONAL INTERACTIONS AT ALL LEVELS

OBJECTIVE

- To contribute to the Minnesota Medical Solutions team by offering my professional, medical cannabis industry experience and over 11 years of direct compliance implementation experience in regulated industries on a local, state, and federal level

SUMMARY OF QUALIFICATIONS

- Advanced proficiency in computer applications systems- MS Office Suite (Power Point, Excel, Word, Outlook), Windows XP and Vista, Point, Encompass, DO/DU AFS/Host, RIMS, ADILAS, METRC
- Superior organizational and analytical practices
- Strong communication, interpersonal, and assertive sales techniques
- Sound time management and writing ability
- Team oriented and results driven with the ability to work independently
- Engaging professional training delivery and precise attention to detail

WORK EXPERIENCE

July 2011 - Present **Colorado 7 Investment LLC** **Denver, CO**

Owner/Member/Manager

- Chief Executive Officer responsible for the oversight and management of the day to day operations, compliance practices, and implementation of the organization's policies and procedures, co-managing and leading the Board and Executive team to navigate through the complex regulatory and licensing requirements while working closely with the state and local licensing authorities, holding 32 primary MMC/RMS licenses and OPC/RMCF licenses in 3 municipalities across Denver and Jefferson Counties, Chairman of the Executive Board of the Marijuana Industry Group (MIG), Founding Board Member of the Council for Responsible Cannabis Regulation (CRCR), Sustaining Member of NCIA, Founding Funder of Women GROW, Former Executive Board Member of CBA

November 2009 - Present **Live Green Consulting LLC** **Denver, CO**

Owner/Member/Manager

- Consulting medical marijuana entrepreneurs on the current Colorado MMJ city and state Regulations, offering compliance solutions and licensing assistance, business concept development, and marketing/PR for dispensary owners and commercial growers, assisting in the real estate placement for properly zoned retail and industrial locations, creating a professional resource and referral network while building personal and trusting relationships with clients, professionals, and city officials to promote the growth and success of the businesses that support the MMJ Industry

November 2008 – October 2009 **Bank of the West** **Denver, CO**

Special Assets Analyst

- Central project manager and support role analyst for the Commercial Banking unit encompassing high risk credit borrowers totaling over $800 million in real estate, assets and collateral throughout the Rocky Mountain and Midwestern region, evaluation of property through residential, commercial, and environmental appraisal review, assist in protecting bank's position as the first lien holder through loan modification and extensions, understanding of O&E reports, UCC Filings, and assessment of property taxes and state tax sales, process installment loan, lease, and invoices collected from payments and recoveries, working relationships with title, RE, and insurance companies, tax assessors, property managers, lawyers, and court ordered receiverships, extensive mathematical skills, including compilation of statistics and balancing of figures, ability to independently format financial reports, presentations, spreadsheets, and graphics, implement and manage both routine and long-term projects

August 2005 – October 2008 **1st Nations Mortgage Corporation** **Louisville, CO**

Director of Compliance

- Responsible for the implementation of internal controls and compliance procedures, coordinated operational activities and strategic planning for business growth and development, interviewed, hired, administered the set up of over 500 senior mortgage professionals and branch managers nationwide, conducted background checks and reference verifications for evaluation of all applicants to determine employment status, directly monitored all state and federal regulatory laws for audit purposes, extensive review of over $250 million in annual loan volume for audit preparatory purposes, coordinated legal loan documents, managed informational website updates and online payroll system, compiled QC Plan and employee contracts, established relationships with over 300 lenders and financial institutions, active licensed CO mortgage broker that originated over $10 million in conforming loans

Mortgage Consultant

- Provided a high level of professionalism while analyzing borrower's financial situation to determine which lender is the best fit for the borrower's mortgage loan needs, gather and submit information for lenders while verifying appropriate documentation, data entry for the processing of the mortgage loan, utilized self-marketing tactics, lead generation and cold-calling as methods to grow new business, professional ability to complete the entire cycle of the mortgage sale transaction

April 2004 – August 2005 **Raindance Communications** **Louisville, CO**

Implementation Consultant

- Apart of the Consultative B2B Sales Team that trained Fortune 500 customer's implementation teams, trainers and end users on Raindance's various software conferencing platforms and services, and performed internal training for new Raindance employees and clients, Offered event consulting to manage customer's marketing, training, and internal communication events, providing a highly professional image. Followed detailed timelines to ensure no aspect or detail of event is overlooked. Created customer-centric curriculum and event project management design and development to manage certification testing programs of employees, partners and clients on Raindance's conferencing solutions.

Product Specialist

- Introduced new technology solutions by educating, entertaining, and exciting consumers through performing presentations and workshops, targeting both prospects and existing customers while increasing visibility and value in Raindance products and services

January 2004 -May 2004 **Madison House Publicity** **Boulder, CO**

Intern

- Exposure to musical touring acts and the administrative practices involved in a successful tour and

relationship with the artists, manage press databases, press releases, promoter updates, press kits, while working closely amongst reputable publicists, responsible for the publish and release of the quarterly corporate newsletter

October 1997 – January 2002 **Abercrombie & Fitch** **Columbus, OH**

Corporate Brand Representative

- Offered quality customer service, maintained excellent store organization, assisted in ground up set up of new retail store locations, ability to handle seasonal demands, demonstrated high quality sales performance, motivated member of solid team effort to reach company's financial and economic goals

EDUCATION

May 2003 **Miami University** **Oxford, OH**

- *Bachelor of Arts in Organizational Communications*

November 2004 **Sales Performance International - Solution Selling** **Westminster, CO**

- *Certification of completed sales workshop resulting in the knowledge of a consultative sales methodology supported by a proven process-oriented sales training program*

Gregory Goldston

CORE COMPETENCIES

I have 21 years of business experience in the private sector developing and directing successful companies. I take a detail oriented, creative, and innovative approach to managing challenges and producing effective results.

- Business managerial experience
- Leadership qualities
- Positive work ethic
- Goal-oriented
- Ability to navigate diverse and complicated problems

PROFESSIONAL EXPERIENCE

National Valuation Company, Miami, Florida
Owner ***1993-2001***

- Owner of the largest real estate appraisal company serving Dade, Broward, Palm Beach, Monroe, and St. Lucie Counties. Managed and directed staff of 27 employees.

Goldston Real Estate Development Company, Ft. Lauderdale, Florida
Founder & Owner ***1997-2006***

- Built 158 residential units throughout Florida. Developed townhouses in Ft. Lauderdale, Mid-Level condo buildings on the intra coastal waterway, and 16 luxury townhouses in Key West Florida.

US Equities Opportunity Fund
Investor **2006-2008**

- Active international equities market investor

Options Medical Center
Founder & Owner ***2009-Present***

- Developed Options Medical Center which encompasses two medical and recreational retail facilities with gross sales exceeding $6.5M in 2014, 1Million watts of indoor grow under 70,000 square feet. Developed Boulder Organic Food Group, LLC, a CO2 cannabis oil processing company for cannabis e-cigarette vaporizers. Active on state regulatory program development through membership with NCIA (National Cannabis Industry Association) and Colorado based industry political action group—MIG (Marijuana Industry Group). Currently manage and direct 47 employees.

EDUCATION

- **1992- BBA- University of Cincinnati, OH. Real Estate and Finance**

PERSONAL

- **Married to Eliza Goldston for 13 years with two children. Eliza was my physical therapist and we met in South Florida. Ashley is my 10 year old daughter going into the 5th grade and Nick is my 4 year old son going into a Pre-K program this fall.**

R. Brian Harvey, RPh

OBJECTIVE

It is my desire to partner with a dynamic organization that will utilize my blend of a Pharmacy education and technology skills with my experience in a progressive clinical setting. In addition, I would insist that this organization allow me the opportunity to work at my maximum ability so that I realize my full potential and the organization can reap the benefits of my efforts.

SUMMARY

Brian Harvey has nearly 20 years of experience in healthcare and Pharmacy Informatics. Mr. Harvey possesses an unsurpassed knowledge of the Epic Willow (Inpatient Pharmacy) and Epic Beacon (Oncology) application. Mr. Harvey's primary drive in his healthcare endeavors is to increase the safety and efficacy of medication therapy through implementation of Best Practices and incorporation of Evidence Based Medicine into Electronic Medical Record (EMR) projects. With additional certifications in Epic's Phoenix Transplant and Epic's Beacon Oncology modules, Mr. Harvey is positioned to incorporate his deep knowledge of Pharmacy Informatics into these medication-therapy intense specialty applications. Never known to back away from a challenge, Mr. Harvey excels at developing and executing creative solutions to complex problems, while maintaining the foresight to understand the needs of collateral stakeholders and their downstream dependencies.

EXPERTISE

Epic Implementation, Upgrades and Optimization

- *Design, build and testing experience in the following key areas in Epic applications:*
  - *Medication build.*
  - *Order set, Smart Sets, and Beacon Protocol build and testing.*
  - *Build and Optimization of Medication Delivery and Distribution.*
  - *Clinical Decision Support.*
  - *Best Practice Alerts, Clinical/Formulary Alternative Alerts.*
  - *Compounding and Repackaging.*
- *Replicated and optimized legacy clinical monitoring tools and reports for use in Epic.*
- *Extensive experience with Chronicles searches, extracts, and imports.*
- *Installed and tested quarterly/monthly data loads from vendors Medispan and First Data Bank.*
- *Represented the Epic Willow Implementation Teams in a variety of change control process design.*
- *Implementation, Support, and Optimization experience with Epic versions beginning with Fall 2004..*
- *Upgraded Epic from older versions to Spring 2007, 2008, and 2009.*

Epic Certification and Proficiencies

- *Epic Willow (EpicRx)* - NVT 2014.
- *Epic Phoenix Transplant.* - NVT 2014.
- *Epic Beacon Oncology.* - NVT 2014.
- *Epic Inpatient Medication Orders. - Current*

Past Positions

Lead Pharmacist / Staff Pharmacist / Clinical Pharmacist

EXPERIENCE

Rx Informatics Consulting - Owner
Epic Beacon Oncology Analyst *- Premier Multi-facility Academic Medical Center and Research Leader,* **Boston, MA**
Epic Beacon Oncology Analyst *- Multi-facility Metropolitan Healthcare Organization,* **Chicagoland Area**
Epic Willow Analyst / OrderSet Analyst *- Large Academic Medical Center,* **San Francisco, CA**

Beacon Partners – Senior Consultant
Epic Clinical Decision Support - OrderSet Analyst *- Large Multi-facility Metropolitan Healthcare Organization,* **Twin Cities, MN**
Epic Willow/Epic Beacon Oncology Analyst – *Large Academic Medical Center****,*** **Burlington, VT**
Epic Willow Analyst – *Medium Multi-facility Metropolitan Healthcare Organization,* **Dayton, OH**

Allina Hospitals and Clinics
Clinical Decision Support Analyst/Epic Willow Analyst, **Minneapolis, MN**
Staff Pharmacist, **Coon Rapid, MN**

Fairview Southdale Hospital
Staff Pharmacist, **Edina, MN**

William's Pharmacy
Staff Pharmacist, **Ladue, MO**

Walgreen's
Staff Pharmacist, **St Louis, MO**
Pharmacy Intern**, St Louis, MO**

EDUCATION

St. Louis College of Pharmacy *St. Louis, MO* *1990 – 1995*
Bachelor of Science in Pharmacy – course work included: General Chemistry (with lab), Organic Chemistry (with lab), Biochemistry (with lab), Medicinal Chemistry, General Biology (with lab), Anatomy and Physiology (with lab), Microbiology (with lab), Pharmacology, Pharmacokinetics, Pathology, Business Management, Pharmacy Law incorporated into a liberal arts education.

Naperville Central High School *Naperville, IL* *1986 – 1990*
High School Diploma

INVENTIONS

Patent Pending:
"AEIOU" oral/sublingual medication device with precision dose delivery
Medical Cannabis Vaporizer with computerized precision dose delivery, usage tracking, and symptom tracking.

LICENSURE HELD

State of Minnesota
Registered Pharmacist – Active and in Good Standing since September 2000; License Number – 117102-2

ROSS M. HUSSEY

QUALIFICATIONS

Skilled attorney with a broad range of experience in various areas of law, including: business law, litigation, contract disputes, contract formation, and transactional work. Possess exceptional verbal and written communication skills. Proven self-starter with an ability to learn quickly who thrives in high pressure situations.

LEGAL AND BUSINESS EXPERIENCE

***Attorney,* Udoibok, & Hussey, PLLP, (formally Udoibok, Tupa & Hussey, PLLP)** September 2011- Present
- Founding partner of law firm with a practice focus business law and litigation.
- Frequently advise business clients concerning risk management, employment issues, insurance coverage and business transactions.
- Extensive litigation experience representing both plaintiffs and defendants in state and federal court.
- Frequently draft and negotiate transactional agreements on behalf of business clients.
- Responsible for acquiring clients, managing staff and working cases from inception to completion.

***Attorney,* Hussey Legal, LLC,** 2007- September 2011
- Founder and sole proprietor of law firm that focused on business law and civil litigation, as well as criminal law.

Key legal accomplishments include:
- Obtaining a substantial judgment after a five day binding arbitration hearing regarding a contract dispute on behalf of an international manufacturing corporation.
- Obtaining dismissals of employment discrimination claims against the owners of a car dealership and upholding the result before the Minnesota Court of Appeals. The resulting case law set the standard for aiding abetting discrimination in Minnesota.
- Successfully representing local manufacturing clients in a number of legal matters and disputes.
- Annually committing over 100 hours of work to low-income and pro bono clients.

***Vice President of Sales*, *In-House Counsel,* J.P. Hussey & Associates, Inc.**, Minneapolis, MN, 2005–2007
- Legal counsel and sales manager for sales and marketing firm specializing in the fine jewelry industry.
- Advised and negotiated the acquisitions of new manufacturing and retail clients.
- Directly contributed to largest percentage of sales increases in company's history.

***Law Clerk*, Yost & Baill, LLP**, Minneapolis, MN, January – September 2004
- Conducted research for litigation and subrogation cases concerning personal injury and property damage.
- Drafted complaints, interrogatories, discovery requests, motions and other litigation documents.

***Law Clerk*, Clegg Manuel Solicitors**, London, England, June – August 2003
- Drafted documents and conducted research dealing with the conveyance of commercial properties in the London area.

***Law Clerk*, Hennepin County Attorney's Office**, Minneapolis, MN, 2001–2002
- Conducted research for criminal cases and appeared at trial calendar on behalf of absent attorneys.
- Frequently met with judges in chambers and attended numerous hearings and trials.

EDUCATION

***Juris Doctor,* William Mitchell College of Law**, St. Paul, MN, 2002–2005
***Bachelor of Arts, Political Science,* Gustavus Adolphus College**, St. Peter, MN, 1997–2001

BAR ADMISSIONS & ASSOCIATIONS

- Minnesota State Court, 2006
- U.S. District Court, District of Minnesota, 2007
- Minnesota State Bar Association, 2005 – Present
- Hennepin County Bar Association 2005 – Present
- Volunteer Lawyers Network, 2007 – Present
- Super Lawyers *Rising Star,* 2013, 2014
- Mock Trial Coach, Breck School, 2011- Present

Curriculum Vitae

Kyle Kingsley MD

[redacted]

[redacted]

EDUCATION AND TRAINING

1994-1999	BS Biochemistry, Magna Cum Laude	University of Minnesota, Duluth
1994-1999	BA German, Summa Cum Laude	University of Minnesota, Duluth
1999-2003	Medical Doctor	University of Minnesota, Twin Cities
2003-2006	Emergency Medicine Residency	Hennepin County Medical Center

SKILLS

Board certified in emergency medicine (ABEM # 38949). Extensive experience with adult and pediatric emergency medicine.

Extensive knowledge and background with electronic medical records, physician scribe services, and employee training, having founded Clinical Scribes LLC in 2007.

Broad company start up experience with Clinical Scribes LLC, Medical Scribe Trainings Systems LLC and MedMacros LLC.

Long-standing interest in pharmacognosy, horticulture and botany. Recent small-scale hops operation started this spring in SE Minnesota, with goal to scale to viability given the robust local brewery scene and demand for locally sourced hops in Minnesota.

CURRENT EMPLOYMENT

Emergency Medicine Physician Suburban Emergency Associates
Aug 2006 – Current
Full time employment as an emergency physician with extensive adult and pediatric emergency medicine exposure in a suburban emergency department.

Employer Contact

Manuel Roman MD
Work: 952 428 2200

CURRENT PROJECTS

CEO, Minnesota Medical Solutions LLC Currently working full time on development of our team of healthcare professionals, scientists, and other community members to create the most patient-centered and safest plan for the production of medical cannabis in the state of Minnesota. Currently working on full-scale implementation plan for Dec. 1.

President and Founder, Clinical Scribes LLC Provides, trains, and manages scribes for physicians in the ED, UC, inpatient and clinical settings. Undergoing significant expansion in Minnesota and Colorado. Currently approximately 50 full and part time employees.

Medical Director and Founder, Medical Scribe Training Systems LLC Offshoot of Clinical Scribes LLC, provides online training for scribes in other states and for other medical scribe companies. Currently a DBA of Clinical Scribes LLC. This company has rapidly expanded over the few years and will become an independent entity in Jan of 2015.

Medical Cannabis—A Primer for Health Care Professionals Co-author of this concise text which will become a mainstay of Minnesota Medical Solutions physician education outreach. We hope that this book will become the standard book used in medical schools and other medical professional training programs. Currently working on the second edition of this book.

Owner, 2K Health LLC Building a state-of –the-art, energy efficient greenhouse for the production of environmentally sustainable medical cannabis. This company will continue to seek sound solutions to drive down the environmental and financial cost of producing cannabis-based medicines for our patients.

Co-Inventor, Medical Cannabis Vaporizer with robust capabilities including memory, test dose and adjustable dose capabilities. Provisional patent pending at this time. Hope to pursue large scale production of this vaporizer with Minnesota Medical Solutions.

Co-Inventor, AEIOU Cannabis Delivry Device A novel device designed for more effective delivery of sublingual and intraoral or buccal cannabis-based medicine formulations to pediatric and disabled patients. Production and distribution of this device will be pursued by Minnesota Medical Solutions LLC. Currently a provisional patent is pending.

Inventor, MigraineBox MigraineBox ™ is a natural headache treatment device. Multiple patents pending at this time.

Founder, MedMacros LLC Provider of major documentation efficiency tools for use with almost any specialty in nearly any EMR.

SCIENTIFIC PUBLICATIONS, PRESENTATIONS

"**Induction of carbamoyl phosphate synthetase III and glutamine synthetase mRNA during confinement stress in gulf toadfish (Opsanus beta)** *The Journal of Experimental Biology; 2000 January; 203 (Pt 2): 311-20*

"Acupressure for the Treatment of Benign Headaches in the Emergency Department" Oral Paper Presentation, Society for Academic Emergency Medicine Annual Meeting, 2015

Chuck Ledermann

Professional Profile

A results-driven professional with over 25 years operational experience leading teams and implementing innovative business solutions. Chuck possesses a passion to deliver information technology solutions which enable business strategy and enhance customer experience. A hands-on leader with the ability to both set and drive departmental goals. Chuck is an effective team builder with proven experience leading day to day operational and technology teams.

Areas of Expertise

Operational efficiency	Agile Project Management – Certified ScrumMaster
Vendor management	Java/J2EE application development manager
Budget management	Web Operations and Infrastructure management
Staff development and management	Application development best practices and standards
HealthCare & Retail Industry	Web applications and technology architecture
Web design and usability	Collaboration best practices
Data Security practices	Quality Assurance and Performance Testing

Highlight of Career Achievements

- Providing Operations and Information Technology Leadership as a member of the Board of Directors and the Operations and Planning Committee for HIRED a nationally recognized leader in workforce development serving more than 10,000 people annually.

- Provided leadership for the creation and staffing of a new HealthPartners Regional Technology Center office in Duluth for the web team supporting the HealthPartners.com suite of websites. This regional technology center now provides primary Web Operations Management for over 750,000 portal users.

- Providing Leadership to the HealthPartners Web Operations Management team. This 14 person team is responsible for the 24/7 production support and application development breakfix for over 100 applications and 750,000 registered users and 3 customer support centers. Additional responsibilities include infrastructure support, performance management and hardware/software lifecycle and patching management for the web hosting environment.

- Provided Leadership and Management for three complete website redesign projects for HealthPartners.com since 2001. These projects incorporated website design, branding and usability testing, implemented by a team of 25+ development, testing and project management staff.

- Providing leadership for the development of the new HealthPartners Intranet site used by the 20,000 HealthPartners employees. Lead a team to design and implement the MyPartner site with a focus on usability and personalization. Was responsible for the implementation, performance tuning and content migration of the new Oracle WebCenter software platform.

- Provided leadership to the HealthPartners Web Applications team. Lead the recruitment, staffing and day to day management of a new J2EE practice, transforming a group of non-java developers into a mature high performing J2EE web development team utilizing best practices in J2EE architecture and technologies such as Agile, Spring, Struts, HTML5, ESB, Drools, TerraCotta, WebLogic Server, Oracle WebCenter Content Management, SOA and Web Services within an Agile environment.

Chuck Ledermann

- Provided Technical Infrastructure Leadership for the architecture and implementation of a high availability web hosting environment for the suite of HealthPartners websites. This hosting environment contains redundant Network, F5 Big IP, ASM Web Application Firewall, SSL accelerators, Firewalls, Apache proxy servers, Oracle WebLogic Clustered servers and Oracle RAC Cluster databases including secure PCI zone and application performance management solutions.

- Provided comprehensive Program Management and business analysis to Arcadia Financial Ltd. for the implementation of a Recovery Management System replacement project. Delivering business needs assessment, cost benefit analysis, RFP solicitation, vendor selection, and executive steering committee presentations.

- Provided comprehensive Project Management to Target Corporation for the implementation of their first store sales data warehousing solution. Developing an integrated, multichannel analytics and marketing solution.

Chuck Ledermann

Career Progression

HIRED Minneapolis, MN *2014 – Present*
Board of Directors

Member of the Board of Directors and Operations and Planning Committees.

HealthPartners Bloomington, MN *2007 – Present*
Manager, Applications Operations Management

Providing management and leadership to a team of Java/J2EE developers, performance management and production support staff for the HealthPartners family of websites. Responsibilities include Operations and Production environment management, 24/7 production support, security assessments, PCI and HIPAA compliance, Disaster Recovery, Vendor Management, and budgets in excess of 5 million dollars.

The HealthPartners.com website contain 6 Web Portals in a high-availability Oracle WebLogic Cluster connecting to Oracle RAC databases, ESB and Web Services. The Linux and Windows Servers ride upon a fully redundant network infrastructure within a primary and secondary Data Center to provide both high availability and disaster recovery. The Web Portals are an integration of in-house developed applications and vended solutions enabling the members to perform over 45 self service capabilities in a 24/7 secured HIPAA and PCI compliant environment supporting over 750,000 registered users.

HealthPartners Bloomington, MN *2000 – 2007*
Manager, IT/Web Applications

Provided management and leadership to both a team of 25 Java/J2EE development resources and a web infrastructure and operations support staff for the HealthPartners.com websites. Chuck successfully managed the implementation of over 100 web projects for the HealthPartners.com family of websites. Responsible for managing a full complement of staff and contractors including: Project Managers, Business Analysts, Java/J2EE and Frontend Developers, Quality Analyst and Content Management staff. Additionally managed the Oracle WebLogic middleware infrastructure team.

Gold Star Computer Group, Inc. Plymouth, MN *1997 - 2000*
Consultant

Provided management consulting, project management and technical services to Target Corporation and Arcadia Financial specializing in Data Warehousing, Credit Marketing and Collections systems.

Diversified Pharmaceutical Services Bloomington, MN *1993 - 1997*
Sr. Programmer Analyst / Applications Architect

Performed Applications Architect and Team Lead responsibilities for the development of Rules Based drug formulary management and claims processing systems.

Fingerhut Corporation Minnetonka, MN *1991 - 1993*
Programmer Analyst II

Chuck Ledermann

Software Architects, Inc. Minneapolis, MN *1990 - 1991*
MIS Consultant

Green Thumb Nursery Alexandria, MN *1989 - 1990*
Irrigation Manager.

Responsibilities included: Sales, Design and Installation of residential and commercial irrigation systems. Was responsible for the management of irrigation staff, inventory, billing and quality controls.

Education

Alexandria Tech, Alexandria, MN *Degree Received 1990*
Collegiate Activities
President, DPMA (Data Processing Management Association)
Member, Phi Theta Kappa (National Honor Fraternity)
Director's List (Academic Gradepoint)
Member, BPA (Business Professionals of America)
2nd Place BPA National Leadership Conference – Prepared Verbal Communications
1st Place BPA State Leadership Conference – Prepared Verbal Communications

Sean J. Leighton

[redacted]

WORK EXPERIENCE

The Coca-Cola Company, Central & Southern Europe Business Unit *October 2012 – Current*
Director of Quality, Safety & Environmental
- Successfully led team through business unit audit process (June 23-27, 2014) with 3 minor findings and final results of pass
- Provide quality, safety and environmental governance of 50+ manufacturing facilities in 23 countries
- Responsible for establishing a step change in the quality culture across the business unit
- Lead business unit through regulatory challenges involving nutritional claims, environmental claims, functional claims
- Authorize and approve new quality standards for business unit and bottler
- Develop models for HACCP calibration, natural ingredient stability, product age management, and an ingredient safety process

Coca-Cola Refreshments, Quality, Health, Safety & Environmental *August 2011 – October 2012*
Director of Contract Manufacture Quality & Food Safety
- Managed a team of 7 regional technical managers overseeing the food safety, quality and environmental standards of 41 contract manufacturing facilities (juices, teas, snack bars, frozen novelties, premix powders, coffee, smoothies) in North America
- Responsible for assessing food safety risk and making critical, finished product disposition decisions
- Led operational excellence/continuous improvement efforts involving contract manufacturing facilities

The Coca-Cola Company, Global Quality & Product Integrity *November 2010 – August 2011*
Director of Strategic Business Initiatives & Executive Assistance to Chief Quality Officer
- Responsible for >$50 million budget including rolling monthly estimates and PO approval
- Prepared presentations, speeches, executive office memorandums for Chief Quality Officer
- Filled role of master of ceremonies (MC) for Global Food Safety Summit, managing all officers' and keynote speakers' presentations, introductions, and question/answer sessions. Responsibilities included organizing and coordinating presentations for Chief Executive Officer (M. Kent), Chief Financial Officer, and SVP of Supply Chain
- Co-developed a forward-looking prospectus on global factors impacting food safety before 2020 for CEO
- Traveled internationally, representing Coca-Cola and Global Quality in multiple strategic business sessions (GFSI, etc.)

The Coca-Cola Company, Coca-Cola North America *August 2009 – November 2010*
Microbiology Manager
- Led and managed microbiology team responsible for the microbiological food safety and regulatory affairs of CCNA
- Conducted microbial risk assessments for all new and existing juices, teas, coffees, dairy-based beverages
- Established critical control points as part of HACCP plan of all North America production facilities
- Designed, developed and executed microbial validation, qualification and troubleshooting methodologies for aseptic, retort, tunnel pasteurization, cold-fill and fountain processes as well as new process technologies
- Established, validated and authorized thermal processes to ensure microbiological quality and safety of North America portfolio
- Represented Coca-Cola on five internationally recognized food safety executive boards and committees

The Coca-Cola Company, Coca-Cola North America *December 2004 - August 2009*
Senior Microbiologist, Six Sigma Green Belt
- Functioned as CCNA's exclusive food safety subject matter expert (SME) dedicated to ensuring the microbiological safety and quality of all beverage operations in Coca-Cola North America
- Completed troubleshooting and start-up of multiple high-acid and low-acid aseptic PET filling lines
- Designed and executed food safety strategy to prevent the outgrowth of *Clostridium botulinum* in Odwalla Carrot Juice, ensuring the sustained microbiological safety of one of Odwalla's top-selling products with revenues over $8 million per year
- Successfully commercialized tunnel pasteurized, retorted and aseptic beverages

Land O' Lakes Dairy, Inc.,
Research & Development, Scientist *August 2004 – December 2004*
- Completed full development of 3 new SKU's of Land O'Lakes Butter: Butter balls, Butter with Canola Oil (inc. Unsalted Butter)
- Initiated phase I of research process into reformulated whipped butter products.

Scientist, Microbiology Team Leader *August 2001 – August 2004*
- Designed, executed, and summarized microbiological challenge/shelf life studies and microbial identifications
- Served as primary quality assurance and HACCP consultant to Land O'Lakes dairy manufacturing facilities and external customers
- Conducted line qualification and troubleshooting in all of company's butter production facilities (Kent, Carlisle, Tulare, Madison)

Quality Assurance Supervisor - Kent, Ohio Production Facility *June 2003 - September 2003*
- Supervised 10 laboratory individuals
- Introduced and implemented food safety (HACCP) concepts and programs that substantially decreased the production downtime

The Pillsbury Company, Department of Microbiology and Food Safety *May 1998 - August 1999*
Summer Intern/Lab Technician
- Executed daily AOAC-approved pathogen tests of various food samples for *Salmonella*, *E.coli* O157:H7, *Clostridium* sp., *Listeria* sp., *Campylobacter*, etc.
- Designed, executed and presented research project on thermal inactivation of *Salmonella* in Totino's Pizza Rolls, recommending a later-adopted thermal process based on a 12-D kill of *Salmonella*
- Completed HACCP certification training/workshop

EDUCATION

Emory University *December 2007 - May 2009*
Degree: Master of Business Administration, Goizueta Business School
Emphasis in business management including courses in Managerial Decision Making, Management Strategy, Managerial Finance, Managerial Accounting and Control, and Organizational Behavior and Leadership.

University of Minnesota-Twin Cities *August 1999 - May 2001*
Degree: Master of Science, Food Science and Nutrition
Research assistant and teaching assistant (Dr. Frank Busta and Dr. Linda Brady)

University of Wisconsin-Madison *August 1995 - May 1999*
Degree: Bachelor of Science, Bacteriology – Dean's List
Undergraduate research assistant and teaching assistant

PUBLICATIONS
1) Varcoe, J., Zook, C., Sui, J., **Leighton, S**., Busta, F. & Brady, L.
"Variable response to exogenous *Lactobacillus acidophilus* NCFM® consumed in different delivery vehicles". *Journal of Applied Microbiology* **93** (5), 900-906, November 2002
2) Sui, J., **Leighton, S**., Busta, F. & Brady, L.
"16S ribosomal DNA analysis of the fecal lactobacilli composition of human subjects consuming a probiotic strain *Lactobacillus acidophilus* NCFM®".*Journal of Applied Microbiology* **93** (5), 907-912, November 2002

INVITED SPEAKING ENGAGEMENTS
- International Association for Food Protection (IAFP): August 2014 (Indianapolis, IN); August 2012 (Milwaukee, WI); July 2011 (New Orleans, LA); July 2007 (Orlando, FL)
- Food Research Institute, Madison WI: March 2009, keynote speaker
- Institute for Thermal Process Specialists (IFTPS): 27th Annual Conference (San Antonio TX)
- International Society for Beverage Technologists: Annual Meeting 2012 (San Diego, CA)

MEMBERSHIPS/ACTIVITIES
- Member of Board of Directors for University of Georgia Center for Food Safety, International Life Sciences Institute Food Microbiology, and University of Wisconsin-Madison Food Research Institute
- Member of International Association for Food Protection, Institute for Thermal Process Specialists (Microbiology Committee Chair), GMA
- Achievement Award – Outstanding contributions to the food science student chapter (President, U of MN Food Science Club)
- President, University of Wisconsin-Madison Bacteriology Club

MITCH MICHAELSON

SUMMARY

I've been a hardworking farmer and businessman for the last 10 years. My skills have been honed by real work experiences and my mentors Sever and Aaron Peterson. The enjoyment of growing extends beyond the stewardship of the land. Keeping up to date with technology, seed varietals, and equipment are important aspects of a successful business in agriculture. I managing multiple businesses, delegating employees efficiently and strategically, and problem solve on a daily basis.

SKILL HIGHLIGHTS

- Self-motivated
- Customer-oriented
- Business operations organization
- Leadership
- Project management
- Communication Skills
- Employee relations
- Client account management

CORE ACCOMPLISHMENTS

GAP (Good Agriculture Practice) Certification - June 2013
Private Pilot License - July 2012
Hennepin County Farm Family of the year - 2011
Certified Private Pesticide Applicator - February 2009
Eagle Scout - 1999

PROFESSIONAL EXPERIENCE

PETERSON FARMS / SEVER'S FARM MARKET / SEVER'S CORN MAZE
Eden Prairie, Minnesota

Co-Owner/Officer 05/2004 to Current

EDUCATION

BACHELOR OF ARTS: BUSINESS MANAGEMENT 2004
St. John's University, Collegeville, Minnesota, USA

Peterson Farms

● Established 1894

Peterson Farms was established in the early 1890s when Sever Peterson I settled along the Minnesota River in Eden Prairie, Minnesota. The homestead and "home farm" still sit in the same location today. The Peterson family has also grown its operation and is now a part of communities in the western metropolitan area including: Chaska, Chanhassen, Carver, Shakopee, Dahlgren Township, San Francisco Township, Mayer, and Henderson. While still involved, Sever Peterson III and his wife, Sharon, have begun the transition of the business operation to the next generation, which includes their son, Aaron Peterson, son-in-law, Mitch Michaelson, and daughter-in-law, Nicola Peterson. The three of them make a solid and diverse management team.

Aaron is the fourth generation of Petersons to own and operate the family farm. He began working alongside his father at the age of five and continues to do so today. Aaron graduated from St. John's University in 2005 with a degree in political science. While always an integral part of the business, Aaron committed himself fully to the operation upon graduation.

Aaron Peterson and Mitch Michaelson met in the 8th grade. Their friendship strengthened in high school and while attending St. John's University. In a wonderful turn of events, they became family when Mitch married Aaron's younger sister, Brooke, in 2009. Mitch is also from Eden Prairie and graduated from St. John's University in 2004 with a business degree. He had worked on the farm throughout high school and college, but began full time after graduation. Working alongside both Aaron and Sever over the last ten years, Mitch has learned the aspects of production agriculture and the importance of being a steward of the land.

In addition to Aaron and Mitch, Aaron's wife, Nicola, also works full time on the farm. She manages many aspects of the business, most specifically the accounting. Nicola graduated magna cum laude from the College of Saint Benedict in 2005 with All College Honors and Departmental Distinction in political science. Nicola also worked on the farm throughout high school and college, and like Mitch, committed full time upon graduation. She and Aaron were married in 2007 and have two sons.

The Peterson family has diversified in order to ensure the family farm business continues well into the future. They own and operate Sever's Farm Market which encompasses 17 roadside retail markets where fresh produce is sold, primarily sweet corn which they have come to be known for over the years. They also own and operate Sever's Corn Maze and Fall Festival in Shakopee, Minnesota where they have enjoyed welcoming hundreds of thousands of people during the 18 years of operation. Due to urban sprawl, they have had experience and opportunities in real estate which have led to further business expansion and investment.

Aaron and Mitch have a true passion for growing. As a team, they currently farm 1,200 acres of corn and soybeans. They also grow 100 acres of sweet corn with 17 different varieties. This sweet corn is picked daily for the retail market locations. For many years, Aaron and Mitch had grown over an acre of tomatoes, cucumbers, and peppers in high tunnel greenhouses.

Unfortunately, in 2010 this production stopped when the farm was unable to be produced on due to neighborhood expansion. They have also increased the family's pumpkin production from 10 acres to over 50 acres, which include over 28 varieties of pumpkins, squash, and gourds. In order to ensure the highest quality of our finished product both in production and distribution, they became certified in Good Agriculture Practices, also known as GAP, through the United States Department of Agriculture. This program focuses on sustainability, traceability, and ethical practices in agriculture. This is truly a "farm to table" experience as this stringent process begins when the seed is planted until the final product reaches the consumer.

In addition, they own 9,200 acres in Tocantins, Brazil which primarily produces soybeans and is leased currently. Aaron even took a year off of college in order to spend time in Brazil with Sever to immerse himself in the business culture, learn the language, and build relationships they believe will last a lifetime. Aaron, Mitch, and Sever take multiple business trips there each year to ensure the success of the planting and harvest of the farm.

Aaron and Mitch are continually looking to new technology and innovation to increase production, efficiency, and quality. They regularly invest in new equipment and farming techniques. Our hard work, diversification, and improvement have made the family business a success and provided confidence as both farmers and entrepreneurs. As the next generation, they look for new opportunities and experiences that will ensure the family business will continue for many more generations.

ANTONIO MIGLIARESE, CPA

SUMMARY OF QUALIFICATIONS

- Results Driven
- Financial Reporting & Accounting
- Financial & Data Analysis
- People Focused & Lifelong Learner
- Relationship & Team Building
- Budgeting, Planning & Forecasting
- Cost Analysis and Reduction
- Business Process Analysis
- Strong Problem Solving Skills
- Financial Modeling
- Financial Presentations
- Project Management

PROFESSIONAL EXPERIENCE HIGHLIGHTS

New Era CPAs LLP, Partner *San Diego, CA* 2013 – Present
Antonio Migliarese, CPA, Sole Practitioner *Beaverton, OR* 2010 – 2013

- Assist clients with timely preparation of U.S. GAAP and SEC financial statement audits and quarterly reviews. All resulting in "clean opinions".
- Consult clients with strategies and processes to ensure compliance with pertinent requirements.
- Consult clients in regulated and de-criminalized cannabis markets on the impact of Internal Revenue Code Section 280E on their business.
- Enable clients to achieve better managerial control, reduce costs and increase efficiencies through consulting services (designing and implementing internal control processes and procedures, assisting in software and ERP system selection and implementation, recommending accounting and reporting best practices).
- Lead a team of six accountants including CPAs which perform the above services along with being an outsourced accounting office for small business including maintaining their books in compliance with U.S. GAAP, sales and use tax reporting, financial statement preparation (SEC and non-SEC), payroll, and other accounting services.
- Successful completion of reverse triangular merger of a private cannabis industry company into a fully reporting SEC publicly traded by providing accounting and SEC reporting services.
- Performed agreed-upon procedures for a county in California which required a licensed medical cannabis dispensary to have limited audit type procedures performed for renewal of its license. This was the first time this type of procedure was required by a governmental agency for a cannabis business as far as we are aware.
- Consult clients with due diligence on buy/sell of cannabis related businesses, specifically assisting clients identify high risk areas associated with cannabis industry businesses.
- Assisted clients in preparing documentation and internal procedures for R&D Tax Credit studies resulting in tax credits of $200K +.

Cascade Microtech Inc. *Beaverton, OR* 2012 – 2013
Sr. Financial Accountant

- Responsible for determining appropriate accounting treatment under U.S. GAAP for revenue recognition of SEC fully reporting Company with revenues of $110M + (contracts included multiple element arrangements, custom terms, conditions and deliverables), capitalization criteria for long-lived assets and capital vs. operating lease considerations. Prepared related accounting entries, supporting reconciliations and managerial reports.
- Created and implemented Company's first policies and procedures around demonstration inventory, successfully enabling reduction of inventory levels and associated costs.
- Created and implemented an efficient process around revenue recognition to provide Management with accurate revenue forecast which allowed them to make pro-active decisions instead of reactive.
- Maintained this position while I began to build my independent CPA and consulting practice.

Lightspeed Technologies, Inc. *Tualatin, OR* 2008 –2012
Financial Reporting Manager

- Oversight of month-end accounting close process: reviewed and approved accounting entries, account reconciliations; investigated and resolved any variances to enable timely completion of processes.
- Responsible for preparation of financial statements, including consolidations accounting, in accordance with U.S. GAAP. Resulting in five "clean" opinions from auditors, including one first year audit.
- Responsible for annual budgeting process (operating, capital, and headcount) for all 13 departments, including creation and development of complex financial models for $30M + business.
- Responsible for successful preparation of Private Placement Memorandum resulting in raising $1.5M +.

- Developed, prepared, and presented financial models and forecasts for annual valuation of Company. Reviewed by outside independent firm.
- Responsible for preparation of all financial presentations utilized in key meetings (board of directors, audit committee, and executive committee). Presented at such meetings independently and in support of CFO.
- Responsible for inventory production, planning, and forecasting and facilitating monthly meeting.
- Responsible for providing and working with key executives on long-term strategic planning and key decision making by providing accurate and relevant data, analysis, and recommendations.
- Responsible for researching, documenting and implementing accounting and operational policies.
- Oversaw company-wide internal controls and implemented corrective actions.
- Developed relationships with executive team, co-workers, consulting firms, audit committee, and board of directors in order to foster open communication and successful working relationships.
- Responsible for creation of and preparation of quarterly financial reporting package for executive team.
- Award recipient of company-wide quarterly award for exemplifying company core values in October 2011.

PricewaterhouseCoopers LLP (PwC) *Portland, Oregon* 2006 – 2008

Assurance Experienced Associate

- Conducted on-site, deadline oriented audit assignments for a wide variety of domestic and international clients.
- Responsible for identification, research, and resolution of key accounting issues such as revenue recognition, managerial estimates, inventory and investment valuation and industry-specific accounting requirements.
- Reporting responsibilities included preparation of financial statements for U.S. GAAP audits and reviews, statutory insurance audits, benefit plan audits and SAS 70 Internal Control attestations.
- Coached and mentored junior associates, including performance reviews.
- Summer 2005 internship in Portland, Oregon office.

EDUCATIONAL AND PROFESSIONAL ACCREDITATIONS

- Certified Public Accountant: State of Oregon, License #11881.
- Completed a 3-month international study abroad program: University of Cantabria, Santander, Spain 2003.
- Bachelor of Science, Accounting (Spanish minor): Oregon State University, Corvallis, Oregon 2006.
- Linguistics: Spanish (fluent) and Italian (basic).

SUMMARY

- Experienced federal agent with proven track record of successful computer and financial fraud investigations leading to the conviction of multiple criminal enterprises.
- Experienced local police officer with broad area of knowledge and proven experience.
- Experienced professional in negotiating, managing, and completing complex projects with large organizations.
- Managed individuals in both the private and government sectors.
- Security expert who has assisted organizations in minimizing risk and mitigating threats.
- Consultant accustomed to analyzing broad issues, developing recommendations, and delivering presentations.

EXPERIENCE

St Charles Police Department 06/07- Present and previously 07/95-09/02

Detective - Assigned to the St Charles Co. Regional Drug Task Force (SCCRDTF) as a Narcotics Detective specializing in clandestine methamphetamine/mariuana grow investigations emphasizing intelligence gathering, informant development and use, as well as drug suppression. Tasked with conducting investigations involving violations of local, state, and federal controlled substance law. Expertise in undercover operations, surveillance operation and equipment. Perform Hazmat operations and seizures of clandestine methamphetamine laboratories/marijuana grow operations and related substances. Singularly responsible for 42% of all reports/investigations/ and arrests among a 13 person squad over a two year period.

Patrolman - Performed regular duties of patrolman with strong emphasis on proactive policing, self-initiated activities, and community interaction. Created and Implemented a site threat assessment program to protect numerous critical buildings and environments within the city to help protect against possible terrorist attack or active shooter situations.

Evidence Technician - Conducted detailed analysis of crime scene, utilizing advanced photography and other evidence collection methods. Assisted in numerous high profile and significant cases.

Field Training Officer - Responsible for the successful introduction of the new officer to the department's methods as well as the smooth transition of the prior knowledge to practical appliance.

Special Services, Inc 07/94 – Present

Special Agent - Responsible for executive protection for several political and influential persons. Performed threat assessment and principal security as needed. Executed site assessment / security planning on numerous downtown St Louis buildings in preparation for a Democratic National Convention bid in 2012.

United States Secret Service 9/02 – 06/07

Special Agent

- **Protection -** Participated in the physical protection of the President, Vice President, and former Presidents of the United States of America, as well as visiting foreign heads of state. Responsible for the overall management, planning, and execution of protection at multiple sites for protectees with varying degrees of threat level. Through a model of proactive risk assessment and threat analysis developed security plans and executed them successfully. Organized, managed, and coordinated with local police counterparts, corporate security, and foreign security to prepare for and accomplish the protective mission. Required to make quick decisions during protective missions while interacting with the public, police, protectees, and fluid changing circumstances. Served over 300 VIP persons, 70 foreign heads of state along several levels of critical protection levels,

along with protection duties serving 7 current and former presidents, 4 prior and current vice presidents in a variety of roles including detail leader, assistant detail leader, shift leader and whip. I have also experienced every protective detail role including advance agent lead, site, motorcade, protective intelligence lead and site, TSD lead and site. Much of my experience was gained as a jump team participant in numerous foreign presidential and vice presidential role assignments.

- **Lead Firearms Instructor** - San Francisco Field Office from 07/04 to 11/06. Improved firearms qualification percentage from 48% to 100%. I have also contributed and written numerous policies and guidelines regarding the firearms program that have led to increased safety, proficiency, and reduced liability.

- **Training Coordinator** - San Francisco Field Office from 10/05 to 04/06. Maintain office records and standards for staff of 50 plus agents. Also as the Training Coordinator, successfully delivered a comprehensive officer safety and motorcade attack training program to the entire San Francisco Bay Area's local law enforcement. This training was instrumental in providing valuable motorcade alignment and practical appliance knowledge to the local law enforcement agencies as well as provided essential protection related training to the Secret Service office.

- **Investigations** - Complex financial and electronic crime cases to include but not limited to computer intrusions, phishing and spoofing attacks, dedicated denial of service attacks, identity theft, credit card fraud, bank fraud, wire fraud, conspiracy, and other criminal action in violation of Federal law. Managed complicated investigations with dollar losses in the millions bearing multiple suspects and victims from inception through arrest, conviction, and restitution. Networked with federal agents, local police officers, district attorneys, Assistant United States Attorneys, corporate investigators, and corporate executives to build a constant pipeline of leads and resources. Managed agents and police officers during multiple surveillance, arrest, and search warrant executions. Received multiple awards from USSS management for successful investigative efforts of complex criminal cases.

  Electronic Crimes Special Agent Program - Computer Forensic Specialist responsible for the seizure, acquisition, and analysis of evidence recovered from digital media. Selected to be one of a select few computer forensic examiners within the United States Secret Service. Completed over 100 forensic examinations from January 2006 to the present. Experienced in working with multiple operating systems and forensic tools.

- **Top Secret Clearance**

US Navy (Reserve) 02//01 – 09/02

- GM3 rate with MIUWU 112 (Mobile Inshore Underwater Warfare Unit) specializing in harbor perimeter security, security operations, and threat assessment.

EDUCATION

- **Master of Science** – Criminal Justice Administration. 06/2000, Lindenwood University, St Charles, MO
- **Bachelor of Arts** – Majors in Criminal Justice, History, and Sociology. 06/1993, Lindenwood University, St Charles, MO

TRAINING

- Special Agent Introductory Training Course – US Secret Service – Beltsville, MD
- Criminal Investigative Training Program – Dept of Homeland Security – Glynco, GA
- Special Agent Training Course – US Secret Service – Beltsville, MD

- Graduate of St Charles County (MO) Police Academy (685 hr program)
- The Investigation of Computer Crime – SEARCH – San Francisco, CA
- Basic Computer Evidence Recovery Training – USSS – Glynco, GA
- Treasury Computer Forensics Training Program – USSS – Dept of Treasury – Glynco, GA
- Emergency Medical Technician (EMT) qualified
- SWAT/Entry training received in both Police and Federal Government sector through SWAT II
- HK MP5 / Colt SMG Instructor
- Certified USSS Armorer in a variety of automatic, semi-automatic weapon platforms including M4, FN P90, HK MP5, Sig Sauer, Remington, Mossberg, etc.
- Certified in both Basic and Advanced Reid Interviewing techniques
- FBI qualified as a Chemical Agents Delivery Instructor. Emphasizing tactical operations, special weapons training, and chemical delivery
- Received specialized FBI training in undercover surveillance operations / photography techniques
- Specialized training in street crimes and undercover surveillance through Reid & Associates
- Received advanced crime scene analysis training in areas such as death / homicide investigation, evidence identification and analysis, etc.
- Strong emphasis in narcotic investigation and informant development

JARED PENMAN

10452 Isabelle Rd.,

Website: www.rinosupply.com

Objectives

To contribute cultivation and operating expertise to the Minnesota Medical Solutions team and the Minnesota Medical Cannabis program through educating and implementing established greenhouse cultivation efficiencies and methodologies

Education

Colorado State University – Graduated 1996

- *Bachelor of Science in Construction Management*

Experience

Supervisor (1996 - 1999)
High Plains Drywall

Broker and Portfolio Allocation Manager (1999 - 2002)
Charles Schwab

Owner/Operator (2002 - 2008)
Basement Solutions Inc.

Advisor (2009 - 2010)
Costa Rican Sustainable Farming

Owner/Operator (2010 - Present)
RiNo Supply Company

Skills

- Self motivated to start new business in the emerging industry of Medical Marijuana
- Organization, planning, and design of all licensed Cultivation and Retail facilities
- Procuring genetics for cultivation and medicinal purposes
- Skill assessment and Placement of individuals into proper environments and positions
- Analyzes industry trends to optimize and scale current business and future expansion
- Utilizes Seed to Sale Tracking methods and data collection through METRC and ADILAS

Jared Penman Biography

Jared Penman has been an active part of the Colorado Medical Cannabis Industry since the inception of Amendment 20 in 2001. Mr. Penman was one of the first registered medical cannabis patients suffering from osteochoritis dissecans as well as osteo arthritis.

In 2010, Mr. Penman became the owner and operator of RiNo Supply Company, a medical cannabis producer and retailer that holds pride in using organic materials and processes to produce high quality cannabis in a state of the art greenhouse. To date, Jared operates four licensed medical dispensaries, three large scale production facilities, and holds a total of 24 state and local licenses.

Mr. Penman has over 20 plus years of experience as a contractor which he has utilized to become an expert in the design and methodology of regulated greenhouse cultivation. His facility is one of the first medical cannabis cultivation greenhouses not only in the State of Colorado but across the nation. The greenhouse facility has allowed Mr. Penman to reduce production costs by 50% and increase carbon efficiency over indoor cultivation facilities by 90%.

Through Jared's professional skill sets and expansive cultivation experience, Mr. Penman is an expert in propagation techniques specific to greenhouses and has created a strategic system in which he utilizes different strains of medical cannabis to coincide with the specific time of year and the optimal amount of natural light available to produce on a perpetual scale of quality and consistency. Jared's methodologies can be recognized throughout the industry, as a standard to maximizing production levels while maintaining low costs and minimal carbon output.

Mr. Penman has been an integral part of the creation and implementation of Colorado's Medical Cannabis Laws. He has participated as a stakeholder and member of the working group for House Bill 1284. Jared is also a Founding Member of the Association of Cannabis Trades for Colorado (ACT4CO) and currently is a Advisory Board Member of the Colorado Hemp Project. His continued commitment to educating and bringing sophisticated cultivation techniques to the industry will help to shape and develop regulated medical programs in Colorado, Minnesota, and across the country.

AARON PETERSON

[redacted]

SUMMARY

I am a fourth generation vegetable farmer. My on the job training started at a young age working with my father; my role as co-owner and operation management started in 2005 after college graduation. I am currently Vice President of our family farming operation. I have over 25 years of field experience, such as cultivation practices and harvest techniques. Our farm employs over 100 people seasonally and I am responsible for the coordinated day to day efforts of our staff.

HIGHLIGHTS

- Organization
- Leadership
- Licensed Pesticide Applicator
- Management Experience
- People Person
- Detail Oriented

ACCOMPLISHMENTS

We electively achieved GAP (Good Agriculture Practices) certification in 2013.

Recognized as a Minnesota Farm Family of the Year in 2011

Constantly refining and improving our operation to streamline input/output balance.

EXPERIENCE

PETERSON FARMS/SEVER'S FARM MARKET/SEVER'S CORN MAZE
Eden Prairie, MN

Field Manager, Sales Manager, Vice President of Operations 01/1987 to 09/2014

Scheduled harvests based on weather conditions and market demands. Installed retaining walls, fences and planters. Managed forestry activity contracts and payments. Mixed and sprayed fertilizers, herbicides and insecticides onto row crops and trees. Delineated wetland and stream management zones. Managed tomato production in high tunnels. Manage input costs and coordinate business expansion; from new market research to securing bank financing if needed.

EDUCATION

ASSOCIATE OF ARTS: POLITICAL SCIENCE 2005
St. Johns University, Collegeville, MN, USA

Peterson Farms

● Established 1894

Peterson Farms was established in the early 1890s when Sever Peterson I settled along the Minnesota River in Eden Prairie, Minnesota. The homestead and "home farm" still sit in the same location today. The Peterson family has also grown its operation and is now a part of communities in the western metropolitan area including: Chaska, Chanhassen, Carver, Shakopee, Dahlgren Township, San Francisco Township, Mayer, and Henderson. While still involved, Sever Peterson III and his wife, Sharon, have begun the transition of the business operation to the next generation, which includes their son, Aaron Peterson, son-in-law, Mitch Michaelson, and daughter-in-law, Nicola Peterson. The three of them make a solid and diverse management team.

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In addition to Aaron and Mitch, Aaron's wife, Nicola, also works full time on the farm. She manages many aspects of the business, most specifically the accounting. Nicola graduated magna cum laude from the College of Saint Benedict in 2005 with All College Honors and Departmental Distinction in political science. Nicola also worked on the farm throughout high school and college, and like Mitch, committed full time upon graduation. She and Aaron were married in 2007 and have two sons.

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Unfortunately, in 2010 this production stopped when the farm was unable to be produced on due to neighborhood expansion. They have also increased the family's pumpkin production from 10 acres to over 50 acres, which include over 28 varieties of pumpkins, squash, and gourds. In order to ensure the highest quality of our finished product both in production and distribution, they became certified in Good Agriculture Practices, also known as GAP, through the United States Department of Agriculture. This program focuses on sustainability, traceability, and ethical practices in agriculture. This is truly a "farm to table" experience as this stringent process begins when the seed is planted until the final product reaches the consumer.

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Joe Schaffer, *CPESC*

Education:

Iowa State University, Ames Iowa
B.S. Wildlife Biology
Graduation Date: December, 1994

Work History:

1998 – Present
Minnesota Native Landscapes, Inc., Otsego, MN
President/Operations Manager/Restoration Ecologist

Joe has almost 20 years of extensive experience involving all aspects of the ecological restoration industry. As the co-founder of MNL and the current operations manager, he has been involved with hundreds of restoration projects all over the upper Midwest and has vast experience in consultation, design, project management, installation and land management. MNL operates a 150 acre production farm near Foley, MN, where over 50 source identified native prairie forbs and grasses are grown, harvested, cleaned, tested and sold. MNL also operates a greenhouse facility at the Foley location that produces over 250 different native species and shrubs.

1996 – 1998
Prairie Restorations, Inc., Princeton, MN
Restoration Ecologist

1994 – 1996
Country Landscapes, Inc., Ames, IA
Landscape Foreman

Certifications:

2012 – Present: Board Chairman for the Minnesota Native Wildflower/Grass Producers Association
2003 – Present: Certified Professional in Erosion and Sediment Control (*CPESC)*
2005 – 2009: Minnesota Nursery and Landscape Association's Environmental Concerns Committee Member
Certified MnDOT Landscaper

AMBER SHIMPA

COMMERCIAL BANKING & FINANCIAL SERVICES PROFESSIONAL

Performance-driven commercial lender with a diverse background and valuable, extensive skills in finance, structuring, credit analysis, sales, debt collection, and asset management. Achieve and exceed business development and revenue goals in a high-pressure environment. Assertive, strong negotiator, with exceptional written and verbal communication skills, excellent multi-tasking and organizational aptitudes along with the proven ability to improve returns of difficult loan portfolios.

PROFESSIONAL EXPERIENCE

Stearns Bank, N.A., April 2006 – present

Vice President – Commercial Lending

A $1.65 billion bank, focused on commercial, nationwide lending and headquartered in St. Cloud, MN, with Return on Assets of 4.26% in 2013 and locations in Arizona, Florida, Georgia and Minnesota.

- Originate, structure, underwrite and close commercial credit facilities, including commercial real estate, construction and development loans, USDA Business and Industry loans, and SBA loans, and the continued servicing of the loans post-closing, including over $26 million in new loan originations year-to-date in 2014.

- Manage and service a diverse loan portfolio currently totaling $72 million in assets and consisting of 525 commercial and consumer loans. At peak volume following the acquisition of 2 banks in 2009 and 2011, managed and serviced $100 million in assets, consisting of over 725 loans.

- Secure approvals from state government staff for bank loan transactions that participate in and obtain a guarantee via various government guaranteed loan programs, including the United States Department of Agriculture Business and Industry loan program.

- Extensive experience in negotiating, modifying and settling troubled debt and complex workout loans with both consumer and business customers in the bank portfolio and acquired banks' portfolios.

- Manage special assets and workout credits that obtain a desired result to the bank - Achieved a reduction in an acquired bank's substandard loan portfolio from 81% concentration to 34%, a reduction of $21 million in troubled assets within 2 years' time.

- Completed the placement and sale of $130 million in third party loan participations from 2006-2008. Managed and serviced the participations for the bank.

- Developed and authored the bank's policies and procedures for the participation portfolio.

AMBER SHIMPA

Marshall BankFirst, May 2001 – April 2006

Assistant Vice President – Financial Analyst Commercial Finance – (August 2004 – April 2006)

- Completed the credit analysis and preparation of loan packages, including presenting of the same to loan committee for approval in the origination and placement of $290 million in commercial real estate financing, comprised of 21 loans from 2004-2006.

- Earned the company's Peak Performer award in 2004

Closing Specialist – Loan Administration – (March 2003 – August 2004)

- Managed over $200 million each in commercial loan closings and commercial construction loan projects.

Executive Assistant – Commercial Finance – (May 2001 – March 2003)

Miller & Schroeder Investments, May 2000 – August 2000

Investment Banking Internship – Native American Gaming Finance

EDUCATION

Bachelor of Business Administration from the University of North Dakota | Graduated May of 2001

3 Year Letter Winner | Volleyball

Dr. Jon Thompson

Summary: A versatile leader with strong financial, manufacturing and operational excellence know-how. Highly experienced in operational excellence protocols, financial management, and in strategic marketing. Industry experience in analytical materials and instrumentation, in-vitro diagnostics, biotech, and mining. Significant experience in worldwide business-to-business functions including manufacturing, product management, product development, technical sales, strategic marketing, and business alliance formation. International experience in Europe and Japan.

Education

PhD, Analytical Chemistry, University of Minnesota, 2002
Carlson School of Management – Executive Mergers and Acquisitions Program, 2006
Green Belt in Operational Excellence- IDEX, 2007
Green Belt in Business Excellence – IDEX, 2008

Areas of Expertise

- Cash Flow Management
- Raising and Managing Capital Requirements
- Proforma Business Plans
- Budgeting and Annual Operating Plan
- Manufacturing Operations Management
- VSM, Kaizen, Lean Manufacturing, Supply Chain Management,
- Business Development- Organic/Acquisition/International
- Strategy Formulation
- Technical Sales & Marketing
- Research & Product Development Strategic Marketing
- Analytical Chemistry & Lab Operations
- Building New Core Competencies
- Fluidics & Materials Engineering
- Liquid –Liquid /Gas –Liquid separations and permeable materials
- Experimentation and Statistics

Professional Experience

Absolute Nano LLC **November 1, 2013**
Fully owned subsidiary of United Science

- Completed acquisition of company assets in November 2013
- Responsible for all aspects of startup operations including administration, finance, HR, manufacture, sales, marketing and development of bench top foundry for nanomaterials and nano layered composites.

United Science Corporation
Founder, Chairman of Board & CEO **May 2009-present**

- Built and financed business from scratch with three locations in the US.
- Manages financial team including controller, administration manager, and purchasing.

- Responsible for all financial aspects of company including capital provision, cash flow management, credit and collection policy, agreements, financial controls, banking arrangements, shareholder reports, securities marketing, and financial records and policy.
- Implemented ISO processes.
- Responsible for marketing and sales growth.
- Sets financial objectives for the company and assures execution.

Cadence Fluidics, Inc. **January2010-present**
Member, Board of Directors

- Advisor on technical, financial and operational policy

Active Spectrum, Inc. **March 2012-present**
Member, Board of Directors

- Advisor on financial and operational policy

IDEX Health & Science, Roseville, MN
Business Development Manager, In-Vitro Diagnostics & Biotech **2008-May 2009**

- Corporate Development
- IP defense litigation.
- M&A Process Creation, targeting, fielding.
- Strategic plans including market and product plans.
- Financial modeling of Synergies and Valuation

IDEX Health & Science, Roseville, MN
Business Development Manager, Analytical Instruments Market **2008-2009**
Responsibility for diversification & M&A strategy.

- Strategic plans for new platforms
- Voice of Customer research for organic growth.
- Green Belt in Commercial Excellence (Dec 2008)
- Value Selling Green Belt
- Goal Deployment

Rheodyne LLC, New Brighton, MN
Business Development Manager **2006-2008**
Worldwide responsibility for creating strategy, new business development activities, establishing alliances, and M&A assessment.

- Collaboration and coordination of cross-functional teams across business units and with target OEM companies for many projects. Projects included international participants and potential OEMs.
- AOP Participation & Business Unit Sales Forecast
- Strategic plan creation, marketing plans, market characterization, market segmentation, business plans, and value maps.
- Negotiating and drafting joint development agreements.

Systec LLC, New Brighton, MN
Product Development Manager **2005-2006**

This was a position for a niche, high technology membrane company. My responsibilities included the AOP, development process, opportunity assessment, sustaining engineering, R&D, strategic market planning, technology strategy, and competitive assessment. I also had interim responsibility for pricing, sales forecasting, sales training, and all other product management duties.

- Improved new products as % sales from 50 to 55%.
- Coordination of business units with customers by leading cross functional teams.
- Executed Joint Development Agreement with a new major European OEM for a project with NPV of $46.6M. Product launched in late 2007.
- Early stage strategy deployments with non-risk adjusted NPVs totaling over $100 M.
- Lean Manufacturing Training and participation in company wide operational excellence overhaul.
- Kaizen and Value Stream Mapping of operations including manufacturing and business functions.

Systec LLC, New Brighton, MN
Research and Development Manager **2003-2005**

- Managed and executed research strategy.
- Managed direct reports
- Budgeting for department
- Technical sales support and documentation

Systec LLC, New Brighton, MN
Senior Research and Development Scientist **2002-2003**

- Materials development for gas liquid separations
- Analytical testing
- Operations support for liquid core waveguide
- Extrusions support and implementation of analytical controls

University of Minnesota
Research Assistant **1998-2002**

- Dissertation: Ultra-fast high temperature Liquid Chromatography, Peter W Carr was dissertation advisor.
- Expert in separations technology and engineering of fluidics systems.
- GPA 3.5

Professional Affiliations

Society of Mining, Metallurgy and Exploration
American Society of Mass Spectroscopy
International Food Protection Association
National Defense Industrial Association
American Chemical Society
AICHE

American Society of Plastics Engineers
International Society for Optical Engineers
North American Membrane Society
Industrial Research Institute

Awards

IDEX Growth Award 2006
Swenson Fellowship,1996-1997
IDEX Innovation Award 2007

Consultant Information:

Dan and Jerry's Greenhouses

Based in Monticello, Minnesota, Dan and Jerry's Greenhouse has over 30 years of experience in wholesale growing, testing and selling annual and perennial flowers, ornamentals and vegetable plants. Currently Dan and Jerry's has four locations consisting of a total of 35 acres of greenhouse space. Its customer base includes independent garden centers, regional chains, supermarket chains and nurseries located throughout the Upper Midwest including Minnesota, South Dakota and Iowa. It carries the Farm Fresh Selects™ label which is a "process" of varietal selection and techniques. Each year hundreds of new varieties of seeds and plants are tested or evaluated in trail gardens and only the best performing and highest quality plants are selected to carry the Farm Fresh Selects™ label. Dan and Jerry have 40 plus years in the greenhouse industry and are experts in cold weather greenhouse operations. Both Dan and Jerry will be pivotal in advising construction and function of the MinnMed greenhouse facilities.

Peterson Farms

Peterson Farms was established in the early 1890s. Peterson Farms owns and operates Sever's Farm Market which encompasses 17 roadside retail markets where fresh produce is sold, primarily sweet corn which Peterson Farms has come to be known for over the years. The Peterson Farm family also owns and operates Sever's Corn Maze and Fall Festival in Shakopee, Minnesota where they have enjoyed welcoming hundreds of thousands of people during the 18 years of operation. Aaron Peterson and Mitch Michaelson have a true passion for growing and currently farm 1,200 acres of corn and soybeans. They also grow 100 acres of sweet corn with 17 different varieties. This sweet corn is picked daily for the retail market locations. For many years, Aaron and Mitch had grown over an acre of tomatoes, cucumbers, and peppers in high tunnel greenhouses. They have also increased the family's pumpkin production from 10 acres to over 50 acres, which include over 28 varieties of pumpkins, squash, and gourds. In order to ensure the highest quality of our finished product both in production and distribution, they became certified in Good Agriculture Practices, also known as GAP, through the United States Department of Agriculture. This program focuses on sustainability, traceability, and ethical practices in agriculture. This is truly a "farm to table" experience as this stringent process begins when the seed is planted until the final product reaches the consumer.

Clover Leaf University

Clover Leaf University is an early-stage specialized education program focused on providing an educational standard for training cannabis industry workers. Clover Leaf works to establish best practices for regulatory compliance and creating cannabis products with attention to public health and safety. It is also a goal to support research and development concerning cannabis, and raise awareness around the potential it has to benefit society through consumer education and creating a knowledgeable workforce.

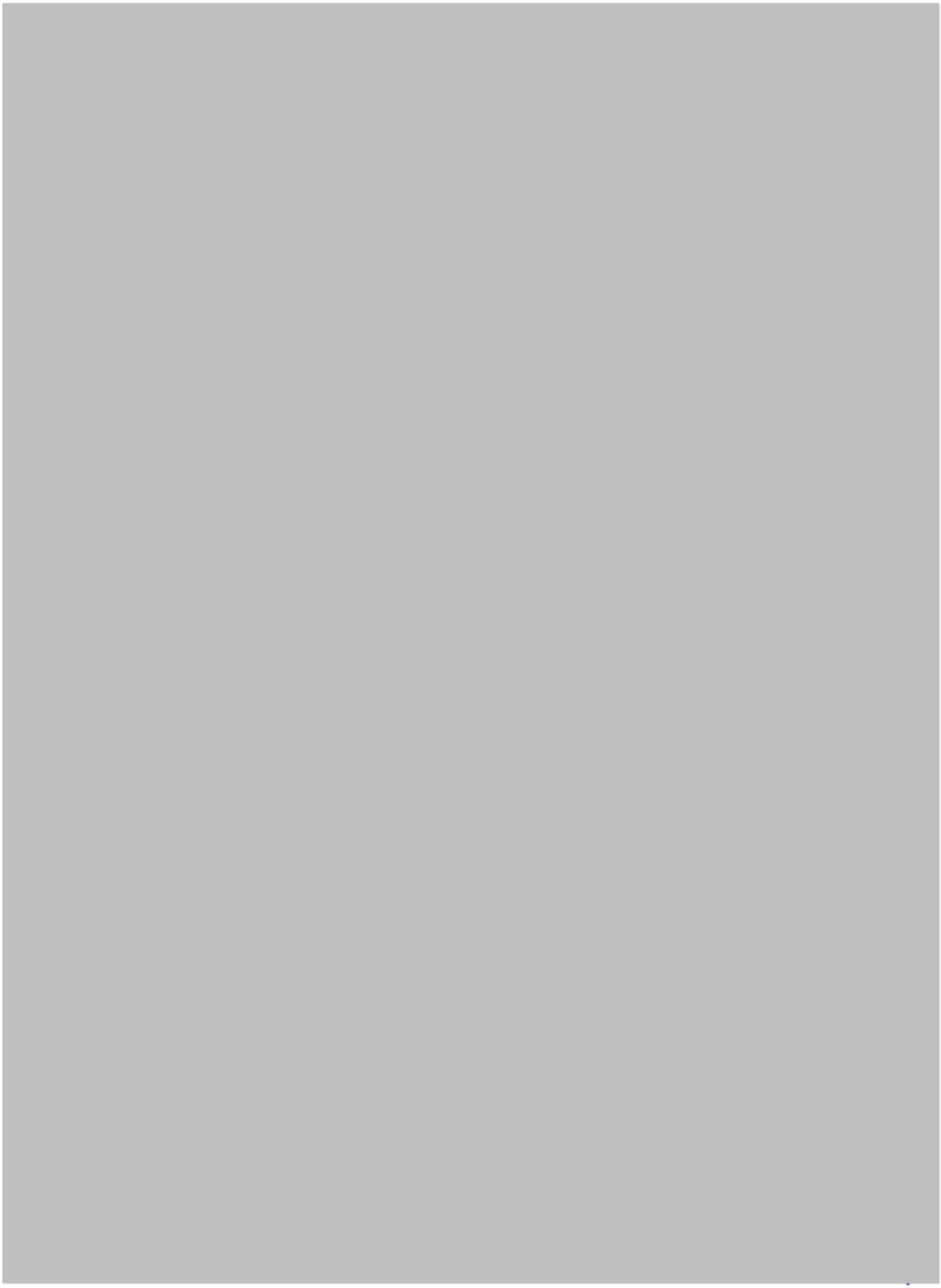
Clover Leaf University is the first cannabis school of its kind to be approved, regulated, and licensed by the Colorado Department of Higher Education's Private Occupational School Board. By accepting and following this educational protocol, you are proving your commitment to creating a safe, compliant, and successful industry for the future.

American Cannabis Company Inc.

The team of experts from the American Cannabis Company Inc. are currently active in nine states and Canada. Collectively, ACC has decades of medical cannabis and botanical experience. Their medical cannabis experience, including implementation and scalable operations, will be fundamental to the immediate industry standard function of MinnMed. The ACC team has helped to integrate the MinnMed team with its many national industry experts.

4. Copies of all compensation agreements with investors, board members, directors, owners, officers, other management. For purposes of this RFA, a compensation agreement includes any agreement that provides, or will provide, a benefit to the recipient whether in the form of salary, wages, commissions, fees, stock options, interest, bonuses or otherwise;

*Please see the attached employment agreements



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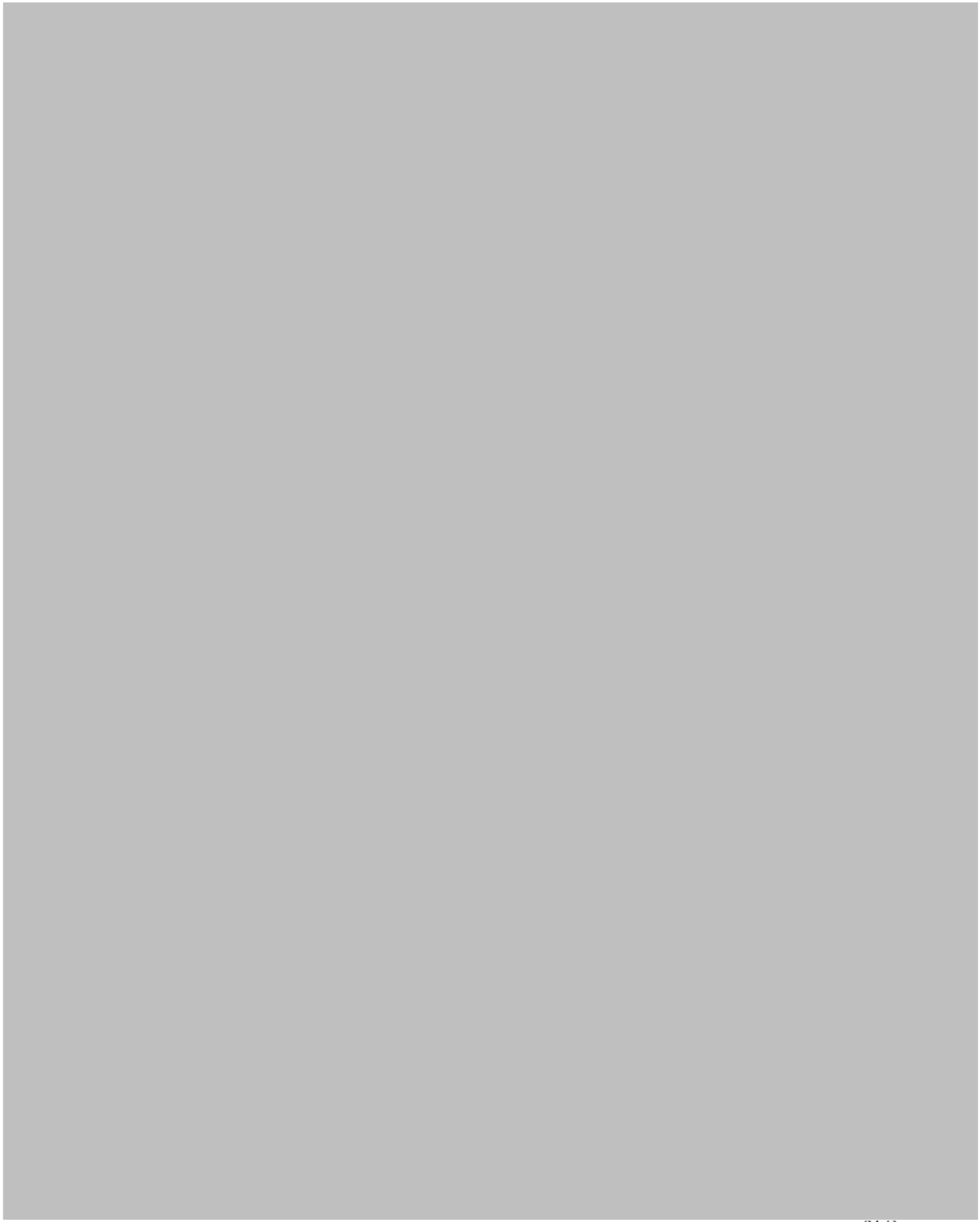

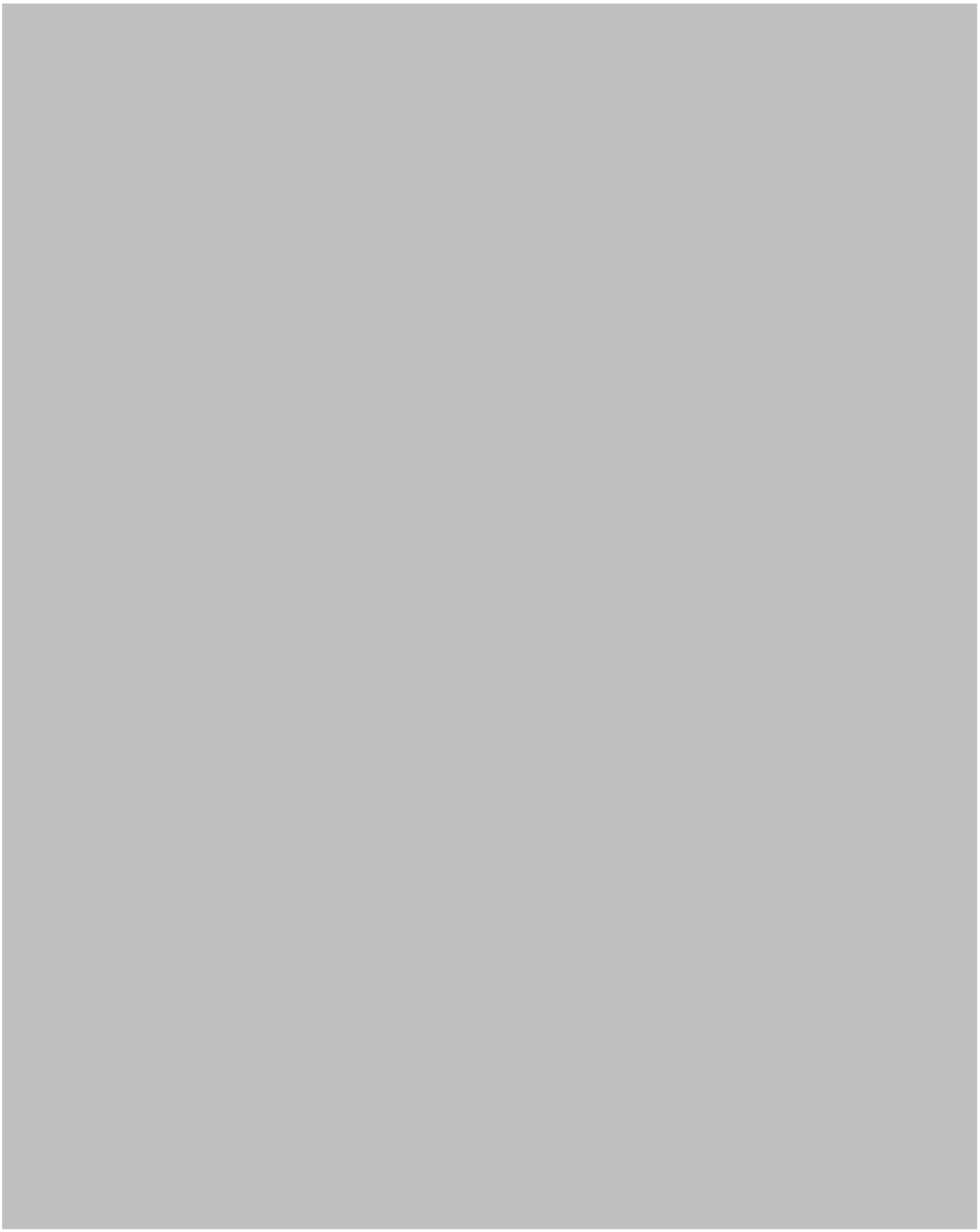

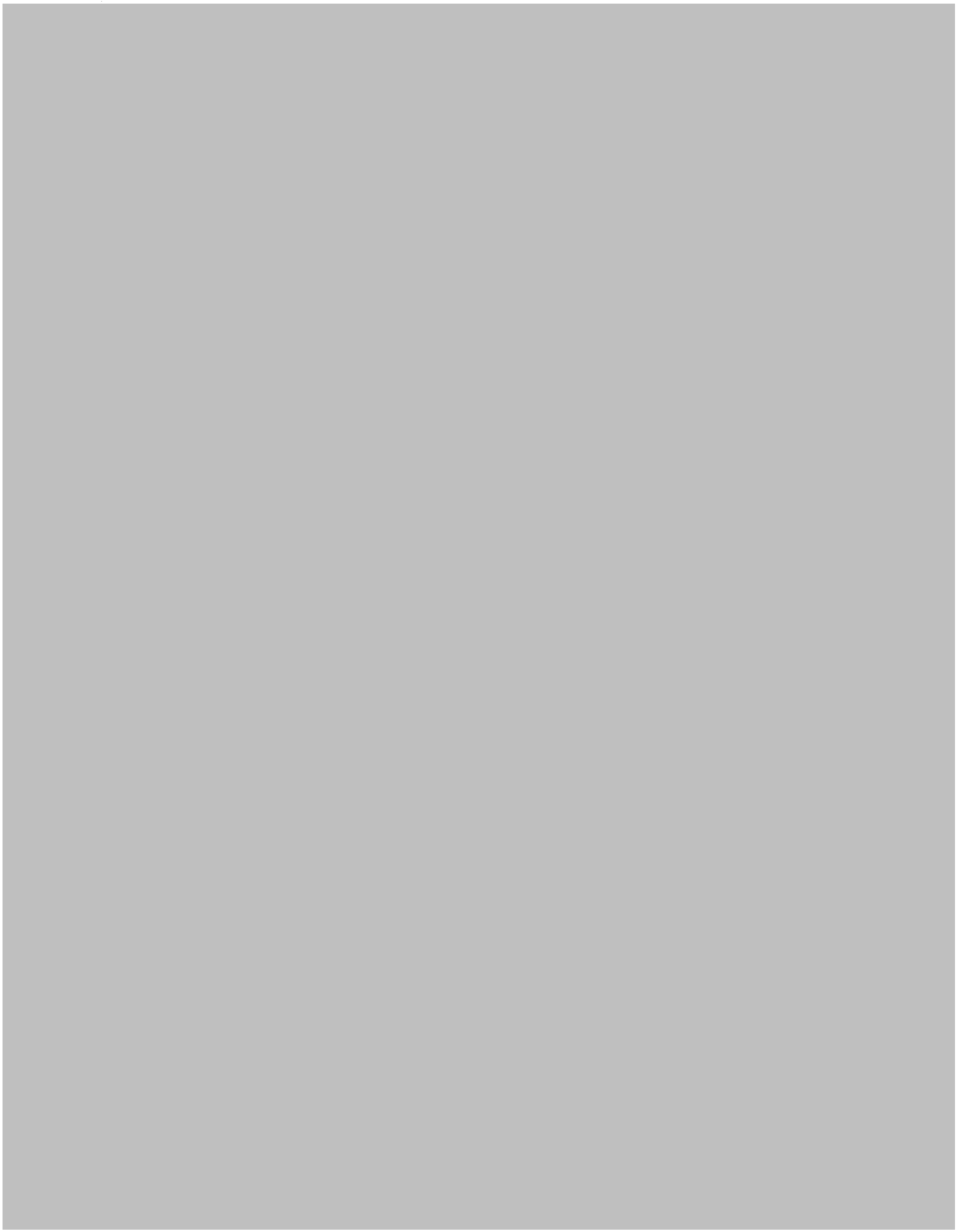

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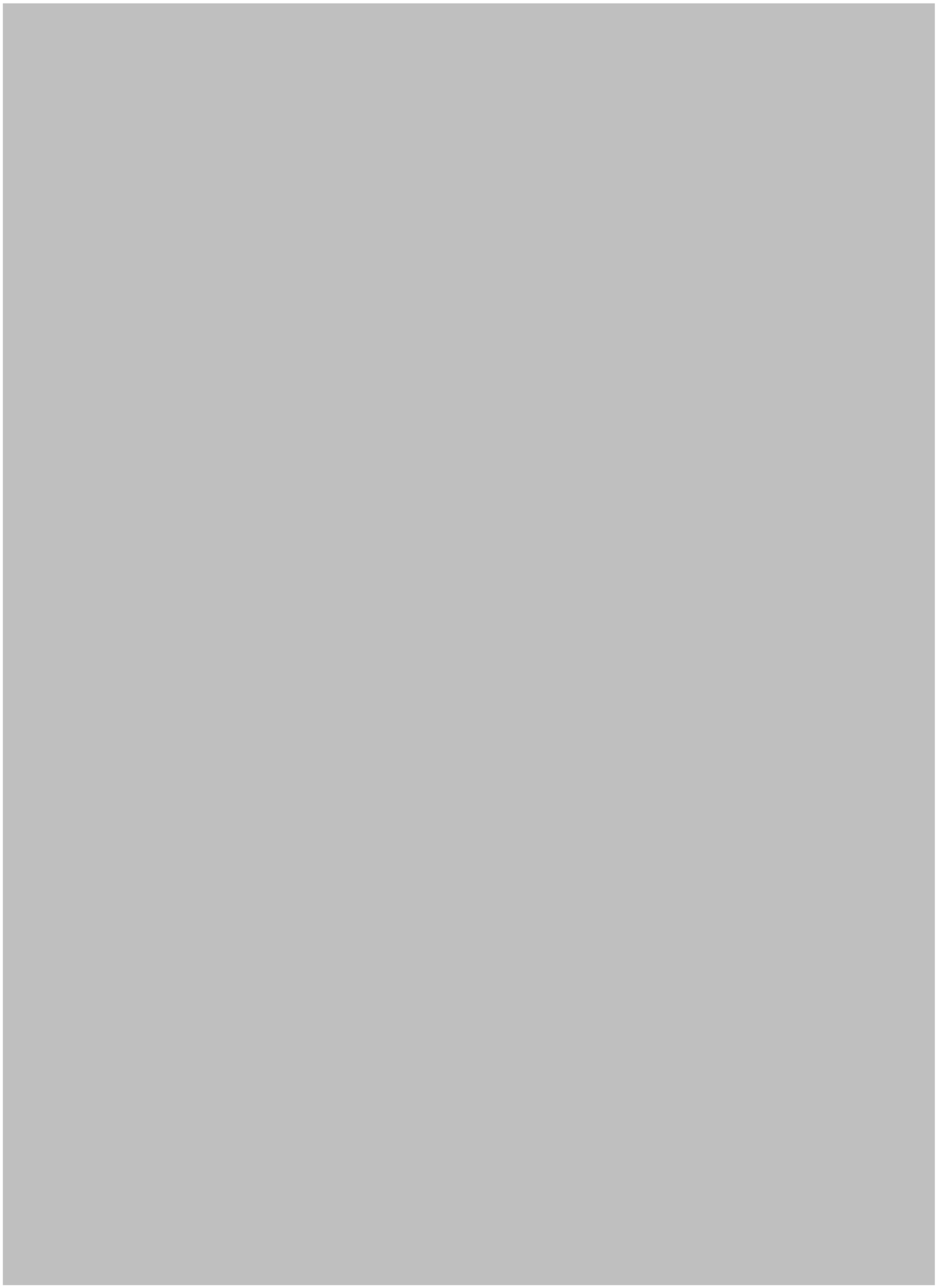

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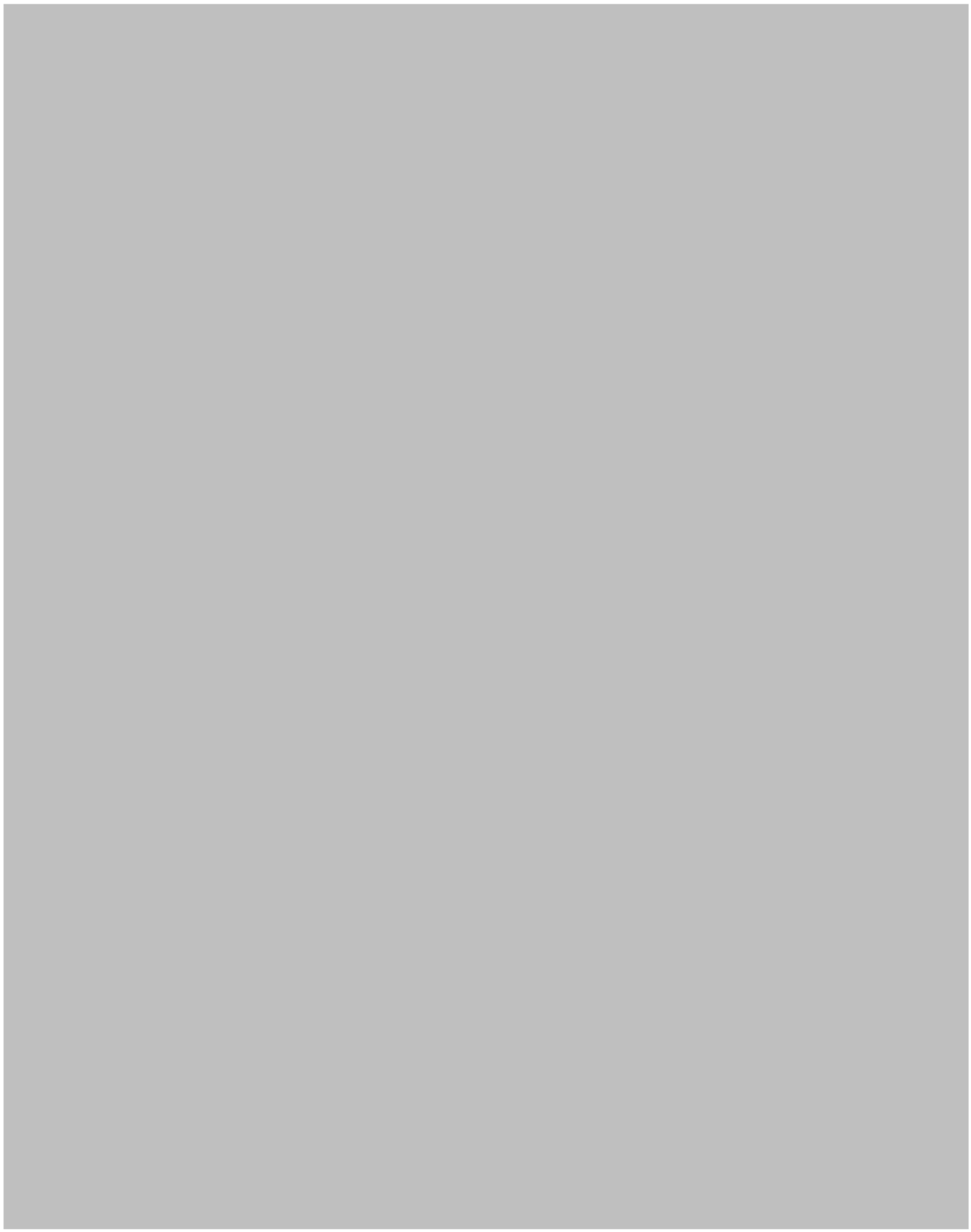

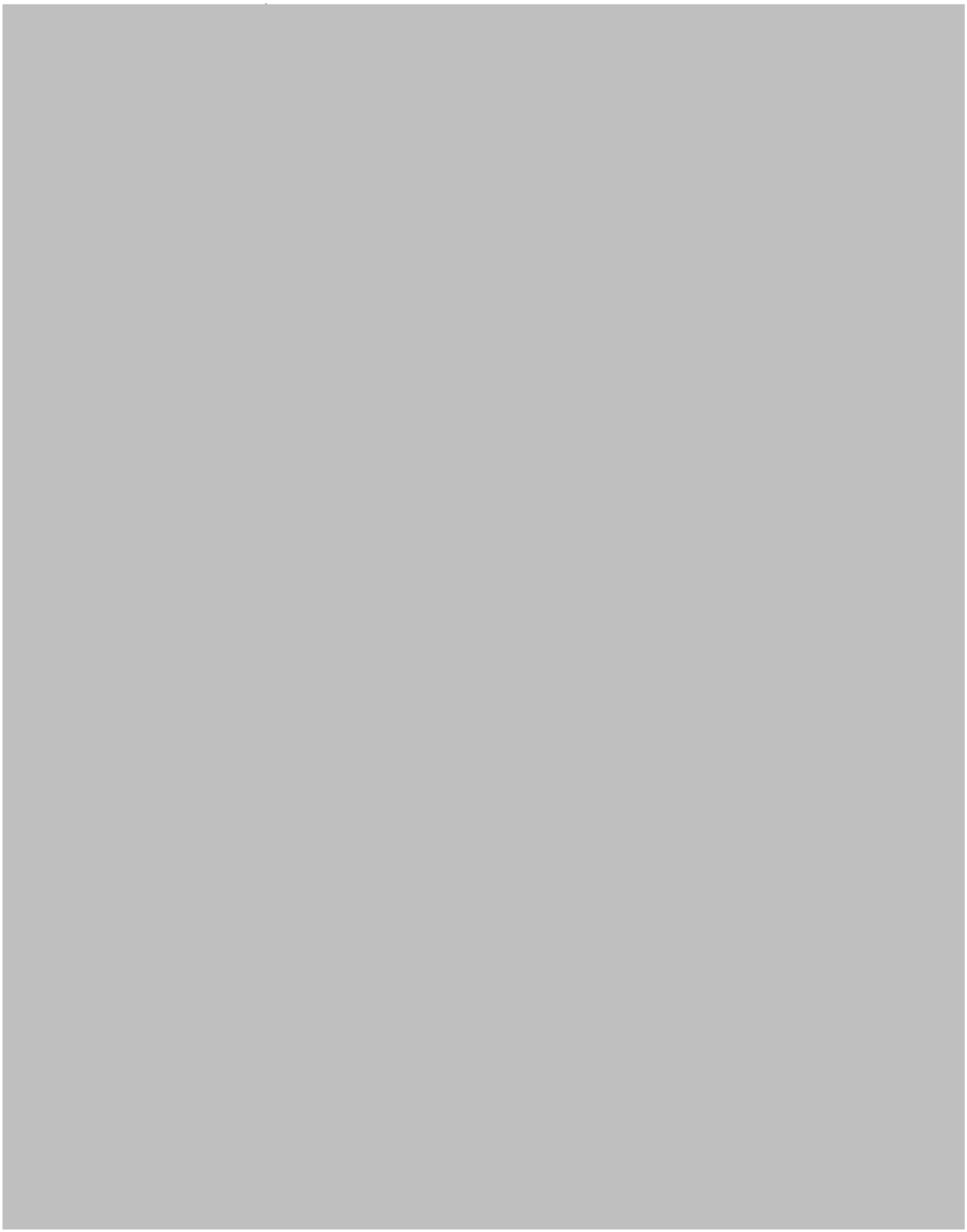

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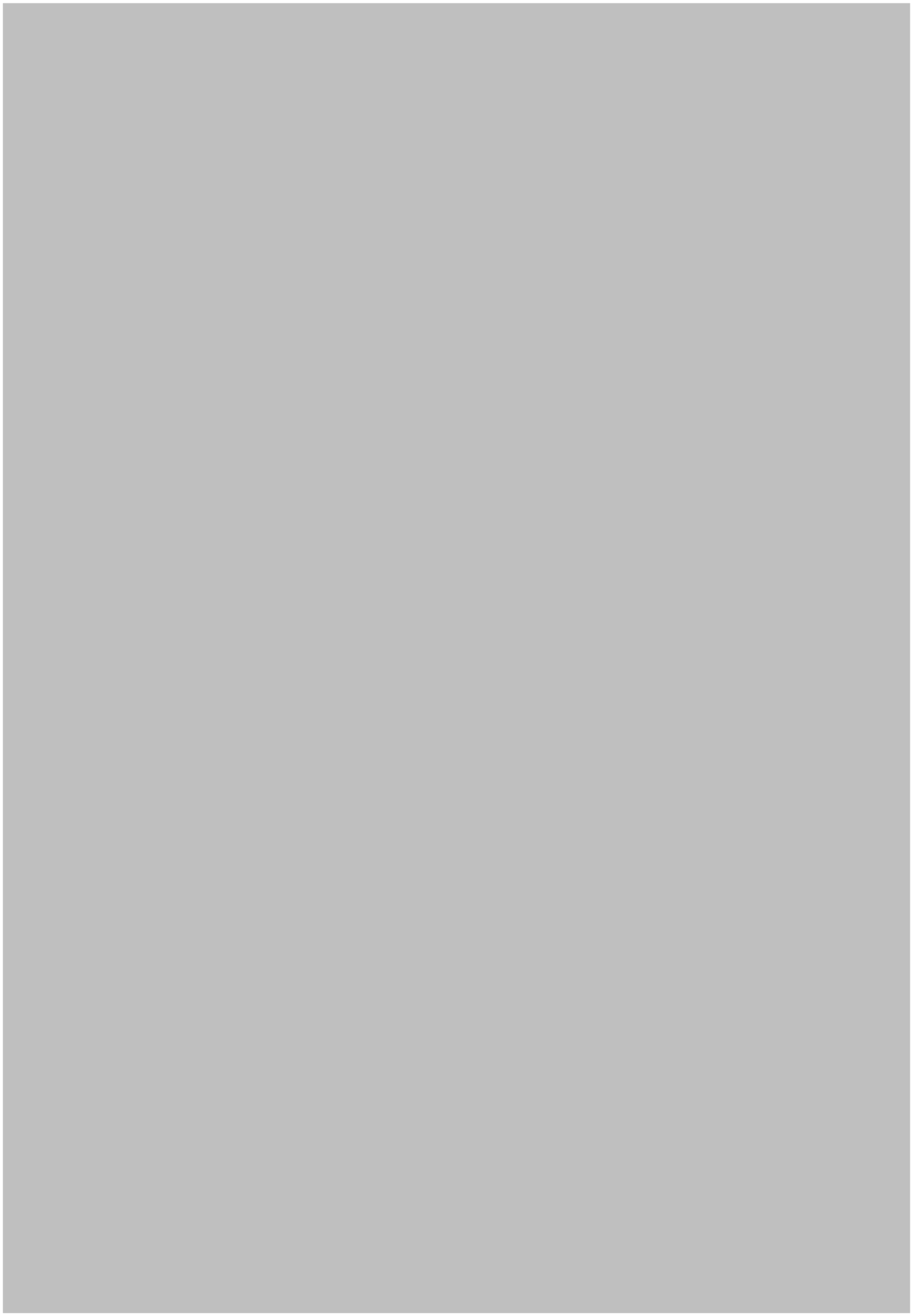

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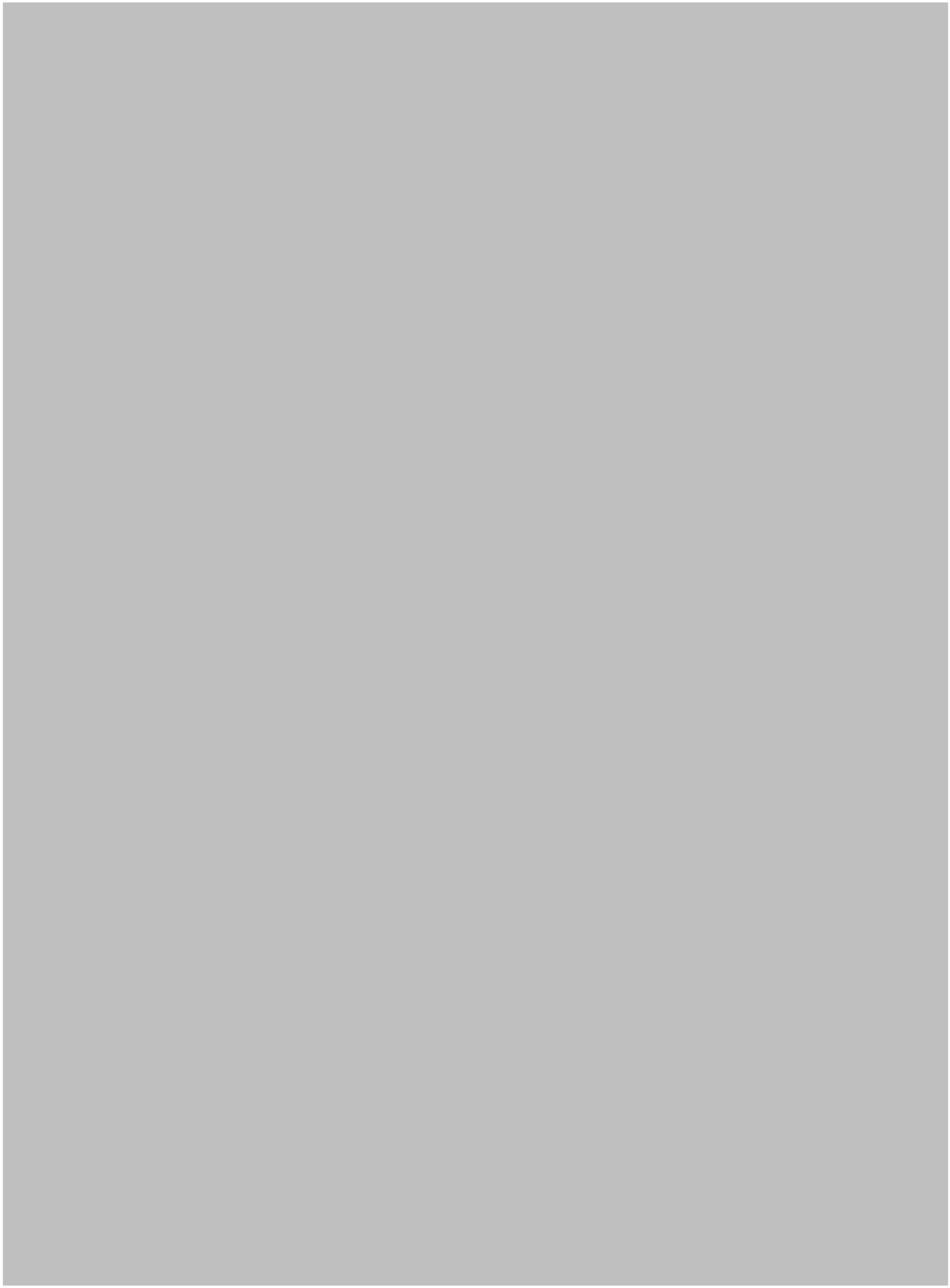

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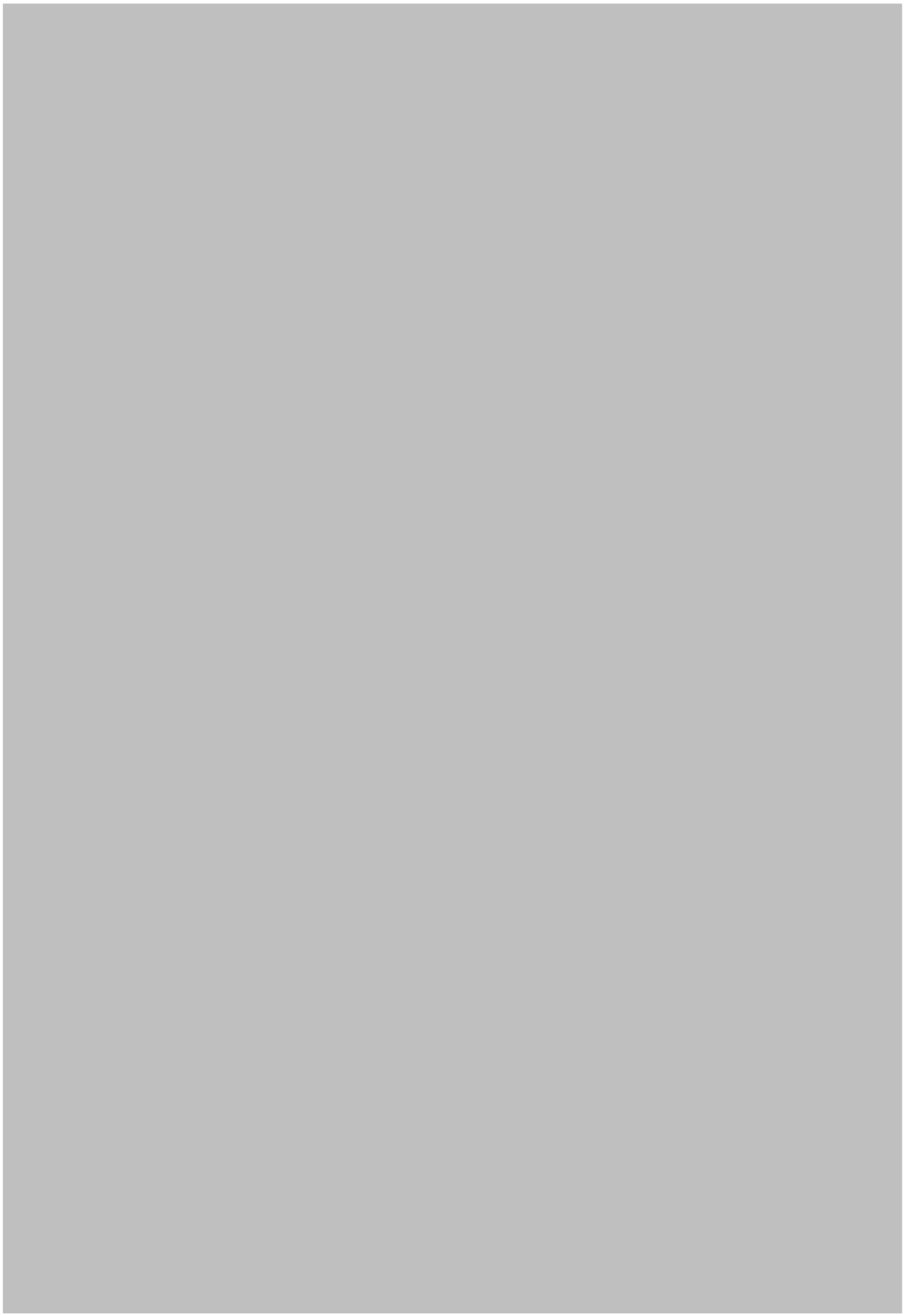

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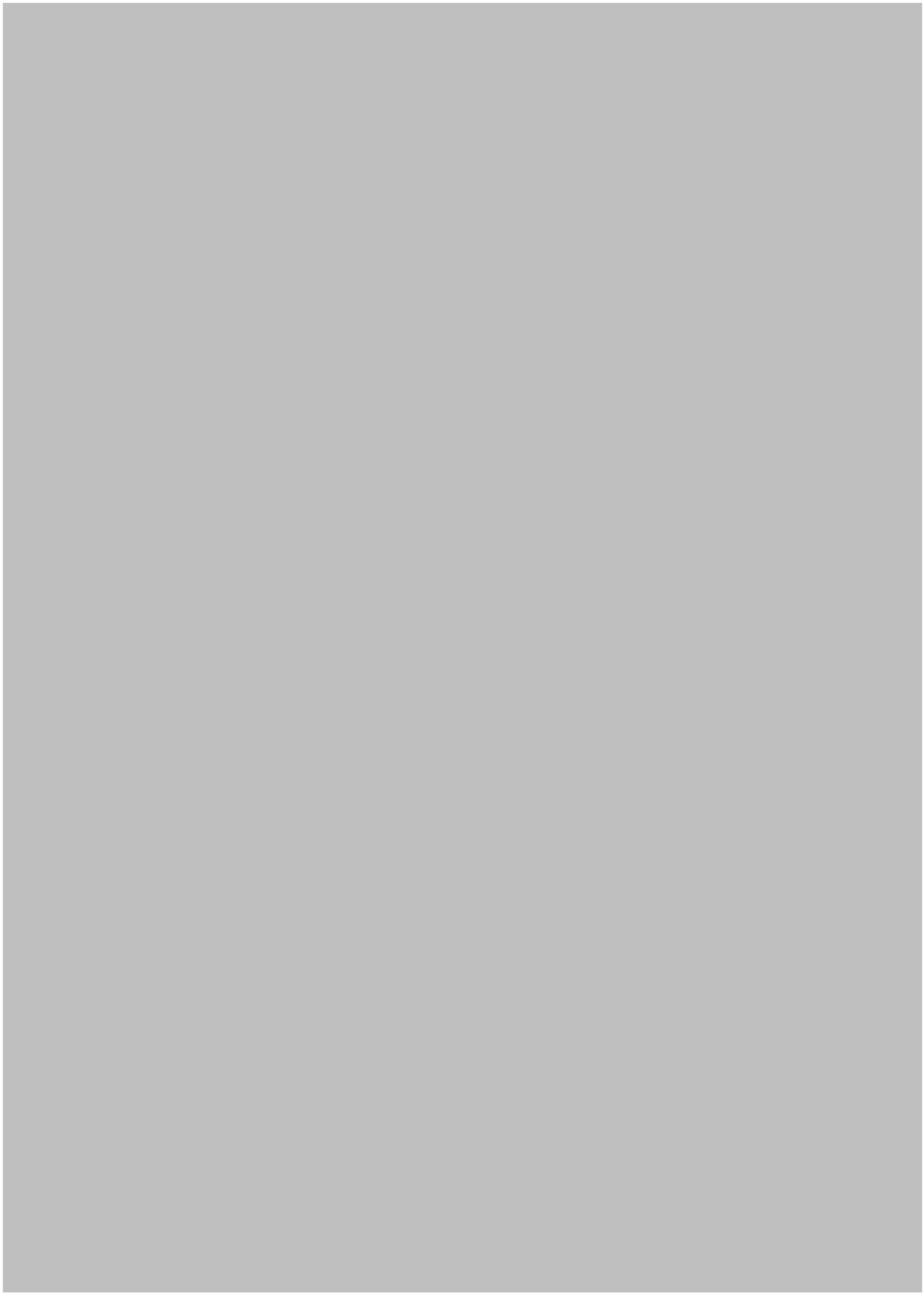

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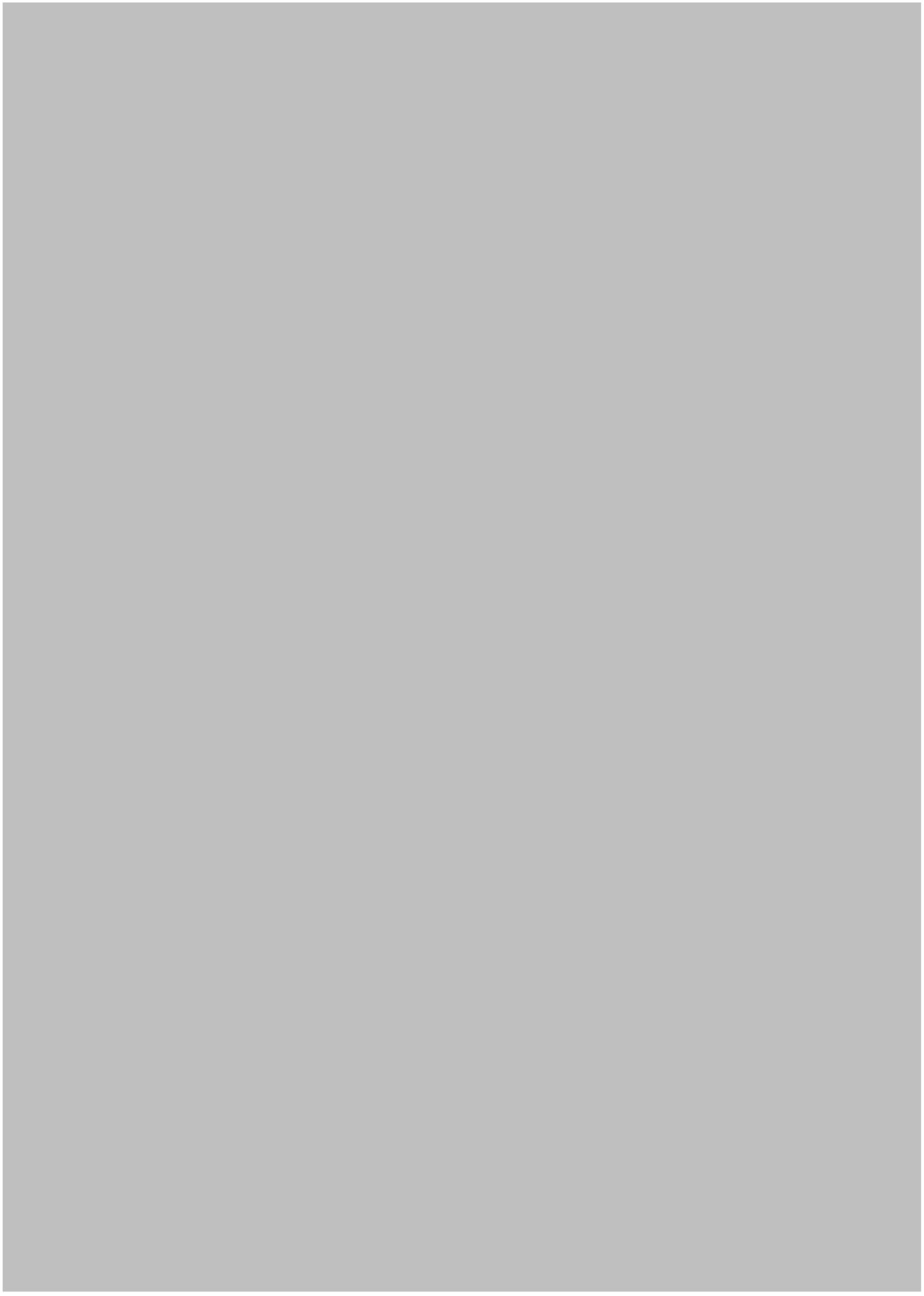

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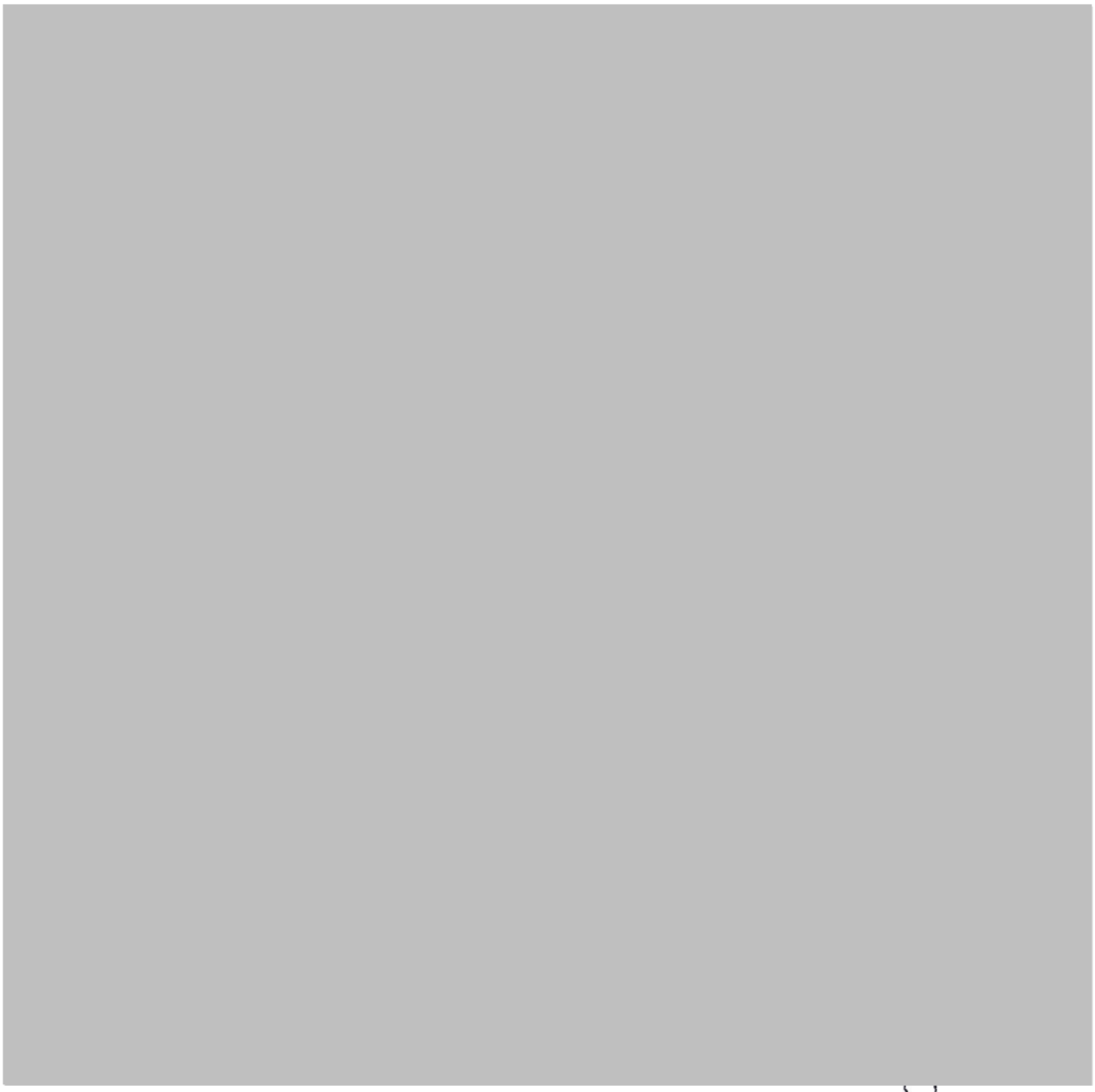

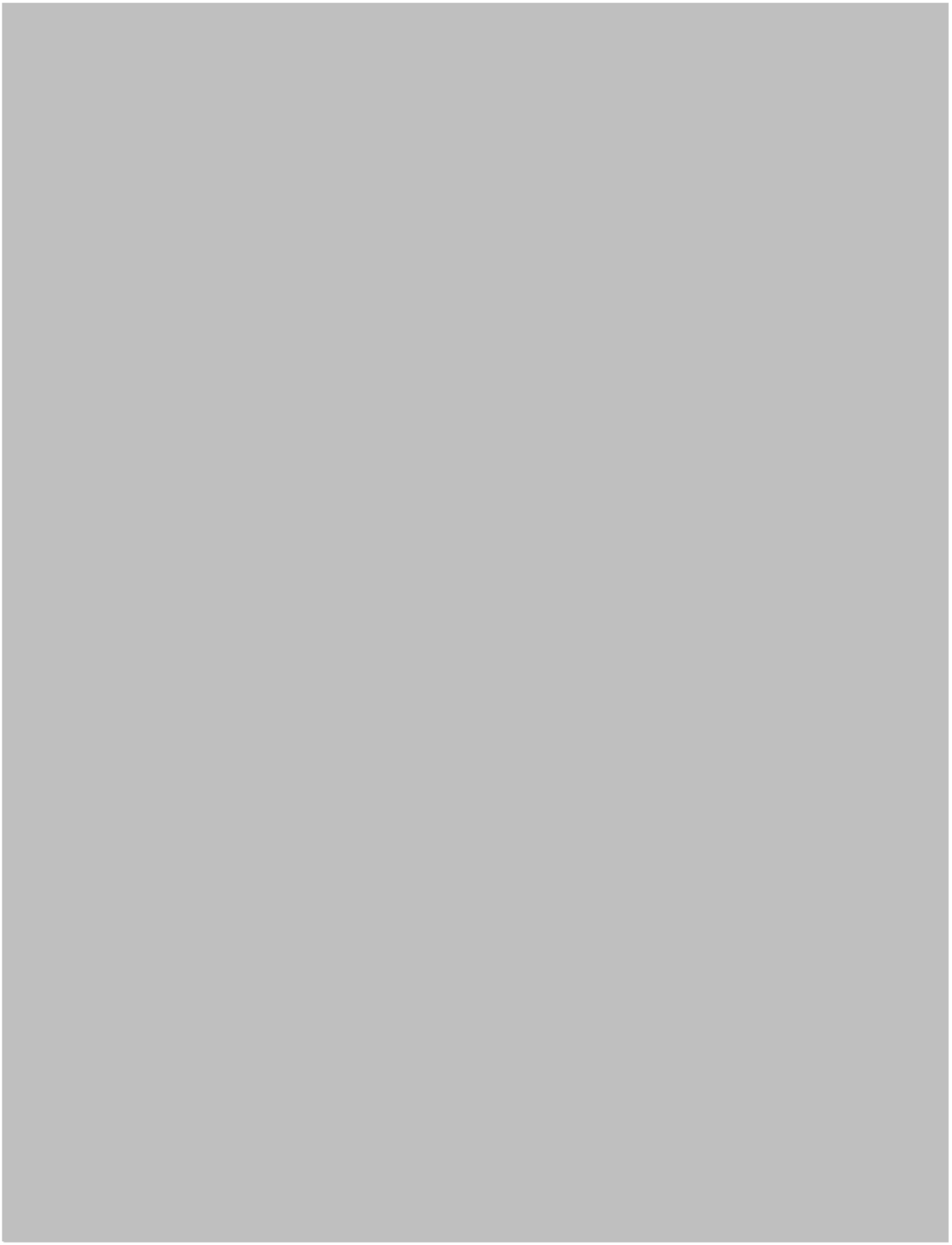

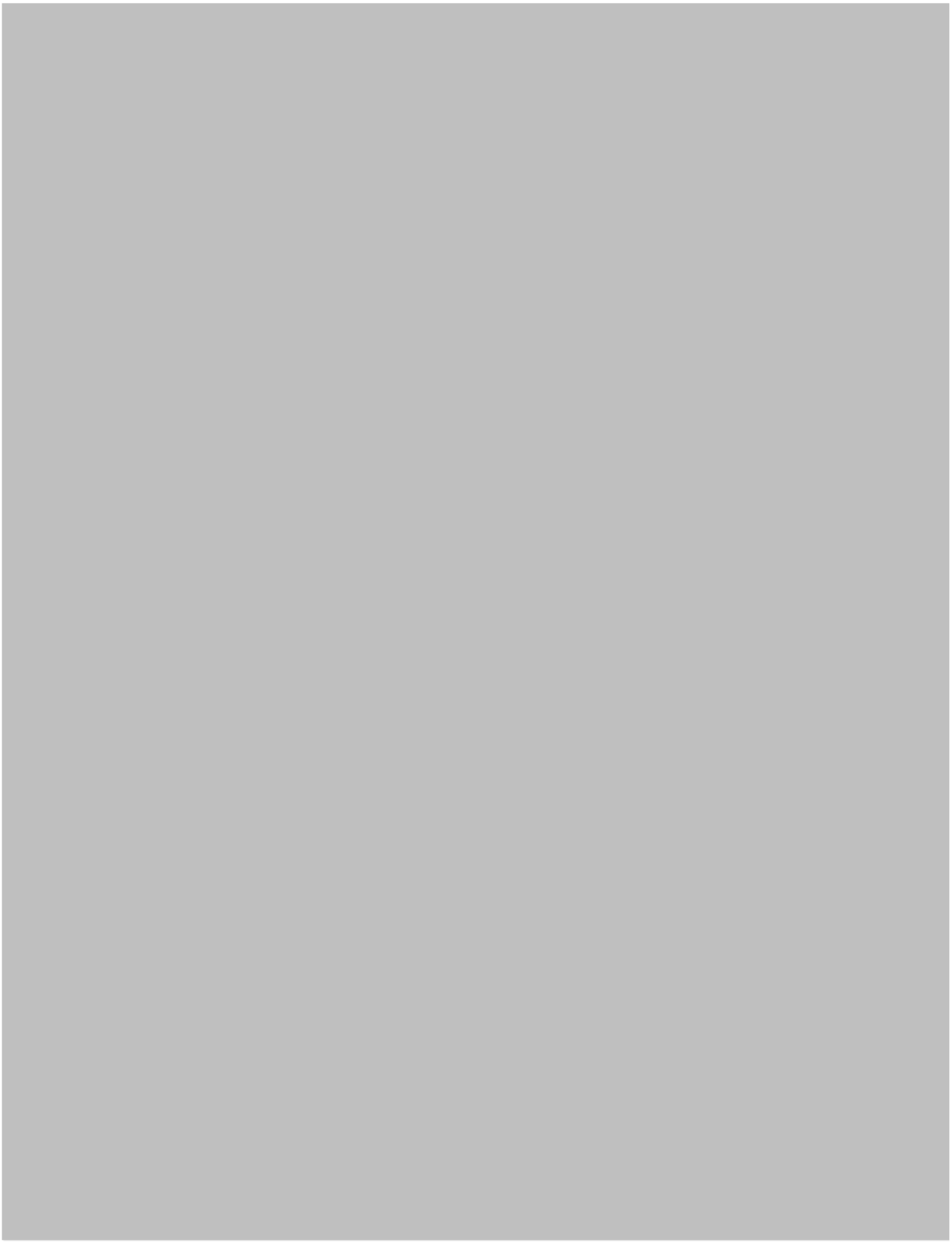

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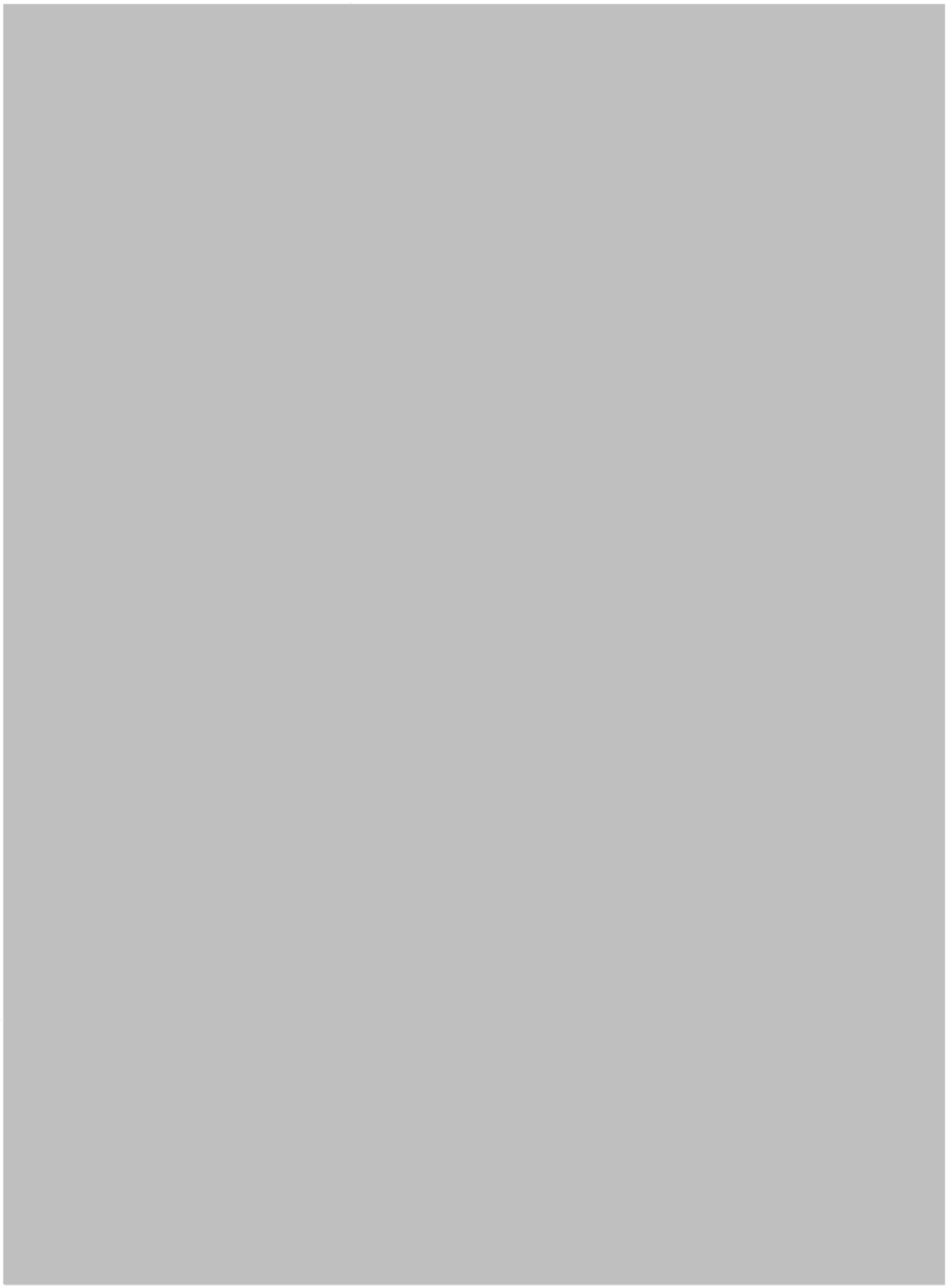

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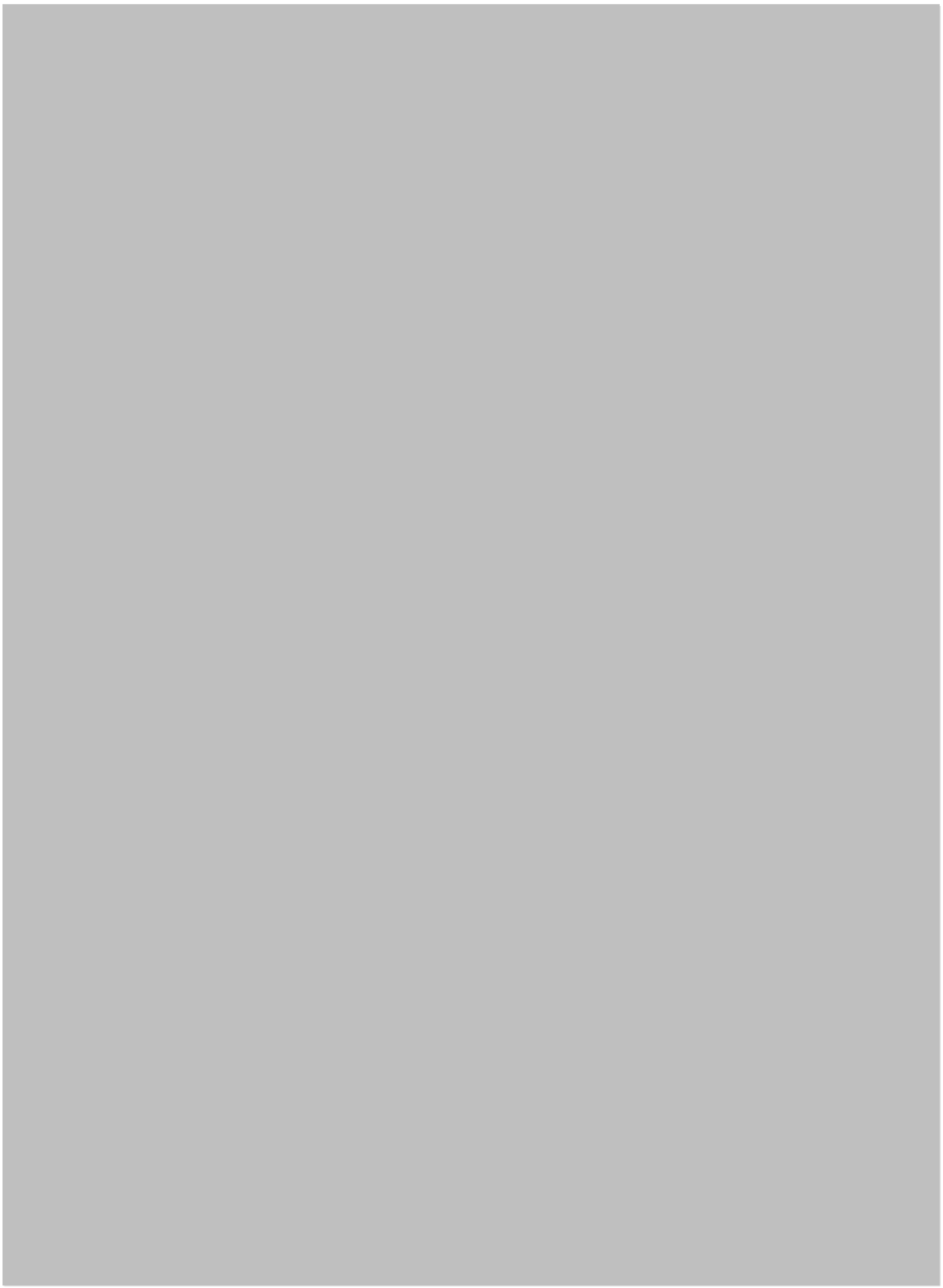

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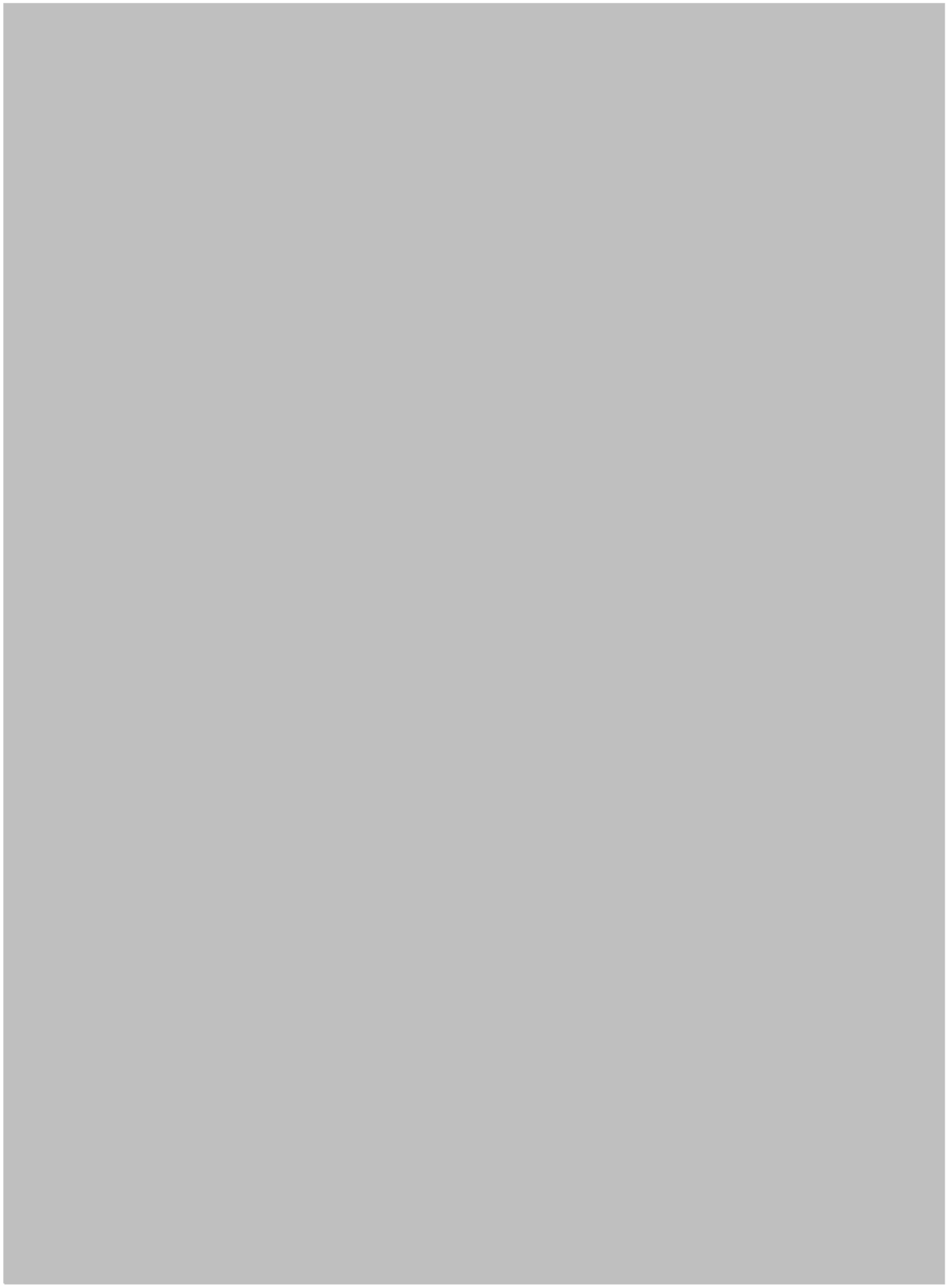

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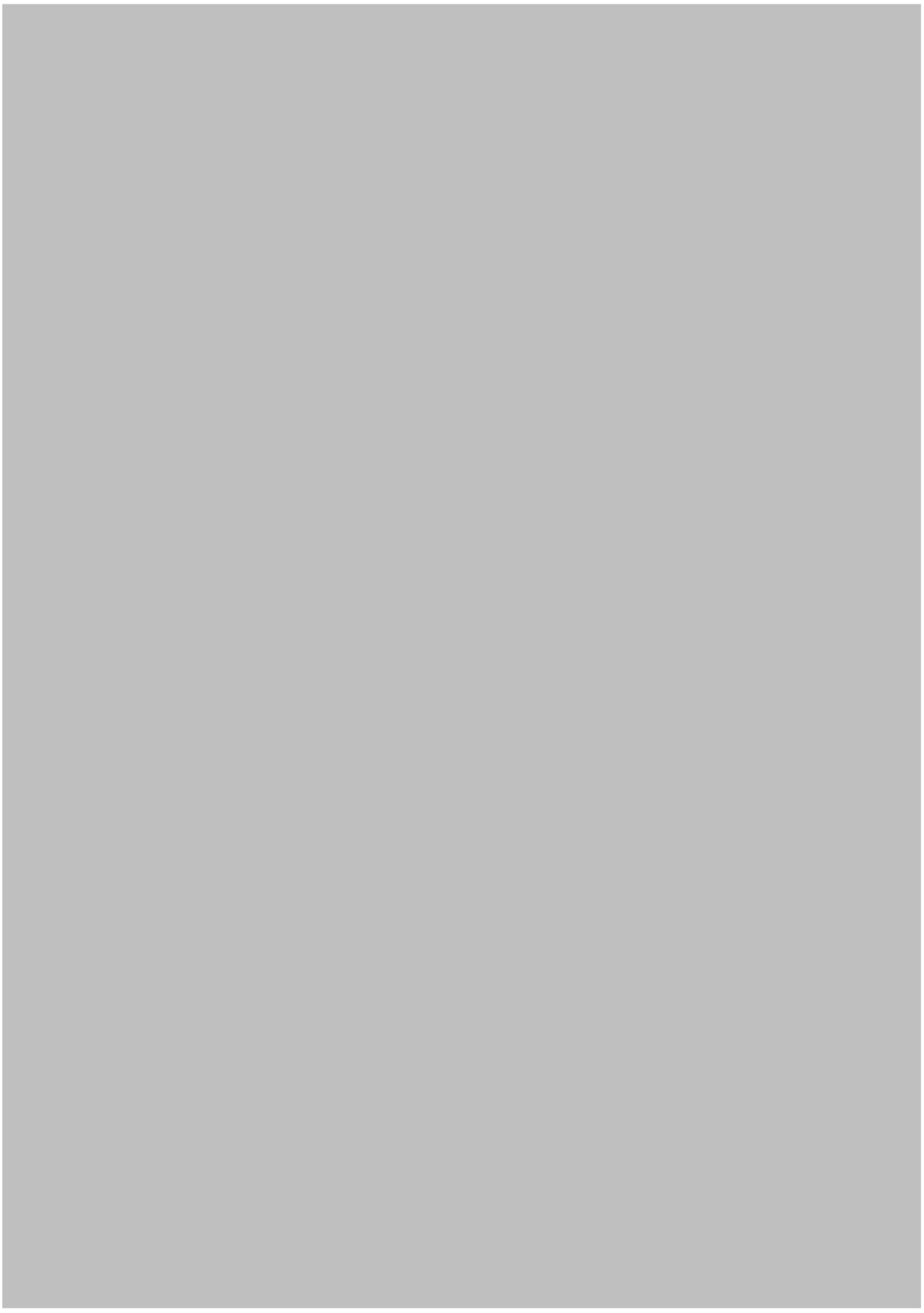

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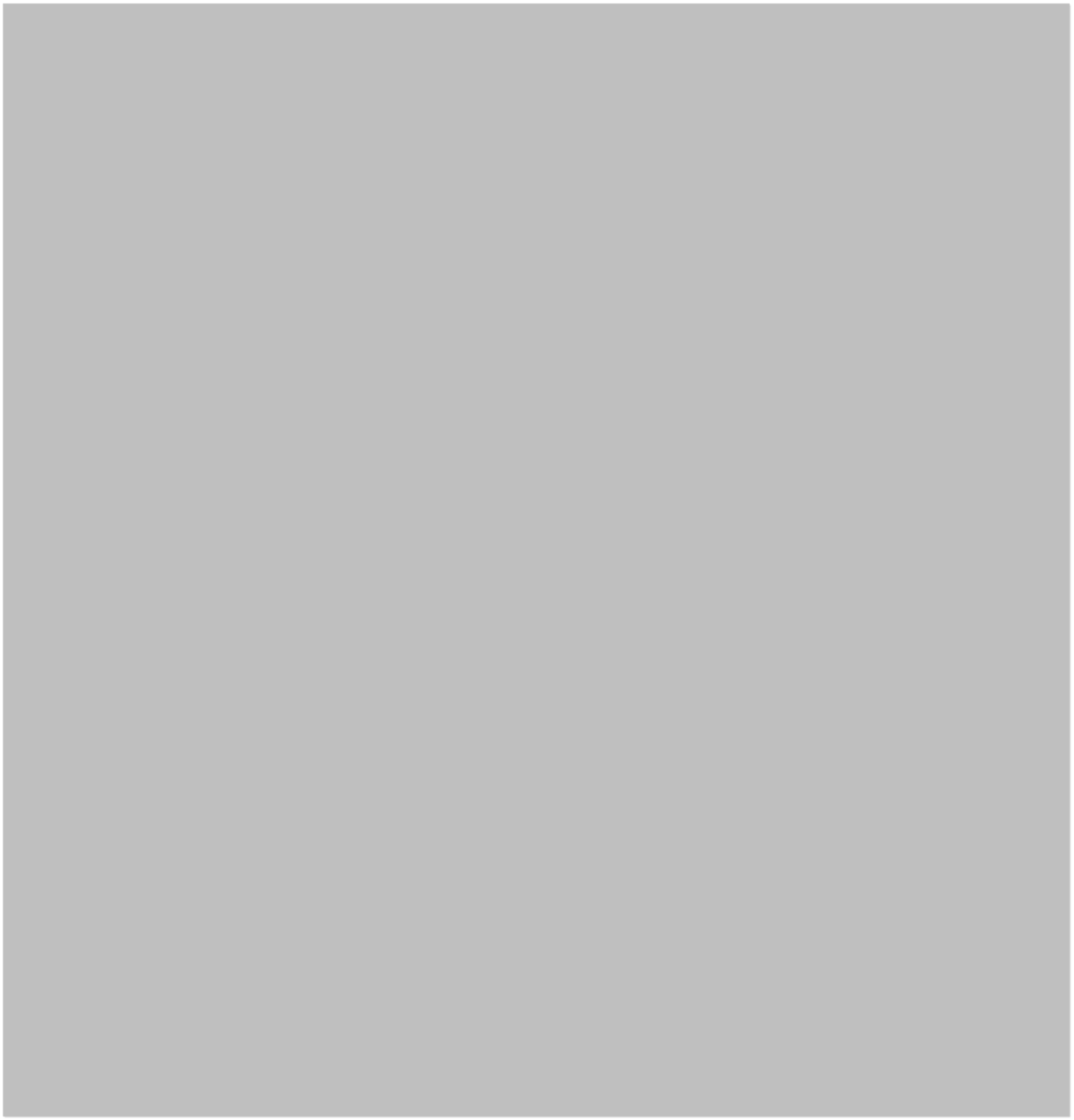

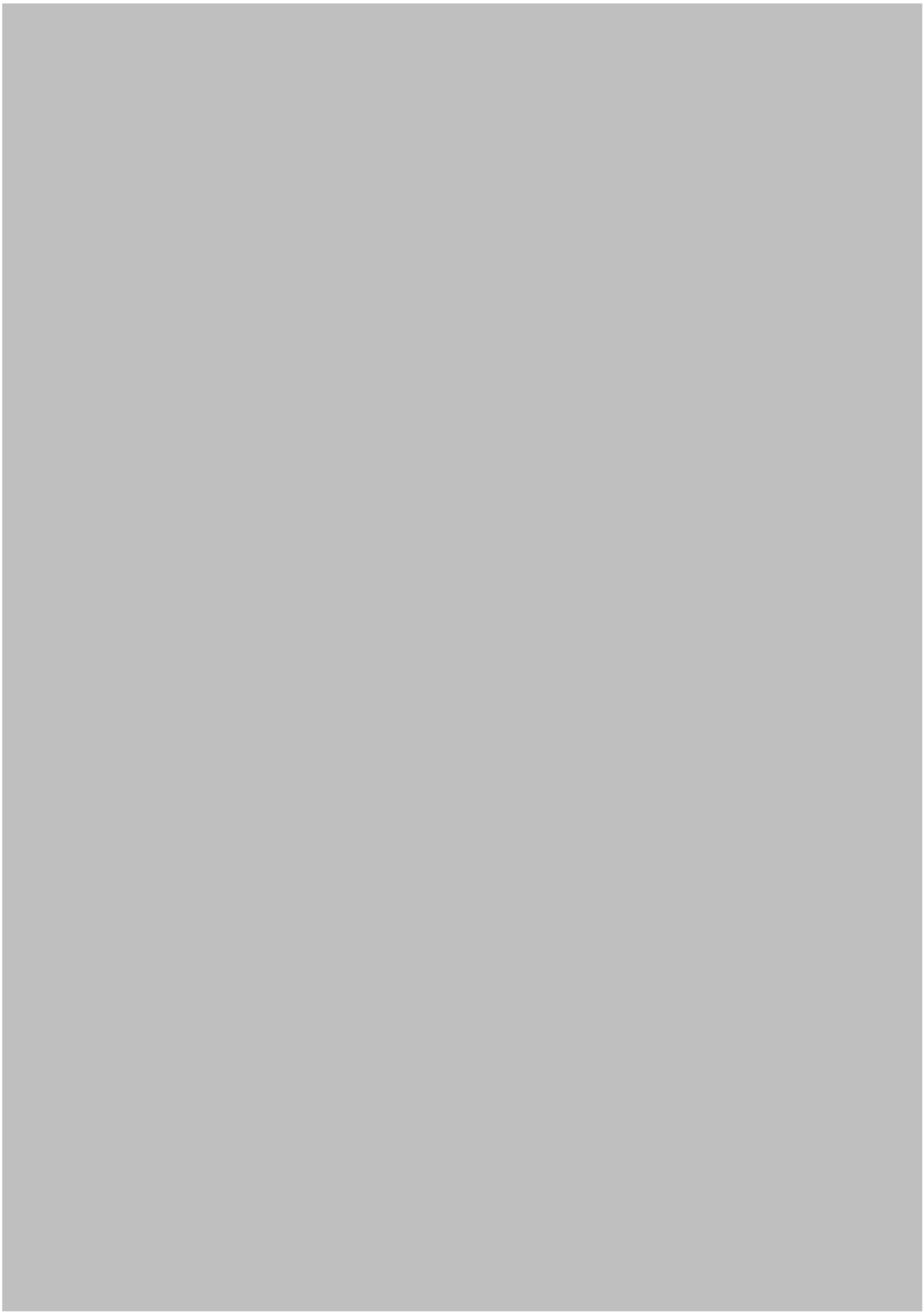

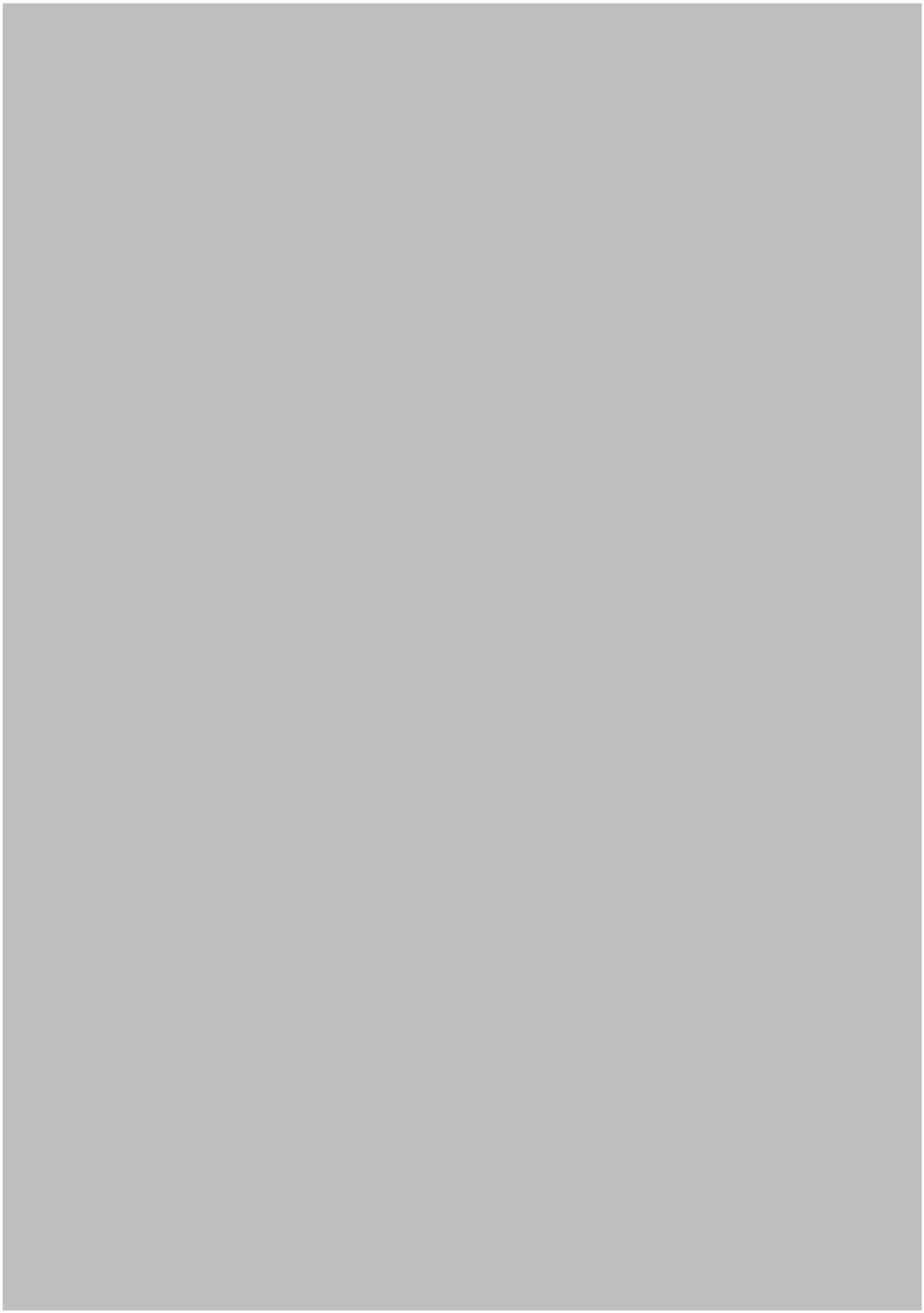

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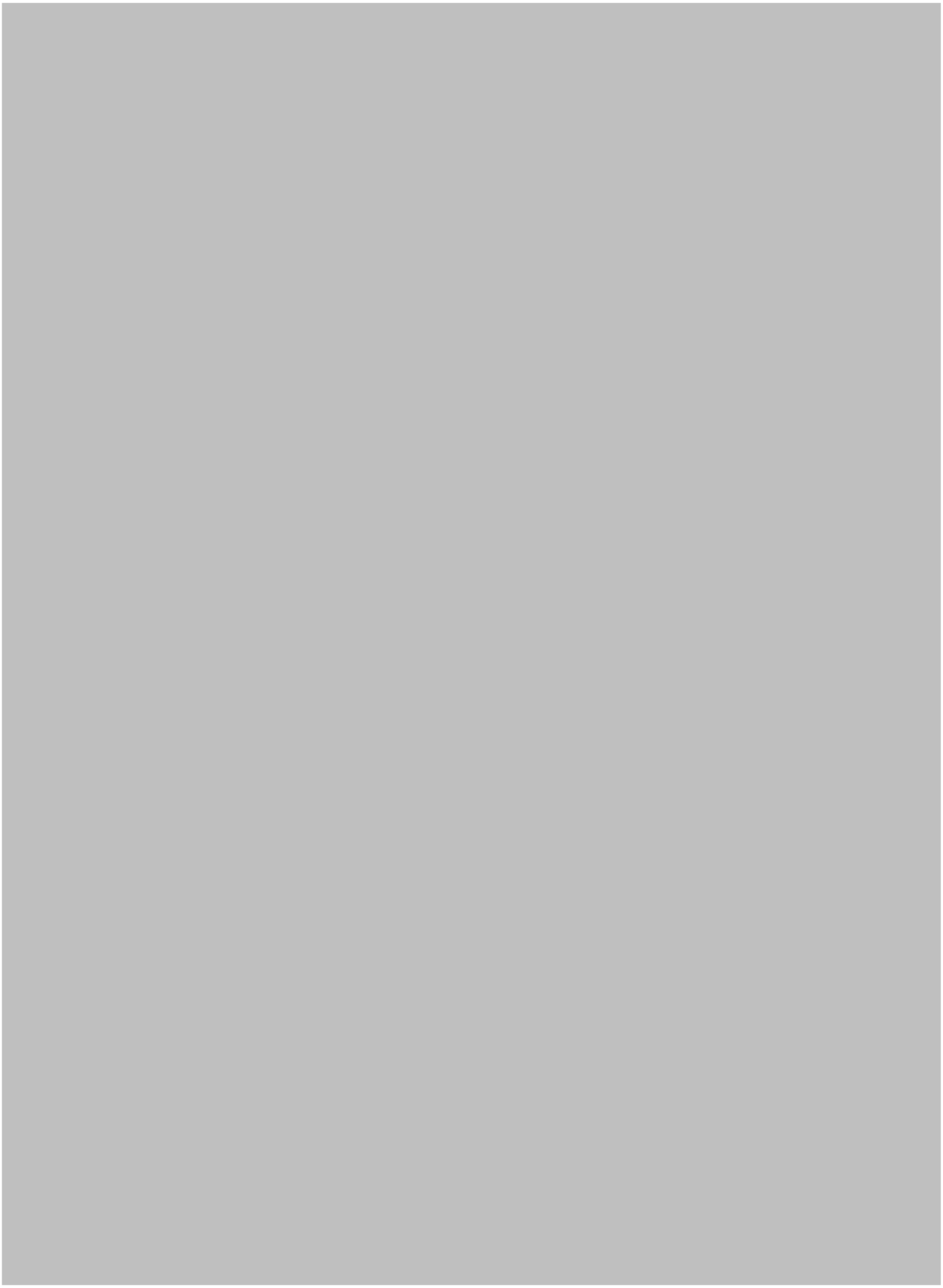

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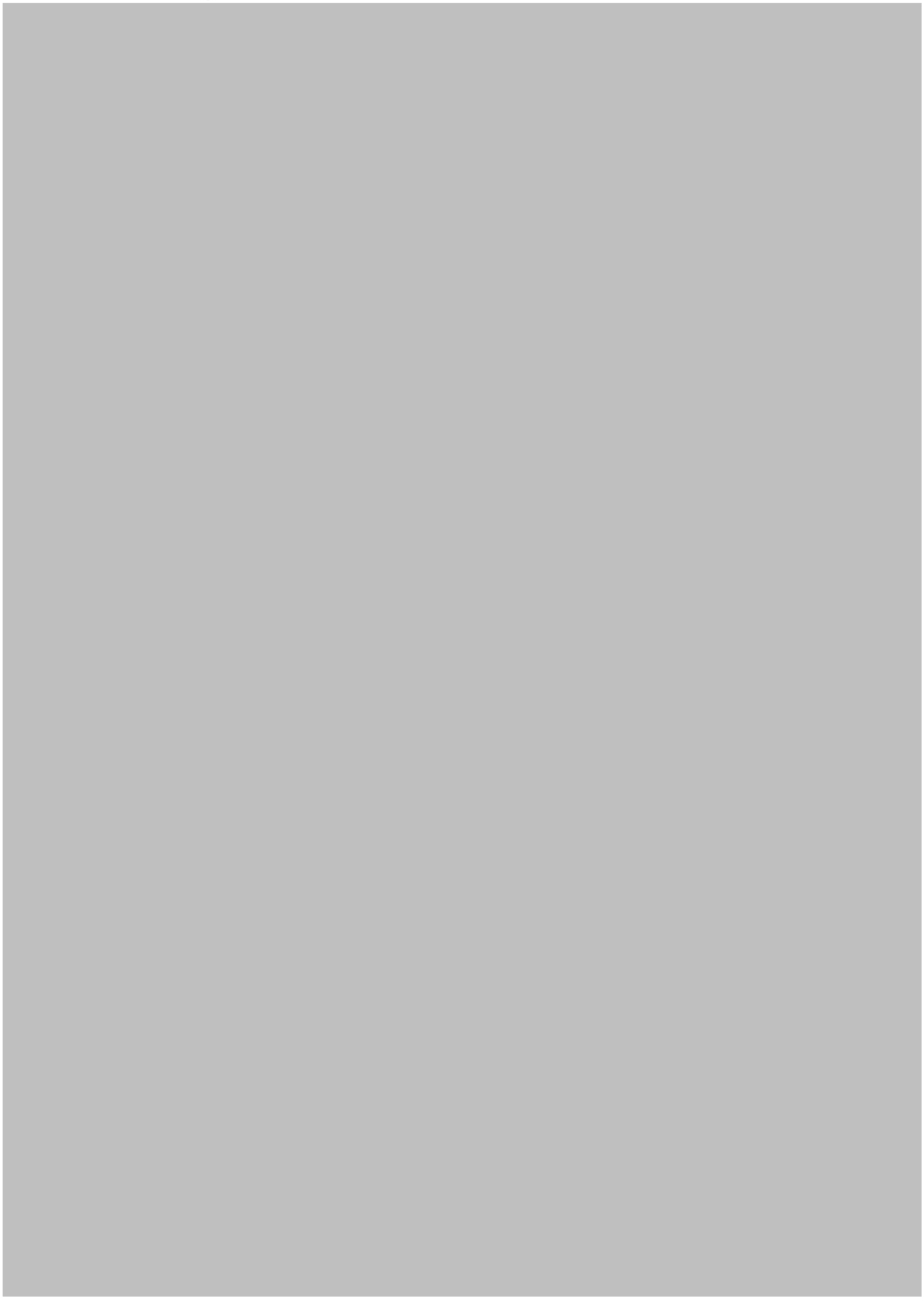

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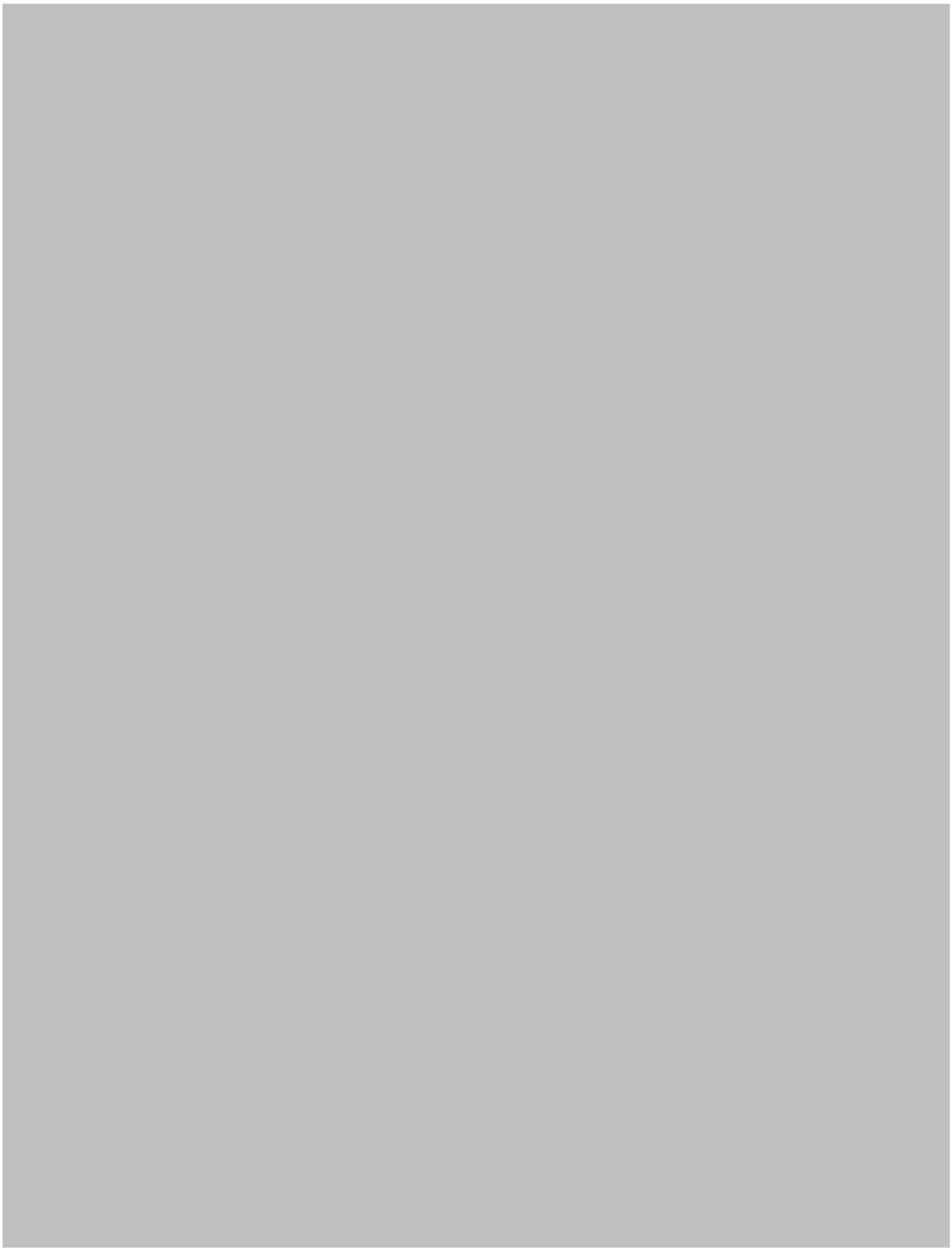

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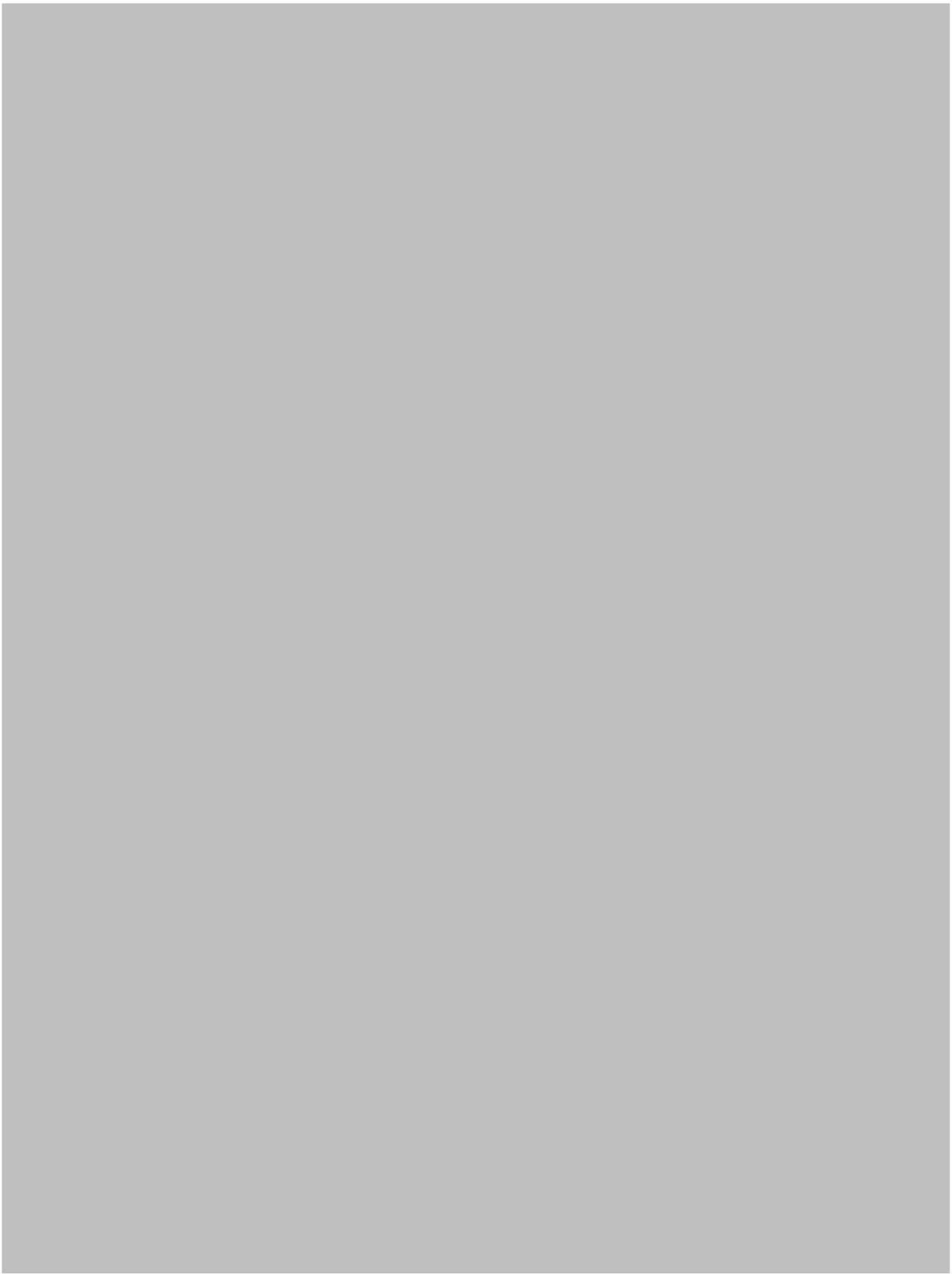

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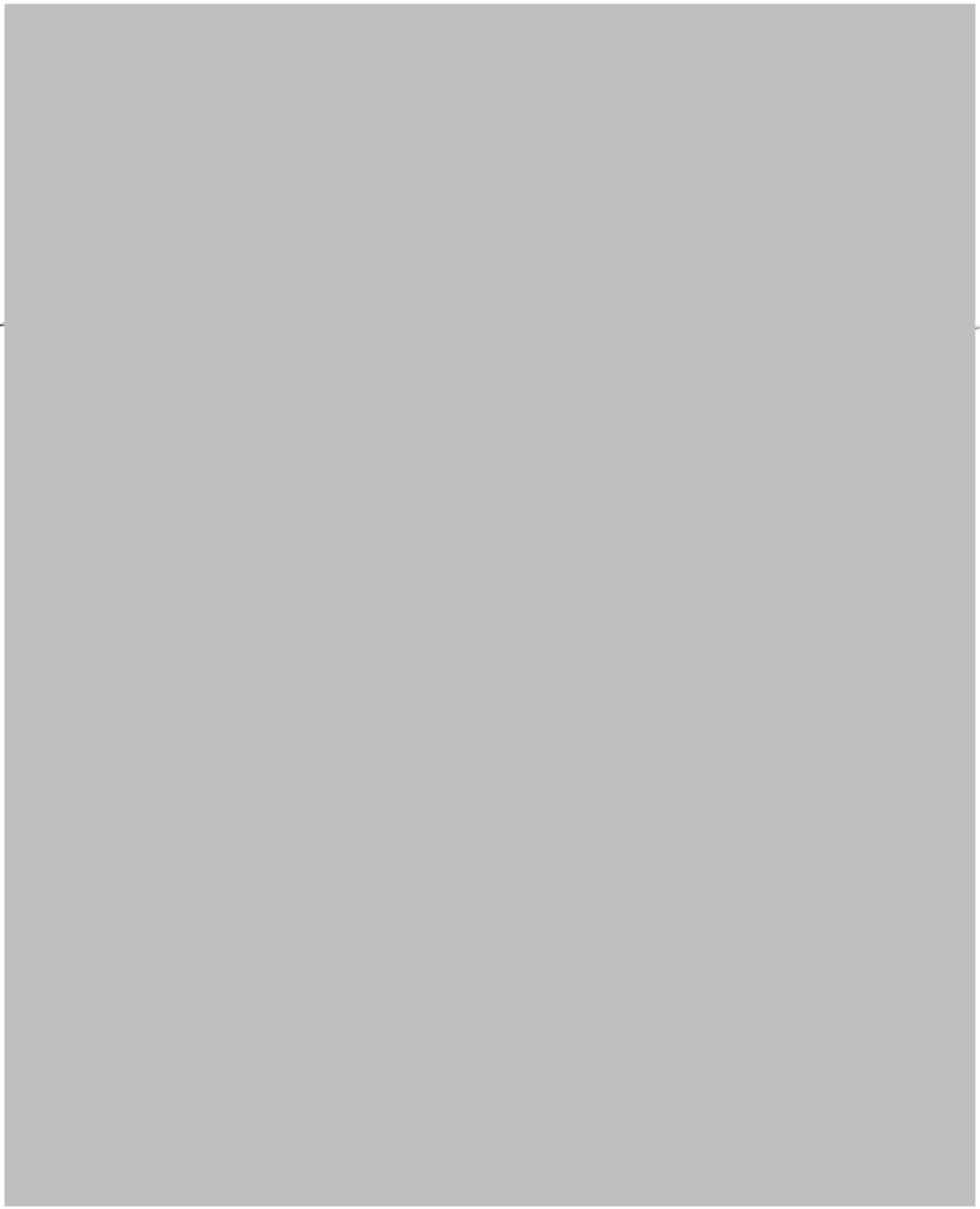

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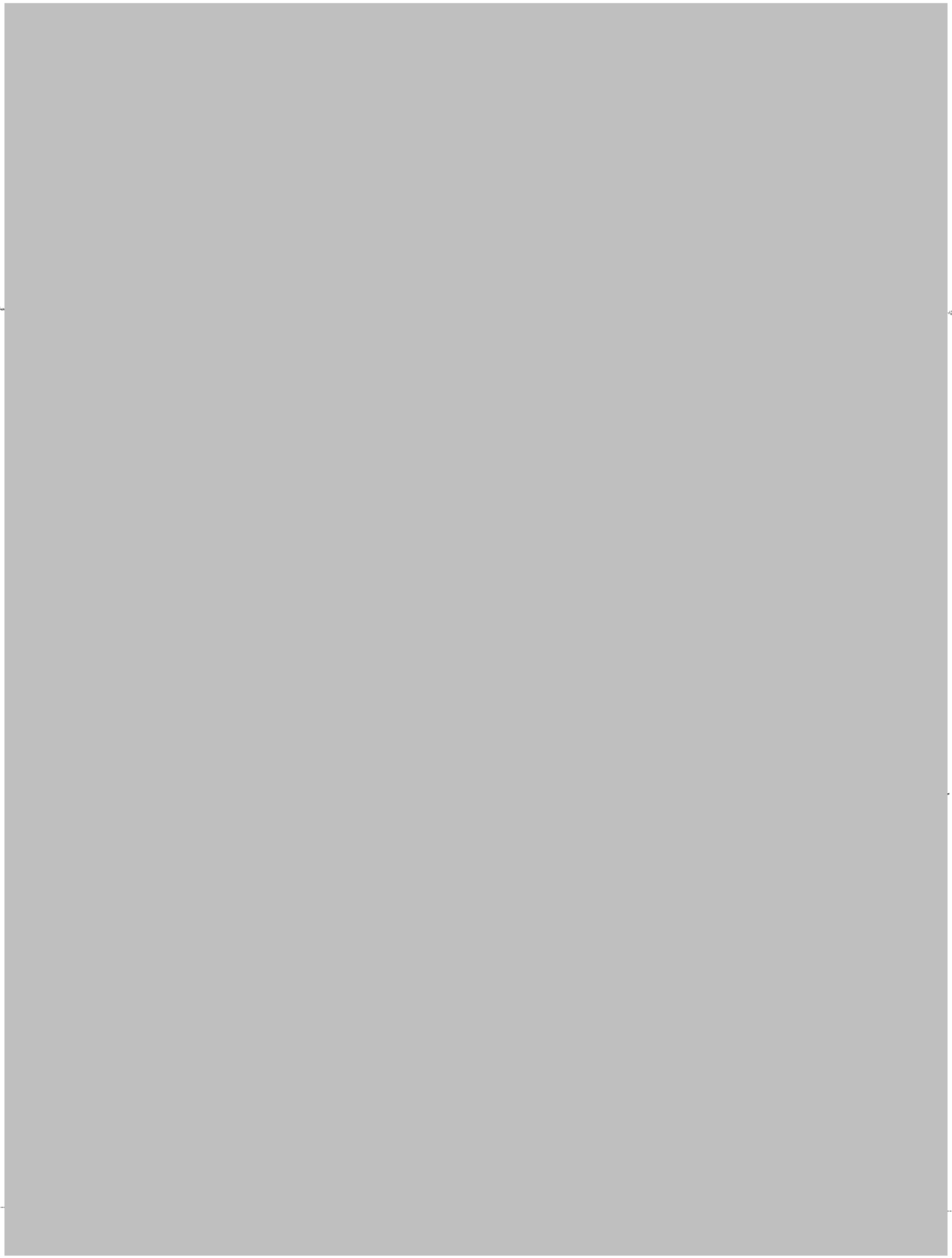

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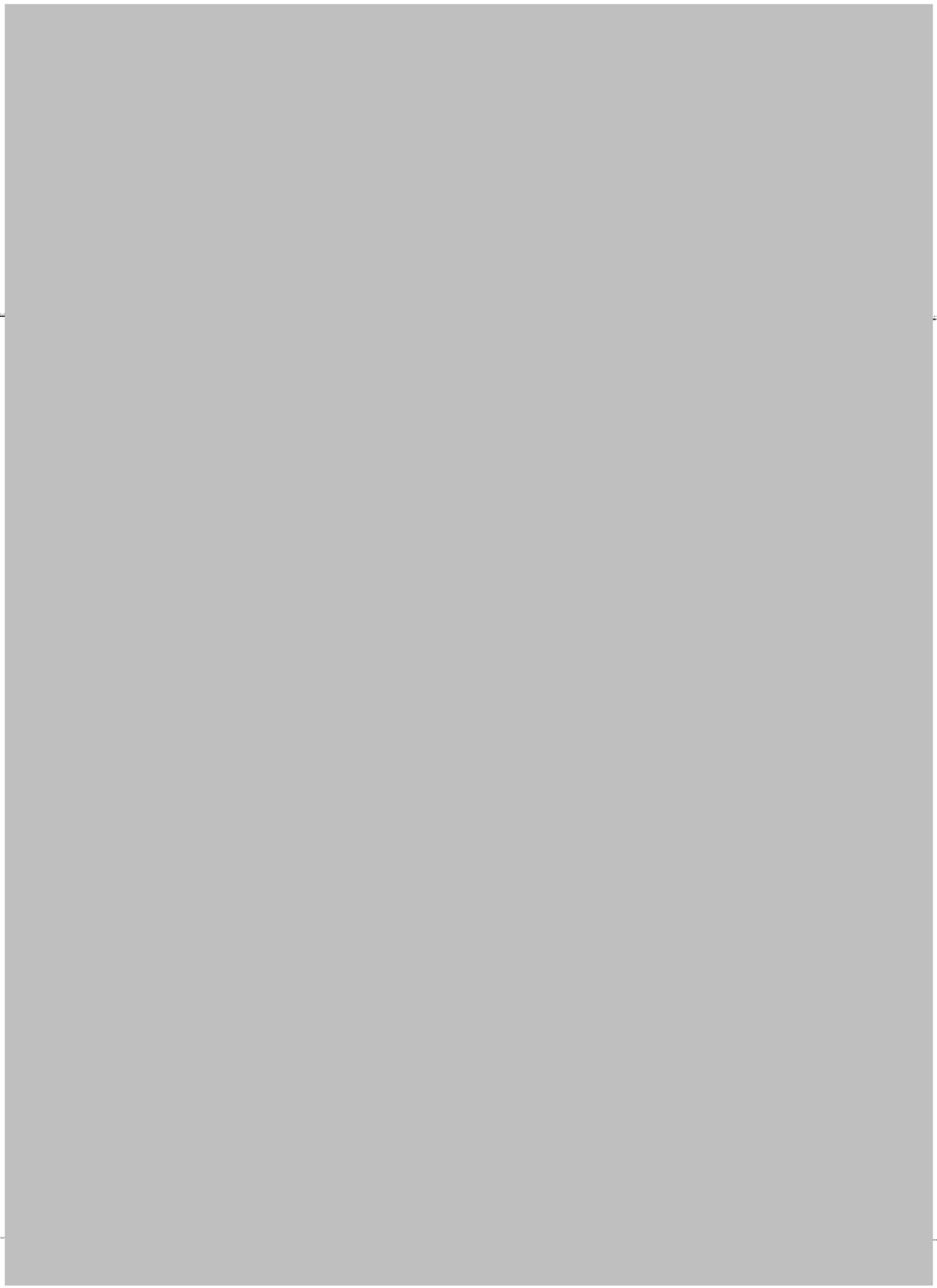

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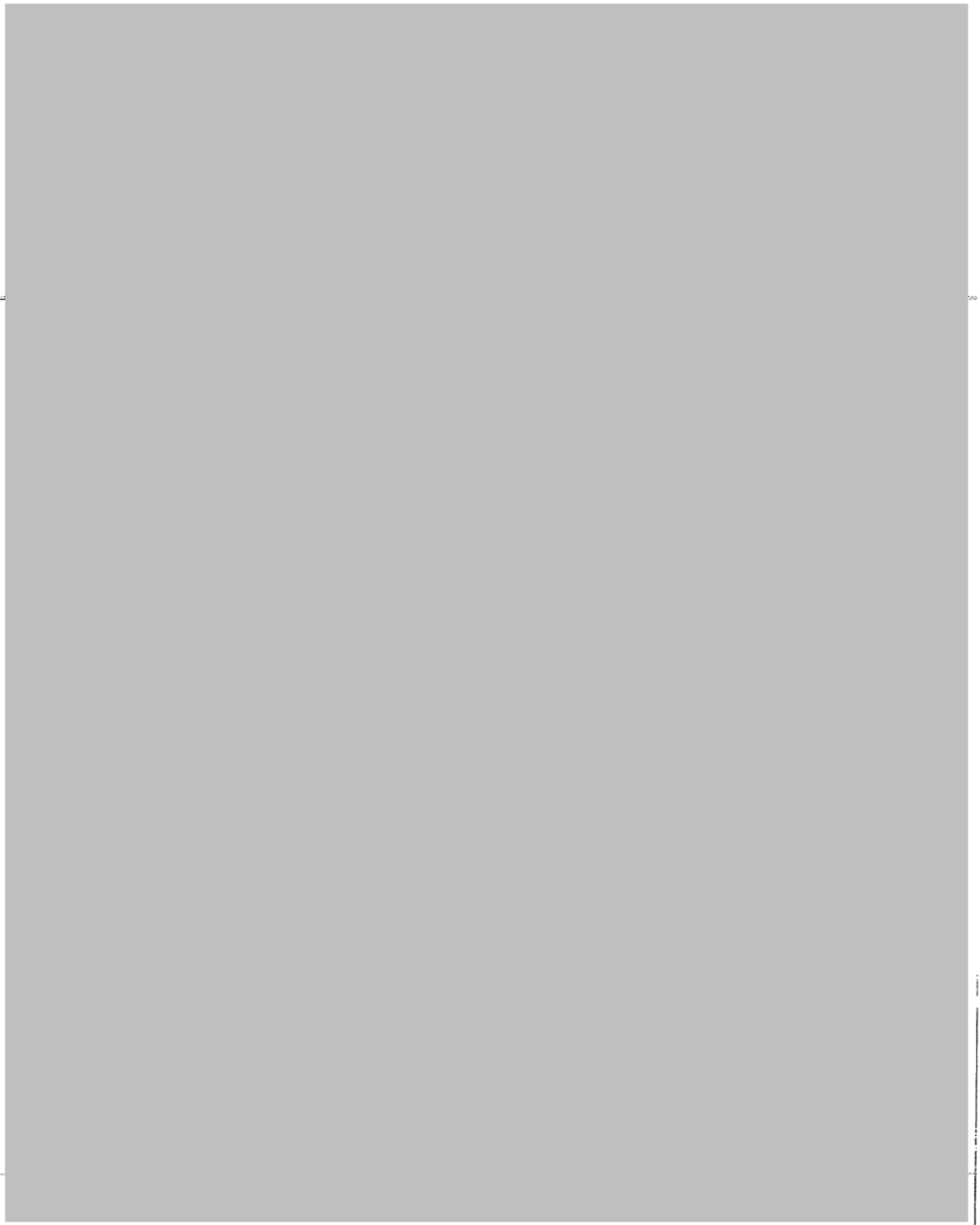

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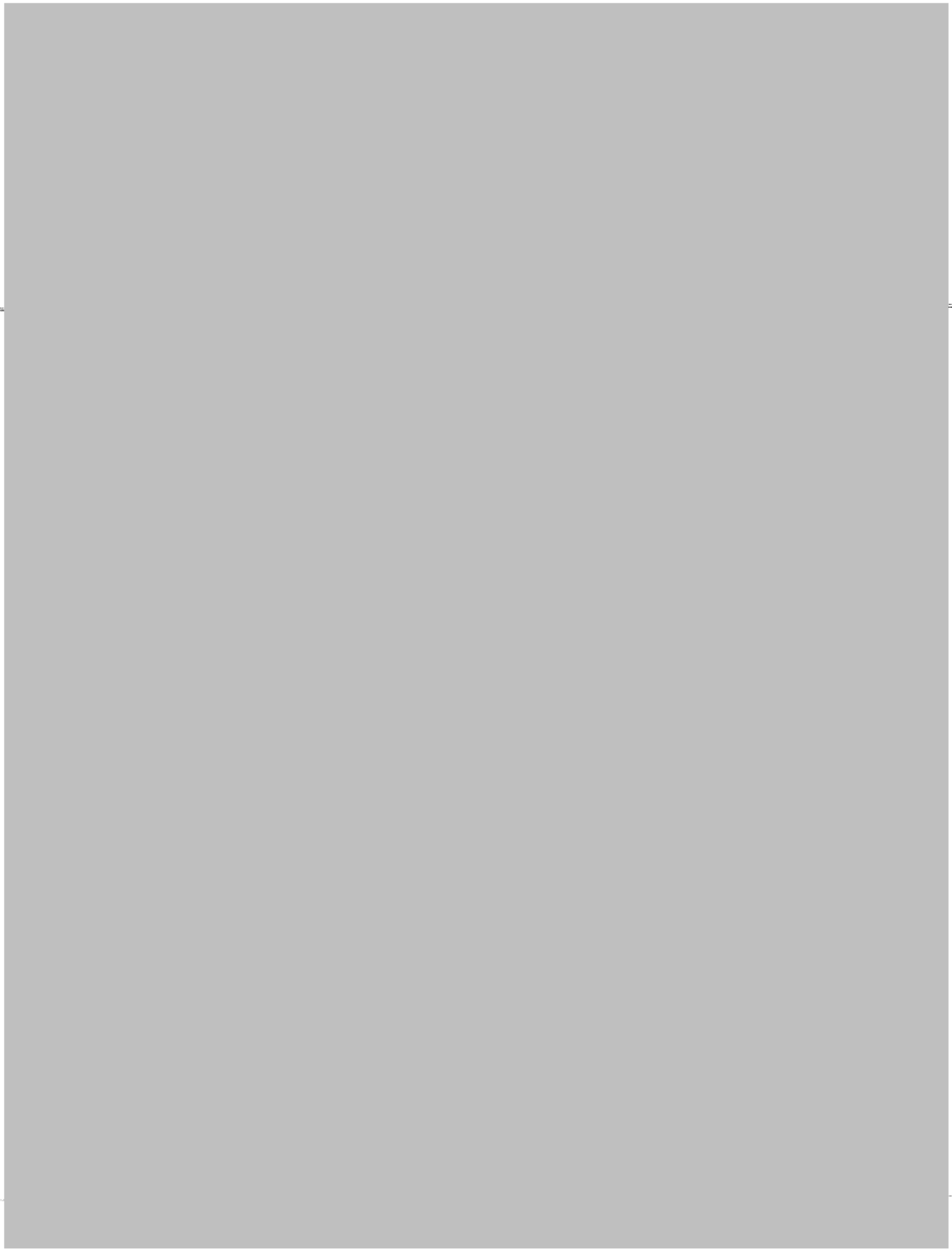

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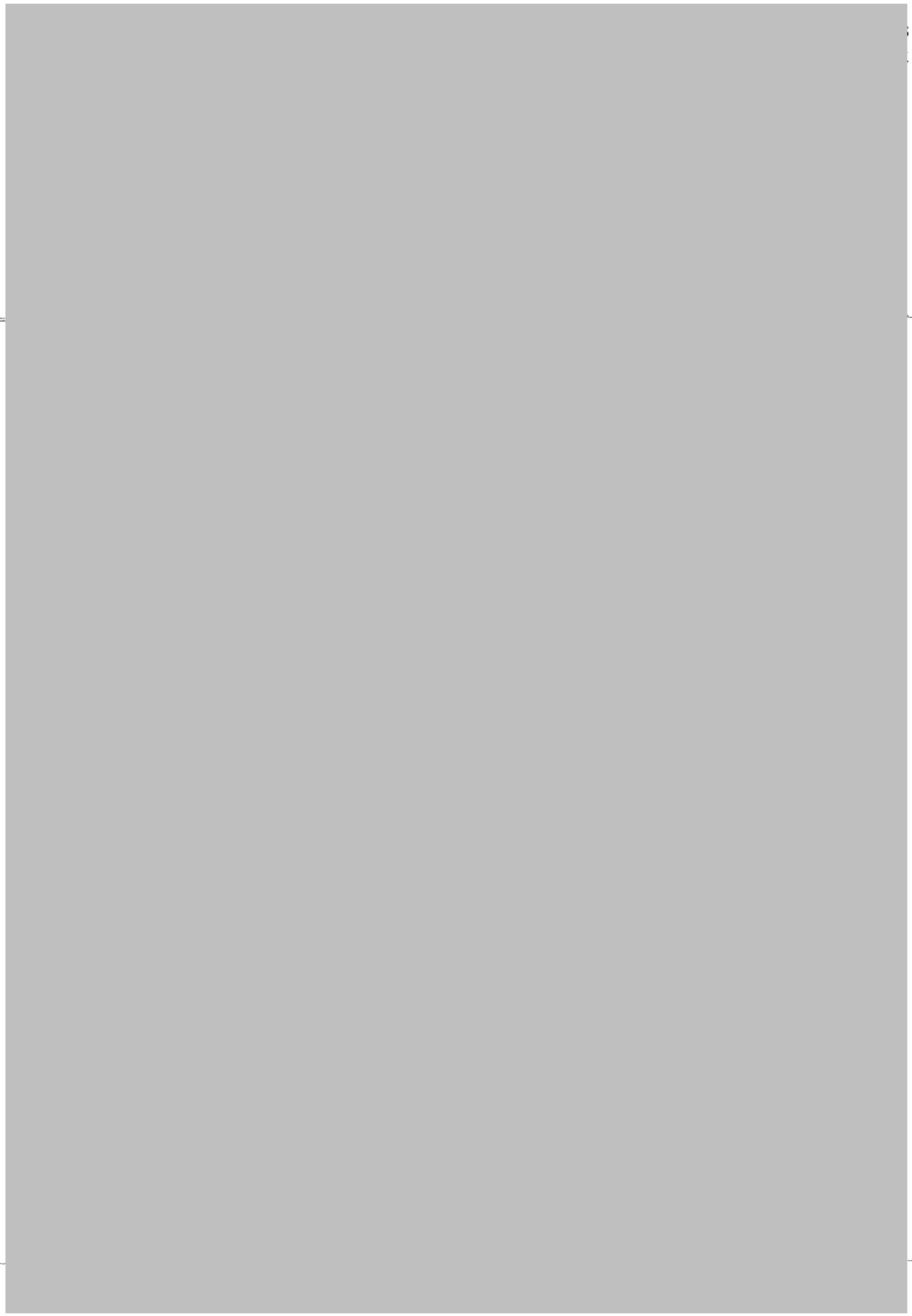

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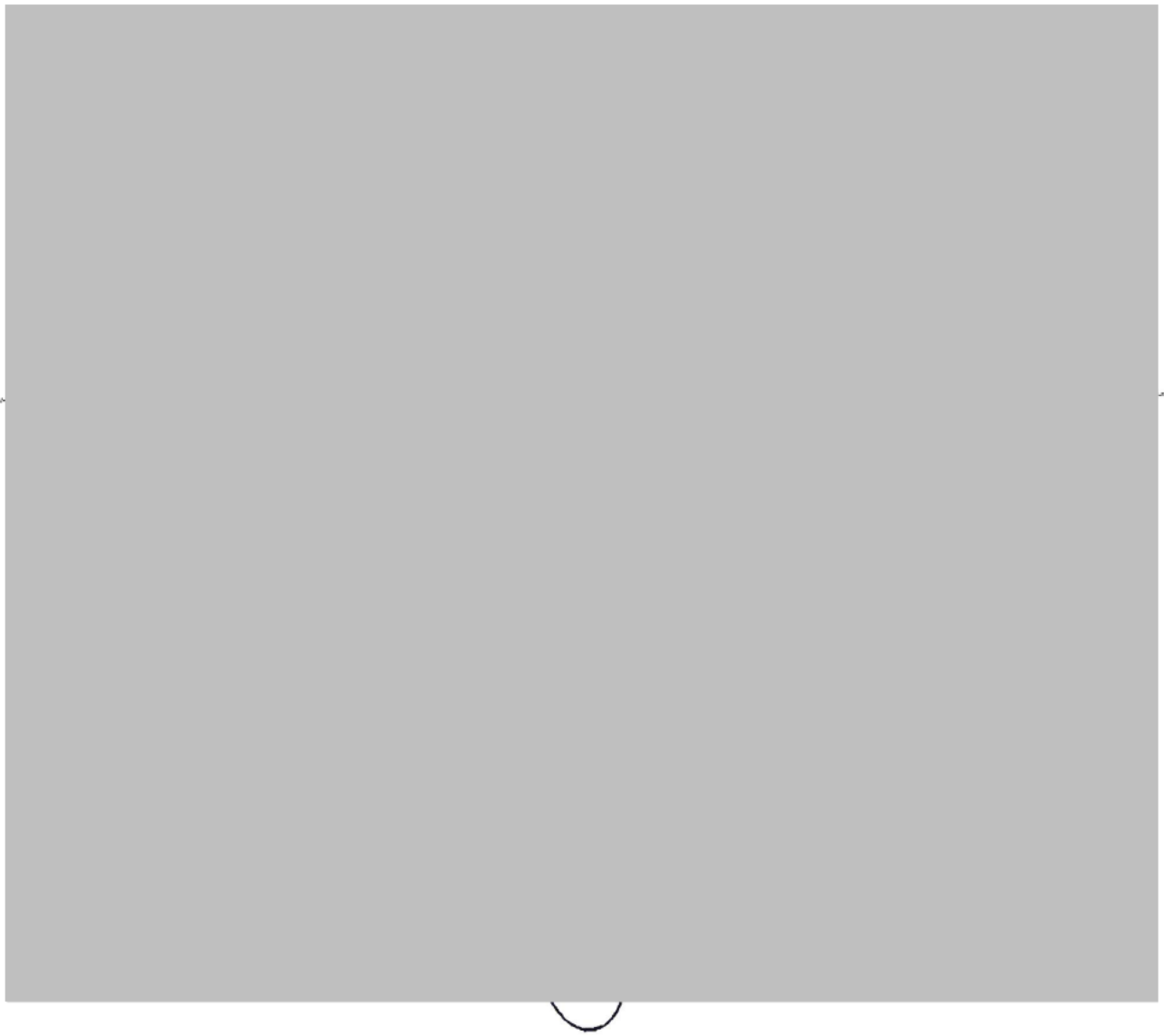
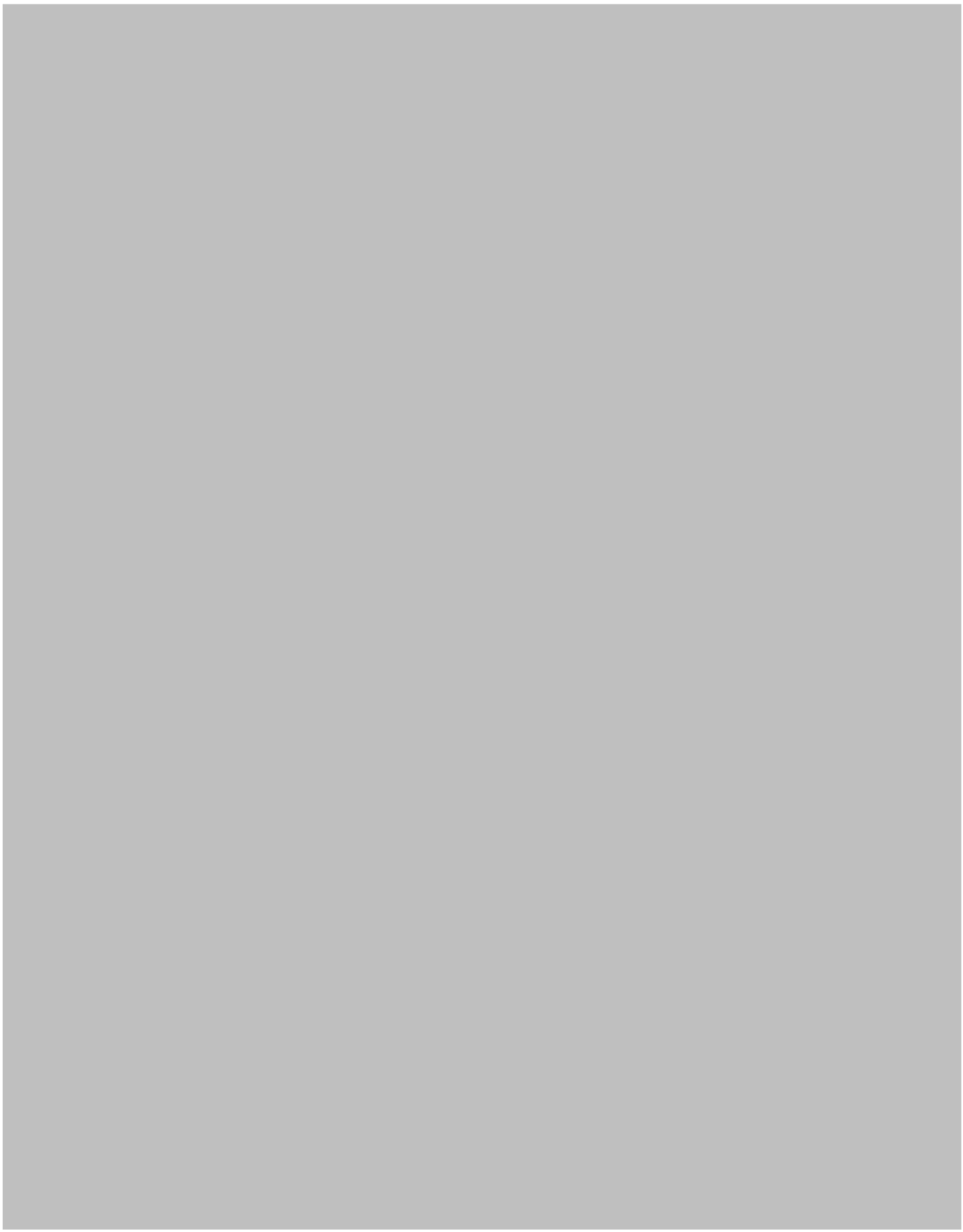
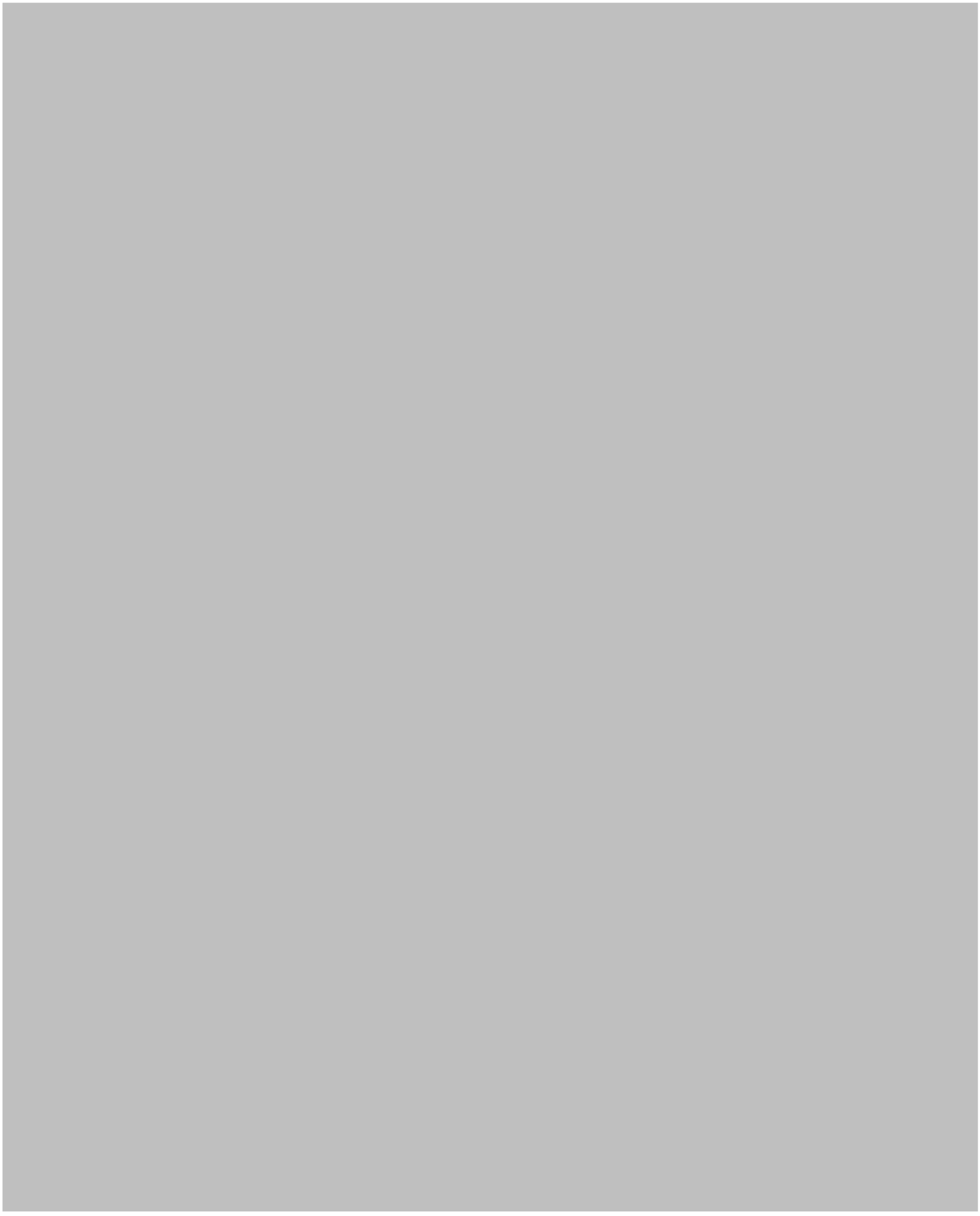
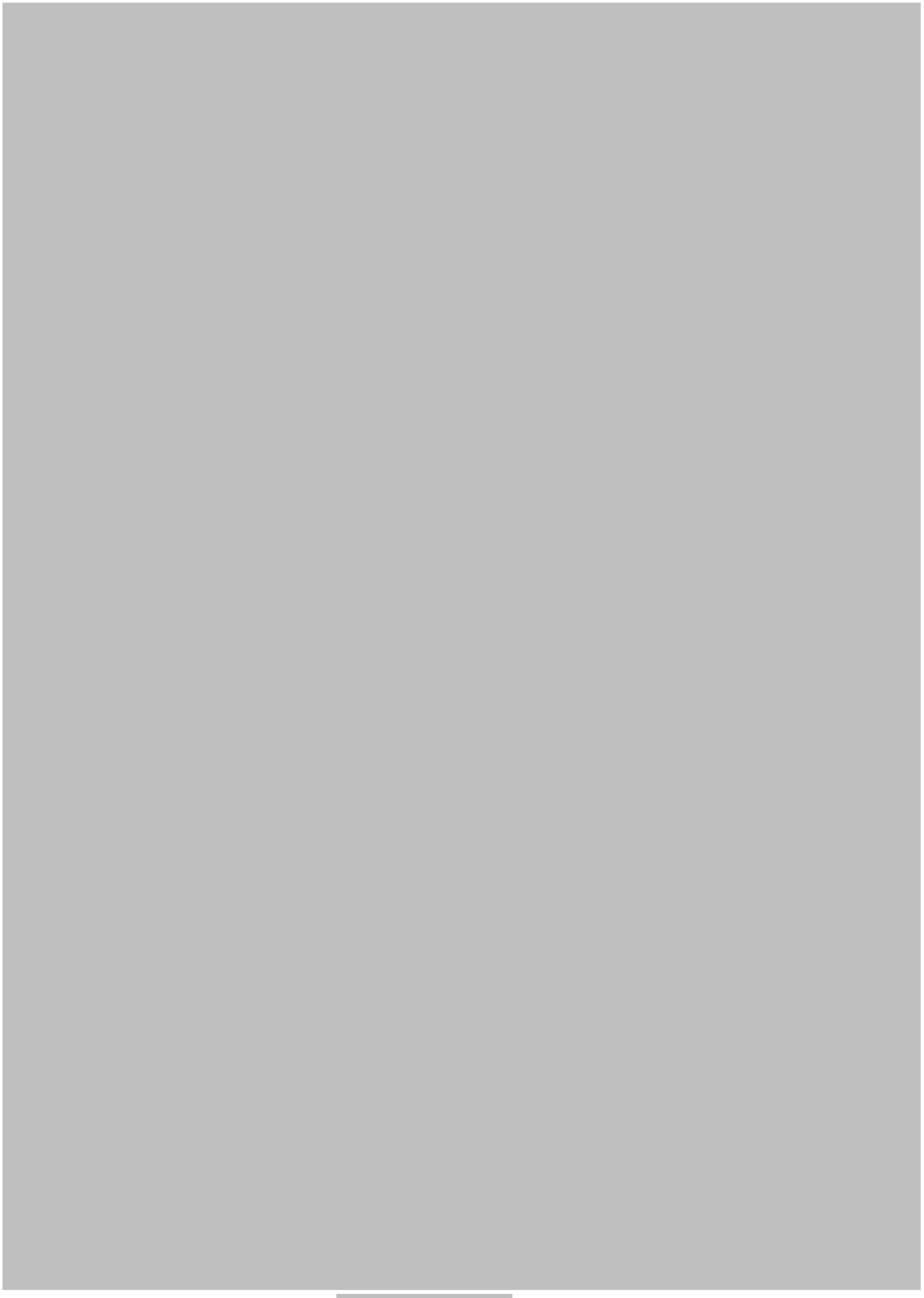
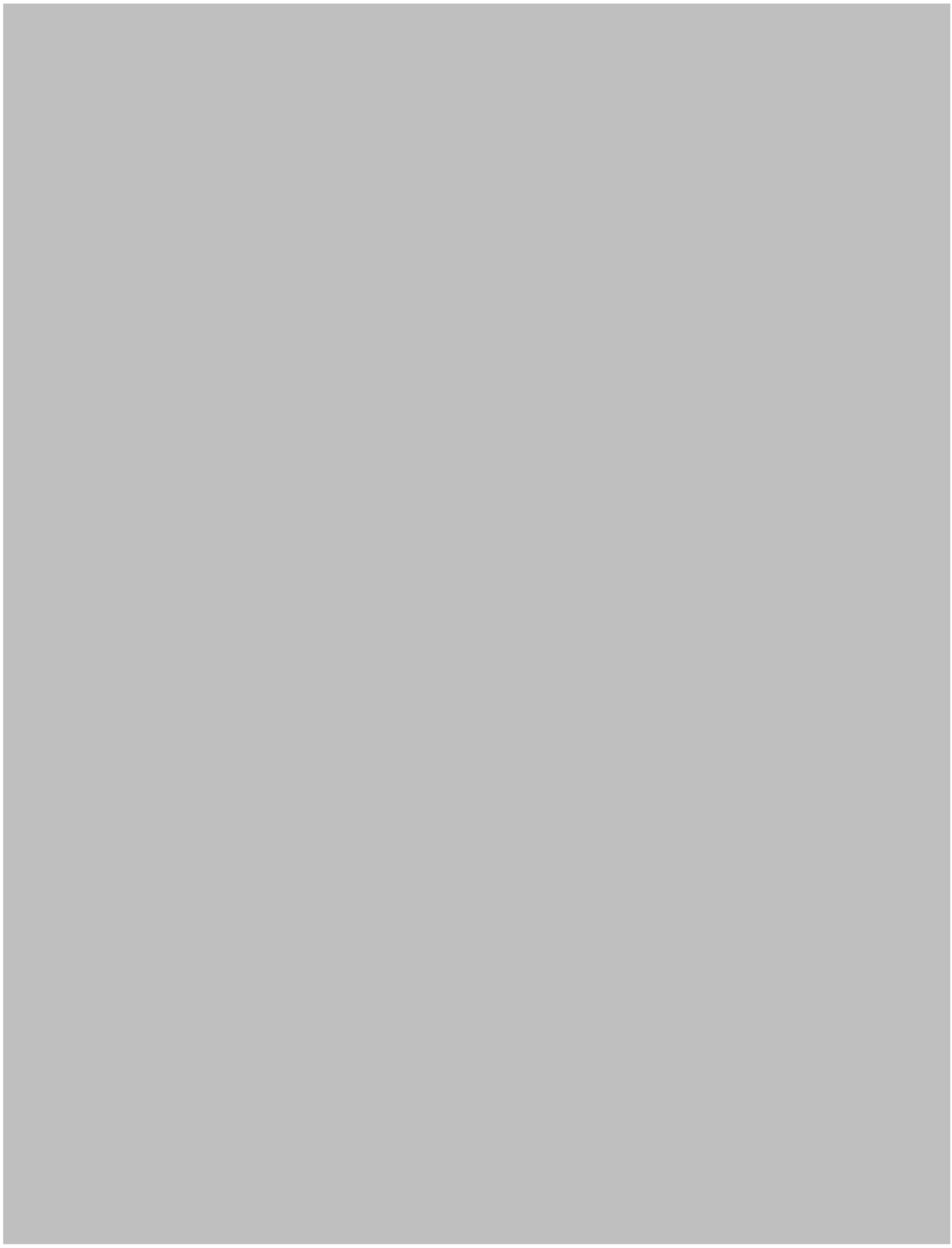
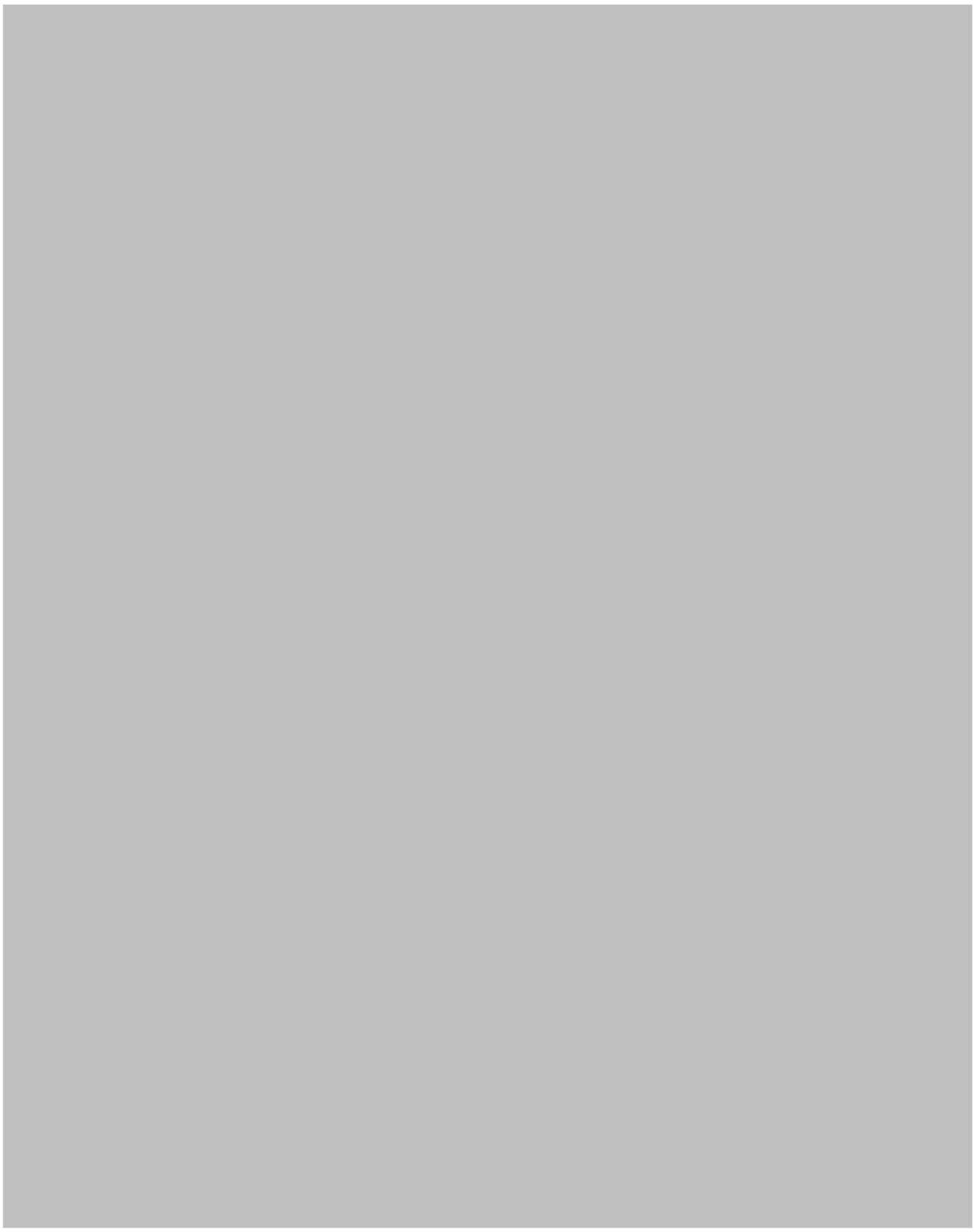


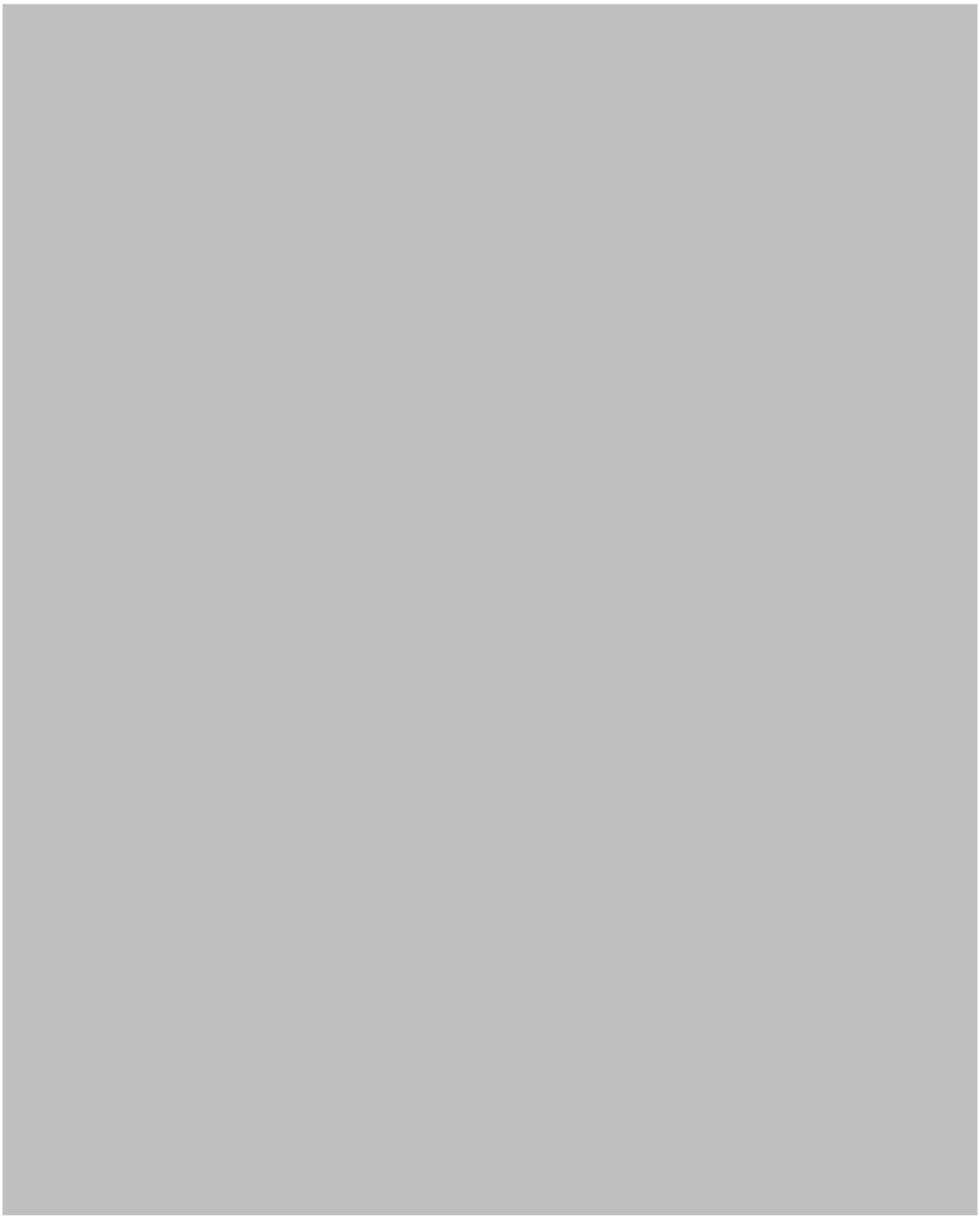


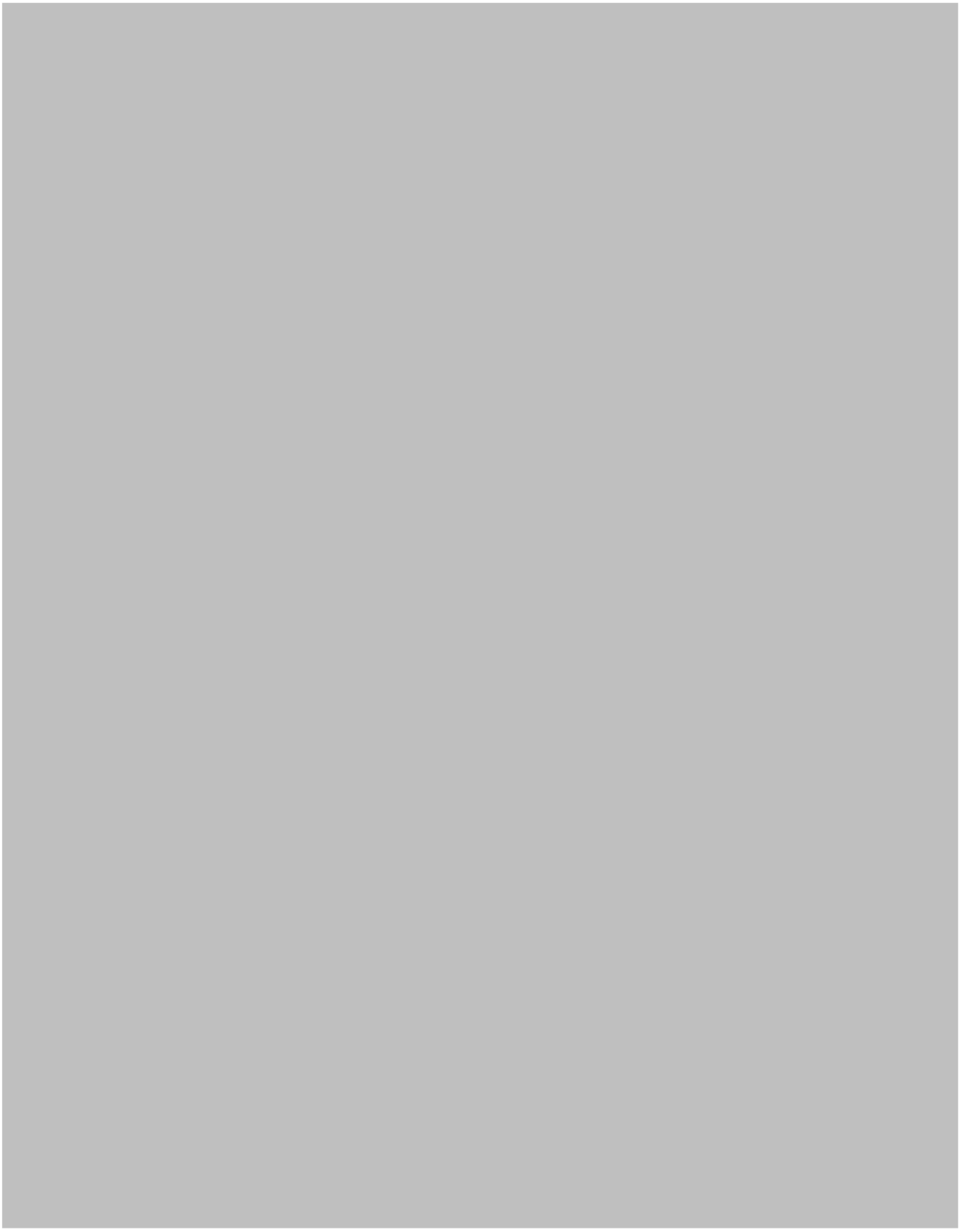


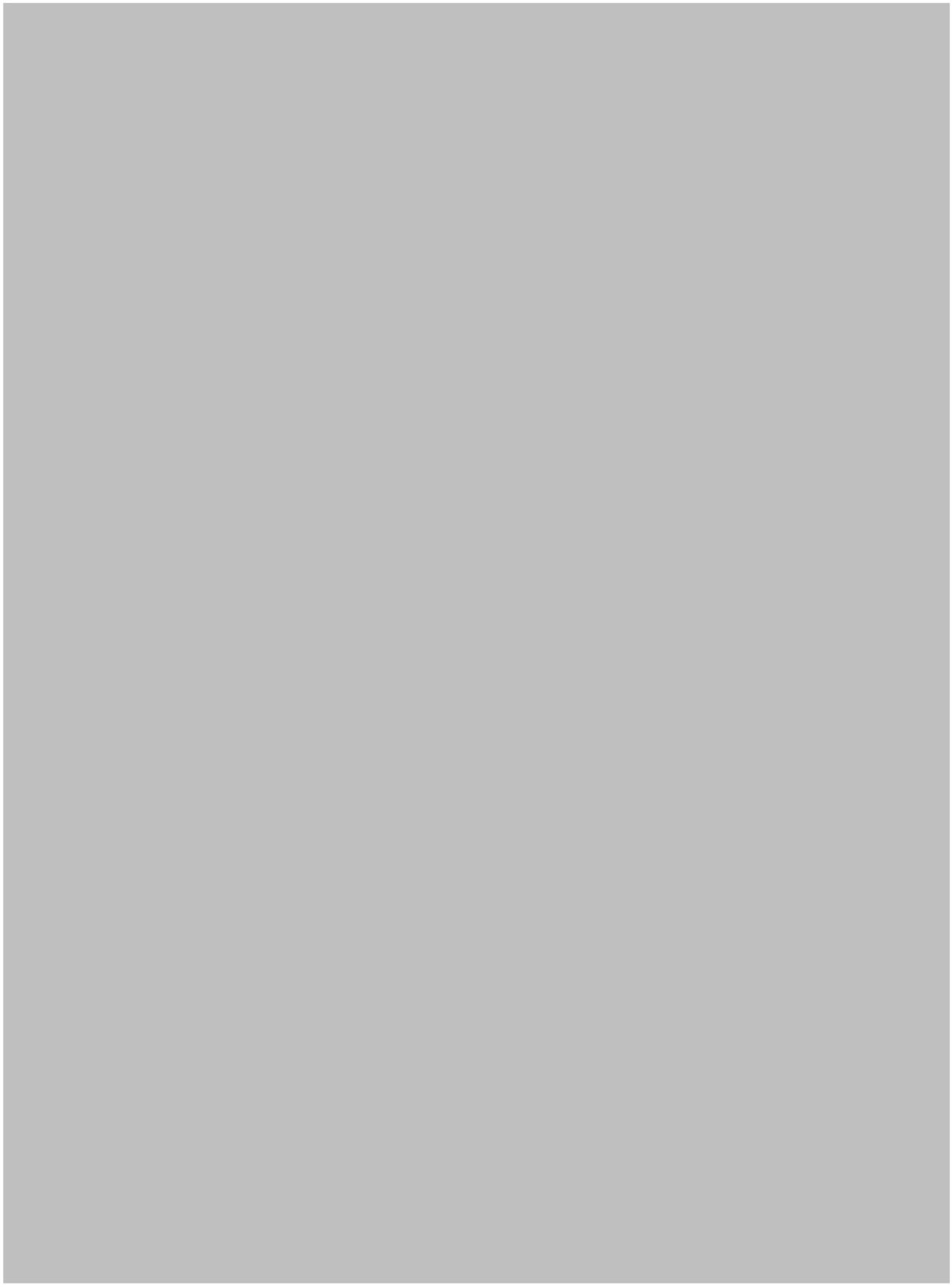


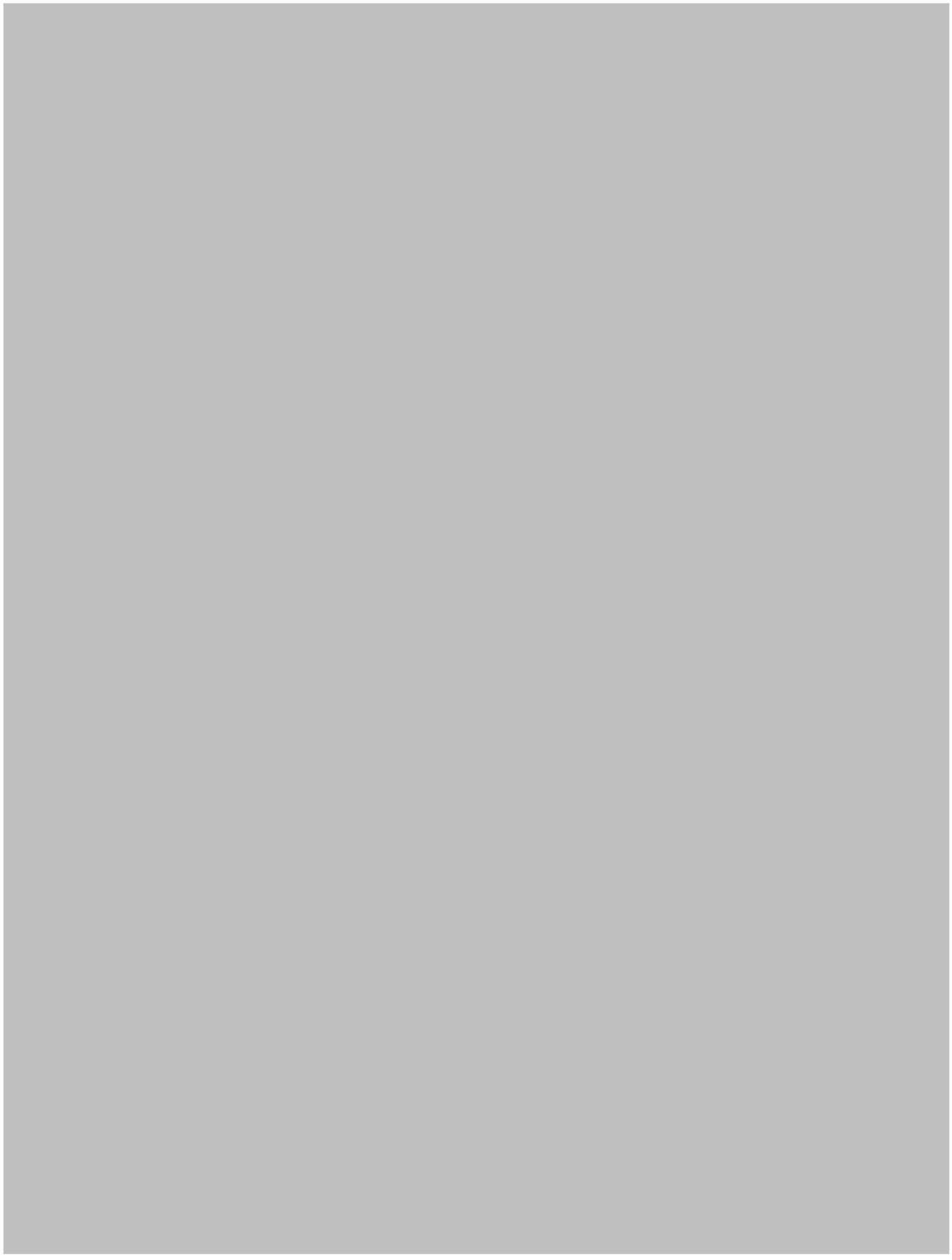


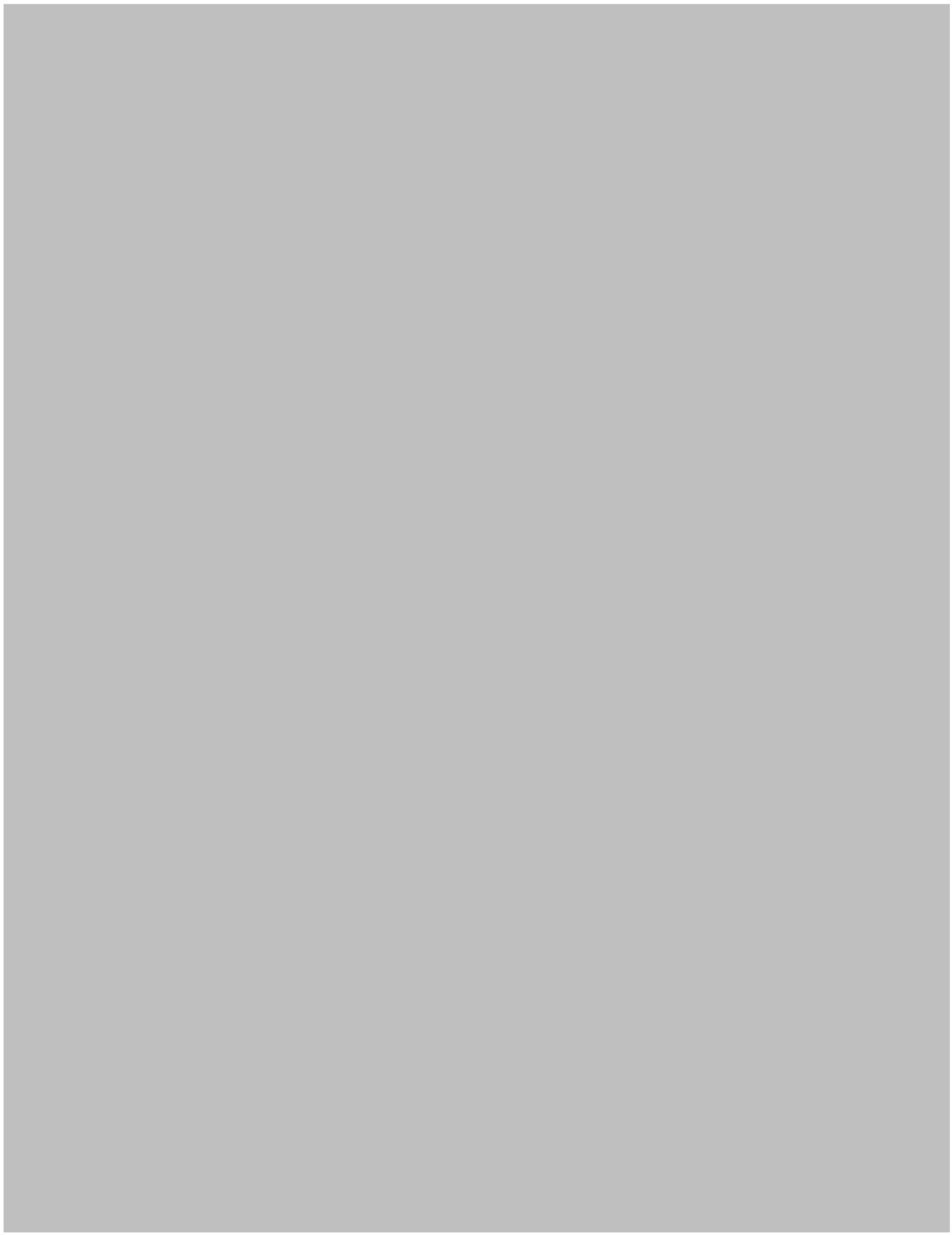


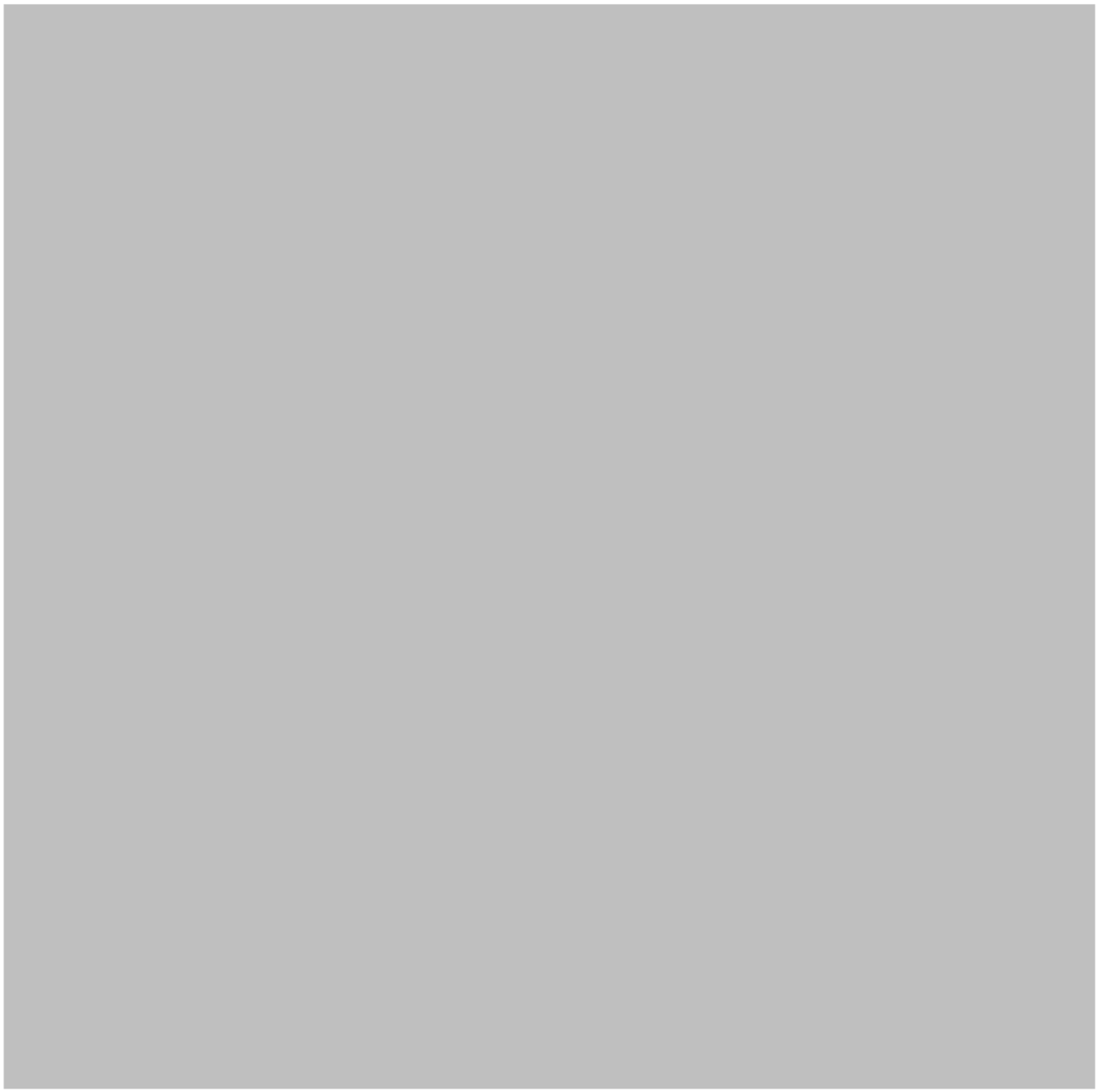


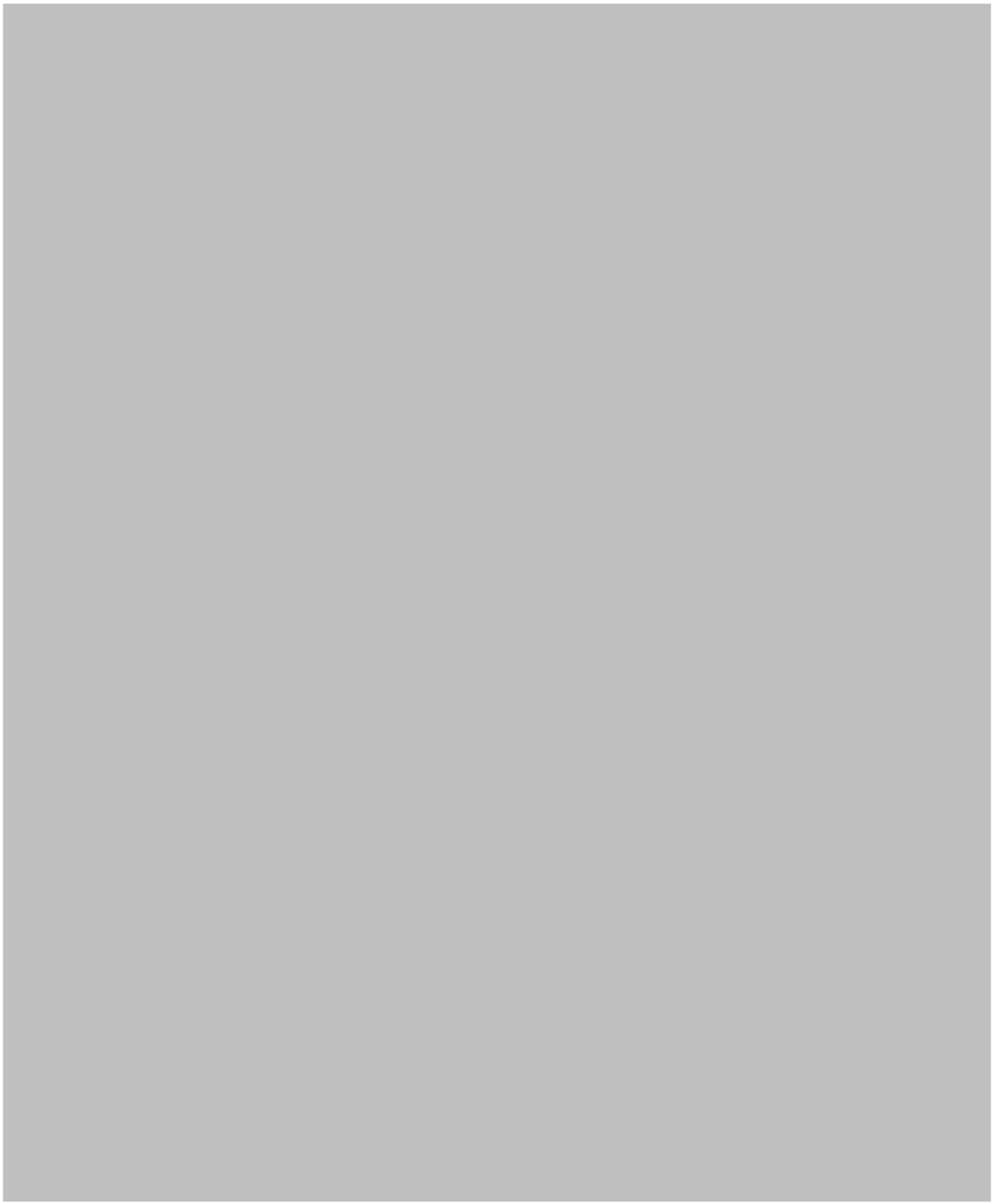


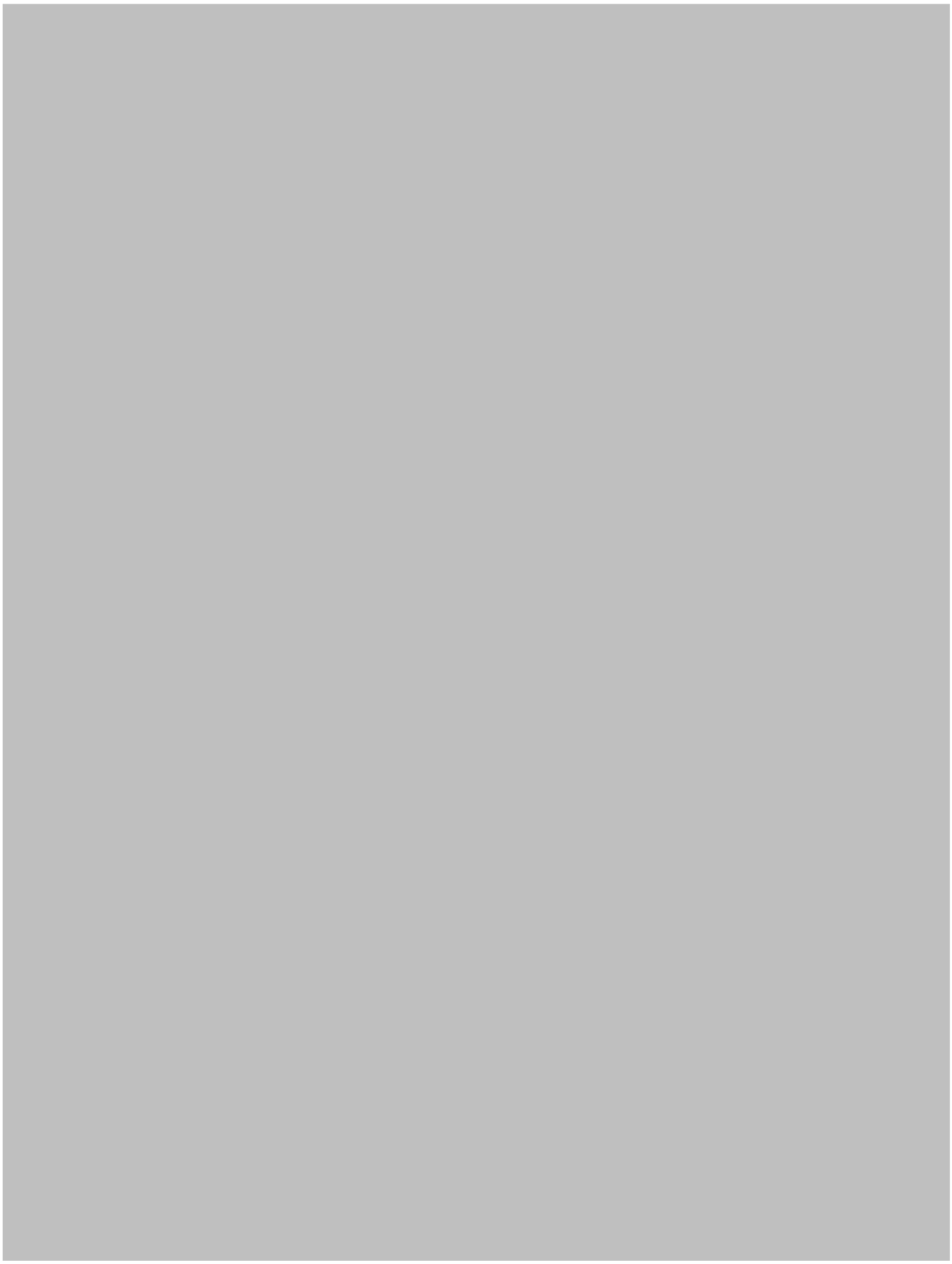


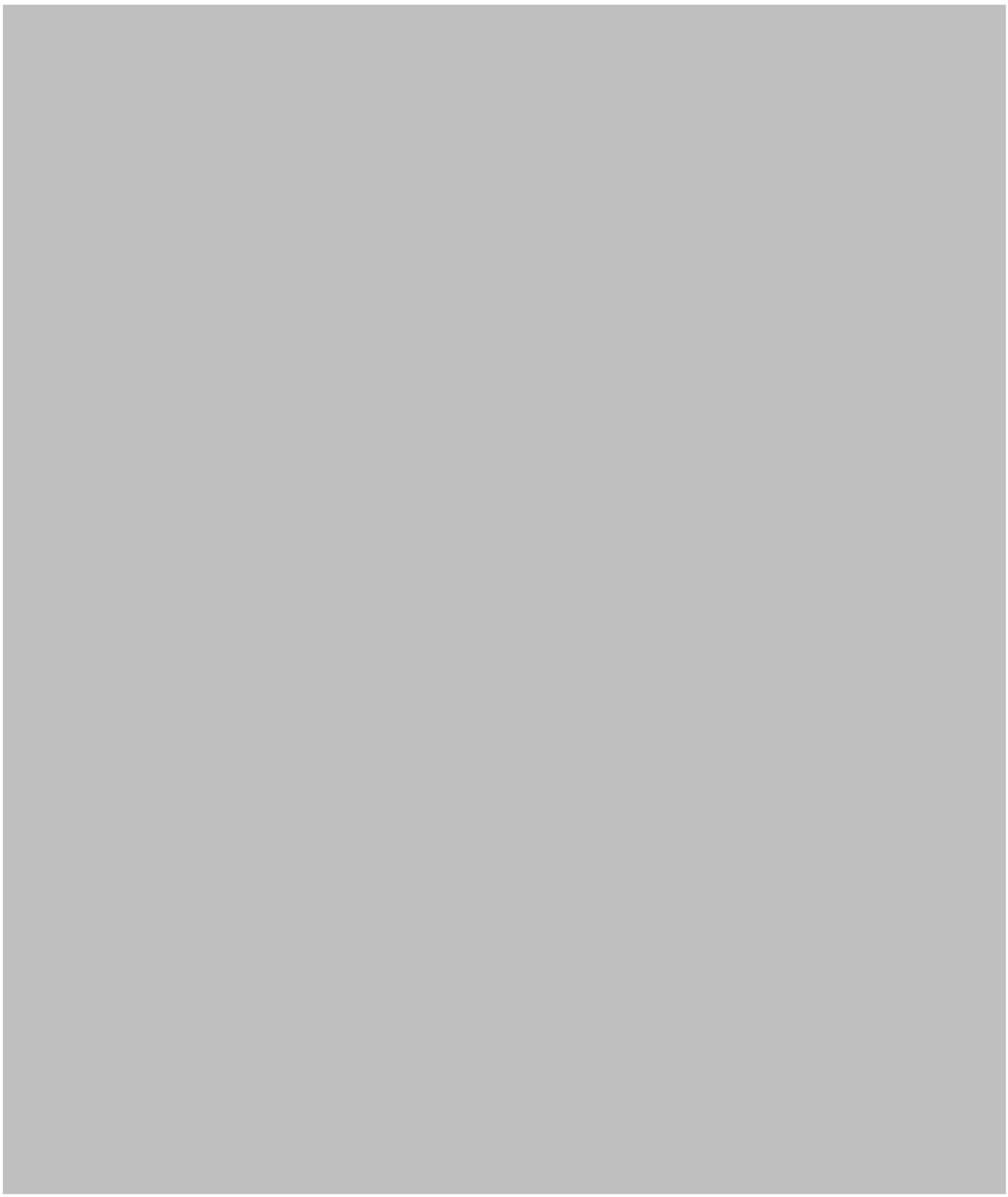


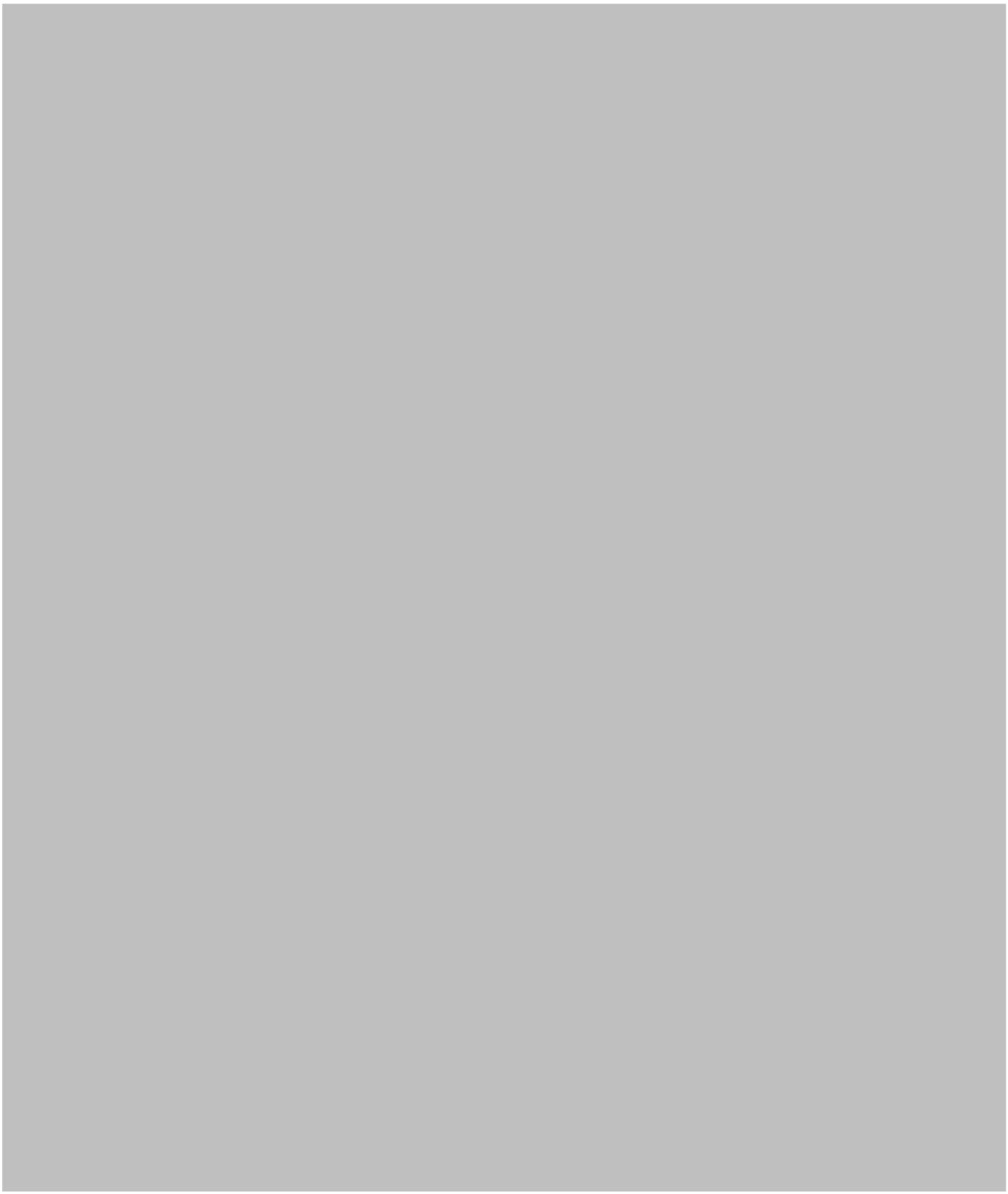


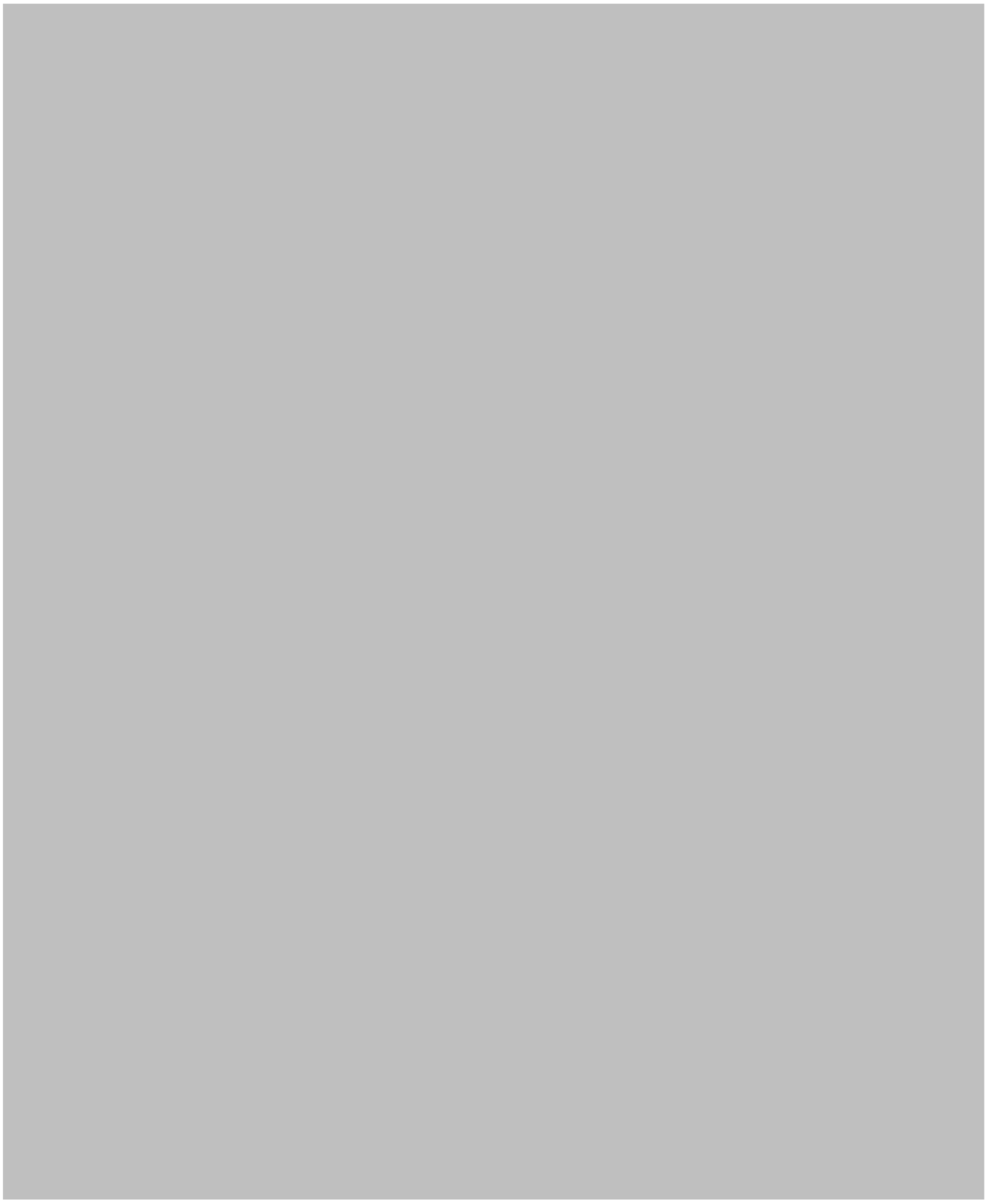


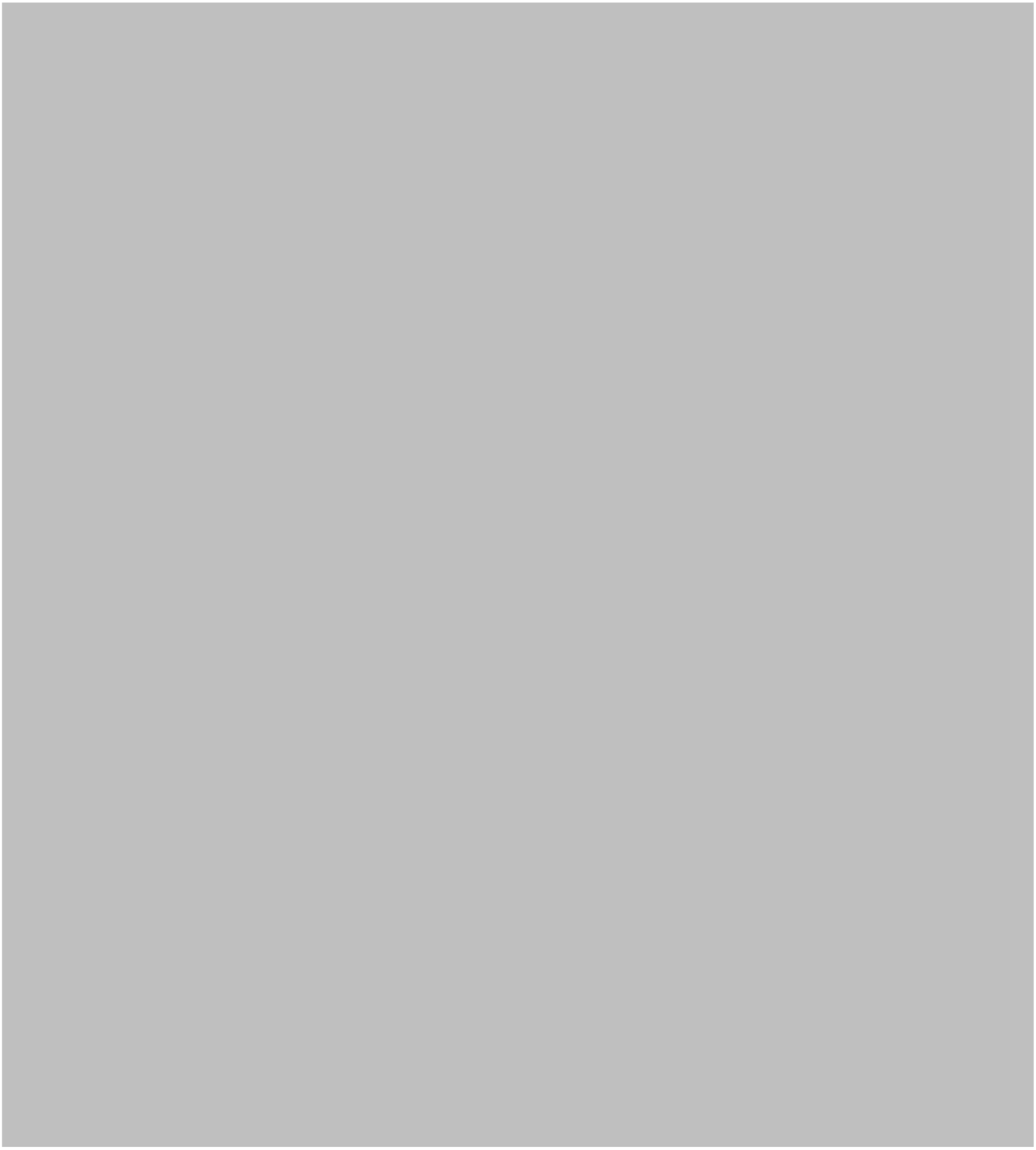


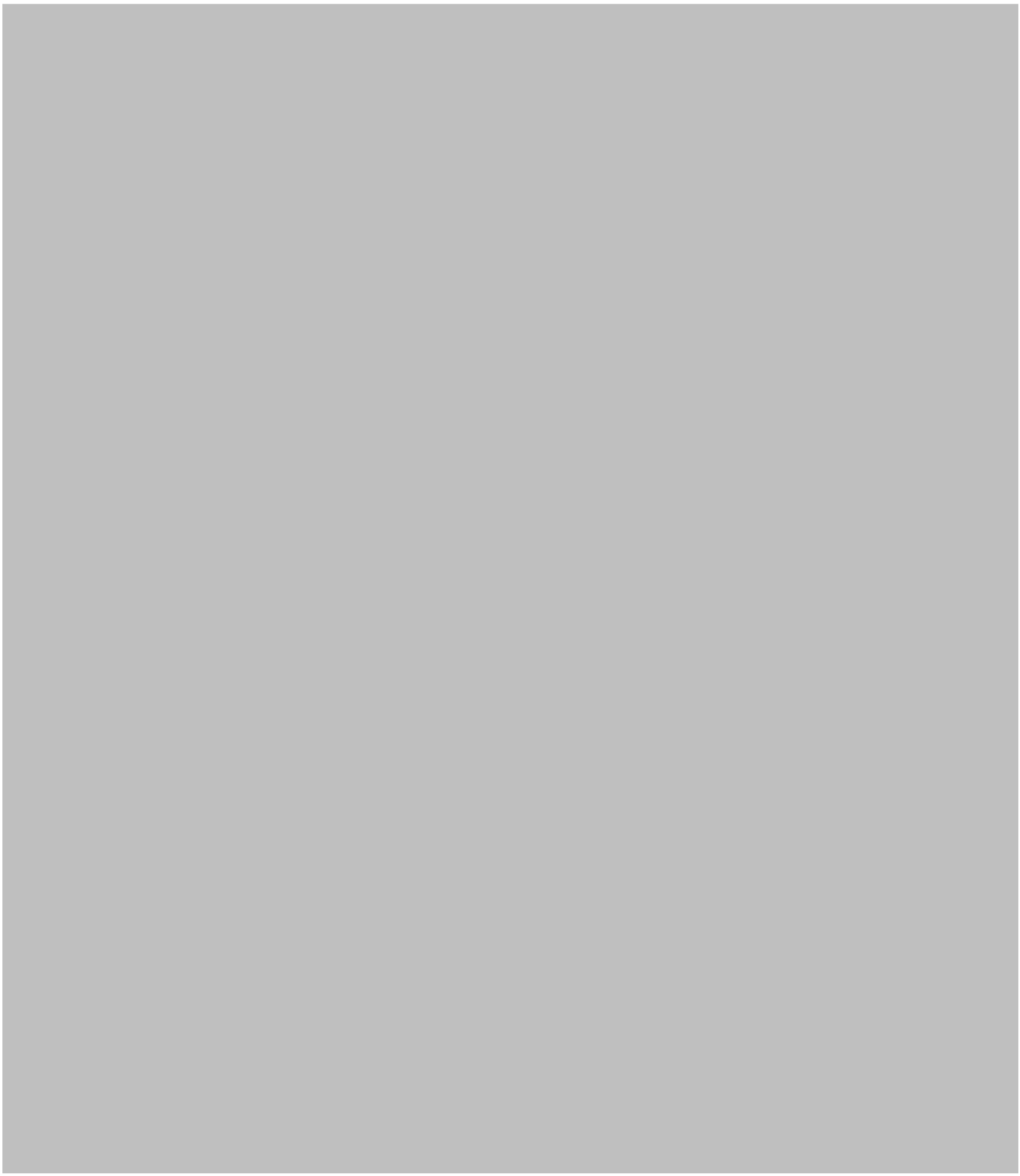


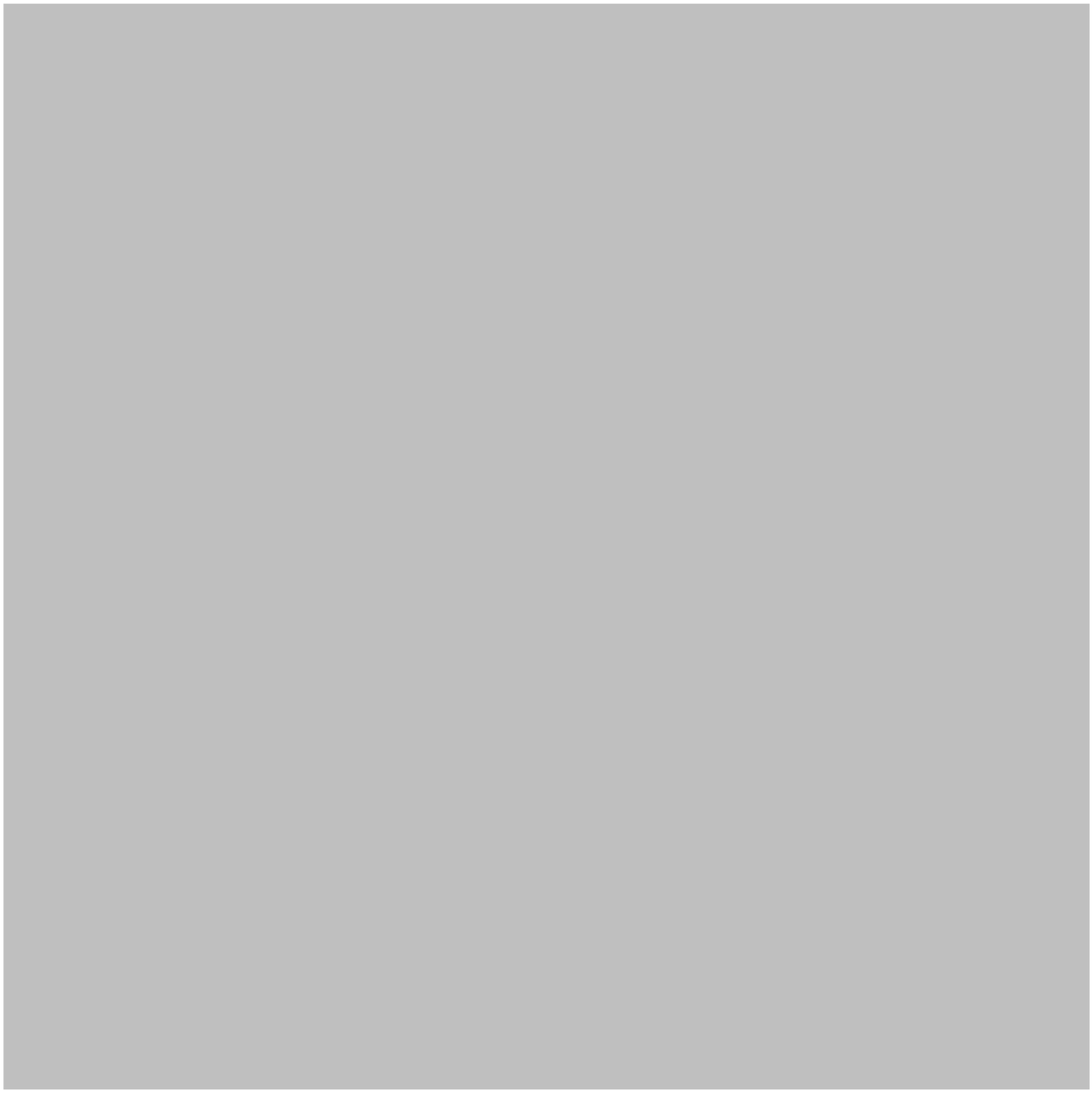


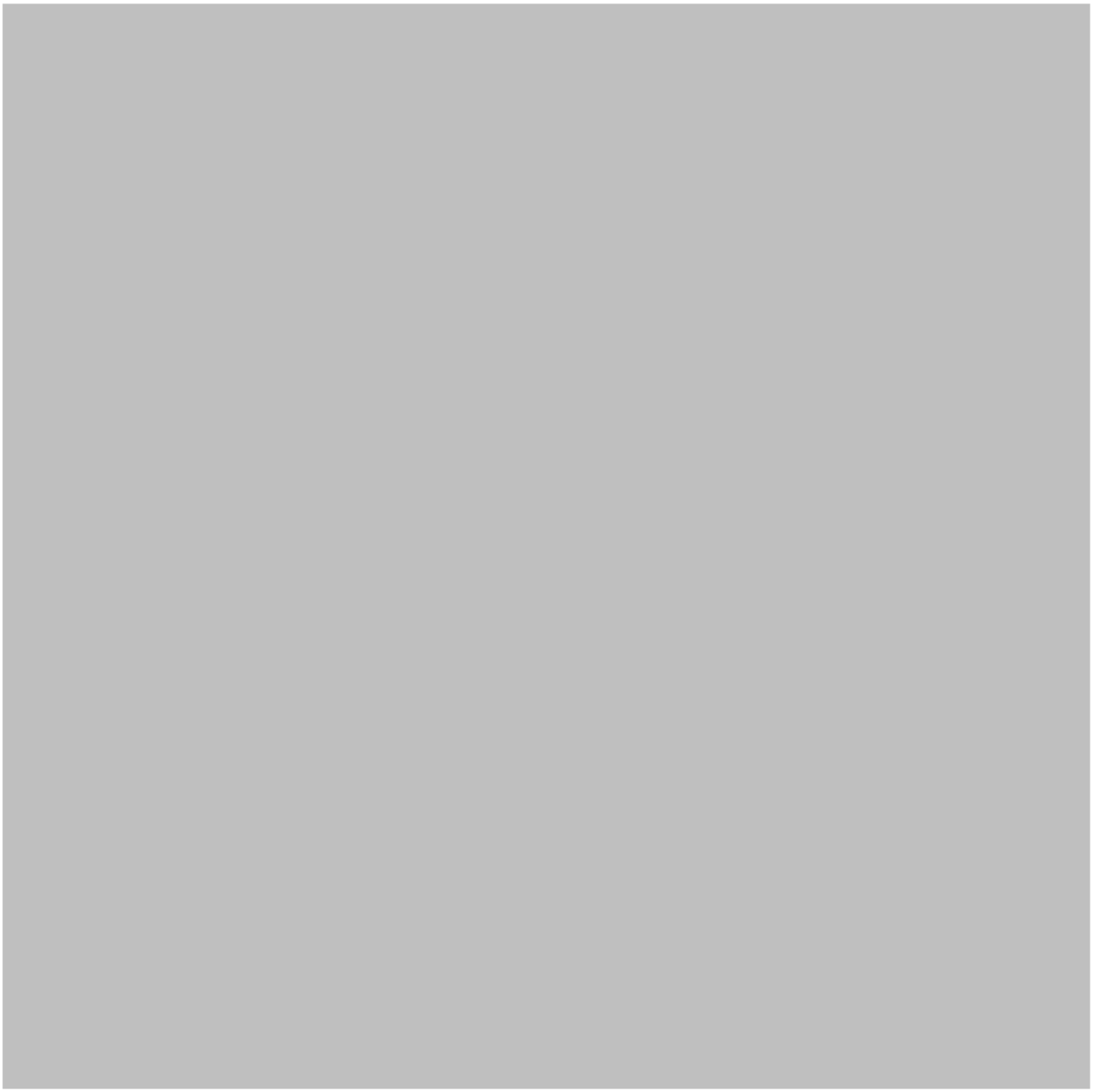












D. OWNERSHIP AND FINANCIAL STRUCTURE

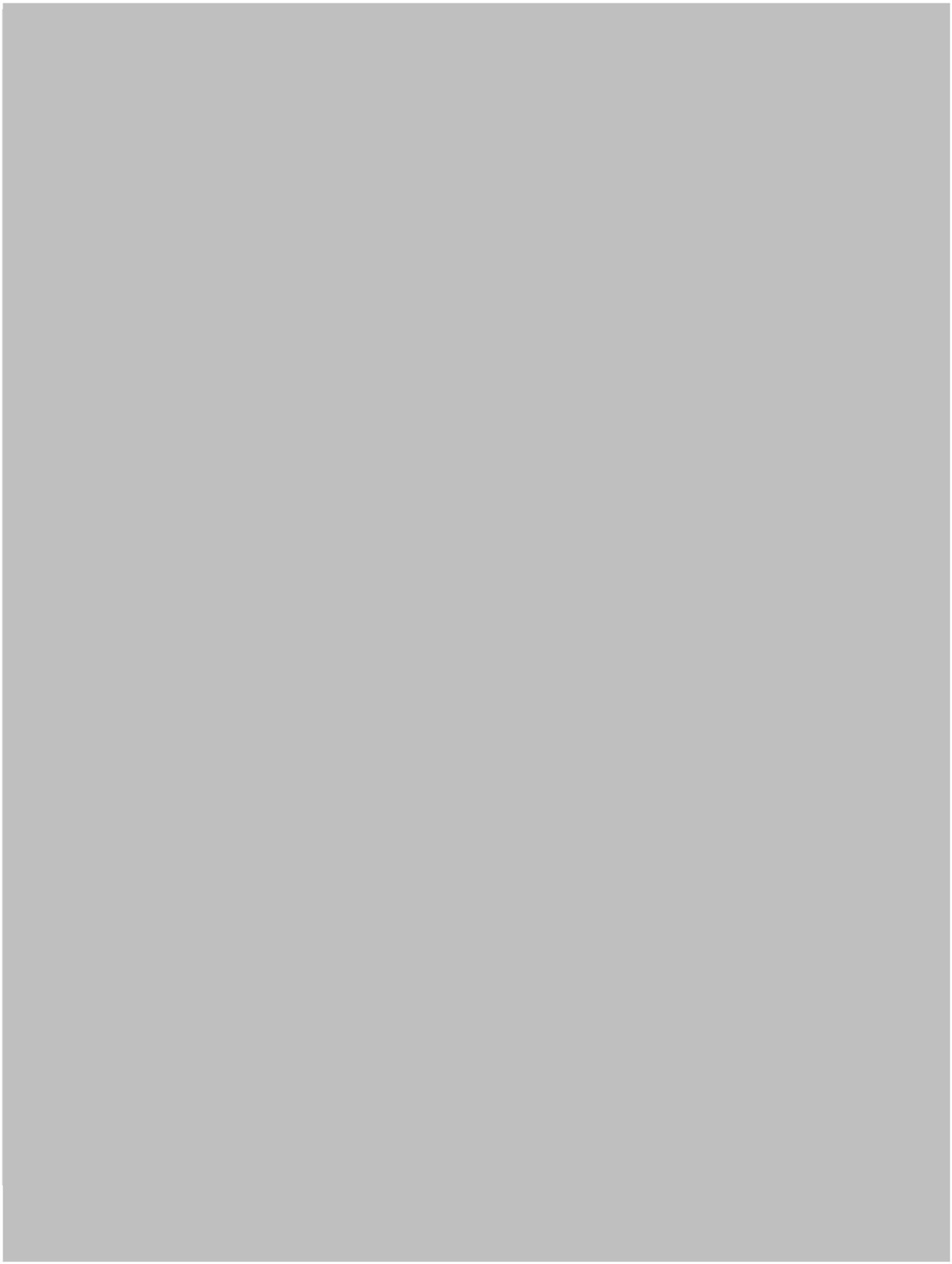
5. A listing of any criminal history and civil litigation (as a plaintiff or defendant) for all individuals identified in items 2, 3 and 4 above.

Criminal History:

Minnesota Medical Solutions invested significant resources in obtaining nationwide criminal background reports to disclose the criminal history of all investors, officers, and individuals listed on the organizational chart. The reports were obtained through IntelliCorp. To further refine the search process, IntelliCorp applies the appropriate State and Federal FCRA filers based on the applicant's home address and state of employment or volunteerism. In the interest of privacy and for the sake of brevity, we have withheld reports for all individuals whose search produced no results of criminal records. For the individuals whose reports produced any manor of criminal history, all of which is minor, we have attached redacted copies of those reports hereto. If the Department of Health would like copies of all reports performed for verification purposes, we will provide them upon request.

Civil Litigation History:

All investors, officers and individuals listed on the organizational chart signed a civil litigation disclosure statement, all of which are attached hereto. If the Department would like additional information regarding any of the matters disclosed, we will provide such information upon request.



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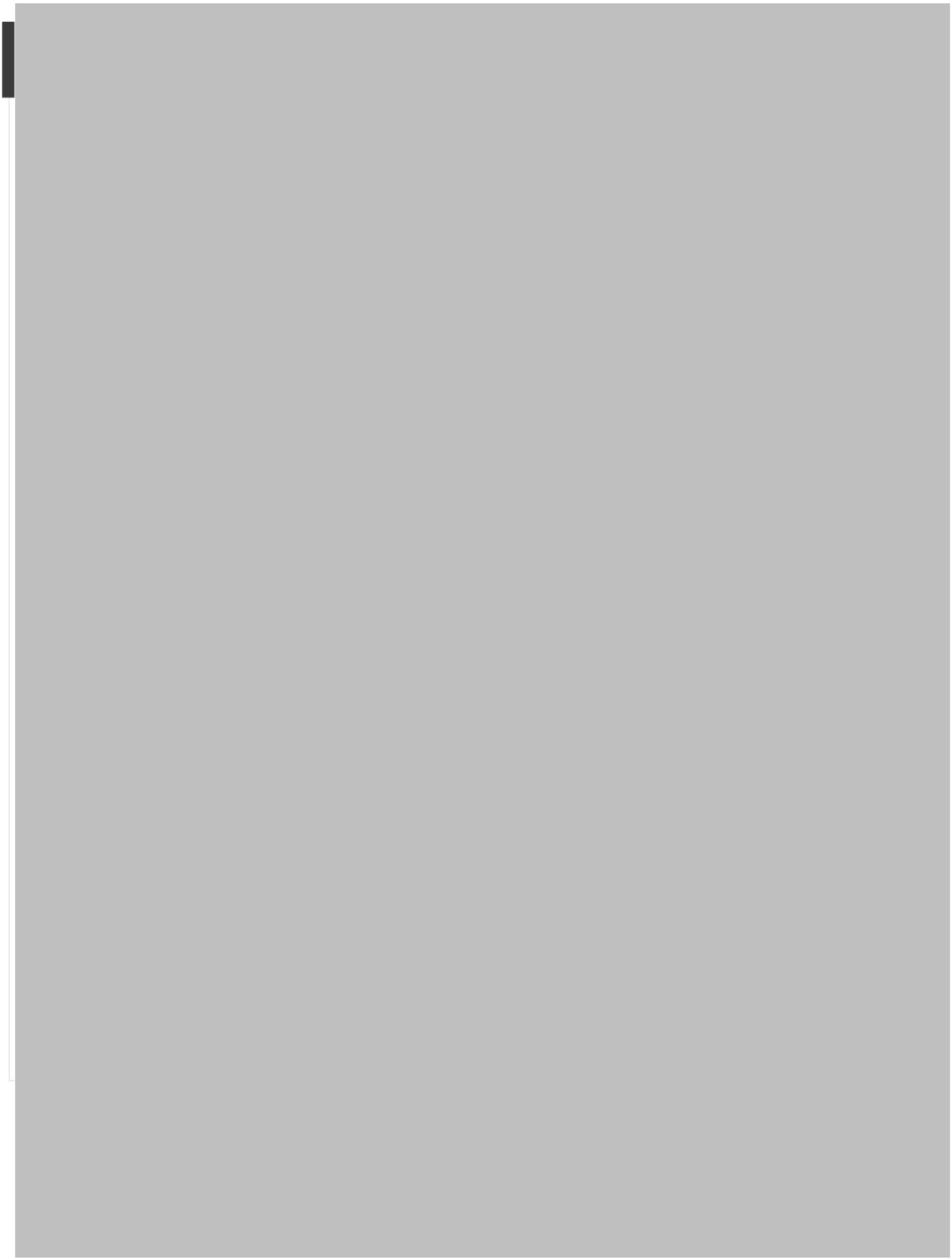

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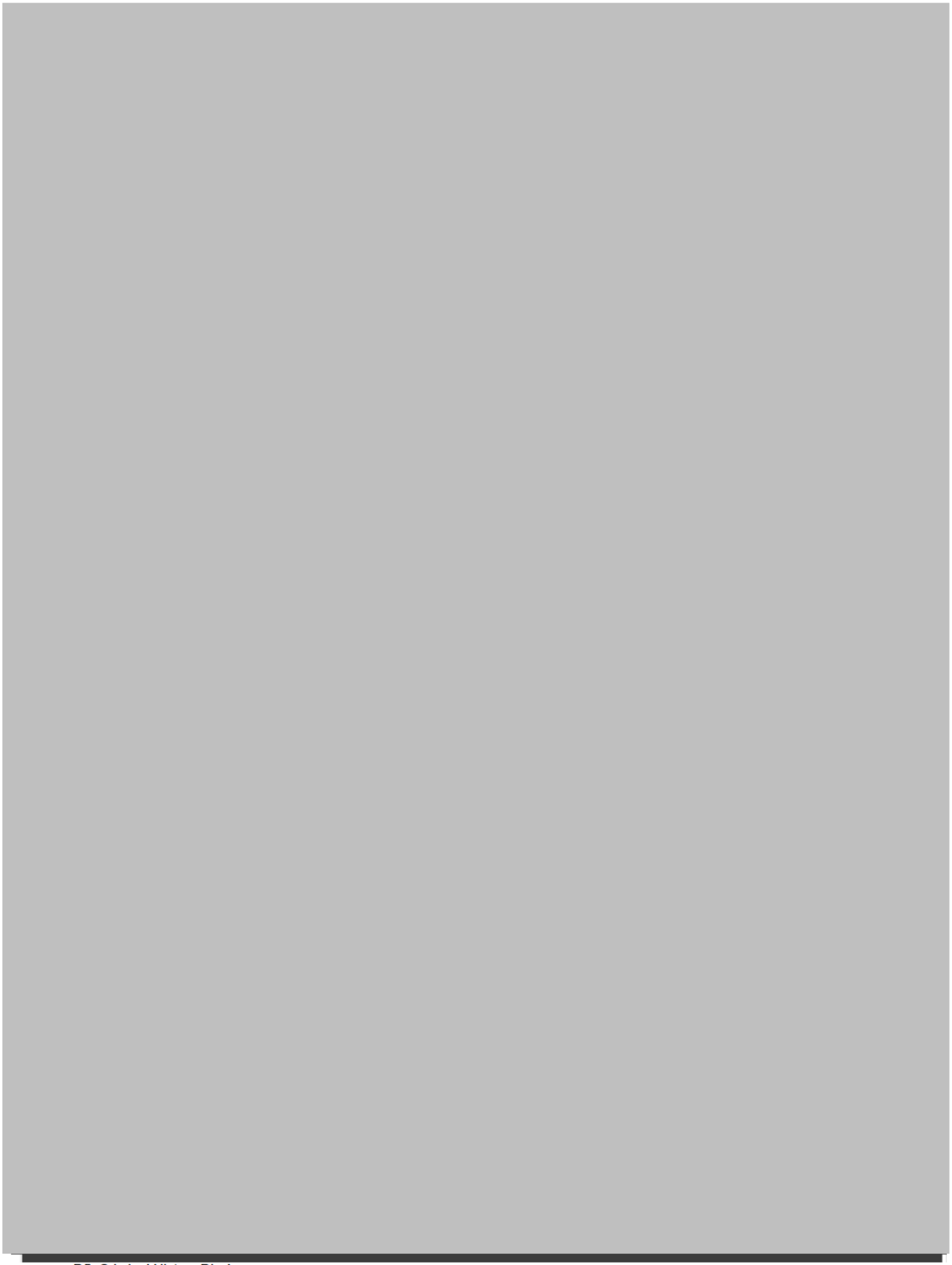

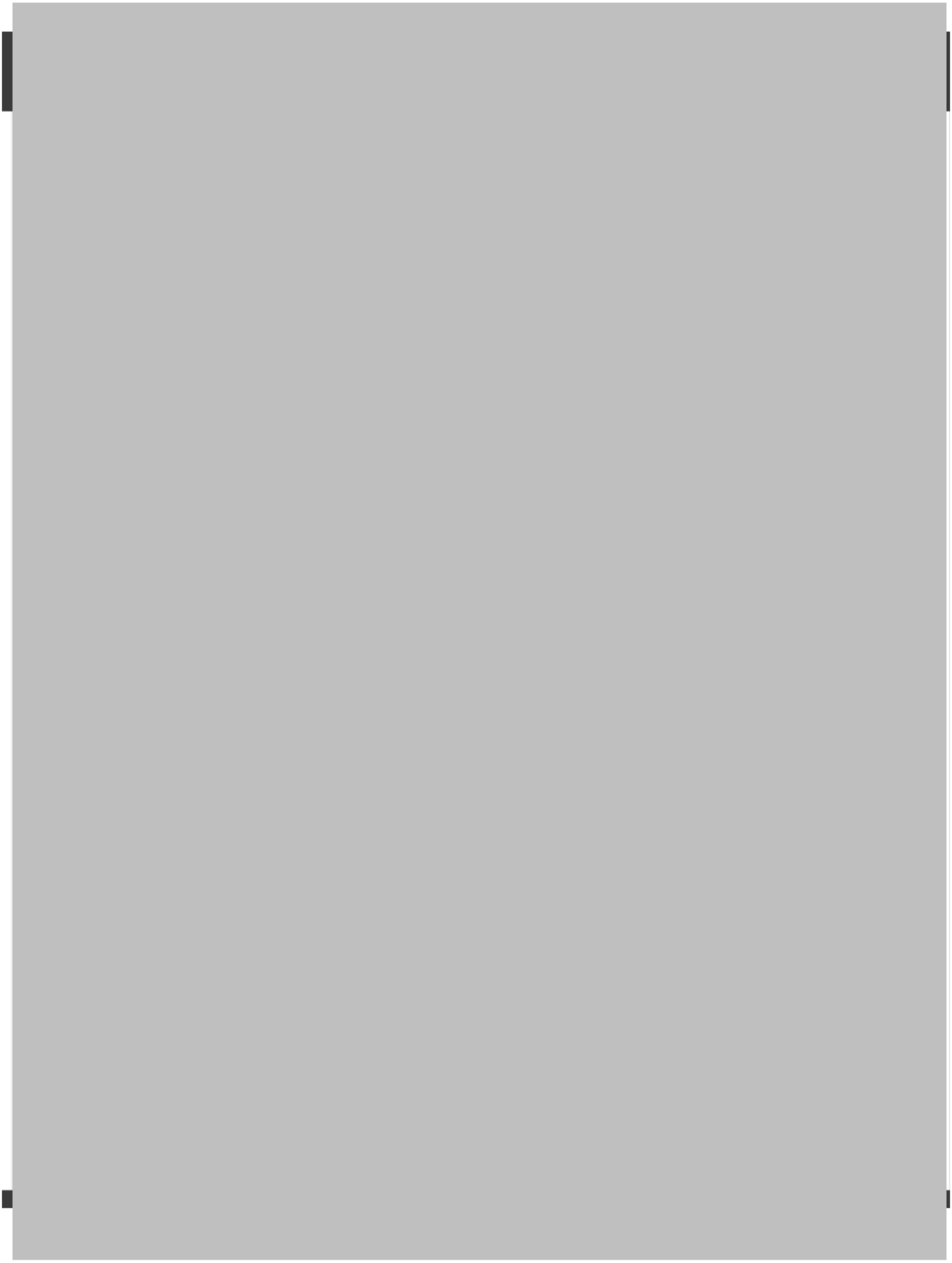

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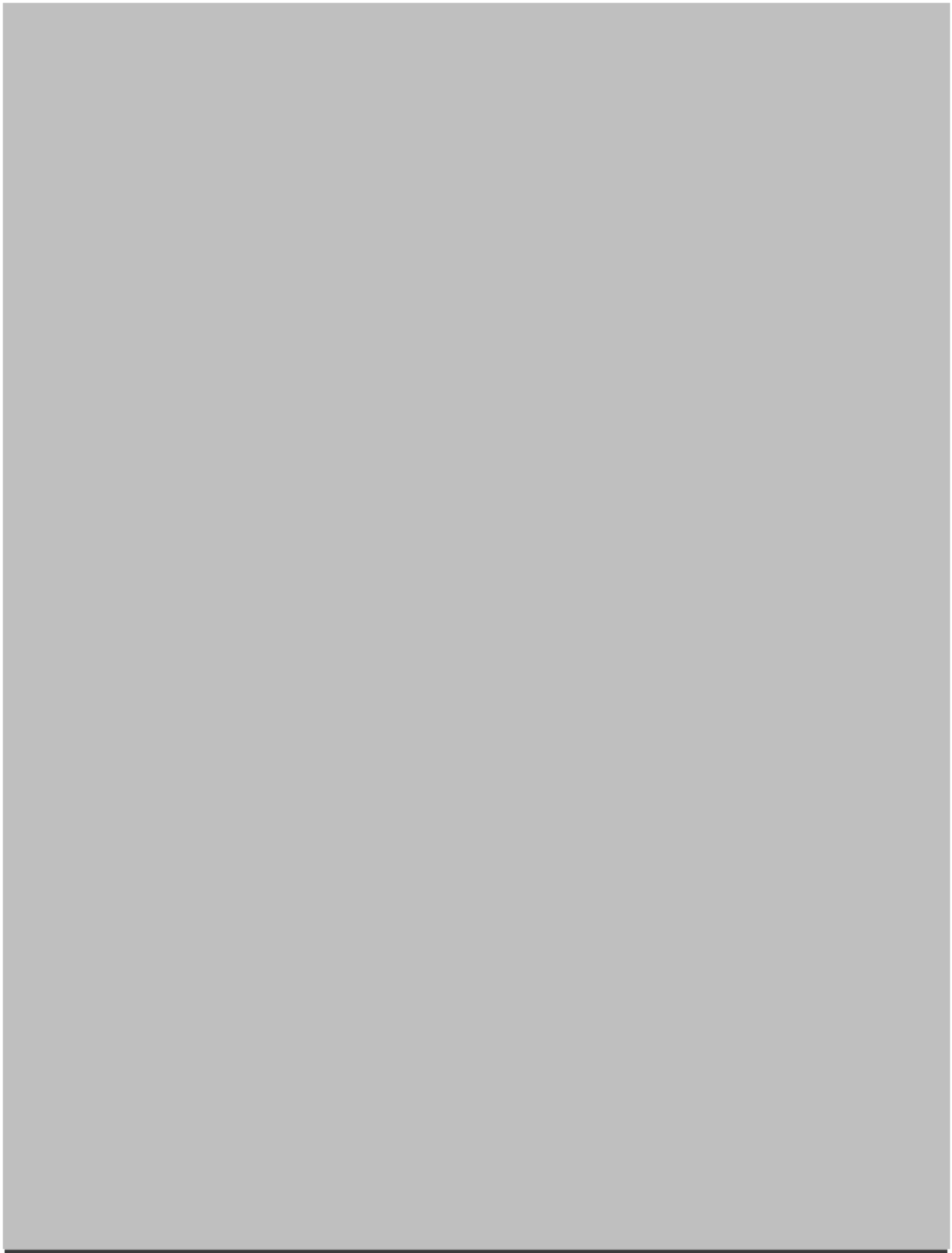

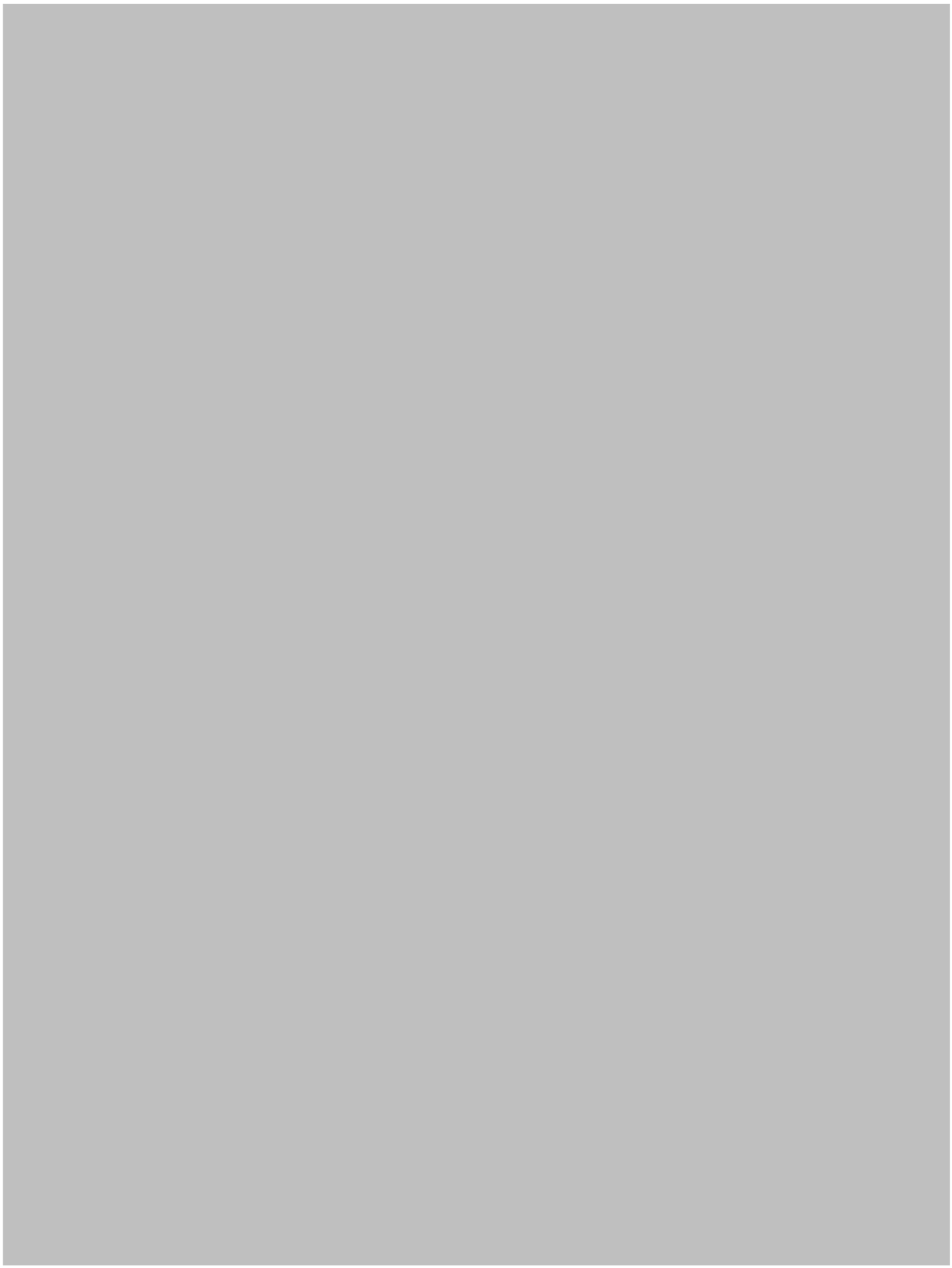

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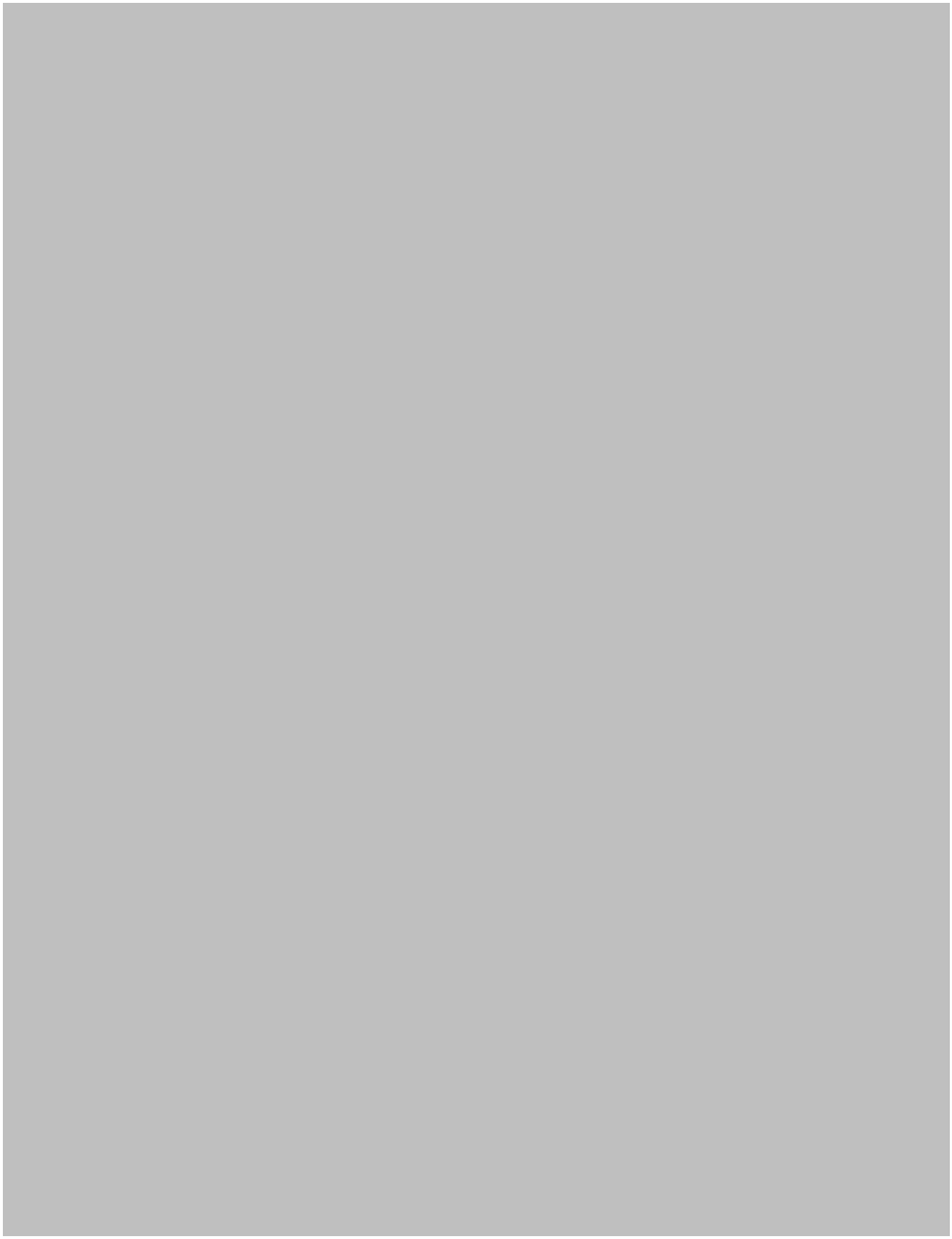

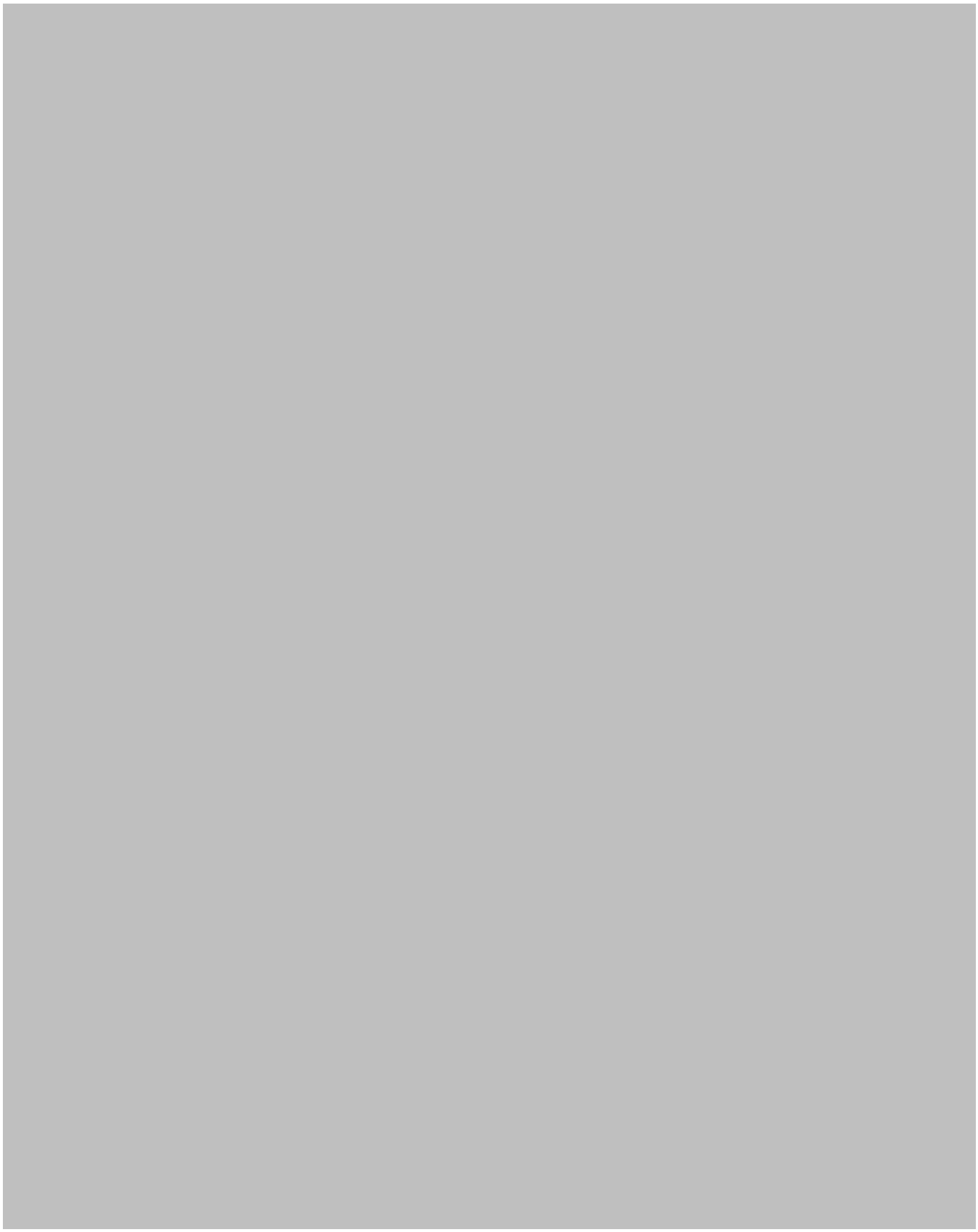

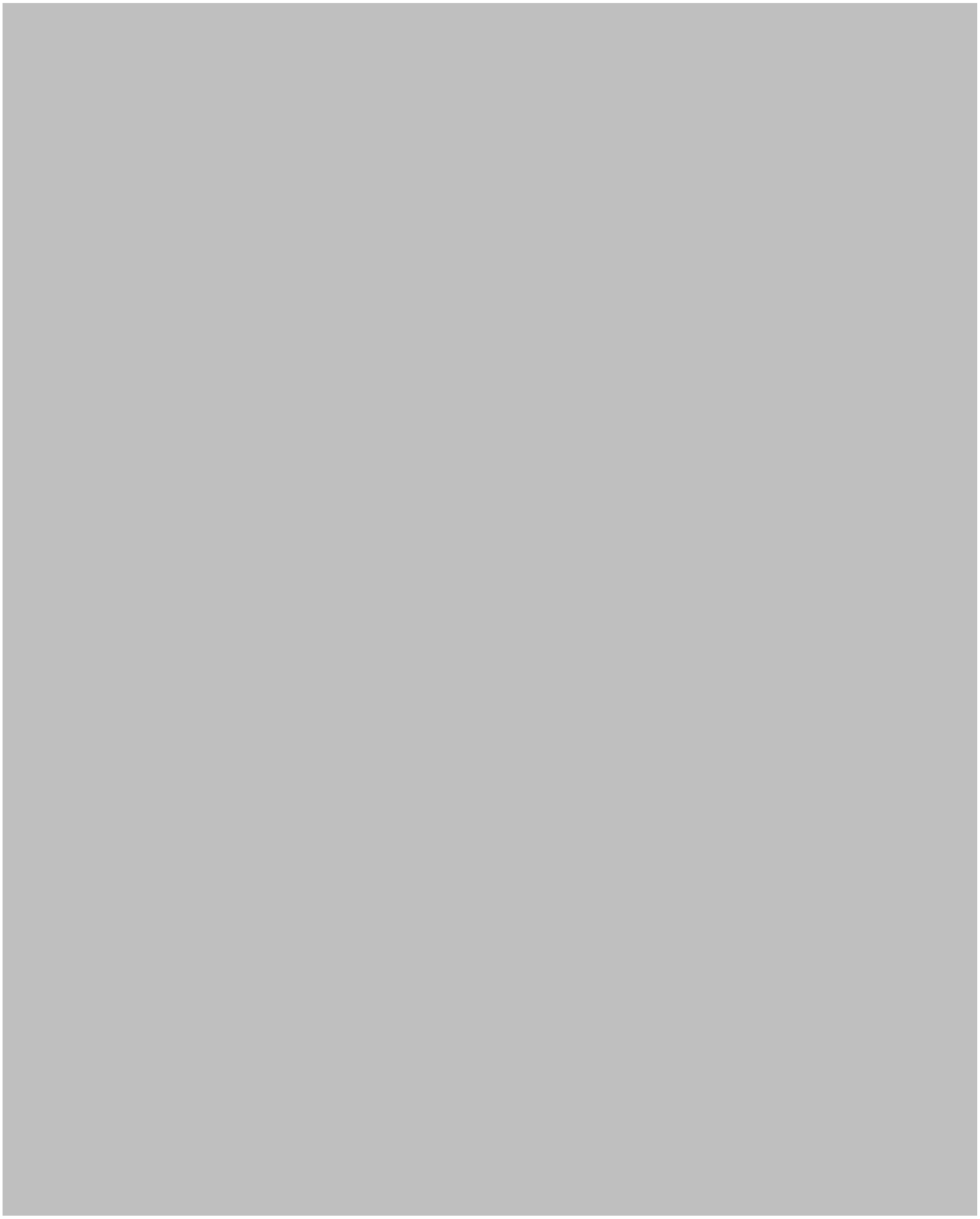

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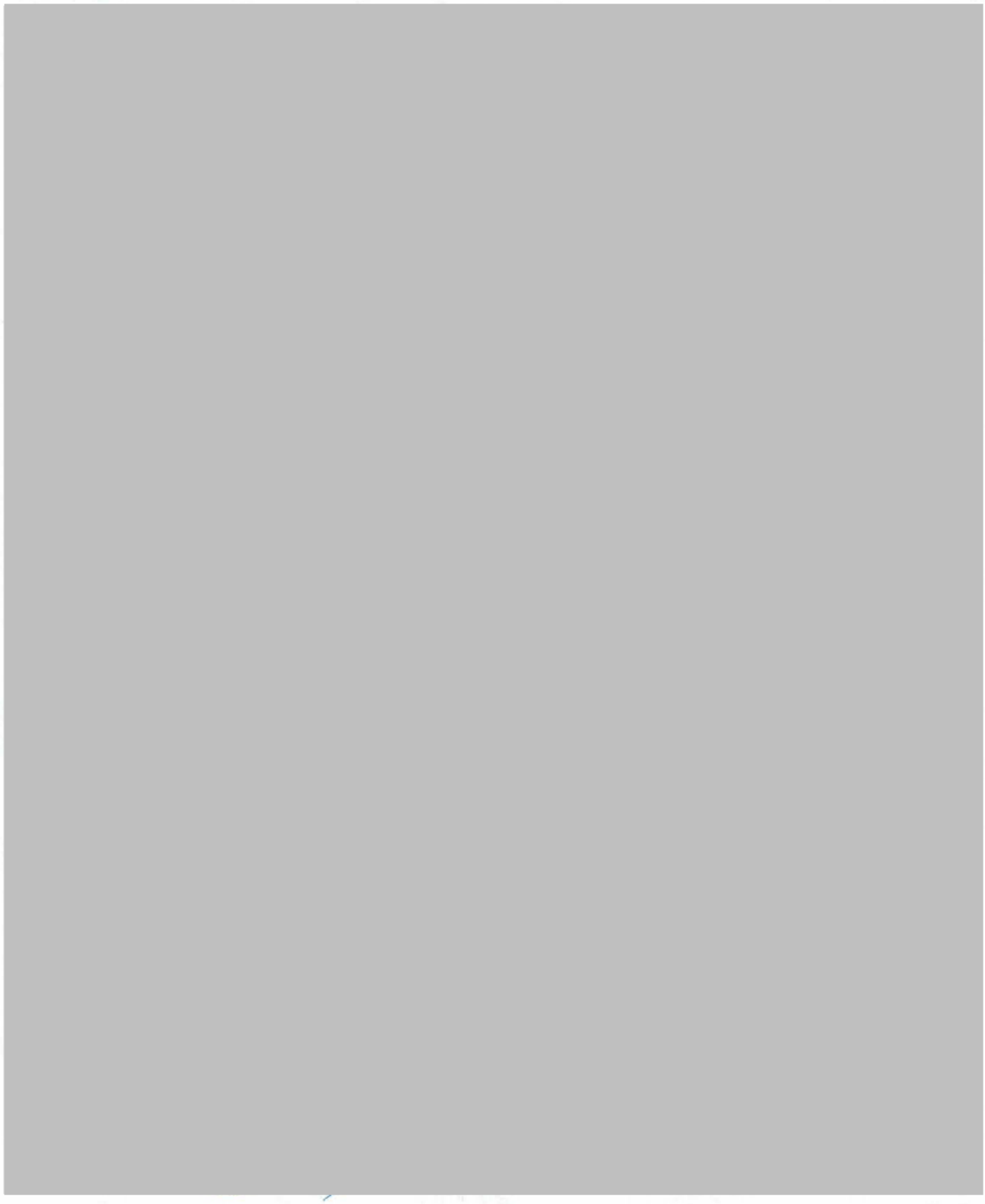

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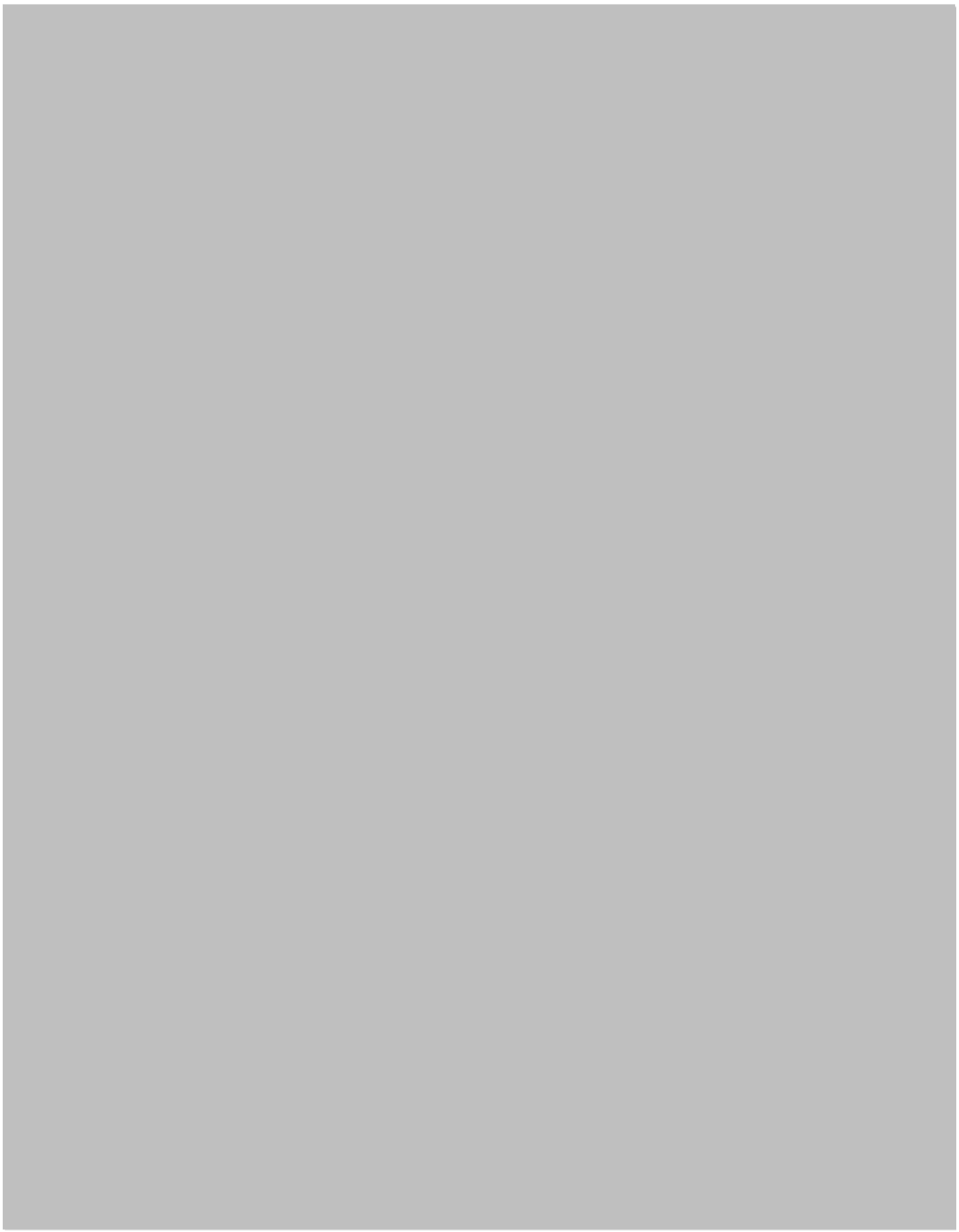

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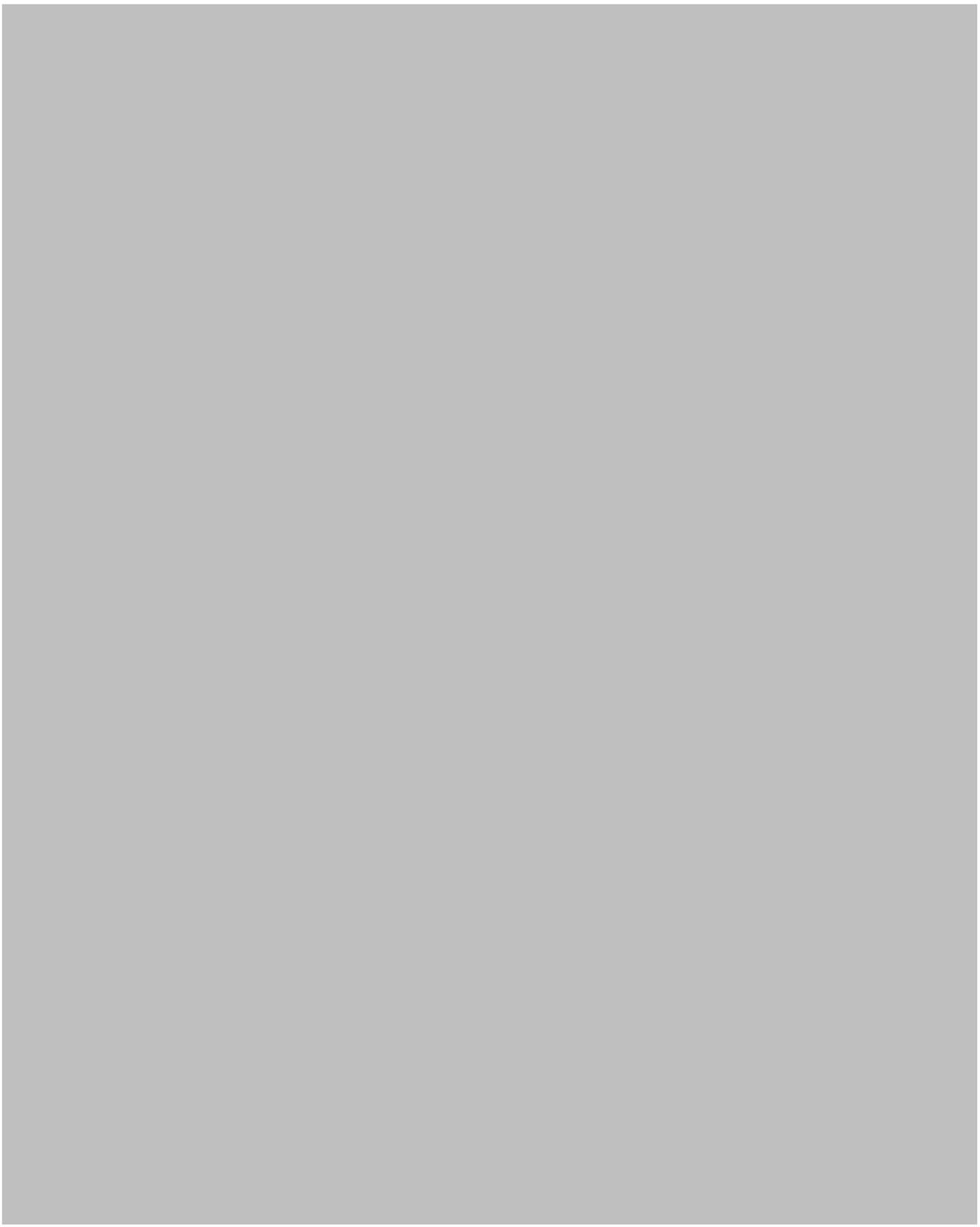

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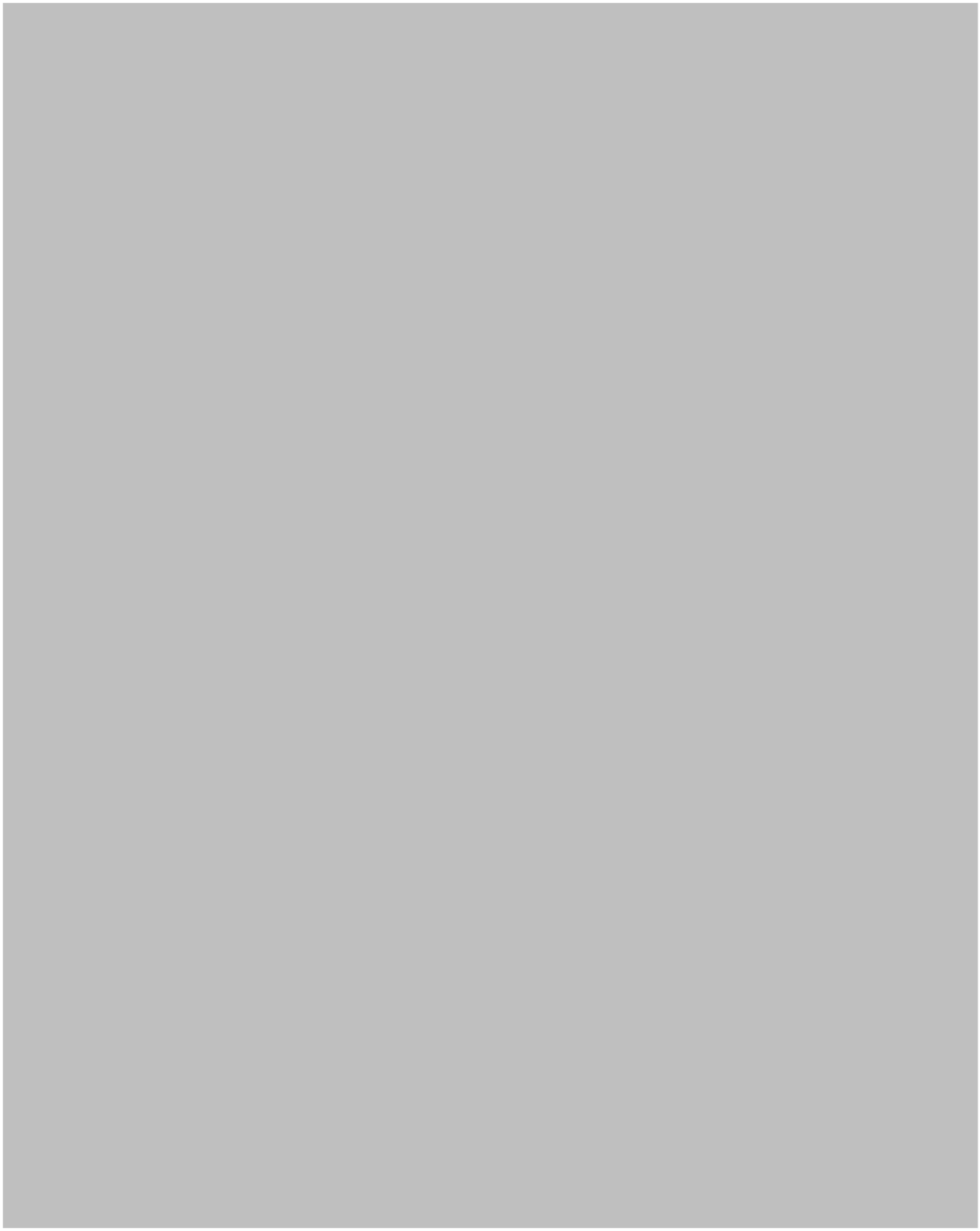

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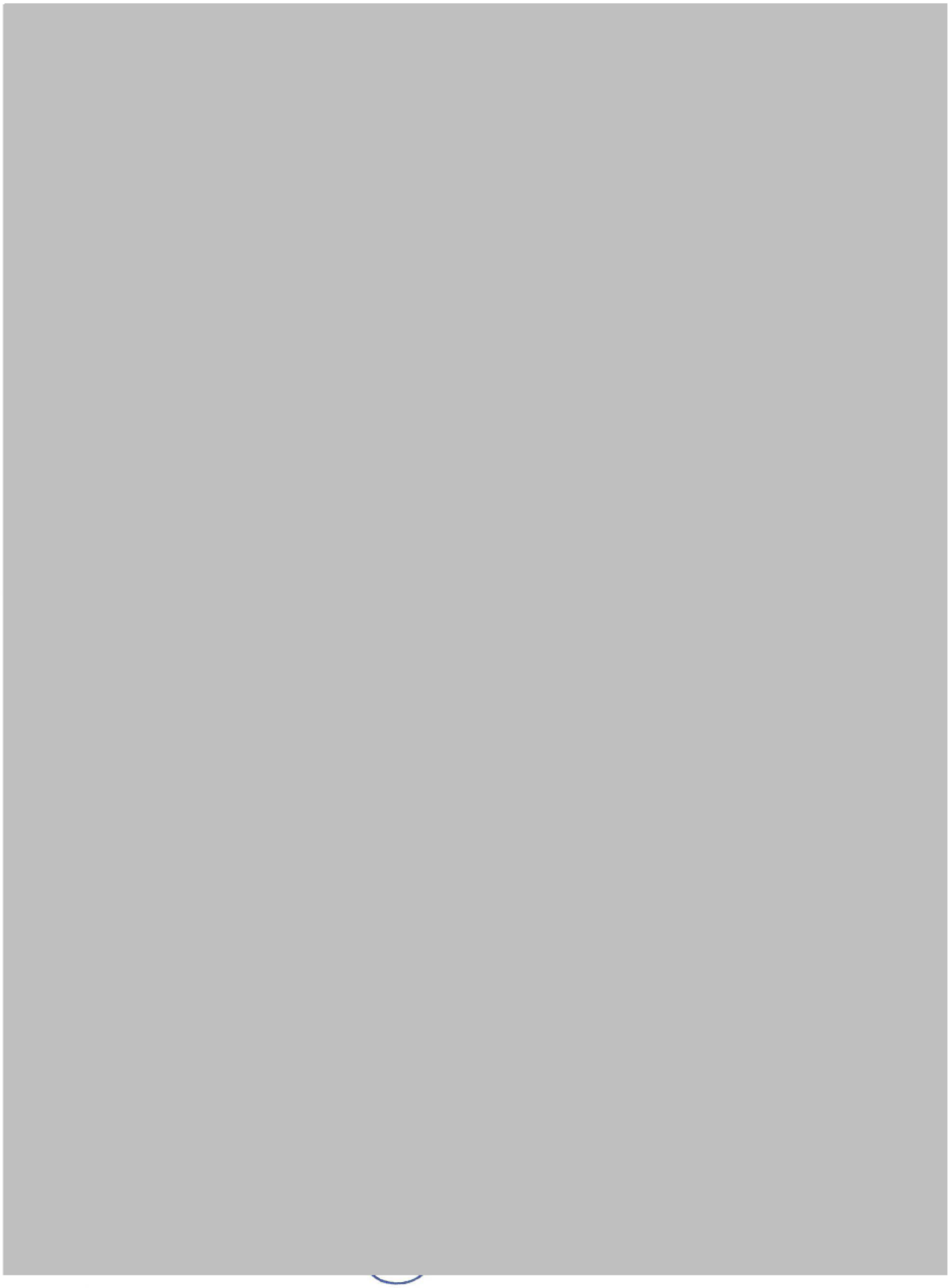

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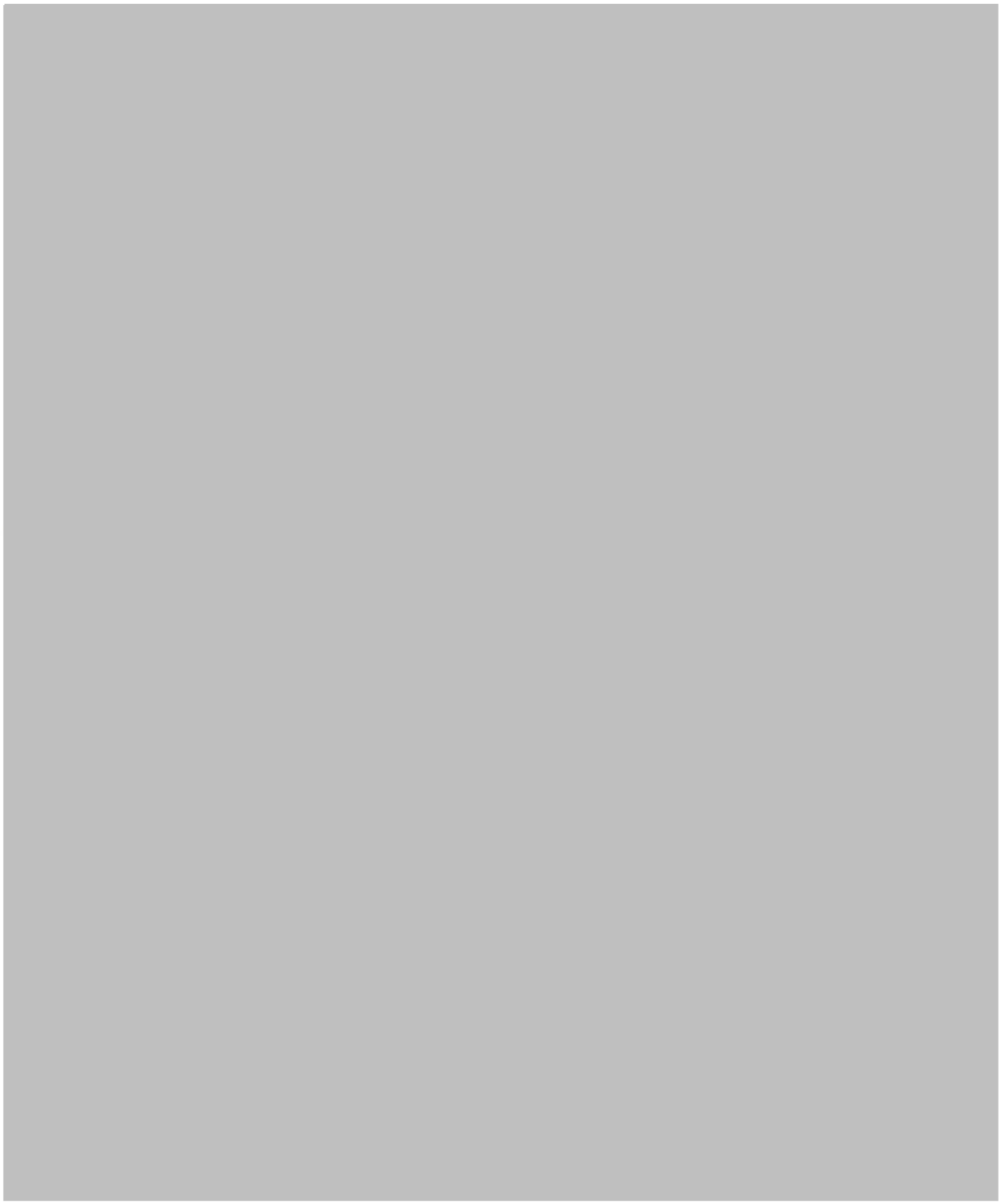

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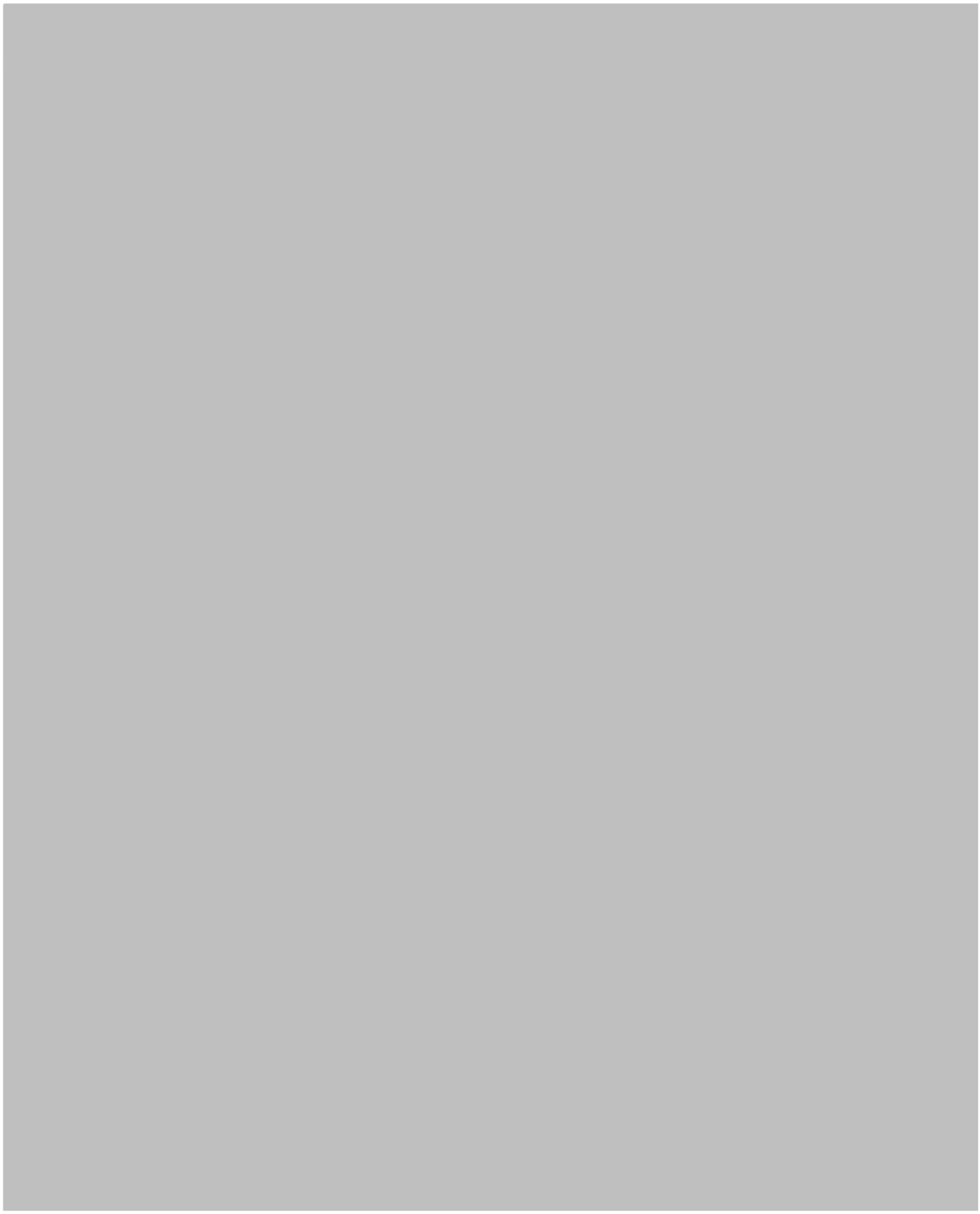

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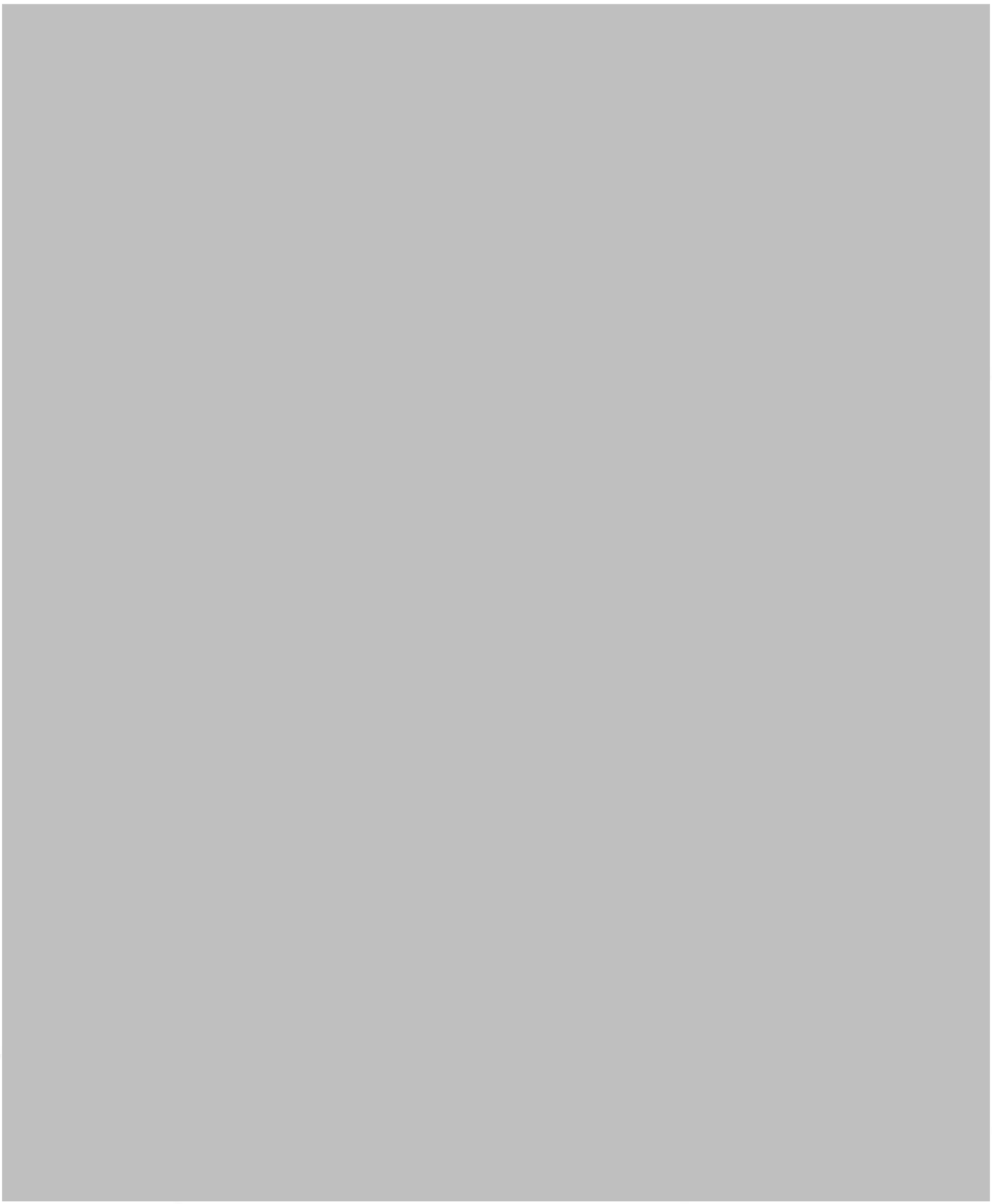

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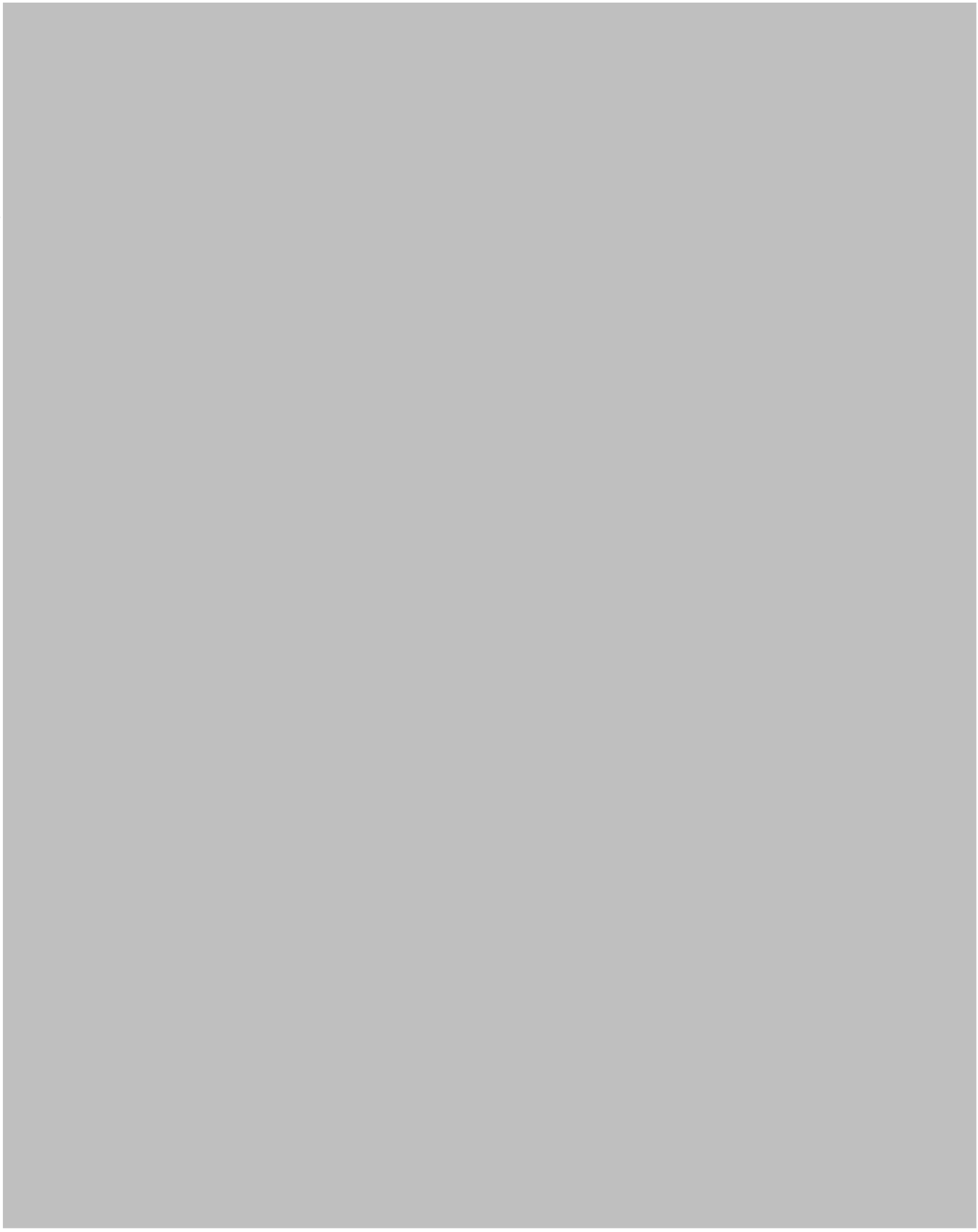

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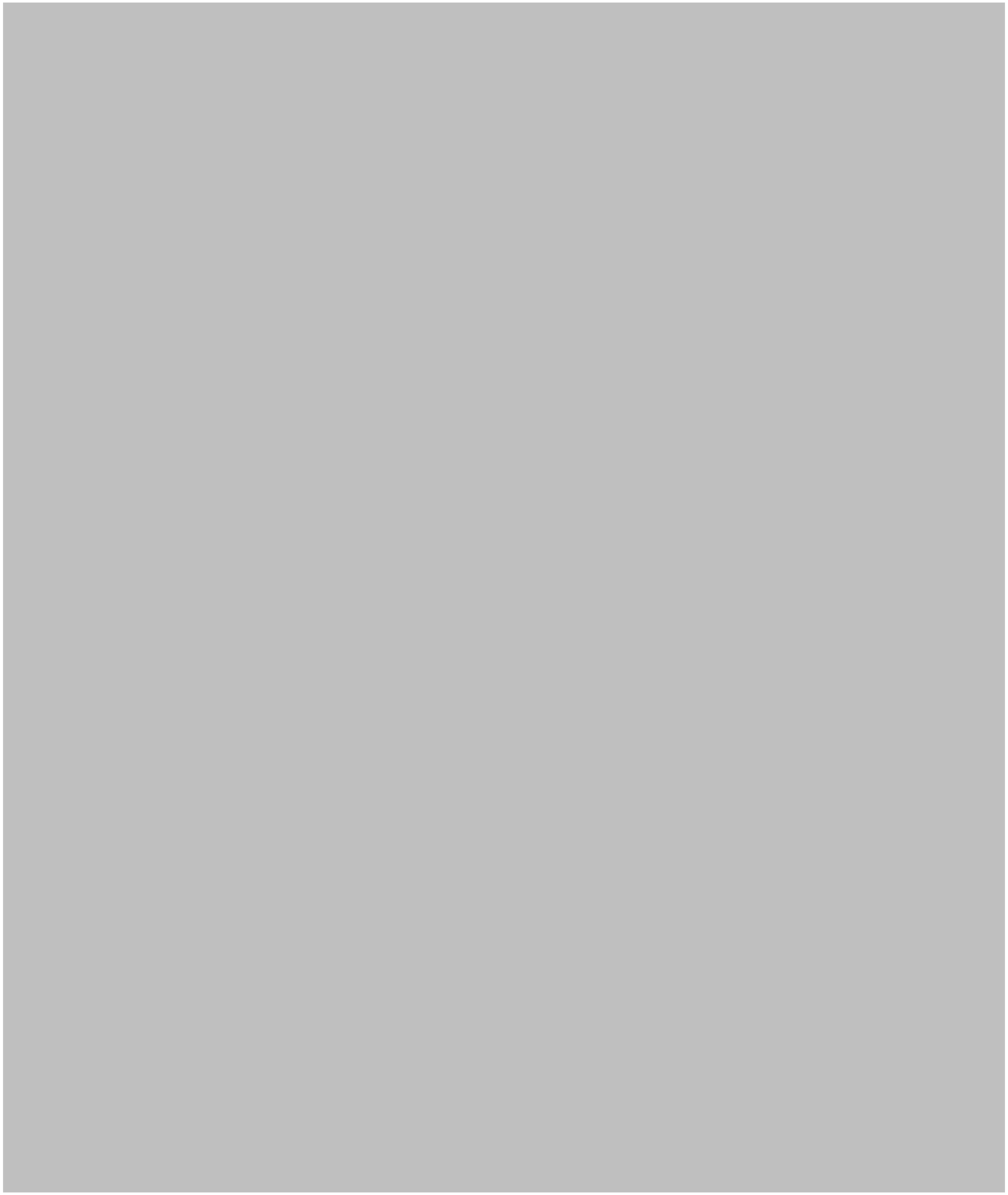

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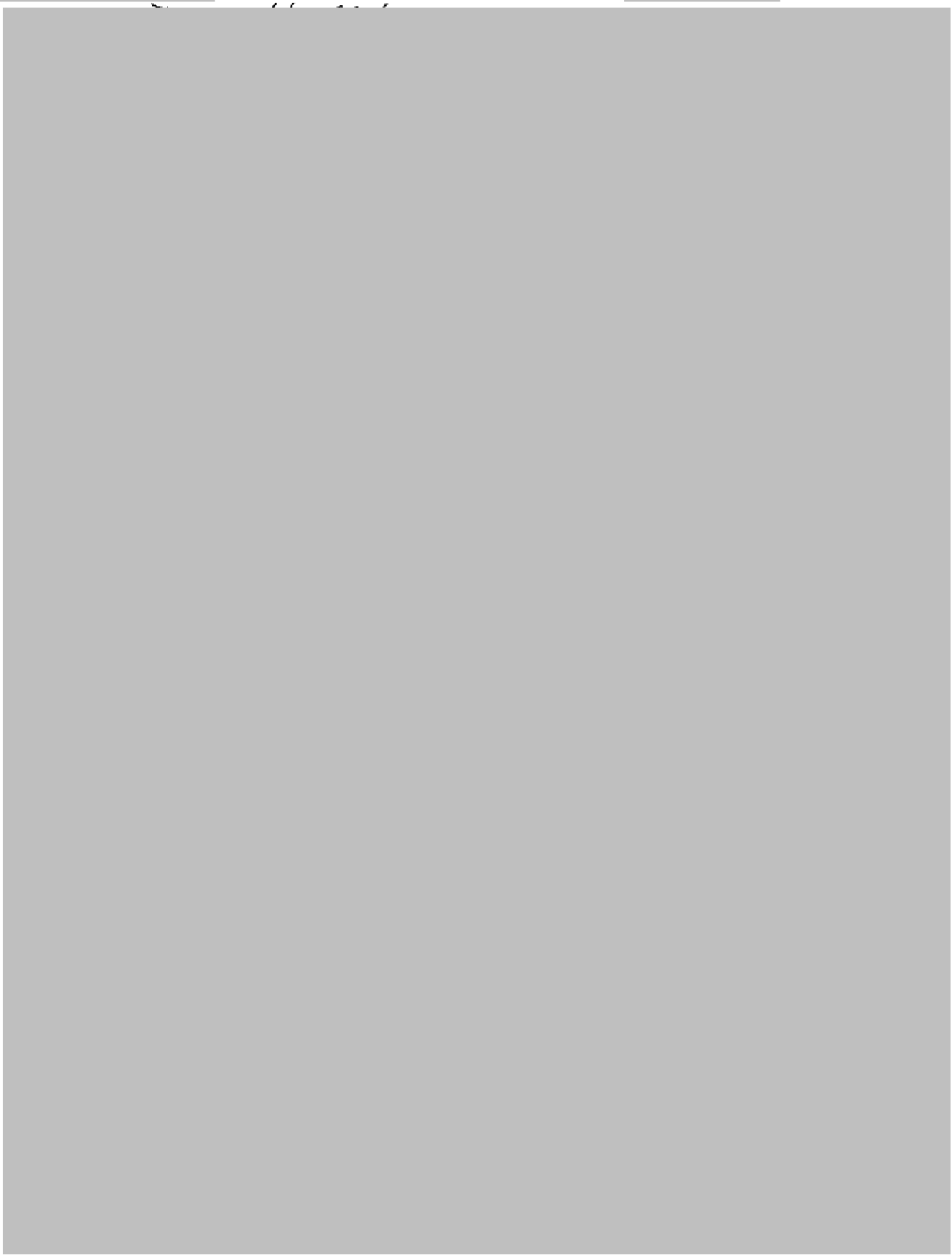

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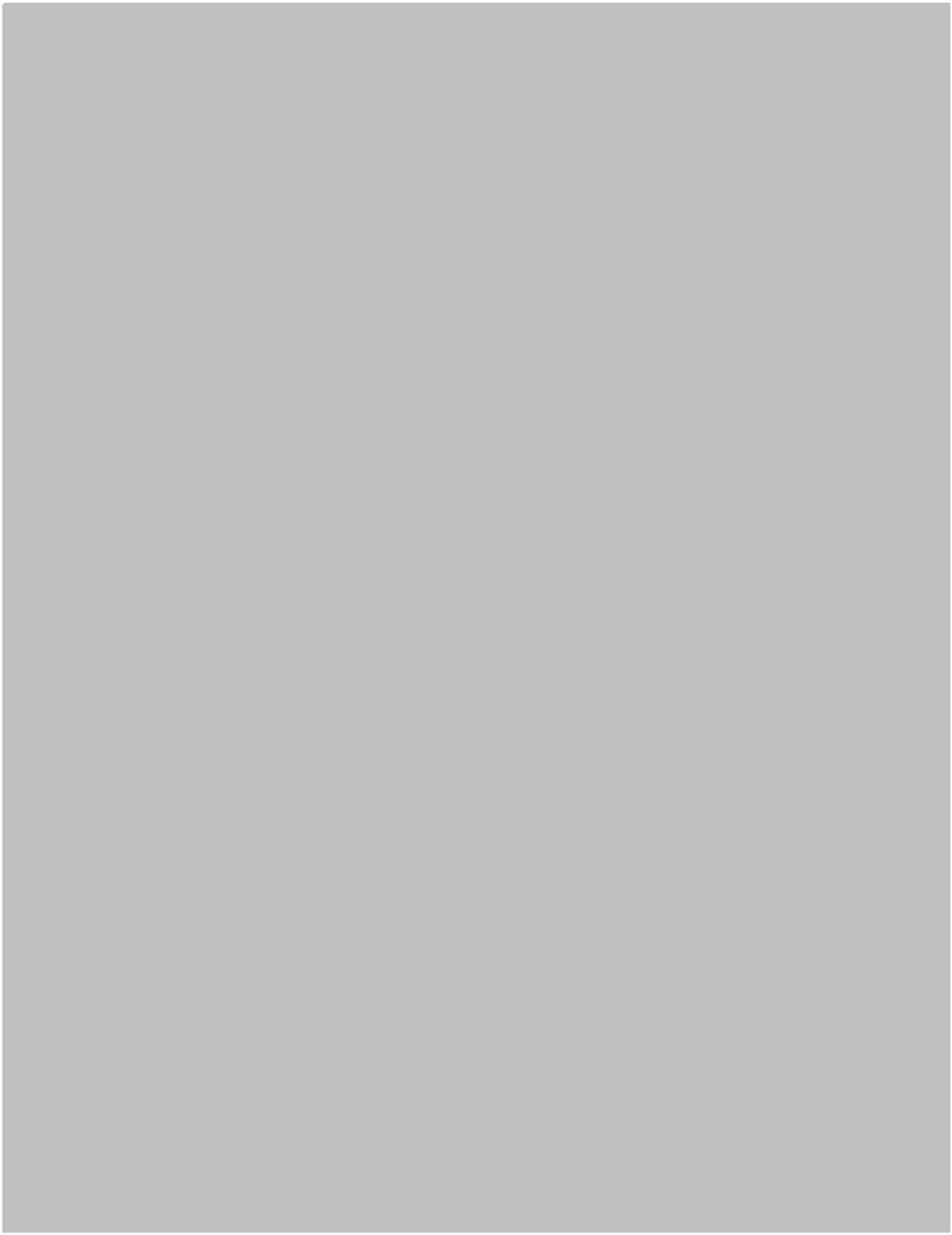

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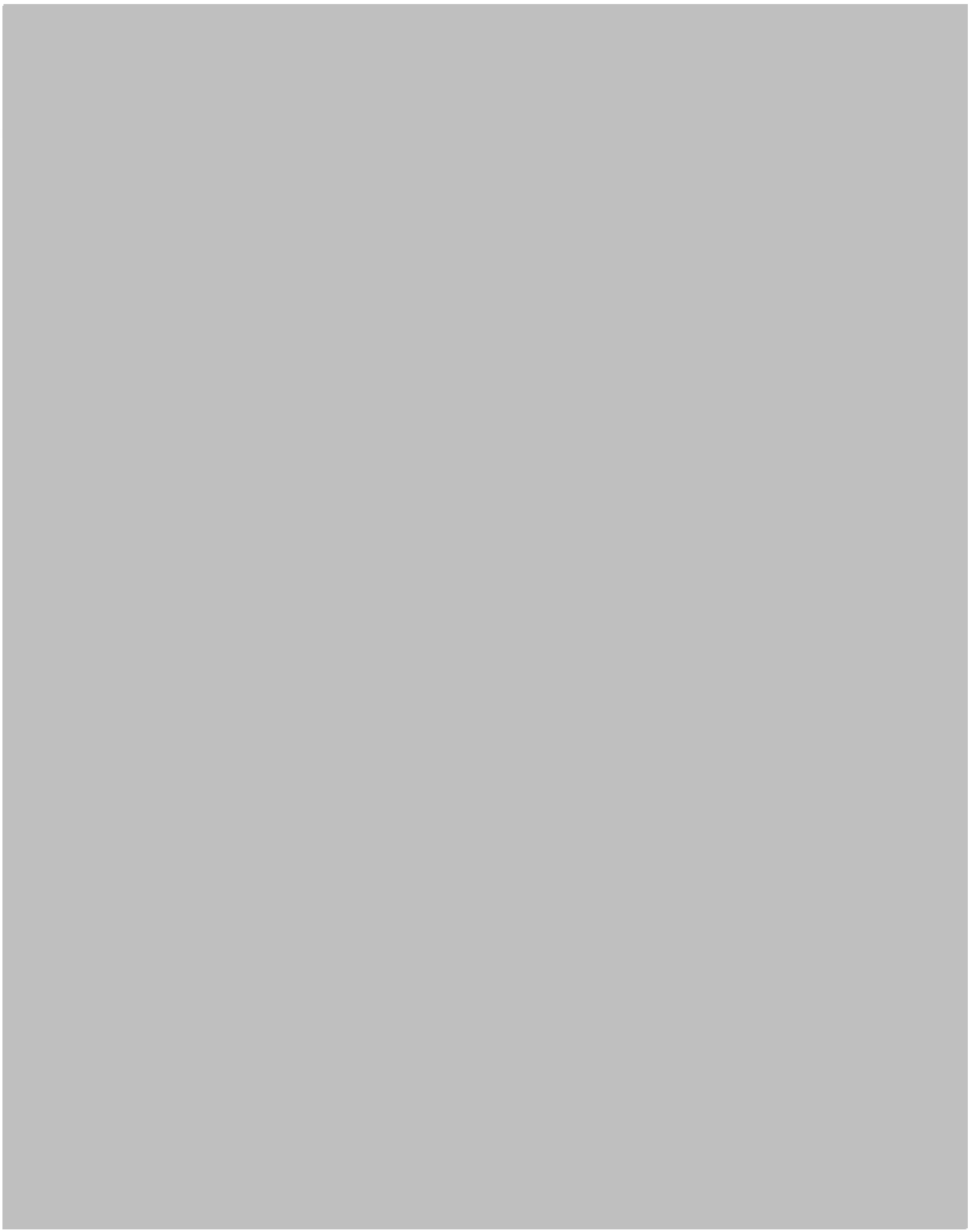

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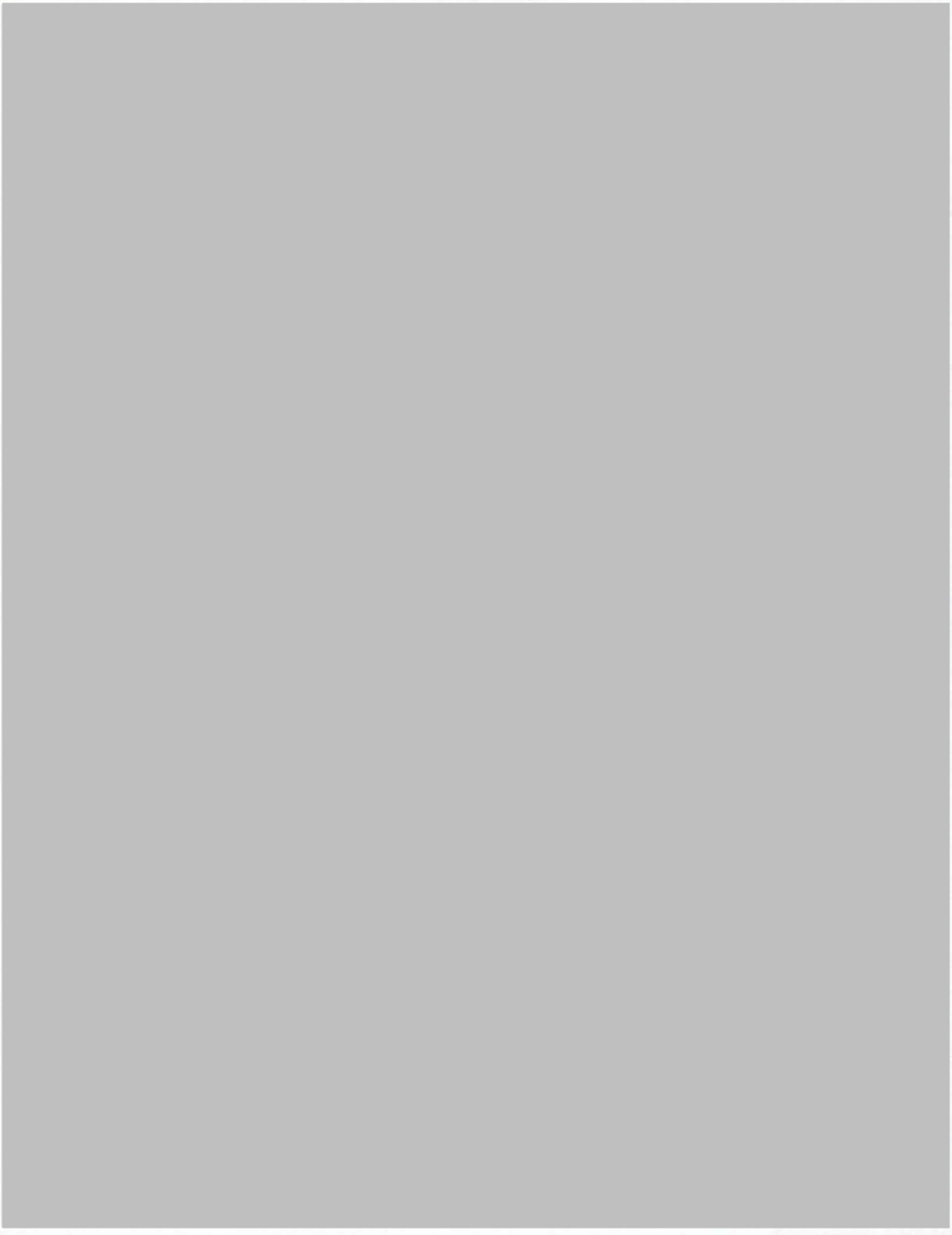

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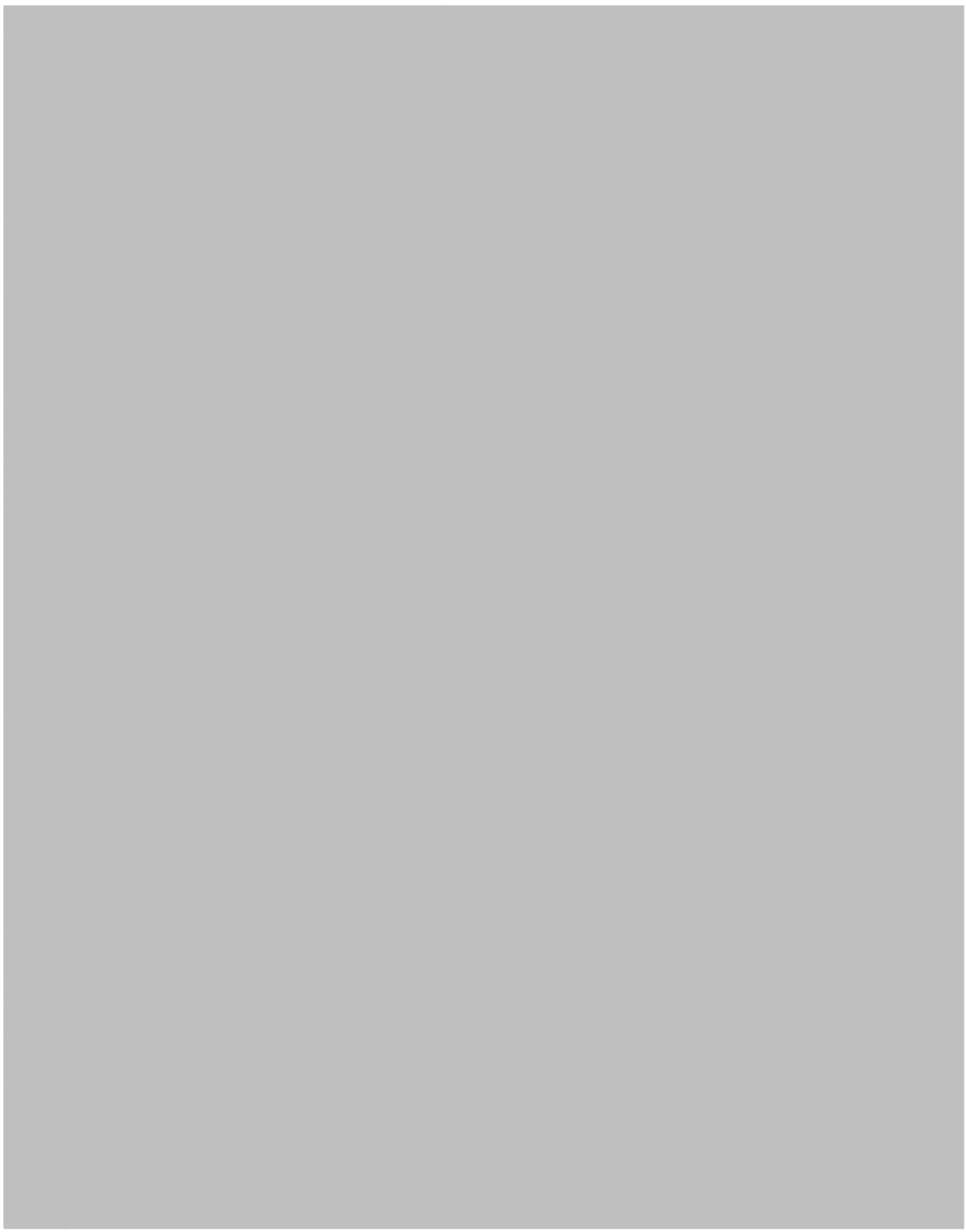

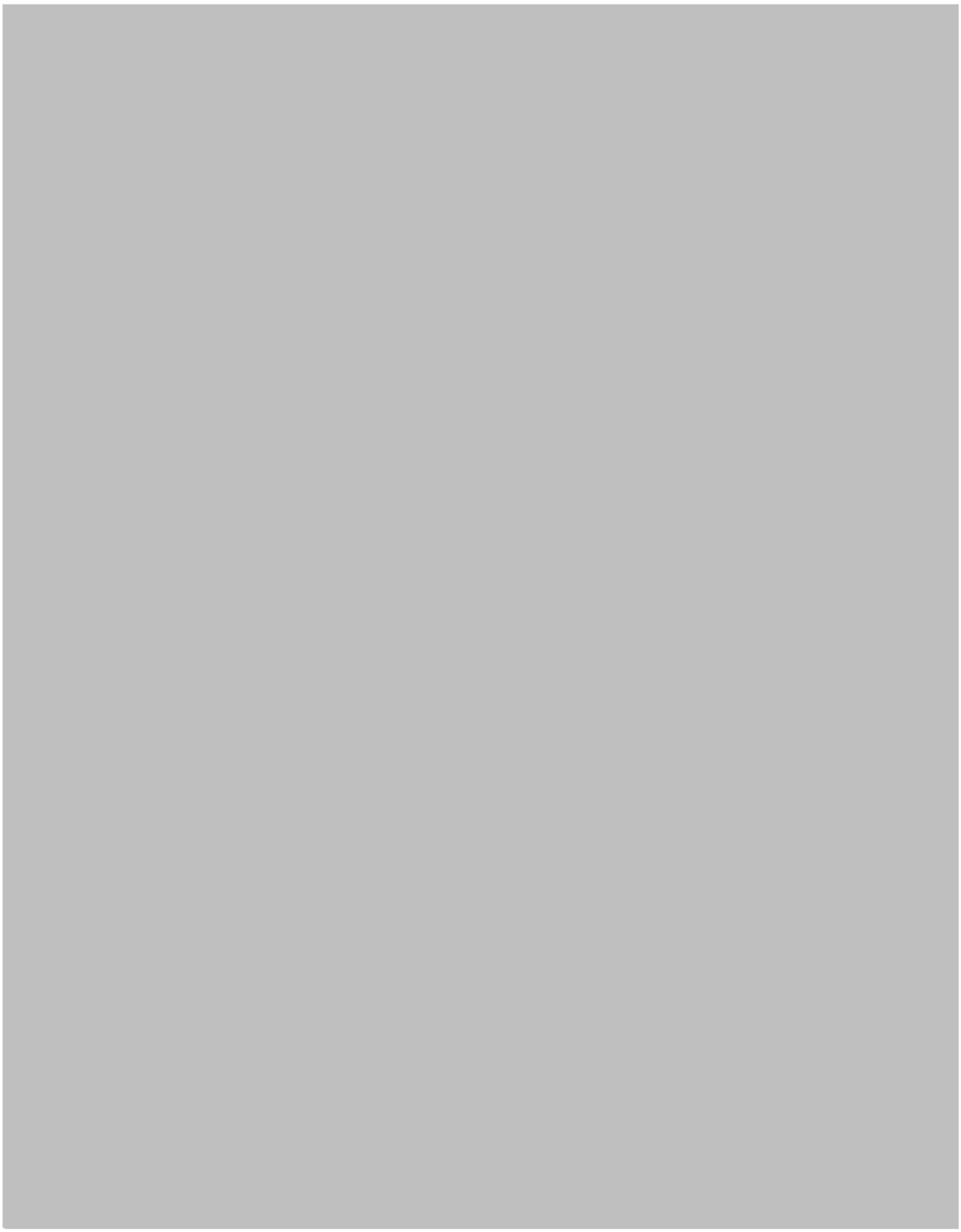

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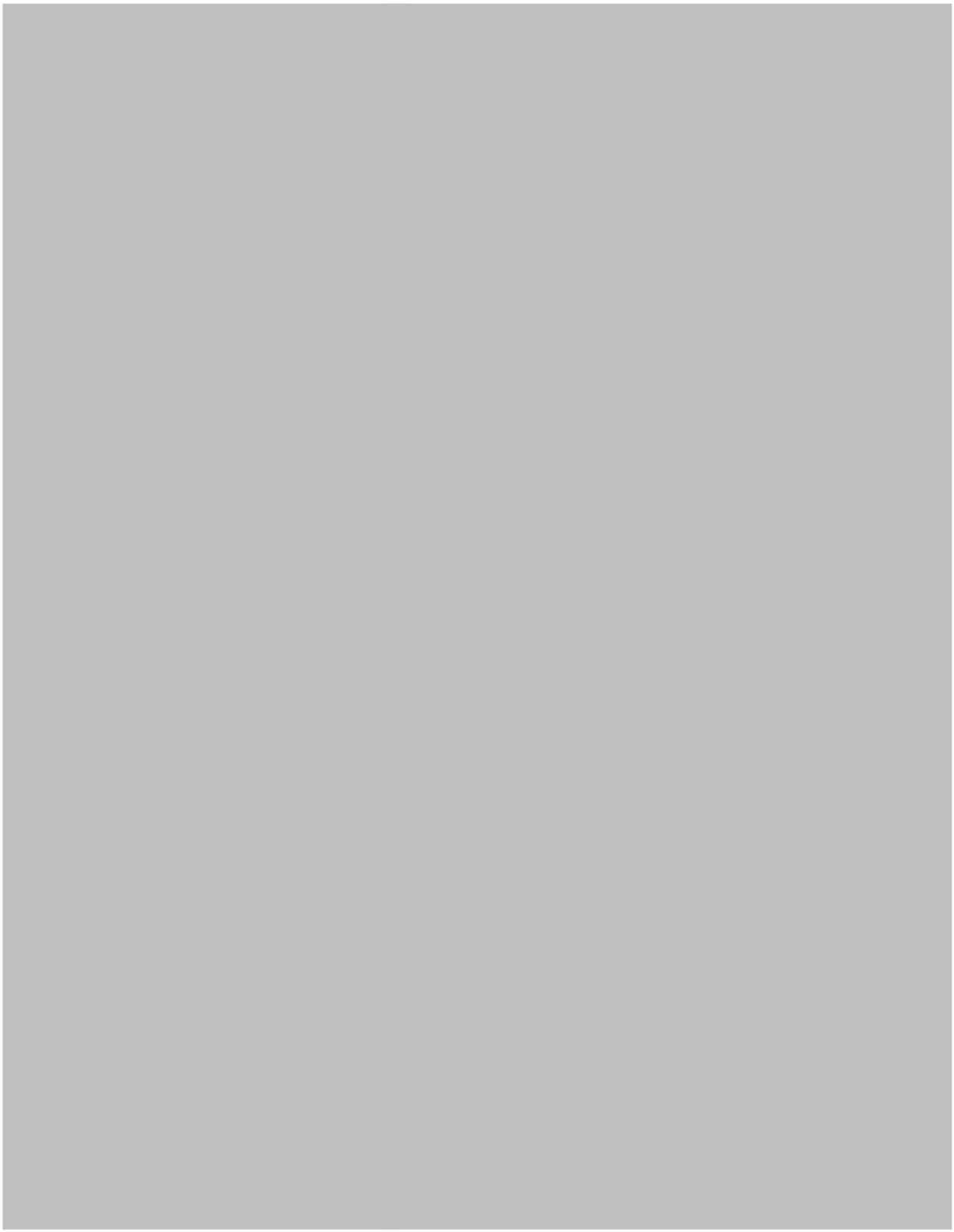

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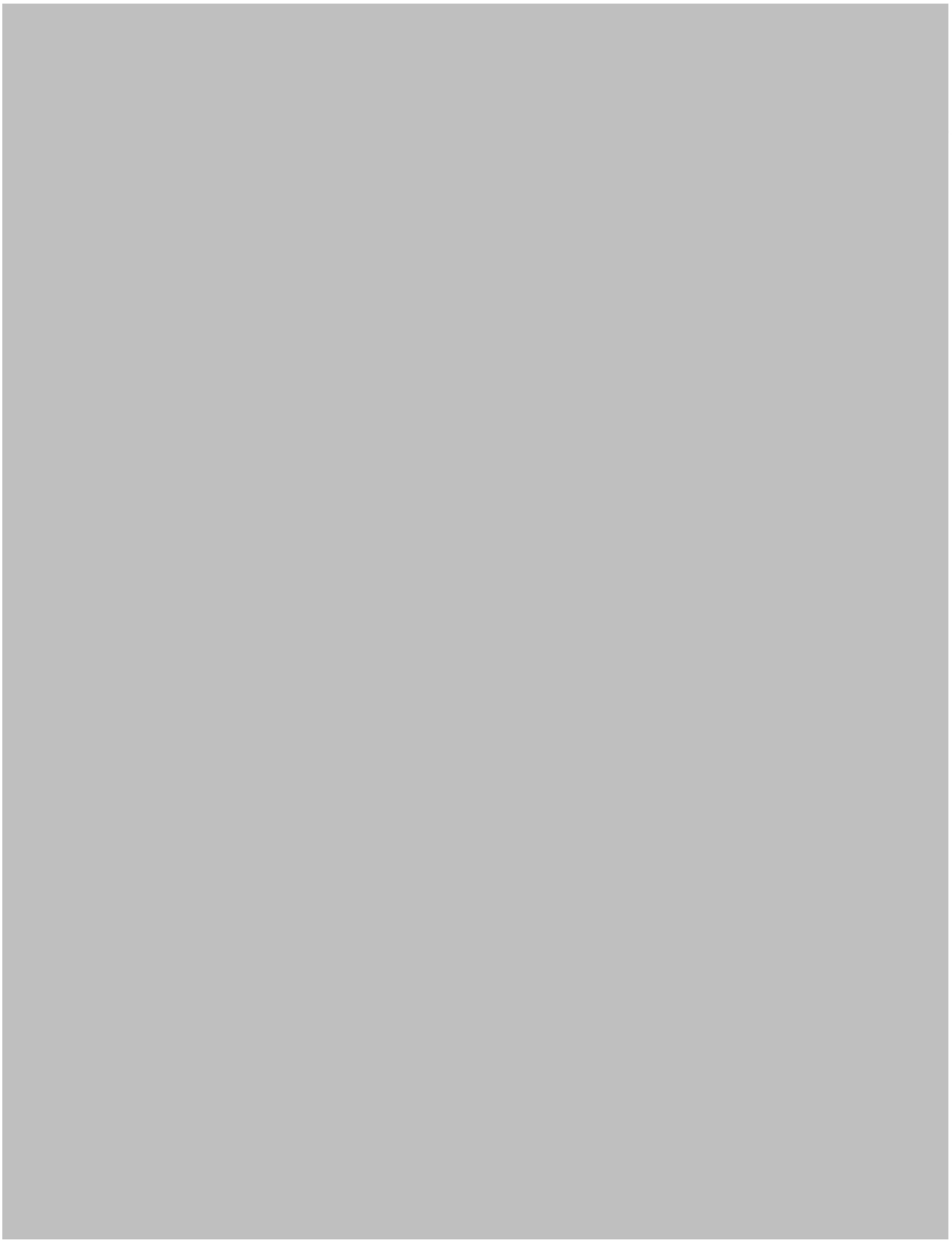

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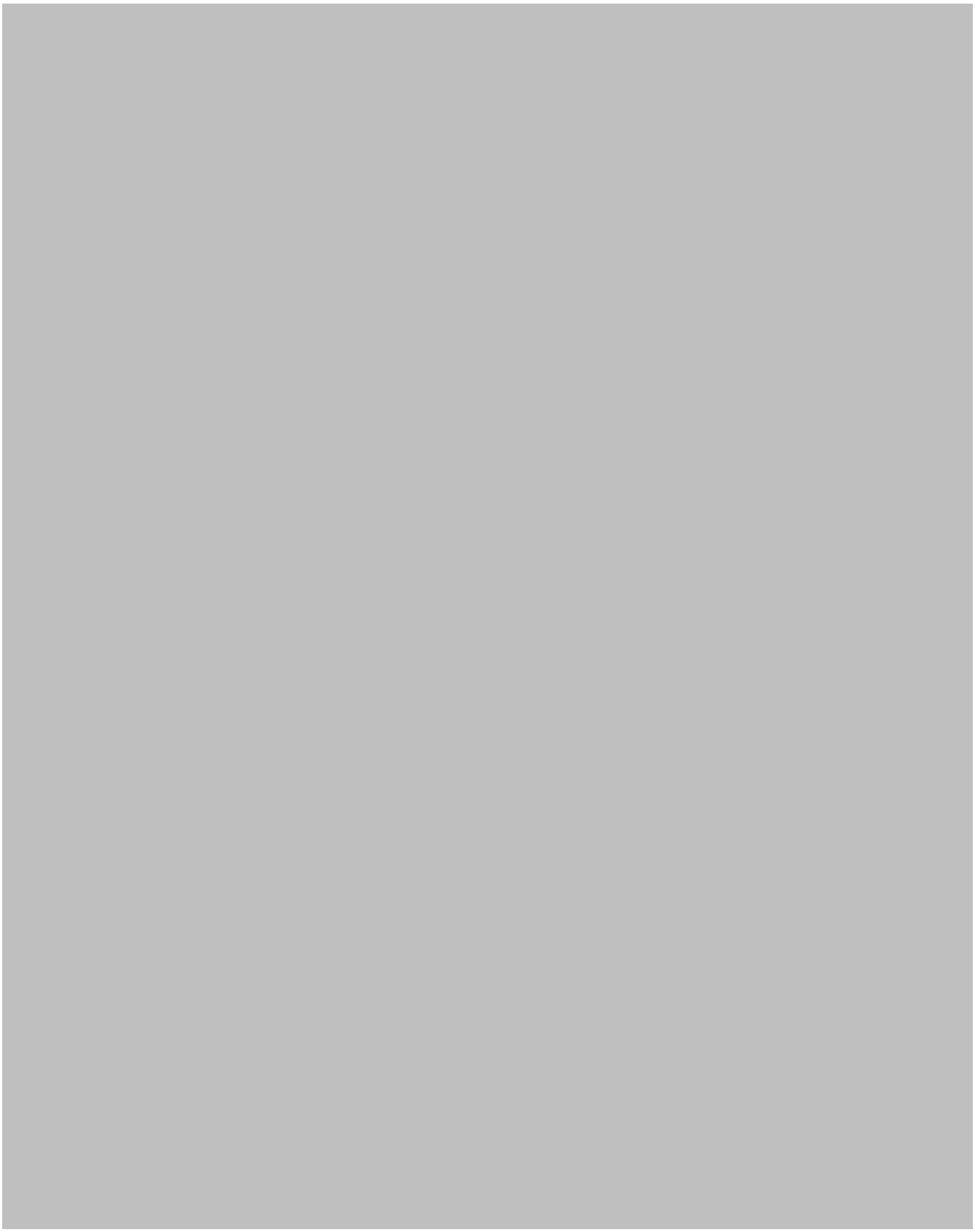

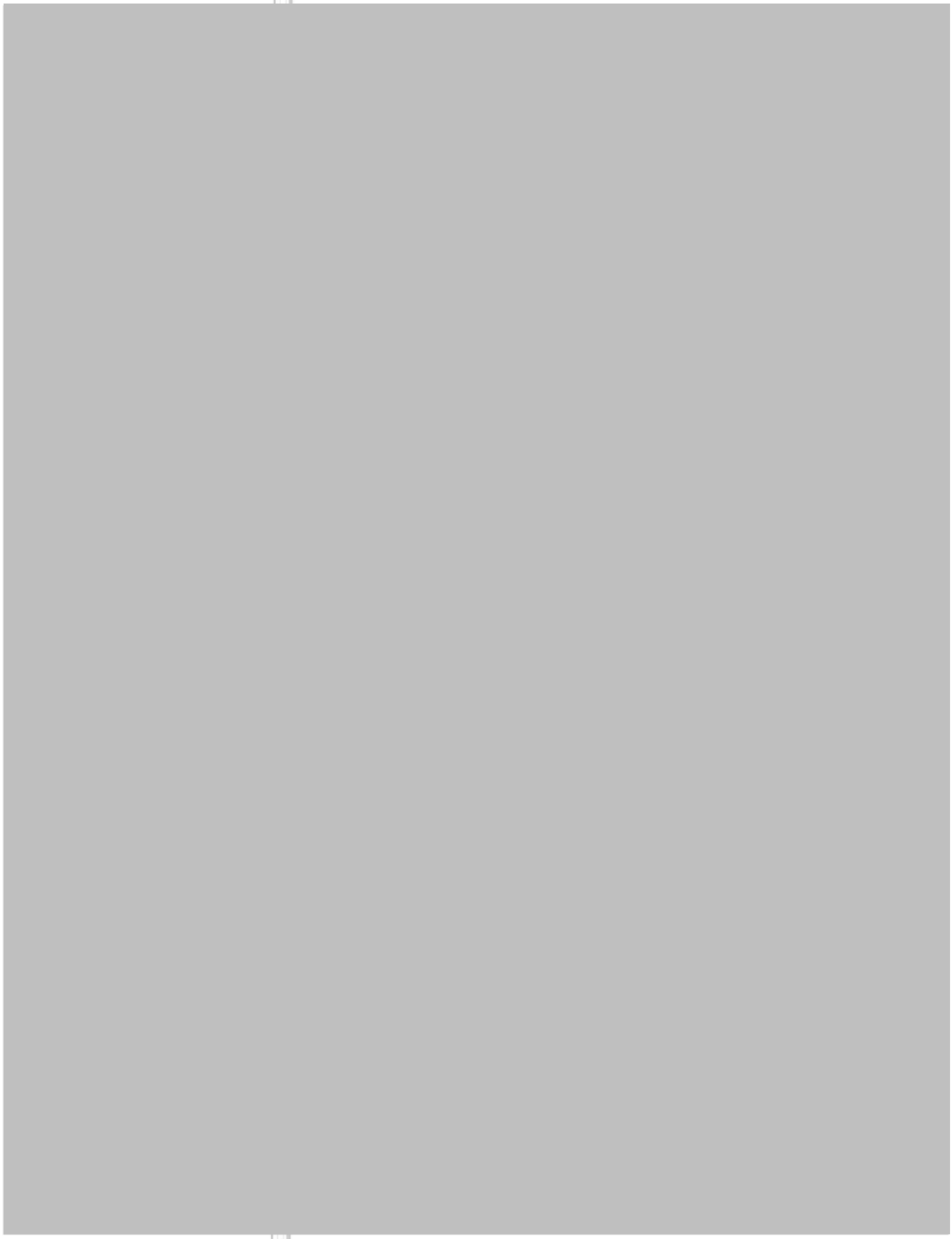

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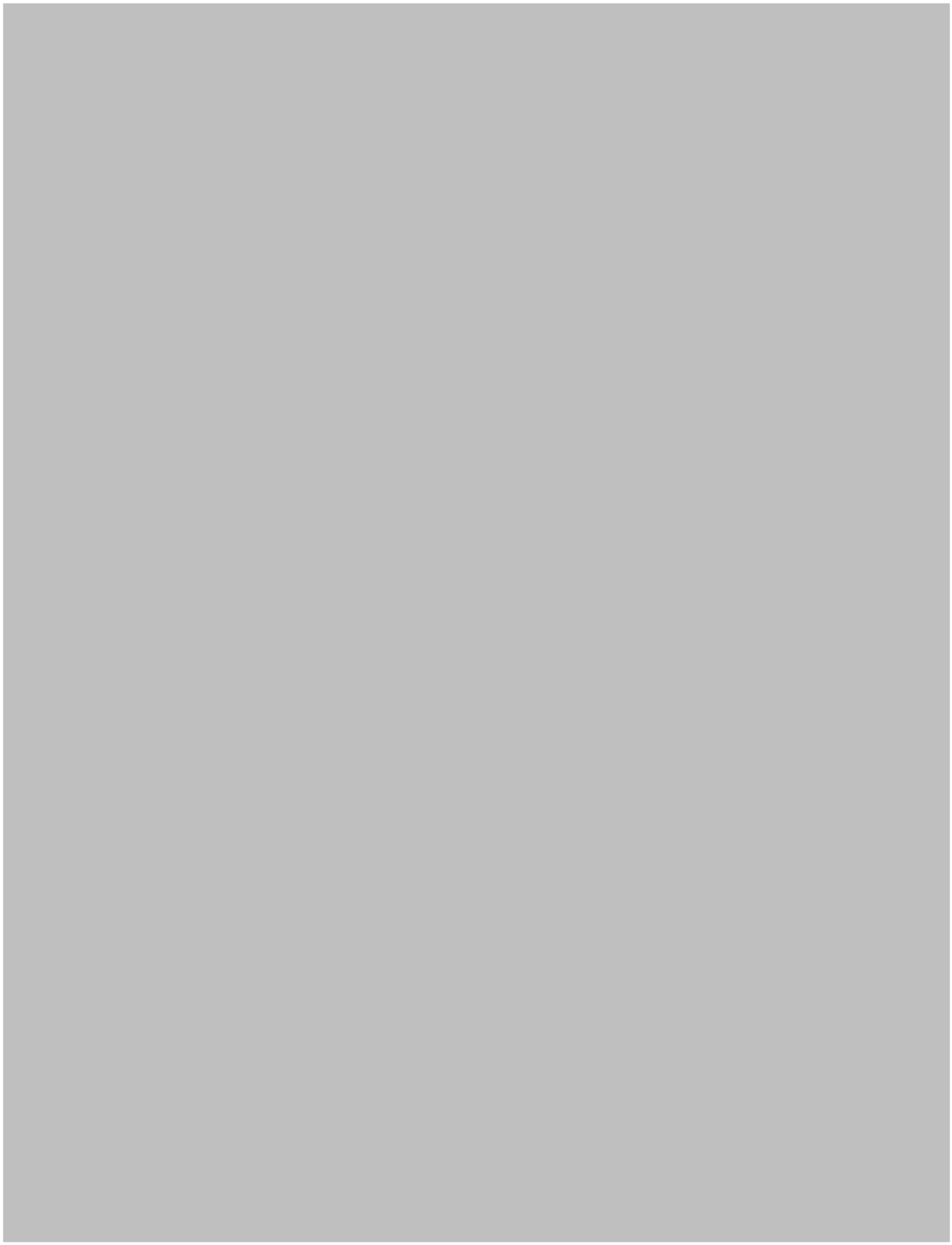

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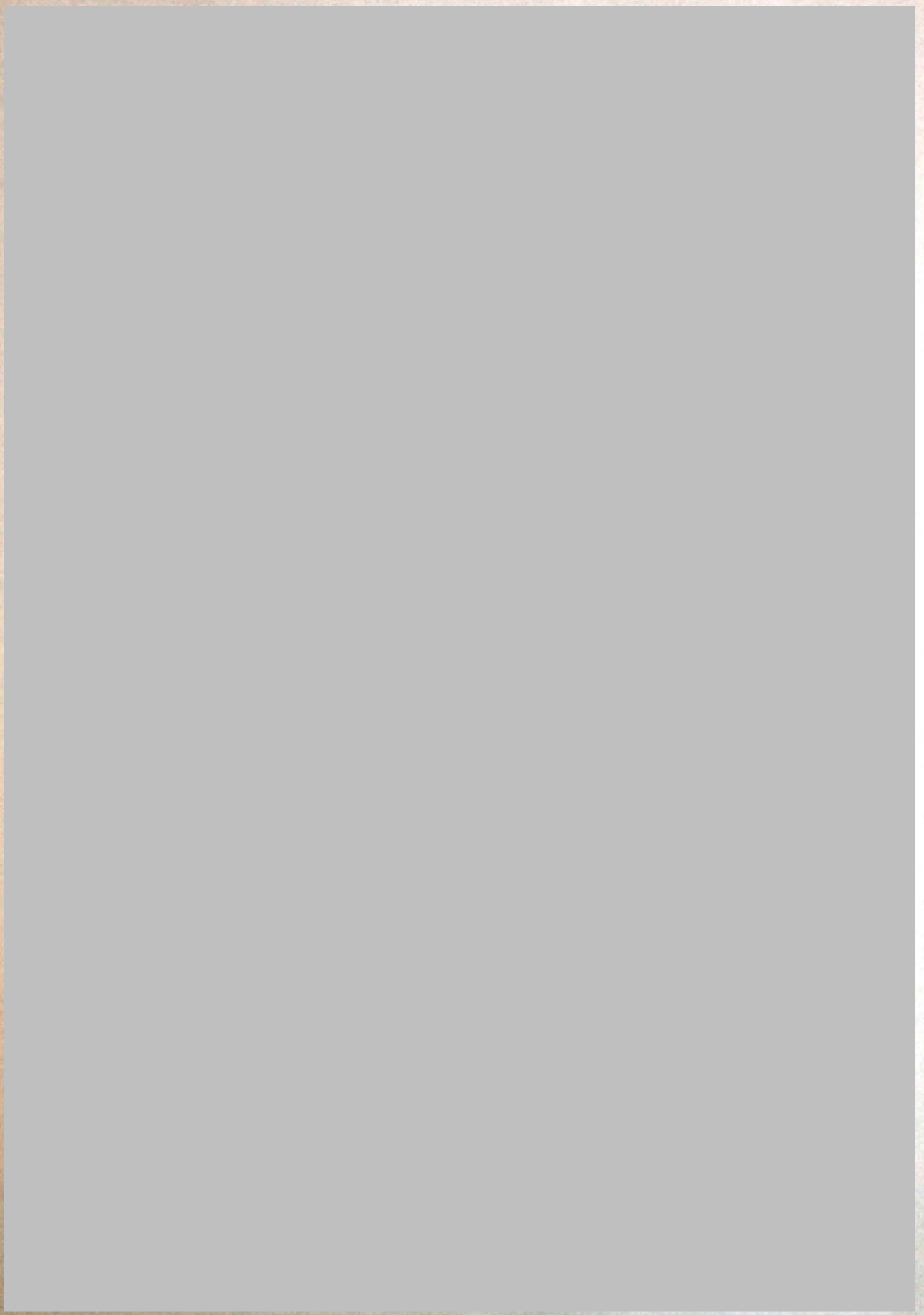

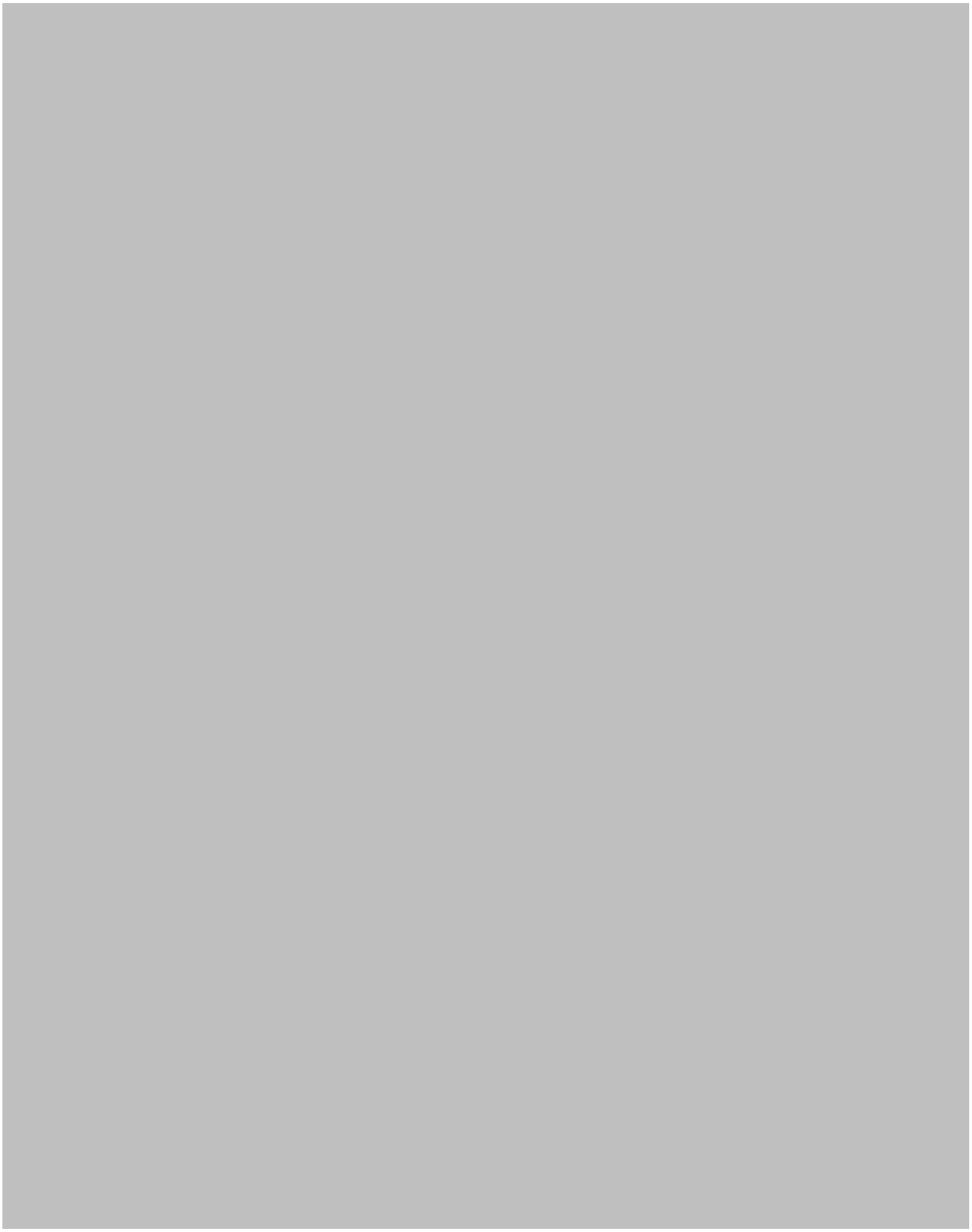

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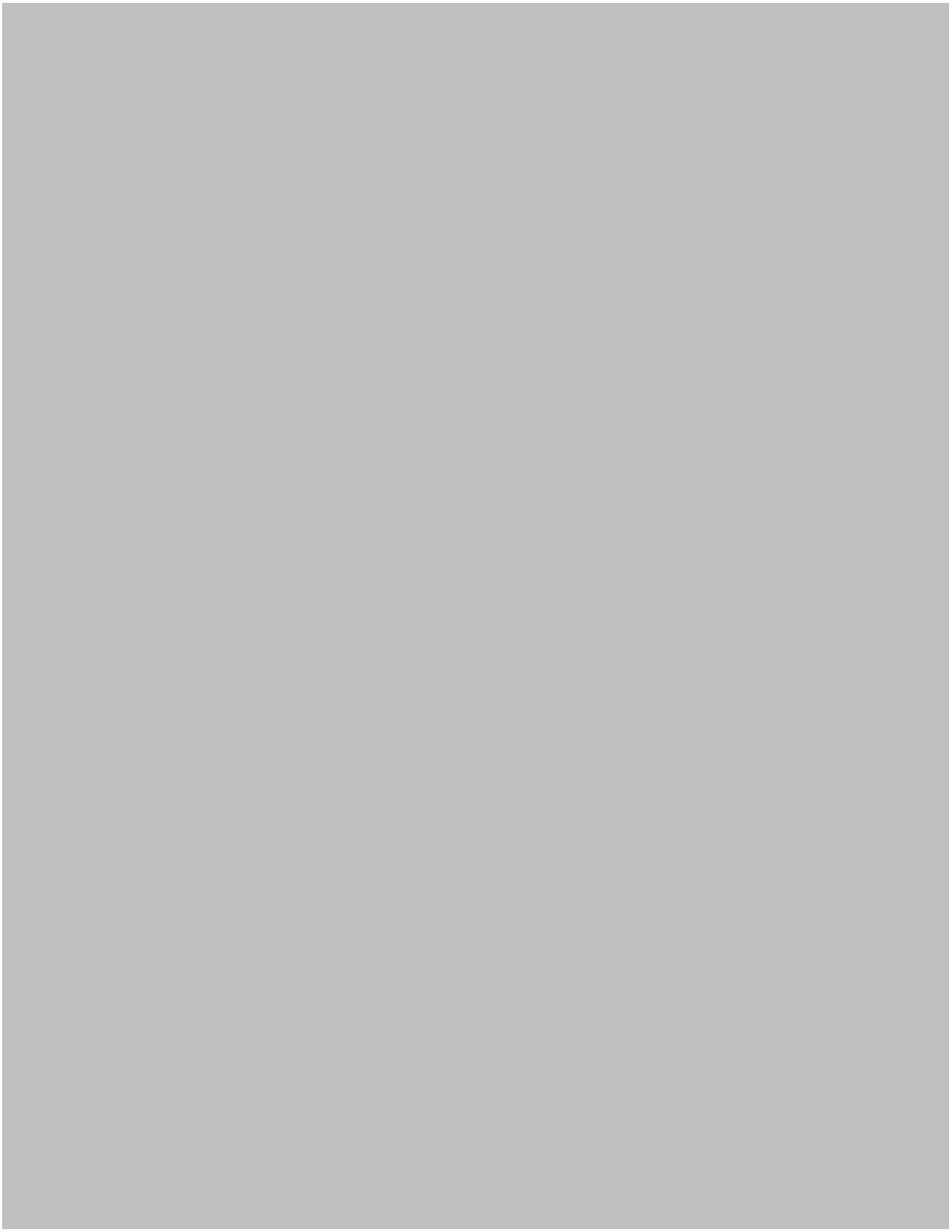

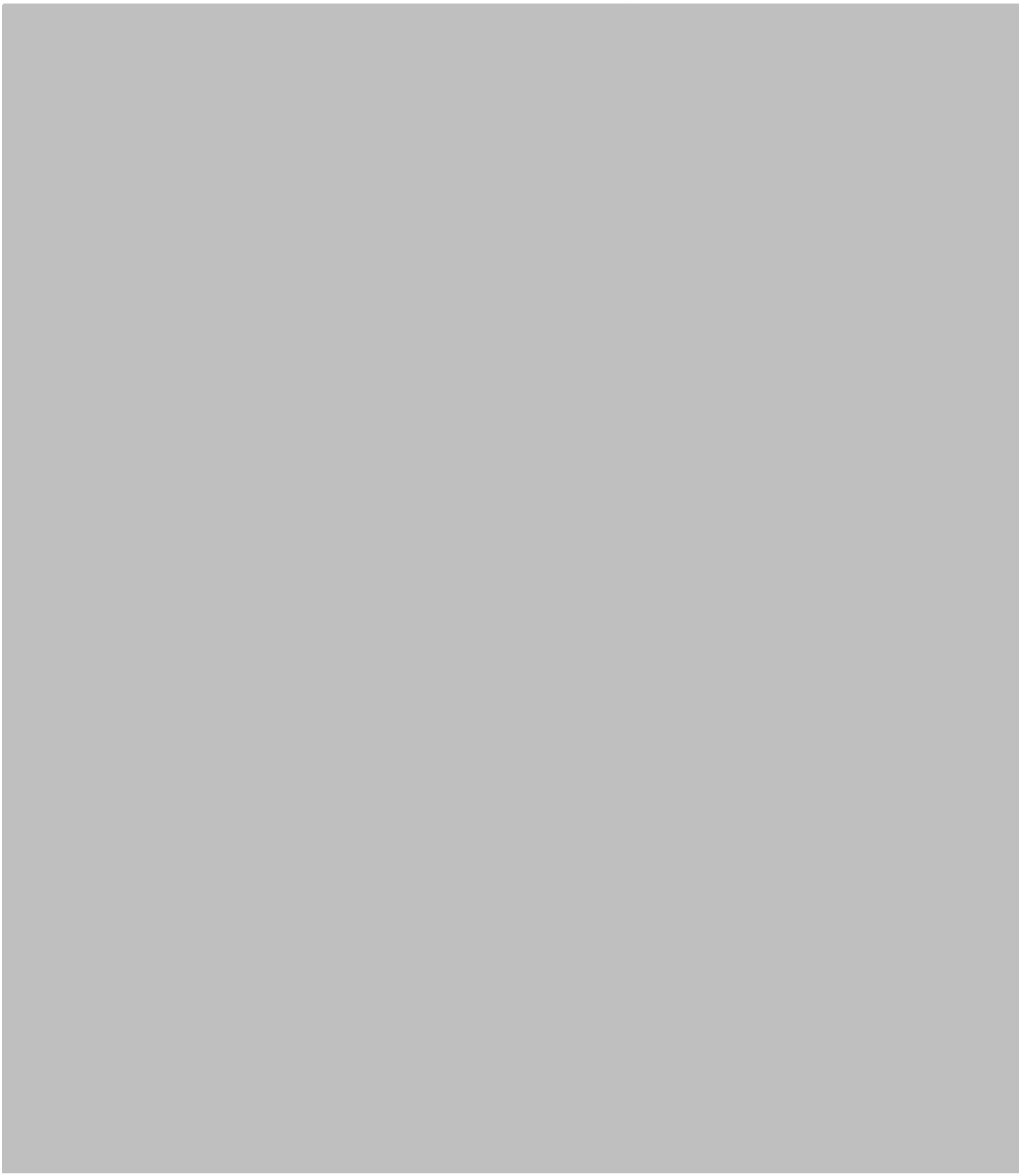

D5. Civil Litigation Disclosures

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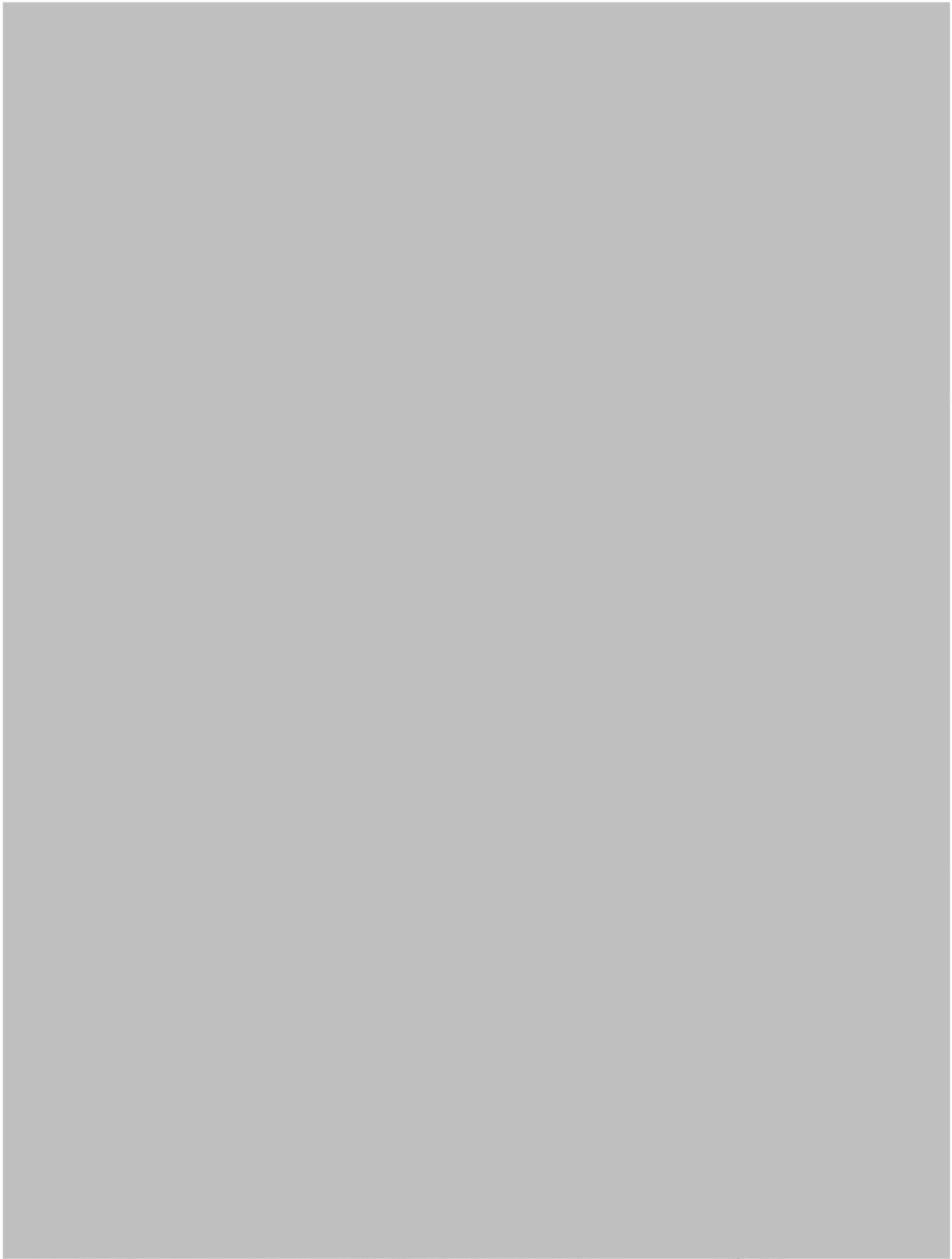

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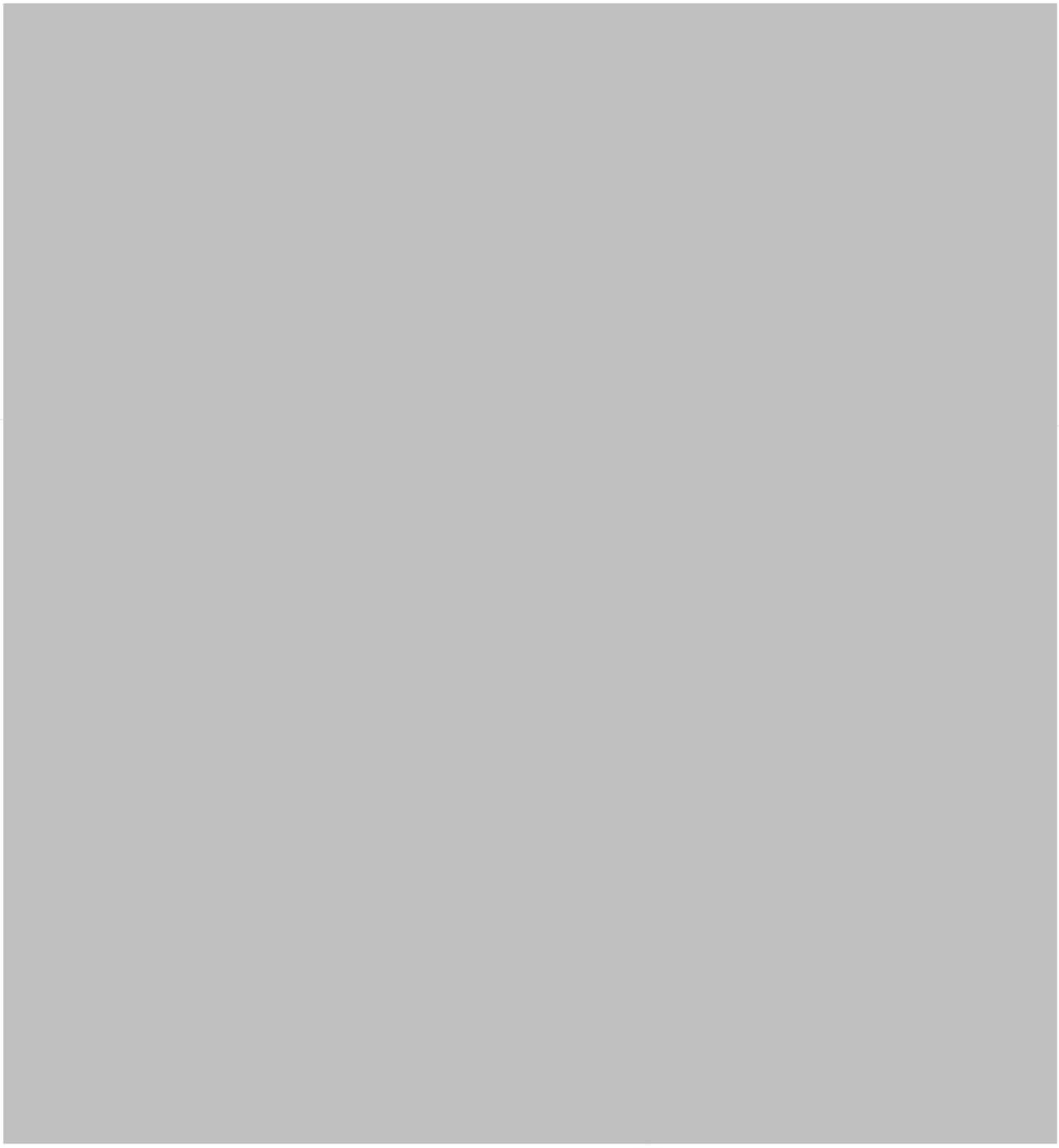

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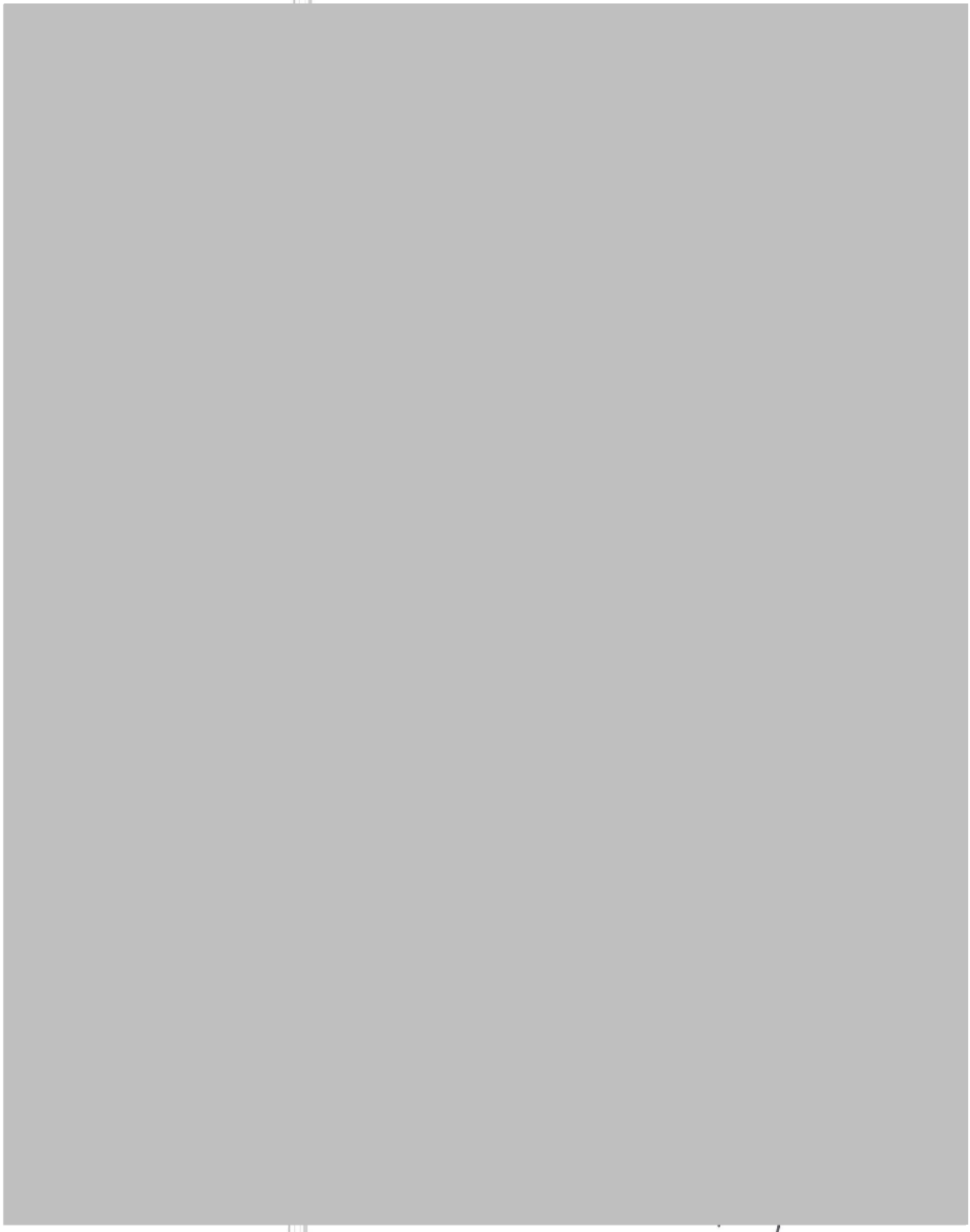

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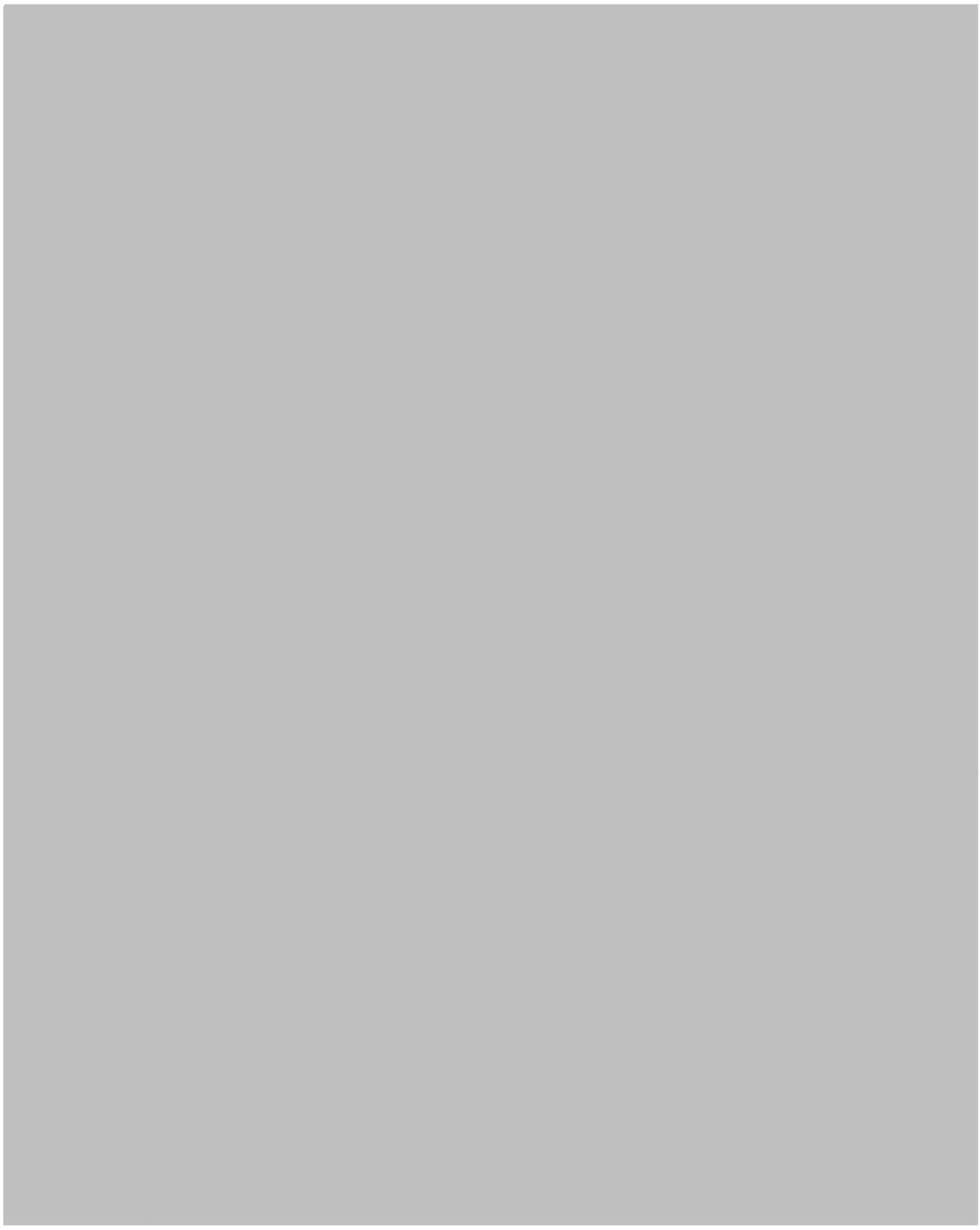

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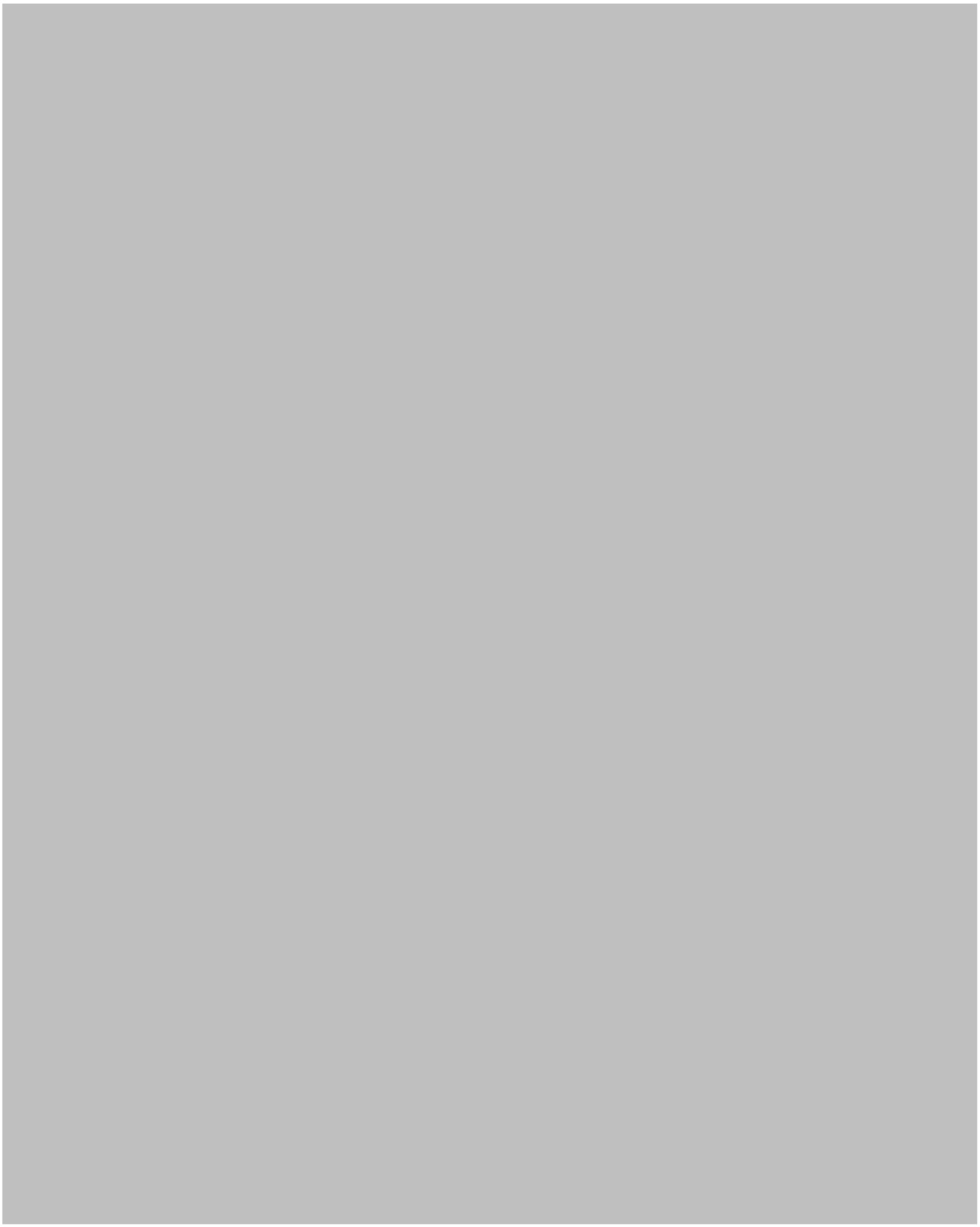

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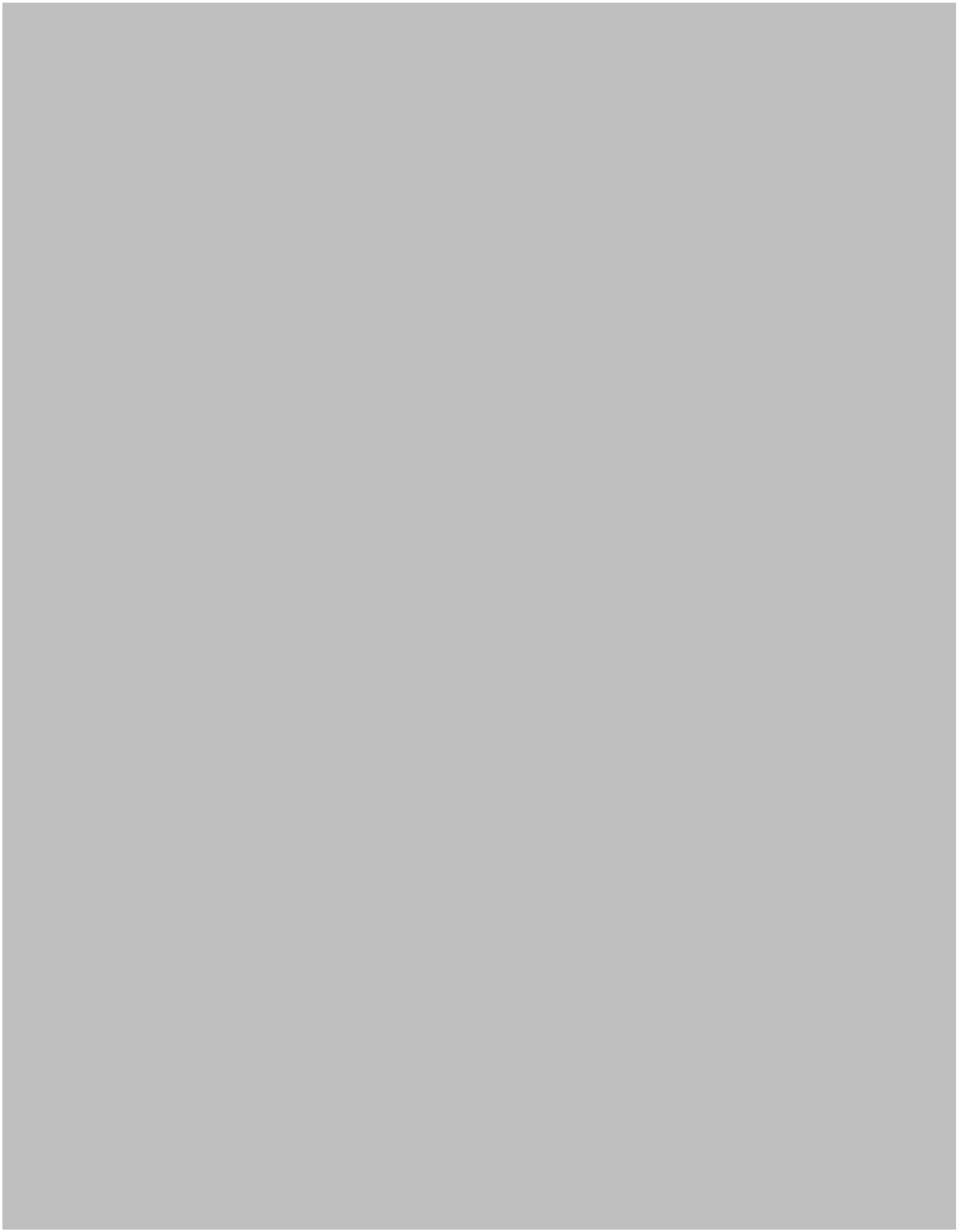

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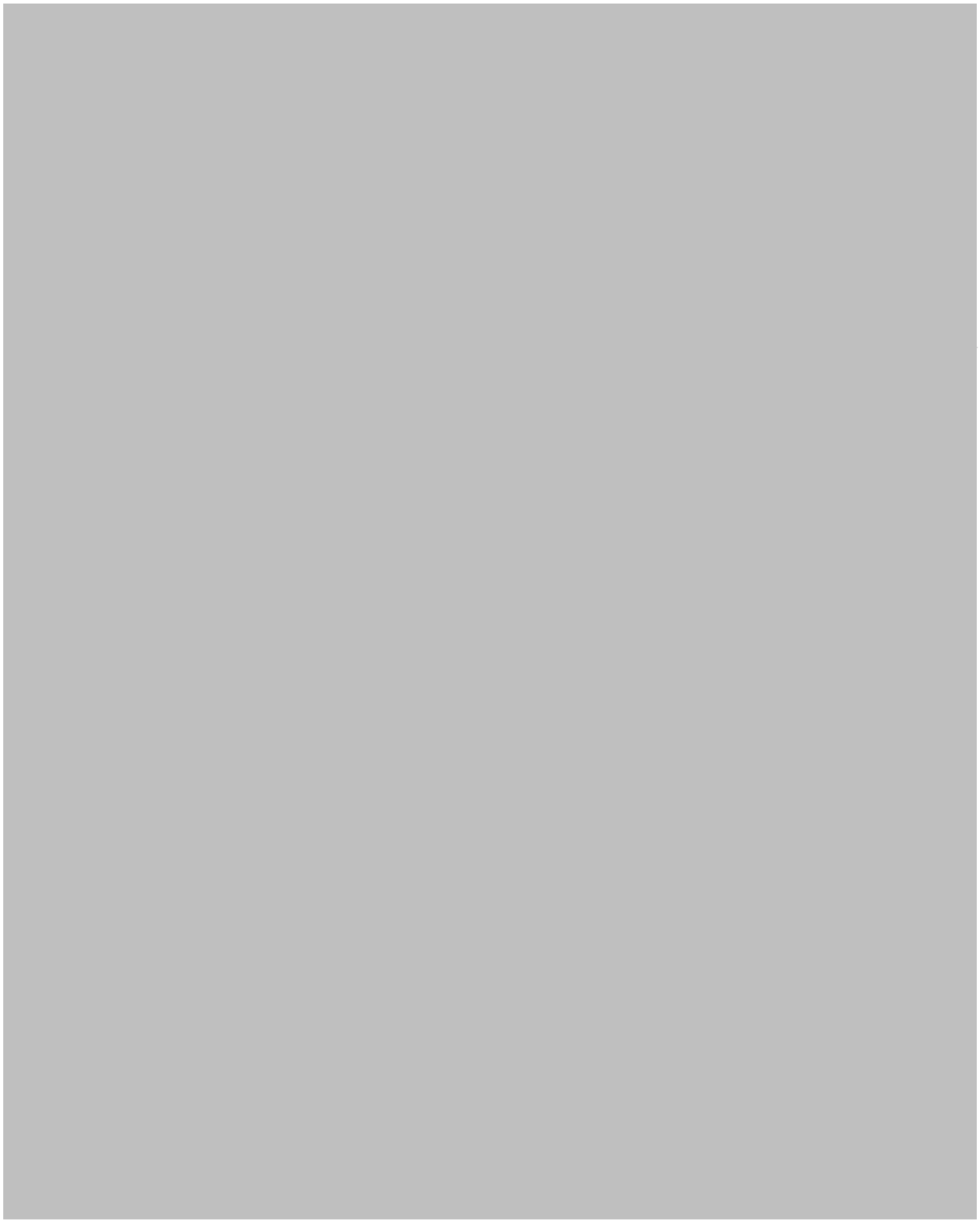

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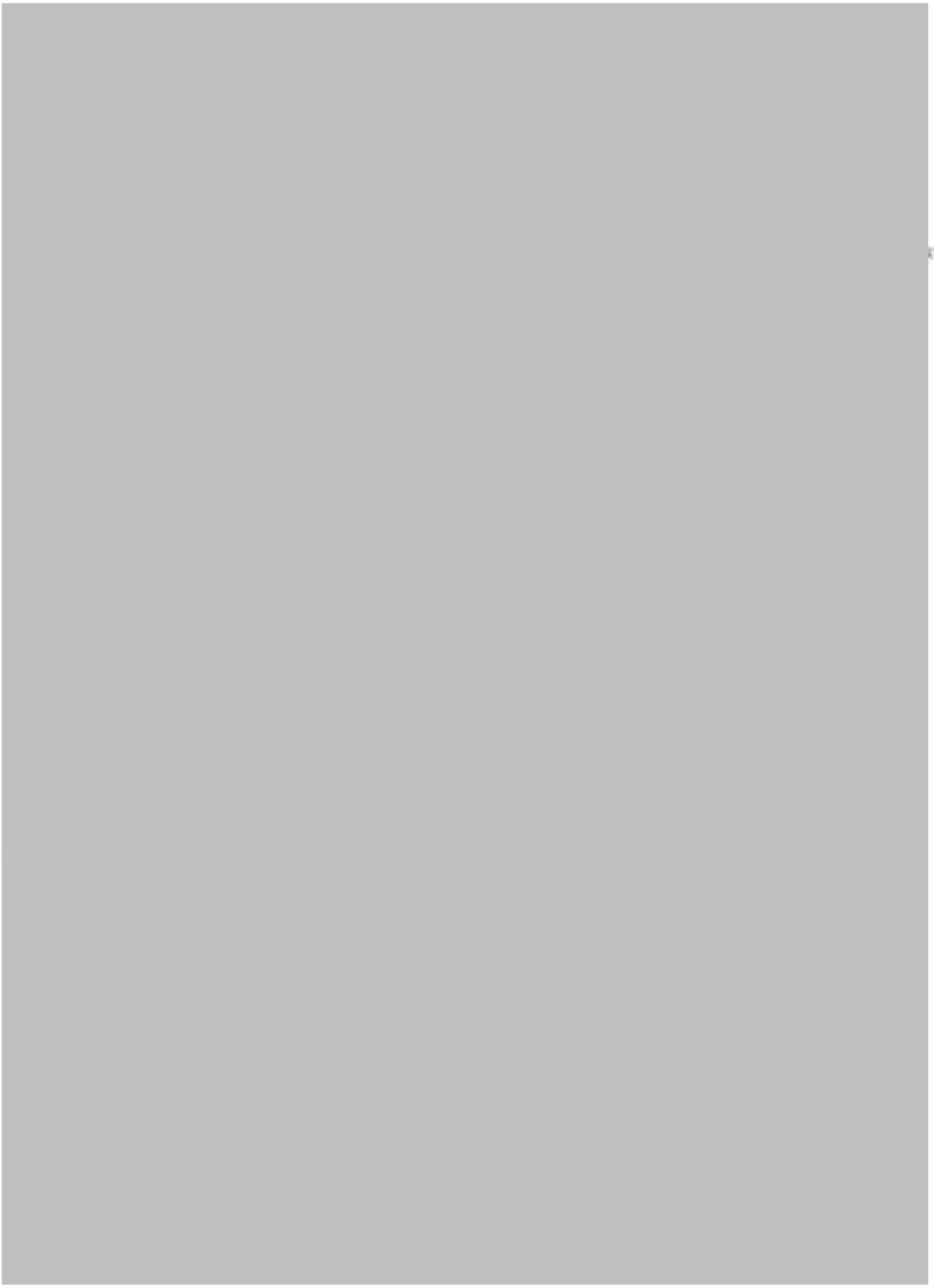

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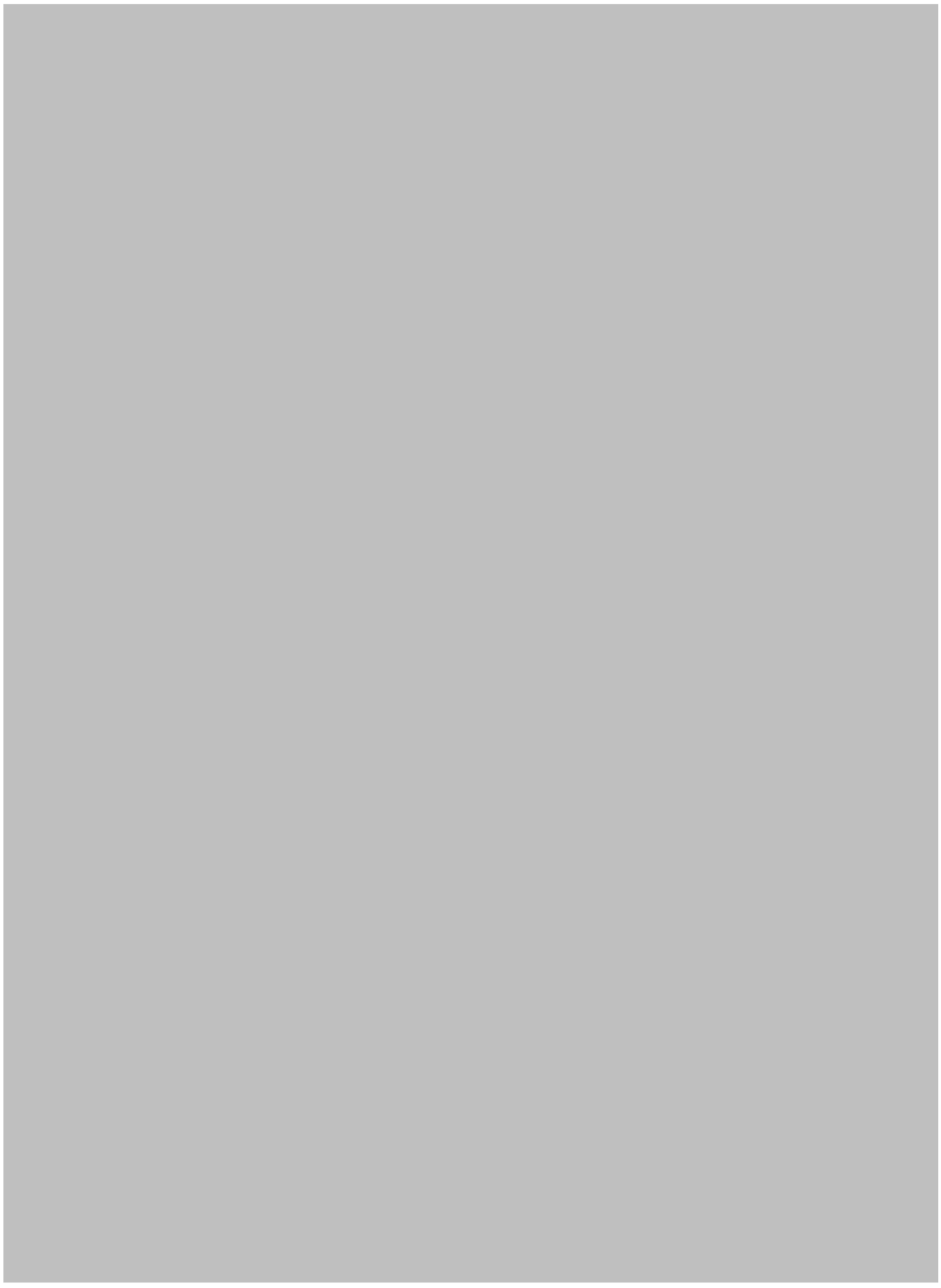

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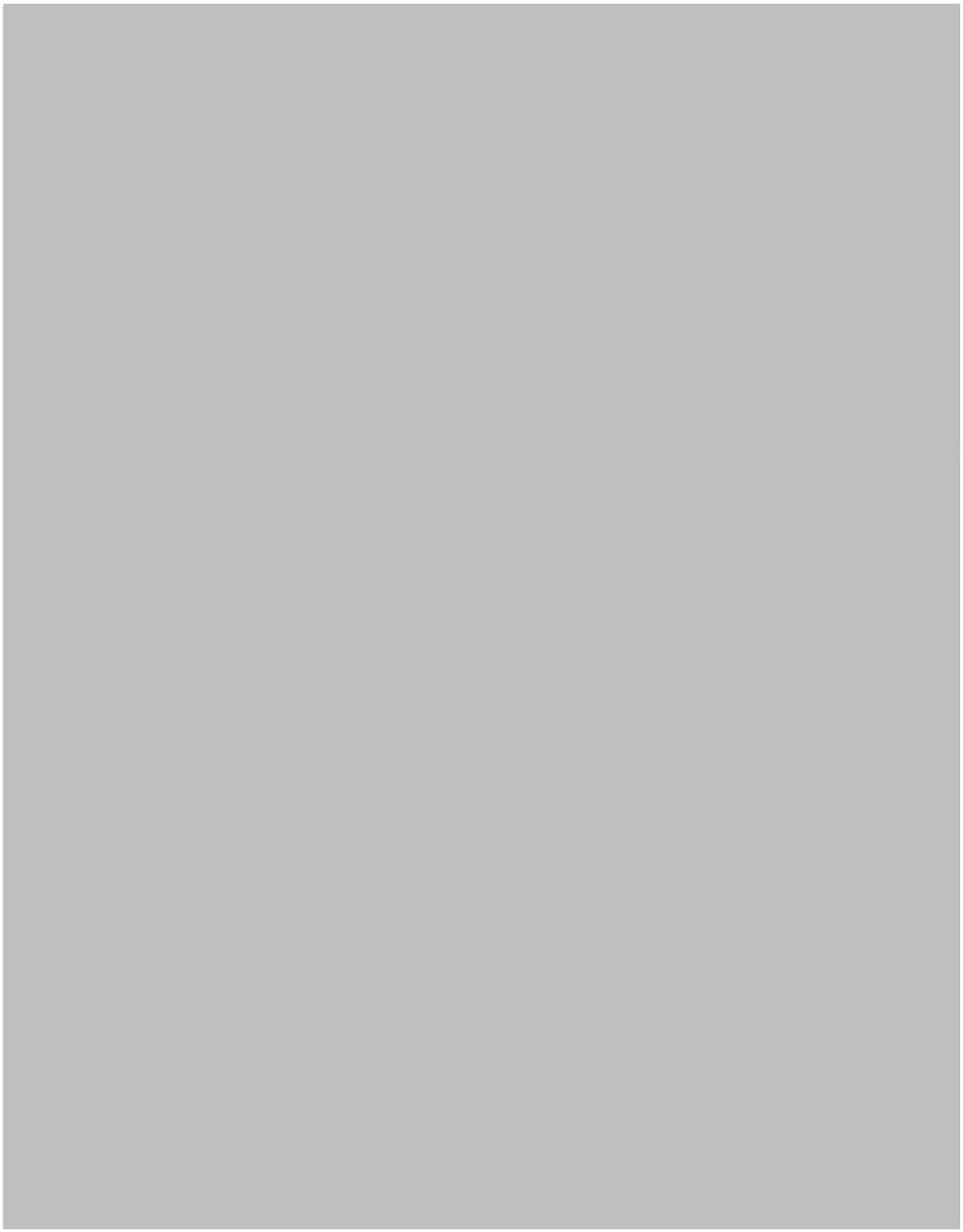

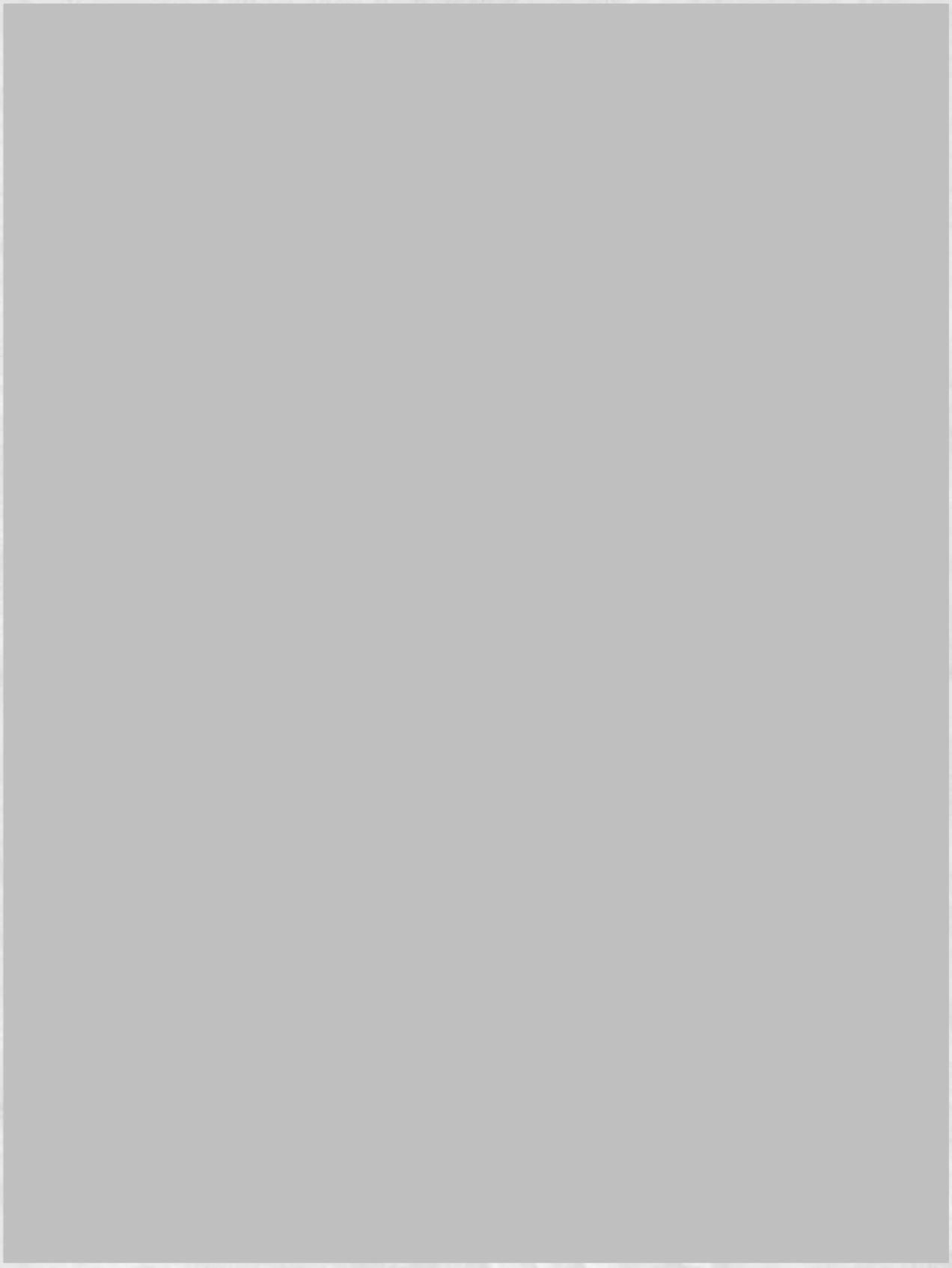

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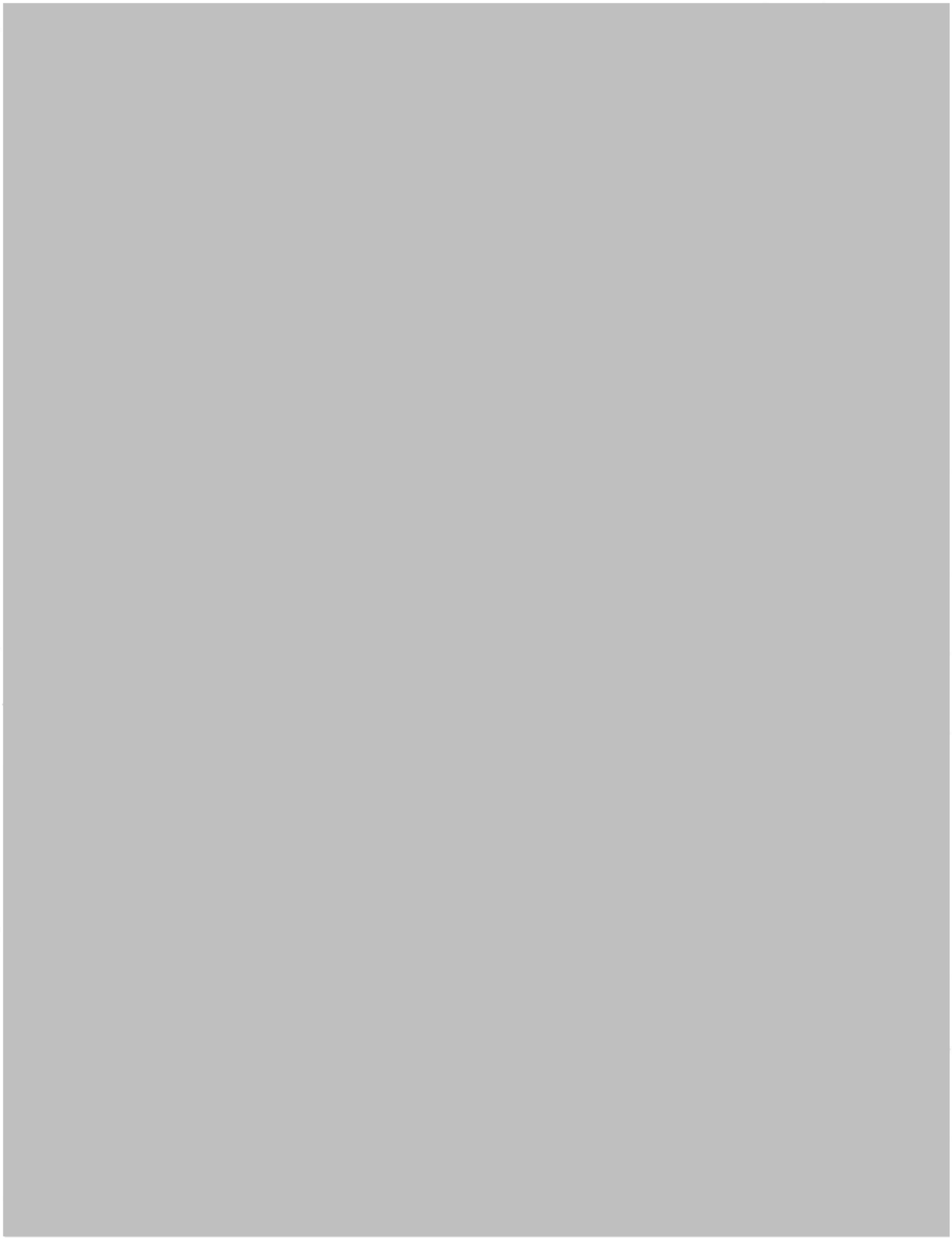

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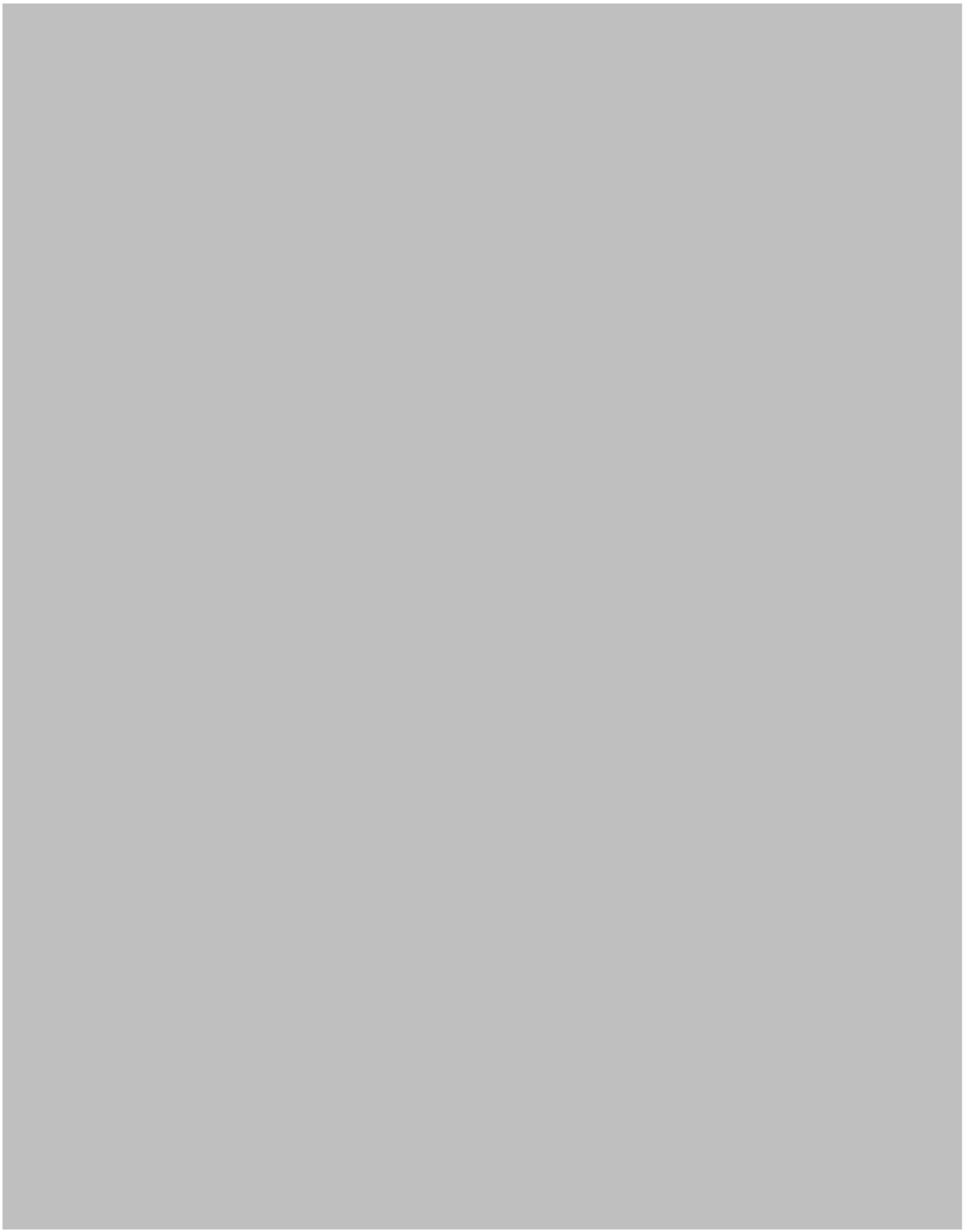

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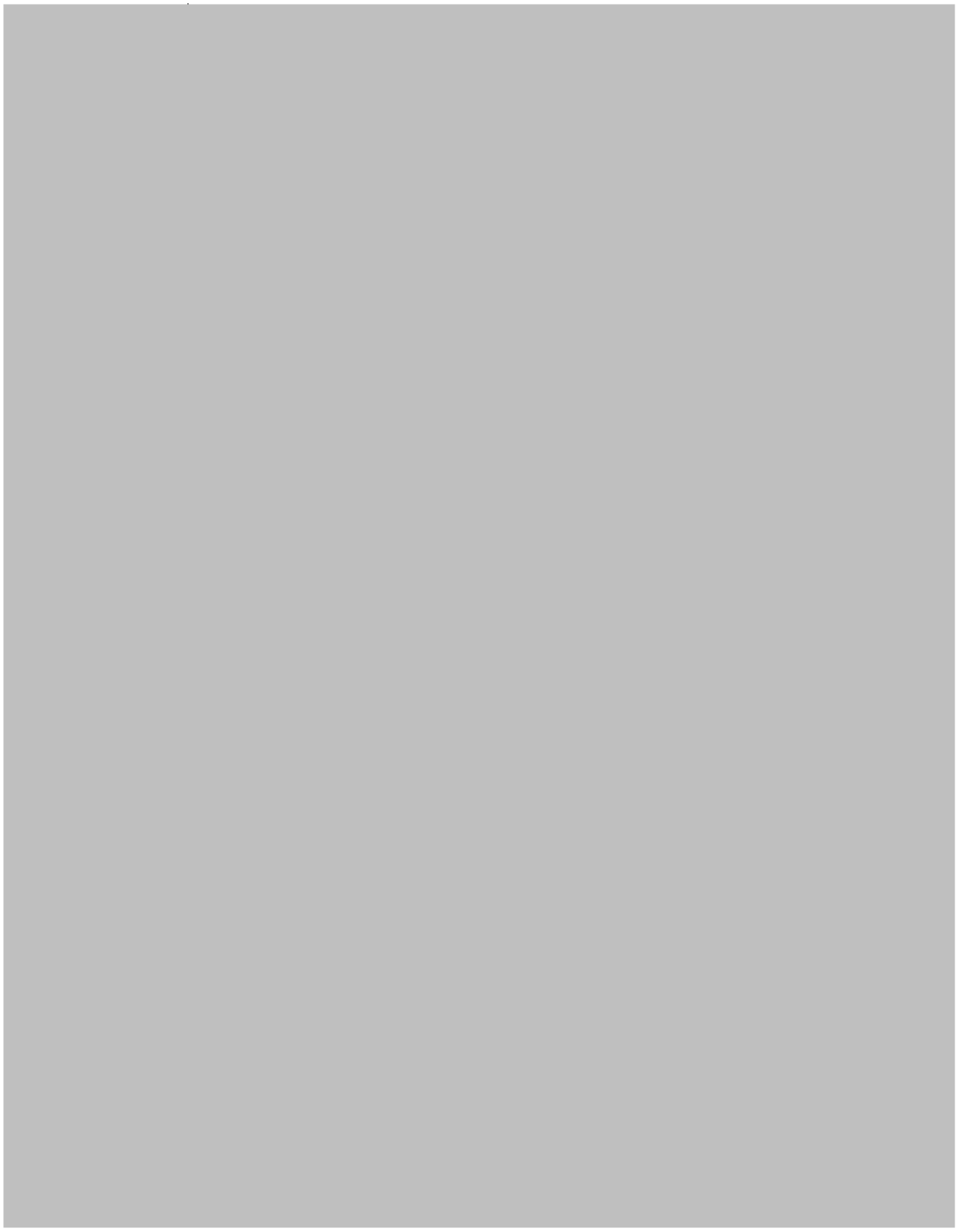

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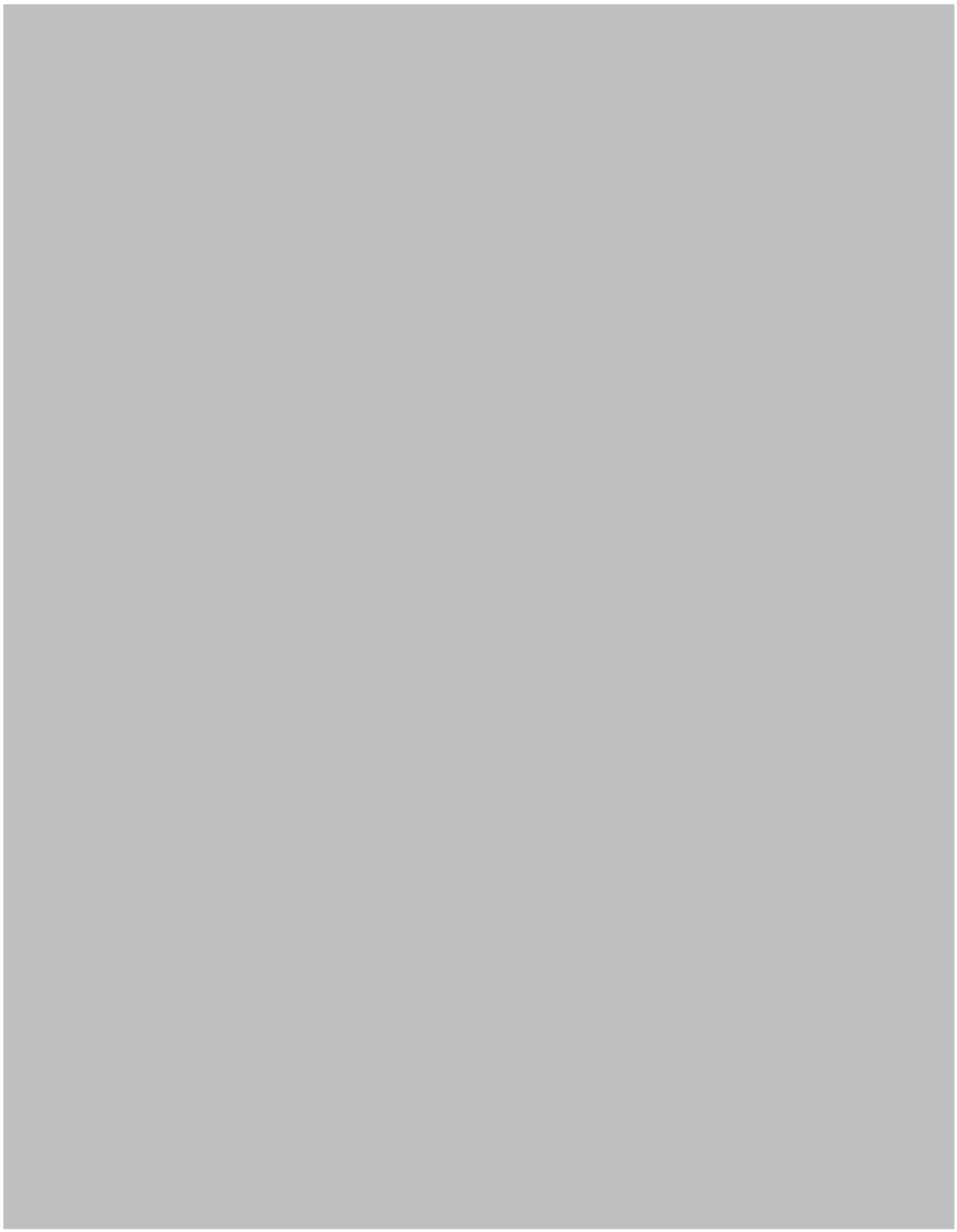

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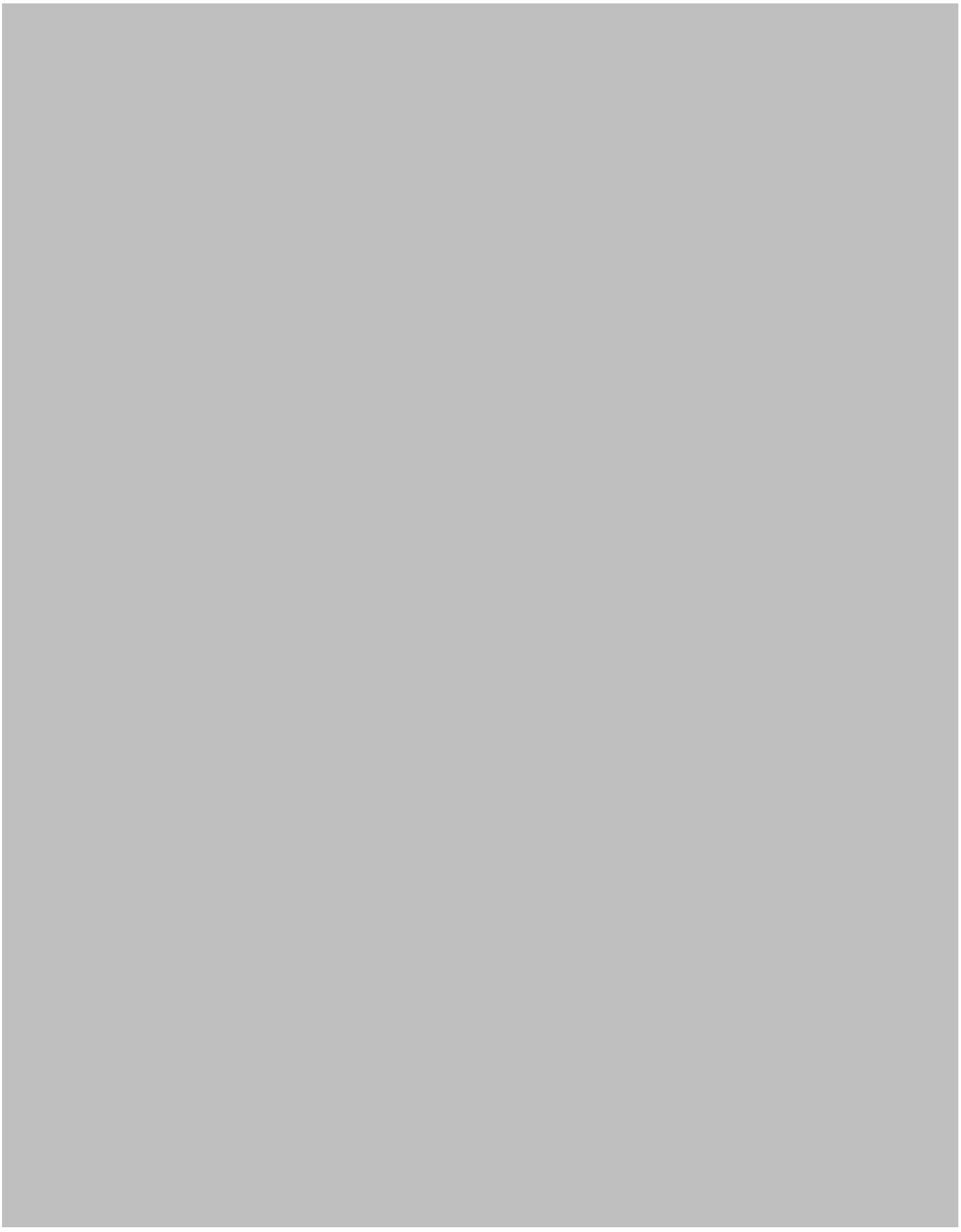
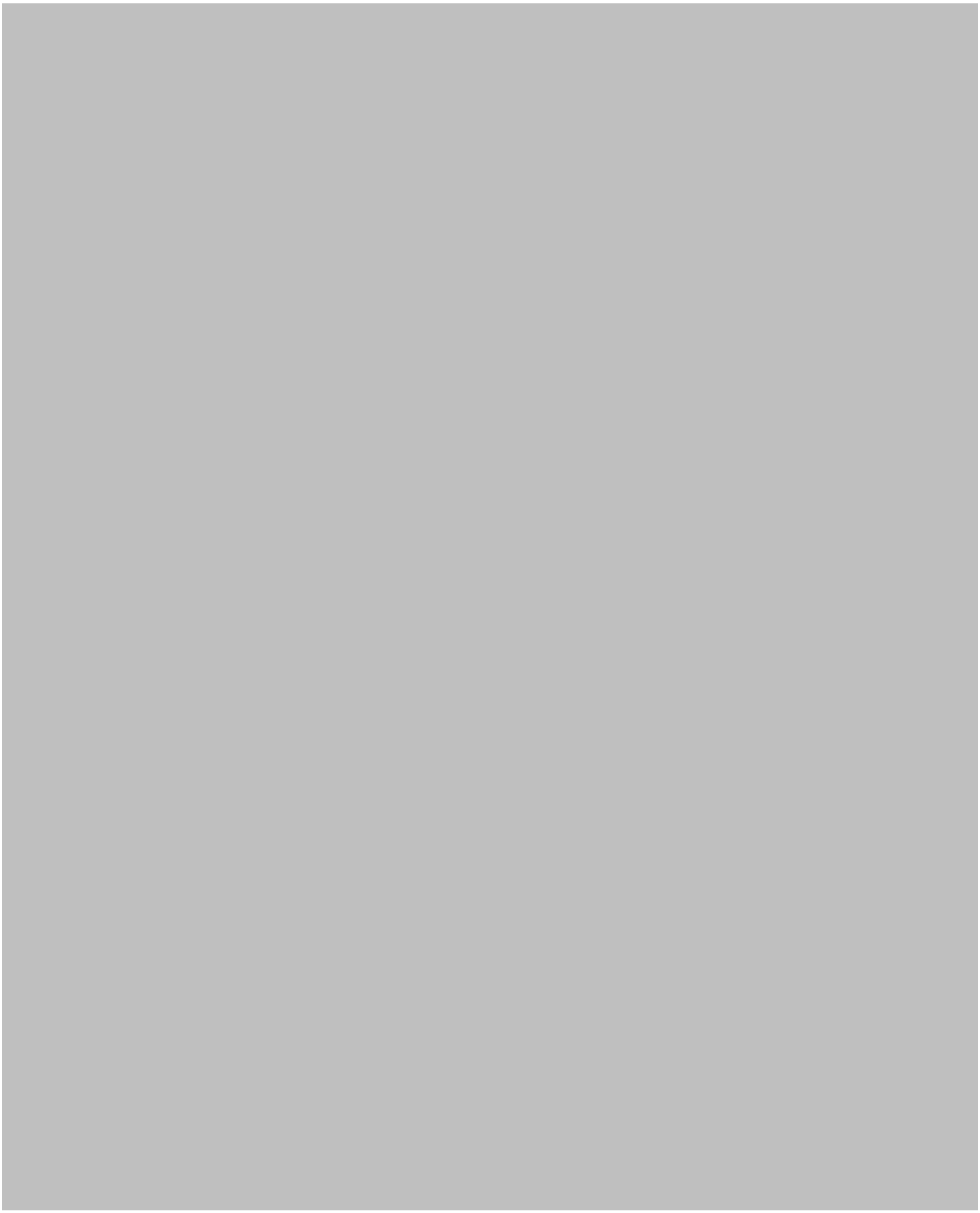


D6. Description of Loans etc.



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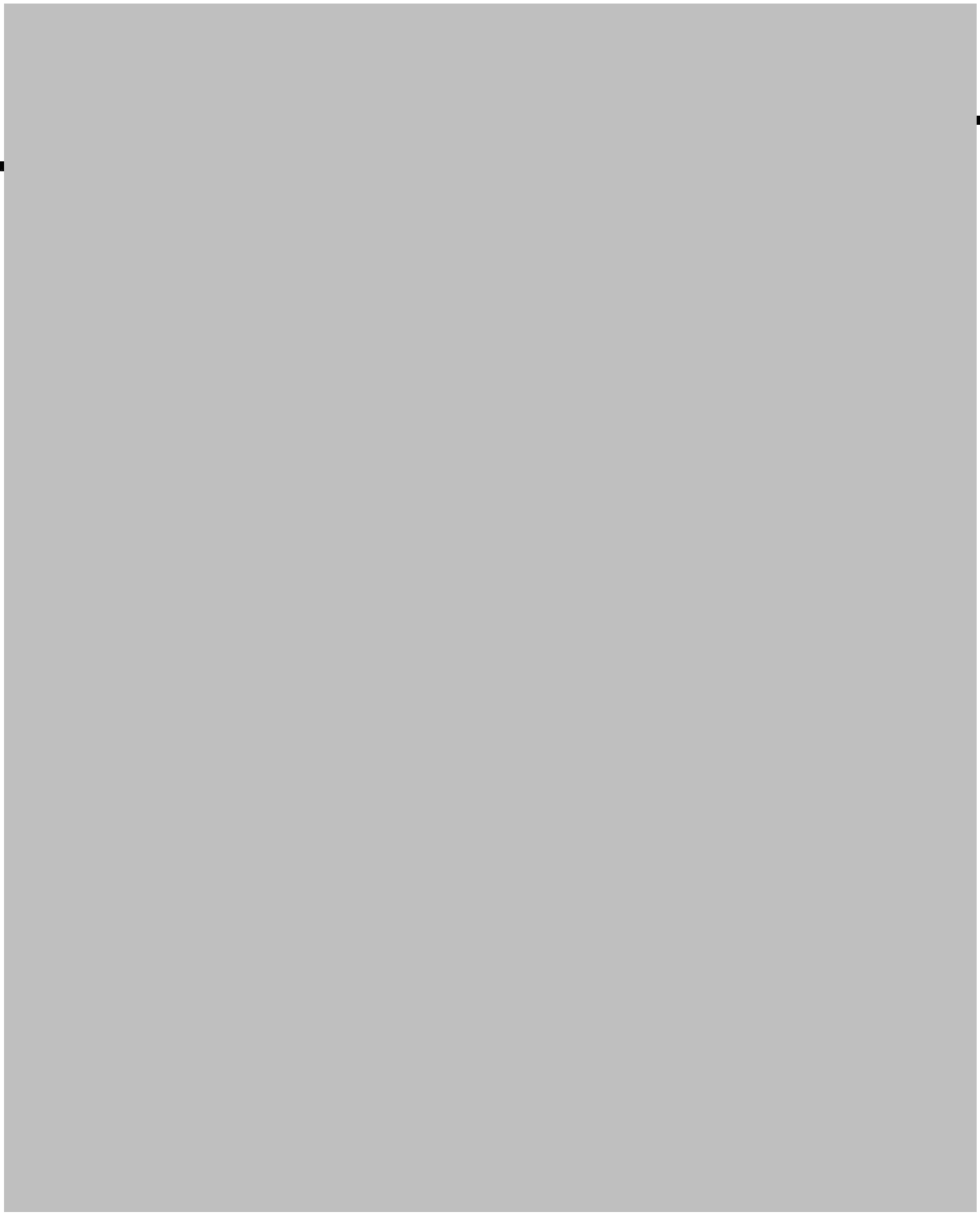
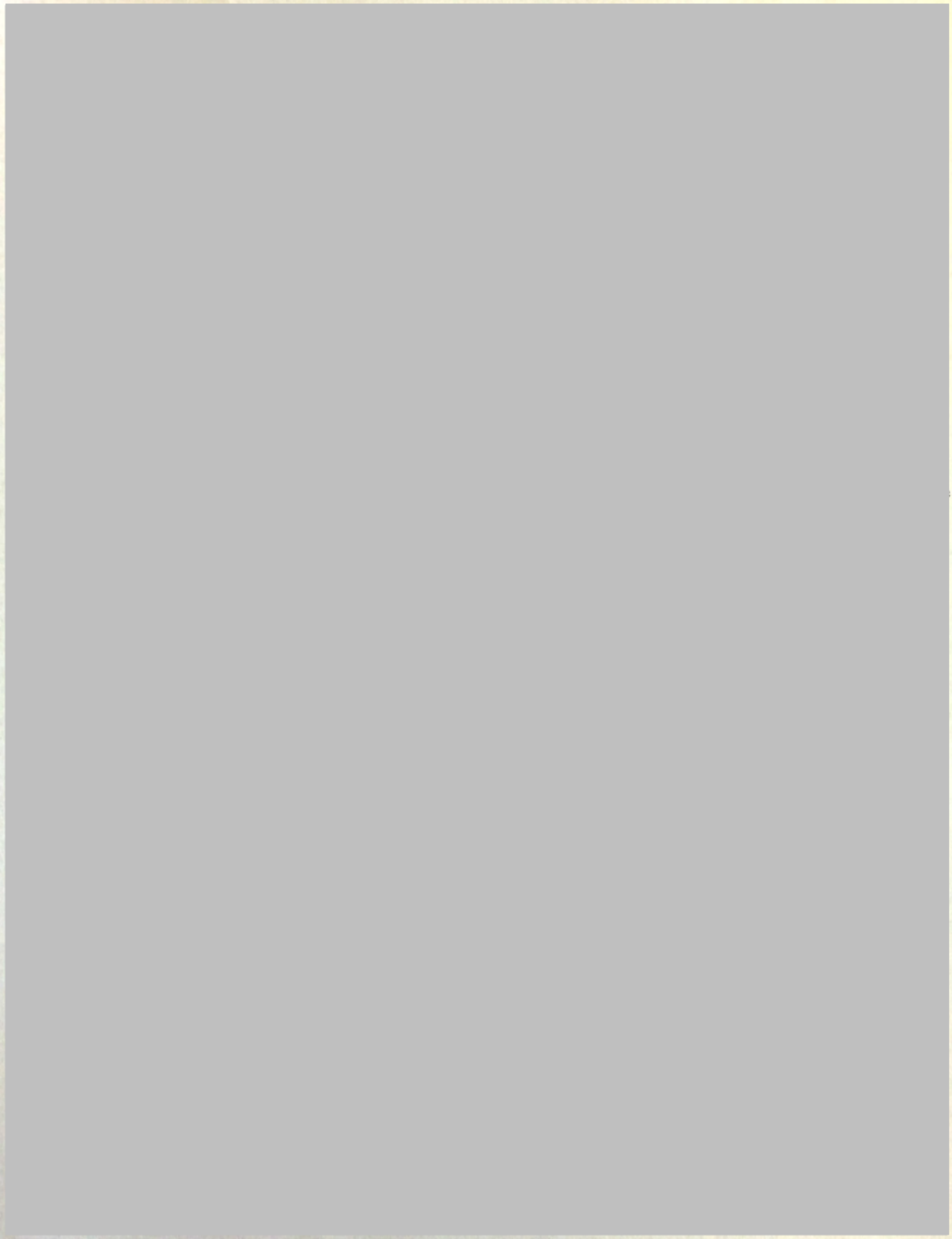
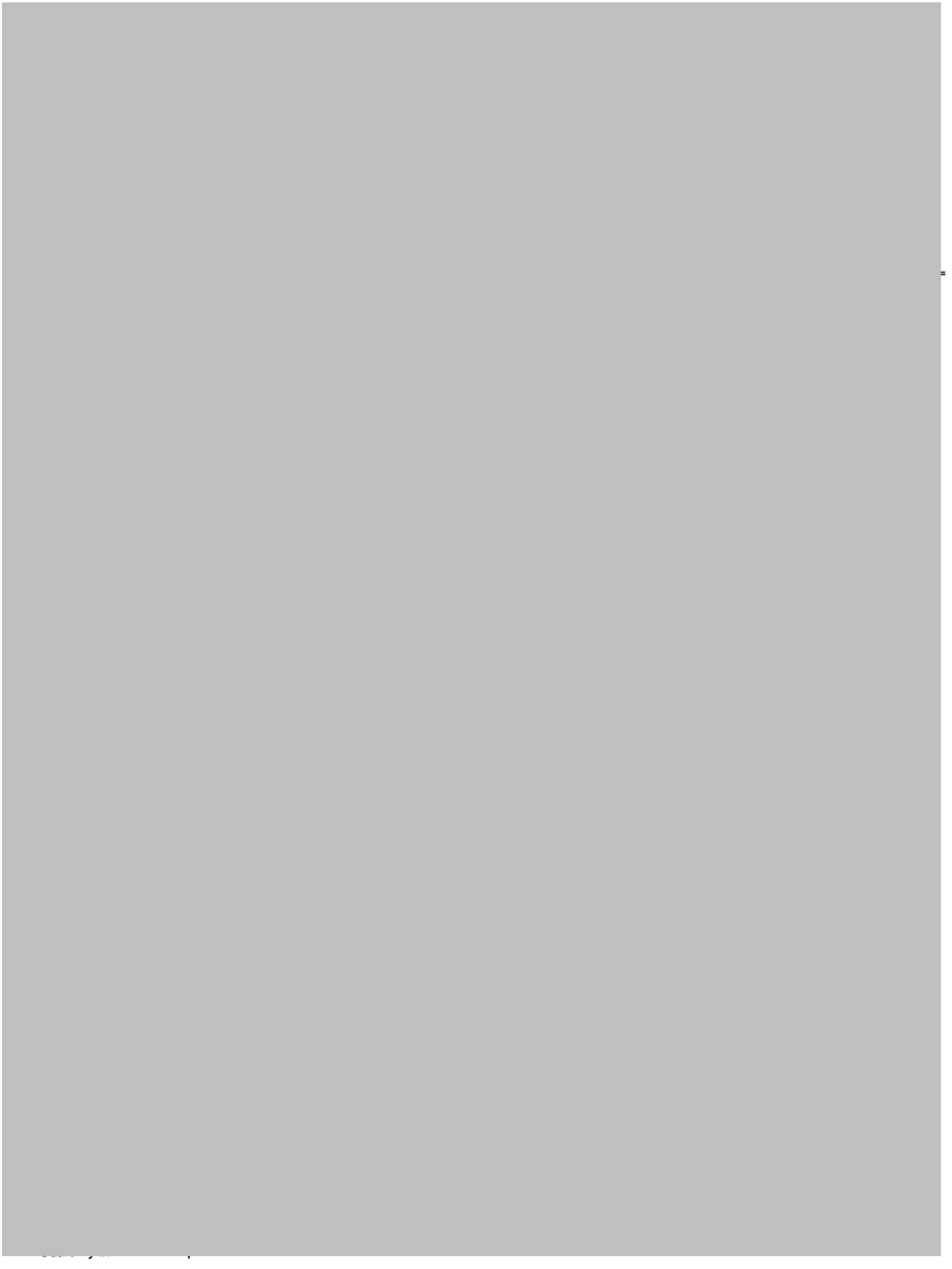
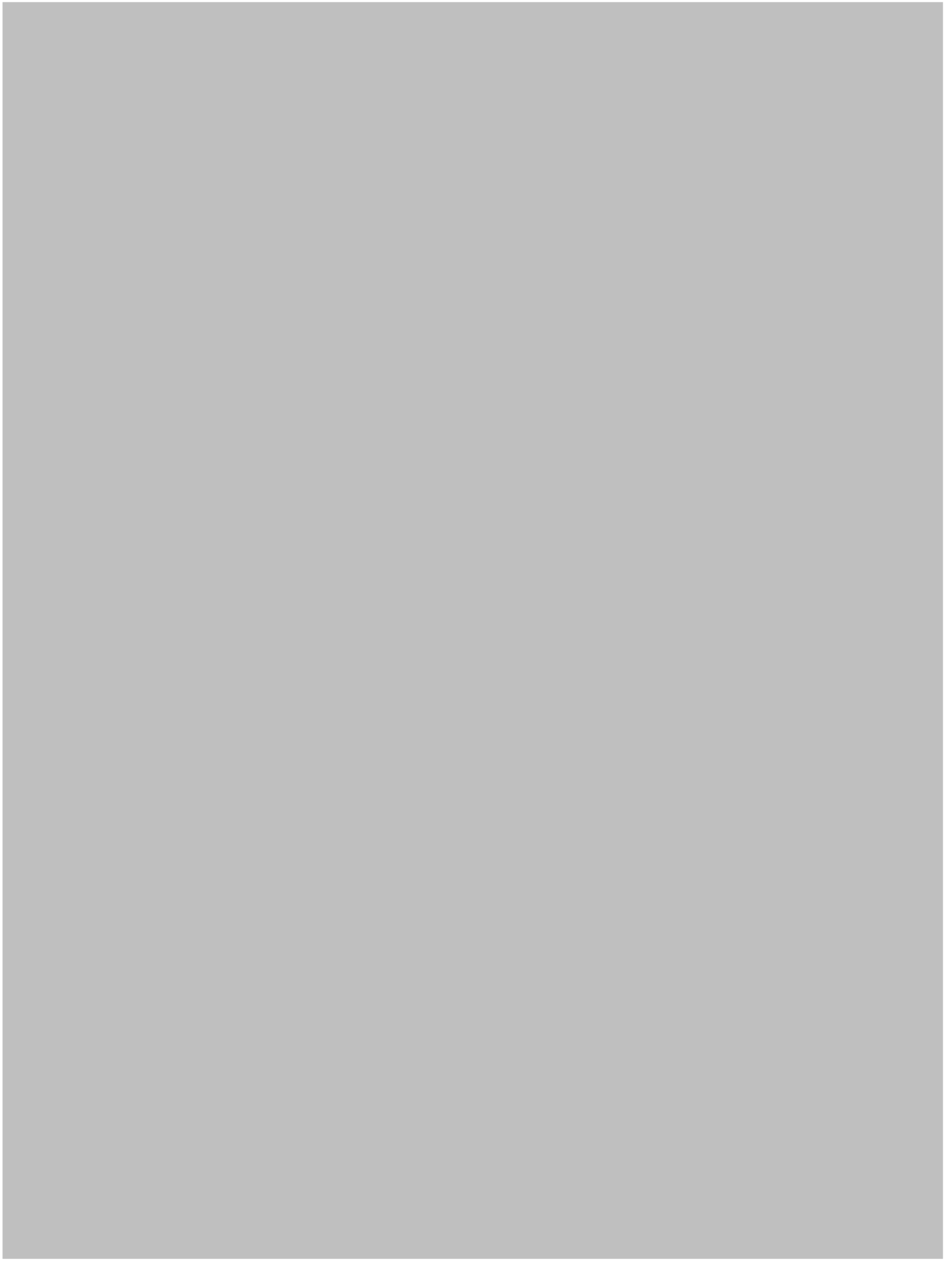


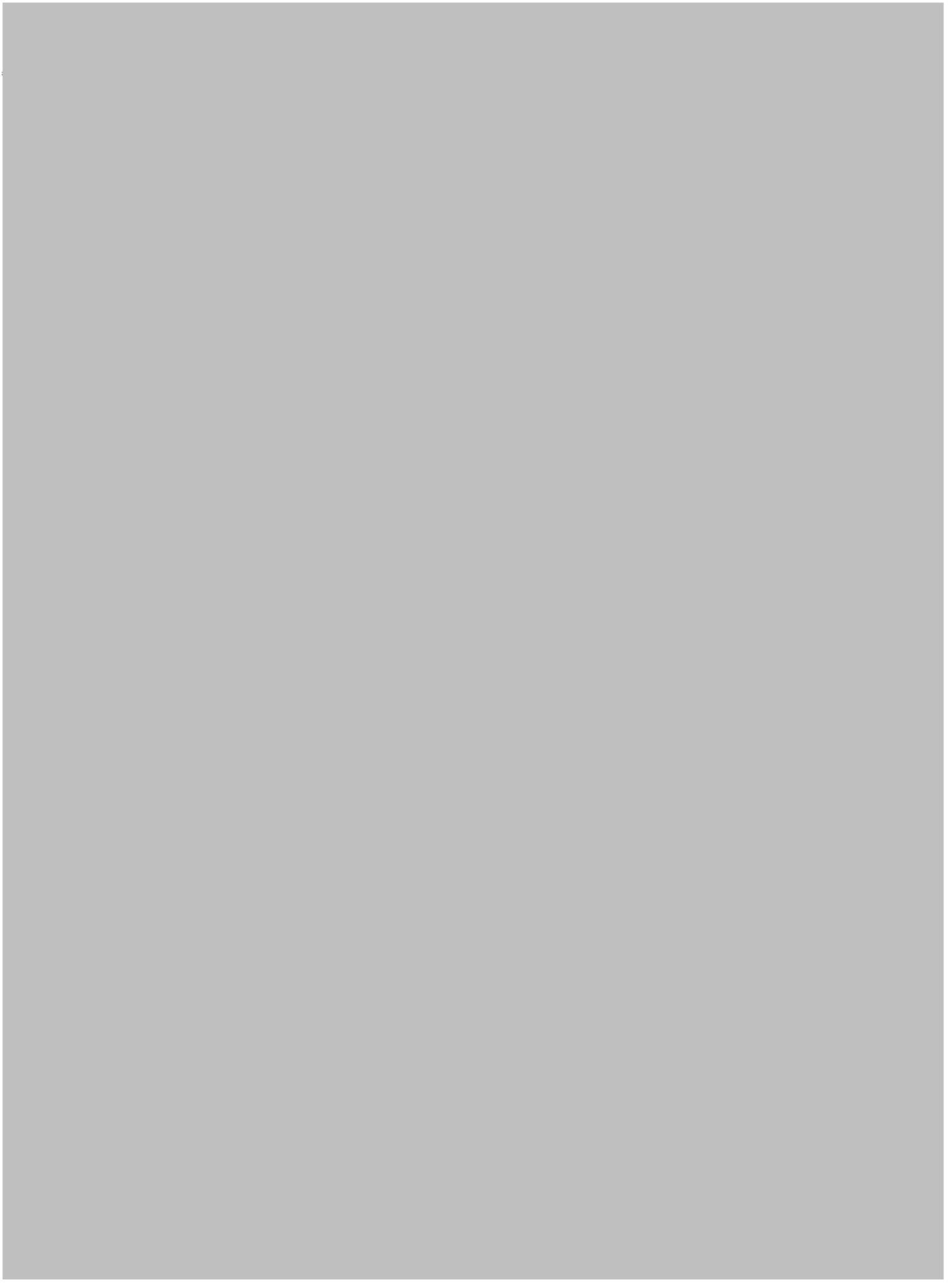
D6. Attachment: Sterns Bank Loan Proposal

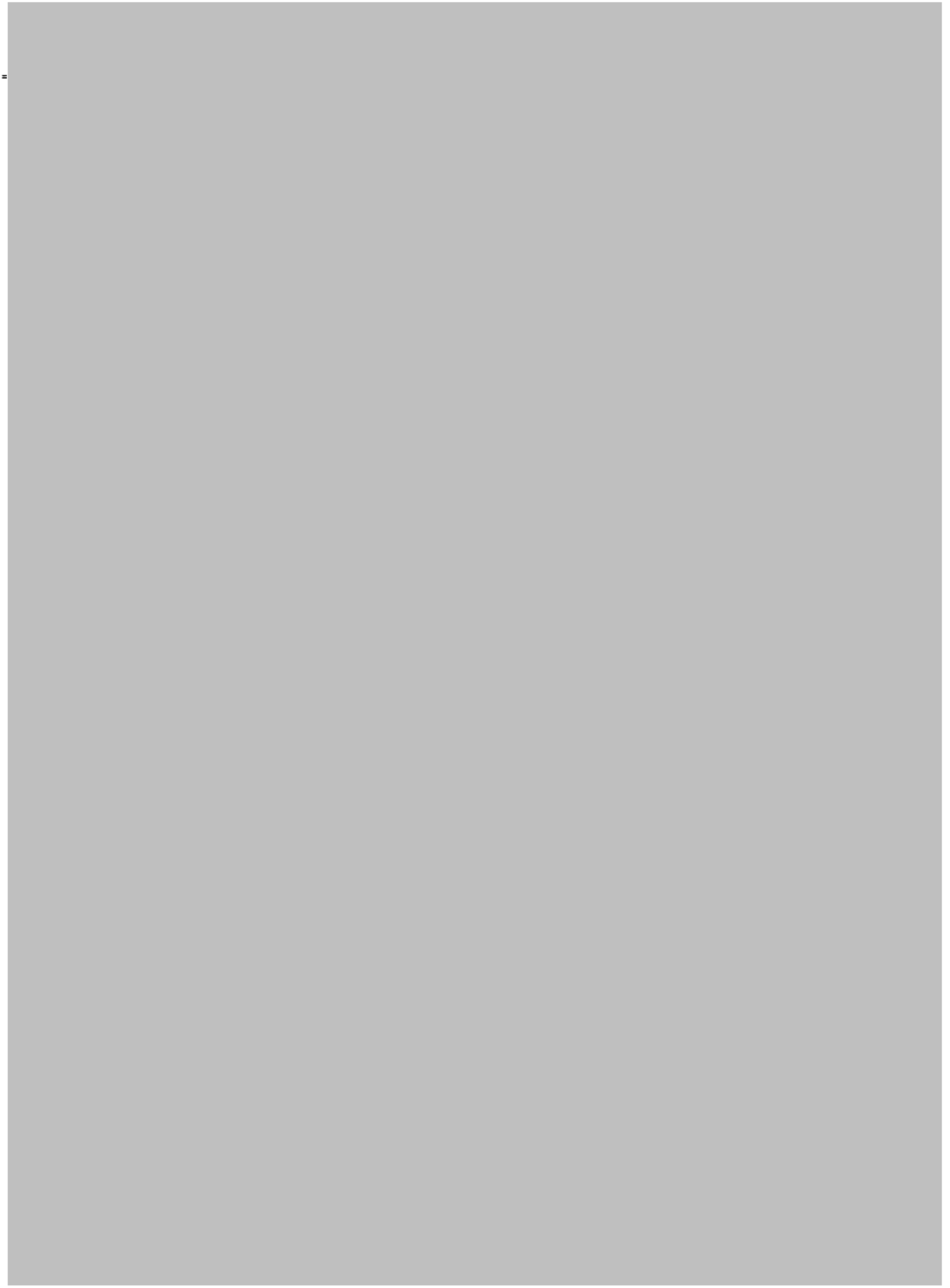


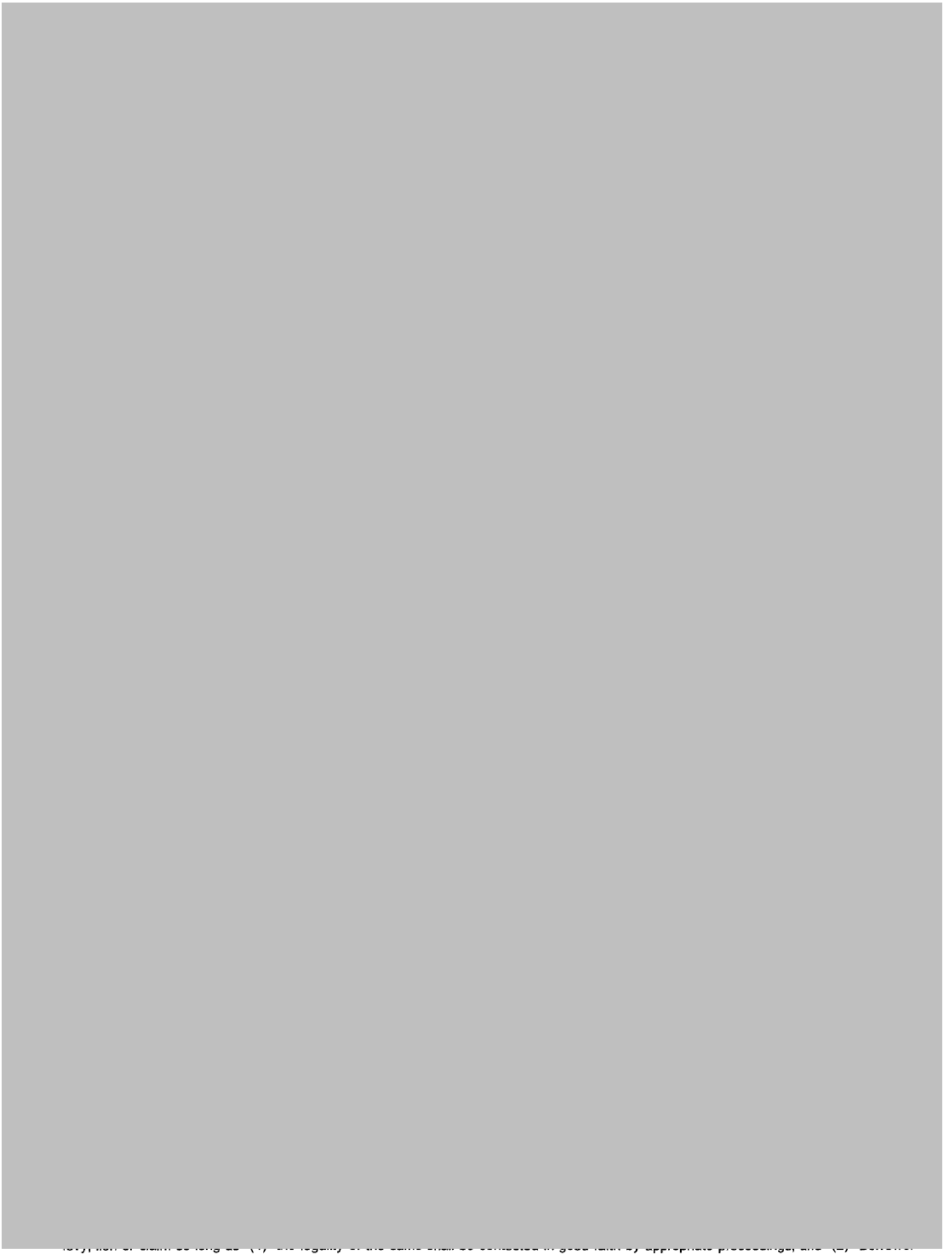
D6. Attachment: Sterns Bank Loan Proposal

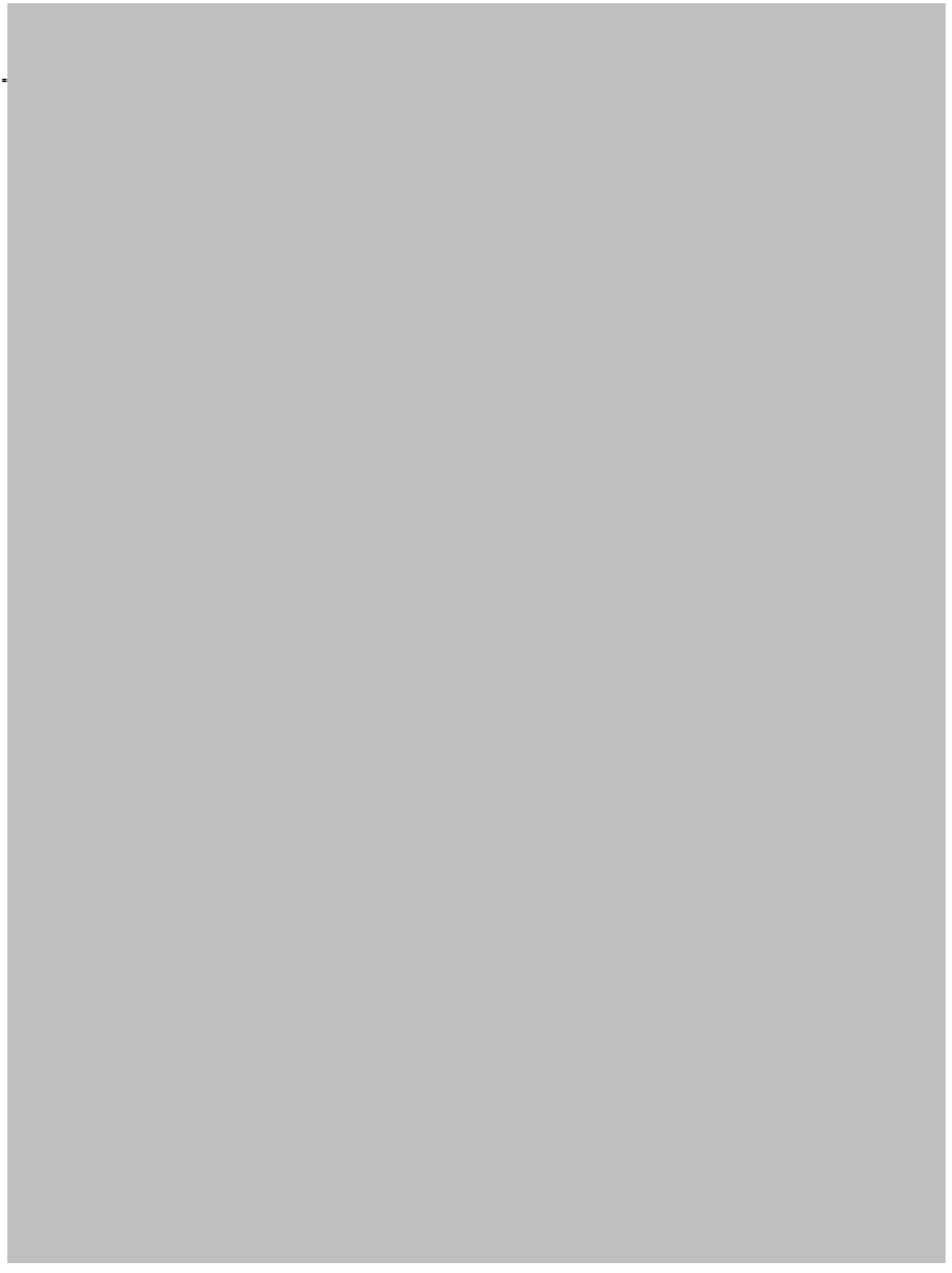


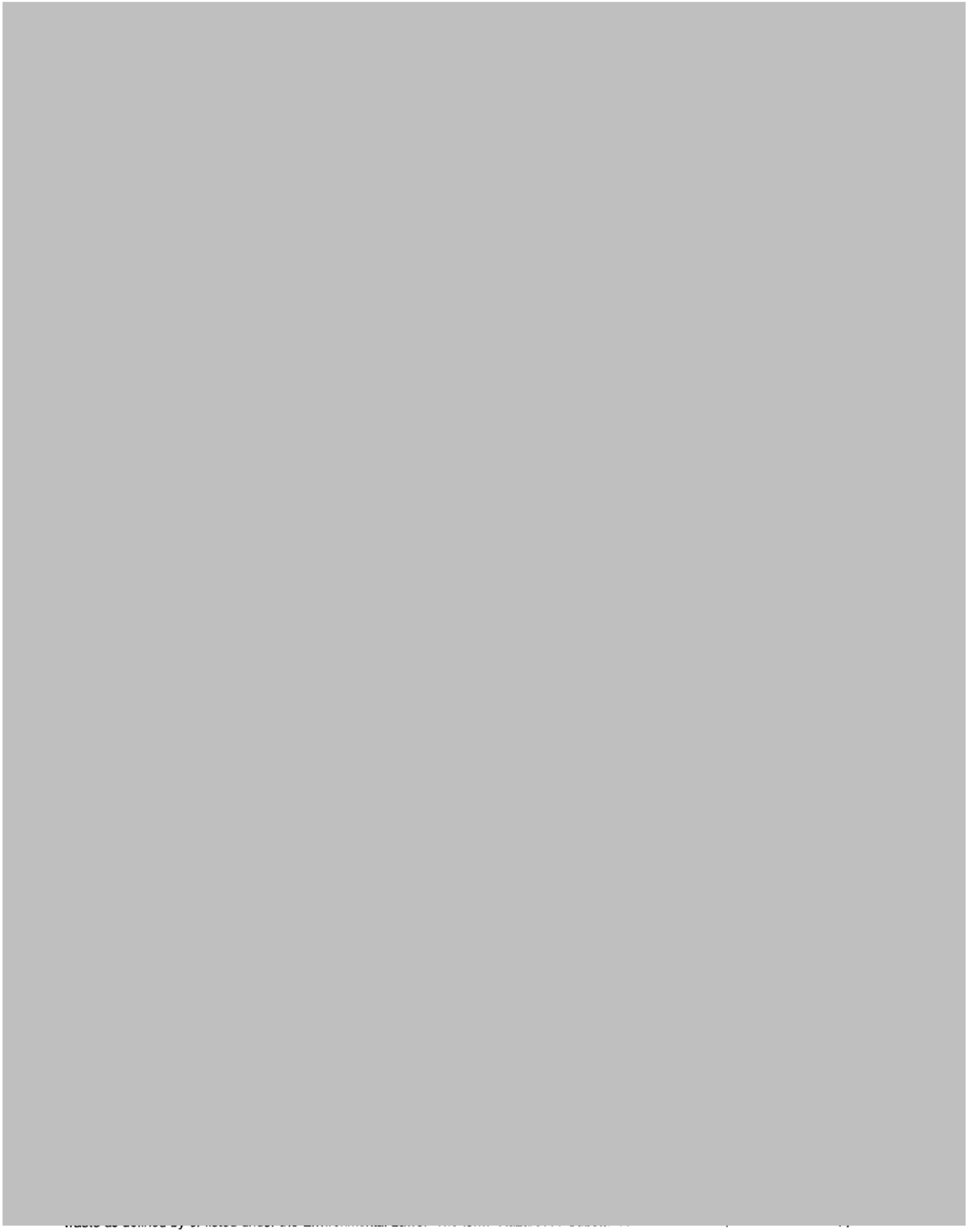


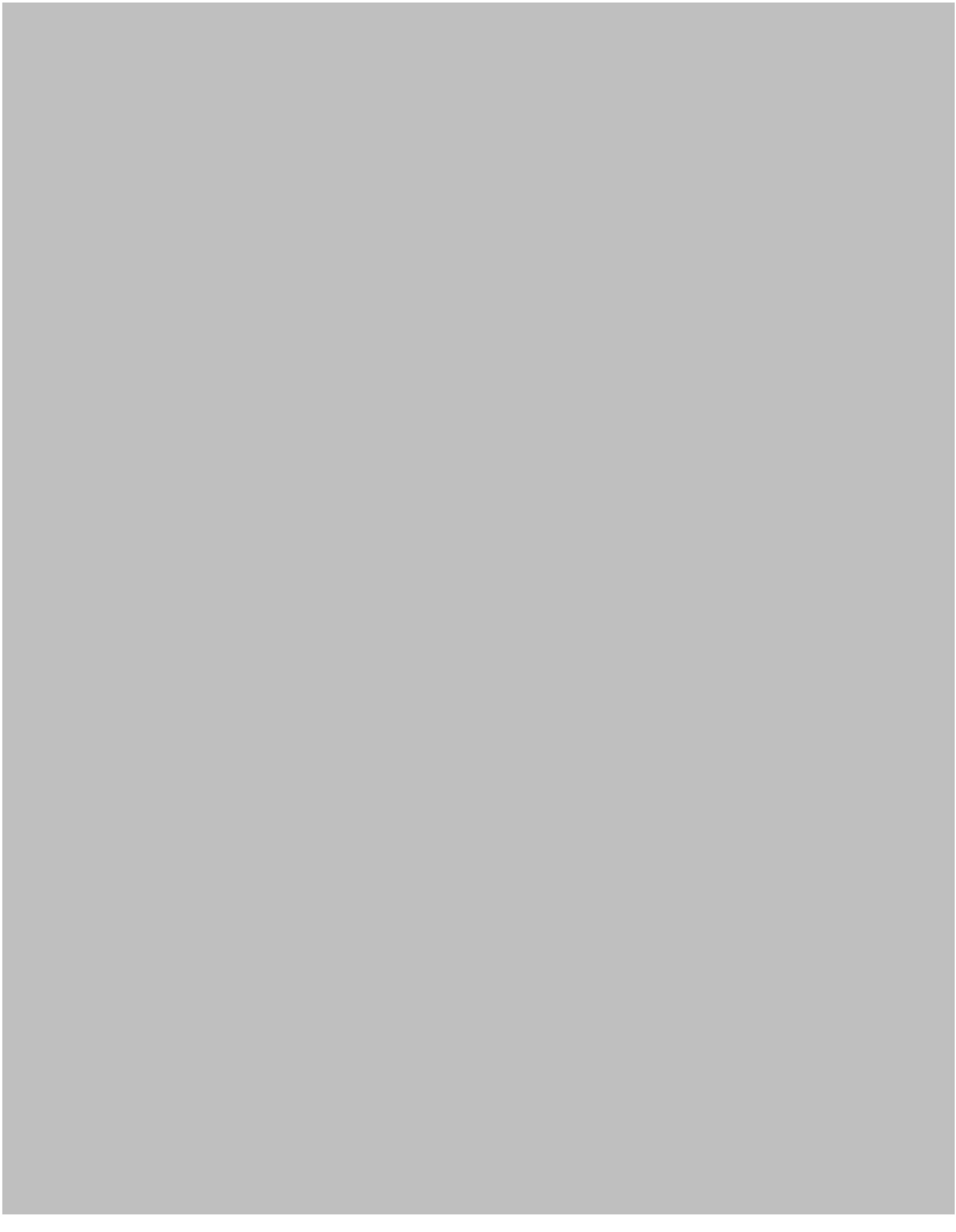


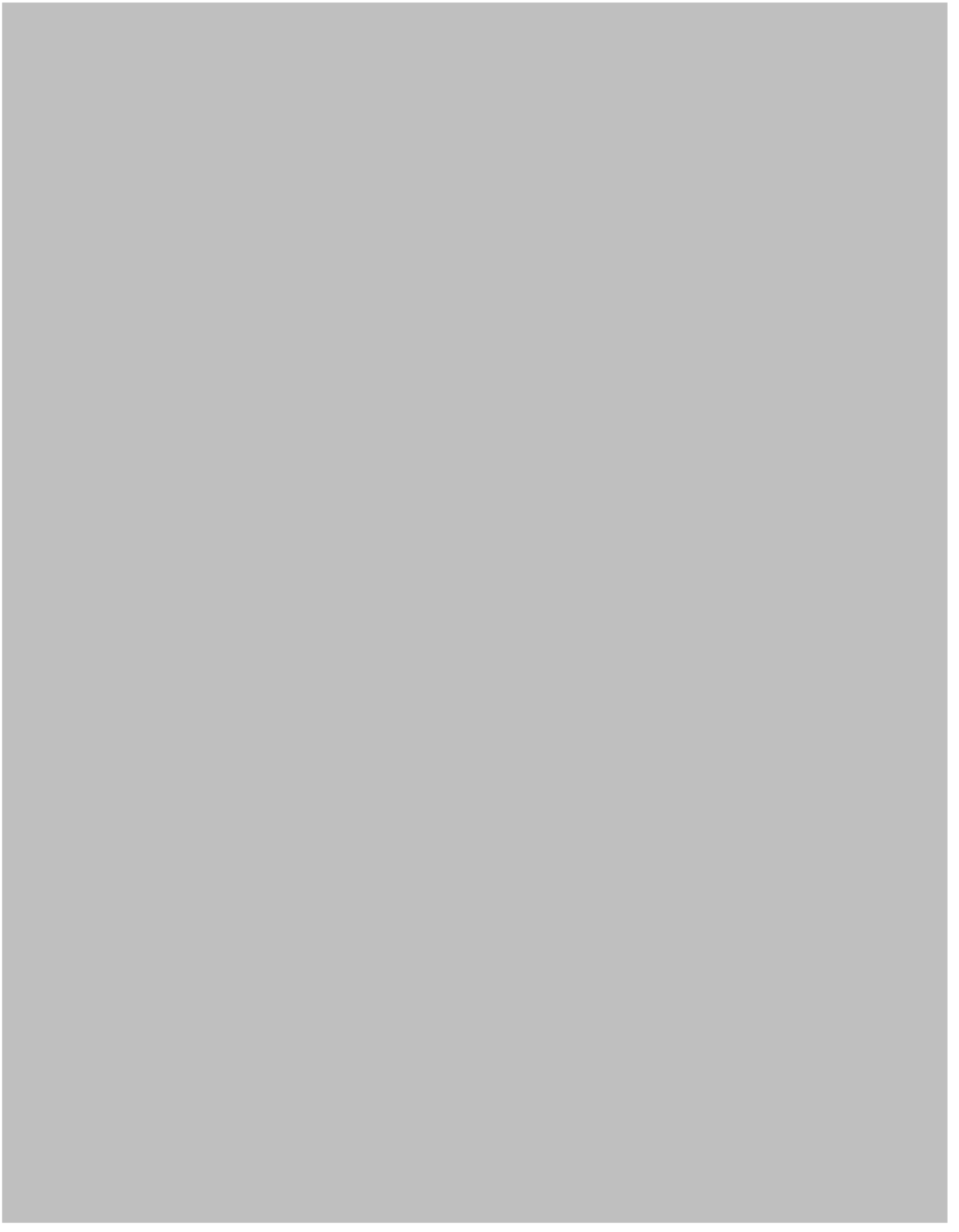


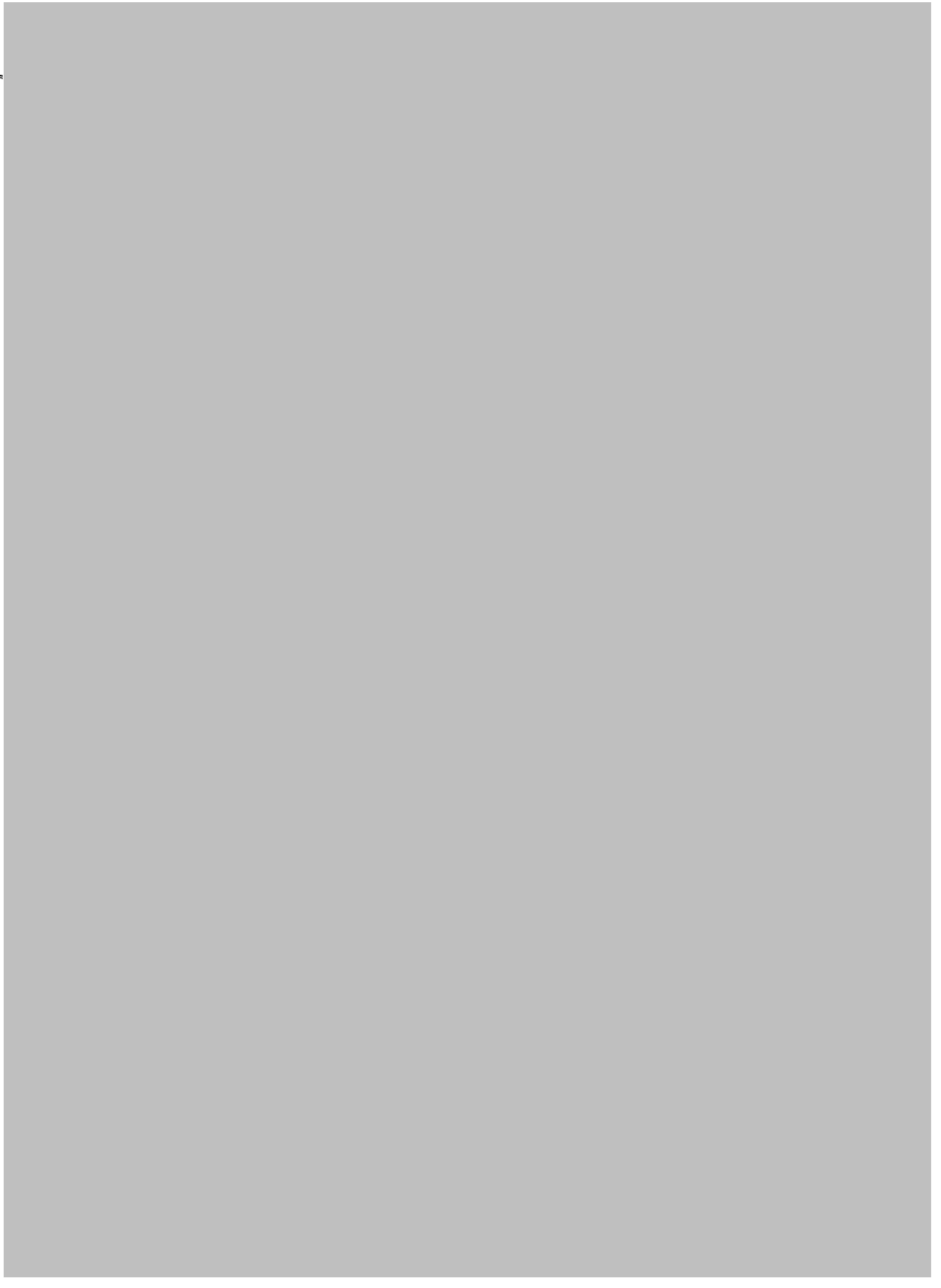


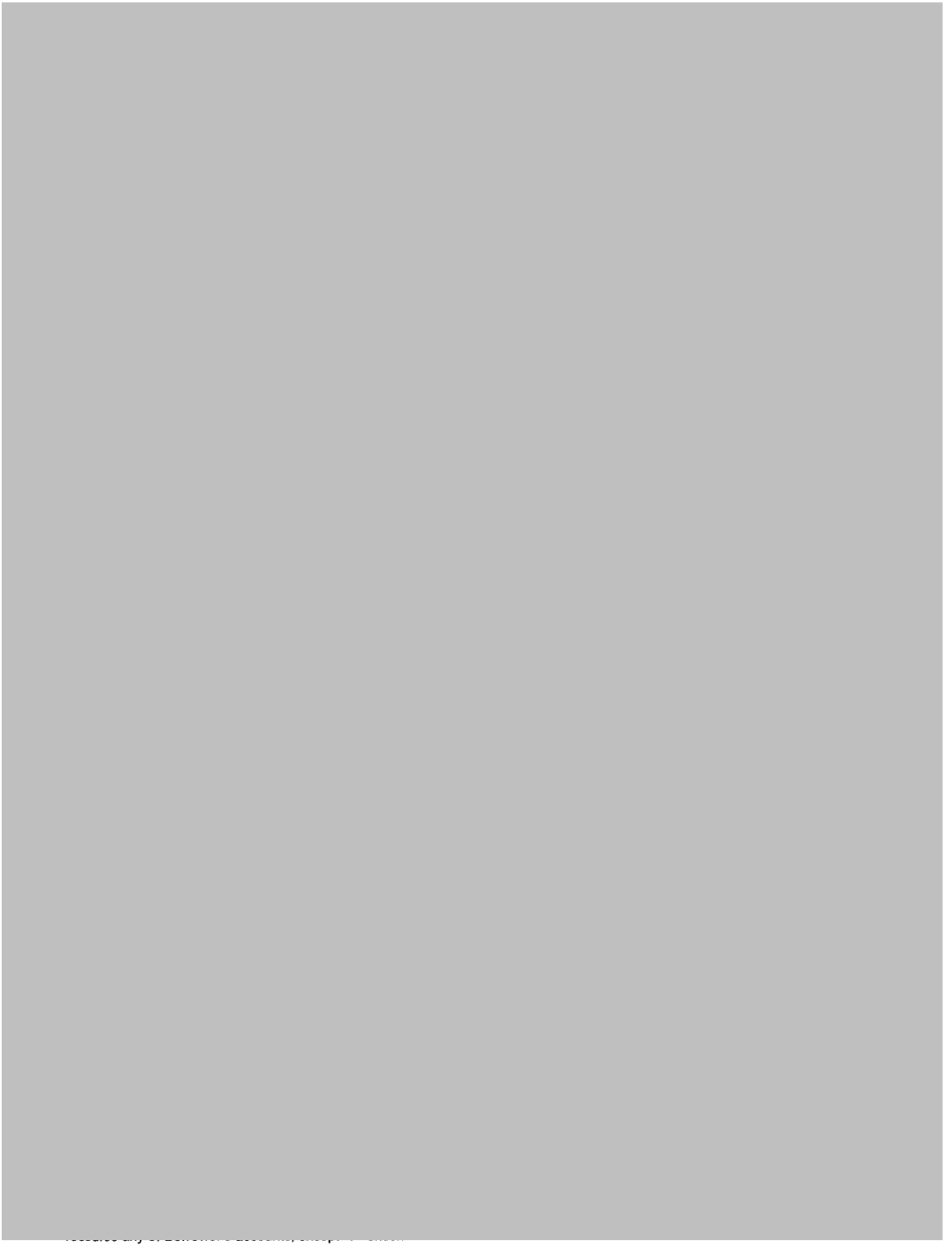


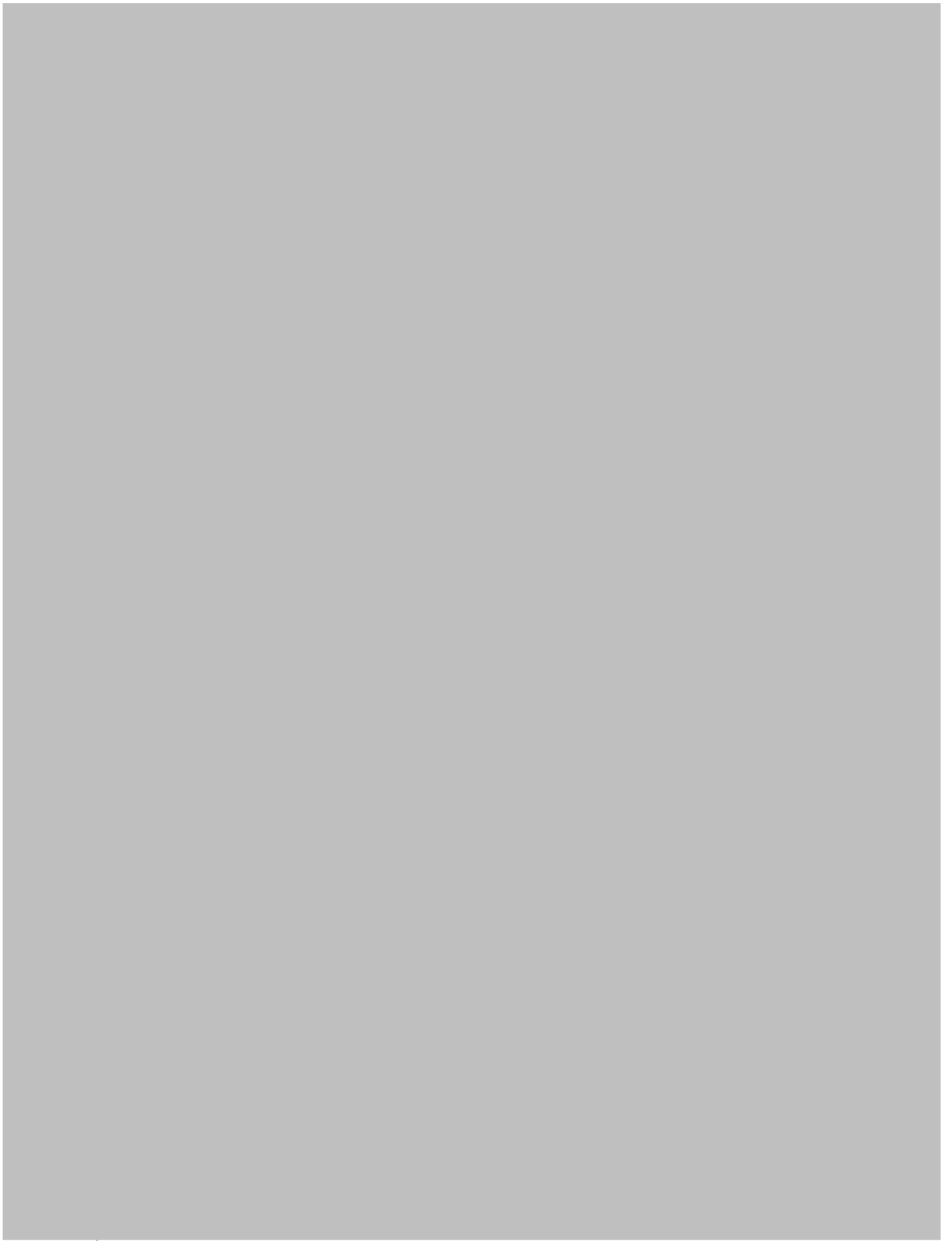


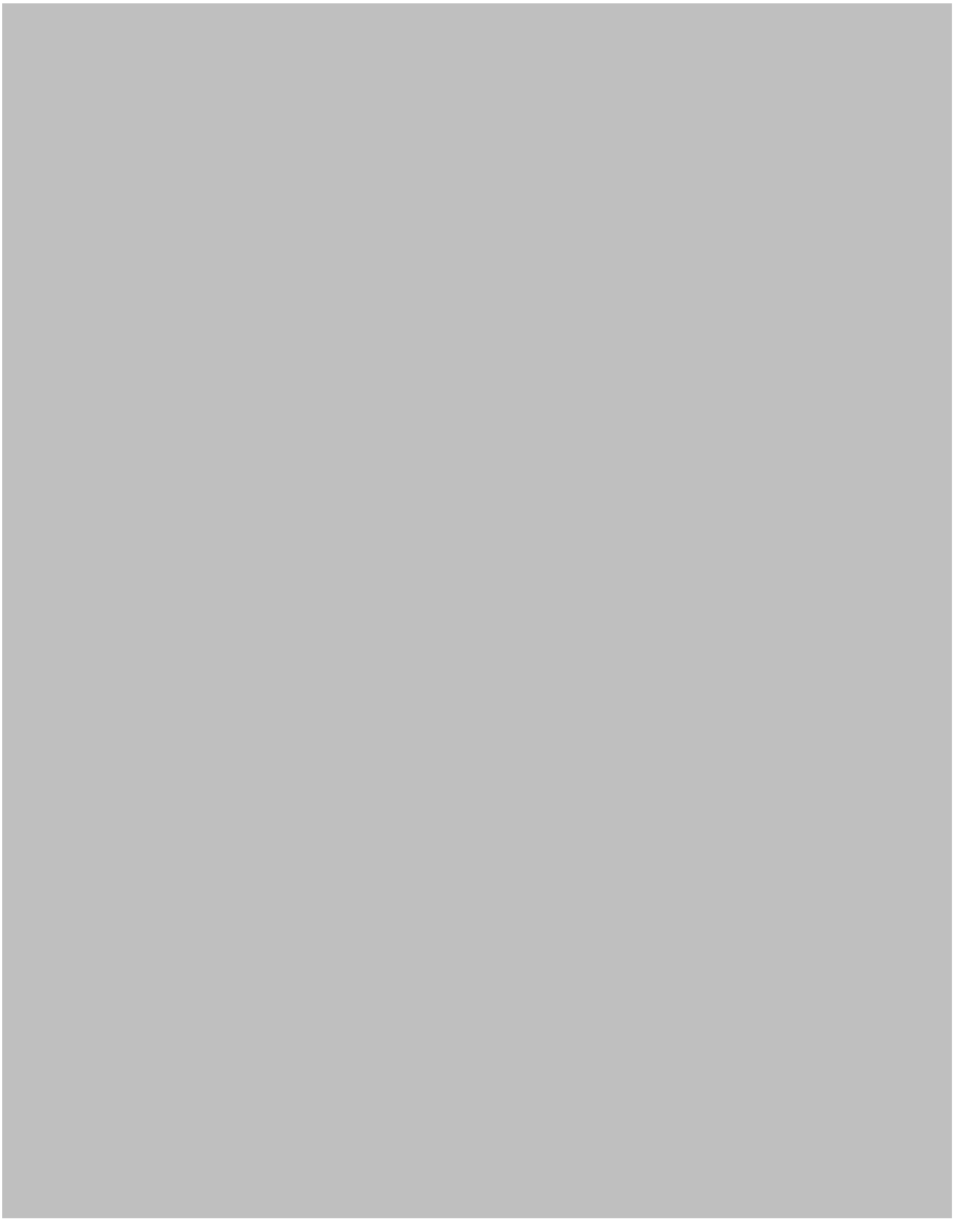


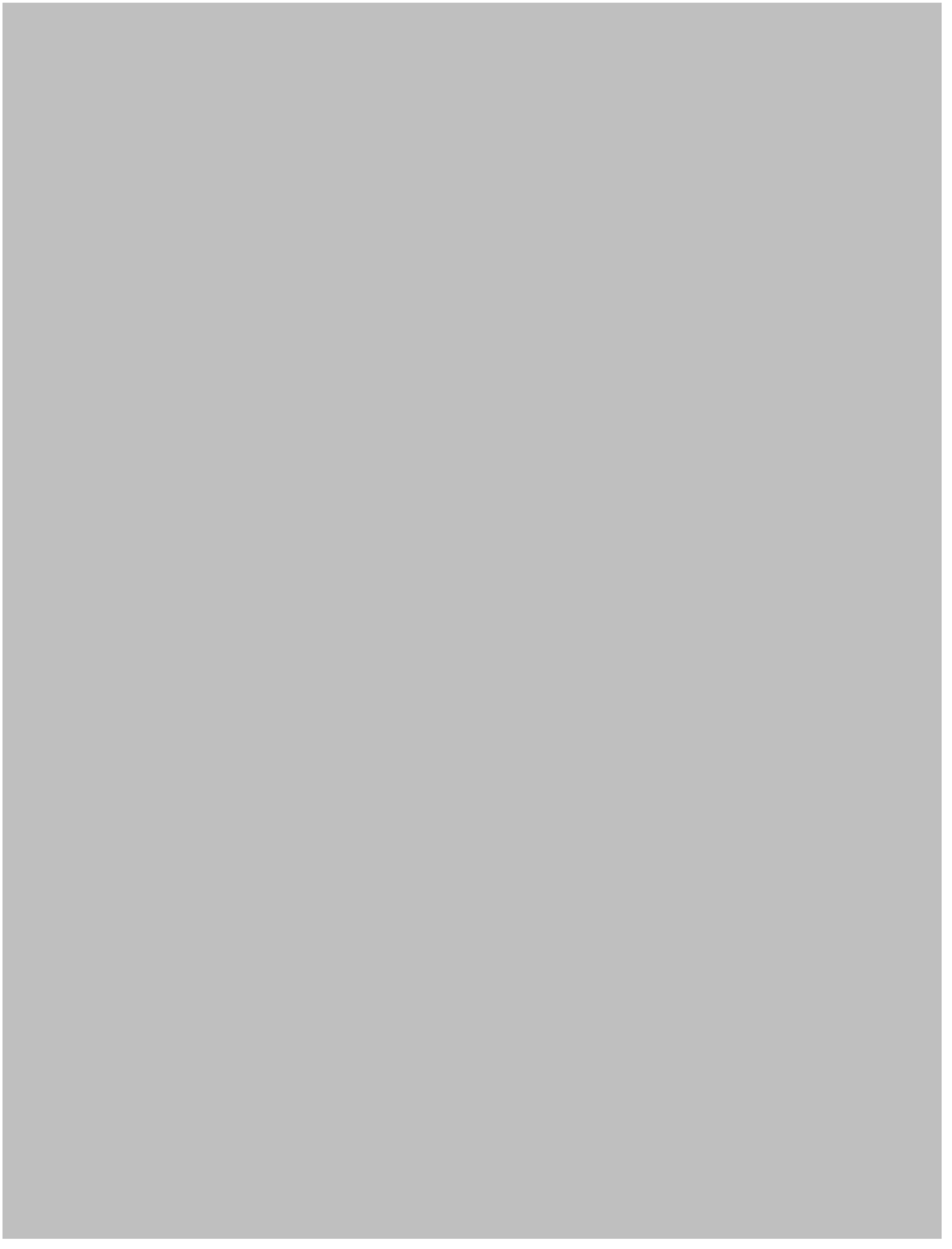


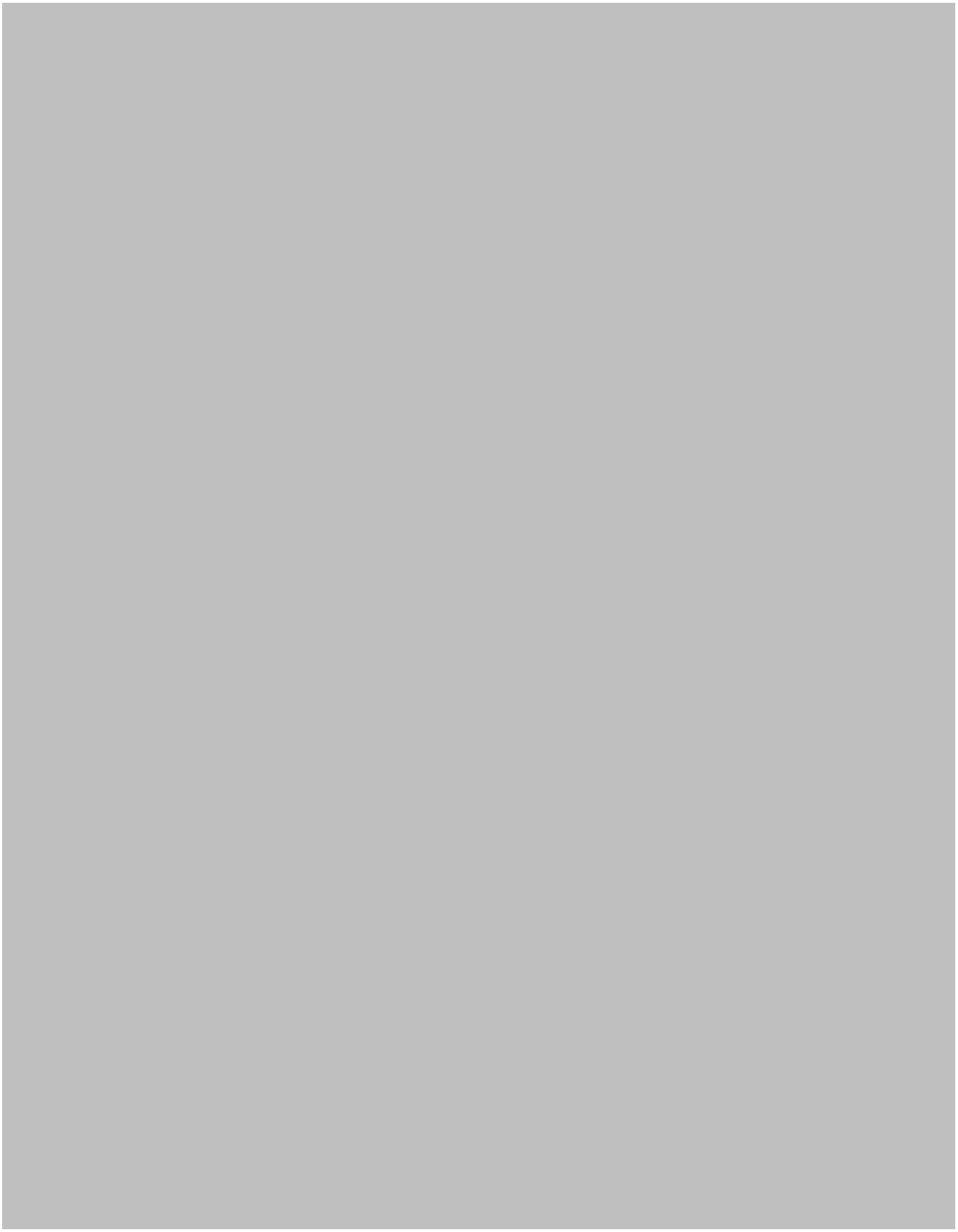


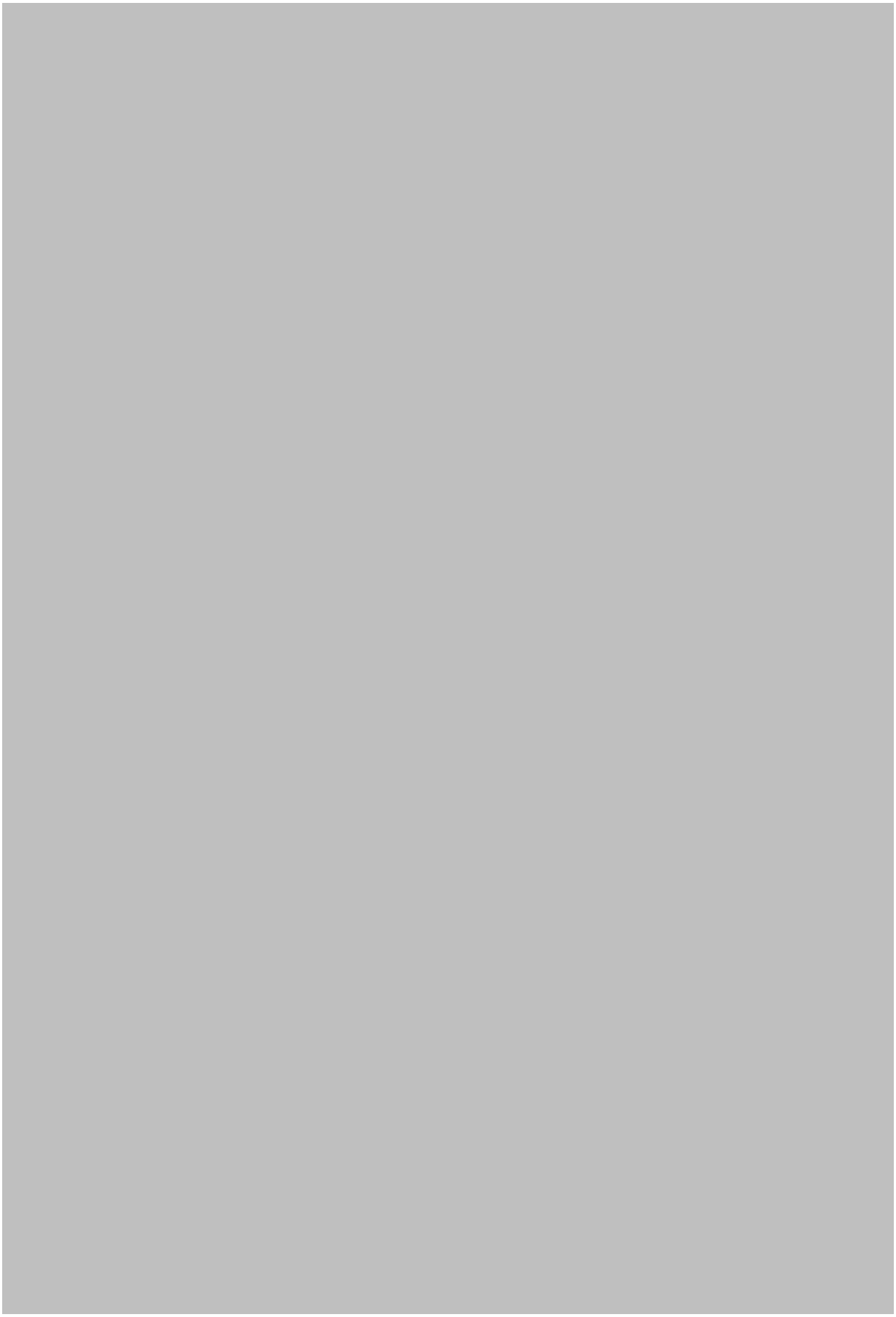


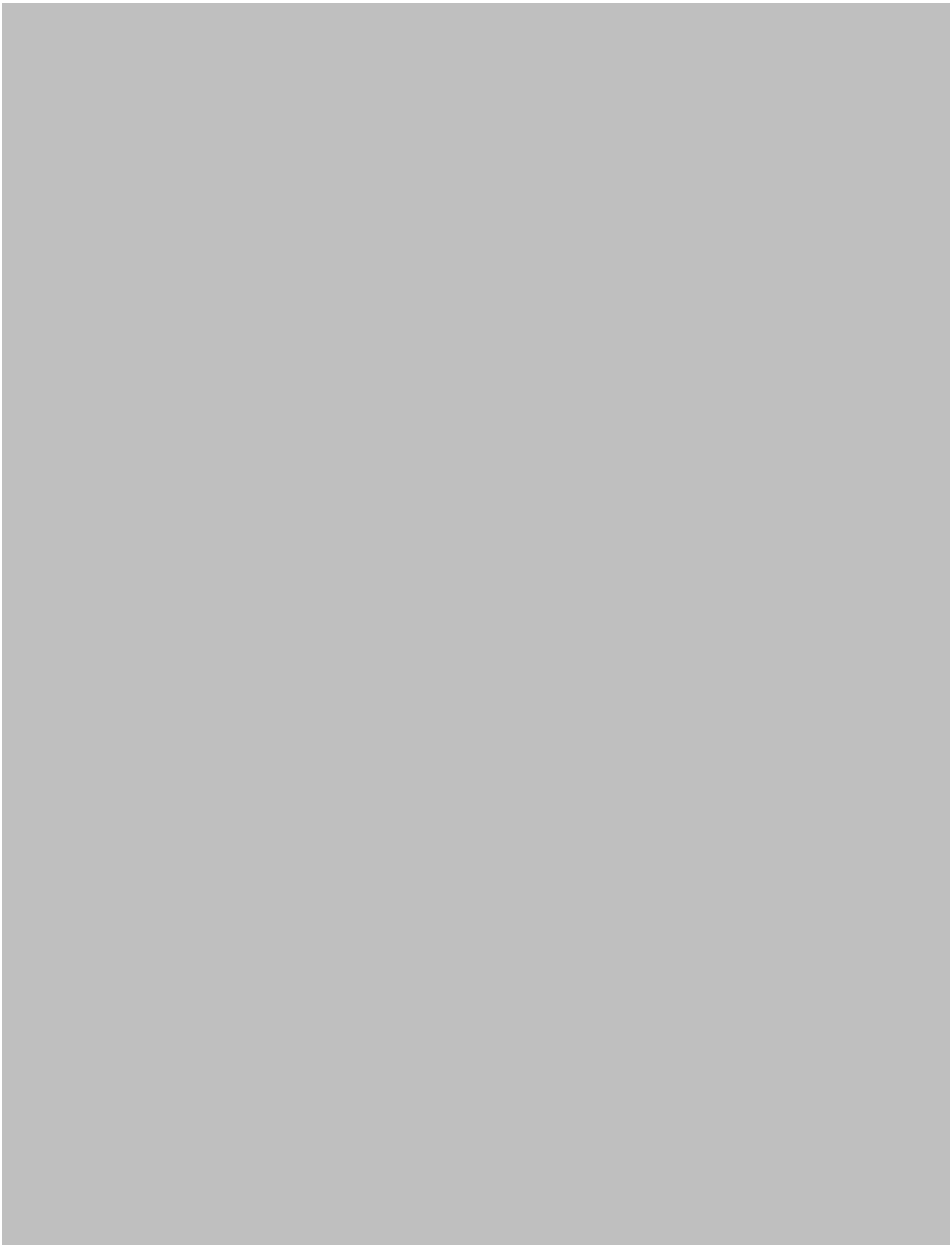


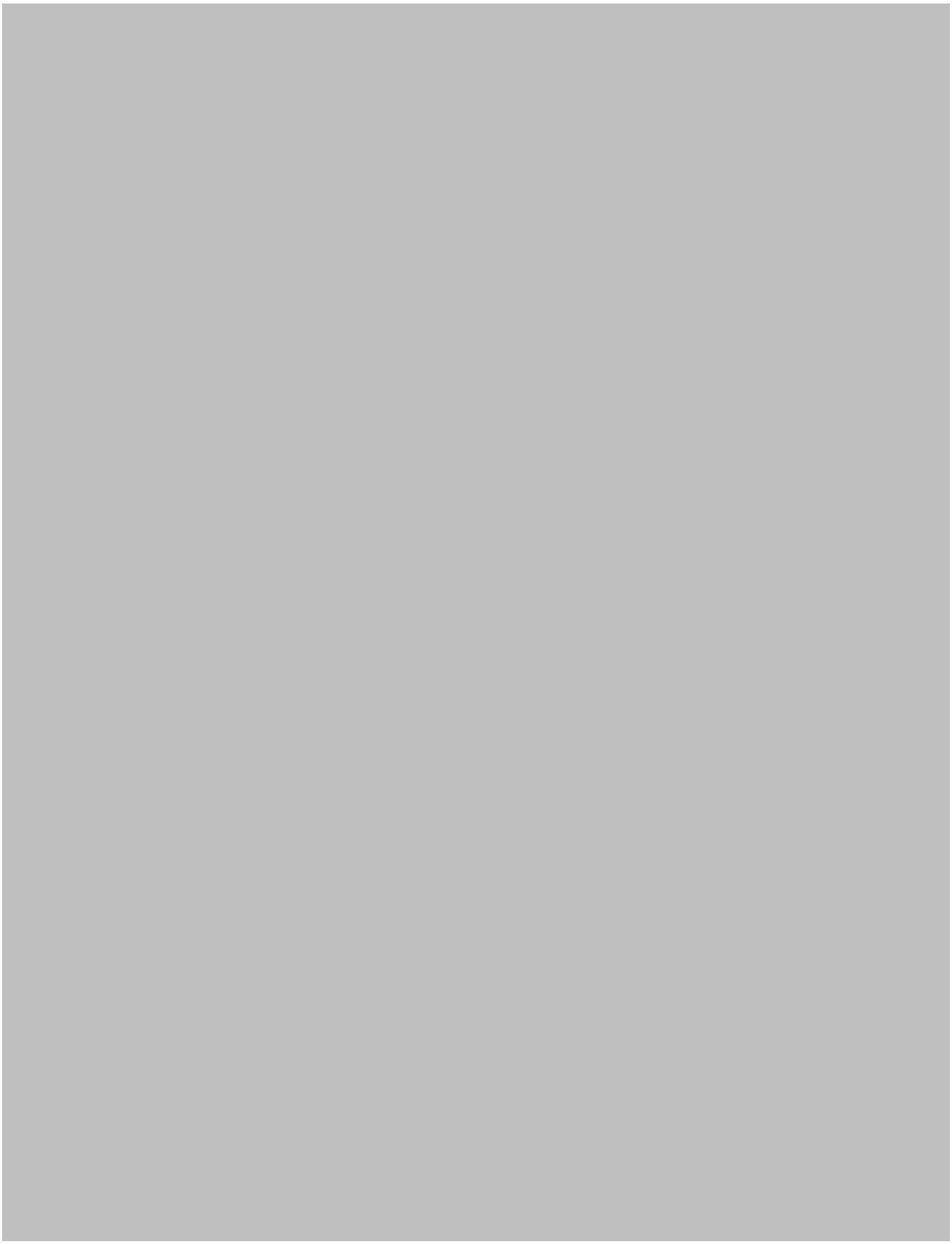


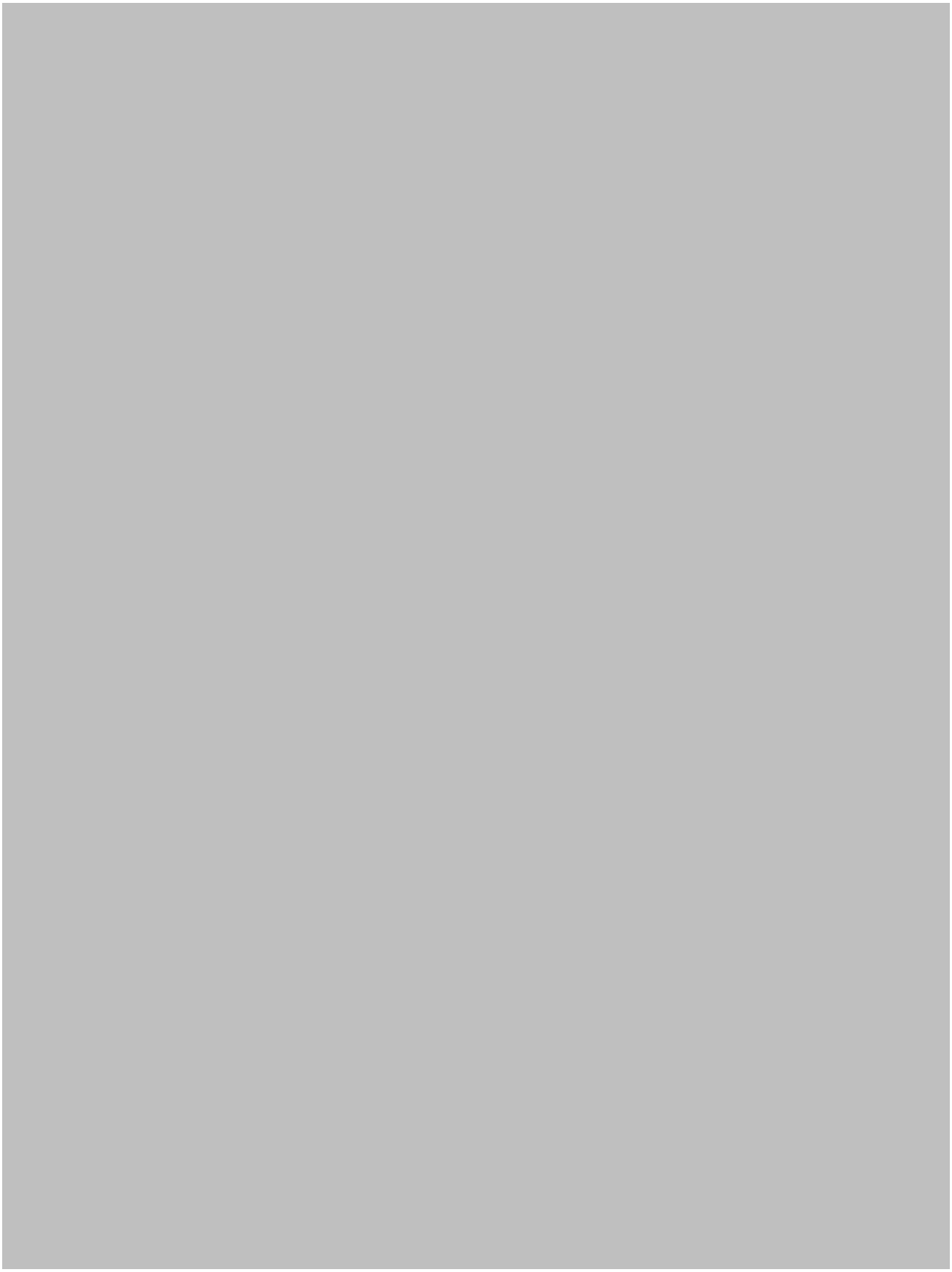


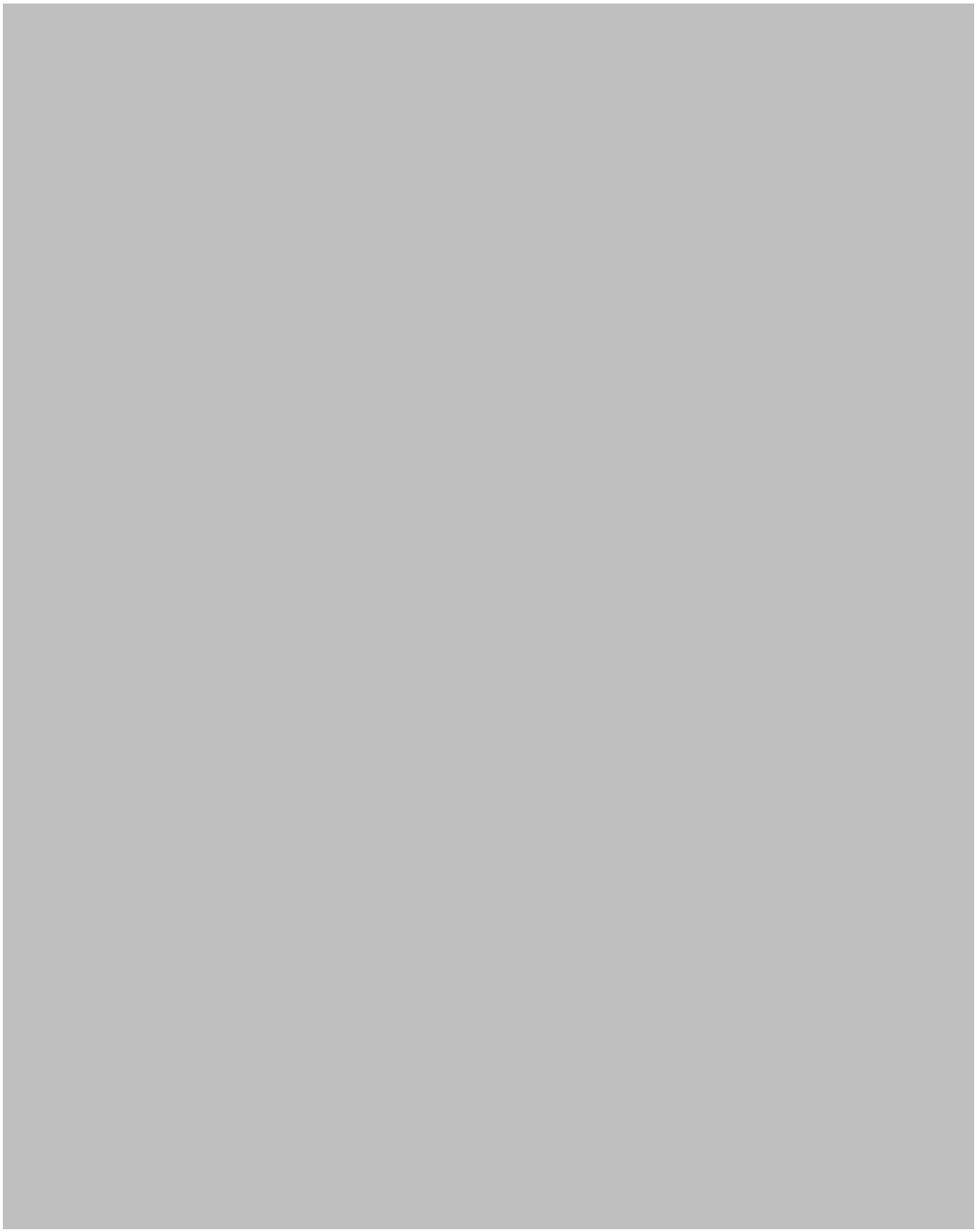


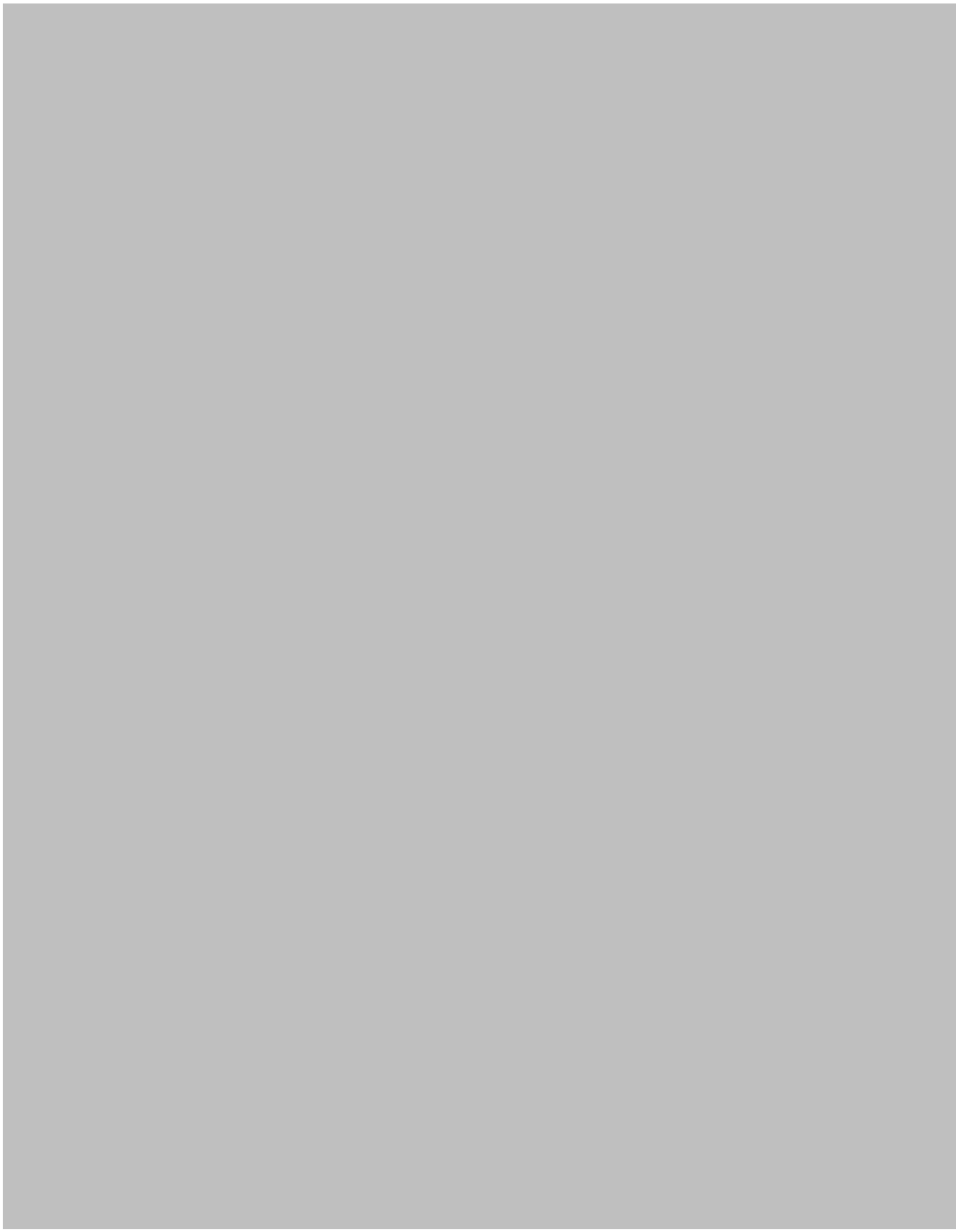


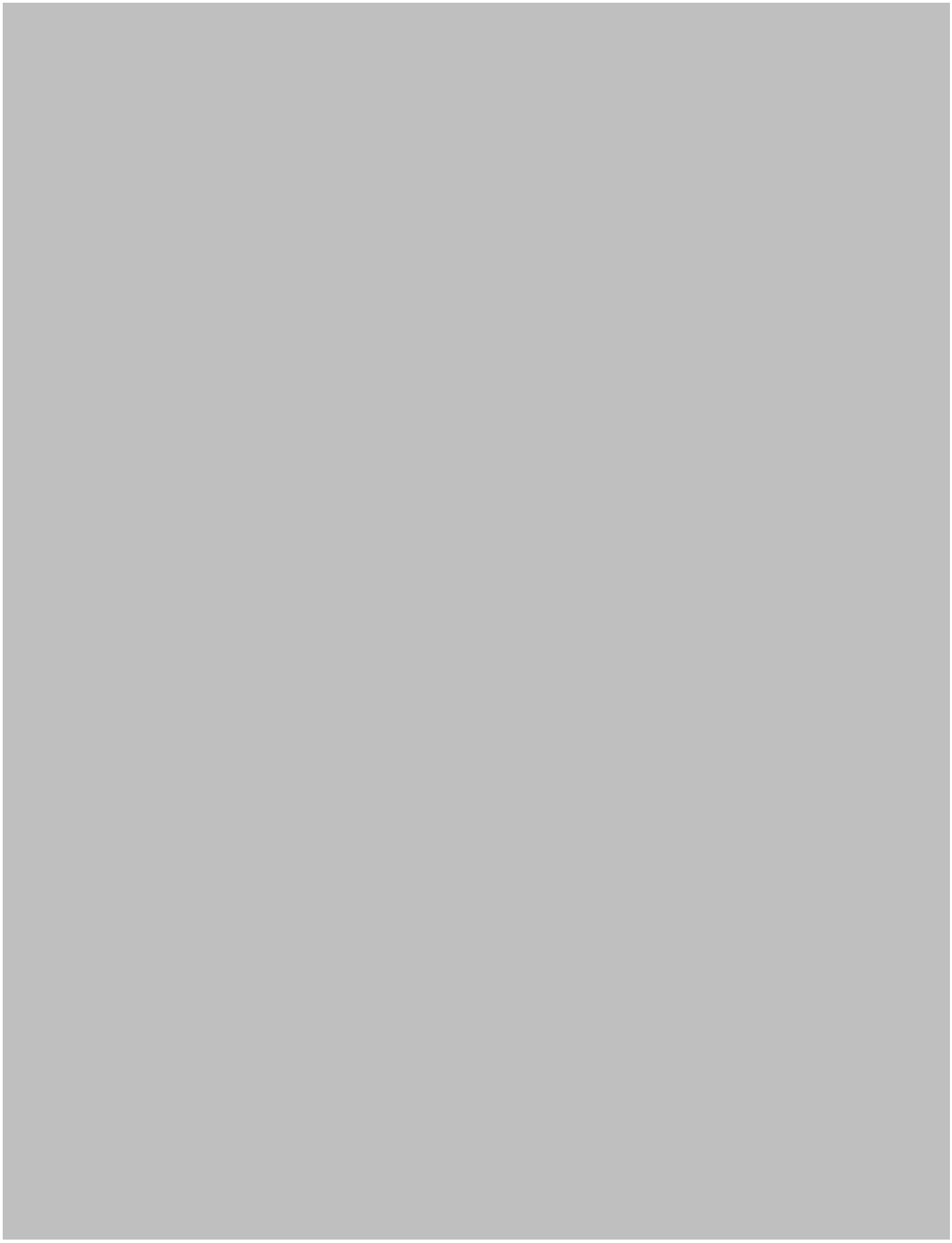


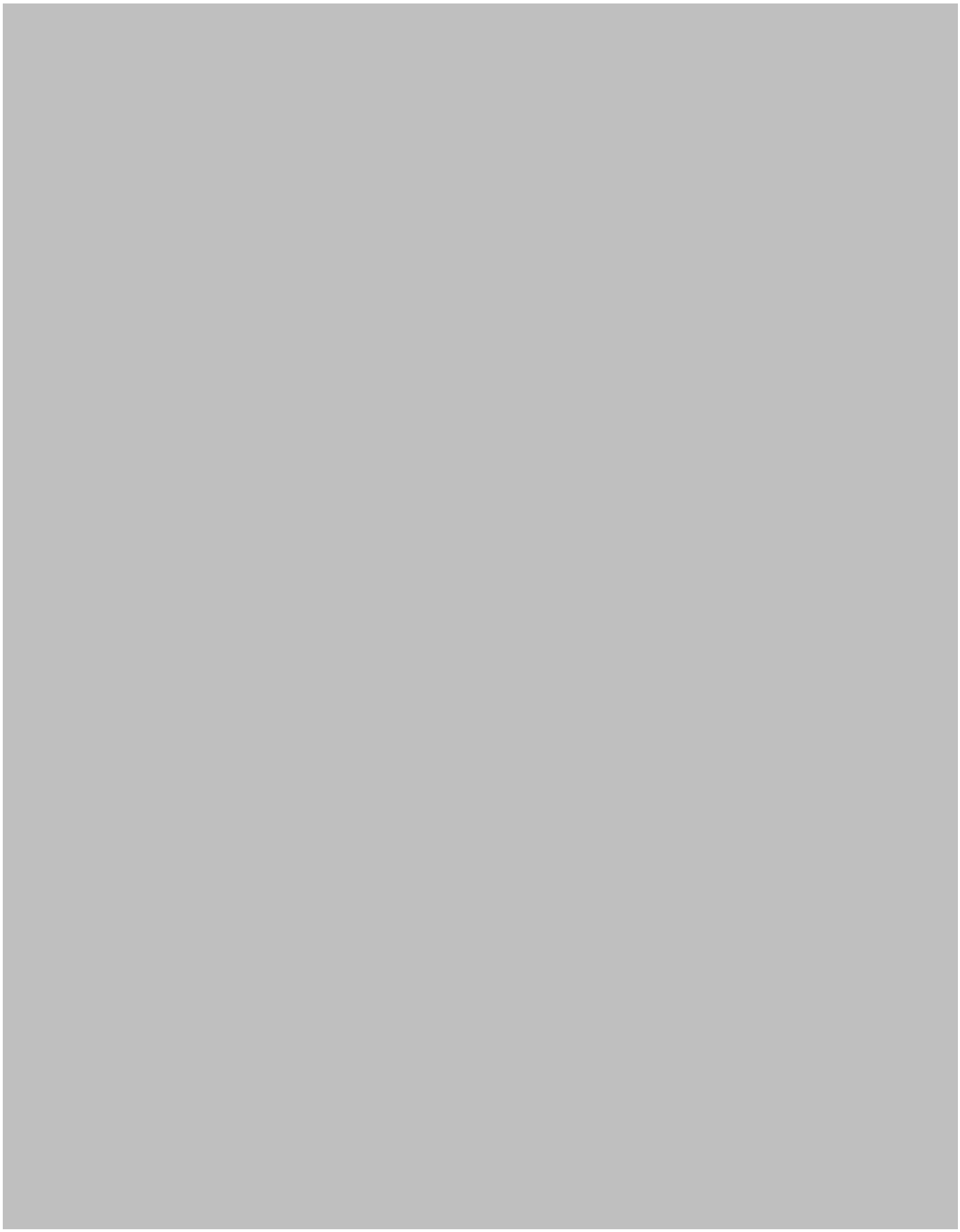


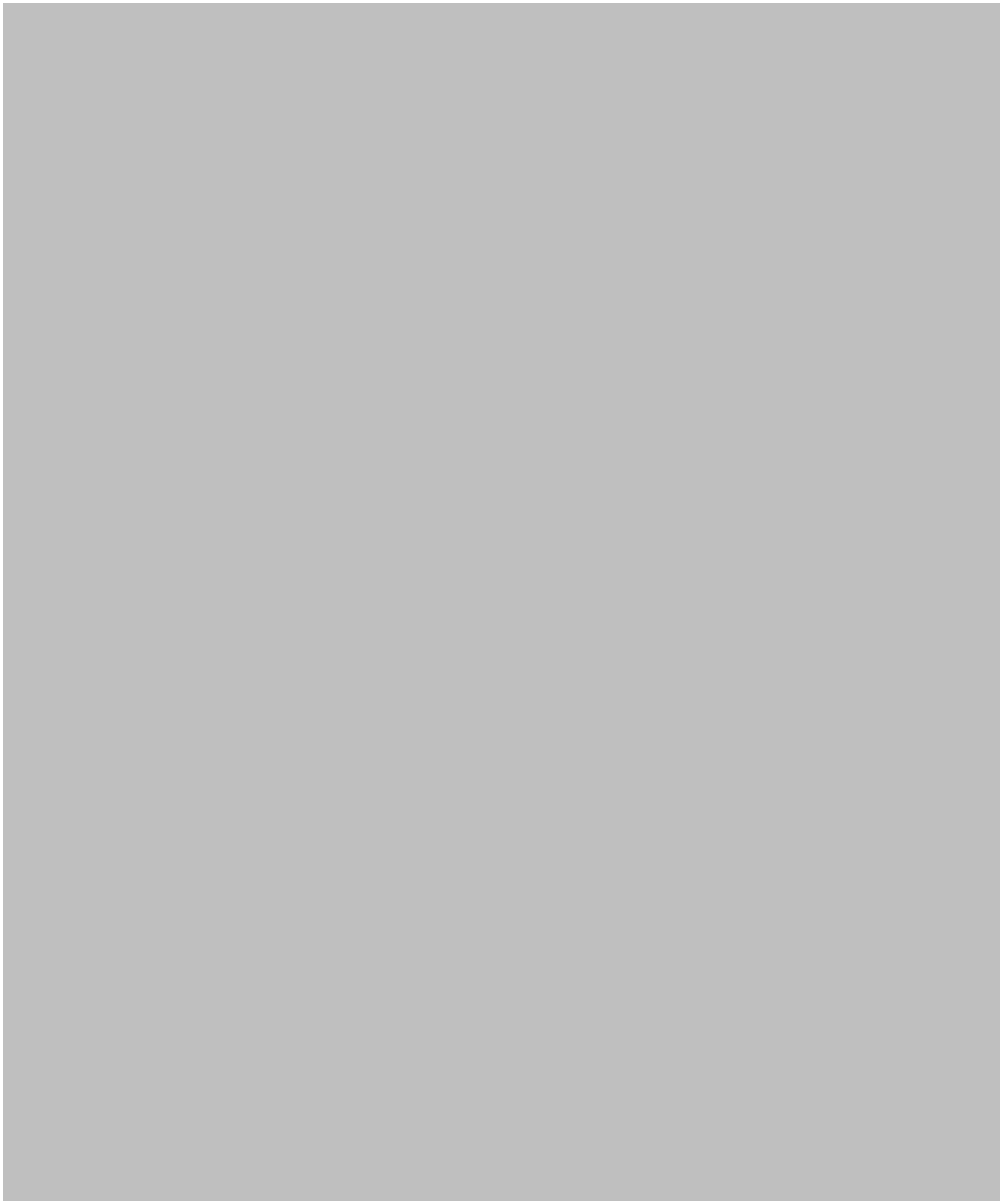


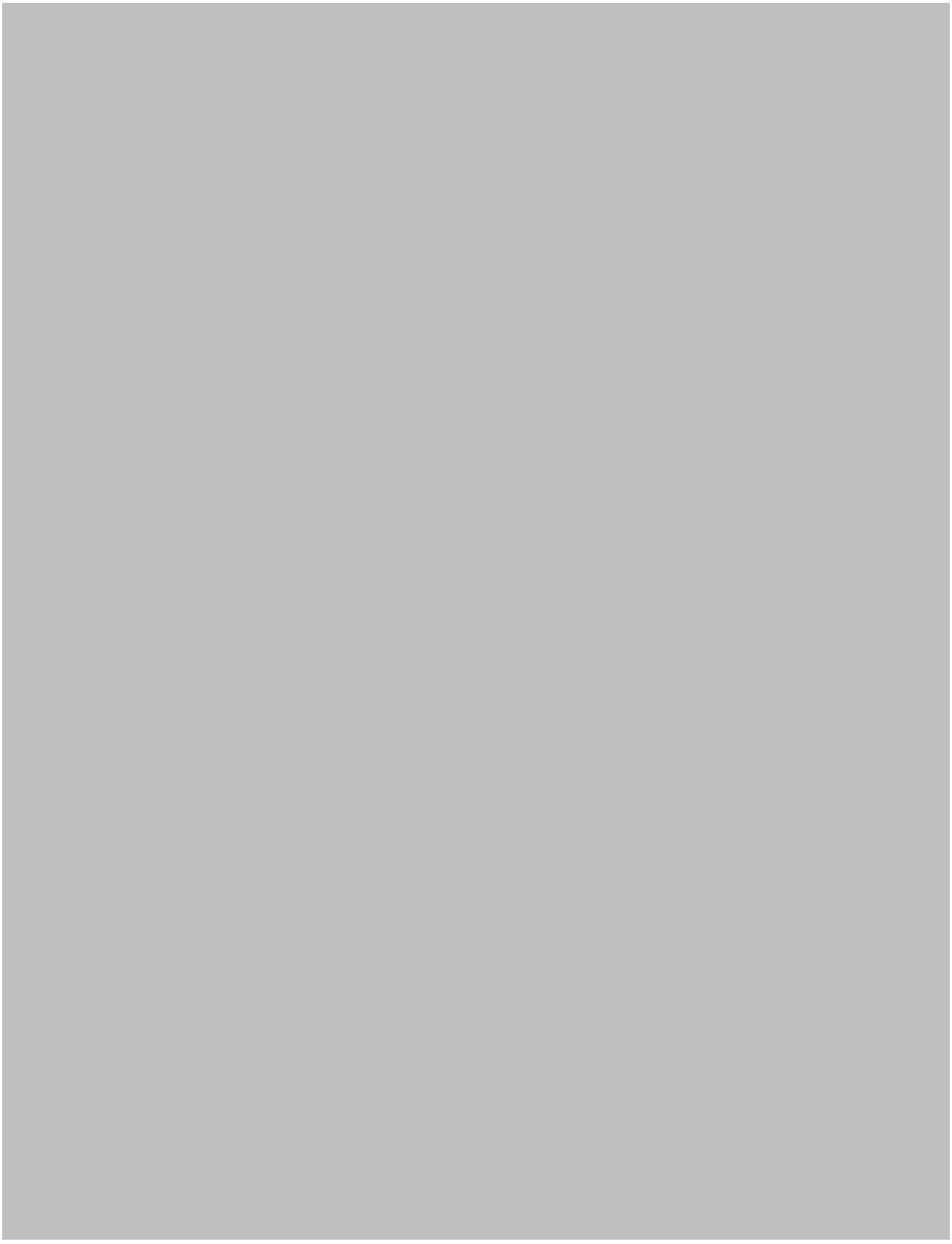


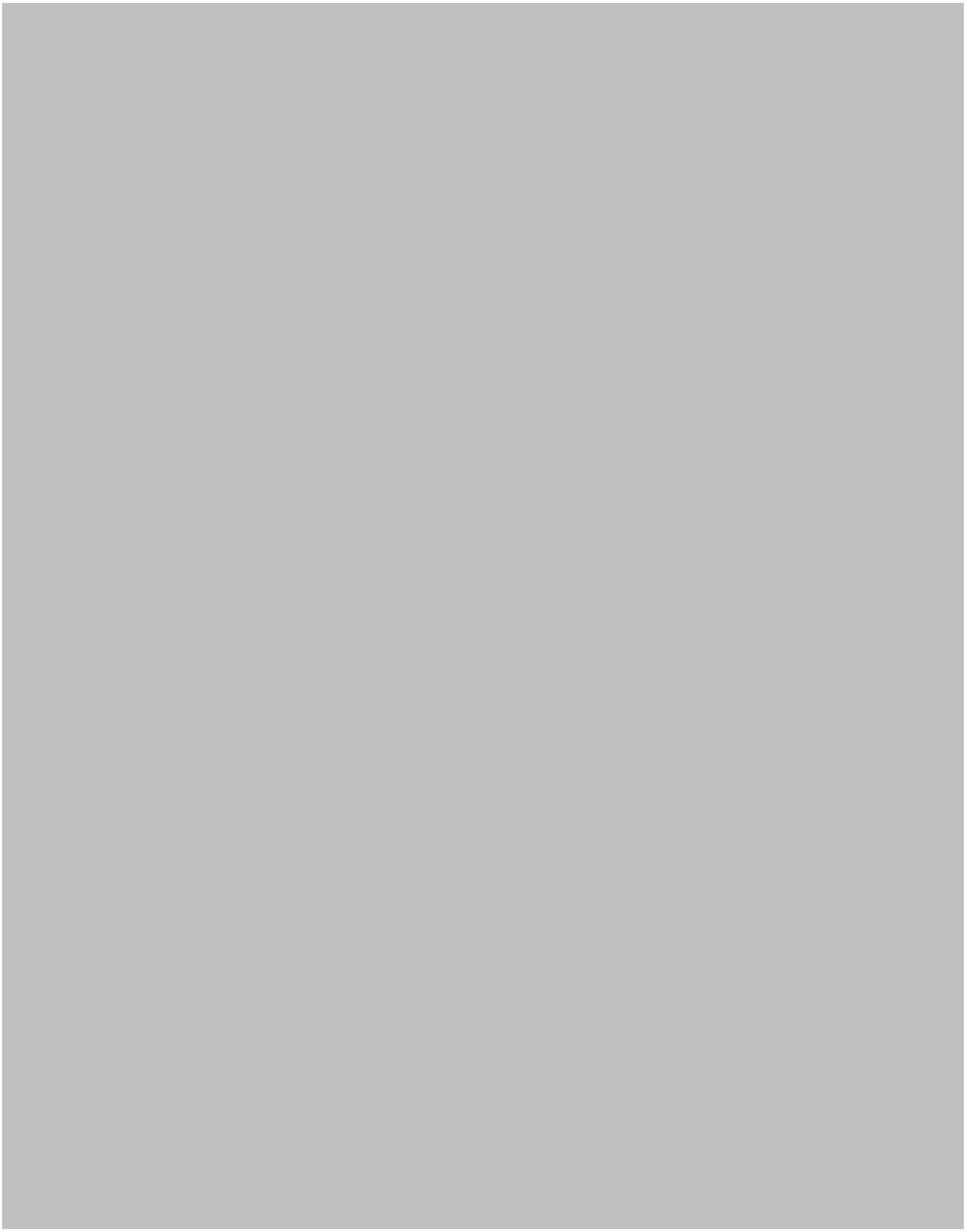


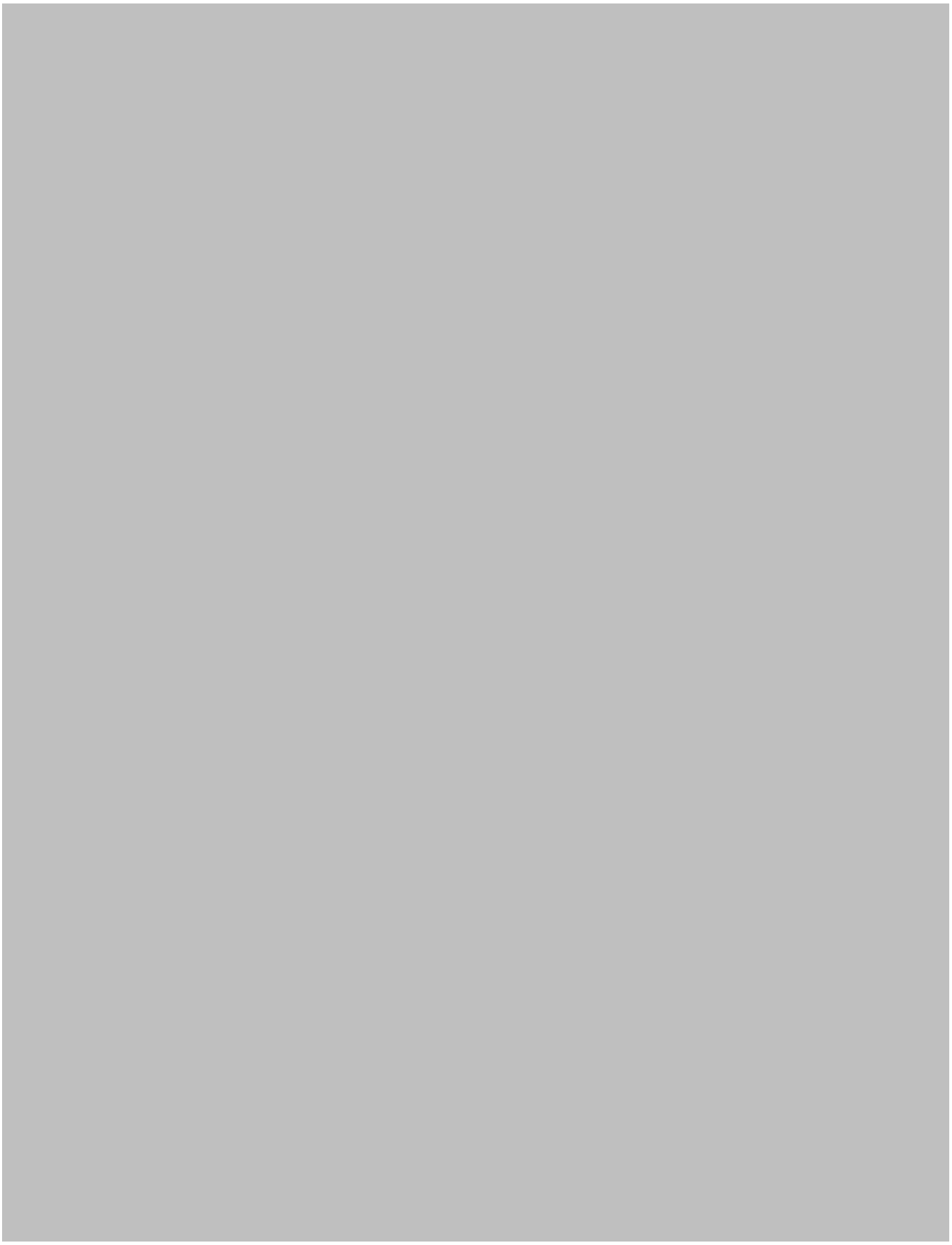


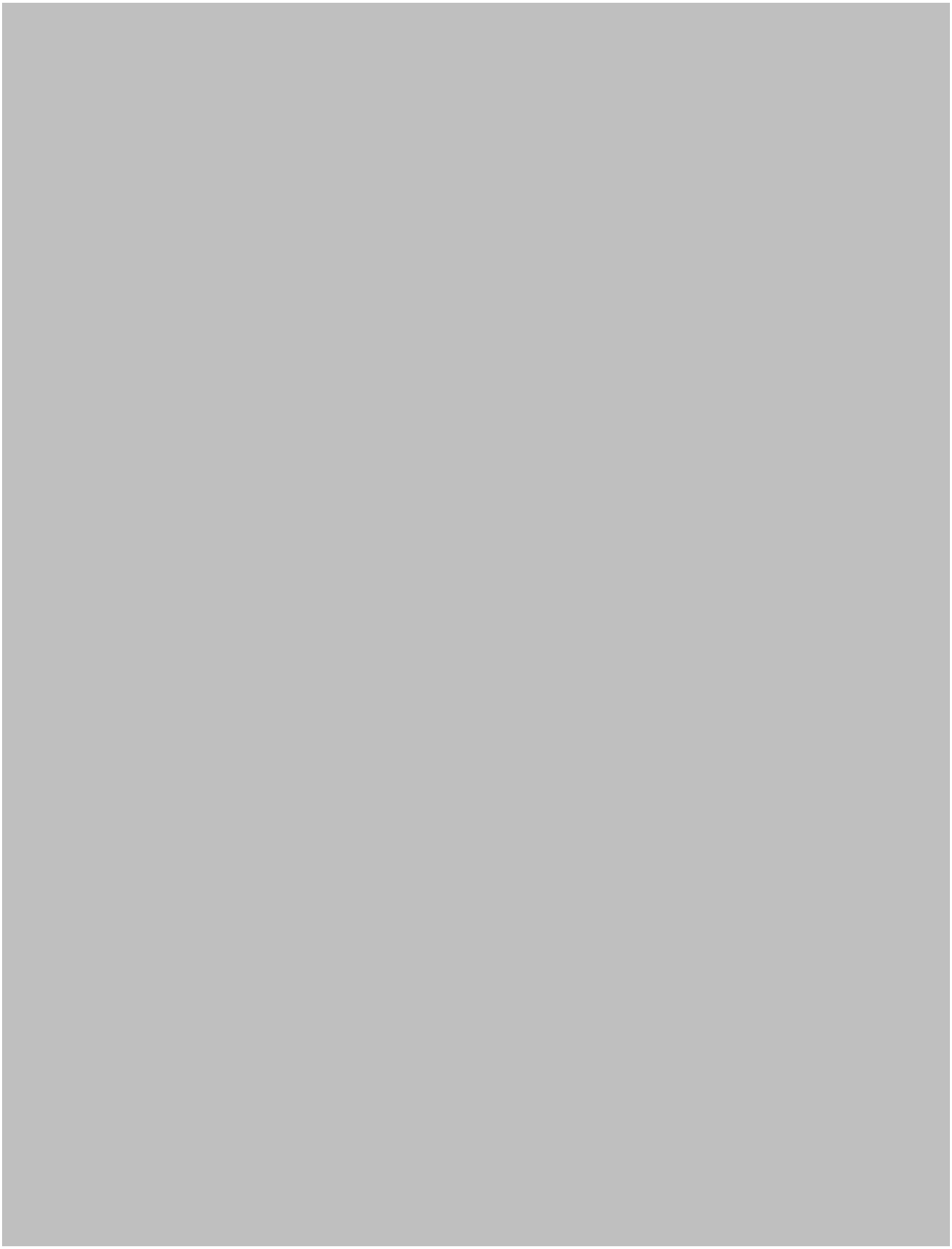


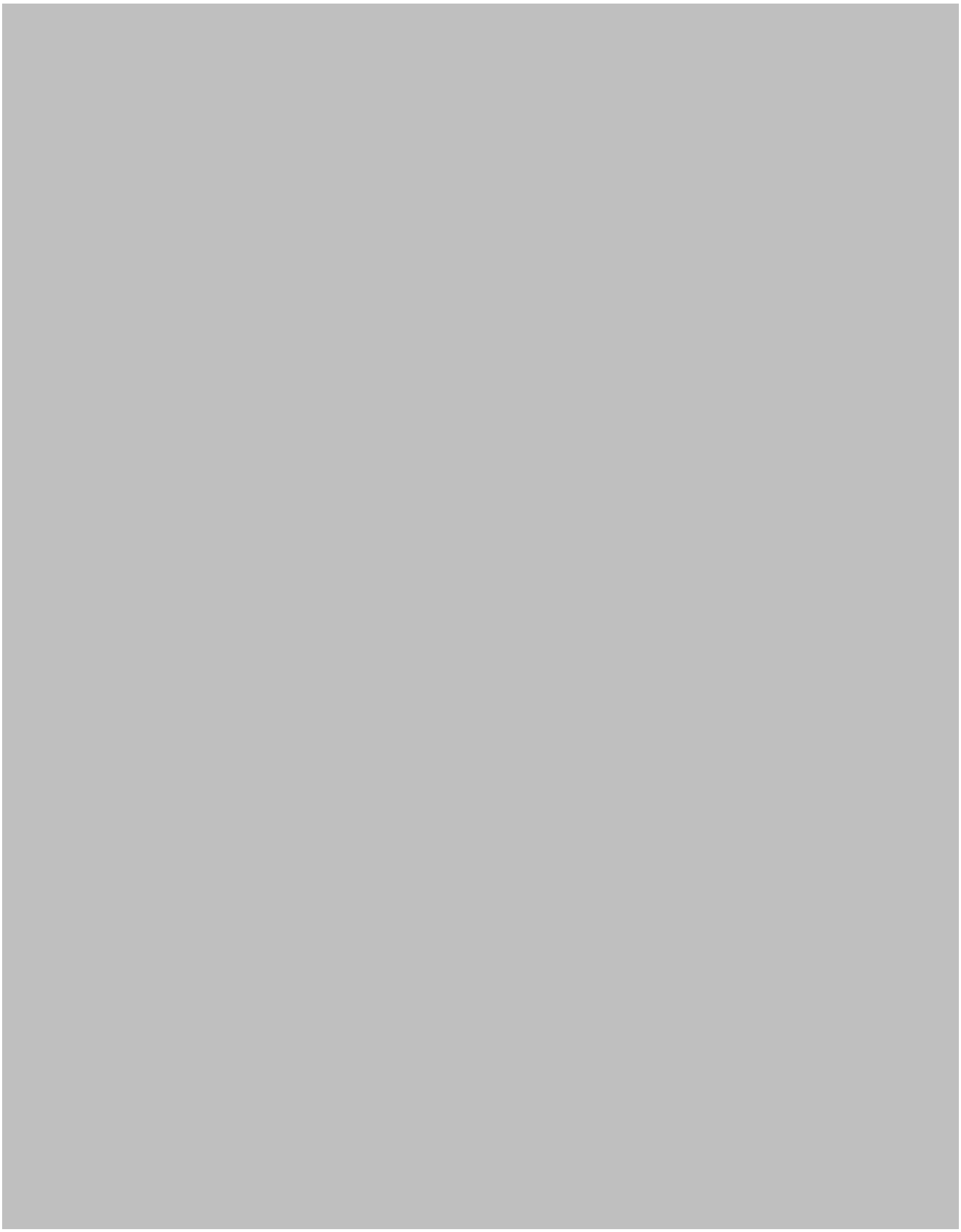


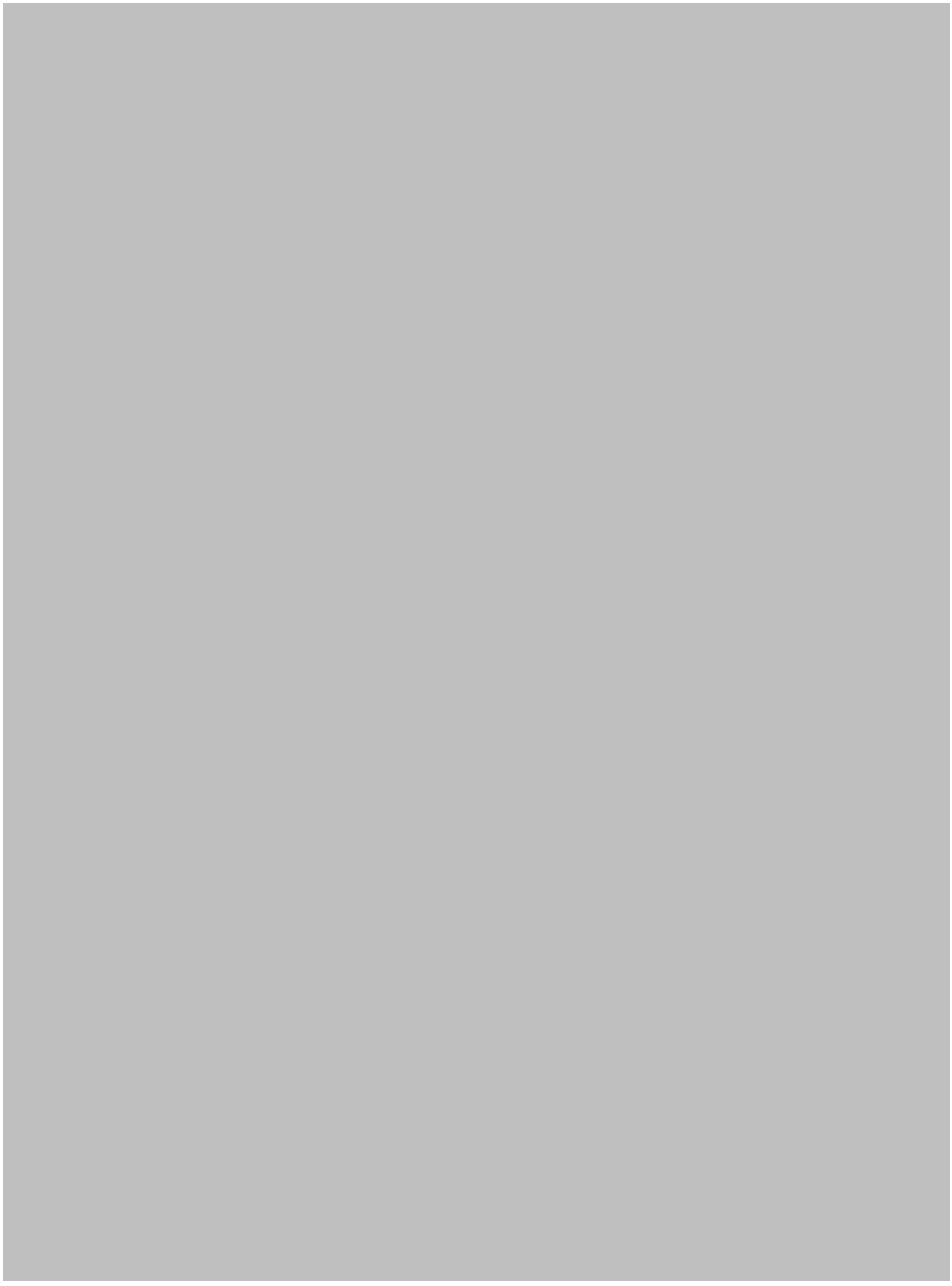


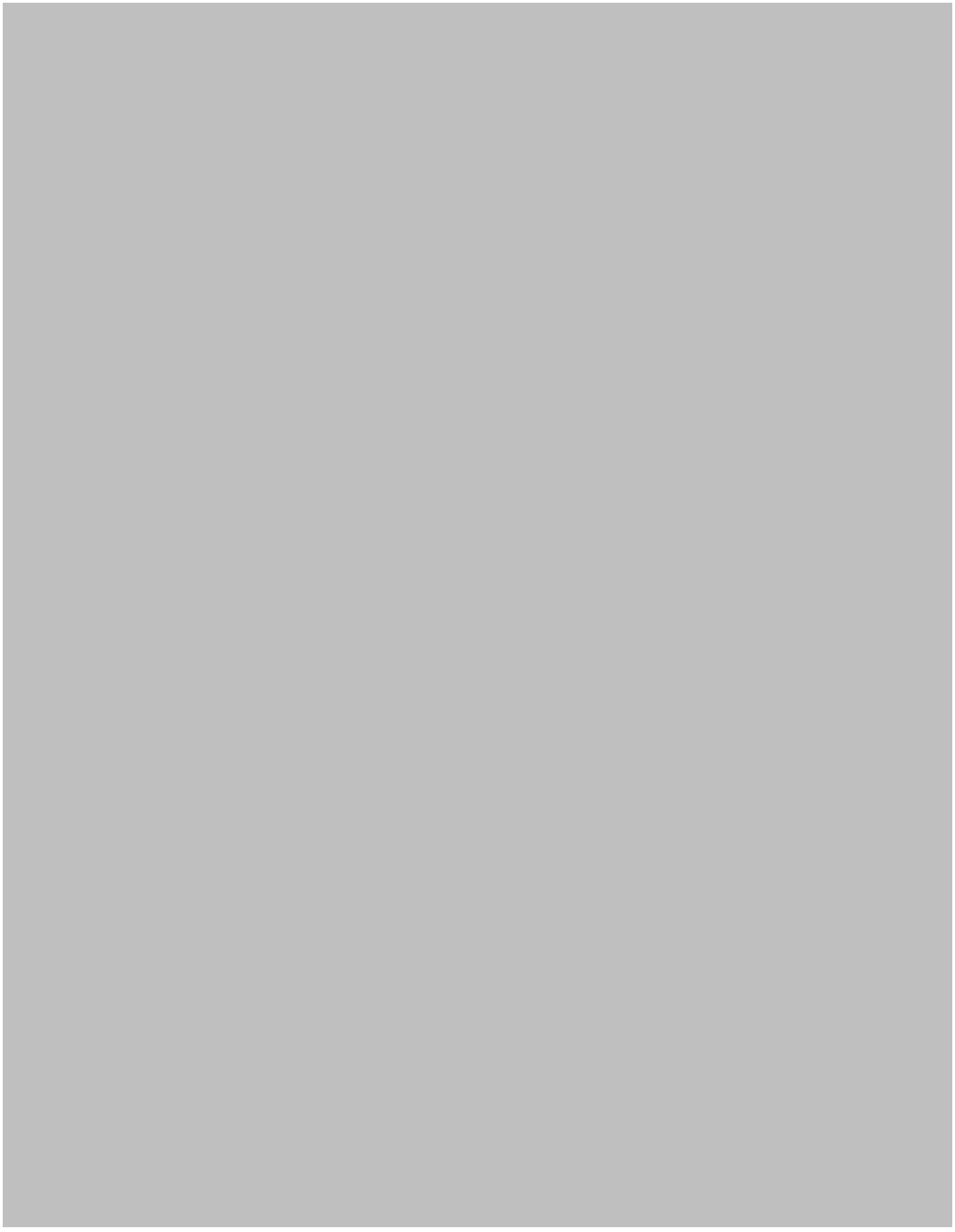


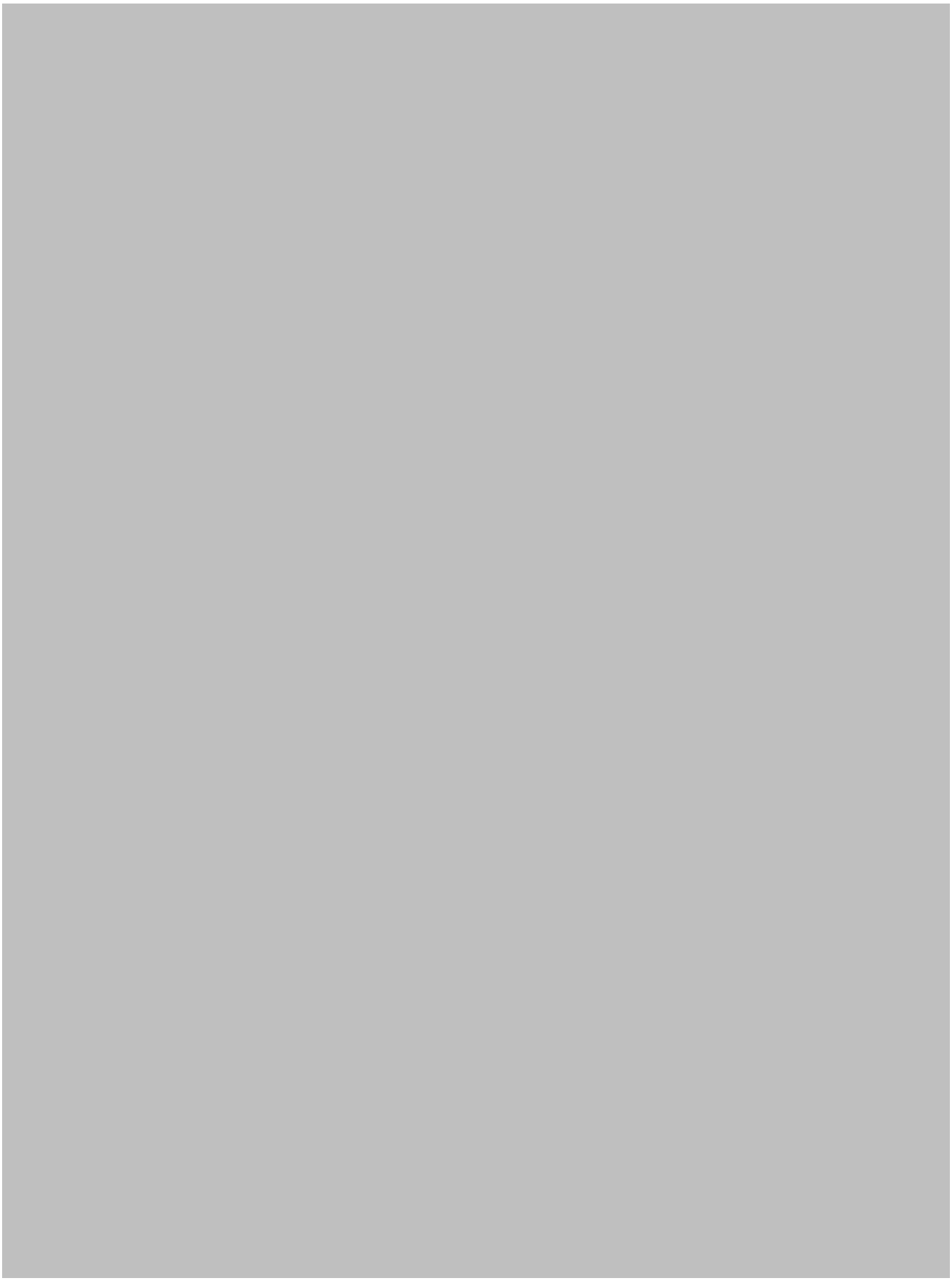


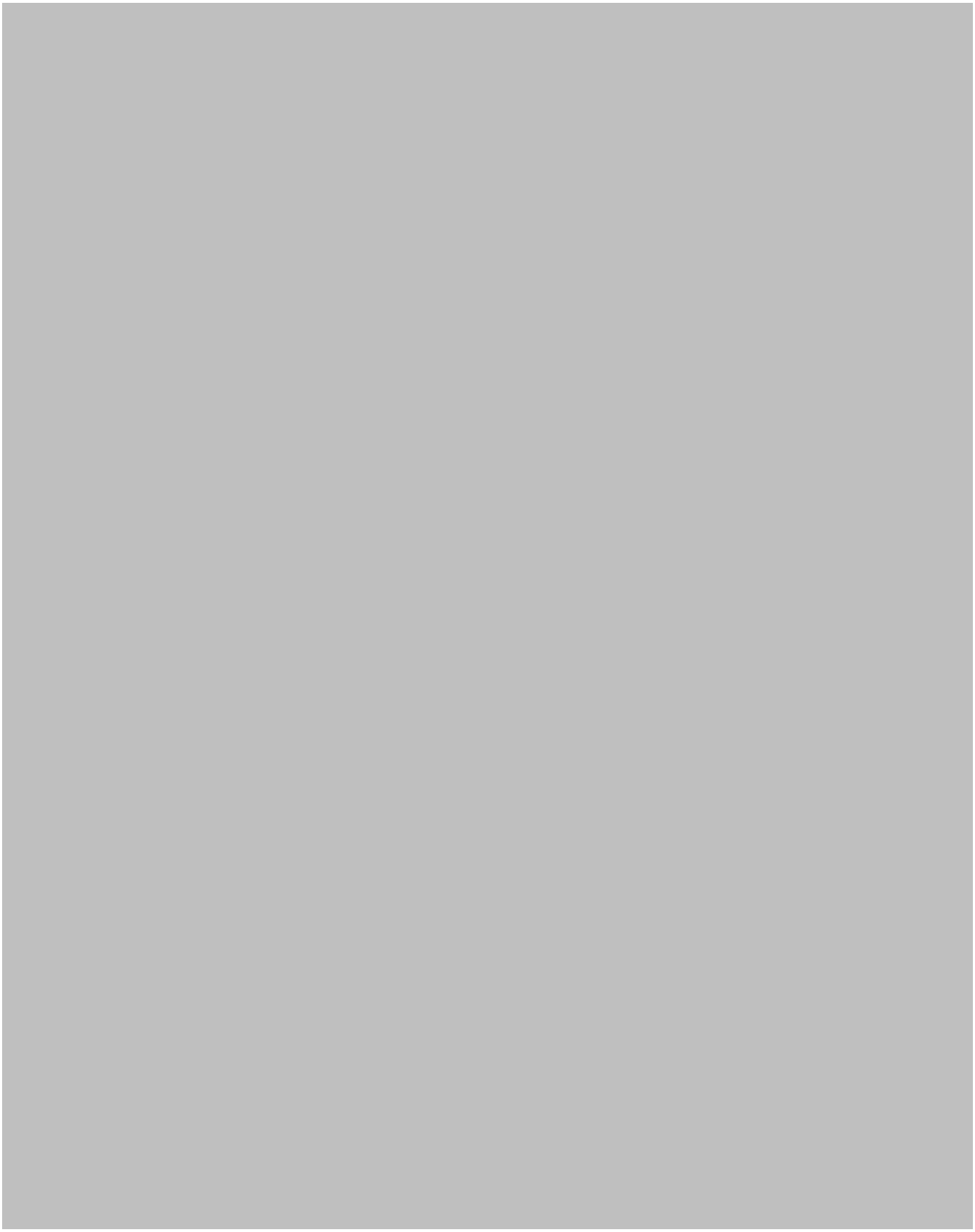


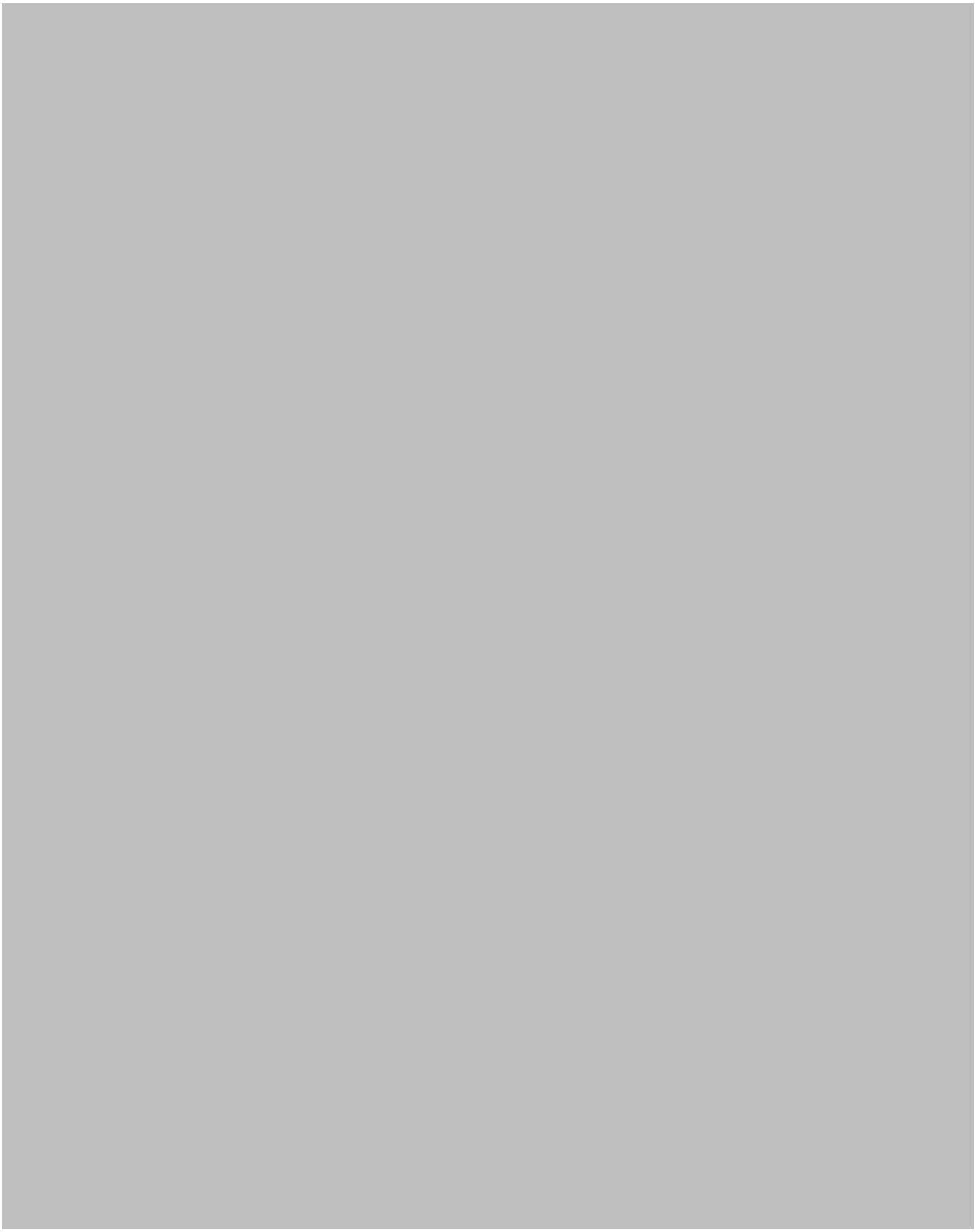


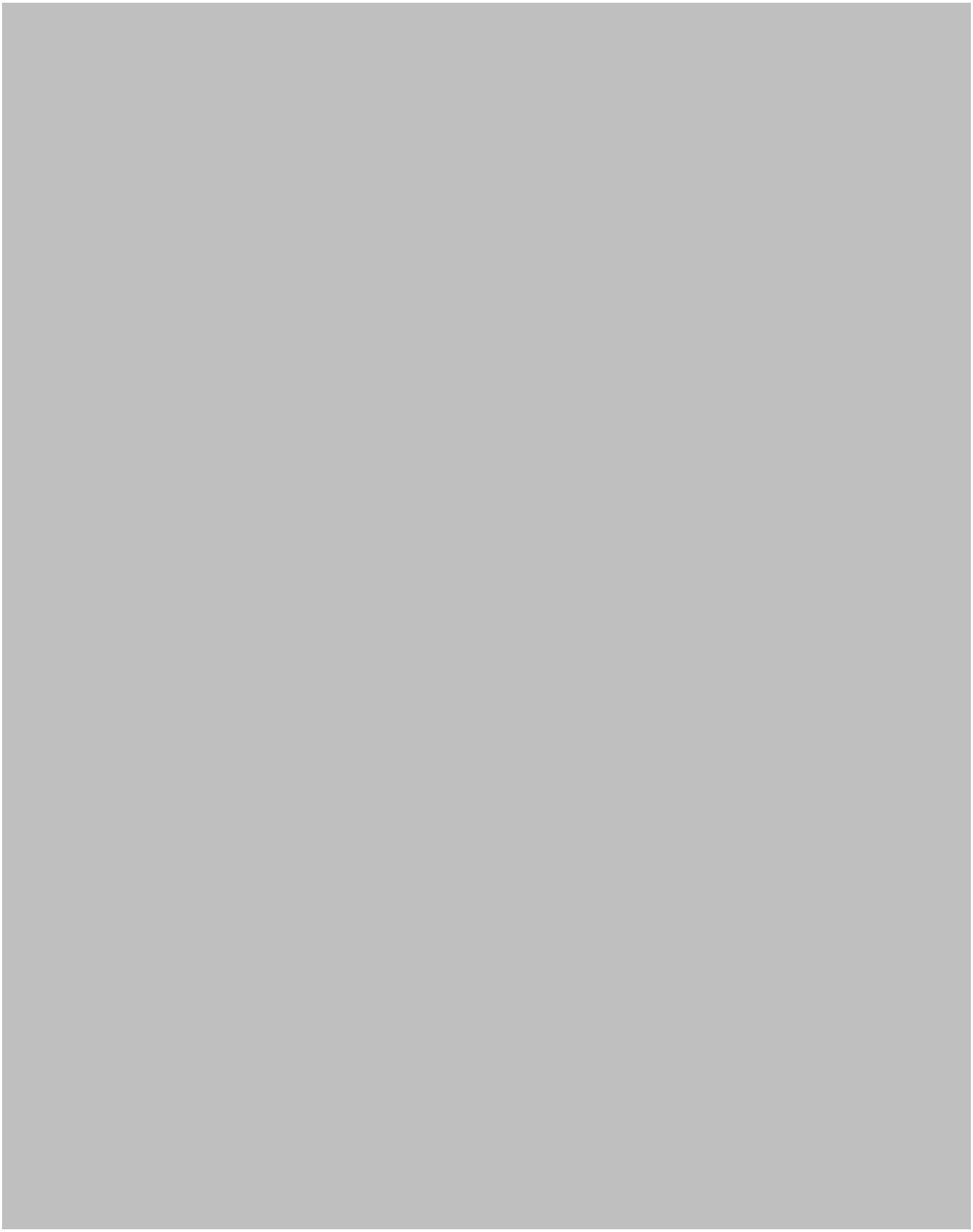


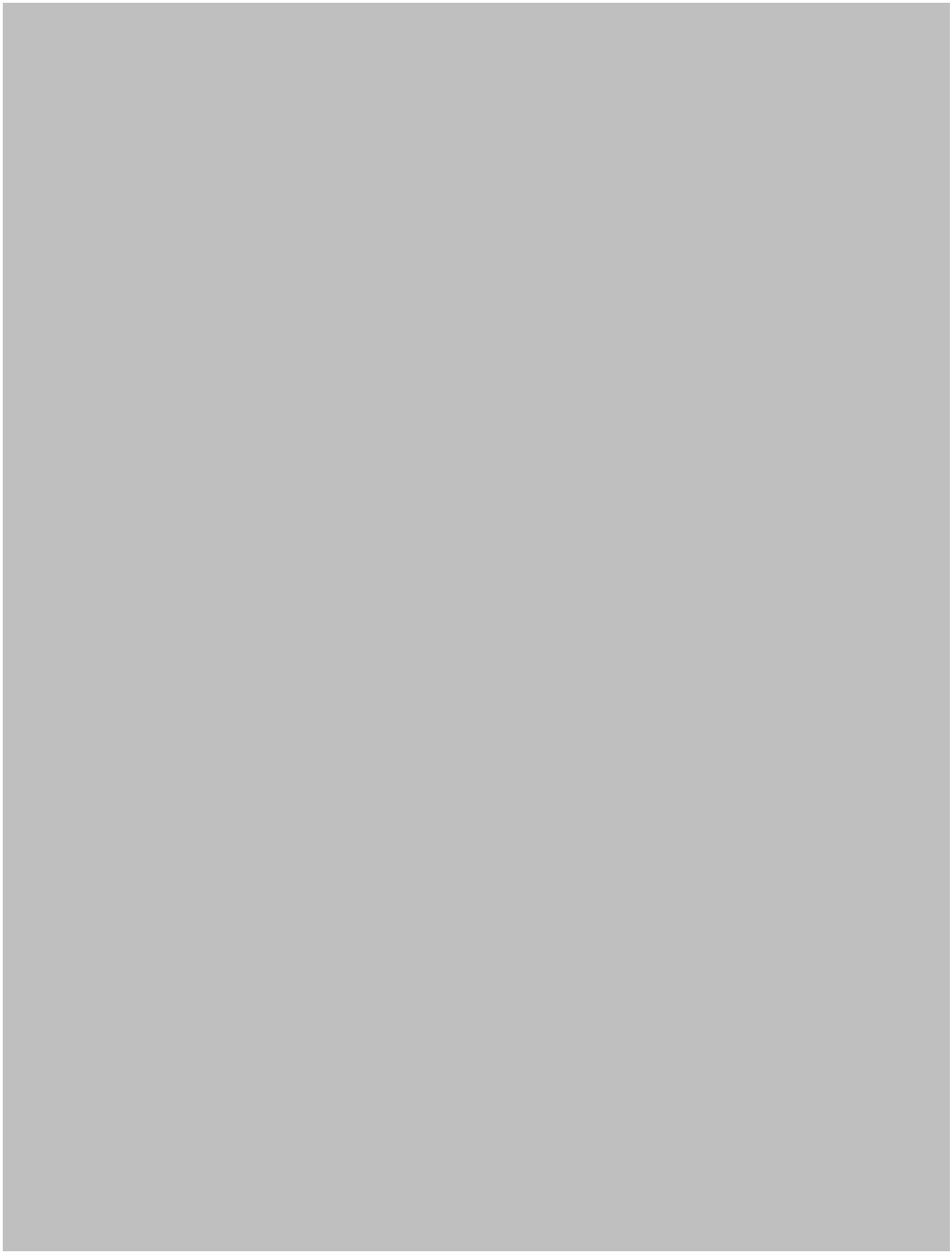


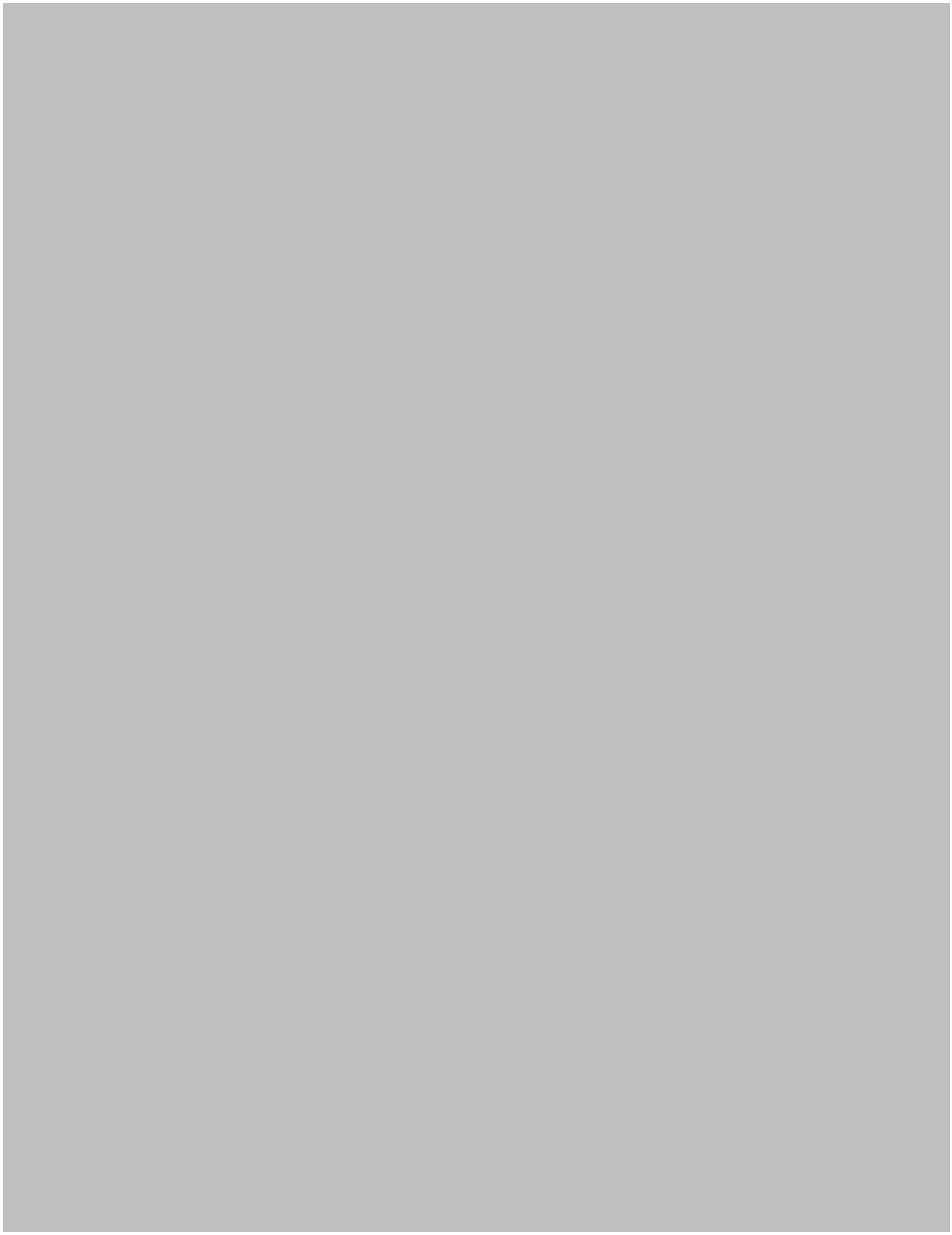


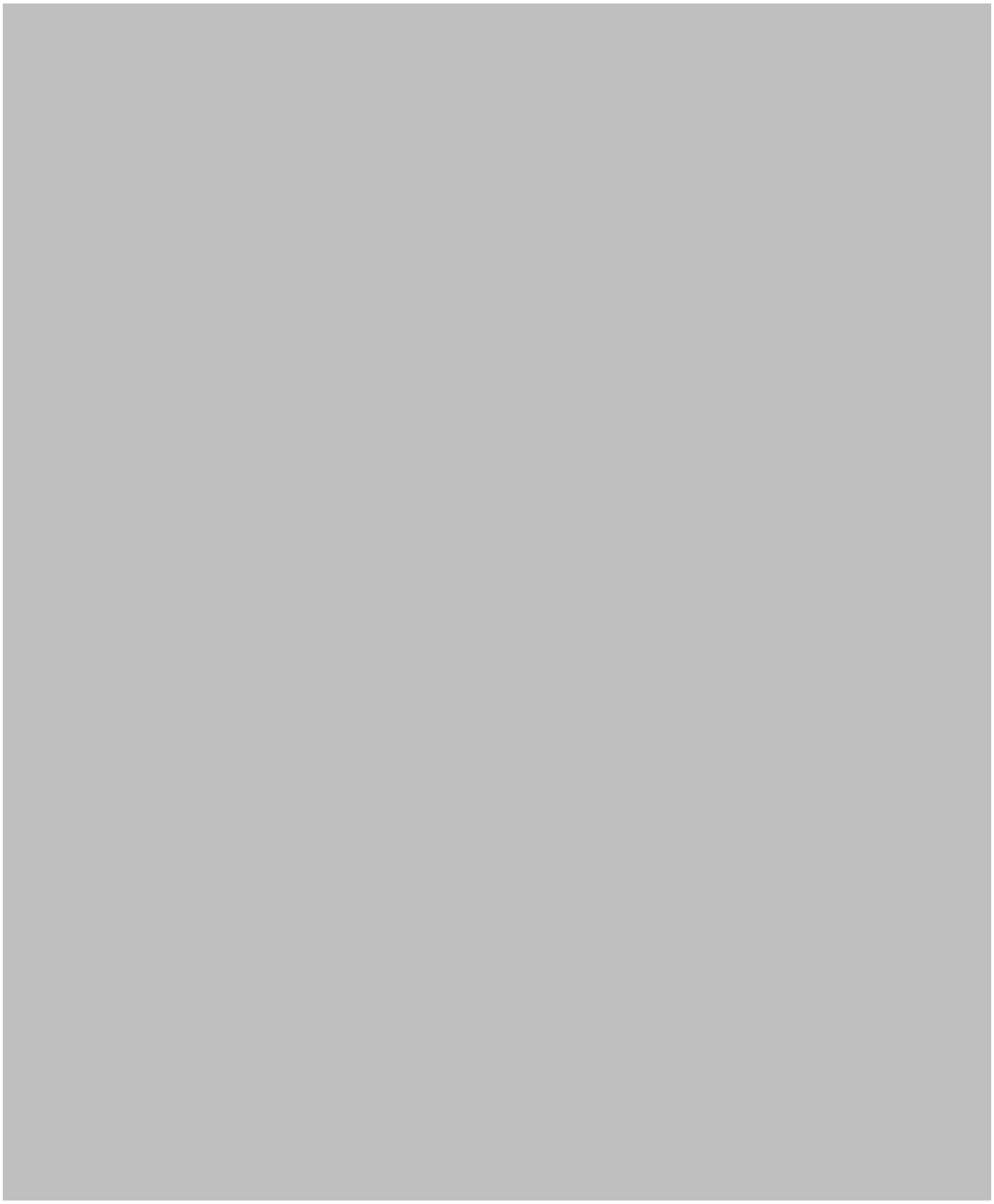


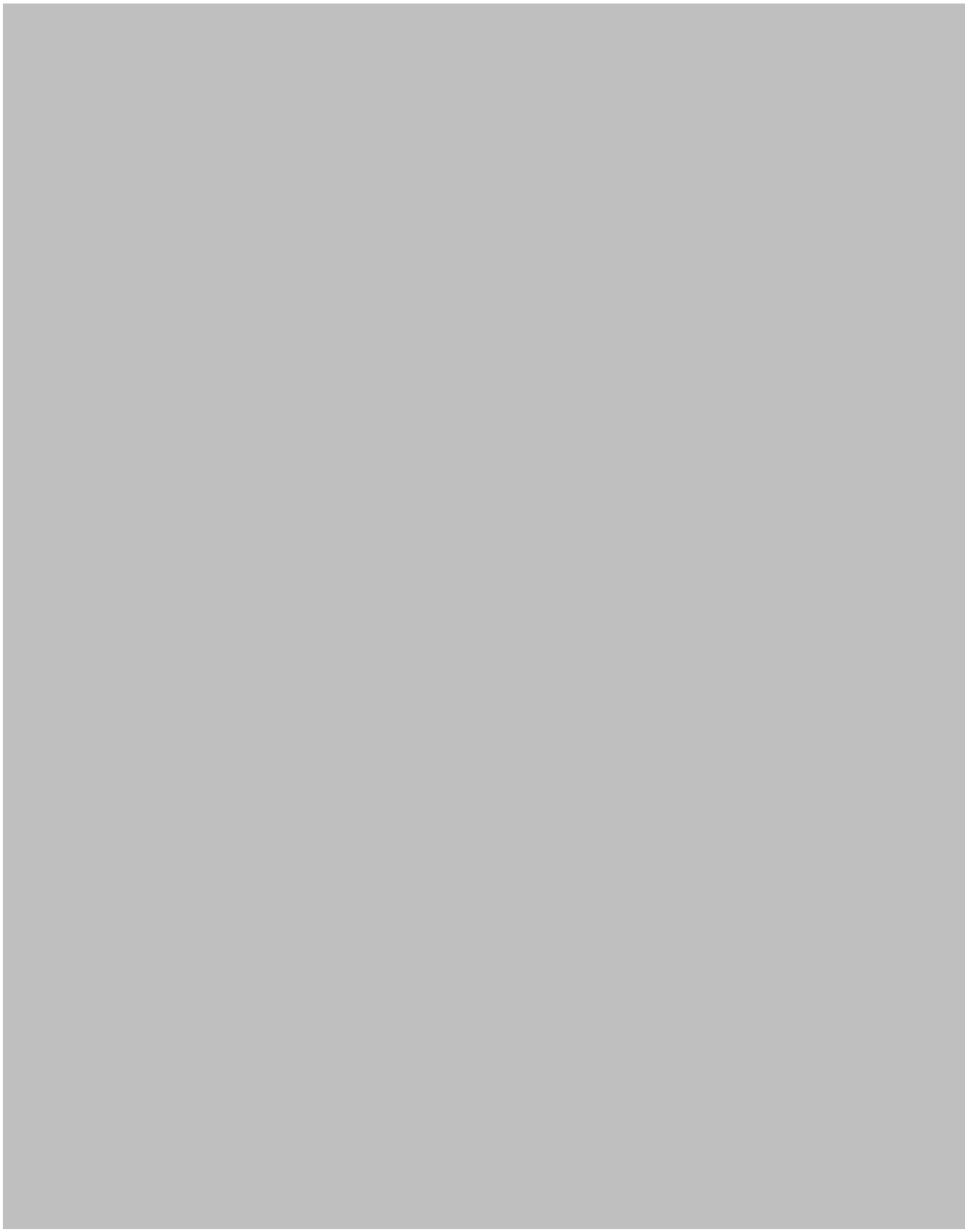


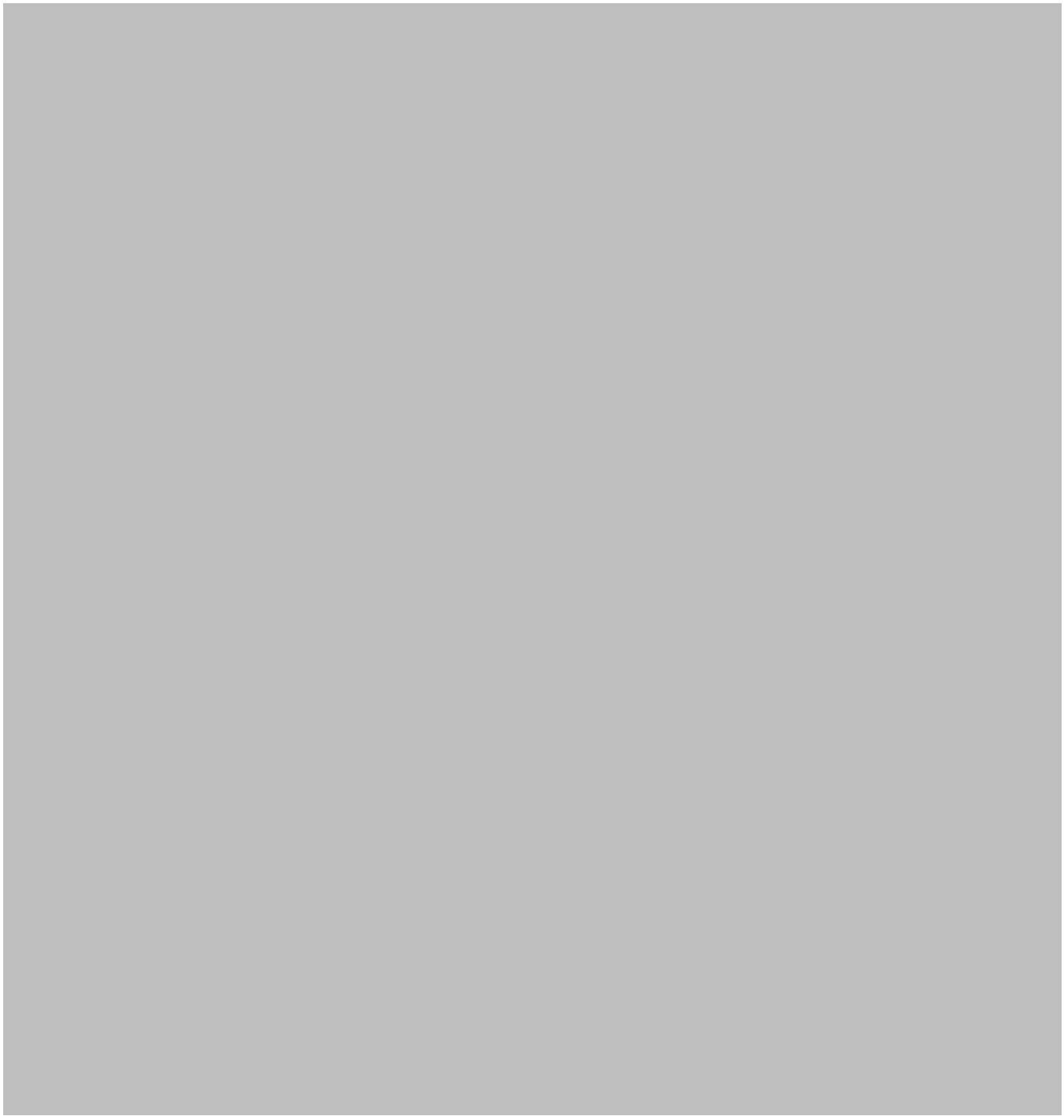


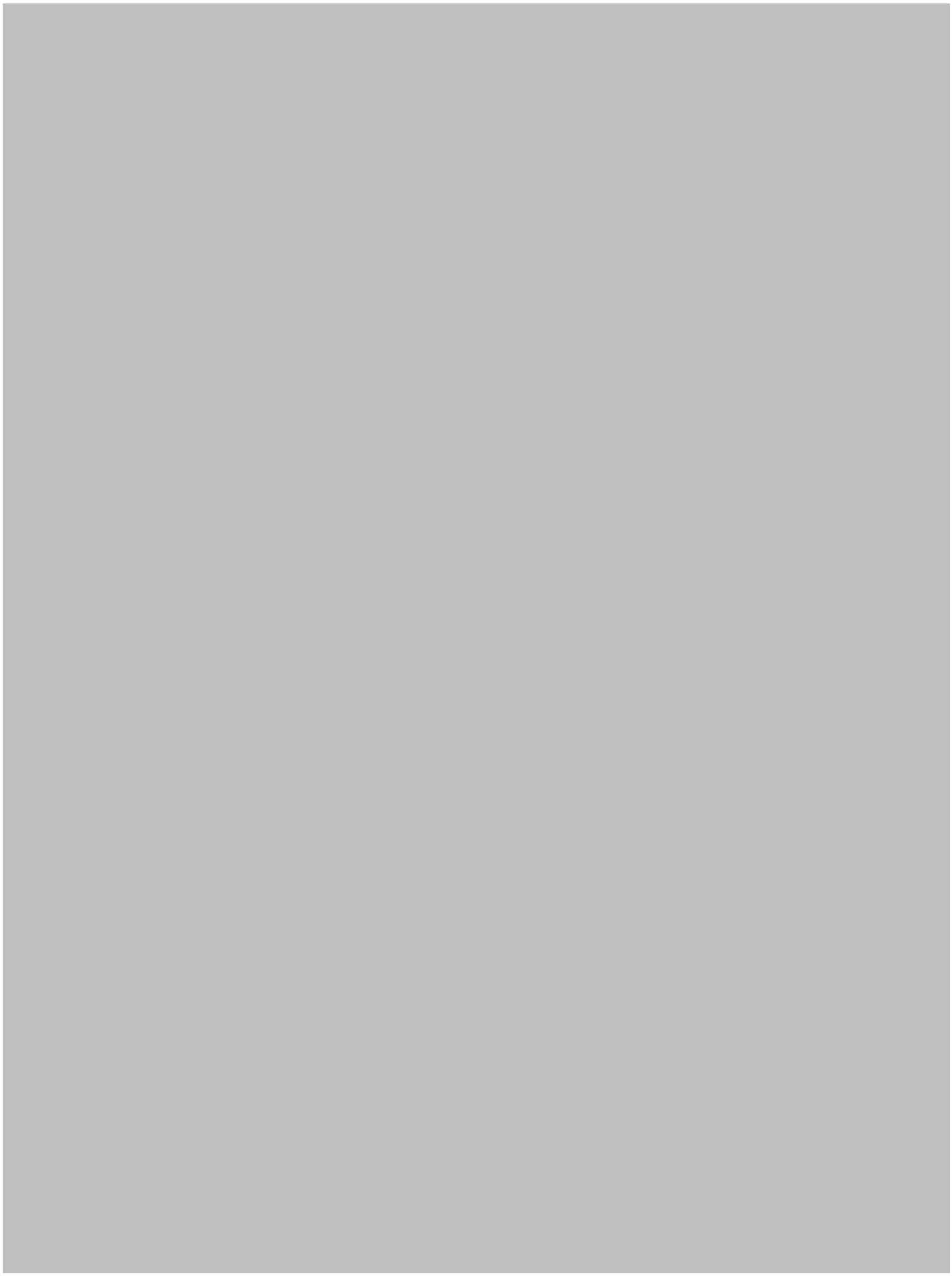












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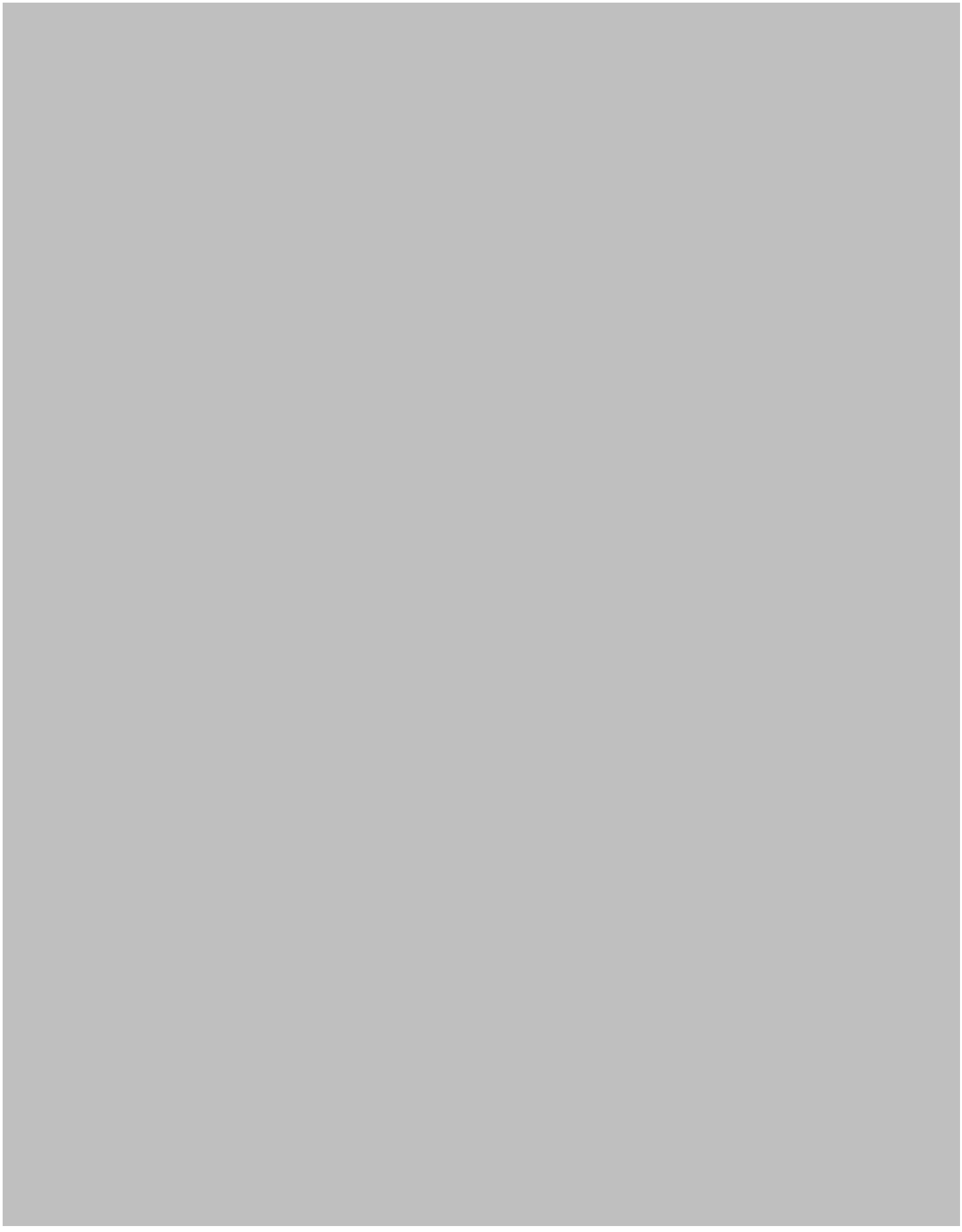

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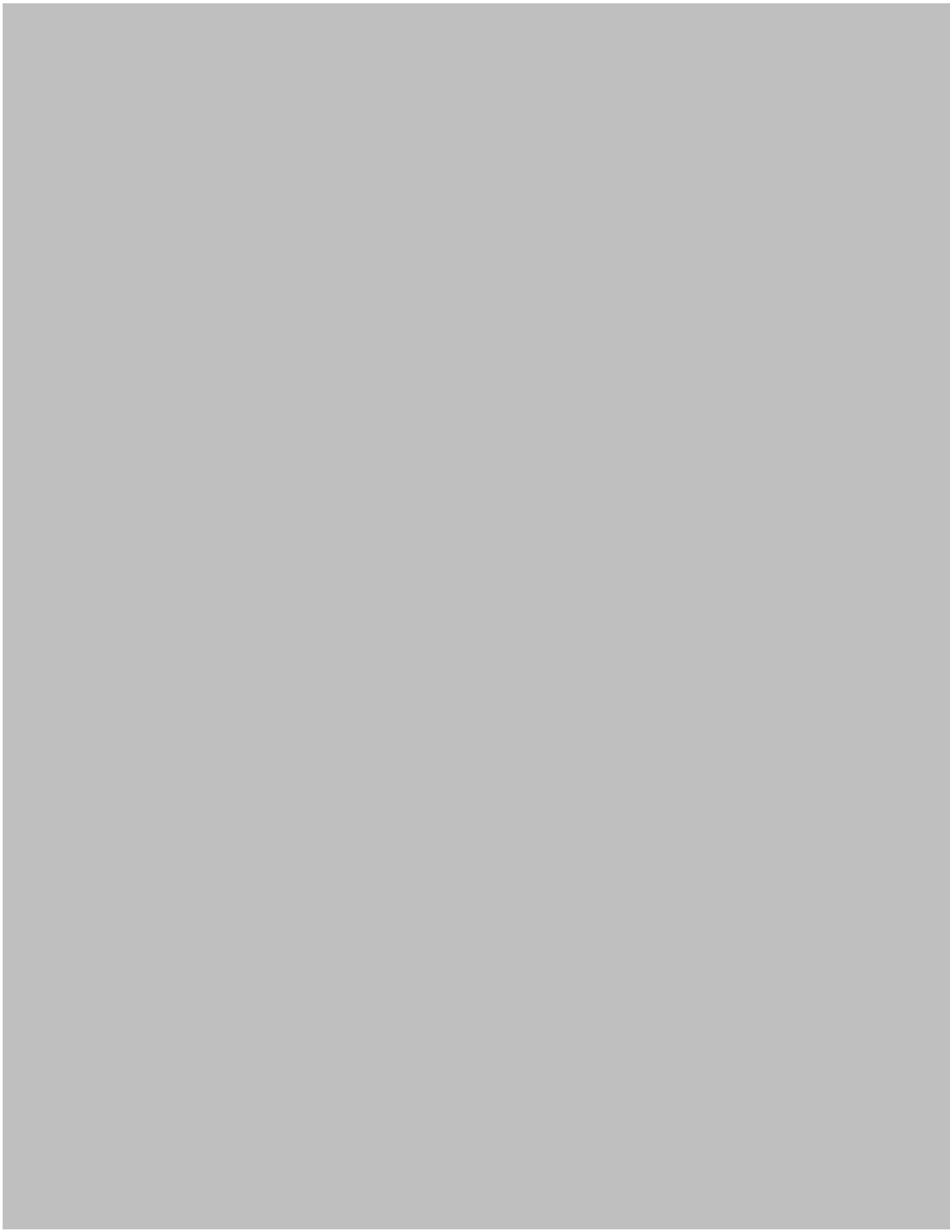

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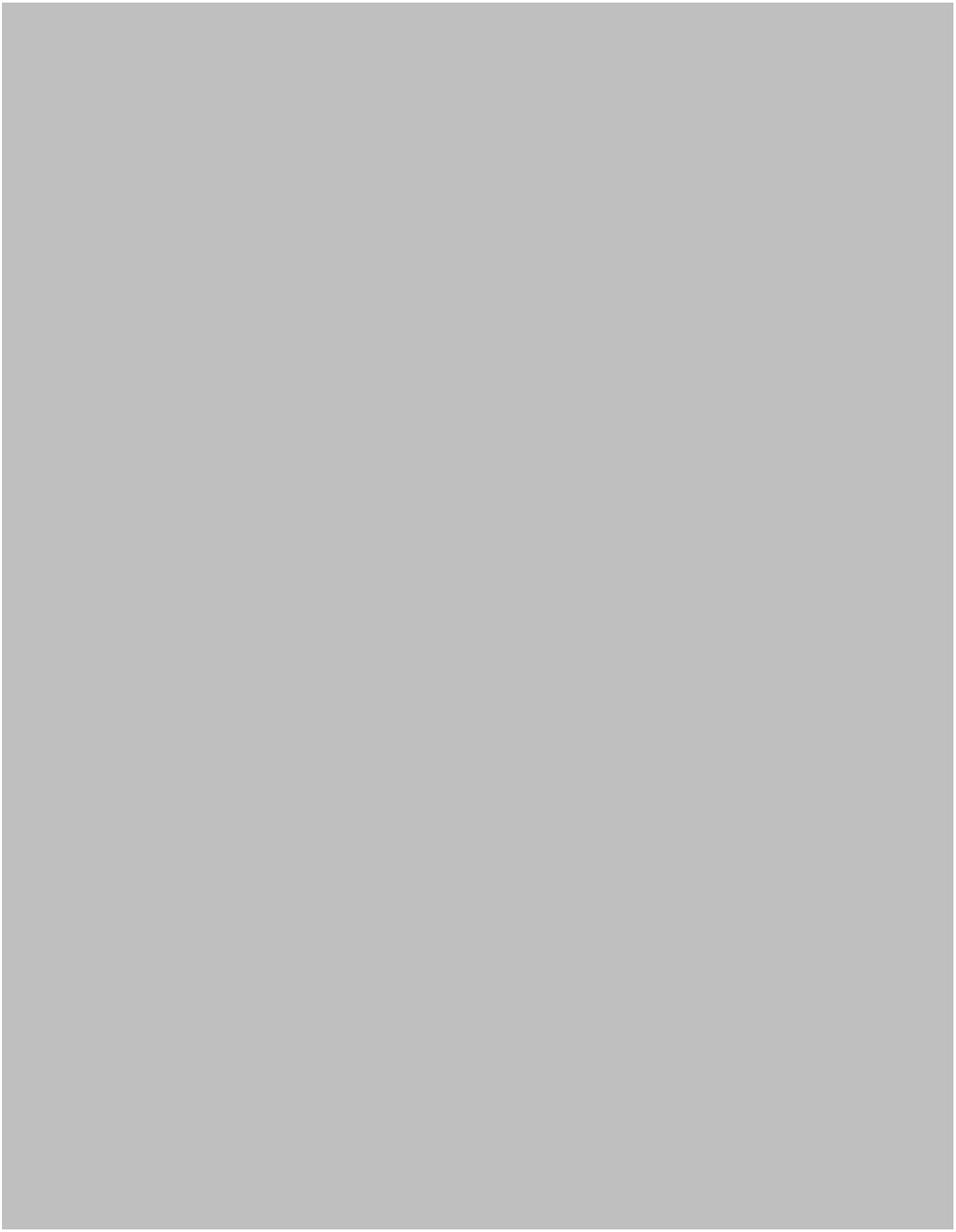

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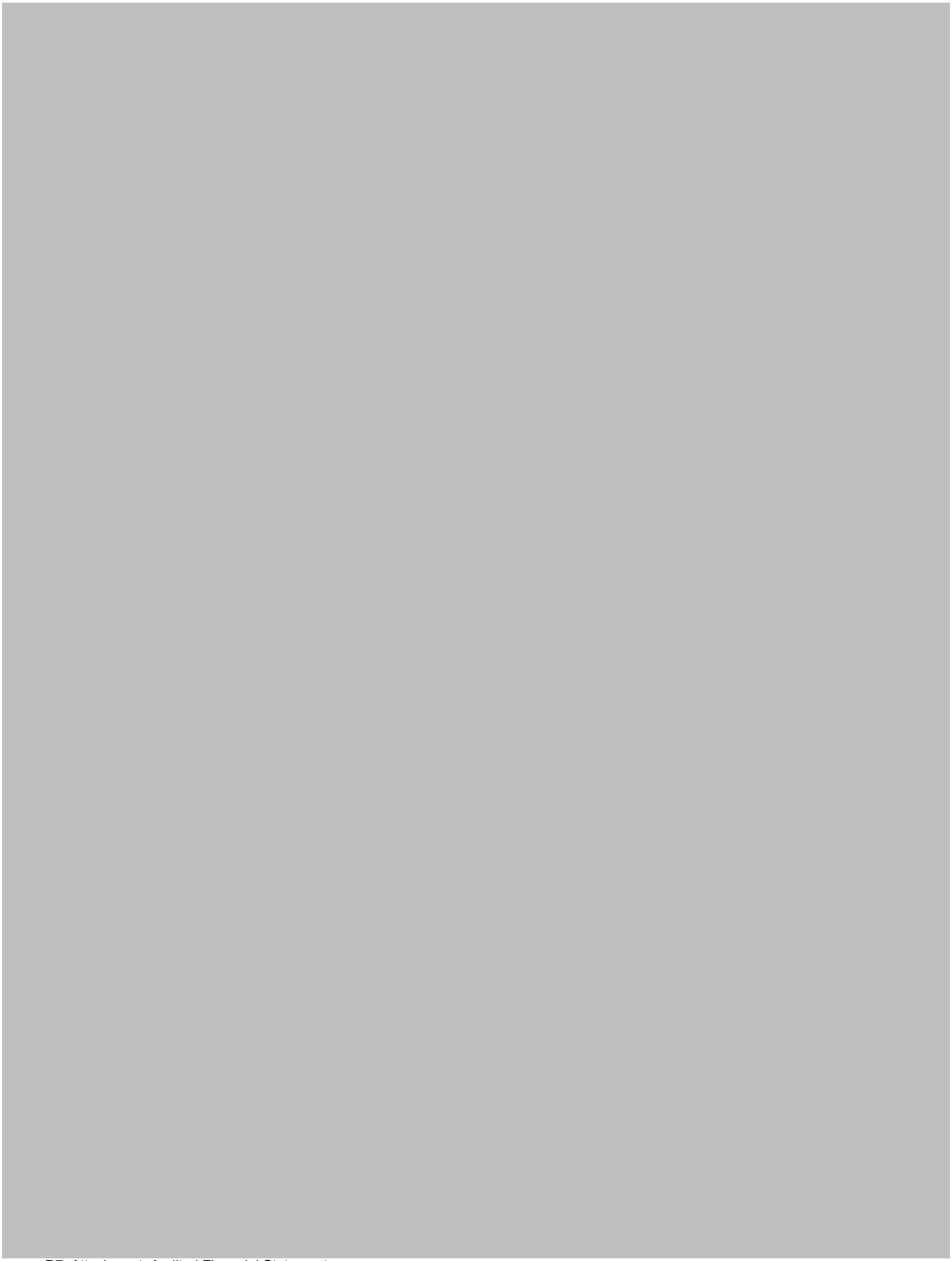

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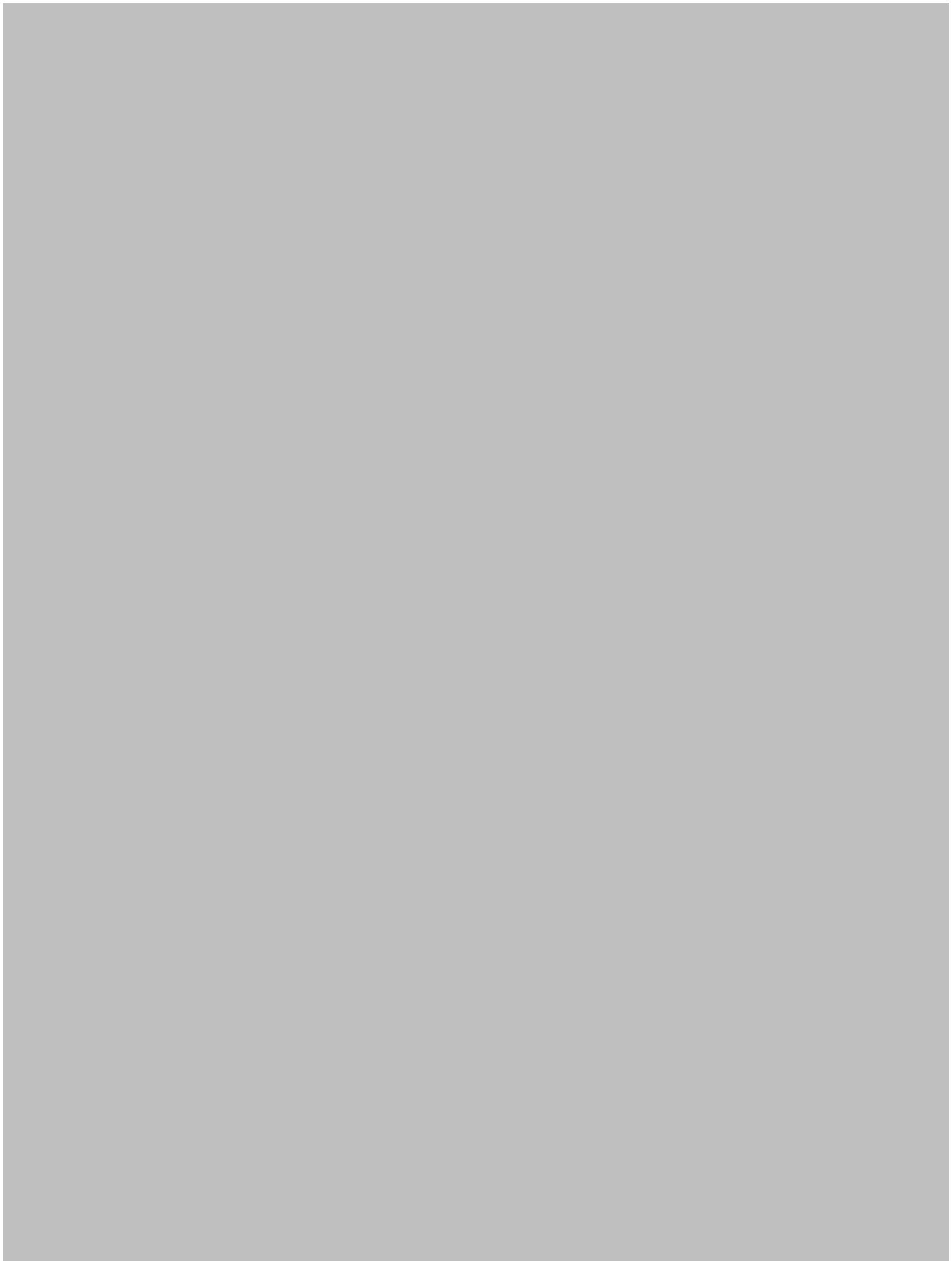

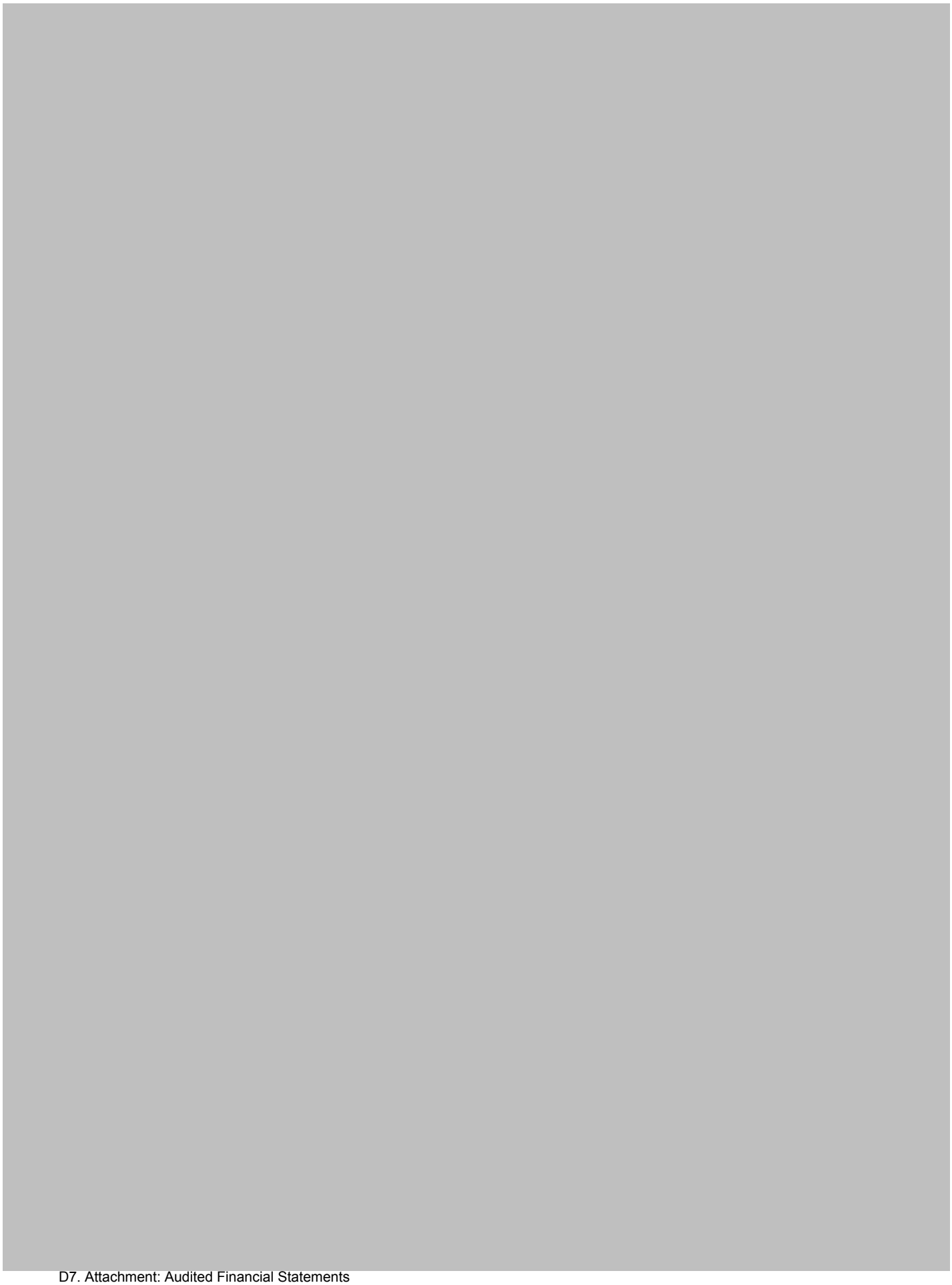

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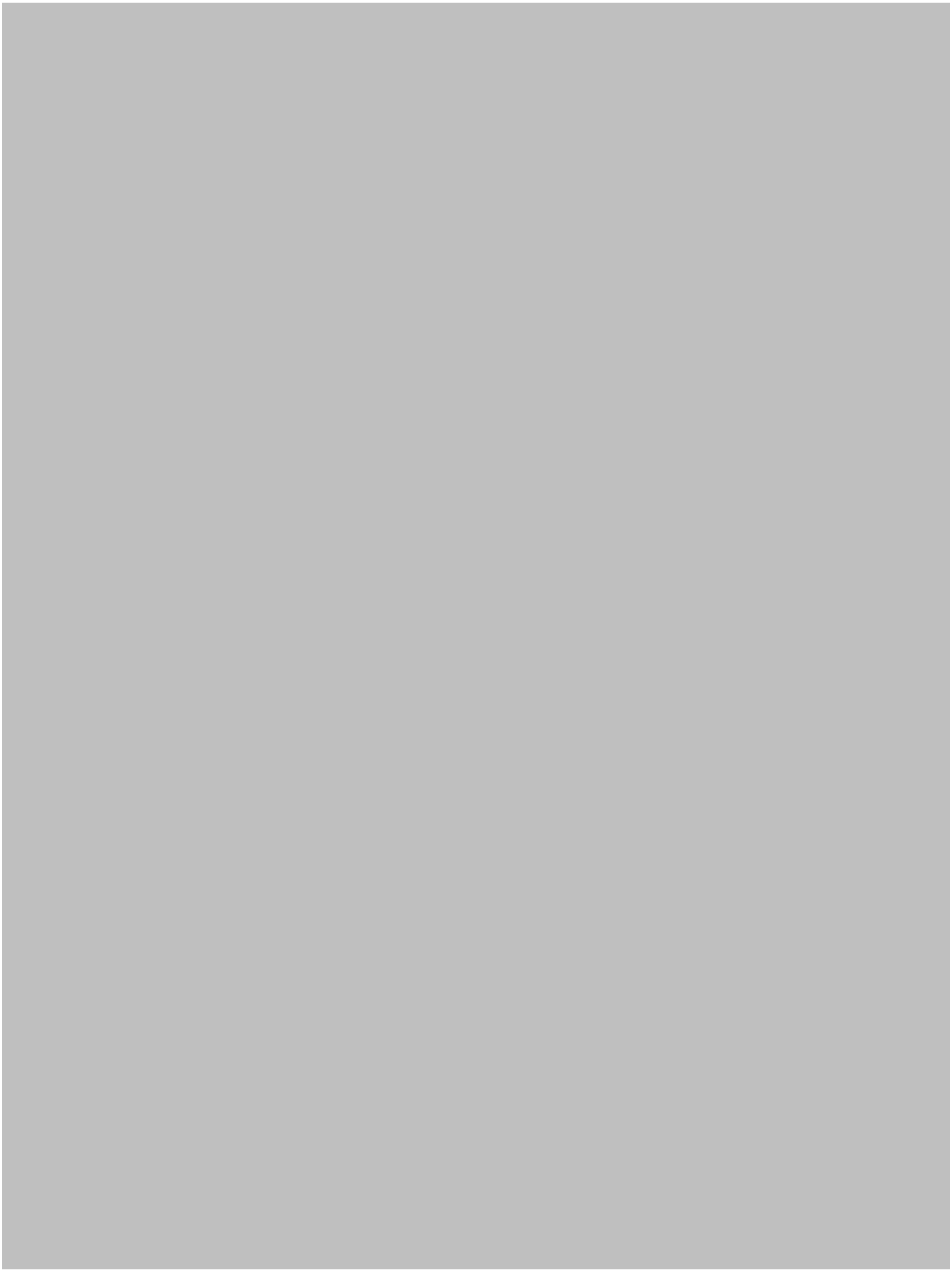

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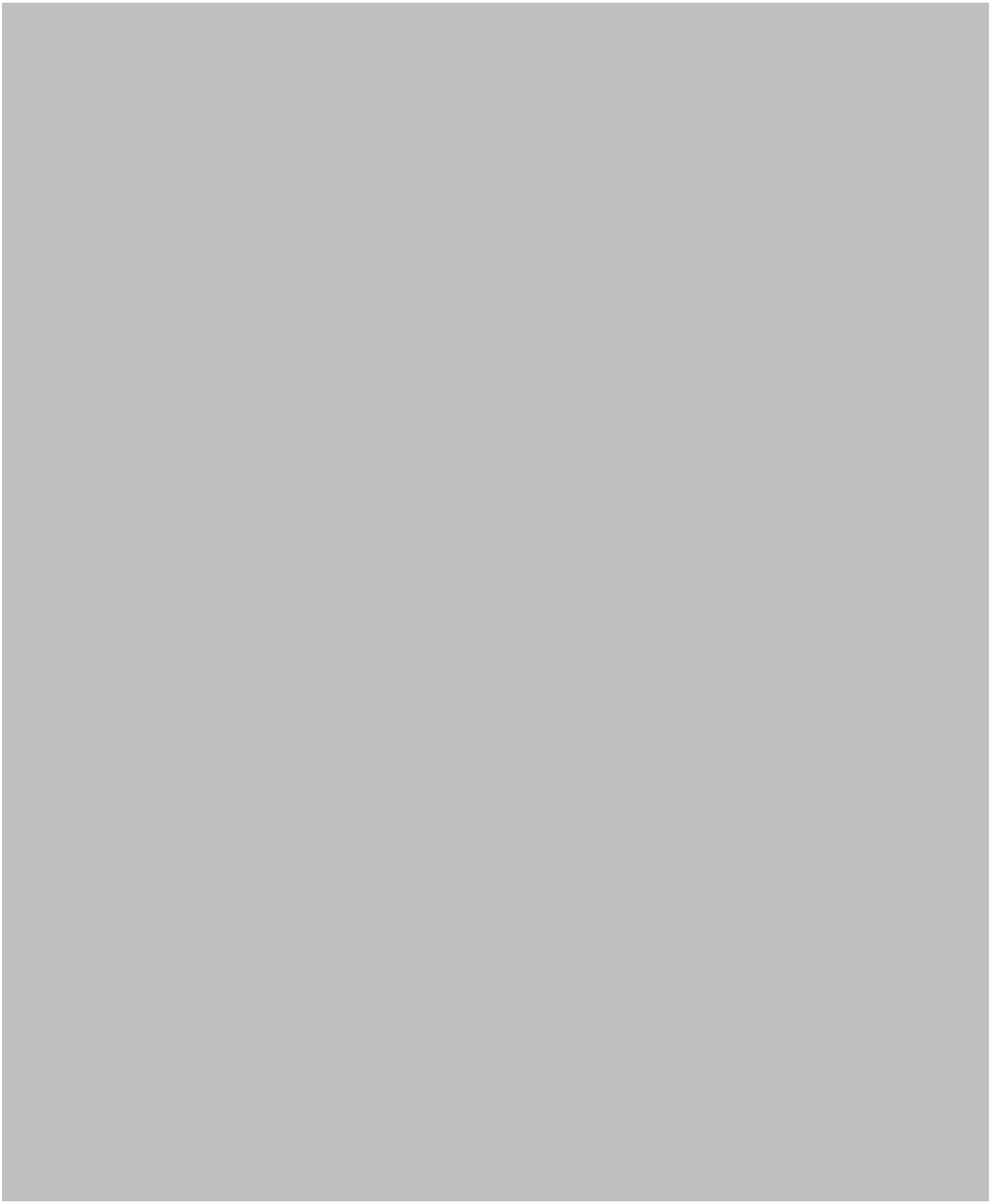

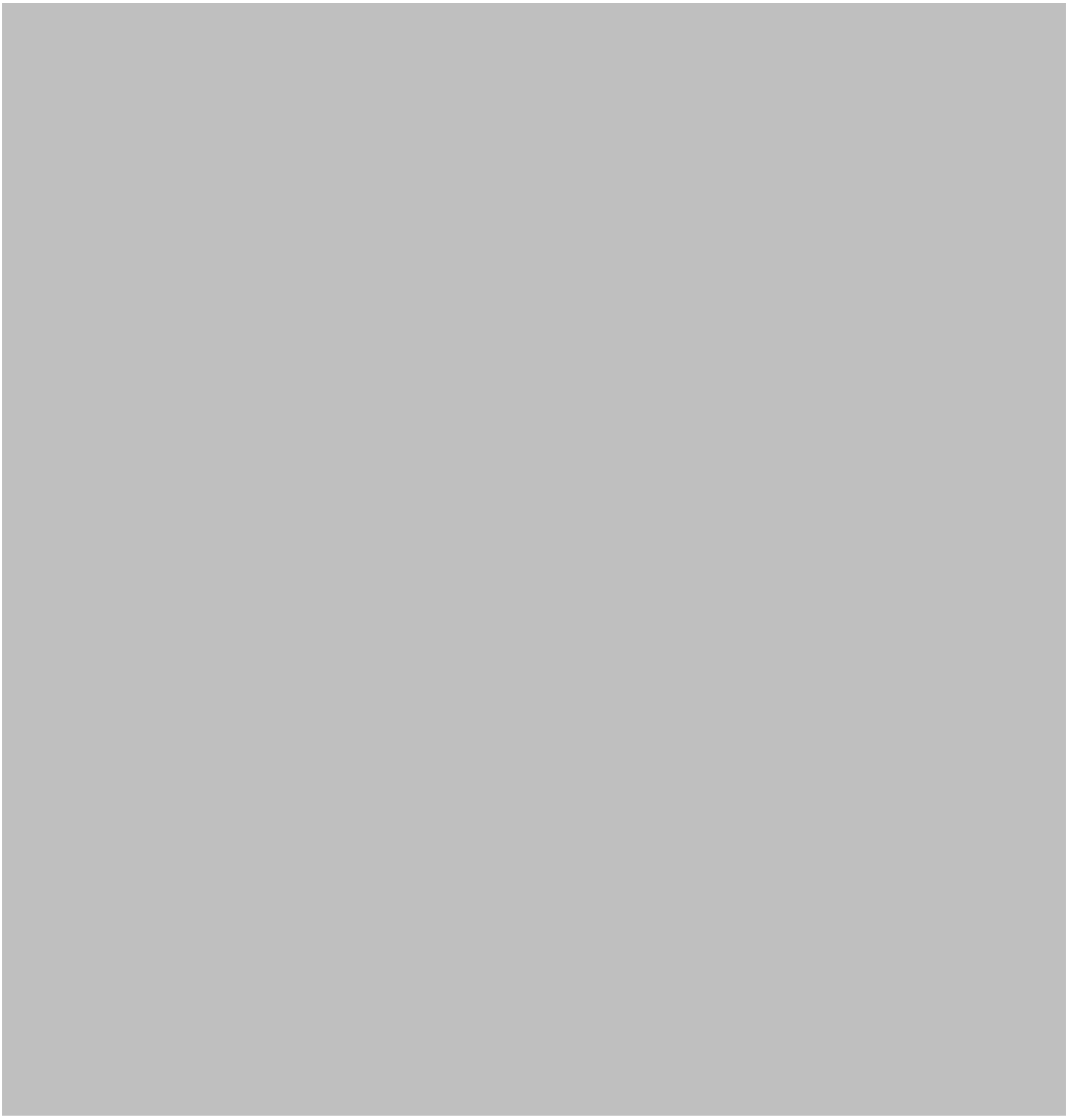

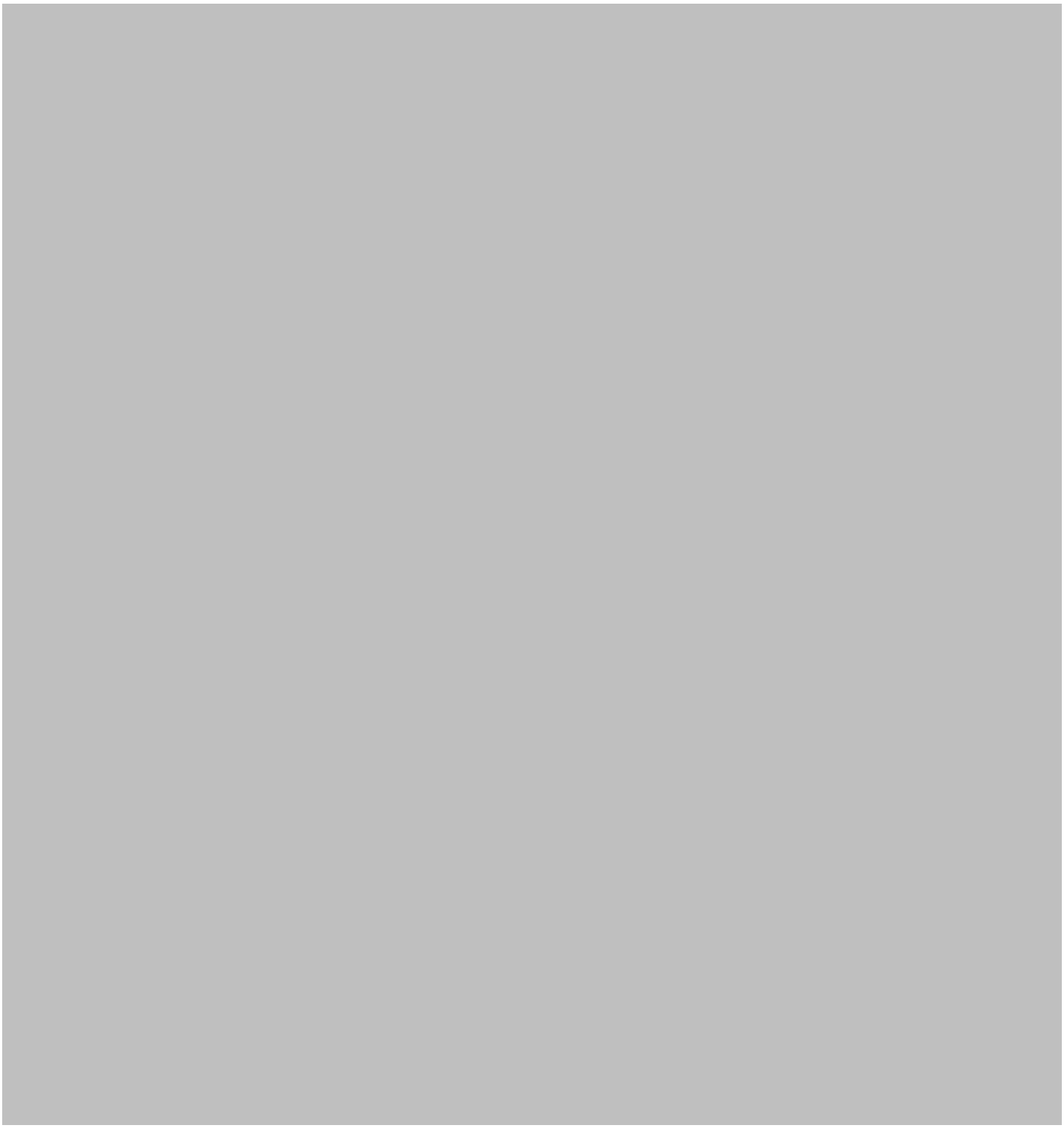

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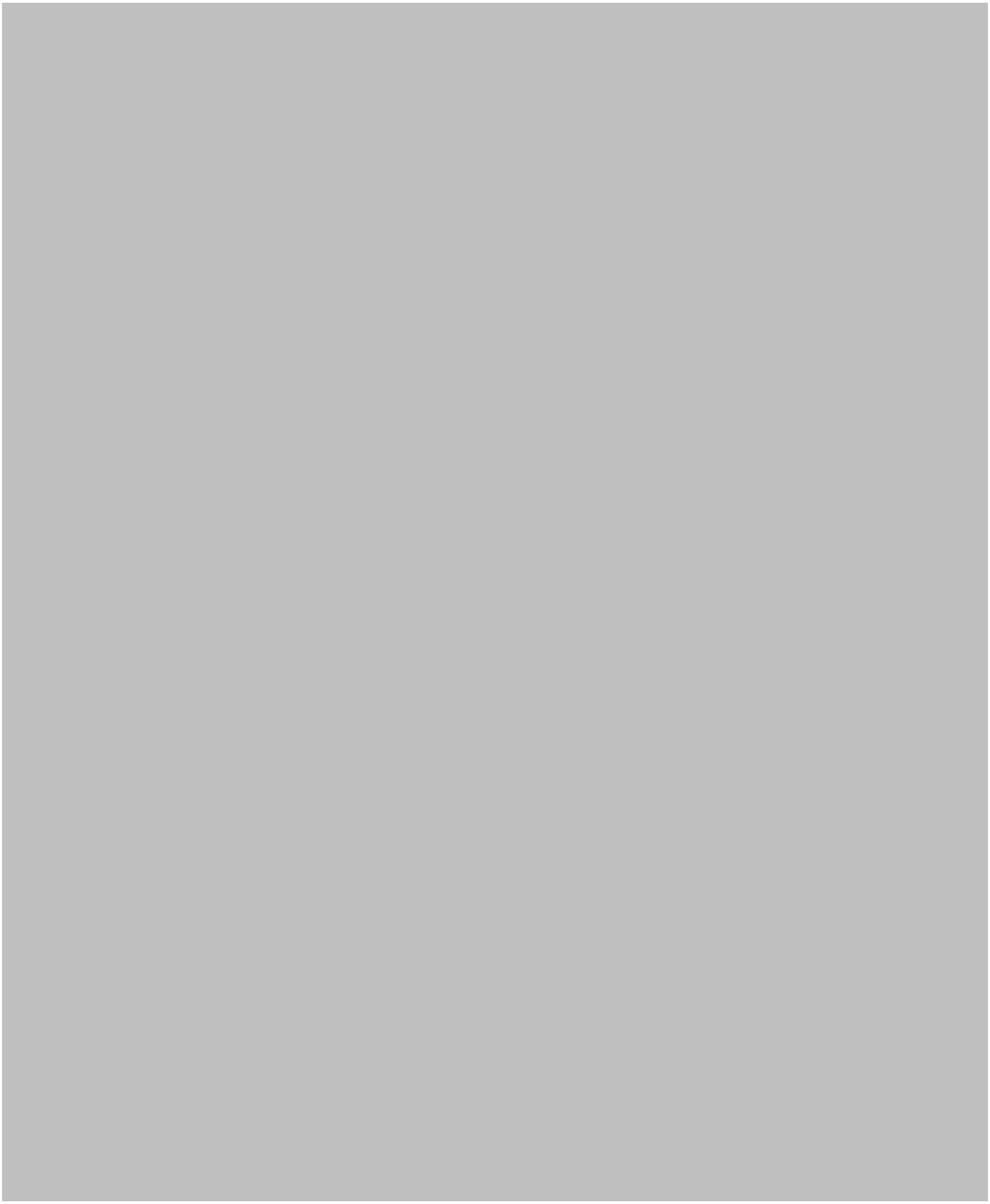

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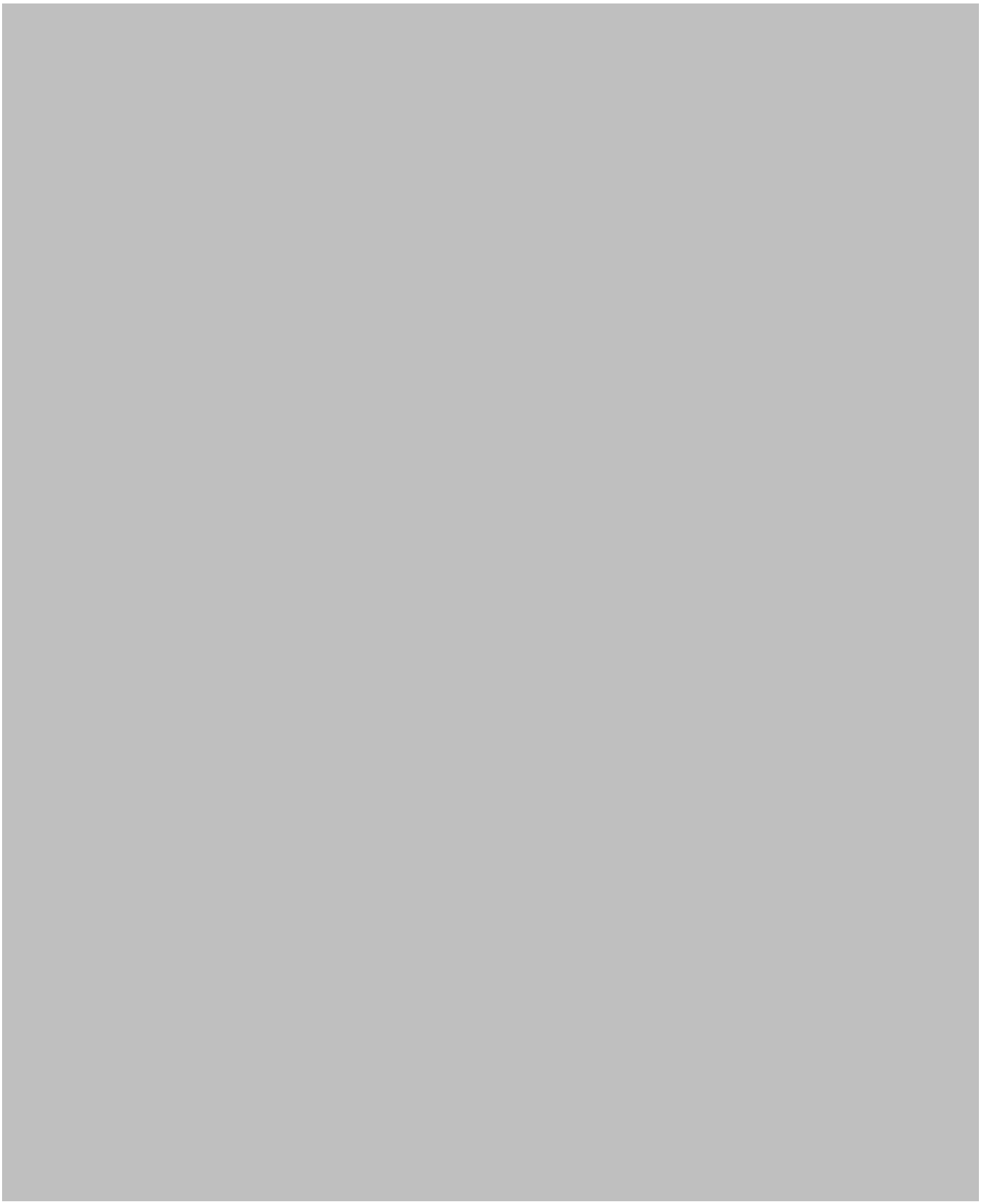

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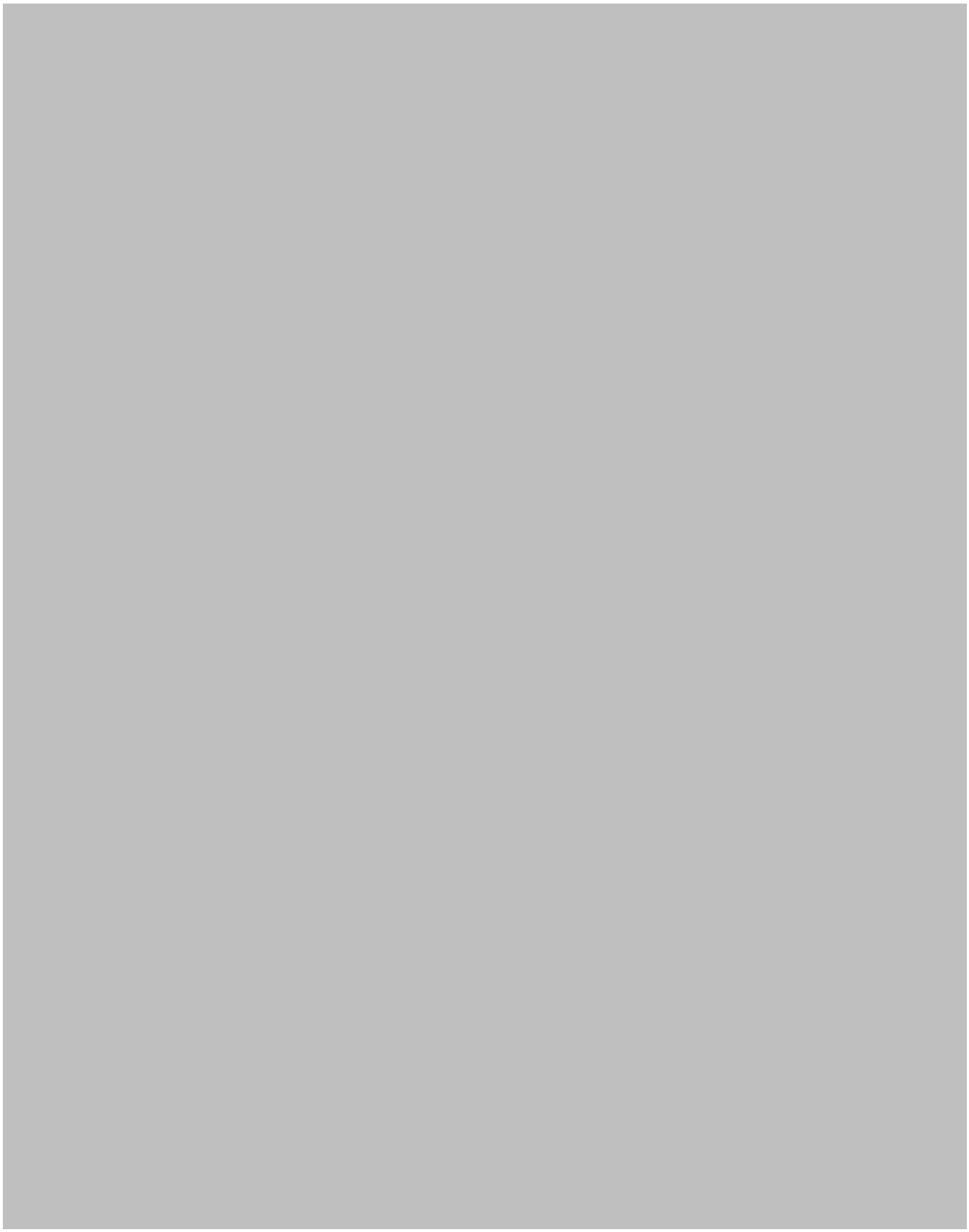

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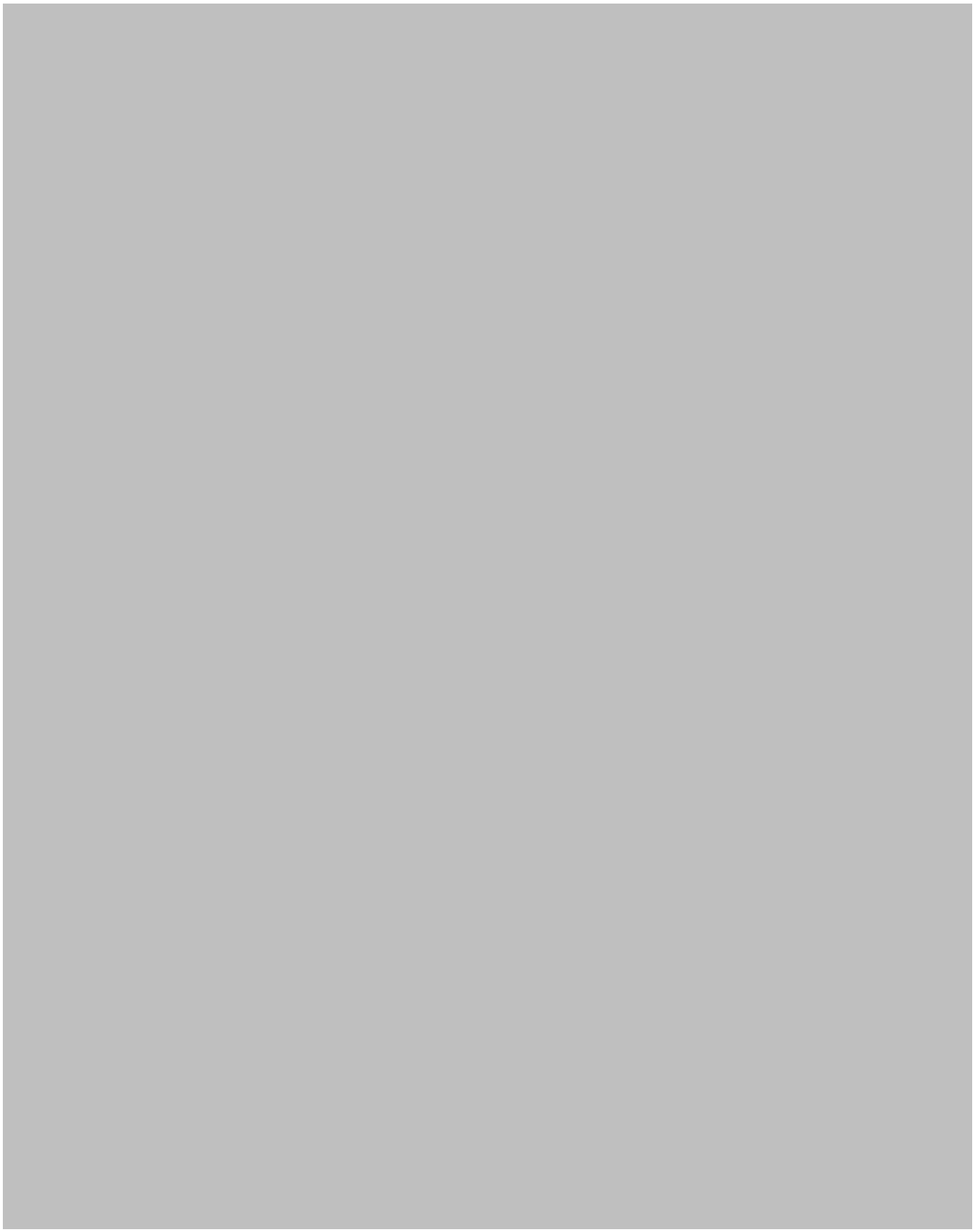

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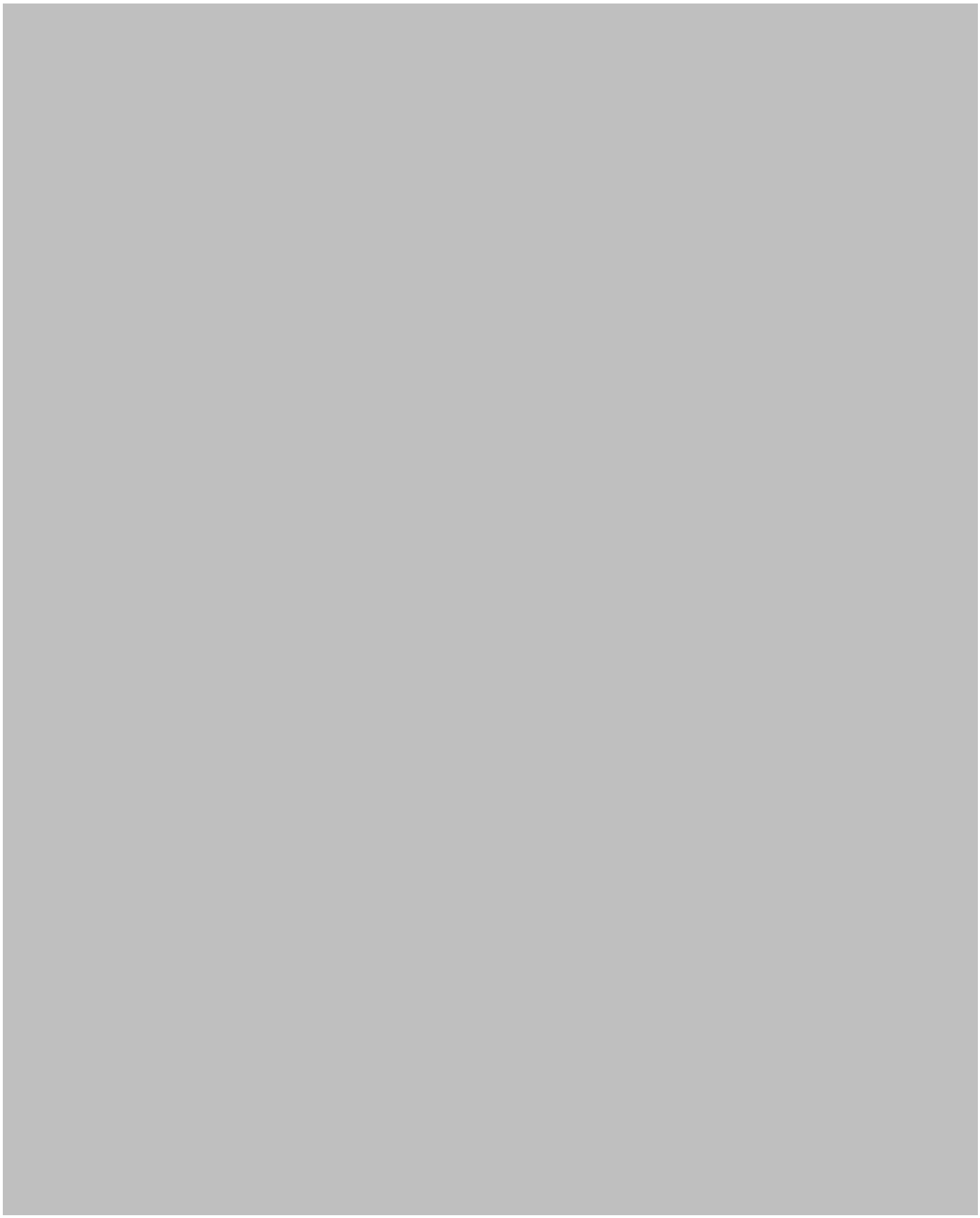

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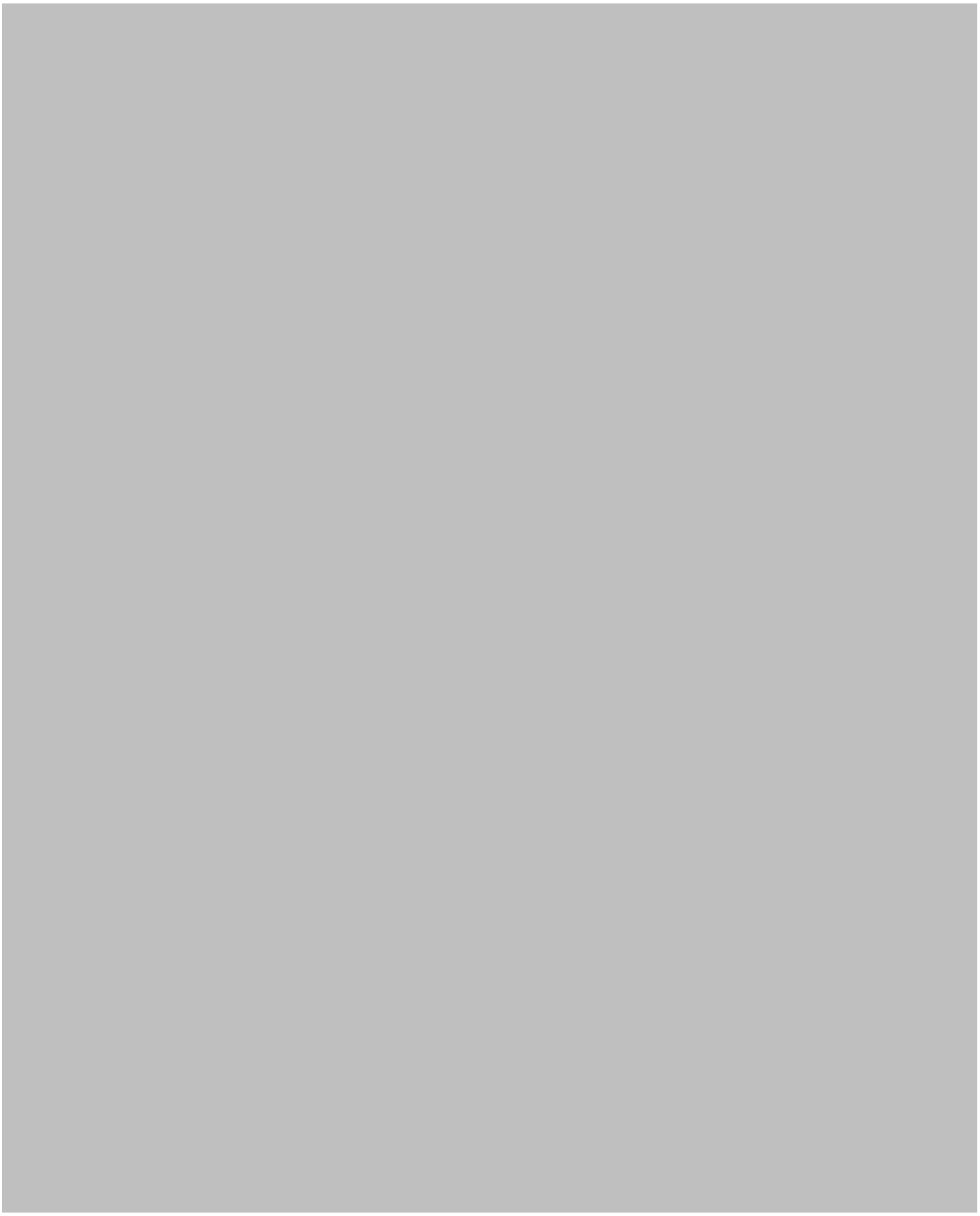

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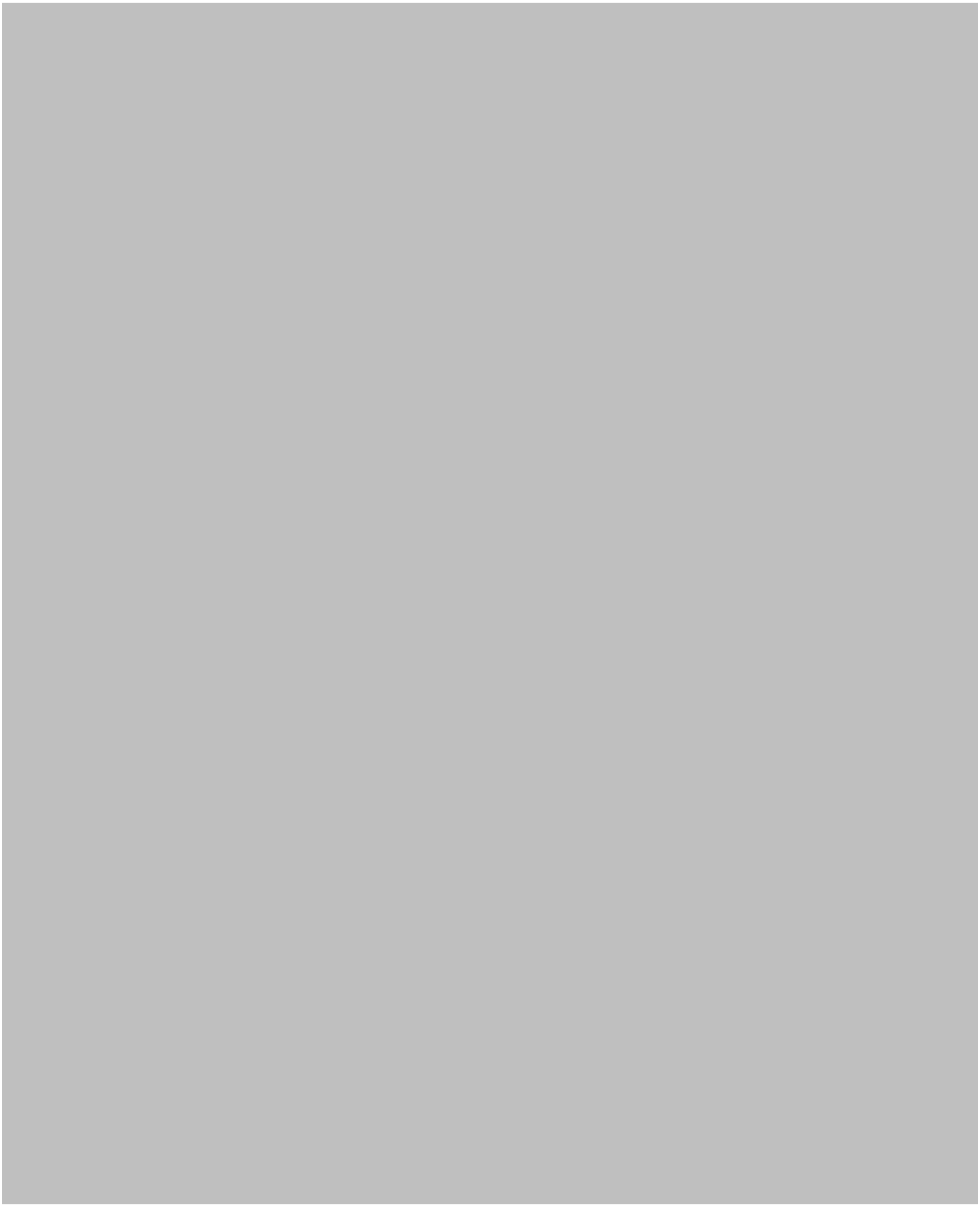

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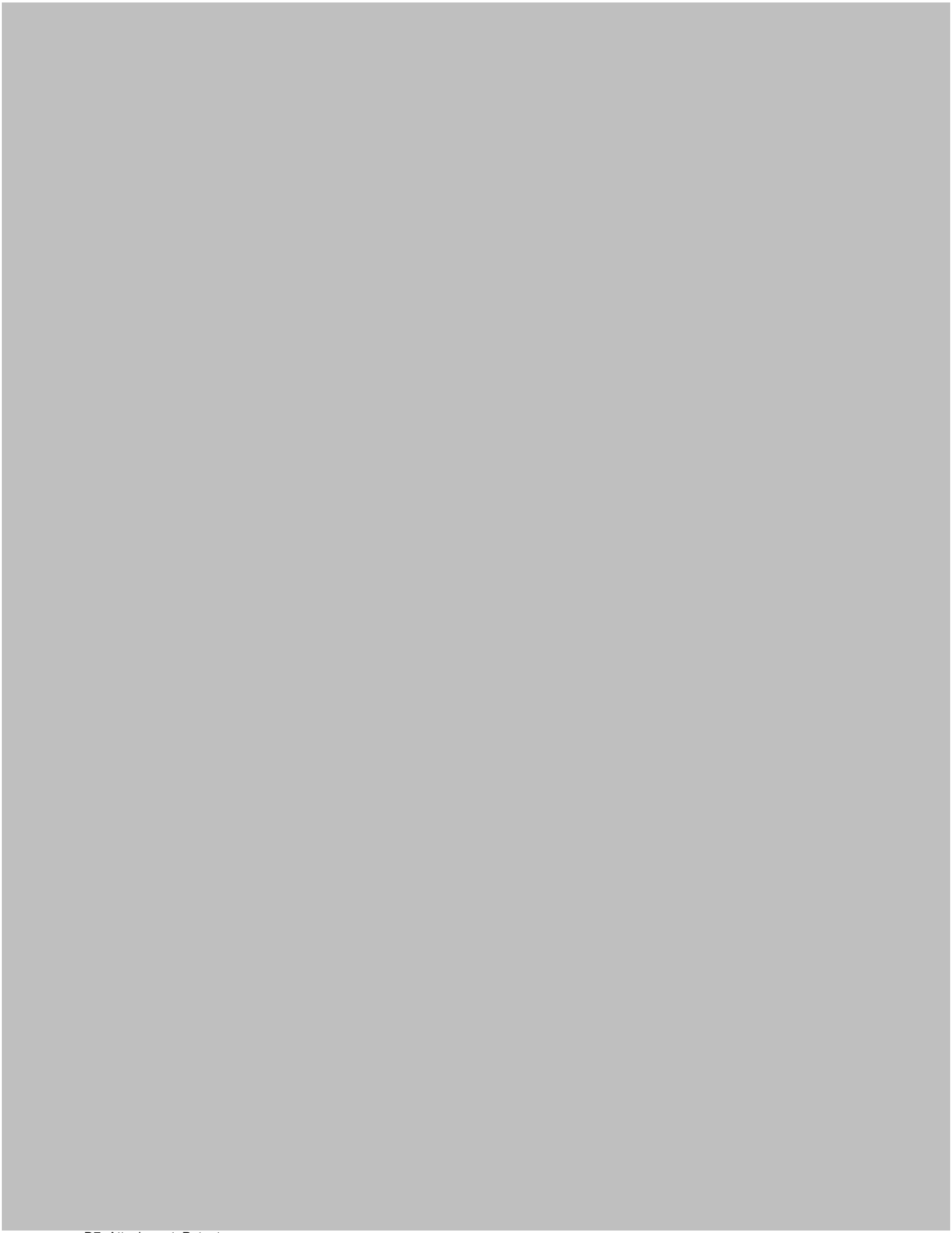

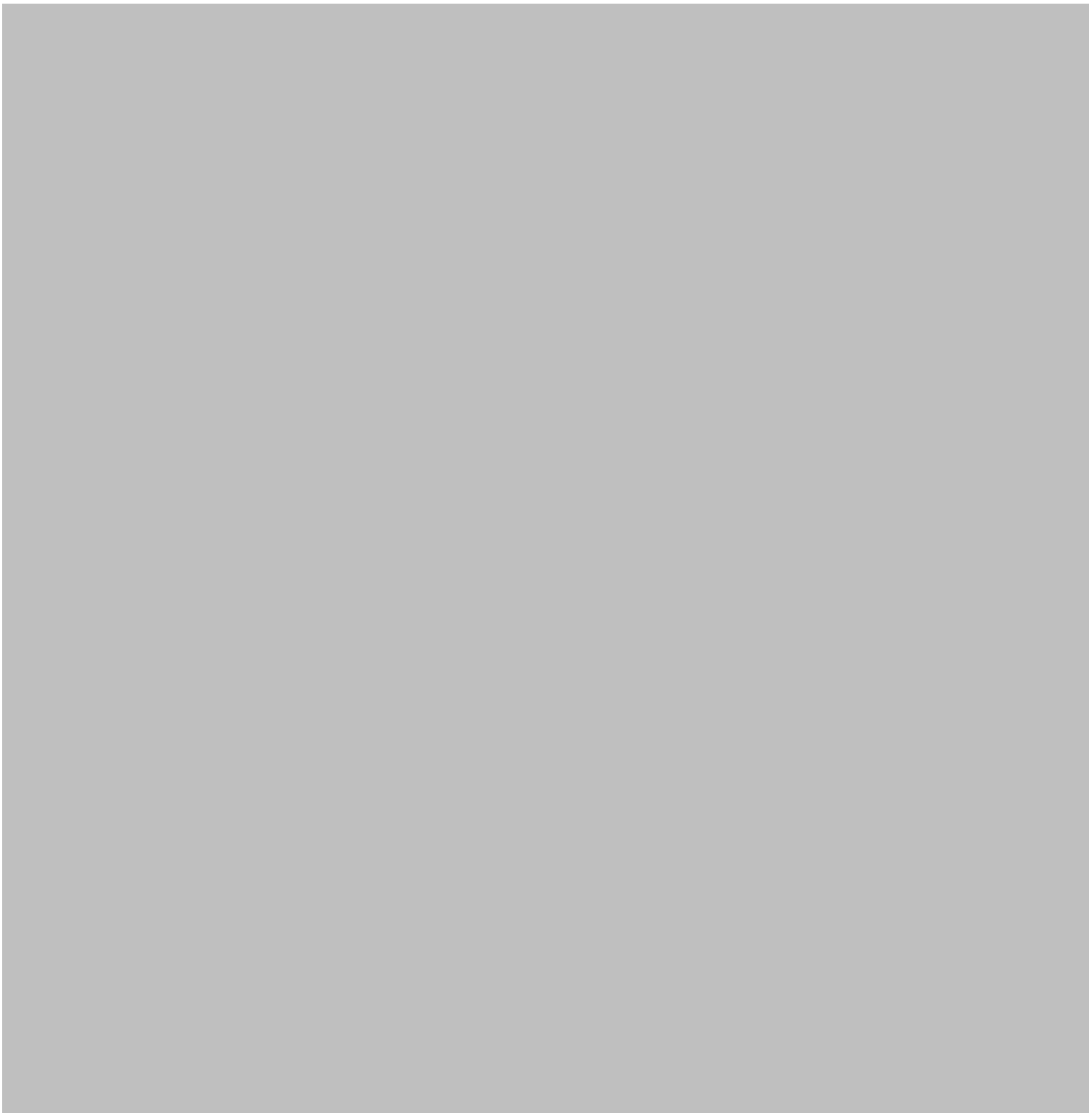

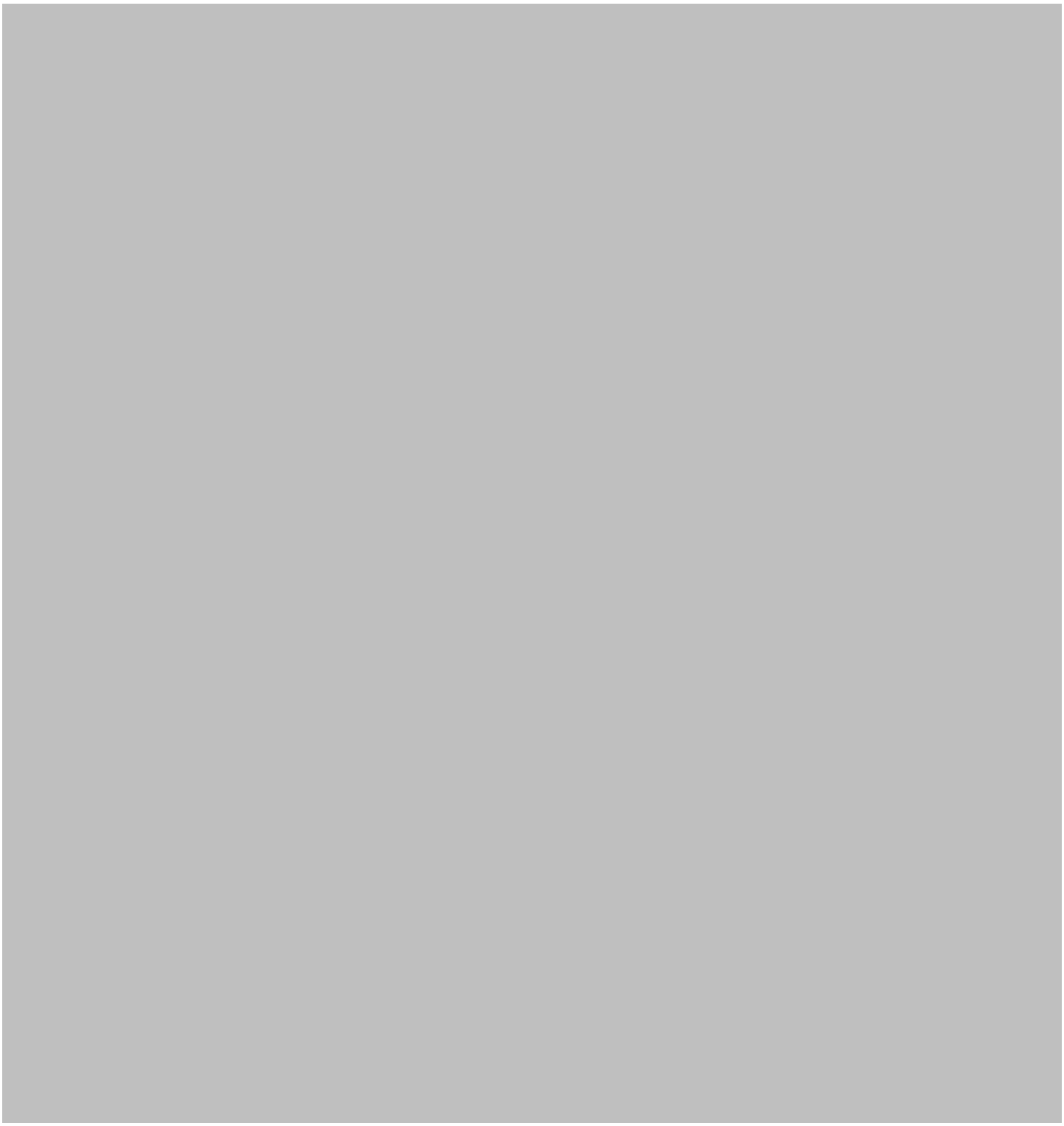

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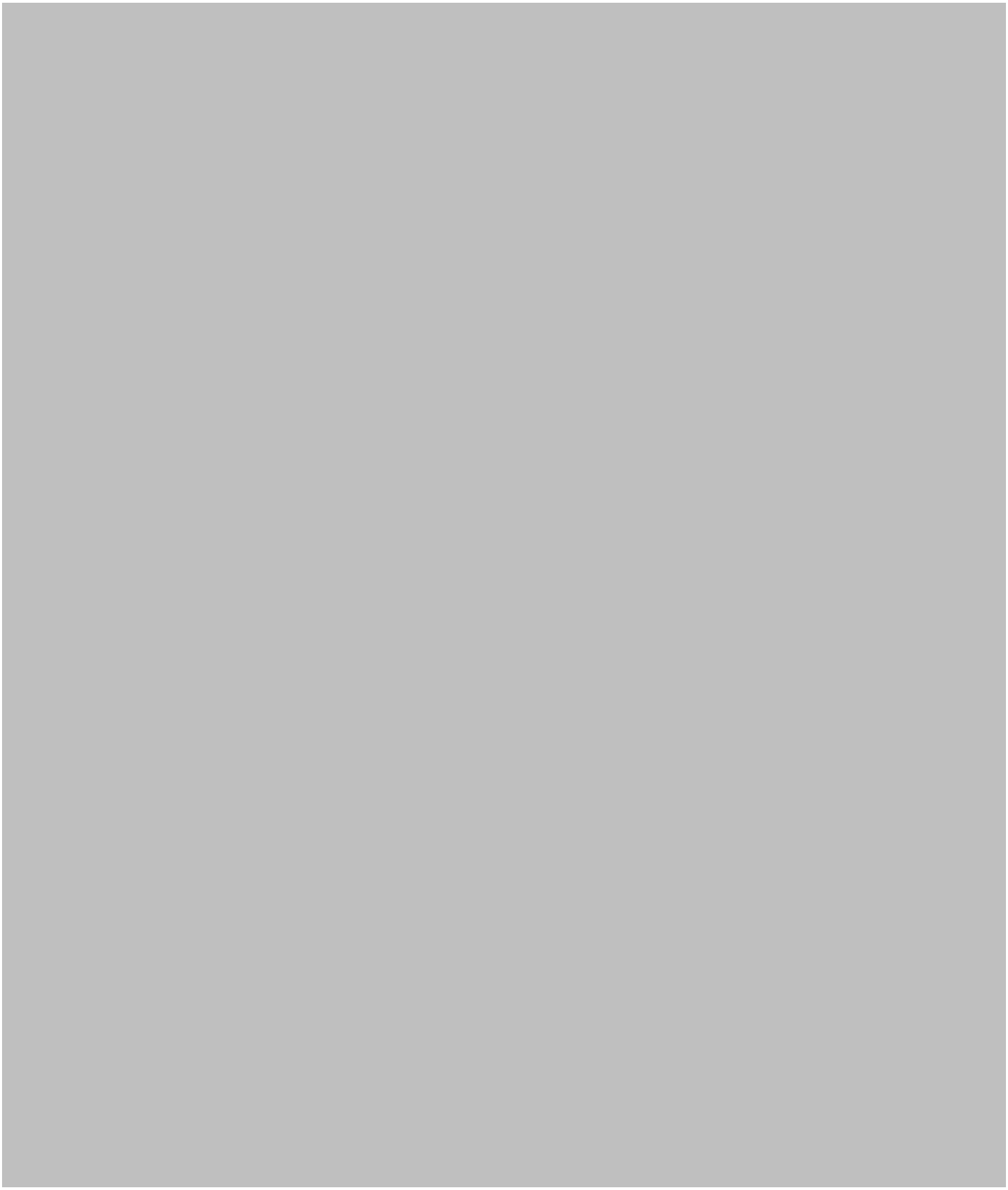

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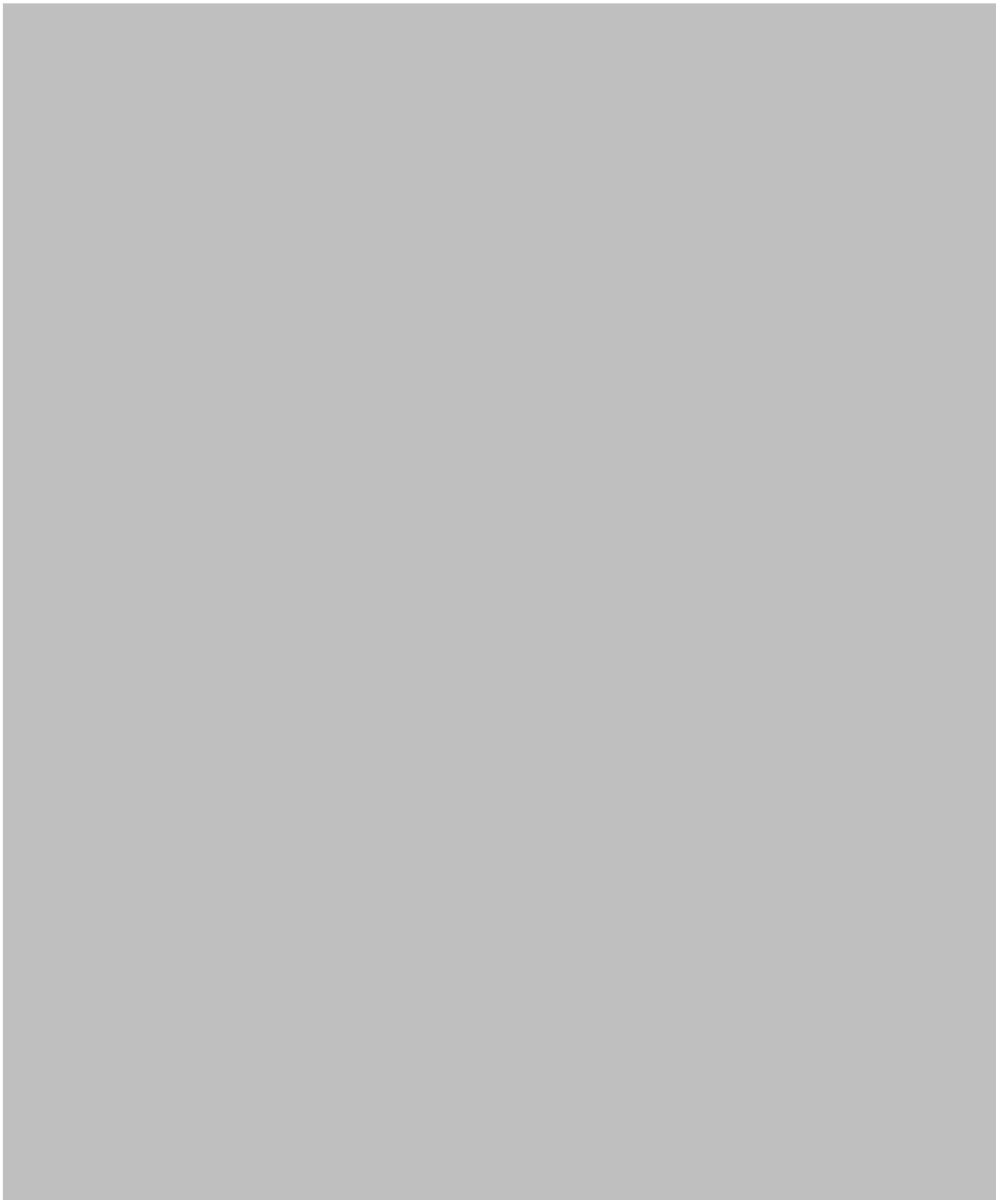

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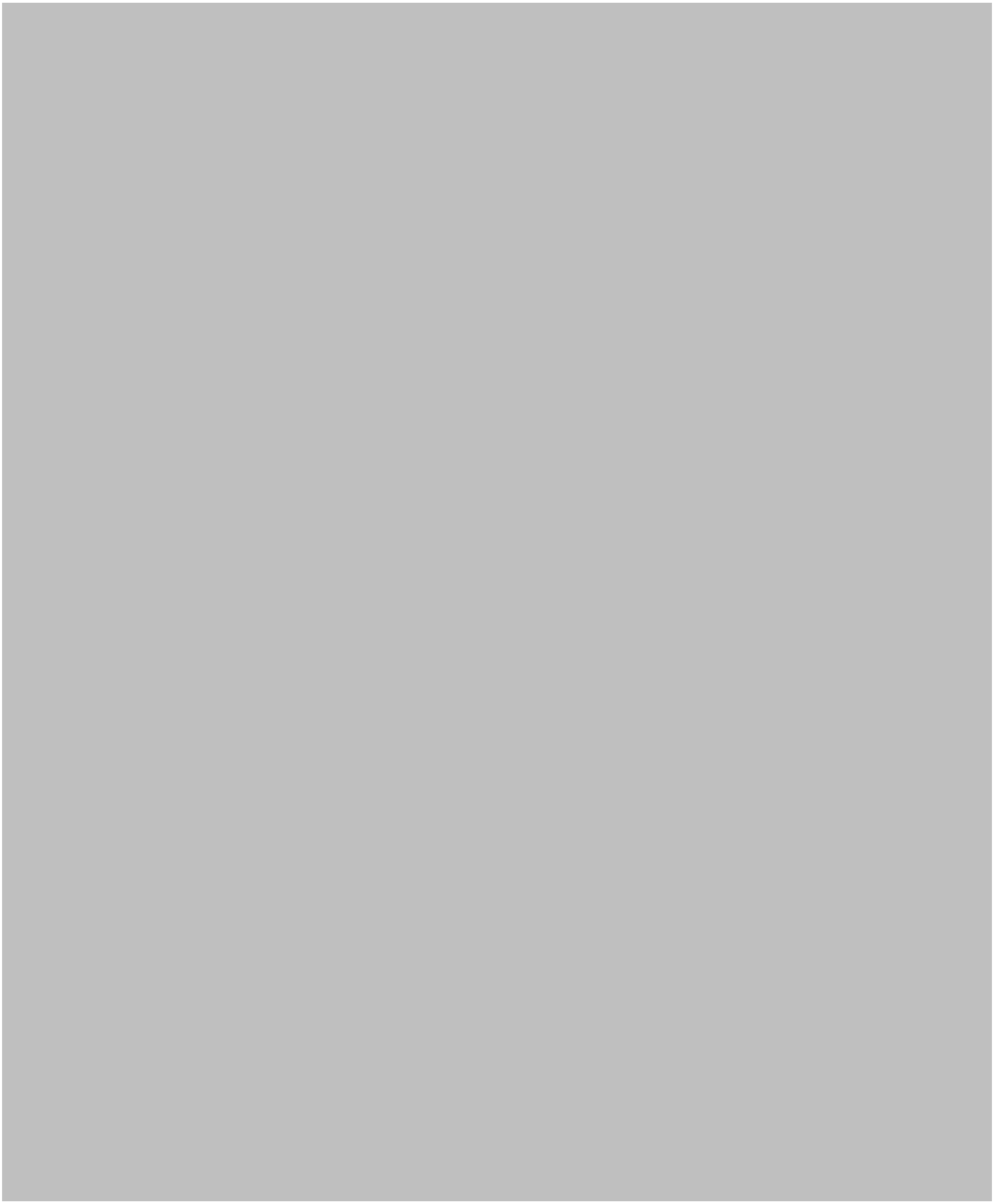

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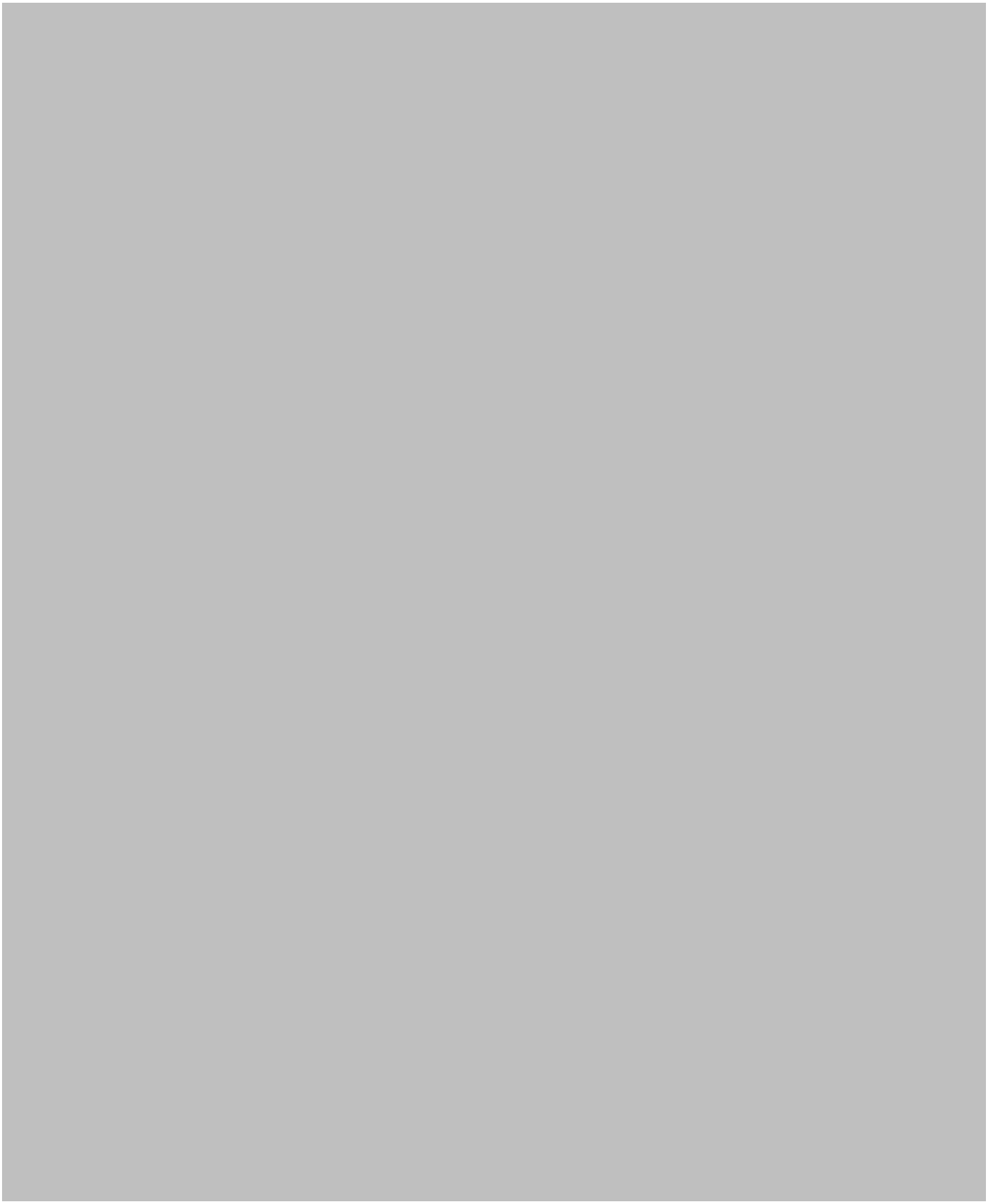

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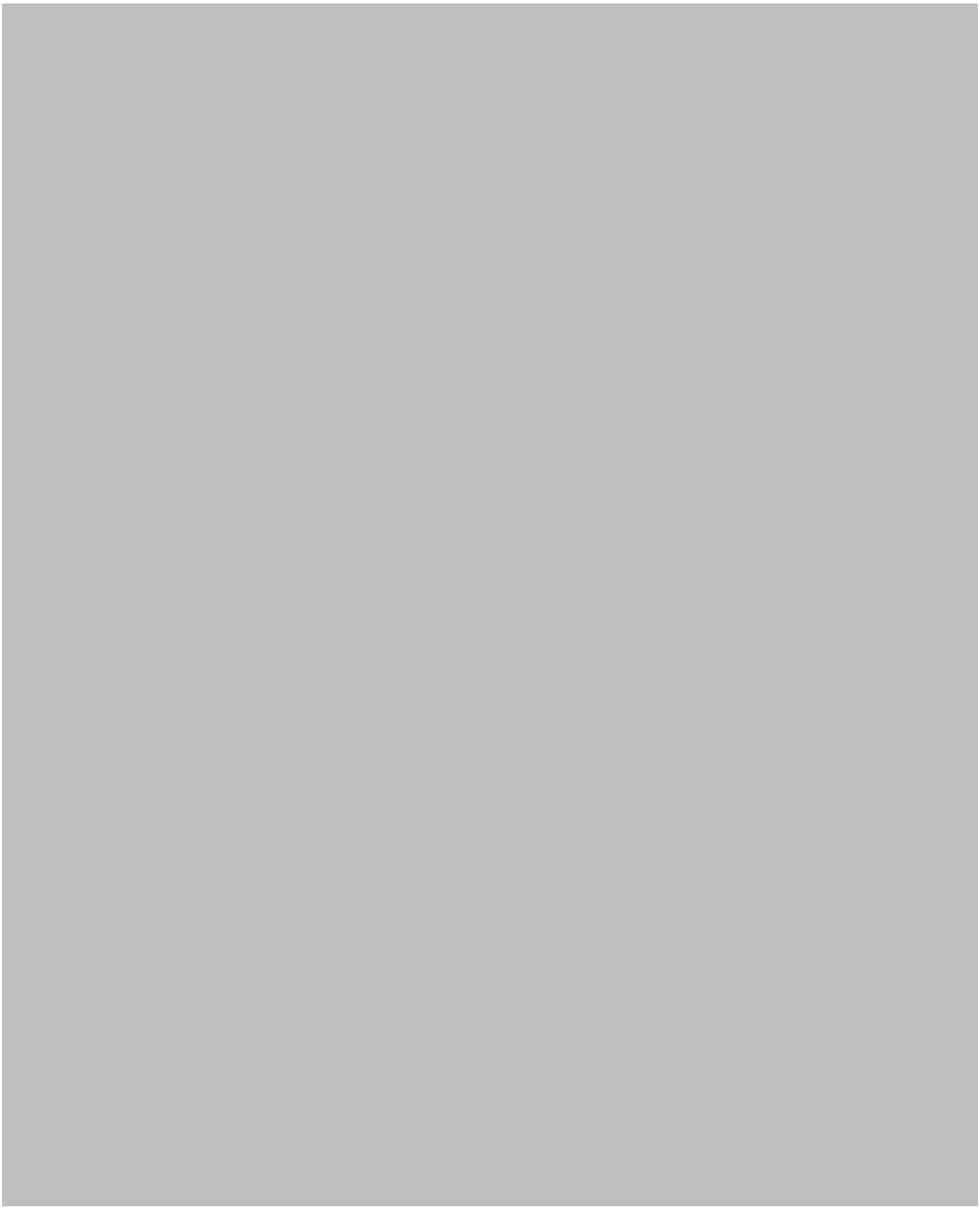

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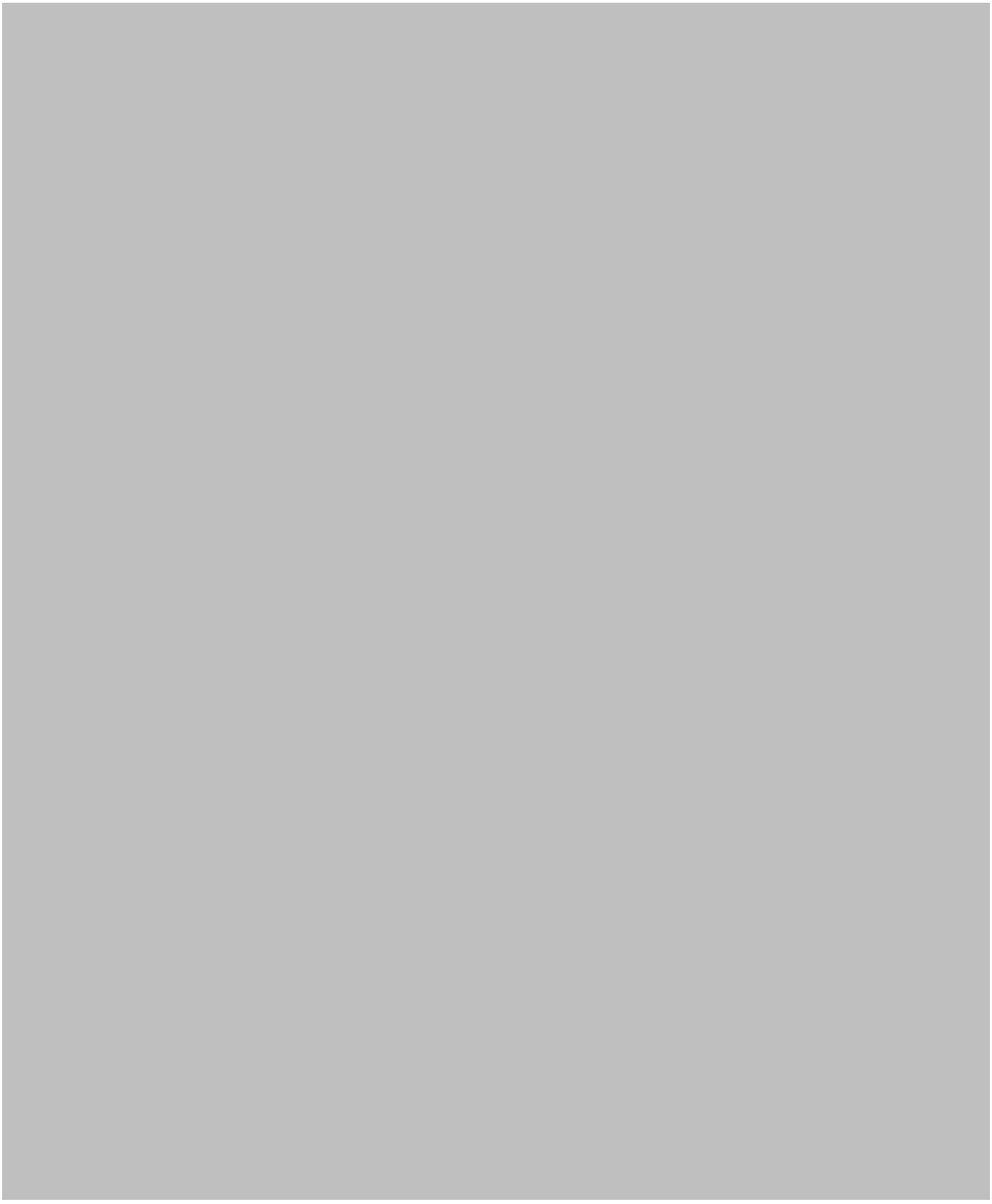

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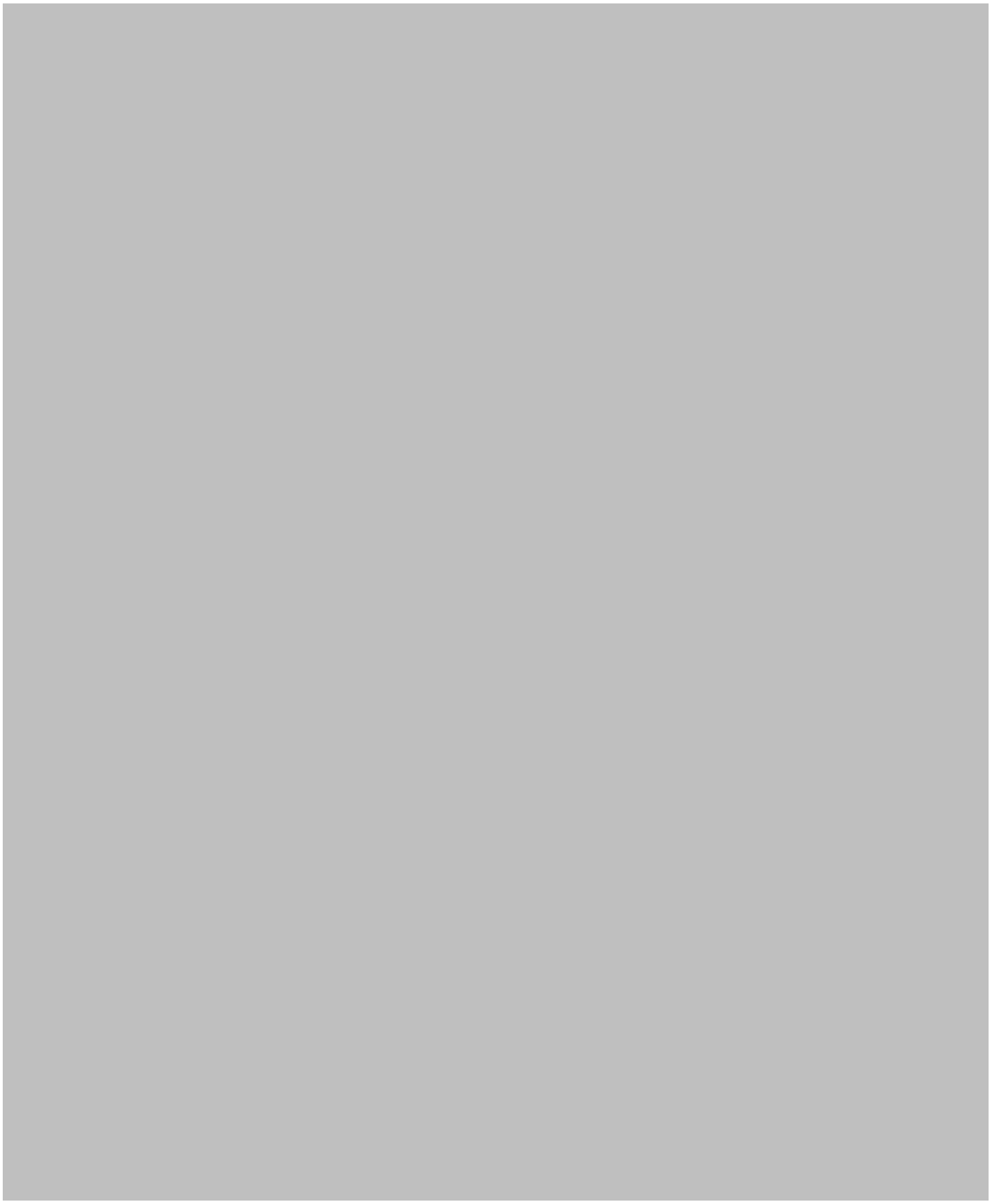

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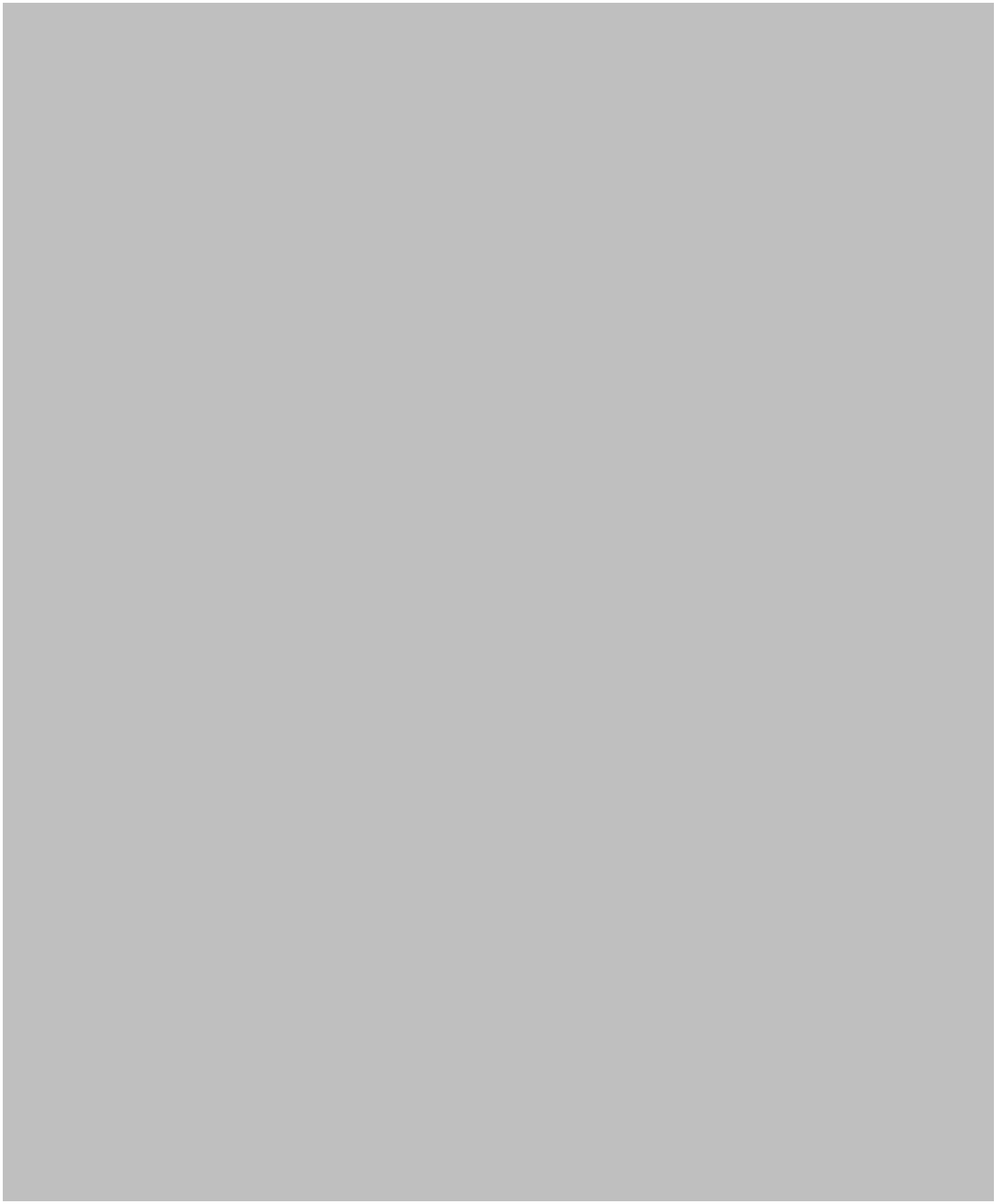

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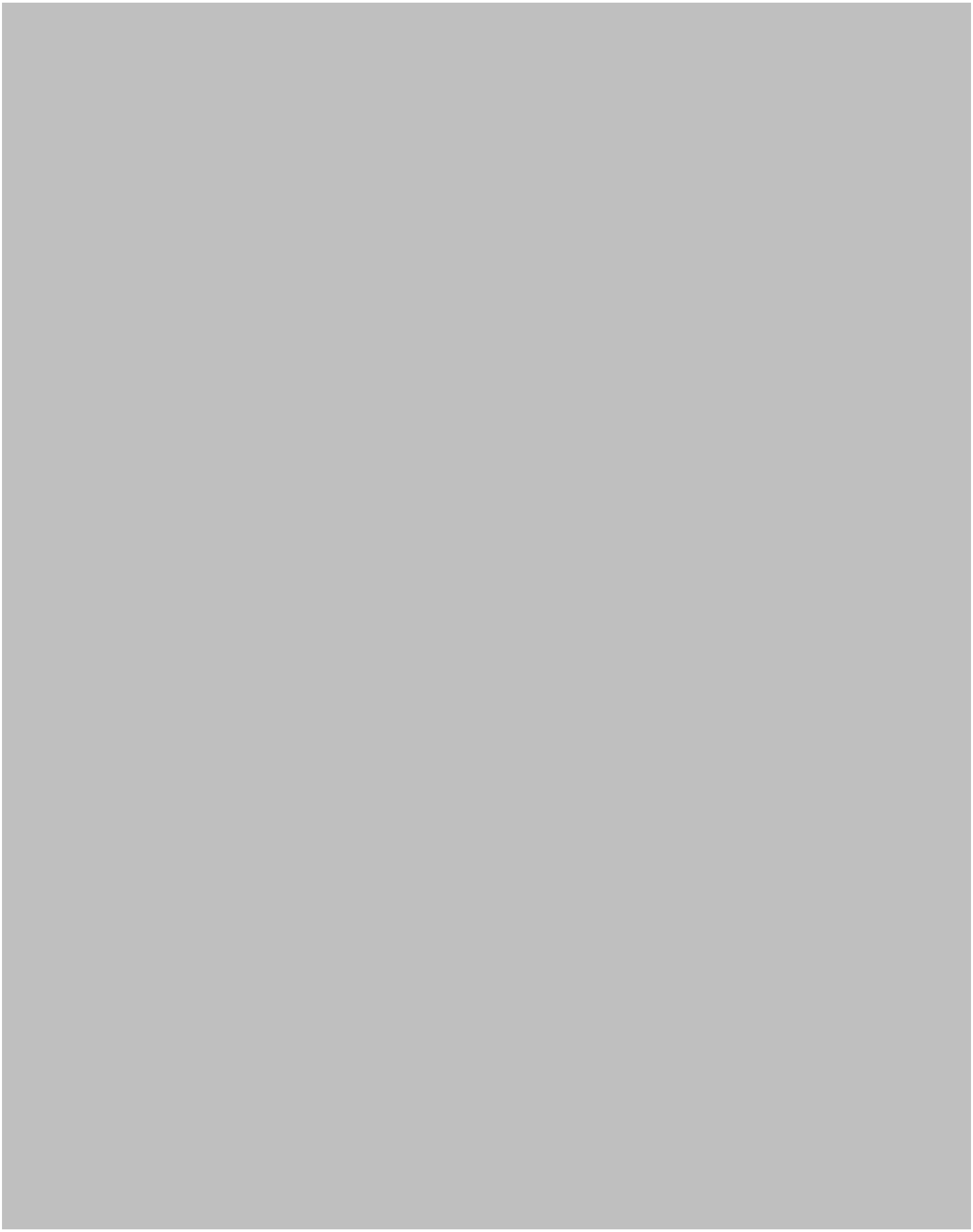

8. A list of owners, their ownership percentage and financial investment for all investors.

Table 20

Investor Name	Ownership Percentage (Once Fully Vested)	Investment
Aaron Peterson	1.792828685	
Amelia Burgess	1.328021248	
Ann Gaertner	1.328021248	
Basir Tareen	3.984063745	
Benjamin Kiehne	1.992031873	
Charles Crutchfield	1.328021248	
Charles Todd	1.328021248	
Charles Aug	1.328021248	
Chuck Ledermann	5.312084993	
David Kingsley	1.859229748	
Debra Dowe Skaalen	1.328021248	
Greg Berkhof	2.656042497	
James Hussey	1.328021248	
Jeffrey Soma	1.328021248	
James Vagts	1.328021248	
Kyle Kingsley	24.30278884	
Laura Bultman	1.859229748	
Luke Lathrop	0.664010624	
Michele Gatzke	1.328021248	
Mitchell Michaelson	1.792828685	
Nancy Overby	1.328021248	
Jon Thompson	6.905710491	
Nathan Haines	3.320053121	
Paul Schaffer	1.328021248	
Robert Shimpa	2.456839309	
Ross Hussey	7.038512616	
Ross Kiehne	1.328021248	
Susan Hewittson	1.992031873	
Ron Owens	1.460823373	
Brian Harvey	2.656042497	
Joe Schaffer	2.656042497	
Jared Penman	1.062416999	
Greg Goldston	1.062416999	
Brooke Gehring	1.593625498	
Dan Totushek	0.531208499	-
Jerry Quall	0.531208499	

Makea Duffy	0.531208499
Josh O'Neill	1.062416999
Susan Viergever	1.66002656
TOTAL	**100**

9. Future financial investments and commitments per owner or investor and potential owners or investors. Provide the amount of future financial investment and the time horizon the commitment is valid for. Each commitment should be accompanied by a letter certified by a Certified Public Accountant (CPA) verifying that the commitment by each owner (or potential owner) does not exceed 50% of their personal net worth, if it does please indicate the percentage of their net worth it represents.

Table 20

D9. Future Financial Investments

D9. Future Financial Investments

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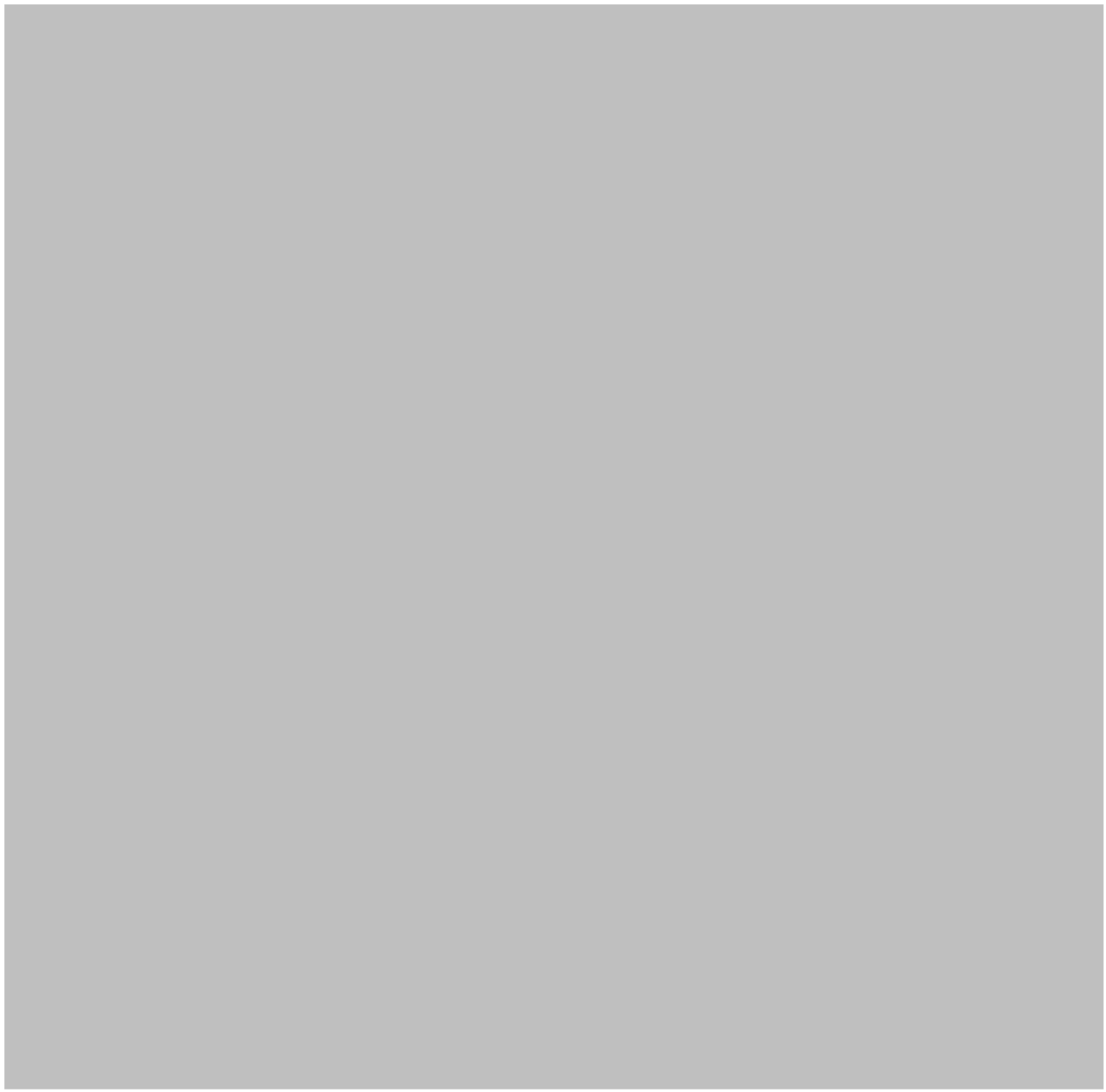


D9. Future Financial Investments

D9. Future Financial Investments

E. BONUS POINTS

Total Possible Points = 100, 10 points available for each category

Applicants may provide information related to any or all of the categories below with their application. Should the applicant be awarded a registration from the Department, their commitments in a bonus category shall become a condition of their registration. If a violation of a condition occurs, it may be deemed a material breach and the Department may assess a penalty or seek suspension or revocation of the registration.

1. **Patient Services Plan (no longer than three pages):**

Minnesota Medical Solutions will provide thoughtful, convenient and cost-effective patient support services. Our patient experience will advance the current industry standard. MinnMed will focus on the development of disease and patient-specific treatment plans that will be fine-tuned as we collect additional data from patients and medical research. MinnMed will leverage patient feedback and the Patient Advisory Board to help explore new opportunities and treatment augmenters for patients. We are very interested in partnering with the state to help develop convenient and effective patient feedback tools. It is a top priority for MinnMed to work diligently with the state to make the data collection a success, as this information will be used to improve patient care throughout Minnesota.

The MinnMed Patient Feedback Mobile App and In-Dispensary Feedback Kiosks

As a patient-centric organization, Minnesota Medical Solutions recognizes the importance and benefits of working closely with patients to manage the efficacy and quality of medicine and to enhance the patient experience. MinnMed understands the need to provide patients and caregivers with an easy means to provide feedback. MinnMed is developing a secure patient feedback mobile application as well as feedback kiosks that will be present in our dispensaries. Patients will be able to provide feedback about their medication, dosage rates, overall experience, etc. through the mobile app or at the kiosk on site. Patient feedback will provide MinnMed with an understanding of products and services from the patient's perspective. This will allow MinnMed to refine products, services, processes or any other area of opportunity to enhance patient experience and outcomes. MinnMed's "patient navigators" in our distribution facilities will also solicit patient feedback when appropriate, and we may require some feedback during the first few visits or annually.

Minnesota Medical Solutions will implement a robust patient research and feedback solution to manage and enhance patient experience and results. MinnMed has a large, experienced, healthcare-specific IT team. This talented pool of healthcare-specific technology experts will lead to the best solutions for Minnesota's patients, focusing on accessibility, convenience and privacy. MinnMed hopes to transform data collection in the medical cannabis industry and make Minnesota a leader in medical cannabis data collection technology. With the extensive

healthcare background of the MinnMed technology team, we understand that patient privacy is of the utmost importance.

The MinnMed clinical feedback solution will be developed with enterprise class information technology solutions. The research and feedback applications will be easily accessible to our patients and engineered to be flexible, secure and HIPAA compliant.

The MinnMed feedback system will be developed with the following capabilities:

- *Disease-specific feedback questions* (ex: Seizures, Crohn's disease, Cancer, HIV/AIDS, Glaucoma, and Terminal illness). Our feedback questions will consist of disease-specific questions and a more broad set of questions relevant to all patients
- *Patient experience feedback* to improve the patient experience and satisfaction
- *Accessible*: Web browser, tablet and mobile enabled with responsive design to enable patient adoption as well as additional accessibility within our distribution facilities, including paper forms for patients without Internet access
- *Event-driven feedback*: Patient feedback will be targeted and triggered by business and patient interaction events
- *Research enabled*: MinnMed will utilize the response data to perform analyses to improve the medical efficacy and effective methods of distribution of the medical cannabis for different medical conditions.
- *Extensible*: Developed to support future needs and reporting requirements.

Please see the attachment: "Feedback Kiosk Screenshot"

MinnMed has also partnered with SafetyCall International PLLC (SafetyCall) to assist in the implementation of standard of care, post market surveillance services associated with the sale, distribution, and use of medical cannabis produced and distributed by MinnMed. MinnMed also aspires to work with the state and the other medical cannabis producers in the state to develop and staff a 24-hour hotline for patients. We believe it would be helpful to centralize this call service to answer any questions patients may have with a single touch point for all medical cannabis patients in the state; this is likely the most cost-effective and convenient solution for patients.

Please see the attachment: "MinnMed Safety Call Joint Statement"

Minnesota Compassionate Collaborative Care Referral Network

Minnesota Medical Solutions supports a patient's decision to seek a holistic approach to treating the complex and multifaceted symptoms of their underlying conditions. MinnMed will seek to establish a network of complementary care providers that are experts in treating a variety of qualifying conditions.

We will actively seek and recruit providers of services, including but not limited to: acupuncture, therapeutic massage, hypnotherapy, and other potentially helpful treatment methods. Minnesota Medical Solutions will screen prospective members of the Minnesota Collaborative Care Referral Network for recognized expertise in their designated fields. We will also invite members the network to contribute to the development of the patient education materials related to complementary care. These materials will be distributed to our patients as part of a robust patient education package.

We will partner with members of the Minnesota Collaborative Care Referral Network to advocate for patients' rights, foster research that alleviates patient suffering, host fund-raising and community awareness events, and work to eliminate barriers to care in underserved regions of Minnesota.

Minnesota CannaCare

Minnesota Medical Solutions is building a nonprofit organization, Minnesota CannaCare, which will be dedicated to aggressively seeking out public and private funds to reduce patient costs, fund research, and generally improve the lives of medical cannabis patients in Minnesota. MinnMed will donate 3% of its net profits to Minnesota CannaCare on an annual basis. These funds will be used to offset the cost of medications to patients.

The MinnMed House

With adequate funds, Minnesota CannaCare will start the "MinnMed House". This will provide safe and affordable housing to medical refugees from surrounding states and will allow children with severe seizure disorders or other debilitating medical conditions to stay in Minnesota long enough to become residents of Minnesota and qualify for medical cannabis treatment. These patients will then have access to medical cannabis and, if treatment is successful, the family can find more permanent housing within the state.

Epilepsy Patient Questionnaire

1. How many known seizures have you had in the last 24 hours?

2. Please rate your current pain:

No pain									Worst possible pain
○	○	○	○	○	○	○	○	○	○

3. Please rate your current levels of drowsiness or sleepiness during the day:

Alert, no drowsiness									Worst possible drowsiness
○	○	○	○	○	○	○	○	○	○

4. Please rate your level of insomnia:

Perfect sleep									Worst possible sleep
○	○	○	○	○	○	○	○	○	○

5. Have you experienced any hallucinations or other disturbing odd thoughts?

- ○ Yes
- ○ No

If yes, please describe

6. Have you had other side effects you'd like to discuss with us?

- ○ Yes
- ○ No

If yes, please describe

Done

Minnesota Medical Solutions LLC and Safety Call International PLLC Joint Statement

Minnesota Medical Solutions LLC (MinnMed) is currently applying for a medical cannabis production license in the state of Minnesota and is looking to redefine the quality and safety of medical cannabis for patients. To meet their stated goals, MinnMed is excited to announce that it will engage the services of SafetyCall International PLLC (SafetyCall) to assist in the implementation of standard of care, post market surveillance services associated with the sale, distribution and use of cannabis products MinnMed produces.

SafetyCall International, a triple licensed, academically affiliated healthcare firm provides independent third party medical support services for manufacturers of consumer products including products under the regulatory jurisdictions of FDA, EPA, and CPSC as well as other international jurisdictions. SafetyCall's healthcare providers respond to any reports of adverse effects associated with the use of a manufacturer's product and provides medical advice, triage and information to consumers and health care providers. Included in SafetyCall services is a comprehensive post market surveillance component intended to identify, manage, document and analyze adverse events and patterns of reporting for the purpose of monitoring and insuring the safe and effective use of a manufacturers products. SafetyCall is considered the national leader in helping manufacturers with specialized post market surveillance service needs that meet both their regulatory and non-regulatory product stewardship responsibilities.

It is the intentions of both parties to collaborate in the development and implementation of a specialized post market surveillance system to support the safe and effective use of medical cannabis. We believe the PMS systems that will be established for MinnMed cannabis products will serve as a national model for corporate responsibility in this sector.

SafetyCall International brings an unprecedented level of expertise to adverse event monitoring. MinnMed intends to use Safety Call International's 24-hour phone hotlines to provide consumer friendly and readily available assistance.

Adverse event monitoring is a fundamental service that should be provided by any medication provider. MinnMed holds that medical cannabis is no different and should be held to the same standard. MinnMed and SafetyCall International will work together to provide a safer experience for cannabis patients.

Kyle Kingsley
CEO, Minnesota Medical Solutions LLC

Rick Kingston PharmD
President, Regulatory and Scientific Affairs
Safety Call International PLLC

2. Employee Working Standards: Describe any plans you have to provide a quality working environment for your employees, including, but not limited to, environmental standards, codes of conduct, healthcare benefits, educational benefits, retirement benefits, and wage standards.

MinnMed will become the standard for employee working conditions and employee satisfaction in the medical cannabis industry. The MinnMed employee plan provides living wages, healthcare coverage, and retirement and education benefits for our employees. We have signed a collective bargaining agreement (CBA) with United Food and Commercial Workers International Union (UFCW) to ensure the quality of employment for our employees. This CBA is attached and details the tremendous opportunity MinnMed will provide for future medical cannabis employees in our state. We believe that secure, well-paid jobs where employees are treated well lead to a stable company and a consistent, uninterrupted supply of medicine to patients. We believe that satisfied employees will become stewards of MinnMed, the community at large, and our patients.

The MinnMed/UFCW Collective Bargaining Agreement Contains: 1) Competitive living wages, 2) Healthcare Coverage, 3) Education Benefits for employees and families and 4) Retirement Benefits.

We believe the medical cannabis industry often undervalues and under-compensates employees. This will not be the case with MinnMed. We support the UFCW's efforts to expand cannabis workers' standard of living and benefits and believe that employees who are treated well and in a positive environment will provide a superior level of care to our patients. We will train our employees to be well-versed in the medical marijuana laws, medicines, and patient practices and to be highly specialized, efficient workers. Employees will receive a reimbursement and benefit package that is representative of the value we place on them as part of our success. MinnMed will offer highly competitive compensation and benefits packages with the intent to retain workers for a lifetime and to ensure a superior quality of life. MinnMed will strongly advocate that the other producer in Minnesota provide the same benefits and living wages by signing a similar collective bargaining agreement with the UFCW. Please see the attached "union neutrality and card check agreement."

All MinnMed facilities will be exceptionally sanitary, clean, top level facilities that exceed the sanitation requirements required by Minnesota law. MinnMed will also contribute to the

community by employing environmentally friendly practices, including energy efficiency mechanisms. MinnMed has paid extra attention to employee needs in our newly constructed manufacturing facility, which will offer a comfortable, employee-friendly environment and ensure employee safety**.** The facility will include break areas (inside and eventually outdoor) and showers. Our distribution facilities will also have break areas equipped with lockers and other amenities. Being a medicine-focused company, MinnMed takes ergonomics very seriously. Quality of the work environment is a vital component integrated into our novel facility design.

Minnesota Medical Solutions Codes of Conduct

Given the nature and circumstance of being one of the first of two medical cannabis manufacturers in Minnesota, Minnesota Medical Solutions will hold all of its directors, officers and employees to the highest standards of conduct and integrity so that the company's culture coincides with the tremendous responsibility and unique opportunity it has been granted. MinnMed will do so through the adoption of a detailed and sophisticated Code of Conduct. At the core of its Code of Conduct, MinnMed and UFCW will underscore the importance of adhering to professional, legal, ethical and safe business standards. Those standards include:

- Responsible customer service and access in a clean and secure environment that assures customer and worker safety.
- Safe and secure storage and other practices that anticipate and respect community and neighborhood concerns and promote safety.
- Responsible dispensing to patients and their caregivers in a manner compliant with Minnesota law.
- A demonstrated commitment to prevent and discourage diversion.
- A commitment to the development of continuing education and eventual certification of industry and workplace standards.

Minnesota Medical Solutions will require all employees to behave in an ethical and law-abiding manner at all times. Employees represent the company and the marijuana industry, and their conduct will have a direct effect on MinnMed's reputation and the reputation of the marijuana industry in Minnesota. All directors, officers, and employees must conduct business in accordance with the letter, spirit, and intent of the law, both in general and as it relates to medical

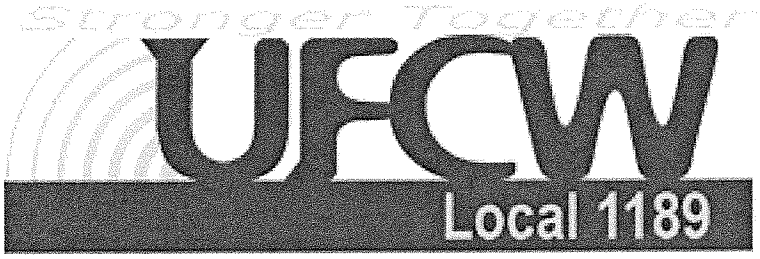
cannabis in the State of Minnesota. MinnMed staff who do not comply with the high standards of conduct will face disciplinary and corrective action, potentially including termination of employment, suspension, or demotion. Please see the attached Employee Handbook and Code of Conduct for more information and details.

MinnMed will employ an in-house compliance officer to help oversee the implementation of its high standards of conduct and to conduct continuing employee education. MinnMed will maintain an open-door feedback policy to raise and address any concerns or suggestions on how to improve operations.

Part of MinnMed's code of conduct will be the implementation and enforcement of a zero-tolerance anti-discrimination policy. Employment opportunities will be based upon one's qualifications and capabilities to perform the essential functions of a particular job and be free from discrimination due to race, religion, sex, national origin, age, veteran status, disability, genetic information, or any other characteristic protected by law. MinnMed strongly urges the reporting of all instances of discrimination and will prohibit retaliation against any individual who reports discrimination or participates in an investigation of such report.

Employee Education

MinnMed will provide its employees with the best training in the industry and will ensure that educational training is ongoing as the medical cannabis laws evolve. Initial training will be led by American Cannabis Company in conjunction with Clover Leaf University. MinnMed has signed an exclusive training contract with Chloe Villano and Clover Leaf University to provide our employees the best possible training in the industry from the start. Dr. Kingsley also has extensive experience in the development of employee training systems, which will serve as the basis for MinnMed's implementation of a comprehensive training system for all employees. This will allow our team to show up well-prepared for their first shift, ensuring medicine is distributed to patients smoothly and effectively from day one. MinnMed recognizes that training is particularly important in the distribution facility clinical roles. This training will include "virtual shifts" that guide our trainees through multiple patient encounters and our treatment algorithms. Dr. Kingsley has worked on development of similar virtual shifts through his medical scribe training company. MinnMed aims to develop a robust medical cannabis-specific clinical training programs for distribution facility staff including our pharmacists.



Medical Cannabis Division

Minnesota Medical Solutions

Effective
12/02/2014 – 12/31/2016

United Food and Commercial Workers Union
Local 1189

266 Hardman Avenue North
South St. Paul, MN 55075
Phone: 651-451-6240
Fax: 651-451-8227
Website: www.ufcw1189.org

Proposed Agreement subject to ratification by the membership.
To be voted within 30 days of opening any parts of the operation.

AGREEMENT

This Agreement entered into by and between Minnesota Medical Solutions, LLC, hereinafter referred to as the "Employer" and United Food and Commercial Workers Union Local 1189 hereinafter referred to as the "Union" agrees to the bound by the following terms and provisions covering wages and working conditions.

ARTICLE 1 - RECOGNITION:

Section 1: The Employer hereby recognizes the Union as the sole collective bargaining agency for an appropriate unit consisting of all full-time and regular part-time employees working at the Employer's present and future place(s) of business in the state of Minnesota. In the event that the Employer opens other facilities outside of the state of Minnesota and within the jurisdiction of the UFCW International Union, employees of those facilities shall be covered by this Agreement in their respective local union or affiliate as assigned by the UFCW International. The parties will bargain over the wages of any classification not covered by this Agreement.

Section 2: When new or additional employees are needed, the Employer shall notify the Union, as one of its sources for new or additional employees. The Union shall have the opportunity to refer applicants for vacancies to be filled. It shall be the sole determination of the Employer as to which applicant(s) shall be offered employment.

Section 3: The Employer will notify the Union of all new bargaining unit employees hired within fourteen (14) days of their employment.

Section 4: All work covered under this Agreement shall be performed by bargaining unit employees of the Employer. The Union and the Employer may mutually agree to bargaining unit work performed by other employees so long as the Employer maintains the position of a dual Employer for all such employees.

Section 5: UNION SHOP. It shall be a condition of employment that all employees covered by this Agreement and hired on or after its effective date shall, on the thirty-first (31st) day following the beginning of such employment become and remain members in good standing in the Union. "In good standing" for the purposes of this Agreement between this Union and this Employer, is defined to mean the payment of a standard initiation fee or a standard reinstatement fee, if applicable, and standard monthly dues as applies uniformly to all employees covered by this Agreement.

ARTICLE 2 - PAYROLL DEDUCTION:

Section 1: The Employer, upon written authorization of an employee, shall deduct equally from each paycheck beginning with the second (2nd) month of employment, the periodic dues and the initiation fees uniformly required as a condition of acquiring or retaining Union membership, and promptly remit the same to the Union on a monthly basis. If properly payable dues are not deducted by error, they should be deducted the following week. The Employer also agrees to

deduct and remit to the Union political check-off contributions upon written authorization by employees.

Section 2: If any employee quits, is discharged or laid off, deductions in accordance with this Article shall be made from the last payment of wages.

Section 3: The Union shall indemnify and save the Employer harmless against any and all claims, demands, suits or other forms of liability that shall arise out of or result by reason of action taken or not taken by the Employer in reliance upon signed authorization cards furnished to the Employer by the Union or for the purpose of complying with any of the provisions of this Article.

Section 4: An authorization for wage deductions signed by an employee in conformance with this Article shall be irrevocable for a term of one (1) year, and shall be automatically renewed each successive year unless an employee desiring to terminate the authorization gives written notice of such desire to the Employer and the Union at least thirty (30) days and not more than ninety (90) days before the automatic renewal date. Employees who terminate authorization for deduction will be responsible for paying their required dues on a monthly basis.

Section 5: The Employer will collect and forward membership application forms for new hires on behalf of the Union.

ARTICLE 3 - MANAGEMENT RIGHTS:

Section 1: The management of the business of the Employer and the direction of its personnel, including but not limited to: the right to hire, promote, demote, schedule hours of work, reduce hours of work daily or weekly, assign duties, transfer or relieve employees from duty for lack of work or other legitimate reasons, discharge and discipline for just cause; to establish reasonable rules and regulations is the exclusive responsibility of the Employer subject to the terms of this Agreement. The Employer shall be the exclusive judge of its business and the methods, processes, means and material to be used. Nothing contained in this Agreement shall be intended or construed as a waiver of any of the usual, inherent, or fundamental rights of the Employer, whether the sane has been exercised heretofore or not; and these rights are hereby expressly reserved to the Employer.

Copies of rules, policies and procedures and changes thereto will be given to the Union and to all employees.

Section 2: As a condition of this Agreement the Employer agrees to abide by all legal business requirements of the municipalities in which it operates. Concurrently with the signing of this Agreement, the Employer will sign the Cannabis Industry Code of Conduct that is attached as Appendix B. Given nature of the industry, the Employer and the Union understand the importance of adhering to professional, legal, ethical and safe business standards. Those standards include:

a. Responsible customer service and access in a clean and secure environment that assures customer and worker safety.

b. Safe and secure storage and other practices that anticipate and respect community and neighborhood concerns.

c. Responsible dispensing to patients and their caregivers in a manner compliant with Minnesota law.

d. A demonstrated commitment to prevent and discourage secondary sales.

e. A commitment to the development of continuing education and eventual certification of industry and workplace standards.

Section 3: The Employer and the Union will work as partners to assure that these standards are met but all legal responsibility for meeting these standards shall rest with the Employer.

Section 4: The Union and the Employer acknowledge and understand the unique nature of the cannabis industry and the need to advocate for and protect the rights of workers and patients. The Union and the Employer will continue to work collaboratively towards this end and will publicly and legislatively oppose efforts to undermine or interfere with these rights. Nothing in this Agreement will limit the right of employees to self-medicate at the workplace, so long as the employees have fulfilled all requirements for the use of medical cannabis under Minnesota law and such use at the workplace would not be contrary to Minnesota Statute, Chapter 152.

ARTICLE 4 - HOLIDAYS:

Section 1: The following days shall be recognized as paid holidays: New Year's Day (beginning at 6 pm on New Year's Eve), Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day (beginning at 4pm on Christmas Eve).

Upon completion of probation, and annually on the employee's anniversary date thereafter, employees will receive three (3) personal holidays. Personal holidays must be requested at least four weeks in advance and are subject to the Employer's approval; such approval will not be unreasonably denied. In cases when multiple employees request the same day and the Employer is not able to accommodate all requests, seniority shall prevail.

Section 2: All full-time employees shall be paid eight (8) hours of holiday pay at their straight time rate of pay for each of the listed holidays and personal holidays. In addition to eight (8) hours of holiday pay for Christmas Day, full-time employees shall receive three (3) hours straight time holiday pay for Christmas Eve regardless of the day it falls on.

Part-time employees, who have completed probation, will receive prorated holiday pay. Holiday pay for part-time employees shall be based on twenty (20%) percent of the employee' saverage

hours paid per week in the six (6); except that in computing pay for the New Year's Holiday, the same period of time used in computing pay for the Christmas holiday shall be used.

Unused personal days will be added to the employee's vacation award on the employee's anniversary.

When required to work on a recognized holiday, employees shall be paid at their straight-time hourly rate plus holiday pay for all hours worked on the holiday. Employees working less than eight (8) hours on the holiday for full-time or less than their prorated hours on the holiday for part-time will still receive their full holiday pay in addition to straight time pay for the hour weekend. Holiday work shall be offered in order of seniority. In the event the Employer must require employees to work on a holiday, the most junior employees will be mandated to work.

Section 3: HOLIDAY WEEK: Any employee who has reported for work on his/her scheduled working day immediately preceding and his/her scheduled working day immediately following a recognized holiday, except when permission to be absent has been granted by the Employer or when the absence is due to a bona fide illness of the employee, shall receive holiday pay at his/her regular rate of pay. It is understood that in order to qualify for holiday pay an employee must work at least one (1) workday during week in which the holiday falls.

ARTICLE 5 - VACATION

Section 1: An employee covered by this Agreement will be granted vacation with pay each year on their anniversary date, based on their continuous years of service with the Employer as follows: an employee with one (1) year of service shall receive two (2) weeks, an employee with three (3) years of service shall receive three (3) weeks, an employee with ten (10) years of service shall receive four (4) weeks, and an employee with sixteen (16) years of service receive five (5) weeks.

Section 2 PAY: Vacations for all employees will be paid on a per day basis based on the average amount of hours worked per day by the employee for the previous calendar year, with a maximum of eight (8) hours per day and (40) hours per week. Employees will be paid straight-time pay for vacation days.

Section 3: The Employer will post vacation sign-up sheets by January 15 of each year and vacations selected on the basis of seniority for the period from April 1 through the following March 31. The approved vacation schedule shall be posted by April 1 of each year.

Vacation scheduling will be done in two (2) rounds, each in seniority order. During the first round, no employee may select more than one (1) week of vacation time before other employees have had an opportunity to select. The deadline to select the first week will be February 1. During the second round, each employee may schedule the entire balance of their vacation eligibility. Vacation scheduling will be done in rounds to ensure that, to the greatest extent possible, each employee will have the opportunity to schedule some vacation time during the summer months. The selection of vacation periods must be completed by March 1 of each year.

The Employer shall reserve the right to designate the number of employees that may be on vacation at any time, but in no event less than one (1) employee in any one (1) week.

Employees are not permitted to rollover unused vacation days from year-to-year.

Section 4: Employees may take vacation as individual days or half-days; such days will be granted by mutual agreement. Under normal circumstances requests to use these single or half days should be made in writing during the week prior to the posting of the schedule for the period when the vacation days are to be used. These requests will be granted as mutually agreed to by the employee and the Employer. When an employee requests to use these single or half days due to an immediate need said requests will not be unreasonably withheld.

Section 5: Whenever a holiday falls during a vacation period of an employee, such employee shall receive an additional day of vacation with full pay; however, by mutual agreement between the Employer and the employee, the employee may be paid out the additional day without an extra day being taken off.

ARTICLE 6 - SICK PAY

Section 1: All employees will earn one (1) hours of sick pay for each forty (40) hours of work, beginning with date of hire. Employees absent for a full day will be paid based on the average amount of hours worked per-day for the previous thirty (30) days, provided the employee has accumulated enough sick pay hours to cover the amount of time the employee is absent. Regardless of the average amount of hours the employee has worked per-day for the previous thirty (30) days, no employee will be paid more than eight (8) hours of straight-time pay for a full day of absence.

Section 2: Hours of sick pay are not paid out at any time other than when used for legitimate sick leave. The employer has a right to request verification that an employee's sick leave is legitimate, provided that such verification does not interfere with an employee's right to patient privacy, if the employee is absent for two (2) consecutive days.

Section 3: Employees are permitted to rollover up to twenty (20) unused hours of sick pay from year-to-year.

ARTICLE 6 - JURY DUTY

Section 1: An employee shall immediately notify their Employer upon receiving a call for jury duty. When a full-time employee is required to serve on a petit jury, the Employer agrees to pay the difference between the employee's regular straight time daily rate and the amount received by the employee for jury service, provided the employee has completed six (6) months service with the Employer, is required to report by the jury commissioner and does serve on any jury. Such an employee must report for work whenever their presence is not required on jury duty. Hours spent on jury duty will be counted as time worked for the purposes of this Agreement.

Section 2: Upon completion of service on the jury, the employee must immediately notify the Employer for further scheduling. Proof of call to jury duty must be submitted to the Employer promptly upon receipt. Proof of daily jury service is required for payment of this benefit.

ARTICLE 7 - FUNERAL LEAVE

Section 1: An employee is eligible for paid funeral leave upon completion of the employee's probation

Section 2: Leave days are for the purpose of arranging for and attending the funeral of a covered family member. Employees will receive funeral pay as follows: four (4) days paid leave in the event of the death of the employee's spouse, child, step-child or significant other; three (3) days paid leave in the event of the death of the employee's grandchild, grandparents, current mother-in-law, father-in-law, brother-in-law or sister-in-law.

ARTICLE 8 - DISCHARGE OR SUSPENSION

Section 1: The Employer may discharge or suspend any employee for just cause. A letter or notice shall be given the employee setting forth the reason for his/her discharge or suspension. A copy will be sent to the Union.

Section 2: In a case where an employee is warned for misconduct but not discharged or suspended, the Employer shall make a written record of such warning and provide a copy for the employee, with a copy sent to the Union.

Section 3: In all disciplinary interviews and in the issuance of written warnings, the Employer shall make reasonable effort to assure that the affected employee understands the process and that he/she has the option to request Union representation at the interview. Employees have a right to object to warnings they believe are unjust, following the procedures outlined in Article 9 of this Agreement.

Section 4: No prior warning notice shall be necessary if the cause of discharge or suspension is for serious infractions. Examples include, but are not limited to, dishonesty, theft, recklessness, use of unauthorized drugs, or gross misconduct.

Section 5: A warning notice shall generally not be considered active for a period of over six (6) months unless a pattern of consistent similar misconduct can be shown to exist over a longer period of time. Prior to any suspension related to progressive discipline, a written warning shall be issued with a copy sent to the Union.

Section 6: Any employee may request an investigation of his/her discharge or suspension and the Union shall have the right to protest the discharge or suspension. Any such protest shall be presented to the Employer in writing within ten (10) calendar days after the discharge or suspension and if not presented within such period, the right of protest shall be waived.

ARTICLE 9 - GRIEVANCE PROCEDURE:

Section 1: In the event of a dispute or grievance over the interpretation of this Agreement the following procedure shall be followed:

a. When a grievance arises, the employee (with or without the Union representative) may attempt first to settle the matter with their immediate supervisor. In the event that this is unsuccessful, the representative of the Union shall be called so that the matter may be settled without loss of time to either party.

b. If the grievance cannot be resolved on a local level, a representative of the Employer and a representative of the Union shall, within seven (7) calendar days, attempt to reach a settlement of the controversy, dispute or disagreement.

c. In the case of wage discrepancies, the Employer agrees to submit to the Union upon request from the Union any and all wage data concerning same.

d. Any claimed grievance of any kind to be acted upon or accepted as valid for any reason must be filed in writing with the Employer and the Union within thirty (30) calendar days after the employee has knowledge of the occurrence giving rise to the grievance. Regardless of the date of filing, the employee will receive the full back pay to which the employee is entitled for a valid grievance and shall be collectable over a period of time covering two (2) years or back to the effective date of the Agreement, whichever is more.

e. Any controversy over the interpretation of or the adherence to the terms and provisions of this Agreement, including all claims for wages which cannot be settled by negotiations, shall be submitted to arbitration by either party notifying the other involved in writing of its desire to do so. Notification of desire to submit the grievance to arbitration must be made within thirty (30) calendar days following exhaustion of a, b, c and d above.

f. Employer Violations: Any Employer who intentionally violated any part of this Agreement shall be penalized for such violation, such as paying less than the established rate of pay or violating hours or employment, etc. If such violations are proven, the Employer shall pay double (2) times the amount involved.

Section 2: MEDIATION: Any discharge or dispute that cannot be resolved under the provisions of Section 1 of this Article may be referred by mutual agreement to the Bureau of Mediation Services of Minnesota, or by mutual agreement to Federal Mediation and Conciliation Service (FMCS), in an attempt to reach an agreement on a resolution. The party wishing to submit the dispute or discharge to nonbinding mediation shall do so in writing within fifteen (15) calendar days following the exhaustion of the remedies in Section 1of this Article. The parties, by mutual agreement, may elect to bypass mediation and refer the matter directly to arbitration.

Section 3: ARBITRATION: If a dispute or discharge is not resolved by the provisions of the Section 1 and Section 2 of this Article, either party may refer the matter to arbitration by notification to the other party, in writing of their desire to arbitrate the issue.

a. A representative on the Union and a representative of the Employer shall meet and attempt to agree on a neutral third (3rd) party to hear and decide the Grievance. If within seven (7) calendar days of notification, the parties cannot agree on a neutral party, either party may petition the FMCS for a list of seven (7) neutral arbitrators. The parties shall alternately strike from this list until one (1) name remains; that person shall be the one (1) to hear and decide the grievance.

b. The neutral party shall meet with the parties to the dispute, hear all evidence in the case or cases referred and render a decision as soon as possible.

c. Each party shall bear the expenses of preparing and presenting its own case. The expenses of the neutral party shall be equally shared by the parties.

d. There shall be no recourse to any other method of settlement, unless a party fails to accept and comply with the award, in which case the award may be enforced by further action of the party in whose favor such award has been given.

e. The decision of the arbitrator shall be final and binding upon all parties to the dispute.

f. Status Quo: During the period of adjustment or arbitration, as provide in this Article, the conditions in effect at the same time of the notification of the claimed grievance shall continue in effect pending final decision.

Section 4: LIMITATIONS ON ARBITRATOR: The arbitrator shall not have the authority to decide questions involving the jurisdiction of any local, or of the International, or which may in any way affect or change the Union security clause, nor shall the arbitrator have the authority to effect a change in, modify or amend any of the provisions of this Agreement.

Section 5: TIME LIMITS: The time limits set forth above shall be absolutely mandatory and failure to comply will mean the grievance is void and no consideration will be given to it. The time limits may be extended by mutual agreement.

ARTICLE 10 - SUBCONTRACTING:

Section 1: SUBCONTRACTING: The Employer will not contract out bargaining unit work except when the Employer lacks special equipment or tools for performing the work or, when employees lack skills or willingness to perform such work, or, as specified in the State contract. In no case shall the Employer contract out work to avoid its obligations under this Agreement or for the purposes of reducing the scope of the work covered by this Agreement.

The Employer is not in violation of this Agreement if nonunion, management level employees of the Company perform the same or similar duties as union employees, in limited circumstances, when the welfare of the Company dictates such action be taken.

ARTICLE 11 – UNION REPRESENTATION/SHOP STEWARD:

Section 1: JOB SITE VISIT: A Union Representative employed by the Union shall be allowed to visit the worksite for the purpose of ascertaining whether or not his Agreement is being observed. This right shall be exercised reasonably. The Union Representative shall follow State rules and procedures related to non-employee visits to the facility. The Employer reserves the right to accompany the Representative in sensitive areas. The Employer agrees to provide space for employees to meet privately with their Union Representative if requested.

Section 2: The Union Representative may attend Employer meetings that represent discussion of continuing problems that the Employer needs to address with the employees and the employees have asked their Union Representative to be present. The Representative will act as an observer only.

Section 3: BULLETIN BOARD: The Employer shall provide space for a bulletin board conveniently located for the posting of notices of official business of the Union.

Section 4: TIME-OFF FOR UNION BUSINESS: Employees shall be allowed time off without pay for the purpose of attending Agreement negotiations, mediation or arbitration board hearings, or for other bona fide Union business. In all instances, the Employer shall be notified not less than two (2) weeks in advance of such absence and the number of employees requesting such absences shall be so limited by the Union that it will not interfere unreasonably with the operation of the Employer's business.

Section 5: SHOP STEWARD: The Union shall be allowed to designate a reasonable number of shop stewards for the purpose of monitoring compliance with this Agreement and other legitimate Union business. Stewards shall be allowed to conduct incidental Union business on company time.

Section 6: JOINT LABOR/MANAGEMENT COMMITTEES: The Employer and the Union agree to establish a Joint Labor and Management Committee (JLM) consisting of bargaining unit employees, management, and the Union. The Committee shall have up to three (3) bargaining unit employees as part of the JLM.

The JLM will meet periodically to discuss information about the contract, data on the industry and community certifications and standards. The Union and the Employer understand the value of the JLM and shall be used as a first line of regulation to the industry.

The JLM shall follow the language outlined in Section 4 of this Article in regards to time off for Union business.

Section 7: APPENTICE PROGRAM: In the event that the Union develops and implements a Cannabis Industry Apprenticeship Program, both parties agree to participate in the program and negotiate over the implementation of the program in appropriate classification upon its certification. No employee's rate of pay shall be reduced as a result of the implementation of an Apprenticeship Program.

ARTICLE 12 - NO STRIKE, NO LOCKOUT:

Section 1: During the term of this Agreement, the Union agrees there will be no strikes and the Employer agrees there will be no lockouts.

ARTICLE 13 - LEGISLATIVE CHANGES:

Section 1: Should any of the provisions in this Agreement be rendered or declared invalid by reason on any existing or subsequently enacted legislation, such invalidation of a portion of this Agreement shall not invalidate the remaining portions and they shall remain in effect.

ARTICLE 14 - HOURS OF WORK:

Section 1: The regular worksheet shall constitute forty (40) hours over five (5) days. Work schedules shall be posted two (2) weeks prior to the start of the schedule. The Employer may utilize part-time employees but the utilization of part-time employees shall not undermine the concept of full-time work. Part-time employees who desire more hours up to and including full-time may request those hours in writing. Available hours shall be offered to those employees based on seniority within their classification.

Section 2: All part-time employees will be scheduled a minimum of sixteen (16) hours per week.

Section 3: OVERTIME: For hourly employees, all time worked in excess of eight (8) hours in one (1) day or in excess of forty (40) hours in one (1) week shall be paid at the rate of time and one-half (1 ½) the straight-time hourly rate. Alternative worksheets may be arranged by mutual consent so long as they comply with state and federal laws. Daily and weekly overtime shall be offered by seniority in each classification. There shall be no pyramiding of overtime and/or premiums and only the highest applicable rate shall apply.

Section 4: MEAL PERIOD AND BREAKS: Each employee shall be entitled to a thirty (30) minute paid lunch period. All employees shall receive a rest period of fifteen (15) minutes during every four hours of work or major fraction thereof.

Section 5: HOURS PAID: Vacation, holiday, and personal time paid but not worked will count as time worked for all purposes of this Agreement.

ARTICLE 15 - RETIREMENT/DEFINED CONTRIBUTION PLAN:

Section 1: The Employer agrees to contribute to the Union's established defined contribution plan at the following rate:

FIRST YEAR	SECOND YEAR	THIRD YEAR/ THEREAFTER
$1.00HR	$1.25/HR	$1.50HR

ARTICLE 16 - SENIORITY:

Section 1: PROBATION: Employees who have not attained seniority with the Employer shall be deemed probationary and subject to discharge without recourse or notice. Once probation is completed, the employee's seniority date shall be retroactive as of the first (1st) day of hire. New employees shall serve a probation period of thirty (30) calendar days. Prior to the end of the thirty (30)-day probationary period in the case of an employee found questionable by management. If the Union approves, an additional thirty (30) day probationary period may be instituted after which time, if the employee remains in the employ of the Employer, the seniority date shall revert back to their original date of employment.

Section 2: LAY OFF: In the reduction of forces, the last employee hired shall be the first employee laid off within the classification. Laid-off employee(s) shall be recalled in the reverse order of layoff within the classification. Seniority shall not apply to any employee until he/she has completed the probationary period.

Non-probationary employees are entitled to receive one (1) weeks' notice of layoff or one (1) week's pay at the employee's regular rate in lieu thereof. Laid off employees will have preference over new hires for openings in other classifications so long as they possess the skills and ability to do the job.

Section 3: JOB CLASSIFICATIONS & RATES OF PAY:
During the term of this Agreement the following job classifications and rates of pay and increases shall apply:

Position	RATE Year 1	Year 2	Year 3
Head Cultivator	$2200/week	$2200/week	$2200/week
Horticultural Technician	$22.00/hr.	$23.10/hr.	$24.25/hr.
Pharmacy Technician	$22.00/hr.	$23.10/hr.	$24.25/hr.
Custodian	$18.00/hr.	$18.90/hr.	$19.85/hr.
Delivery Driver	$22.00/hr.	$23.10/hr.	$24.25/hr.
Security Chief	$2800/week	$2800/week	$2800/week
Security	$24.00/hr.	$25.00/hr.	$26.00/hr.

Laboratory Technician	$22.00/hr.	$23.10/hr.	$24.25/hr.
Extractor	$25.00/hr.	$26.25/hr.	$27.60/hr.
Extract Packaging	$22.00/hr.	$23.10/hr.	$24.25/hr.
Vaporizer Production Technician 1	$24.00/hr.	$25.00/hr.	$26.00/hr.
Vaporizer Production Technician 2	$22.00/hr.	$23.00/hr.	$24.00/hr.
Laboratory Equipment Producer 1	$24.00/hr.	$24.00/hr.	$26.00/hr.
Laboratory Equipment Producer 2	$22.00/hr.	$23.00/hr.	$24.00/hr.

Section 4: LOSS OF SENIORITY: Seniority shall terminate for the following reasons:

a. Discharge for just cause

b. Resignation

c. Layoffs of six (6) consecutive months or a period equal to the employee's length of service when the layoff began whichever is less.

d. Failure to report to work within five (5) calendar days after recall from layoff. The employee will be notified by certified letter at the employee's last known address.

e. Employee fails to return to work from a leave of absence.

f. Employee is absent from work for three (3) consecutive workdays without reporting to management unless such failure to report is due to serious, proven medical reasons satisfactory to the Employer. Such three (3) days with no report shall be deemed a voluntary quit.

Section 5: SCHEDULE SELECTION: Seniority shall prevail regarding the selection of workweek schedules and shift selection when it is operationally feasible.

Section 6: When a vacancy or new job opening occurs the employer will post the opening on the agreed bulletin board (or web page) for a period of seventy (72) hours. The posting shall indicate the job, location, shift, rate of pay, and supervisor. If no employees in the division bids for and is awarded the job, the job will then be posted for bid to the remainder of the company. All job bids will be determined on the basis of seniority so long as the winning bidder has the qualification to perform the job or learn the job in a reasonable period of time. Employees are limited to two bids per twelve (12) month period.

Section 7: The Employer will forward the seniority list to the Union semi-annually or whenever new employees have completed probation.

Section 8: The Employer and the Union agree to establish five (5) divisions for purpose of seniority and bidding: horticulture, retail, extraction, infused products, office clerical.

ARTICLE 17 - HEALTH AND WELFARE:

Section 1: CONTRIBUTIONS:

a. The Employer agrees to make contributions to the United Food and Commercial Workers Union Local 1189 and St. Paul Food Employers Health Care Plan on behalf of any full-time employee who has worked thirty (30) or more hours per week or averaged thirty (30) or more hours per week for the reporting period ("Full-time Contributions").

b. The Employer further agrees to make contributions to the Fund on behalf of any regular part-time employee working less than thirty (30) hours per week ("Part-time Contributions"). It is further agreed that if the aforementioned part-time employee who works thirty (30) hours or more during that reporting period.

c. The Employer agrees to pay 100% of the contributions for full-time and part-time participants in the Plan.

Section 2: Such Trust Fund is jointly administered, is a part of this Agreement, and is in lieu of all Employer-established programs including life insurance, sickness and accident insurance, hospitalization insurance, or any other said forms of insurance now in practice.

Section 3: The program of benefits of this full-time plan and of this part-time plan are as agreed to between the Employer and the Union trustees and will be maintained for the life of this Agreement at no contribution cost to employees. Benefits may be modified by mutual agreement of the board of trustees.

ARTICLE 18 - UNIFORMS:

Section 1: Employees will be required to wear standard uniforms, the Employer shall furnish such uniforms at no cost.

ARTICLE 19 - LEAVES OF ABSENCE:

Section 1: PERSONAL: Personal Leaves of absence without pay may be granted upon written request by the employee for a period not longer than thirty (30) cumulative days in any one (1) calendar year with mutual agreement by the Employer. Such leave requests will be for bona fide reasons. All personal leaves must be granted in writing. Personal leaves may be extended for up to fifteen (15) additional days upon extenuating circumstances and with mutual agreement.

Section 2: MEDICAL: In case of accident, injury, pregnancy or sickness which renders the employee unable to work, an automatic leave of absence shall be granted for the period of time that they are judged unable to work up to a period of one year. Extensions of this time limit shall be granted upon certification that the employee is still unable to return to work, up to a period of three (3) years. The employee must be able to pass a physical examination upon return to work two (2) weeks in advance. The employee may return earlier if a mutual agreement is reached and hours are available. Employees may use earned vacation and personal days to care for sick children, parents and spouses.

Section 3: FMLA/FAMILY: The Employer will grant family and medical leaves of absence in conformity with the FMLA and State leave laws. Employees may use earned sick pay, vacation and personal days for the care of sick children, parents, or spouses, in addition to personal medical reasons.

Section 4: PARENTAL: Non-probationary employees shall be eligible for up to three (3) weeks paid parental leave of absence in the event that they have given birth, that their spouse has given birth or for the adoption of a child, for the purpose of bonding with their new child.

ARTICLE 20 - INJURY ON THE JOB:

Section 1: The Employer will establish and publish a written policy setting out its guidelines for employee safety and store security. These guidelines shall make clear that no employee is required to take any action in response to theft or security incidents which may endanger the safety of the employee.

Section 2: When an employee is injured on the job, reports for medical care, and is certified unable to return to work, the employee shall be paid the basic straight-time rate of pay for hours not worked on the day of the injury.

ARTICLE 21 - GENERAL PROVISIONS:

Section 1: SAFETY RULES: Safety rules pertaining to the conduct of employees shall be conspicuously posted by the Employer in his place of business, and the Employer shall maintain in their store, or place of business, a fully equipped first aid kit.

Section 2: MILITARY SERVICE: The Employer agrees to comply with the terms of the Universal Military Training and Service Act, with reference to all provisions providing for the reemployment of persons entering military service. These provisions shall be deemed a contractual obligation under the terms of this Agreement.

Section 3: PROBATIONARY BONUS: Upon completion of the probationary period, the Employer agrees to provide a $200 bonus to the employee.

Section 4: PAID CIVIC DUTY: Employees will be offered up to three (3) hours paid annually for the purpose of voting.

(Clothing allowance eliminated, required uniforms purchased at company expense)

ARTICLE 22 - PAY PERIOD AND WAGE STATEMENT:

Section 1: All employees shall be paid on at least a biweekly basis. Paychecks shall include an itemized statement of hours worked and wages paid, including overtime pay, premiums and vacation.

ARTICLE 23 - NO DISCRIMINATION:

Section 1: The Employer and the Union will adhere to all Federal and State statutes and Municipal ordinances that impact this Agreement.

ARTICLE 24 - EDUCATION TUITION REIMBURSEMENT:

Section 1: The Employer shall reimburse an employee enrolled in an accredited college or university for 50% of the full cost of tuition, on a class-by-class basis. The employee must attain a 3.0 grade in the course to be eligible for reimbursement.

Section 2: An employee who has been employed for three (3) consecutive years shall be eligible for tuition reimbursement at the rate of $1,000 for each full time semester for any family member covered in Article 17, Health and Welfare, of this Agreement. An employee's family member who attends an accredited college or university shall be eligible for reimbursement for a semester in which they achieve at least a 3.0 grade. This section covers classes designed for an Associate or Bachelor's degree.

ARTICLE 25 - SUCCESSOR:

SECTION 1: In the event of sale of any store or stores covered by this Agreement, the new owner shall recognize the Union and the Agreement with all its provisions, and grant to all employees all rights and benefits provided for thereunder, including all seniority and service time accumulated, except that the new owner shall have a thirty (30) day probation period applied to all employees and may request, in addition thereto, another thirty (30) days in respect to any individual employee whom the Employer has reason to doubt their performance.

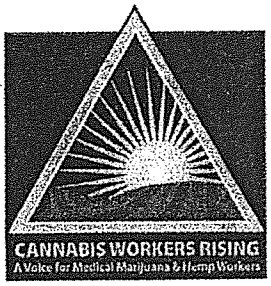
ARTICLE 26 - DURATION OF AGREEMENT:

Section 1: Except as otherwise indicated herein, this Agreement shall be effective Dec. 2, 2014, and shall remain in full force and effect in all areas to and including Dec 31, 2016, and shall be considered as renewed from year to year thereafter unless either party hereto gives written notice to the other of its desire to have the same modified or terminated. Such notice shall be given at least sixty (60) days prior to such expiration date during which period negotiations for a new agreement shall be conducted with all conditions agreed to by the parties to become effective on the first (1st) day of the week nearest the expiration date of this Agreement. If after opening, as provided herein, the parties fail to reach an agreement within the period so provided, then the provisions of Article 12 of this Agreement shall not be binding on either party.

DATE: _____

DATE: Sept 9, 2014

Minnesota Medical Solutions



Neutrality and Card Check Agreement

Minnesota Medical Solutions ("the Employer") and the United Food and Commercial Workers Union ("the Union") hereby agree to the following terms:

1. Neutrality and Non-Disparagement. The Employer agrees to remain neutral. Neutrality means that the Employer and its agents will not oppose union representation or hinder union organizing efforts. The Union waives the right to strike or picket the Employer during the agreement. Additionally, neither party will act or communicate in a negative, derogatory, or demeaning way, or engage in any coercive conduct or delaying tactics that might interfere with the employees' right to choose union representation.

2. Access. In accordance with applicable law and regulations, accredited Union representatives will be allowed onto the Employer's premises during working hours to speak with employees during non-working time. The Employer will cooperate with the Union in making arrangements to permit these conversations to be held in areas where the employees will be able to speak to the Union representatives without monitoring by the Employer.

3. Meeting. At the Union's request, the Employer will conduct a meeting on a mutually agreeable date(s) and time(s) with all of its employees. At the meeting, the Employer will tell the employees that it is neutral, does not object to their talking to and supporting the Union, and will negotiate a collective bargaining agreement (CBA) with the Union if a majority of the covered employees designate the Union as their collective bargaining representative. Union representatives will attend the meeting and, after the Employer has introduced them and left the meeting, talk with the employees about the Union.

4. Appropriate Bargaining Unit. All current full-time and regular part-time employees employed by the Employer in Minnesota who are eligible to join the unit under applicable law.

5. Contact information. At the Union's request, the Employer shall furnish to the Union the names, job classifications, home addresses, home telephone numbers and home email addresses, if known, of all the Employer's current full-time and regular part-time employees, consistent with applicable law and regulations.

6. Recognition and Bargaining. When a mutually agreed upon third party confirms that a majority of the bargaining unit has authorized the Union to represent them for the purpose of collective bargaining, the Employer will recognize the Union as the exclusive representative of its employees, provided that the Union may assign jurisdiction and representation rights to any of its affiliates. The Employer and the Union will comply with all requirements necessary to obtain certification of the Union as the exclusive bargaining representative of the employees. Within 20 days from the date of recognition, the parties will begin good faith bargaining for a CBA covering the employees.

7. Arbitration. The parties agree that final and binding arbitration will be the exclusive remedy for any alleged violations of this Agreement and any dispute or claim arising from or relating to the interpretation or application of any provision of this Agreement. Unless they promptly agree on an arbitrator, the parties will proceed to expedited arbitration using the American Arbitration Association's rules and procedures. The arbitrator is authorized to compel the attendance of witnesses and the production of documents at the arbitration hearing, and to award appropriate monetary, injunctive and declaratory relief. The parties agree not to challenge the arbitrator's decision in court.

8. Successorship, affiliated companies and subcontractors. This agreement will be binding on the parties' successors and assigns, including all purchasers of the Employer's assets or business, and in the event of a merger. This agreement is also binding on any and all corporations, partnerships, organizations and sole proprietorships affiliated with or related to the Employer. If the Employer intends to subcontract any work performed by bargaining unit employees, the Employer agrees to require the subcontractor, in writing, to comply with this agreement.

9. Governing Law and Severability. The parties agree that their rights under this Agreement shall be exercised in accordance with the applicable laws the state of Minnesota. Further, the parties agree that this Agreement and any CBA they may enter into will remain binding and valid regardless of whether the National Labor Relations Board asserts jurisdiction over the Employer's operations. In addition, the parties agree that if any provision of this Agreement is held illegal, void or invalid under any applicable law, it may be changed to make it legal, valid and binding, and that the remaining provisions of this Agreement will remain binding and enforceable according to their terms and the parties' intent.

10. Term of Agreement. This Agreement is effective for a three-year term, from 8/18/14 [date] through 8/18/17 [date], or the date on which the Employer recognizes the Union as the collective bargaining representative of its employees, whichever occurs sooner, and may be extended by mutual agreement of the parties.

Minnesota Medical Solutions, LLC
Employer

5200 Wilson Rd. STE 150
Address Edina, MN 55424

612 205-6675
Phone

Signed

8-18-2014
Date

Union

Address

Phone

Signed

Date

Minnesota
Medical Solutions LLC

Employee Handbook and Code of Conduct

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Table of Contents

Introduction

Welcome Message

Dear Valued Employee,

Welcome to Minnesota Medical Solutions! We are pleased with your decision to join our team.

Minnesota Medical Solutions is committed to providing superior quality and unparalleled customer service in all aspects of our business. We believe each employee contributes to the success and growth of our company.

This employee handbook contains general information on our policies, practices, and benefits. Policies are not intended as a contract of employment. Please read it carefully.

Please direct all questions regarding the policies in this employee handbook to the Director of Human Resources unless otherwise specified.

Welcome aboard. We look forward to working with you!

Sincerely,

Dr. Kyle Kingsley, CEO

Company Goals, Values, and Beliefs

Effective Date: 10/1/2014

Our goal at Minnesota Medical Solutions is simple: extraordinary product quality and customer service. We accomplish this by observing a common set of values and by partnering with organizations that have the finest reputation for quality. There are no shortcuts; we believe that our goals are accomplished only with a real commitment from every employee.

Our values and beliefs require that we:

- Treat employees and colleagues with respect; Minnesota Medical Solutions does not tolerate discrimination of any kind;
- Encourage all managers and supervisors to involve employees in creative problem solving;
- Provide consistent leadership and competent on-the-job training;
- Maintain an open-door policy that encourages interaction and discussion; encourage ideas to improve the workplace and increase productivity;
- Provide effective and efficient corrective action to resolve customer service issues and ensure complete customer satisfaction;

- Deliver competitive, outstanding service to our customers and partner with vendors who share that goal; and
- Make "Do It Right the First Time" our team attitude to ensure continued growth and prosperity.

Collective Bargaining Agreement

Effective Date: 10/1/2014

Minnesota Medical Solutions has entered into a Collective Bargaining Agreement ("CBA") with the United Food and Commerical Workers International Union ("UFCW"). Should any policies in this Employee Handbook prove to be inconsistent with the terms of the CBA, the differences shall be resolved in favor of the CBA. For reference, Minnesota Medical Solutions will provide new employees a copy of the CBA along with this Handbook.

Changes in Policy

Effective Date: 10/1/2014

Company change is inevitable. Therefore, we expressly reserve the right to interpret, modify, suspend, cancel, or dispute, with or without notice, all or any part of our policies, procedures, and benefits at any time with or without prior notice. Changes will be effective on the dates determined by Minnesota Medical Solutions, and after those dates all superseded policies will be null and void.

No individual supervisor or manager has the authority to alter the foregoing. Any employee who is unclear on any policy or procedure should consult a supervisor or the Director of Human Resources.

Company Events

Effective Date: 10/1/2014

Company-sponsored events are common throughout the year. While some events are intended to encourage awareness of Minnesota Medical Solutions, such as job fairs or Chamber of Commerce functions, other events are simply held for employee enjoyment.

All such events are optional and do not mandate attendance, unless otherwise stated by Company management. Because attendance is voluntary, no accidents, injuries, or illnesses as a result of employee participation in a company-sponsored event may be considered to have occurred while "at work". Exceptions exist when non-exempt employees are being paid or when exempt employees are working during their regular work hours and their activities result in injury or illness.

Among some of our company events are summer picnics and/or sport outings. Although the physical aspect of outdoor recreational activities may be exciting to most employees, it is a good idea to consult a physician before participating to ensure good health and safety.

Finally, in the case of alcohol availability at company-sponsored events, employees are to use caution and control their consumption. Although these events may not be work-related, employees are still required to follow company policies on sexual harassment, personal appearance, and standards of conduct.

General Employment

Nature of Employment

Effective Date: 10/1/2014

The policies set forth in this employee handbook are the policies that are in effect at the time of publication. They may be amended, modified, or terminated at any time by Minnesota Medical Solutions, except for the policy on at-will employment, which may be modified only by a signed, written agreement between the company partners and the employee at issue. Nothing in this handbook may be construed as creating a promise of future benefits or a binding contract between Minnesota Medical Solutions and any of its employees.

Equal Employment Opportunity

Effective Date: 10/1/2014

Minnesota Medical Solutions is an Equal Opportunity Employer. Employment opportunities at Minnesota Medical Solutions are based upon one's qualifications and capabilities to perform the essential functions of a particular job and free from discrimination because of race, religion, sex, national origin, age, veteran status, disability, genetic information, or any other characteristic protected by law.

This Equal Employment Opportunity policy governs all aspects of employment, including, but not limited to, selection, job assignment, compensation, discipline, termination, and access to benefits and training.

Minnesota Medical Solutions strongly urges the reporting of all instances of discrimination and prohibits retaliation against any individual who reports discrimination or participates in an investigation of such report.

Appropriate disciplinary action, up to and including immediate termination, will be taken against any employee who violates this policy.

Ethics

Effective Date: 10/1/2014

We expect Minnesota Medical Solutions employees to behave in an ethical manner at all times. Employees are a representation of the Company and your conduct has a direct effect on Minnesota Medical Solutions's reputation. Employees must act in accordance with Minnesota Medical Solutions's ethical principles and uphold the highest standards of conduct and personal integrity.

We expect all directors, officers, and employees to conduct business in accordance with the letter, spirit, and intent of the law and to not do anything that is illegal, dishonest, or unethical. It is the responsibility of every Minnesota Medical Solutions employee to comply with our ethics policy.

Employees who ignore or do not comply with this standard may be subject to disciplinary action, up to and including termination of employment. If you are not sure if an action is ethical or proper, you should discuss the matter openly with your supervisor.

Confidentiality

Effective Date: 10/1/2014

Minnesota Medical Solutions takes the protection of confidential business information very seriously. Confidential business information includes, but is not limited to, the following examples:

- Any material developed using company resources and/or time;
- Compensation data;
- Computer processes;
- Computer programs and codes;
- Conversations between any persons associated with the company;
- Customer lists;
- Customer preferences;
- Financial information;
- Genetics library;
- Labor relations strategies;
- Marketing strategies;
- Medical cannabis research and developments;
- New materials research;
- Pending projects and proposals;
- Proprietary production processes;
- Personnel/payroll records;
- Research and development strategies;
- Scientific data;
- Scientific formulae;
- Scientific prototypes;
- Strains;
- Technological data; and
- Technological prototypes.

All employees must maintain confidential information in strict confidence. This policy applies to active employees as well as employees who separated from Minnesota Medical Solutions.

Employees found to be in violation of this policy will be subject to disciplinary action, up to and including termination of employment.

Intellectual Property

Effective Date: 10/1/2014

Ideas and inventions developed through the course of your employment with Minnesota Medical Solutions and as a direct result of your job responsibilities with Minnesota Medical Solutions are considered to be the intellectual property of the Company.

Intellectual property includes, but is not limited to the following:

- Inventions;
- Discoveries;
- Trade secrets;
- Trademarks;
- Writings;
- Software;
- Marketing campaigns; and
- Product formulas.

Intellectual property created by an employee within the scope of his or her employment with Minnesota Medical Solutions or intellectual property created on company time with the use of company facilities and/or resources is to be kept confidential. This policy applies equally to current employees as well as terminated employees.

Solicitation

Effective Date: 10/1/2014

For safety and privacy reasons, Minnesota Medical Solutions prohibits employees from soliciting clients, customers, vendors, and visitors of Minnesota Medical Solutions.

Employees are further prohibited from soliciting other employees during work time. Posting or distribution of non-work related material should be limited to non-work areas. Work time does not include break periods, meal times, or other specified periods during the workday when staff members are not engaged in performing their work tasks.

Solicitation includes verbal and written communication, the distribution of e-mails, circulars, handbills or other types of literature. In addition, the attempt to sell goods and services, raise funds, or conduct non work-related business also constitutes solicitation in accordance with this policy.

Employee Relations

Effective Date: 10/1/2014

Minnesota Medical Solutions believes that the work conditions, wages, and benefits it offers to its employees are competitive with those offered by other employers in this area and in this industry. If employees have concerns about work conditions or compensation, they are strongly encouraged to discuss these concerns openly and directly with their supervisors or the Director of Human Resources. Employees should also follow procedures outlined in the CBA's Grievance Procedure.

Our experience has shown that when employees deal openly and directly with supervisors and peers, the work environment can be excellent, communications can be clear, and attitudes can be positive. We believe that Minnesota Medical Solutions amply demonstrates its commitment to employees by responding promptly and effectively to employee issues.

Open Door Policy

Effective Date: 10/1/2014

Minnesota Medical Solutions welcomes the opportunity to discuss business-related concerns and suggestions. To this end, it is our policy to maintain an open door to our employees.

Employees should feel free to email any questions, problems, complaints or suggestions to HR@minnmed.com.

Employee Identification Card Requirements

Effective Date: 10/1/2014

In order to protect the welfare of the clients, customers, employees, and resources of Minnesota Medical Solutions, it is the policy of Minnesota Medical Solutions – as well as a requirement under the law – to require employees to possess a Minnesota Department of Health-issued Employee Identification Card. An employee of Minnesota Medical Solutions must keep his or her employee identification card visible at all times when on any Minnesota Medical Solutions property and during the transportation of medical cannabis to a distribution facility.

Applicants who apply for positions in which the essential job duties require the use of company vehicles must have a driving record in good standing. A driving record check will be made only after a conditional job offer has been made pending the results of the check. For all employees, continued use of company vehicles is contingent on their maintenance of a good driving record, which will be assessed annually.

Applicants who have been convicted of a disqualifying felony offense will not be considered for employment.

"Disqualifying felony offense" means a violation of a state or federal controlled substance law that is a felony under Minnesota law, or would be a felony if committed in Minnesota, regardless of the sentence imposed, unless the commissioner of the Minnesota Department of Health determines that the person's conviction was for the medical use of cannabis or assisting with the medical use of cannabis.

Drug Testing

Effective Date: 10/1/2014

In order to promote a safe, healthful, and efficient work environment, Minnesota Medical Solutions does not employ persons who use illegal drugs. Accordingly, Minnesota Medical Solutions reserves the right to require an employee to submit to a drug test as a continuing condition of employment.

Employees refusing to submit to a drug test, or employees who test positive, may be suspended from duty pending further investigation and subject to disciplinary action, up to and including termination of employment.

Drug testing is also a requirement during the hiring process. All candidates who have been extended a conditional offer of employment must submit to a drug test. Refusal to submit to a drug test, or results that indicate positive drug use, will result in denial of employment.

Character Reference Checks

Effective Date: 10/1/2014

To ensure that all individuals joining Minnesota Medical Solutions are well qualified and have a strong potential to be productive, it is the policy of Minnesota Medical Solutions to check the employment references of all applicants.

In addition, Minnesota Medical Solutions will respond to reference check inquiries from other employers. No employment data will be released without the written authorization of the individual who is subject of the inquiry. Responses to such inquiries will confirm only dates of employment and position held.

Conflict of Interest

Effective Date: 10/1/2014

Minnesota Medical Solutions has guidelines to avoid real or potential conflicts of interest. It is your responsibility as an employee of Minnesota Medical Solutions to follow the guidelines included herein. Questions or concerns regarding this policy should be directed toward your supervisor or the Director of Human Resources.

Employees should not allow their responsibilities outside of work to create a conflict of interest. Minnesota Medical Solutions does not automatically assume that there is a conflict of interest when an employee has a relationship with another company. However, if you have any influence on transactions involving purchases, contracts, or leases, you must inform Minnesota Medical Solutions as soon as possible. By informing us that there is the possibility of an actual or potential conflict of interest, we can establish safeguards to protect everyone involved.

In cases where your family members are employed by, or serve on committees of, our suppliers or competitors you are required to notify Minnesota Medical Solutions to make a formal notice of such association. By informing us that there is the possibility of an actual or potential conflict of interest, we can establish safeguards to protect everyone involved.

An actual or potential conflict of interest occurs when you are in a position to influence a decision or have business dealings on behalf of Minnesota Medical Solutions that might result in a personal gain for you or for one of your relatives or friends. For this purpose, a relative is any person who is related to you by blood or marriage, or whose relationship with you is similar to being a relative even though they are not related by blood or marriage.

The possibility for personal gain is not limited to situations where you or your relative has a significant ownership in a firm with which Minnesota Medical Solutions does business. Personal gains can also result from situations in which you or your relative receives a kickback, bribe, gift, or special consideration as a result of a transaction or business dealing involving Minnesota Medical Solutions.

Violation of this policy may result in disciplinary action, up to and including termination of employment.

Outside Employment

Effective Date: 10/1/2014

Full-time employees may hold outside jobs as long as the employee meets the performance standards of their position with Minnesota Medical Solutions.

Unless an alternative work schedule has been approved by Minnesota Medical Solutions, employees will be subject to the company's scheduling demands, regardless of any existing outside work assignments; this includes availability for overtime when necessary. Employees may not use company time to complete projects or work for outside employment.

Minnesota Medical Solutions's property, office space, equipment, technologies, materials, trade secrets, and any other confidential information may not be used for any purposes relating to outside employment.

Employee Suggestions

Effective Date: 10/1/2014

Minnesota Medical Solutions encourages employee feedback in order to improve upon company operations and employee satisfaction. Employees who have suggestions can send an email to HR@minnmed.com.

Every care will be taken to preserve employee privacy. The Director of Human Resources checks the inbox on a regular basis and meetings are held to determine which suggestions will be implemented.

Employee Complaints

Effective Date: 10/1/2014

It is the policy of Minnesota Medical Solutions to maintain a harmonious workplace environment. Minnesota Medical Solutions encourages its employees to express concerns about work-related issues, including workplace communication, interpersonal conflict, and other working conditions.

Employees are encouraged to raise concerns with their supervisors. If not resolved at this level, an employee may submit, in writing, a signed complaint to the Director of Human Resources.

After receiving a written grievance, Minnesota Medical Solutions may hold a meeting with the employee, the immediate supervisor, and any other individuals who may assist in the investigation or resolution of the issue. All discussions related to the complaint will be limited to those involved with, and who can assist with, resolving the issue.

Complaints involving alleged discriminatory practices shall be processed in accordance with the Minnesota Medical Solutions's Sexual and other Unlawful Harassment Policy.

Minnesota Medical Solutions assures that all employees filing a complaint can do so without fear of retaliation or reprisal.

Employee Orientation

Effective Date: 10/1/2014

Employee orientation is a welcoming process designed to make new employees feel comfortable, informed about the company, and prepared to succeed with Minnesota Medical Solutions.

New employee orientation is conducted by the department manager, and includes an overview of our company history as well as an explanation of our core values, vision, and mission. Our intention is to provide new employees with a clear understanding of our goals and objectives. In

addition, the program will address benefits, company programs, and standards and provide employees with the opportunity to complete any necessary paperwork.

At this time, employees will also be presented with all codes, keys, and procedures needed to navigate within the workplace. New employees' supervisors will introduce them to staff throughout the company, review the job description and scope of their position, and explain vital company procedures.

Training and Professional Development

Effective Date: 10/1/2014

Minnesota Medical Solutions is committed to the personal and developmental growth of all its employees. To this end, Minnesota Medical Solutions not only prepares their new hires to succeed with the Company, Minnesota Medical Solutions also continually teaches, develops, and improves current employees' skills in order to constructively respond to today's on-going business challenges.

Employee training and development is essential in responding to the rapid business changes that occur due to continual economic fluctuations, global economy, enhanced technology, and cultural and demographic factors. Minnesota Medical Solutions strongly encourages the training and development of employees to aid them in improving their ability to succeed. Minnesota Medical Solutions employees receive job-specific training regularly.

Minnesota Medical Solutions firmly believes in developing employees by drawing on the knowledge and experience of its own talented workforce. To this end, Minnesota Medical Solutions encourages coaching and mentoring.

Internal Communication

Effective Date: 10/1/2014

Effective and ongoing communication within Minnesota Medical Solutions is essential. As such, the company maintains systems through which important information can be shared among employees and management. The company will utilize a portal which provides a forum for intra-company communication.

Employees may also correspond and send files via a personal company e-mail. For more information on the appropriate usage of e-mail in the workplace, employees may refer to the Internet Usage and Computer Usage policies.

All employees are responsible for checking internal communications on a frequent and regular basis. Employees should consult their supervisor with any questions or concerns on information disseminated.

Company Portal

Effective Date: 10/1/2014

We believe well-informed employees feel better about their jobs and the company they work for. That is why Minnesota Medical Solutions intends to design an intra-company networking portal. The portal is intended to provide employees access to important posted information and announcements and to encourage communication within the company.

The employee is responsible for reading necessary information posted on the portal. Employees are encouraged to check the portal daily.

Staff Meetings

Effective Date: 10/1/2014

Minnesota Medical Solutions strongly believes in open communication among directors, managers and all employees. As such, Minnesota Medical Solutions will conduct staff meetings as needed. These meetings will provide an opportunity to inform employees of recent Minnesota Medical Solutions activities and initiatives, discuss project development and improvement, and recognize employees for outstanding effort and achievement. A memo will be distributed to all employees required to attend, specifying the time, date, location, and specific purpose for the meeting.

Employment of Relatives

Effective Date: 10/1/2014

Minnesota Medical Solutions always hires employees based on their experience, skills, and background.

Employees with family members interested in working for Minnesota Medical Solutions must apply through the normal channels. Special consideration will not be given to employees' relatives.

Although the employment of relatives is permitted, hiring a relative of an employee into a role that would place him or her as the employee's supervisor or subordinate is prohibited.

Relatives cannot be in a position in which they work directly together or can influence decisions regarding the status of employment, promotion, or compensation affecting another relative.

In order to reduce potential conflict of interest, applicants will not be considered for employment in a position in which they would be subject to supervision by a relative.

Employment of Minors

Effective Date: 10/1/2014

Minnesota Medical Solutions only hires employees who are legally authorized to work, as prescribed by federal, state and local laws. Applicants under the age of twenty-one (21) will not be permitted to work for Minnesota Medical Solutions due to Minnesota law.

Immigration Law Compliance

Effective Date: 10/1/2014

Minnesota Medical Solutions is committed to employing only United States citizens and aliens who are authorized to work in the United States and does not unlawfully discriminate on the basis of citizenship or national origin.

In compliance with the Immigration Reform and Control Act of 1986, as amended, each new employee, as a condition of employment, must complete the Employment Eligibility Verification Form I-9 and present documentation establishing identity and employment eligibility. Former employees who are rehired must also complete the form if they have not completed an I-9 with Minnesota Medical Solutions within the past three years, or if their previous I-9 is no longer retained or valid.

Whistleblower Protection

Effective Date: 10/1/2014

This policy is designed to protect employees and address Minnesota Medical Solutions commitment to integrity and ethical behavior. In accordance with Whistleblower Protection regulations, Minnesota Medical Solutions will not tolerate harassment, retaliation, or any type of discrimination against an employee who:

- Makes a good faith complaint regarding suspected Company or employee violations of the law;
- Makes a good faith complaint regarding accounting, internal accounting controls, or auditing matters that may lead to incorrect, or misrepresentations in, financial accounting;
- Provides information to assist in an investigation regarding violations of the law; or
- Files, testifies, or participates in a proceeding in relation to alleged violations of the law.

Negative employment sanctions, such as demotion or termination, as a result of an employee's decision to provide good-faith information regarding violations of the law, will not be tolerated. In addition, discrimination, threats, and harassment is prohibited.
Anyone violating this policy will be subject to discipline, up to and including termination of employment.

Employee Benefits

Anniversary Date

Effective Date: 10/1/2014

The first day an employee reports to work is considered their official start date and corresponding anniversary date. Anniversary dates are used for calculating benefit eligibility for PTO and other company benefits.

Probation

Effective Date: 10/1/2014

Employees who have not attained seniority with Minnesota Medical Solutions shall be deemed probationary and subject to discharge without recourse or notice. Once probation is completed, the employee's seniority date shall be retroactive as of the first (1st) day of hire. New employees shall serve a probation period of thirty (30) calendar days. Prior to the end of the thirty (30)-day probationary period in the case of an employee found questionable by management. [The prior sentence is contained in the CBA and should be clarified.] If the Union approves, an additional thirty (30)-day probationary period may be instituted after which time, if the employee remains in the employ of Minnesota Medical Solutions, the seniority date shall revert back to their original date of employment.

Benefits

Effective Date: 10/1/2014

Minnesota Medical Solutions offers a benefits program for its full-time employees. However, the existence of these programs does not signify that an employee will necessarily be employed for the required time necessary to qualify for the benefits included in and administered through these programs.

Holidays

Effective Date: 10/1/2014

The following days shall be recognized as paid holidays: New Year's Day (beginning at 6 pm on New Year's Eve), Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day (beginning at 4pm on Christmas Eve).

Due to the nature of our business, Minnesota Medical Solutions may require employees to work on a holiday.

When required to work on a recognized holiday, employees shall be paid at their straight-time hourly rate plus holiday pay for all hours worked on the holiday. Employees working less than eight (8) hours on the holiday for full-time or less than their prorated hours on the holiday for part-time will still receive their full holiday pay in addition to straight time pay for the hour weekend. Holiday work shall be offered in order of seniority. In the event the Employer must require employees to work on a holiday, the most junior employees will be mandated to work.

All other holiday hours will be determined by company need and scheduled by the department managers based on the instruction of the CEO/Vice President of Operations.

Vacation

Effective Date: 10/01/2014

An employee covered by this Agreement will be granted vacation with pay each year on their anniversary date, based on their continuous years of service with Minnesota Medical Solutions as follows: an employee with one (1) year of service shall receive two (2) weeks, an employee with three (3) years of service shall receive three (3) weeks, an employee with ten (10) years of service shall receive four (4) weeks, and an employee with sixteen (16) years of service receive five (5) weeks.

Vacations for all employees will be paid on a per day basis based on the average amount of hours worked per day by the employee for the previous calendar year, with a maximum of eight (8) hours per day and (40) hours per week. Employees will be paid straight-time pay for vacation days.

Minnesota Medical Solutions will post vacation sign-up sheets by January 15 of each year and vacations selected on the basis of seniority for the period from April 1 through the following March 31. The approved vacation schedule shall be posted by April 1 of each year.

Vacation scheduling will be done in two (2) rounds, each in seniority order. During the first round, no employee may select more than one (1) week of vacation time before other employees have had an opportunity to select. The deadline to select the first week will be February 1. During the second round, each employee may schedule the entire balance of their vacation eligibility. Vacation scheduling will be done in rounds to ensure that, to the greatest extent possible, each employee will have the opportunity to schedule some vacation time during the summer months. The selection of vacation periods must be completed by March 1 of each year. Minnesota Medical Solutions reserves the right to designate the number of employees that may be on vacation at any time, but in no event less than one (1) employee in any one (1) week.

Employees are not permitted to rollover unused vacation days from year-to-year.

Employees may take vacation as individual days or half-days; such days will be granted by mutual agreement. Under normal circumstances requests to use these single or half days should be made in writing during the week prior to the posting of the schedule for the period when the vacation days are to be used. These requests will be granted as mutually agreed to by the

employee and Minnesota Medical Solutions. When an employee requests to use these single or half days due to an immediate need said requests will not be unreasonably withheld.

Whenever a holiday falls during a vacation period of an employee, such employee shall receive an additional day of vacation with full pay; however, by mutual agreement between Minnesota Medical Solutions and the employee, the employee may be paid out the additional day without an extra day being taken off.

Sick Pay

Effective Date: 10/1/2014

All employees will earn one (1) hours of sick pay for each forty (40) hours of work, beginning with date of hire. Employees absent for a full day will be paid based on the average amount of hours worked per-day for the previous thirty (30) days, provided the employee has accumulated enough sick pay hours to cover the amount of time the employee is absent. Regardless of the average amount of hours the employee has worked per-day for the previous thirty (30) days, no employee will be paid more than eight (8) hours of straight-time pay for a full day of absence.

Hours of sick pay are not paid out at any time other than when used for legitimate sick leave. Minnesota Medical Solutions has a right to request verification that an employee's sick leave is legitimate, provided that such verification does not interfere with an employee's right to patient privacy, if the employee is absent for two (2) consecutive days.

Employees are permitted to rollover up to twenty (20) unused hours of sick pay from year-to-year.

Jury Duty

Effective Date: 10/1/2014

Minnesota Medical Solutions encourages employees to fulfill their civic responsibilities by serving jury duty when required. Employees must provide their immediate supervisor with a copy of their jury summons as soon as possible to provide time to make arrangements to accommodate their absence.

Either Minnesota Medical Solutions or the employee may request an excuse from jury duty if it is determined that the employee's absence would create serious operational difficulties.

When a full-time employee is required to serve on a petit jury, the Minnesota Medical Solutions agrees to pay the difference between the employee's regular straight time daily rate and the amount received by the employee for jury service, provided the employee has completed six (6) months service with Minnesota Medical Solutions, is required to report by the jury commissioner and does serve on any jury. Such an employee must report for work whenever their presence is not required on jury duty. Hours spent on jury duty will be counted as time worked for Minnesota Medical Solutions.

Voting Time

Effective Date: 10/1/2014

Minnesota Medical Solutions encourages employees to exercise their civic duties by voting. Employees will be offered up to three (3) hours paid annually for the purpose of voting

An employee requesting time off to vote must provide their supervisor with 72 hours advance notice so that the appropriate coverage can be made.

Military Leave

Effective Date: 10/1/2014

Minnesota Medical Solutions proudly grants employees time off of work for service in the uniformed services in accordance with the Uniformed Services Employment and Reemployment Rights Act (USERRA). In addition, Minnesota Medical Solutions complies with the terms of the Universal Military Training and Service Act, with reference to all provisions providing for the reemployment of persons entering military service.

All employees requesting time off for military service must provide advance notice of military service to their immediate supervisor, unless military necessity prevents such notice or it is otherwise impossible or unreasonable.

Employees are eligible for re-employment for up to five (5) years from the date their military leave began. The period an individual has to make application for reemployment or report back to work after military service is based on time spent on military duty. For service of less than 31 days, the service member must return at the beginning of the next regularly scheduled work period on the first full day after release from service, taking into account safe travel home plus an eight-hour rest period. For service of more than 30 days but less than 181 days, the service member must submit an application for reemployment within 14 days of release from service. For service of more than 180 days, an application for reemployment must be submitted within 90 days of release from service.

Employees who qualify for re-employment will return to active employment at a pay level and status equal to that which they would have attained had they not entered military service. They will be treated as though they were continuously employed for purposes of determining benefits based on length of service.

Funeral Leave

Effective Date: 10/1/2014

An employee is eligible for paid funeral leave upon completion of the employee's probation Leave days are for the purpose of arranging for and attending the funeral of a covered family

member. Employees will receive funeral pay as follows: four (4) days paid leave in the event of the death of the employee's spouse, child, step-child or significant other; three (3) days paid leave in the event of the death of the employee's grandchild, grandparents, current mother-in-law, father-in-law, brother-in-law or sister-in-law.

Minnesota Medical Solutions understands the deep impact that death can have on an individual or a family, therefore additional unpaid time off may be granted at the company's discretion. Arrangements must be approved by the employee's supervisor.

To be eligible for bereavement leave, employees are expected to notify their supervisors at the earliest opportunity so that the supervisor can try to arrange coverage for the employee's absence. In addition, Minnesota Medical Solutions may require verification of the need for the leave.

Family and Medical Leave

Effective Date: 10/1/2014

Employees may be entitled to a leave of absence under the Family and Medical Leave Act (FMLA). This policy provides information regarding FMLA eligibility and administration. Questions regarding FMLA should be directed to the Director of Human Resources. Under the CBA, employees may also use earned sick pay, vacation and personal days for the care of sick children, parents, or spouses, in addition to personal medical reasons.

Eligibility Requirements:

Employees eligible for leave under the FMLA are those who: (1) have worked at least 12 months for Minnesota Medical Solutions; (2) have worked for at least 1,250 hours during the 12 month period immediately preceding the start date of the requested leave; and (3) are employed at a worksite where 50 or more employees are located within 75 miles of the worksite.

Basic FMLA Leave Entitlement:

The FMLA grants up to 12 weeks of unpaid leave to eligible employees for the following reasons: (1) to care for the employee's child following birth or placement for adoption or foster care; (2) to care for the employee's spouse, son, daughter or parent (but not in-law) who has a serious health condition; (3) for the employee's own serious health condition (including any period of incapacity due to pregnancy, prenatal medical care, or child birth) that makes the employee unable to perform one or more of the essential functions of the employee's job; or (4) because of any qualifying exigency arising out of the fact that an employee's spouse, son, daughter, or parent is a covered military member who is a member of a regular component of the Armed Forces on active duty or who has been notified of an impending call or order to active duty status for deployment to any foreign country in the regular or reserve components of the Armed Forces, including the National Guard or Reserves.

A serious health condition is an illness, injury, impairment, or physical or mental condition that involves either an overnight stay in a medical care facility, or continuing treatment by a health

care provider for a condition that either prevents the employee from performing the functions of the employee's job, or prevents the qualified family member from participating in school or other daily activities. Subject to certain conditions, the continuing treatment requirement may be met by a period of incapacity of more than three consecutive calendar days combined with at least two visits to a health care provider or one visit and a regimen of continuing treatment, or incapacity due to pregnancy, or incapacity due to a chronic condition. Other conditions may meet the definition of continuing treatment.

Qualifying exigencies may include attending certain military events, arranging for alternative childcare, addressing certain financial and legal arrangements, attending certain counseling sessions, and attending post-deployment reintegration briefings.

Additional Military Family Leave Entitlement:

In addition to the basic FMLA leave entitlement discussed above, an eligible employee who is the spouse, son, daughter, parent or next of kin of a covered service member is entitled to take up 26 weeks of leave during a single 12-month period to care for the service member with a serious injury or illness. Leave to care for a service member shall only be available during a single-12 month period and, when combined with other FMLA-qualifying leave, may not exceed 26 weeks during the single 12-month period. The single 12-month period begins on the first day an eligible employee takes leave to care for the injured service member.

A covered service member means a member of the Armed Forces, including a member of the National Guard or Reserves, and/or a veteran of the Armed Forces, including a veteran of the National Guard or Reserves, who is undergoing medical treatment, recuperation, or therapy, is otherwise in outpatient status, or is on the temporary retired list, for a serious injury or illness. Such veteran is considered a covered service member if he/she was a member of the Armed Forces, including the National Guard and Reserves, at any time during the five-year period preceding the date on which the veteran undergoes medical treatment, recuperation or therapy. A covered service member of the Armed Forces would have a serious injury or illness if he/she has incurred an injury or illness in the line of duty while on active duty in the Armed Forces or if he/she has an injury or illness that was incurred before the covered service member's active duty and was aggravated by service in the line of duty while on activity duty; provided that the injury or illness may render the service member medically unfit to perform duties of the member's office, grade, rank or rating. A serious injury or illness of a veteran is further defined to encompass an injury or illness incurred in the line of duty while on active duty, or which existed prior to active duty but was aggravated by service in the line of duty while on active duty, and that manifested itself either before or after the covered service member became a veteran.

Intermittent Leave and Reduced Leave Schedules:

FMLA leave usually will be taken for a period of consecutive days, weeks or months. However, employees also are entitled to take FMLA leave intermittently or on a reduced leave schedule when medically necessary due to a serious health condition of the employee or covered family member or the serious injury or illness of a covered service member.

Protection of Group Health Insurance Benefits:

During FMLA leave, eligible employees are entitled to receive group health plan coverage on the same terms and conditions as if they had continued to work.

Restoration of Employment and Benefits:

At the end of FMLA leave, subject to some exceptions including situations where job restoration of "key employees" will cause the Company substantial and grievous economic injury, employees generally have a right to return to the same or equivalent positions with equivalent pay, benefits and other employment terms. The Company will notify employees if they qualify as "key employees", if it intends to deny reinstatement, and of their rights in such instances. Use of FMLA leave will not result in the loss of any employment benefit that accrued prior to the start of an eligible employee's FMLA leave.

Notice of Eligibility for, and Designation of, FMLA Leave:

Employees requesting FMLA leave are entitled to receive written notice from Minnesota Medical Solutions telling them whether they are eligible for FMLA leave and, if not eligible, the reasons why they are not eligible. When eligible for FMLA leave, employees are entitled to receive written notice of: (1) their rights and responsibilities in connection with such leave; (2) the Company's designation of leave as FMLA-qualifying or non-qualifying, if not FMLA-qualifying, the reasons why; and (3) the amount of leave, if known, that will be counted against the employee's leave entitlement.

Minnesota Medical Solutions may retroactively designate leave as FMLA leave with appropriate written notice to employees provided the Company's failure to designate leave as FMLA-qualifying at an earlier date did not cause harm or injury to the employee. In all cases where leaves qualify for FMLA protection, Minnesota Medical Solutions and the employee can mutually agree that leave be retroactively designated as FMLA leave.

Notice of the Need for Leave:

Employees who take FMLA leave must timely notify Minnesota Medical Solutions of their need for FMLA leave. The following describes the content and timing of such employee notices.

Content of Employee Notice:

To trigger FMLA leave protections, employees must inform the Director of Human Resources of the need for FMLA-qualifying leave and the anticipated timing and duration of the leave, if known. Employees may do this by either requesting FMLA leave specifically, or explaining the reasons for leave so as to allow the Company to determine that the leave is FMLA-qualifying. Calling in "sick," without providing the reasons for the needed leave, will not be considered sufficient notice for FMLA leave under this policy. Employees must respond to the Company's questions to determine if absences are potentially FMLA-qualifying.

If employees fail to explain the reasons for FMLA leave, the leave may be denied. When employees seek leave due to FMLA-qualifying reasons for which the Company has previously provided FMLA-protected leave, they must specifically reference the qualifying reason for the leave or the need for FMLA leave.

Timing of Employee Notice:

Employees must provide 30 days advance notice of the need to take FMLA leave when the need is foreseeable. When 30 days notice is not possible, or the approximate timing of the need for leave is not foreseeable, employees must provide the Company notice of the need for leave as soon as practicable under the facts and circumstances of the particular case. Employees who fail to give 30 day notice for foreseeable leave without a reasonable excuse for the delay, or otherwise fail to satisfy FMLA notice obligations, may have FMLA leave delayed or denied.

Medical Certifications:

Depending on the nature of FMLA leave sought, employees may be required to submit medical certifications supporting their need for FMLA-qualifying leave. It is the employee's responsibility to provide Minnesota Medical Solutions with timely, complete and sufficient medical certifications. Employees must provide the requested certifications within 15 calendar days following the Company's request, unless it is not practicable to do so. Minnesota Medical Solutions may deny FMLA leave to employees who fail to timely cure deficiencies or otherwise fail to timely submit requested medical certifications.

Employees requesting leave because of their own, or a covered relation's, serious health condition, or to care for a covered service member, must supply medical certification supporting the need for such leave from their health care provider or, if applicable, the health care provider of their covered family or service member. If employees provide at least 30 days notice of medical leave, they should submit the medical certification before leave begins.

Certifications Supporting Need for Military Family Leave:

Upon request, the first time employees seek leave due to qualifying exigencies arising out of the active duty or call to active duty status of a covered military member, the Company may require employees to provide: (1) a copy of the covered military member's active duty orders or other documentation issued by the military indicating the covered military member is on active duty or call to active duty status and the dates of the covered military member's active duty service; and (2) a certification from the employee setting forth information concerning the nature of the qualifying exigency for which leave is requested. Employees shall provide a copy of new active duty orders or other documentation issued by the military for leaves arising out of qualifying exigencies arising out of a different active duty or call to active duty status of the same or a different covered military member.

When leave is taken to care for a covered service member with a serious injury or illness, Minnesota Medical Solutions may require employees to obtain certifications completed by an authorized health care provider of the covered service member.

Substitution of Paid Leave for Unpaid FMLA Leave:

Employees must use any accrued paid time while taking unpaid FMLA leave. The substitution of paid time for unpaid FMLA leave time does not extend the length of FMLA leaves; the paid time will run concurrently with an employee's FMLA entitlement.

Leaves of absence taken in connection with a disability leave plan or workers' compensation injury/illness shall run concurrently with any FMLA leave entitlement.

Coordination of FMLA Leave with Other Leave Policies:

The FMLA does not affect any federal, state or local law prohibiting discrimination, or supersede any State or local law that provides greater family or medical leave rights. For additional information concerning leave entitlements and obligations that might arise when FMLA leave is either not available or exhausted, please contact the Director of Human Resources.

Donations

Effective Date: 10/1/2014

Minnesota Medical Solutions believes in the importance of making charitable contributions. As such, the Company will match all full time and part time employee contributions to charitable organizations up to $1,000 per employee per year.

In order for Minnesota Medical Solutions to match employee contributions, Company management must approve the charity. Employees interested in utilizing this benefit should submit a donation request to the Director of Human Resources.

Health Insurance

Effective Date: 10/1/2014

Minnesota Medical Solutions employees will receive health insurance through the United Food and Commercial Workers Union Local 1189 and St. Paul Food Employers Health Care Plan. This will be available to any full-time employee who has worked thirty (30) or more hours per week or averaged thirty (30) or more hours per week for the reporting period Minnesota Medical Solutions will also make contributions to the Fund on behalf of any regular part-time employee working less than thirty (30) hours per week. Minnesota Medical Solutions will pay 100% of the contributions for full-time and part-time participants in the Plan.

Workers' Compensation

Effective Date: 10/1/2014

Employees who are injured on the job at Minnesota Medical Solutions are eligible for Workers' Compensation benefits. Such benefits are provided at no cost to employees and cover any injury or illness sustained in the course of employment that requires medical treatment.

Employees who sustain work-related injuries or illnesses must notify their supervisor immediately so Minnesota Medical Solutions can notify the workers' compensation insurance carrier as soon as possible.

Lost time or medical expenses incurred as a result of an accident or injury that occurred while an employee was on the job will be compensated for in accordance with workers' compensation laws. Minnesota Medical Solutions pays for this protection in full. No premium is charged for this coverage and no individual enrollment is required. Minnesota Medical Solutions will provide medical care and a portion of lost wages through our insurance carrier.

All job-related accidents or illnesses must be reported to an employee's supervisor immediately upon occurrence. Supervisors will then immediately contact the Director of Human Resources to obtain the required claim forms and instructions.

Timekeeping and Payroll

Timekeeping

Effective Date: 10/1/2014

It is the company's policy to comply with applicable laws that require records to be maintained of the hours worked by our employees. Every employee is responsible for accurately recording time worked by clocking in and out of the timekeeping system coinciding with arrival and departure times.

In addition to recording arrival and departure times, all employees (exempt and non-exempt) are required to accurately record the start and end of each meal period as well as any departures for non-work related reasons.

PTO, absences for jury duty, funeral leave or military training must be specifically recorded by all managers for all employees on the provided form.

It is the responsibility of all employees to confirm the time records for each employee each week. Any corrections must be made with the department manager.

All department managers must confirm employees' time records and provide the Payroll Manager a report of hours worked every other Sunday in line with the company's bi-weekly payroll.

Altering, falsifying, tampering with time records, or recording time on another employee's time record may result in disciplinary action, up to and including termination of employment.

Paydays

Effective Date: 10/1/2014

Minnesota Medical Solutions employees are paid on a biweekly basis. In the event that a regularly scheduled payday falls on a holiday, employees will be paid on the day preceding the holiday, unless otherwise required by state law.

Paychecks will not, under any circumstances, be given to any person other than the employee without written authorization. Paychecks may also be mailed to the employee’s listed address or, upon advance written authorization, deposited directly into an employee's bank account.

Employees who elect payment through direct deposit will receive an itemized statement of wages when the Company makes direct deposits.

In the event of employee termination, the employee will receive their accrued pay in accordance with applicable federal, state and local laws.

Overtime

Effective Date: 10/1/2014

Minnesota Medical Solutions is open for business 7 days per week. Overtime compensation is paid to nonexempt employees in accordance with federal and state wage and hour restrictions.

For hourly employees, all time worked in excess of eight (8) hours in one (1) day or in excess of forty (40) hours in one (1) week shall be paid at the rate of time and one-half (1 ½) the straight-time hourly rate. Alternative worksheets may be arranged by mutual consent so long as they comply with state and federal laws. Daily and weekly overtime shall be offered by seniority in each classification.

Time off on personal time, holidays, vacation, or any leave of absence will not be considered hours worked when calculating overtime, this includes all PTO.

All overtime work performed by an hourly employee must receive the supervisor's prior authorization. Overtime worked without prior authorization from the supervisor may result in disciplinary action. The supervisor's confirmation of hours worked authorizes pay for overtime.

When possible, both exempt and non-exempt employees will be given advanced notice of when Minnesota Medical Solutions might require overtime hours. Minnesota Medical Solutions may provide 24 hours advanced notice in this circumstance.

Travel Time

Effective Date: 10/1/2014

In accordance with applicable wage and hour laws, Minnesota Medical Solutions provides non-exempt employees pay for time spent traveling for work-related purposes. Different guidelines are followed based on the different circumstances outlined below:

Travel from Site to Site

Travel from one job to another during the workday is counted as work time.

One-day Assignments

Travel out of town during the workday is counted as work time, minus meal periods and the period of time that normally would be considered home to work travel time

Overnight Assignments

Travel out of town overnight is counted as work time only for those hours that fall within an employee's regularly scheduled shift.

Travel on a Non-work Day

Travel time required of non-exempt employees which occurs during his or her normal working schedule (e.g. 8:00 am to 4:30 pm) is work time even if the travel takes place on a day other than one's normal work day.

Home to Work Travel

Travel from home to work is not considered work time, regardless of whether the employee must report to work at a fixed location or at various job sites.

Expense Reimbursement

Effective Date: 10/1/2014

Expenses incurred by an employee must be approved in advance by their supervisor. Some expenses that may warrant reimbursement include, but are not limited, to the following: mileage costs, air or ground transportation costs, lodging, and meals used for the purpose of carrying out company business.

Employees must submit expense reports to HR@minnmed.com for approval.

Questions regarding this policy should be directed to your supervisor.

Garnishments

Effective Date: 10/1/2014

Minnesota Medical Solutions honors federal and state required withholdings from your paycheck upon court order or for the purpose of child support, or repayment of unpaid student loans or federal, state, local municipality or school taxes.

Upon Company receipt of a notice of wage demand, the employee will be immediately notified of the name of the creditor, the amount claimed and whether the demand is based on a wage deduction or a wage assignment. All garnishments will abide by applicable withholding limits as prescribed by law.

Minnesota Medical Solutions does not discriminate or take any adverse action against an employee whose wages are subject to garnishment.

Pay Corrections

Effective Date: 10/1/2014

Minnesota Medical Solutions takes all reasonable steps to ensure that employees receive the correct amount of pay in each paycheck and that employees are paid promptly on the scheduled pay date.

In the unlikely event that there is an error in the amount of pay, the employee should promptly bring the discrepancy to the attention of their supervisor so corrections can be made as quickly as possible.

Demotions/Reductions in Pay

Effective Date: 10/1/2014

Certain circumstances may warrant the downgrading of responsibilities and/or compensation. This may be due to a variety of reasons; including poor work performance, an employee's request, or a change in business needs. All demotions will be handled in a fair and consistent manner through the Director of Human Resources.

The three types of demotions are outlined below:

Administrative Demotion:

Occurs when an employee is moved from his or her current position to a position in a lower salary grade with less responsibilities and pay to prevent disruption of business; the decision is made by Minnesota Medical Solutions management.

Disciplinary Demotion:

Occurs when an employee must be moved to a lower salary grade position with fewer responsibilities due to poor work performance or failure to meet expectations and/or goals of the department; the decision is made by supervisory level employees and Company management.

Voluntary Demotion:

Occurs when an employee initiates a written request for a lower salary grade position with fewer responsibilities for their own personal reasons.

All demoted employees will be paid consistent with similarly situated employees within their new pay grade.

Employment Status and Record Keeping

Employment Classifications

Effective Date: 10/1/2014

For purposes of salary administration and eligibility for overtime payments and employee benefits, Minnesota Medical Solutions classifies employees as either exempt or non-exempt. Non-exempt employees are entitled to overtime pay in accordance with federal and state overtime provisions. Exempt employees are exempt from federal and state overtime laws and, but for a few narrow exceptions, are generally paid a fixed amount of pay for each workweek in which work is performed.

If you change positions during your employment with Minnesota Medical Solutions or if your job responsibilities change, you will be informed by the Director of Human Resources of any change in your exempt status.

In addition to your designation of either exempt or non-exempt, you also belong to one of the following employment categories:

Full-Time:

Full-time employees are regularly scheduled to work greater or equal to 32 hours per week. Generally, regular full-time employees are eligible for Minnesota Medical Solutions's benefits, subject to the terms, conditions, and limitations of each benefit program.

Part-Time:

Part-time employees are regularly scheduled to work less than 32 hours per week. Regular part-time employees may be eligible for some Minnesota Medical Solutions benefit programs, subject to the terms, conditions, and limitations of each benefit program.

Temporary:

Temporary employees include those hired for a limited time to assist in a specific function or in the completion of a specific project. Employment beyond any initially stated period does not in any way imply a change in employment status or classification. Temporary employees retain temporary status unless and until notified by company management of a change. They are not eligible for any of Minnesota Medical Solutions's benefit programs.

Work Schedules

Effective Date: 10/1/2014

Work schedules are posted at each location. On occasion, your manager may need to change your regular schedule to meet scheduling demands, so be sure to review the schedule each week.

Managers will try to avoid scheduling conflicts as much as is possible. If you need to take a day off, be sure to inform your manager as soon as possible so that the appropriate scheduling adjustments can be made. However, there is no guarantee that your request will be honored.

Questions regarding this policy should be directed to your supervisor.

Personnel Files

Effective Date: 10/1/2014

All personnel files are the property of Minnesota Medical Solutions. Employee records are maintained to aid in the administration of human resource policies with greater efficiency and to also aid in the compliance with federal and state employment policies. Records are intended to provide documentation in support of human resource decisions such as hiring, compensation, discipline and termination.

Employees who wish to review their own file should contact the Director of Human Resources. With reasonable advance notice, employees may review their personnel files in the Company's office and in the presence of the Director of Human Resources.

Minnesota Medical Solutions retains the following records on all of its employees:

Personnel File Records:

With each employee's personnel files are documents related to their employment and performance; including: pre-employment applications, pre-employment tests, employment\ contracts, job descriptions, performance appraisals, position and rate changes as well as documentation related to benefits administration, transfers, trainings, disciplinary actions, and exit interviews. Management personnel of Minnesota Medical Solutions who have a legitimate reason to review the file are allowed to do so. These records will be maintained for a minimum of six 6 years following the date of separation.

Personnel files do not include any information that may lend itself to discrimination, including: date of birth, age, gender, marital status, medical history, national origin, religion, and any other information unrelated to the job or Company. Documentation that reveals this type of information will be incorporated in the employee's health file.

Payroll Records:

Each employee's payroll records include documents related to their compensation, including: their wage rate, number of hours worked, gross wages, deductions, allowances claimed, net wages, and overtime. These records will be maintained for a minimum of three (3) years following date of separation.

Medical Records:

In accordance with the American's with Disabilities Act of 1990 (ADA), all employees' medical records are treated as confidential. As such, this information is kept separate from employment and payroll records. Only the Director of Human Resources has access to these files. All employee records are maintained under lock and key security at all times.

Salary Administration

Effective Date: 10/1/2014

Salary administration at Minnesota Medical Solutions is intended to achieve fair and consistent pay practices, comply with state and federal wage and hour laws, provide Equal Employment Opportunities, and offer competitive compensation packages relative to the current labor market. As such, Minnesota Medical Solutions is committed to paying our employees equitable wages that appropriately reflect the requirements and responsibilities of their positions and are comparable to the pay received by similarly situated employees in other organizations in the area.

Compensation for each position is determined by several factors including the essential duties and responsibilities of the job as salary survey data of other geographically similar companies in our industry.

Minnesota Medical Solutions periodically reviews its salary administration program and restructures it as necessary. Merit-based pay adjustments may be awarded in conjunction with superior employee performance documented by the performance evaluation process. Merit-based retail and production bonuses may be awarded in conjunction with superior company performance.

Employees should bring their pay-related questions or concerns to the attention of the Human Resources Manager, who is also available to answer specific questions about the salary administration program.

Introductory Period

Effective Date: 10/1/2014

The introductory period for full-time and part-time employees is 90 days from the date of hire.

During this time, employees may evaluate the Company and management has its first opportunity to evaluate the employee's performance.

Employment beyond the introductory period is contingent upon the satisfactory evaluation of an employee's performance. If at any time during the introductory period it is determined that an employee has not met their job requirements, employment may be terminated without advance notice.

Upon satisfactory completion of the introductory period, a 90-day review will be given and benefits will begin as appropriate. All employees, regardless of classification or length of service, are expected to meet and maintain Company standards for job performance and behavior.

Newly promoted employees will be subject to an additional 90-day introductory period. If in this time it is found that the employee is unable to successfully execute the requirements of their new position, the employee may be reinstated to the position held, or comparable one for which he or she is qualified, depending on the availability of such positions and the Company's needs.

Performance Evaluations

Effective Date: 10/1/2014

Supervisors will conduct performance reviews and planning sessions with all full-time and part-time employees after 90 days of service. Thereafter, formal performance evaluations will be conducted annually. Supervisors may conduct informal performance reviews and planning sessions more often if they choose.

Performance reviews are designed for the supervisor and the employee to discuss his or her current job tasks, encourage and recognize attributes, and discuss positive, purposeful approaches for meeting work-related goals. Together, the employee and supervisor discuss ways in which the employee can accomplish goals or learn new skills. The planning sessions are designed for the employee and his or her supervisor to make and agree on new goals, skills, and areas for improvement.

Wage increases will be considered based upon an employee's annual performance review as well as his or her degree of improvement, dependability, attitude, cooperation, adherence to all employment policies, and employee status within a given pay range. Minnesota Medical Solutions directly links wage and salary increases with performance. If promoted, employees may be eligible for a pay increase as dictated by the pay range of the new position.

HIPAA

Effective Date: 10/1/2014

Pursuant to the Health Insurance Portability and Accountability Act of 1996 (HIPAA), the U.S.

Department of Health and Human Services (HHS) has released provisions that address, among other things: (1) standards for the privacy of individually identifiable health information; (2) security standards to protect the confidentiality and integrity of health information and the information technology used to store, process, and transmit such data; and (3) standards for administrative transactions and data elements exchanged electronically that are consistent with the goals of improving the operation of the health care system and reducing administrative costs.

Privacy Pledge:

Minnesota Medical Solutions does not disclose personal medical information and ensure that its practices and standards comply with HIPAA and other applicable federal and state laws and regulations. Minnesota Medical Solutions will work with appropriate regulatory and accreditation agencies to ensure consistency between Minnesota Medical Solutions's policies and HIPAA. In addition, when there is a difference between state and federal regulations, we will always uphold the privacy standard that greater protects the employee.

Personal Information Received:

We may receive personal medical and financial information about employees from the following sources:

- Applications, consents, authorizations and other forms provided by you, or your authorized representative;
- Documentation collected during your care (test results, physician orders, etc.);
- Billing and payment transactions (such as claims submission with insurance companies and payment) with us, our affiliates or others; and
- Outside sources pertaining to care or coverage, such as health care providers, insurance companies and federal and state agencies.

Information Protection:

Our policy restricts access of your personal information to employees who have a need to know, as permitted by law. We maintain physical, electronic and procedural safeguards that comply with legal requirements to protect your non-public personal medical and financial information.

Minnesota Medical Solutions has undertaken an initiative to educate its officers, employees, volunteers and others about HIPAA compliance. This training includes an annual refresher course in privacy and confidentiality.

Use of Individually Identifiable Health Information:

We use medical and financial information to provide and facilitate treatment, collect payment for services and conduct health care operations.

Minnesota Medical Solutions may, as permitted by law, make discretionary public health disclosures of protected health information if, in its judgment, public safety is believed to be at risk.

Minnesota Medical Solutions may use employee medical and financial data for purposes of contacting you to provide information about health-related benefits and services that may be of interest to you.

Other uses of your information may require you to provide separate written authorizations.

Your Privacy Rights:

At Minnesota Medical Solutions, you have the following rights:

- The right to authorize disclosure of your protected health information to third parties;
- The right to revoke previously authorized disclosures;
- The right to request limited disclosure of your health information;
- The right to inspect and copy your protected health information;
- The right to amend information;
- The right to request a listing of personnel who have accessed your information; and
- The right to request to be placed on a mailing list to receive notice of updates to Minnesota Medical Solutions's Privacy Notices.

If you have any questions about this policy, wish to request personal disclosure documentation or to confidentially report an incident, contact the Director of Human Resources. Requesting information or reporting an incident will not adversely affect your access to health insurance at Minnesota Medical Solutions.

Employee Data Protection

Effective Date: 10/1/2014

In an effort to combat identity theft and to protect the privacy rights of our employees, Minnesota Medical Solutions vigorously strives to safeguard employees' personal information. Personal information includes any information capable of being associated with a particular individual, such as Social
Security numbers (SSNs), driver's license numbers, addresses, bank account numbers, and the like.

Minnesota Medical Solutions has implemented administrative, physical, and technical controls to ensure the confidentiality of personal information, restrict access to those with a need know, and protect against accidental or unlawful disclosure or destruction. These controls require that all Minnesota Medical Solutions employees, contractors, and third party vendors observe the following guidelines:

- Data will only be collected, stored, and analyzed for legitimate human resources, business, or safety/security purposes;
- Data will be collected, stored, processed and used only in accordance with applicable state and federal laws;
- Data will be relevant to the purpose for which it is collected;
- Data will be retained only as long as is necessary for the purpose for which it was collected;
- Appropriate measures will be taken to prevent unauthorized access; and
- Appropriate measures will be taken to destroy and dispose of personal information

It is the responsibility of all employees to provide the Director of Human Resources with accurate personal data and to inform the Director of Human Resources anytime there is a change in personal information.

Personnel Data Changes

Effective Date: 10/1/2014

It is the responsibility of each employee to promptly notify their supervisor of any changes in personnel data. Such changes may affect your eligibility for benefits, the amount you pay for benefit premiums, and your receipt of important company information.

If any of the following have changed or will change in the coming future, contact your supervisor or their manager as soon as possible:

- Legal name;
- Mailing address;
- Telephone number(s);
- Change of beneficiary;
- Exemptions on your tax forms;
- Emergency contact(s);
- Training certificates; and/or
- Professional licenses.

Job Descriptions

Effective Date: 10/1/2014

Minnesota Medical Solutions utilizes job descriptions as a way to communicate company expectations regarding each position. Job descriptions are updated as frequently as is possible. In some cases, we may ask for help from the employee in drafting an accurate description of the position.

Job descriptions are by no means comprehensive or absolute. Employees may be asked to perform duties not explicitly listed in their job descriptions. Employees refusing to perform

requested duties may be subject to disciplinary action, up to an including termination of employment.

Hiring

Effective Date: 10/1/2014

Minnesota Medical Solutions requires that all candidates for employment submit a resume. Letters of recommendation and other materials may also be required as part of the hiring process.

Applicants who submit resumes found to include false or misrepresented information will no longer be considered for employment with Minnesota Medical Solutions. If it is found that after hire false or inaccurate information was provided on the employee's resume, the employee may be subject to discipline, up to and including termination of employment.

The Company will make conditional offers of employment to those we believe to be most qualified. Minnesota Medical Solutions does not discriminate on the basis of: race, color, religion, sex, national origin, age or disability. Conditional offers depend on the applicant's consent to and successful passing of all necessary drug, background, and reference checks.

Rehiring

Effective Date: 10/1/2014

A former employee who has been rehired after leaving employment for more than one (1) calendar year is considered an introductory employee during their first 90 days following rehire. Employees will receive paid time off accrual benefits upon completion of the introductory employee.

Any employee returning to work after a leave of less than one (1) calendar year will have their benefits reinstated at the level when separation began. This is intended to help employees who have been laid off due to unforeseen Minnesota Medical Solutions circumstances. However, other mitigating factors may affect the Company's decision to reinstate benefits, except for those benefits that are required by law.

Minnesota Medical Solutions will not rehire past employees who were terminated due to gross misconduct, insubordination, violence, harassment, or other similar actions that violate company policy and standards of conduct.

Job Vacancy/Postings

Effective Date: 10/1/2014

Whenever possible, Minnesota Medical Solutions makes every effort to promote from within. When a job vacancy occurs, a written announcement will be posted on the company portal. The

vacancy will also be posted on various employment websites as determined by Minnesota Medical Solutions. Keep in mind, not all positions can be filled internally.

The skills and background required will be listed on the job posting. We encourage employees who meet the requirements to apply. Employees will be asked to submit a resume and will be required to go through the regular interview and pre-hire procedures. To apply for an open position, see the Director of Human Resources. Each employee/applicant will be considered equally amongst the other applicants.

Minnesota Medical Solutions will promote within its own ranks when the employee is determined to be qualified for the vacant position. The employee chosen to fill the position, whether new to Minnesota Medical Solutions or promoted is subject to the introductory period of 90 days from the date of hire. During this time, employees may evaluate Minnesota Medical Solutions and management has its first opportunity to evaluate the employee's performance.

Promotions

Effective Date: 10/1/2014

Whenever possible, Minnesota Medical Solutions strives to fill vacancies by promoting from within. Promotion to all positions is based on, among other things, individual ability, qualifications, performance, attendance and punctuality, educational background and length of service.

All newly promoted employees will be subject to an additional 90-day introductory period. The same applies whenever an employee is reassigned to a new position. An employee who, in the sole judgment of management, is not successful in the new position can be removed from that position at any time during the secondary introductory period. If this occurs, the employee may be allowed to return to his or her former job or to a comparable job for which the employee is qualified, depending on the availability of such positions and the Company's needs.

Minnesota Medical Solutions adheres to all equal employment opportunity provisions when making promotional and any other employment decisions.

Transfers

Effective Date: 10/1/2014

Though you are hired for a specific job, there may be occasions when it would be mutually beneficial to transfer you to another job or department. When such a transfer is made on a permanent basis, your rate of pay will be adjusted in accordance with the job rating of your new job. Transfers to give temporary help to other departments will not affect your pay rate.

Employees may be required to transfer from one department to another in response to changing retail and production requirements if they have the particular skills required. The job evaluation system establishes levels and ranges of pay rates for all jobs. The evaluation of each job and the

pay range for each job are designed to enable an employee to be assigned to more than one particular work station, machine, task, or department in the plant or office.

Only employees who have been with the company for at least 1 year are eligible to apply for a transfer to another position.

Temporary Transfer

A temporary transfer is one of six weeks or less duration, made for the convenience of Minnesota Medical Solutions or for medical reasons of the employee. In such cases, you will receive no less than your current rate of pay for the duration of the temporary transfer. Temporary transfers are at times necessary due to changes in retail and production schedules. This type of transfer can also be used for training purposes.

Permanent Transfer

Permanent transfers can result for a number of reasons, for instance, should you have a permanent partial disability which prevents you from performing your normal job or should a lack of work situation occur of such length that it results in job reassignment. In such transfers, your rate of pay will be reviewed for appropriate adjustment.

In order to assist qualified employees to advance within the company, a list of current job openings is published periodically to inform employees of available positions. To apply for these open positions, contact the Director of Human Resources.

Employees who are transferred at the request of the company will be paid the higher of the compensation at their existing geographic location or the compensation at the geographic location to which the employee is transferred. Similarly, Minnesota Medical Solutions will make available benefits in accordance with its plans at the new geographic location. At Minnesota Medical Solutions's discretion, it may increase the employee's compensation to offset any loss of benefits at the new location.

Wherever practical, seniority is considered along with job qualifications in considering assignment and transfer of employees. Seniority alone is never the determining factor. In some cases re-assignment may be required to enable an employee to continue in the service of the company.

Attendance and Punctuality

Effective Date: 10/1/2014

Absenteeism and tardiness place an undue burden on other employees and on the company as a whole. Minnesota Medical Solutions expects that every employee will be regular and punctual in attendance. This means being ready to work at your scheduled start time each day. Employees are also expected to return from scheduled breaks and meal periods on time.

All time off must be requested in writing, in advance, as outlined in the Minnesota Medical Solutions Paid Time Off (PTO) policy. If you are unexpectedly unable to report for work for any reason, or if you will be late for any reason, you must notify your supervisor as early as possible, but always prior to your scheduled starting time. Employees must make every effort to speak with their supervisor directly. It is not acceptable to leave a voicemail message with a supervisor, except in extreme emergencies. In cases that warrant leaving a voicemail message or when an employee's direct supervisor is unavailable, a follow-up call must be made later that day.

Employees who are going to be absent for more than one day should contact their supervisor each day they are absent. Minnesota Medical Solutions reserves the right to ask for a physician's statement in the event of a long-term illness (3 consecutive days), or multiple illnesses or injuries.

If an employee fails to notify their supervisor after three (3) consecutive days of absence, Minnesota Medical Solutions will presume that the employee has voluntarily resigned and the employee will be removed from payroll. Minnesota Medical Solutions will review any extenuating circumstances presented by the employee that may have prevented him/her from calling in before being removed from payroll.

If an illness or emergency occurs during work hours, employees should notify their supervisor. Employees must also notify their supervisor at least one day in advance of known absences for medical or dental appointments.

Minnesota Medical Solutions considers consistent attendance and punctuality to be the foundation for excellent performance. Should undue or recurrent absence and tardiness become apparent, the employee may be subject to disciplinary action, up to and including termination of employment.

Job Abandonment

Effective Date: 10/1/2014

Employees abandoning their jobs shall be considered to have voluntarily terminated their employment with Minnesota Medical Solutions.

When an employee who is within their 90-day introductory period fails to call in and directly notify a supervisor of the reason for the absence for one (1) workday, it shall be considered that the employee has abandoned his or her job.

When an employee who has completed their 90-day introductory period fails to call in and directly notify a supervisor of the reason for the absence for three (3) consecutive workdays, it shall be considered that the employee has abandoned his or her job.

Job abandonment also occurs when an employee fails to return to work or directly notify a supervisor of the reason for absence within three (3) consecutive working days following: any approved leave of absence, disciplinary suspension, or recall from layoff status.

Termination of Employment

Effective Date: 10/1/2014

Termination of employment is an inevitable part of personnel activity within any organization, and many of the reasons for termination are routine. Common circumstances under which employment is terminated include the following:

- **Resignation** - Voluntary employment termination initiated by an employee;
- **Termination** - Involuntary employment termination initiated by Minnesota Medical Solutions. In most cases, Minnesota Medical Solutions will use progressive disciplinary actions before dismissing an employee. However, certain actions warrant immediate termination;
- **Layoff** - Involuntary employment termination initiated by Minnesota Medical Solutions for non-disciplinary reasons; and
- **Retirement** - Voluntary employee termination upon eligibility for retirement.

Non-exempt and exempt employees who intend to terminate employment with Minnesota Medical Solutions, shall provide Minnesota Medical Solutions with at least two (2) weeks written notice. Such notice is intended to allow the company time to adjust to the employee's departure without placing undue burden on those employees who may be required to fill in before a replacement can be found.

Since employment with Minnesota Medical Solutions is based on mutual consent, both the employee and Minnesota Medical Solutions have the right to terminate employment at will, with or without cause, during and after the introductory period.

In the case of employee termination, the employee will receive their accrued pay in accordance with all federal, state and local laws.

Any employee who terminates employment with Minnesota Medical Solutions shall return all files, records, keys, and any other materials that are property of Minnesota Medical Solutions.

Employee benefits will be affected by employment termination in the following manner:

- All accrued vested benefits that are due and payable at termination will be paid in accordance with applicable federal, state and local laws.

Exit Interviews

Effective Date: 10/1/2014

Minnesota Medical Solutions values feedback from all of its employees and will heed all suggestions in making Minnesota Medical Solutions a better place to work. Upon termination, voluntary or involuntary, employees are requested to partake in an exit interview.

Exit interviews will be conducted by the department manager. These interviews allow departing employees to provide honest input into the company's pay, benefits, and overall working conditions. Although encouraged, exit interviews are strictly voluntary, and are intended to improve employee relations within the company.

Unemployment Insurance

Effective Date: 10/1/2014

Employees are protected under the Federal-State Unemployment Compensation program and the state Unemployment Insurance law. Unemployment compensation is intended to provide temporary and partial wage replacement to involuntarily unemployed workers who were recently unemployed.

Should you leave employment with Minnesota Medical Solutions, you are entitled to unemployment insurance benefits subject to regulations established by state law. The Director of Human Resources will supply you with an Unemployment Insurance Form upon termination of employment.

By law, an employee separated under certain conditions is eligible to collect state Unemployment Insurance. Contact the state Unemployment Office for more details.

Arbitration

Effective Date: 10/1/2014

In the case of an employment dispute at Minnesota Medical Solutions, we require settlement exclusively through binding arbitration under the Federal Arbitration Act. Any dispute associated with employment, termination of your employment, discrimination, or harassment will qualify for arbitration resolution.

Arbitration shall be the exclusive means of resolving any dispute arising out of employment or termination. The cost of the arbitrator is to be shared among the parties equally.

By accepting or continuing employment with the Company, the employee agrees that arbitration is the exclusive remedy for all disputes within Minnesota Medical Solutions. In addition, both Minnesota Medical Solutions and the employee agree that arbitration will be used in lieu of civil court action regarding the dispute.

If the employee disputes an alleged incident during employment, he or she must deliver a written request for arbitration to the Director of Human Resources. The employee will have up to one (1) year from the date in which the alleged incident(s) or conduct occurred to make such request. He/she will also have up to fourteen (14) calendar days to respond to communications from the Company regarding the selection of an arbitrator and the scheduling of a hearing. If these instructions are not followed, the employee waives any right to raise a claim out of the issue.

Working Conditions and Hours

Safety

Effective Date: 10/1/2014

Minnesota Medical Solutions is committed to providing a clean, safe, and healthful work environment for its employees. Maintaining a safe work environment, however, requires the continuous cooperation of all employees. Minnesota Medical Solutions and all employees must comply with all occupational safety and health standards and regulations established by the Occupational Safety and Health Act and state and local regulations. In addition, all employees are expected to obey safety rules and exercise caution and common sense in all work activities.

Employees must immediately report any unsafe conditions to their supervisor. Employees who violate safety standards; cause hazardous or dangerous situations; or fail to report or, where appropriate, remedy such situations may be subject to disciplinary action, up to and including termination of employment.

In the case of an accident that results in injury, regardless of how seemingly insignificant the injury may appear, employees must notify their supervisor.

Questions regarding this policy should be directed to your supervisor.

Security

Effective Date: 10/1/2014

The purpose of Minnesota Medical Solutions's security policy is to protect company assets and to maintain a safe working environment for all employees.

Facility Access:

Certain Minnesota Medical Solutions employees will be issued a key to gain access to Minnesota Medical Solutions facilities. Employees who are issued keys are responsible for their safekeeping. All lost or stolen keys must be reported to your supervisor as soon as possible.

Upon separation from Minnesota Medical Solutions, and at any other time upon Minnesota Medical Solutions's request, all keys must be immediately returned to your supervisor.

Closing Procedures:

The last employee, or a designated employee, who leaves the office at the end of the business day assumes the responsibility to ensure that: all doors are securely locked; the alarm system is armed; thermostats are set on appropriate evening and/or weekend setting; and all appliances and lights are turned off with exception of the lights normally left on for security purposes.

Employees are not permitted on company property after hours without prior written authorization from their manager.

Accidents

Effective Date: 10/1/2014

Minnesota Medical Solutions takes all necessary precautions to provide a safe and healthful work environment for our employees. It is the responsibility if each employee to observe all Minnesota Medical Solutions safety guidelines at all times.

If you are injured or become ill while at work, you are required to immediately report the incident to your supervisor so that the appropriate measures can take place.

Any employee, who is injured and/or loses time from work because of a job-related injury or illnesses, will be compensated according to the Workers' Compensation Act. After an injury that causes an employee's absence, the employee may only return to work once he or she has a written release from a physician.

Emergency Procedures

Effective Date: 10/1/2014

Employee health and safety is of utmost concern to Minnesota Medical Solutions. As such, we have implemented emergency procedures designed to allow for the quick response of appropriate personnel during emergency situations.

In order to ensure all employees know how to appropriately respond in case of an emergency, employees are required to participate in emergency training during their new hire orientation and annually thereafter.

In case of an emergency, employees are to:

- Call 911 immediately;
- Inform a supervisor of the emergency;
- Exit the building using the approved exit routes;
- Never attempt to respond to a situation that you are not trained to handle; and
- Follow approved company safety protocol at all times.

Questions regarding this policy should be directed to your supervisor.

Emergency Closing

Effective Date: 10/1/2014

At times, emergencies such as severe weather, fires, or power failures can disrupt company operations. In extreme cases, these circumstances may require the closing of a work facility. The decision to close or delay regular operations will be made by the CEO or the Vice President of Operations.

When the decision is made to close the office, employees will receive official notification from their supervisors.

Medical Emergencies

Effective Date: 10/1/2014

In the event that an employee requires medical attention due to injury or illness while at work, the manager on duty should dial 9-1-1 for assistance. See the Worker's Compensation section for more information.

If an emergency arises, other than a worker's compensation incident, that requires an emergency medical service to evaluate the injury/illness of an employee at a medical facility, the employee will be responsible for any charges incurred for transportation in an ambulance and other related costs.

No Minnesota Medical Solutions employee will be responsible for transporting another employee to an emergency facility, due to safety and liability issues.

Upon recovery, a physician's "permission to work" notice may be required prior to the employee's return to work.

Weapons

Effective Date: 10/1/2014

Minnesota Medical Solutions strives to promote a safe and healthy work environment. To this end, all weapons are prohibited on company property. All persons entering company premises are barred from carrying a handgun, firearm, knife, or other weapon of any kind regardless of whether the person is licensed to carry the weapon or not.

The only exception to this policy applies to police officers, security guards or other persons who have been given written consent by Minnesota Medical Solutions to carry a weapon onto the property.

Employees that disregard this policy will be subject to immediate termination.

Robbery Policy

Effective Date: 10/1/2014

If you are ever confronted with a hold-up, you are required to comply with the orders of the robber. Employees are urged not to take any chances in disobeying the individual; doing so could put your life in jeopardy.

If ever in a robbery situation use the panic button located near the cash register in order to alert the authorities. Note that the panic button can be used to report any suspicious activity you believe may put you or the store at risk. Direct any questions regarding the panic button to your immediate supervisor.

Once the individual has left the premises, lock yourself inside the store and call the police. Only after you have called the police, should you call the store manager and/or supervisor. After notifying both the police and your supervisor(s), write down details of the robber, including: his or her appearance, features, dress, and voice.

The store will remain closed until after the authorities have arrived and fully investigated the incident.

Questions regarding this policy should be directed to your supervisor.

Patient/Customer Theft Prevention

Effective Date: 10/1/2014

Employees are not to leave product unattended within reach of patients and customers. Patient theft of product will not be tolerated. If you witness a theft, politely ask the patient to place the item back on the counter until the purchase has been made. If this is not possible, you should immediately ask for the manager's assistance.

The manager will assess the situation based on the amount stolen, whether or not the patient returned the product, the camera footage, witness accounts, etc. and determine the best course of action, up to and including reporting the incident to law enforcement. Managers must bear in mind the safety of all people inside the building when deciding to confront a patient at the time of the incident.

Patient theft will result in a patient being permanently blacklisted from all Minnesota Medical Solutions locations. The store manager will relay all necessary information to the patient in question as well as the store managers at the other locations.

Employee Theft Prevention

Effective Date: 10/1/2014

In protecting the assets of Minnesota Medical Solutions as well as employees' personal property, all employees will be required to follow the theft prevention guidelines included herein. Theft prevention cannot be handled in a constructive manner unless all employees make it their responsibility to protect company assets.

Minnesota Medical Solutions will take all appropriate measures to protect employee and company assets, including but not limited to:

- Utilizing electronic surveillance;
- Conducting regular audits of company assets;
- Limiting access to supply and storage areas;
- Searching employee work areas at management's discretion;
- Requiring written management approval for removing company property from company premises;
- Thoroughly investigating all suspected thefts; and
- Strictly enforcing all policies relating to the opening and closing of company facilities.

Workplace Investigations:

Minnesota Medical Solutions reserves the right to use any lawful method of investigation which, in its sole discretion, it deems reasonable and necessary to determine whether an employee has engaged in conduct warranting disciplinary action.

Whenever Minnesota Medical Solutions has reason to believe an employee has stolen from the company or from another employee, an investigation will take place. When this occurs, you will be notified that you are under investigation. Management reserves the right to suspend employees pending the results of an investigation and will use its discretion in making such a decision.

Any employee who is asked by management to submit to such a search or investigation is to cooperate. Failure to do so may lead to discipline, up to and including termination of employment. In addition, providing falsified information during the course of an investigation may lead to discipline, up to an including termination of employment. The results of an investigation will be made available only to those employees with the need to have access to such information.

If it has been found that an employee has stolen from the company, a co-worker, client or customer, the employee will be subject to immediate termination and may face criminal charges.

All employees who know or observe improper or wrongful conduct are to contact their direct supervisor or any management-level employee. All managers have a responsibility to act on such

information. All employees who fail to report improper or wrongful conduct, and managers who fail to act, are subject to discipline, up to and including termination of employment.

Fire Prevention

Effective Date: 10/1/2014

Minnesota Medical Solutions considers employee health and safety of utmost importance. As such, the Company requires that all employees be aware of the location of fire extinguishers within their respective departments and follow the guidelines set forth within this policy:

- Heat producing equipment such as burners, heat exchangers, boilers, ovens, stoves, fryers, etc., must be properly maintained and kept clean of accumulations of flammable residues; flammables are not to be stored close to this type of equipment;
- When smoking outside of the facility, use the cigarette receptacles provided to dispose of cigarette waste;
- Open containers of flammable liquids is prohibited and proper chemical storage is required at all times;
- Exits are to be kept clear at all times; and
- All employees must be aware of all evacuation routes and exits. Any employee unaware of the closest exit should consult their supervisor.

In the case of a fire, employees should immediately:

- Dial 911 or the local fire department;
- Contact a supervisor and evacuate all employees from the area;
- If it's a small fire, locate the nearest fire extinguisher and attempt to extinguish the fire;
- If it's a large fire, immediately leave the area and make no attempts to fight the fire; and
- Upon their arrival, direct the fire department crew to the fire; do not re-enter the building unless directed to do so by the fire department.

Questions regarding this policy should be directed to your supervisor.

Workplace Privacy

Effective Date: 10/1/2014

Minnesota Medical Solutions respects the personal privacy of our employees and customers. However, in an effort to safeguard company property and to ensure employee safety and security, Minnesota Medical Solutions has systems in place for workplace monitoring. Workplace monitoring includes but is not limited to the monitoring of: telephones, email, internet, and computers. In addition, Minnesota Medical Solutions may also use video surveillance to protect against theft.

While on company property and while using company resources, employees do not have a reasonable expectation of privacy. Any statements made to employees are not intended to alter the Company's privacy policy or create an expectation of privacy.

When monitoring employee activities in the workplace, Minnesota Medical Solutions will follow all applicable state and federal laws.

Questions regarding this policy should be directed to your supervisor.

Electronic Monitoring

Effective Date: 10/1/2014

Minnesota Medical Solutions may conduct electronic monitoring on its employees in order to ensure quality control, employee safety, security, and customer satisfaction.

Computers furnished to employees are the property of Minnesota Medical Solutions. As such, computer usage and files may be monitored or accessed. Minnesota Medical Solutions retains the right to conduct searches at any time. This includes the right to search individual computers or files, even if protected by password. Any employee that attempts to obtain or alter a password for the purpose of accessing restricted files will be subject to disciplinary action, up to an including, termination of employment.

Phone conversations may also be monitored in order to ensure quality customer interactions and to improve upon customer service practices.

Minnesota Medical Solutions is sensitive to the legitimate privacy rights of employees; therefore, every effort will be made to guarantee that workplace monitoring is done in an ethical and respectful manner.

Video Surveillance

Effective Date: 10/1/2014

Employee and customer safety and security are of utmost importance to Minnesota Medical Solutions. As such, Minnesota Medical Solutions will install video cameras in common areas, including the waiting room, shop floor, parking lot, and inventory room designed to comply with licensing requirements. Recorded video will be stored in a secure location and accessed only by authorized personnel.

Video surveillance is also designed to minimize theft and to identify persons engaged in theft or criminal activity while on company property.

In accordance with federal law, our video surveillance does not contain an audio component. Additionally, video will never be recorded in private areas such as locker rooms and restrooms.

Workplace Searches

Effective Date: 10/1/2014

Employee and customer safety and security are of utmost importance to Minnesota Medical Solutions. As such, workplace searches may be conducted when investigating the loss of company or employee property, when it is suspected that a security breach has occurred, when there is reasonable suspicion of illegal drug use, or in any other circumstance Minnesota Medical Solutions deems a search to be necessary in order to protect the safety and security of the workplace and the general public.

Minnesota Medical Solutions reserves the right to conduct workplace searches at its discretion. If there is evidence suggesting an employee has engaged in criminal activity, Minnesota Medical Solutions may contact law enforcement personnel to assist with the search.

All employees are expected to cooperate with workplace searches. During a search, employees may be asked to empty their pockets, purses, briefcases, lockers, desks, workspaces, or vehicles in plain view of Company management. Minnesota Medical Solutions will conduct workplace searches in a manner that is as minimally intrusive as possible.

All desks, storage areas, lockers, and vehicles owned, financed, or leased by Minnesota Medical Solutions or used by Minnesota Medical Solutions to transport employees, goods, and/or products are subject to search at any time without employee knowledge, presence, or permission. With the exception of your personal vehicle, employees are prohibited from locking or securing desks or lockers with a locking device not approved by Minnesota Medical Solutions.

Failure to comply may lead to disciplinary action, up to and including termination of employment. In addition, providing falsified information during the course of a search may also lead to disciplinary action, up to and including the termination of employment.

Questions regarding this policy should be directed to your supervisor.

Infection Control Policy

Effective Date: 10/1/2014

Infectious diseases can become prevalent in work environments and may result in absenteeism and disability. Minnesota Medical Solutions recognizes this and intends to play an important role in reducing the prevalence of communicable diseases. Employees of Minnesota Medical Solutions must commit themselves to assuming responsibility of maintaining appropriate hygiene, attending to personal illness and infection as well as minimizing exposure of the disease to other employees and clients. Employees of Minnesota Medical Solutions are expected to recognize and identify the risk of outbreaks and use preventive measures to assure the health and safety of every member.

Hazard Communication

Effective Date: 10/1/2014

In accordance with the Occupational Safety and Health (OSH) Act, the Hazard Communication Policy of Minnesota Medical Solutions provides for the right of both employees and employers to know of any potential dangers to health or physicality in the workplace.

Every chemical used at Minnesota Medical Solutions is evaluated with regard to its potential physical and health hazards. All known chemical hazards are revealed to employees through the manufacturer's Material Safety Data Sheet (MSDS), or if the chemical was created on Company premises, through an MSDS created by the individual mixing the chemicals. Chemical inventories as well as all MSDS forms are kept in every department with chemical substances present.

In addition, all containers of hazardous chemicals are labeled to reflect the identity of the chemical, the hazard warning, and the name and address of the chemical manufacturer. Chemicals are stored in spill-proof bottles or containers.

All employees are required to participate in training regarding the Company's Hazard Communication standard. Employees with responsibilities that require the routine use of handling of potentially hazardous chemicals are required to participate in additional training conducted by their supervisor.

Questions regarding this policy should be directed to your supervisor.

Hazardous Materials

Effective Date: 10/1/2014

All employees are responsible for reporting safety concerns and potential hazards.
Each employee is expected to obey safety rules and exercise caution and common sense in all work activities. Employees must immediately report any unsafe conditions to their supervisor. Employees who violate safety standards; cause hazardous or dangerous situations; or fail to report or, where appropriate, remedy such situations may be subject to disciplinary action, up to and including termination of employment.

Employees cleaning up hazardous materials must do so in accordance with operation procedures in cleaning hazardous materials. When cleaning hazardous materials, use the hazardous materials kit.

In the case of an accident that results in injury, regardless of how insignificant the injury may appear, employees must notify their supervisor.

Hazardous Waste

Effective Date: 10/1/2014

There are a variety of safety provisions that regulate the management, storage, and disposal of hazardous waste. Minnesota Medical Solutions fully complies with all of these regulations to ensure the safety and health of our employees, clients, and customers.

For the purposes of this policy, "hazardous waste" is defined as any substance no longer in use with chemical and/or biological properties that may harm or endanger employees, material, or the environment if handled improperly.

Employees should ensure that as little hazardous waste is generated as possible. When using hazardous material, use sparingly and carefully in accordance with the Company's chemical use and storage policies.

Employees are not to use plumbing systems to dispose of hazardous waste, regardless of whether or not they are "chemically resistant". Each department containing hazardous chemicals is equipped with appropriate disposal containers, labeled for each type of waste.

Different types of chemicals waste must be segregated in order to avoid unnecessary mixing. Regular trash containers are not to be used to dispose of such waste.

Questions regarding this policy should be directed to your supervisor.

Chemical Storage

Effective Date: 10/1/2014

Chemical toxins pose a substantial risk to employees in the workplace and may cause injuries or fatalities if handled incorrectly. Minnesota Medical Solutions recognizes this and intends to defend the safety of all our workers by requiring employees to follow the guidelines set forth in this policy.

All chemicals must be stored in original labeled containers or bottles and must be placed only in authorized storage areas. Furthermore, all chemicals must be stored by category and apart from one another to prevent unplanned blending.

For further information on storing chemicals, employees should see the Material Data Safety Sheets (MSDS), which are found in authorized storage areas. In the event a leak of unknown origin is discovered in the storage area, the employee should alert their supervisor as soon as possible to determine severity and whether evacuation is necessary.

Employees of Minnesota Medical Solutions are expected to recognize and identify the risk of carelessness in chemical storage and use preventive measures to assure the health and safety of every staff member.

Questions regarding this policy should be directed to your supervisor.

Material Safety Data Sheets (MSDS)

Effective Date: 10/1/2014

Minnesota Medical Solutions considers employee health and safety to be of utmost importance. As such, in accordance with our Hazard Communication standard, we ensure that all departments containing hazardous chemicals are equipped with Material Safety Data Sheets (MSDS's). An MSDS is a detailed informational document prepared by the manufacturer or importer of a hazardous chemical describing the physical and chemical properties of the material and its potential hazards.

The MSDS includes the following information:

- The identity of the hazardous components of the chemical;
- The health and physical hazards of the chemical;
- Protective measures and equipment to be used if exposed to the chemical;
- Appropriate method(s) of disposal; and
- Manufacturer's contact information.

Questions regarding this policy should be directed to your supervisor.

Reasonable Accommodation

Effective Date: 10/1/2014

Minnesota Medical Solutions is committed to fully complying with the Americans with Disabilities Act (ADA) and the ADA Amendment Act (ADAAA) to ensure equal opportunity in employment for qualified persons with disabilities. All employment practices and activities are conducted on a nondiscriminatory basis.

Reasonable accommodation is available to all disabled employees, where their disability affects the performance of essential job functions. All employment decisions are based on the merits of the situation in accordance with defined criteria, not the disability of the individual.

Qualified individuals with disabilities are entitled to equal pay and other forms of compensation (or changes in compensation) as well as in job assignments, classifications, organizational structures, position descriptions, lines of progression and seniority status.

Minnesota Medical Solutions does not discriminate against any employee or applicant because they are related to or associated with a person with a disability. Minnesota Medical Solutions will follow any state or local law that provides individuals with disabilities greater protection than the Federal ADA or the ADAAA.

This policy is neither exhaustive nor exclusive. Minnesota Medical Solutions is committed to taking all other actions necessary to ensure equal employment opportunity for persons with disabilities in accordance with the ADA and all other applicable federal, state, and local laws.

Personal Property

Effective Date: 10/1/2014

Employees should use their discretion when bringing personal property into the workplace. Minnesota Medical Solutions assumes no risk for any loss or damage to personal property.

Additionally, employees may not possess or display any property that may be viewed as inappropriate or offensive on Minnesota Medical Solutions premises.

Lost & Found

Effective Date: 10/1/2014

Any items found within the facility should be delivered to the Manager. The Manager will keep the item until its rightful owner claims it.

In the event an item is not claimed within 10 days, the Manager will make a posting of the missing item on bulletin boards. If the item is not claimed within 30 days, it will first be offered to the finder, and if refused will be discarded.

Minnesota Medical Solutions is not responsible for lost or stolen personal items.

Use of Company Property

Effective Date: 10/1/2014

Company property refers to anything owned by the Company: physical, electronic, intellectual, or otherwise. The use of company property is for business necessity only.

When materials or equipment are assigned to an employee for Company business, it is the employee's responsibility to see that the equipment is used properly and cared for properly.

However, at all times, equipment assigned to the employee remains the property of the Company, and is subject to reassignment and/or use by the Company without prior notice or approval of the employee. This includes, but is not limited to: computer equipment and data stored thereon, voice mail, records and employee files.

Minnesota Medical Solutions has created specific guidelines regarding the use of company equipment. Below is a list of employee responsibilities and limitations in regards to company property.

Personal use of company property:

Company property may not be taken from the premises without proper written authority from company management.

Company Tools:

All necessary tools are furnished to employees in order to assist them in their required duties. Each employee is, in turn, responsible for these tools. Tools damaged or stolen as a result of an employee's negligence will, to the extent permitted by federal, state and local law, be charged to the employee.

Care of Company Property:

Office areas should be kept neat and orderly and all equipment should be well maintained. The theft or misappropriation of unauthorized removal, possession, or use of company property or equipment is expressly prohibited.

Any action in contradiction to the guidelines set herein will result in disciplinary action, up to and including termination of employment.

Return of Company Property

Effective Date: 10/1/2014

Employees are responsible for all Minnesota Medical Solutions property, materials, or written information that is issued to them or in their possession or control. This includes company issued cell phones, employee identification badges as well as company provided vehicles and computers.

Employees must return all Minnesota Medical Solutions property immediately upon request or upon termination of employment. Where permitted by applicable laws, Minnesota Medical Solutions may withhold from the employee's check or final paycheck the cost of any items that are not returned when required. Minnesota Medical Solutions may also take all action deemed appropriate to recover or protect its property.

Parking

Effective Date: 10/1/2014

Minnesota Medical Solutions provides parking for employees in the building parking lot. There should be ample space for all employees. Employees may only park in open spaces or those designated for use by Minnesota Medical Solutions. Vehicles parked in spaces designated for private use will be towed at the owner's expense.

Smoking

Effective Date: 10/1/2014

Minnesota Medical Solutions employees, customers, and visitors are allowed to smoke in designated areas only. An employee found to be smoking in unauthorized areas will be subject to disciplinary action.

Smoking is prohibited throughout the workplace.

Company Hours

Effective Date: 10/1/2014

At the time of this writing, Minnesota Medical Solutions was in the process of determining the hours of operation for its manufacturing facility and its distribution sites.

Supervisors will advise employees of their scheduled shift, including starting and ending times. Business needs may necessitate a variation in your starting and ending times as well as in the total hours you may be scheduled to work each day and each week.

Meal & Rest Periods

Effective Date: 10/1/2014

In accordance with state and local laws, non-exempt employees will be provided with meal and rest periods. Each employee shall be entitled to a thirty (30)-minute paid lunch period. All employees shall receive a rest period of fifteen (15) minutes during every four hours of work or major fraction thereof.

Non-exempt employees must be fully relieved of their job responsibilities and are not permitted to work during unpaid break periods. If for any reason a non-exempt employee does not take the applicable meal and rest period that they are provided, the employee must notify his or her supervisor immediately.

Managers will schedule meal and rest periods in order to accommodate company-operating requirements.

Employee Conduct

Standards of Conduct

Effective Date: 10/1/2014

Minnesota Medical Solutions's rules and standards of conduct are essential to our productive work environment. All employees must familiarize themselves with company rules and standards; all employees will be held to them. Any employee who disregards or deviates from company rules or standards may be subject to disciplinary action, up to and including termination of employment.

While not intended to be an all-inclusive list, the examples below represent behavior that is considered unacceptable in the workplace. Behaviors such as these, as well as other forms of misconduct may result in disciplinary action, up to and including termination of employment:

- Theft or inappropriate removal/possession of property;
- Providing unauthorized patient discounts;
- Falsification of timekeeping records;
- Possession, distribution, sale, transfer, or use of alcohol or illicit drugs in the workplace;
- Fighting or threatening violence in the workplace;
- Gossiping or spreading rumors about co-workers;
- Boisterous or disruptive activity in the workplace;
- Negligence or improper conduct leading to damage of company-owned or customer-owned property;
- Insubordination or other disrespectful conduct;
- Violation of safety or health rules;
- Smoking in the workplace;
- Sexual or other unlawful or unwelcome harassment;
- Excessive absenteeism or any absence without notice;
- Unauthorized use of telephones, computers, or other company-owned equipment;
- Unauthorized disclosure of any confidential information; or
- Violating any state or local law regarding the sale, production or distribution of medical marijuana.

Other forms of misconduct not listed above may also result in disciplinary action, up to and including termination of employment.

Questions regarding this policy should be directed to your supervisor.

Customer Service

Effective Date: 10/1/2014

Minnesota Medical Solutions holds customer service to be one of our utmost company values. All employees are expected to act friendly, courteous, respectful, and polite when interacting with all clients and customers.

Examples of prompt and courteous customer service include but are not limited to the following actions:

- Answering the telephone before three (3) rings;
- Answering the telephone stating the company name(s) and location, your name, and a question relative to helping the caller with the information they are requesting.
- Transferring calls to the individual or department that is best fit to assist the caller;
- Greeting clients and customers when they enter the building;
- Assisting clients and customers as best you can; and
- Treating clients and customers as you expect to be treated.
- Calls from potential vendors should be escalated to the Store Manager or the Inventory Manager.

Even when not on company property, you still represent the Company and are required to behave appropriately and respectfully in your daily interactions.

Medical Cannabis Registry Verification

Effective Date: 10/1/2014

According to the Minnesota statutes, "Prior to distribution of any medical cannabis, the manufacturer shall:
(1) verify that the manufacturer has received the registry verification from the commissioner for that individual patient;
(2) verify that the person requesting the distribution of medical cannabis is the patient, the patient's registered designated caregiver, or the patient's parent or legal guardian listed in the registry verification using the procedures described in section 152.11, subdivision 2d."

Section 152.11, subdivision 2d provides: "No person may dispense a controlled substance included in Schedule II or III without requiring the person purchasing the controlled substance, who need not be the person for whom the controlled substance prescription is written, to present valid photographic identification, unless the person purchasing the controlled substance, or if applicable the person for whom the controlled substance prescription is written, is known to the dispenser.

It is the responsibility of all employees to ensure that proper verification procedures are being followed.

Questions regarding this policy should be directed to your supervisor.

Teamwork

Effective Date: 10/1/2014

Minnesota Medical Solutions expects all employees to work together to meet work-related goals. It is expected that each person will do their part to avoid situations that disrupt other team members or intentionally sabotage the efforts of other employee teams or departments.

Teamwork is dependent upon the efforts of all group members. Minnesota Medical Solutions believes our success is a result of the teamwork found within our employees. Teamwork means each member pulls their weight, works toward a common goal and helps one another when in need.

If you believe another team member is not acting according to this policy, please contact your supervisor.

Disciplinary Action

Effective Date: 10/1/2014

Disciplinary action at Minnesota Medical Solutions is intended to fairly and impartially correct behavior and performance problems early on and to prevent reoccurrence.

Disciplinary action may involve any of the following: verbal warning, written warning, suspension with or without pay, and termination of employment, depending on the severity of the problem and the frequency of occurrence. Minnesota Medical Solutions reserves the right to administer disciplinary action at its discretion and based upon the circumstances.

Minnesota Medical Solutions recognizes that certain types of employee behavior are serious enough to justify termination of employment, without observing other disciplinary action first.

These violations include but are not limited to:

- Workplace violence;
- Harassment;
- Theft of any kind;
- Vandalism or destruction of company property;
- Presence on company property during non-business hours;
- Use of company equipment and/or company vehicles without prior authorization;
- Divulging Minnesota Medical Solutions business practices or any other confidential information; and
- Violating any state or local law regarding the sale, production, or distribution of medical marijuana.

Workplace Etiquette

Effective Date: 10/1/2014

Minnesota Medical Solutions strives to maintain a positive work environment where employees treat each other with respect and courtesy. Sometimes issues arise when employees are unaware that their behavior in the workplace may be disruptive to others. Many of these day-to-day issues can be addressed by politely talking with a co-worker to bring the perceived problem to his or her attention. In most cases, common sense will dictate an appropriate resolution. Minnesota Medical Solutions encourages all employees to keep an open mind and graciously accept constructive feedback or a request to change behavior that may be affecting another employee's ability to concentrate and be productive.

The following workplace etiquette guidelines are not necessarily intended to be hard and fast work rules with disciplinary consequences. They are simply suggestions for appropriate workplace behavior to help everyone be more conscientious and considerate of co-workers and the work environment.

- Avoid public accusations or criticisms of other employees. Address such issues privately with your supervisor or those involved;
- Try to minimize unscheduled interruptions of other employees while they are working;
- Communicate by email or phone whenever possible, instead of walking unexpectedly into someone's office or workspace;
- Be conscious of how your voice travels, and try to lower the volume of your voice when talking on the phone or to others in open areas;
- Keep socializing to a minimum, and try to conduct conversations in areas where the noise will not be distracting to others;
- Minimize talking between workspaces or over cubicle walls. Instead, conduct conversations with others in their workspace;
- Try not to block walkways while carrying on conversations;
- Refrain from using inappropriate language (swearing) that others may overhear;
- Avoid discussions of your personal life/issues in public conversations that can be easily overheard;
- Monitor the volume when listening to music, voice mail, or a speakerphone that others can hear;
- Return copy machine and printer settings to their default settings after changing them;
- Replace paper in the copy machine and printer paper trays when they are empty;
- Retrieve print jobs in a timely manner and be sure to collect all pages;
- Keep the area around the copy machine and printers neat and orderly;
- Be careful not to take or discard others' print jobs or faxes when collecting your own; and
- Clean up after yourself and do not leave behind waste or discarded papers.

Please contact your supervisor if you have comments, concerns, or suggestions regarding these workplace etiquette guidelines.

Patient/Customer Relationship Policy

Effective Date: 10/1/2014

Professional relationships amongst employees and patients of Minnesota Medical Solutions are maintained through clear ethical boundaries. Patient relationships refer to any relationship that occurs outside the context of the business operation between an employee of Minnesota Medical Solutions and a patient of Minnesota Medical Solutions. Patient relationships established prior to a patient's relationship with Minnesota Medical Solutions would be exempt from this policy.

Patient relationships are strictly prohibited in order to avoid inappropriate behavior in the workplace, conflicts of interest, and undue harm to both Minnesota Medical Solutions employees and patients.

If it is observed that an employee's behavior with a client goes beyond established professional boundaries, the employee will be subject to disciplinary action, up to an including termination of employment. Employees are prohibited from divulging private information about themselves or other employees. An employee's involvement with a patient may also result in the loss of his or her professional licenses and/or certifications as well as a ban on the employee's ability to practice within their profession.

Employee Relationships in the Workplace

Effective Date: 10/1/2014

Minnesota Medical Solutions realizes that in some circumstances, two employees may become involved in a personal non-work related relationship. Although Minnesota Medical Solutions does not expressly prohibit consensual relationships between two co-workers, we have developed guidelines relating to the issue.

Workplace relationships are permitted only under the following circumstances:

- Both parties must mutually consent to the relationship;
- The relationship may not affect work performance (of those involved and of coworkers);
- The relationship does not negatively impact the work environment; and
- Involved parties must act professionally while on Minnesota Medical Solutions premises.
- Behavior that is construed as offensive, obscene, threatening, uncomfortable, or disruptive to other employees is prohibited.

If it is found that a workplace relationship results in decreased productivity among involved parties or that the relationship has negatively impacted the work environment, one or both parties may be transferred, asked to resign, and subject to disciplinary action, up to and including termination of employment.

Romantic relationships involving supervisors and subordinates are not permitted. Due to issues relating to the use of one's power to coerce or intimidate the other, or the increased possibility of favoritism and bias, even if consensual, supervisor-subordinate relationships are prohibited.

If you are in a romantic relationship with a fellow employee, we ask that you disclose the relationship to the Director of Human Resources.

Workplace Violence

Effective Date: 10/1/2014

Minnesota Medical Solutions strictly prohibits workplace violence, including any act of intimidation, threat, harassment, physical violence, verbal abuse, aggression or coercion against a coworker, vendor, customer, or visitor.

Prohibited actions, include, but are not limited to the following examples:

- Physically injuring another person;
- Threatening to injure another person;
- Engaging in behavior that subjects another person to emotional distress;
- Threatening to use or using a weapon while on company premises, on company-related business, or during job-related functions; and/or
- Intentionally damaging property.

All threats or acts of violence should be reported immediately to your supervisor. Employees found to have engaged in violence may be subject to immediate termination.

Visitors in the Workplace

Effective Date: 10/1/2014

To ensure the safety and security of Minnesota Medical Solutions and its employees, only authorized visitors are permitted on company premises and in company facilities.

All visitors must enter through the main reception area and sign in and out on the visitor sign in sheet at the front desk. All visitors are also required to wear a “visitor” badge while on Minnesota Medical Solutions property. Authorized visitors will be escorted to their destination and must be accompanied by a representative of the company at all times.

Food and Beverages in the Workplace

Effective Date: 10/1/2014

Minnesota Medical Solutions considers employee safety and health of utmost importance. As such, food and beverages are only permitted in authorized areas of the workplace. Employees are permitted to eat and drink in break rooms, conference rooms, and lunch areas. Employees are also authorized to eat and drink at their desk when doing so does not present a disturbance to other employees. All other areas of the workplace, including the front desk, are considered off-limits for eating and drinking.

All beverages must be in a closed, non-breakable container or bottle in order to prevent unnecessary spills. After eating, employees are expected to clean up after themselves and dispose of all trash. Employees are reminded to exercise common sense when eating and drinking on premises.

Questions regarding this policy should be directed to your supervisor.

Entering & Exiting the Building

Effective Date: 10/1/2014

Minnesota Medical Solutions employees are required to enter and exit the building using the employee entrance.

Employees entering the building without their employee identification card will be asked to get it prior to beginning work and may be subject to discipline, up to and including termination of employment.

The last employee to leave the building at the end of the day is responsible for appropriately securing the facility and turning off all lights.

Computer, Email & Internet Usage

Effective Date: 10/1/2014

Minnesota Medical Solutions's computer systems allow us to be more productive. Computer, e-mail, and internet are tools that create great value, but can cause problems if used improperly. It is extremely important that all employees use good business judgment when using the computer systems.

Computer hardware, software, electronic mail, internet connections, and all other computer or electronic communication or data storage systems used by Minnesota Medical Solutions are the property of Minnesota Medical Solutions and are intended for business use only. Employees have no right of personal privacy in their use of Minnesota Medical Solutions's computer and electronic communication systems. To ensure compliance with this policy, computer, email and

internet usage may be monitored, including but not limited to, reviewing documents created and stored on Minnesota Medical Solutions's computer and electronic communication systems, monitoring sites visited by employees on the internet, reviewing materials downloaded or uploaded by employees from or to the internet, and reviewing emails sent and received by employees.

Minnesota Medical Solutions strives to maintain a workplace free of harassment and sensitive to the diversity of its employees. Therefore, Minnesota Medical Solutions prohibits the use of computers and the email system in ways that are disruptive, offensive to others, or harmful to morale.

Computer, email and internet may not be used to solicit others for commercial ventures, religious or political causes, outside organizations, or other non-business matters.

Minnesota Medical Solutions purchases and licenses the use of various computer software for business purposes and does not own the copyright to this software or its related documentation. Unless authorized by the software developer, Minnesota Medical Solutions does not have the right to reproduce such software for use on more than one computer. Employees may only use software according to the software license agreement. Minnesota Medical Solutions prohibits the illegal duplication of software and its related documentation.

The unauthorized use, installation, copying, or distribution of copyrighted, trademarked, or patented material on the Internet is expressly prohibited. As a general rule, if an employee did not create material, does not own the rights to it, or has not gotten authorization for its use, it should not be put on the Internet. Employees are also responsible for ensuring that the person sending any material over the Internet has the appropriate distribution rights.

Abuse of this policy may result in disciplinary action, up to and including termination of employment. The following behaviors are examples of previously stated or additional actions and activities that are prohibited and can result in disciplinary action:

- Sharing passwords for email, computers, operating systems, or other password-protected proprietary information;
- Sending or posting discriminatory, harassing, or threatening messages or images;
- Stealing, using, or disclosing someone else's code or password without authorization;
- Copying, pirating, or downloading software and electronic files without permission;
- Sending or posting confidential material, trade secrets, or proprietary information outside of the organization;
- Violating copyright law;
- Failing to observe licensing agreements;
- Engaging in unauthorized transactions that may incur a cost to the organization or initiate unwanted Internet services and transmissions;
- Sending or posting messages or material that could damage the organization's image or reputation;
- Participating in the viewing or exchange of pornography or obscene materials;
- Sending or posting messages that defame or slander other individuals;

- Attempting to break into the computer system of another organization or person;
- Refusing to cooperate with a security investigation;
- Sending or posting chain letters, solicitations, or advertisements not related to business purposes or activities;
- Using the Internet for political causes or activities, religious activities, or any sort of gambling;
- Sending or posting messages that disparage another organization's products or services;
- Passing off personal views as representing those of the organization; and/or
- Engaging in any other illegal activities.

Employees should notify their immediate supervisor or any member of management upon learning of violations of this policy.

Telephone Usage

Effective Date: 10/1/2014

Minnesota Medical Solutions telephones are intended for the sole use of conducting company business.

Personal use of company telephones and individually owned cell phones during business hours is prohibited except in emergencies. In addition, long distance phone calls that are not strictly business-related are expressly prohibited.

Any employee found in violation of this policy will be subject to disciplinary action, up to and including termination of employment.

Cell Phone Use

Effective Date: 10/1/2014

Minnesota Medical Solutions prohibits our employees from using cell phones for personal use while at work.

Employees should keep their cell phones in the designated personal items area or in a personal vehicle.

Cell phone use will be permitted for business purposes or during an emergency situation. The use of cell phones is a distraction to other co-workers and takes time away from performing your job duties.

Cell phone use includes, but is not limited to, the following activities: calling others or answering calls from others, text messaging, use of the internet, and the use of cell phone digital photo and recording features.

Photography and Videotaping in the Workplace

Effective Date: 10/1/2014

Photography and videotaping has the potential to disclose confidential company information and jeopardizes employee privacy rights. As such, Minnesota Medical Solutions strictly prohibits photography and videotaping in the workplace, unless expressly authorized by Company management.

Employees are prohibited from using any device that has the capacity to capture photographic images or video images; this includes company issued and personal cell phones.

Any employee found to have violated this policy will be subject to disciplinary action, up to and including immediate termination of employment.

Personal Appearance

Effective Date: 10/1/2014

The purpose of Minnesota Medical Solutions' personal appearance policy is to ensure safe and sanitary working conditions and that all employees present a professional image. During business hours or when representing Minnesota Medical Solutions, employees are expected to dress and groom themselves according to the requirements of their positions. All employees must wear appropriate clothing, be well groomed, and observe high standards of personal hygiene.

Appropriate workplace attire for Minnesota Medical Solutions employees working at the retail locations include the following:

- Slacks or Jeans with no holes; shorts are acceptable in the summer.
- Appropriate tops; no holes or offensive slogans
- Closed toe shoes are recommended when working on the sales floor

Appropriate workplace attire for Minnesota Medical Solutions employees working at the production locations include the following:

- Company-provided coveralls;
- Work pants;
- T-shirts without offensive slogans;
- Work boots; and
- Hat.

It is never appropriate to wear open-toes shoes or stained, wrinkled, frayed, or revealing clothing in the workplace. Employees with long hair must wear it in a ponytail.

Employees are urged to use their discretion when determining what is appropriate to wear to work. Employees who wear inappropriate attire to work will be sent home to change their clothing.

Hygiene

Effective Date: 10/1/2014

Employee Hygiene

Minnesota Medical Solutions encourages the practice of appropriate employee hygiene within the workplace. This includes but is not limited to:

- Washing hands after using the restroom;
- Limiting or abstaining from the excessive use of perfumes and colognes;
- Appropriate use of deodorant;
- Appropriate bodily cleanliness;
- Kept hair (pulled back); and
- Containment of communicable diseases.

Workplace Hygiene

Minnesota Medical Solutions encourages the practice of clean hygiene within the workplace. This includes but is not limited to:

- Washing hands after using the restroom;
- The proper disposal of garbage;
- Proper sanitation in eating areas; and
- Cleanliness of workspace.

Managers and supervisors are responsible for interpreting and enforcing the hygiene policy at their discretion. This includes advising employees with inappropriate hygiene standards. Reasonable accommodation can be made in extreme circumstances.

Business necessity does call for professional standards in order to protect a clean and non-distracting work place. Questions or concerns should be handled by an employee's immediate supervisor or the Director of Human Resources. Any employee may be sent home in order to correct a problem.

Minnesota Medical Solutions seeks to remain in compliance with all relevant state and federal laws.

Housekeeping

Effective Date: 10/1/2014

Minnesota Medical Solutions expects all employees to keep work areas, break rooms, and Minnesota Medical Solutions property clean and well maintained at all times. The use of the break room and Minnesota Medical Solutions facilities is a privilege and proper care is required.

The break room and coffee station are available for employee use. Employees are permitted to use the refrigerator, microwave, toaster, and coffee maker. Employees are expected to clean all areas after using them.

Employee workspaces are also expected to be kept neat and orderly. Prior to leaving for the day, all employees are required to tidy up their work area and return all items to their proper location.

Any employee found to be contributing to unsanitary conditions will be subject to discipline, up to and including immediate termination of employment.

Questions regarding this policy should be directed to your supervisor.

Media Inquiries

Effective Date: 10/1/2014

If inquiries regarding Minnesota Medical Solutions are made from outside the company, particularly from the press, employees should not respond. Please direct all such questions to your supervisor, the Vice President of Operations, the Community Outreach Director, or the Director of Human Resources.

When media calls, it is not appropriate to answer questions about the business without express permission from the Executive team.

Remember to be polite and respectful when handling outside inquiries. Your conduct is a direct reflection of Minnesota Medical Solutions.

Obligating the Company

Effective Date: 10/1/2014

Only authorized persons may purchase supplies or enter any contractual obligation on behalf of Minnesota Medical Solutions. No employee whose regular duties do not include purchasing shall incur any expense on behalf of Minnesota Medical Solutions or bind Minnesota Medical Solutions by any promise or representation without express written approval.

Company Credit Cards

Effective Date: 10/1/2014

Minnesota Medical Solutions makes available to eligible employees a pre-paid company credit card for purchases required to carry out your job duties.

Employees must provide copies of all receipts. Any charge incurred not accompanied by a receipt or determined to be a non-qualified expense will be deducted from the employee's paycheck. Employees may not make personal or other non-job related purchases.

Failure to abide by this policy may result in disciplinary action, up to and including termination of employment.

Cash Handling

Effective Date: 10/1/2014

Minnesota Medical Solutions has enacted cash handling procedures in order to account for all monies received by the Company. These internal controls are necessary in order to prevent the mishandling of funds and to safeguard against loss. For purposes of this policy, "cash" is defined as: coin, currency, checks, money orders, and credit card transactions.

All employees collecting funds on behalf of Minnesota Medical Solutions must abide by the following cash handling procedures:

- Funds must be adequately safeguarded at all times (i.e., kept in a safe, locked cabinet, or locked drawer) in order to reduce the risk of loss or misuse. Access is to be restricted to authorized employees only;
- When collecting funds in person, employees are to issue customers a receipt for every purchase;
- Checks received are to be made payable to Minnesota Medical Solutions and must accompany a valid driver's license;
- Checks and money orders will be restrictively endorsed immediately upon receipt;
- Voided receipts or transactions must be approved by a supervisor and all copies of the voided receipt are to be retained;
- No funds administered by Minnesota Medical Solutions will be used for articles or services which are for employees' personal use; and
- Personal checks will not be cashed for employees.

All Minnesota Medical Solutions employees handling cash must have both an awareness of and show a commitment to strong internal controls. All Minnesota Medical Solutions funds will be reviewed periodically to assist in maintaining proper accountability and internal control.

Employees found to have violated this policy will be subject to disciplinary action, up to and including termination of employment.

Petty Cash

Effective Date: 10/1/2014

Minnesota Medical Solutions permits departments to maintain a petty cash fund. Each department is responsible for security and control over these funds.

Petty cash can be used to reimburse employees for non-travel out of pocket expenses of no more than $20. When appropriate, the petty cash fund can also be used for small incidental department expenses, when it is impractical to use normal Company purchasing means. Petty cash can only be used in this manner when absolutely necessary and must require the approval of the department manager.

Below are some circumstances in which petty cash is prohibited:

- Personal loans

Petty cash funds should be securely locked at all times. Each department is responsible for electing a custodian to monitor the use and replenishment of the fund. Custodians are also responsible for documenting the amount and purpose of all petty cash transactions. Appointment and approval of the fund's use must be made by the department manager.

Questions regarding this policy should be directed to your supervisor.

Community Affairs

Effective Date: 10/1/2014

Minnesota Medical Solutions encourages employee involvement in community and civic activities. However, employees are expected to keep such activities in practical balance with their job requirements, which take first priority. Employees must also be sure that their involvement in community affairs does not present an apparent or actual conflict of interest with the Company.

Political Activity

Effective Date: 10/1/2014

Employees of Minnesota Medical Solutions may engage in political activities outside of work hours, but should not allow their political affiliation to affect the performance of their work responsibilities and duties or relationships with coworkers and other employees.

Minnesota Medical Solutions has enacted the following guidelines with regards to political activity:

- Employees may not, under any circumstances, affiliate the company name with any political candidate endorsement or issue;
- Employees are prohibited from directly or indirectly coercing or attempting to coerce other employees or patients in support of a political party or candidate; and
- Political materials, such as posters and political buttons, may not be posted or worn in areas visible to the public, such as reception areas and lobbies.

Social Networking and Social Media

Effective Date: 10/1/2014

Minnesota Medical Solutions realizes that social networking has become a popular activity. While this creates new opportunities for communication and collaboration, it also creates new responsibilities for Minnesota Medical Solutions employees. This policy sets forth appropriate use of social media and is designed to protect the privacy, confidentiality, and interests of Minnesota Medical Solutions and our current and potential products, employees, and customers.

For purposes of this policy, social media includes technology that enables people to communicate over the Internet and share information. Examples include, but are not limited to, websites such as LinkedIn, Facebook, Flickr, Twitter, YouTube, and MySpace.

For performance, privacy and security reasons, personal use of social networking websites while at work is prohibited. All employees intending to utilize social networking or social media in connection with any business-related purpose must seek authorization from their supervisor.

Regarding social media, employees are prohibited from disseminating confidential information, including but is not limited to:

- Customer information, internal policies and procedures, product information, financial records, trade secrets or any other data that may be considered confidential;
- Employees are prohibited from bullying, harassing, and discriminating against coworkers or patients when posting information on social networking websites;
- If you identify yourself as an employee of Minnesota Medical Solutions, clearly state that views expressed are not those of the company;
- Be mindful of copyright and intellectual property rights of others and of Minnesota Medical Solutions;
- The company's logo and trademarks may not be used without express permission in writing from Minnesota Medical Solutions management; and
- Do not disclose co-workers' personal information without their prior consent.

Violation of this policy may result in disciplinary action, up to and including termination of employment.

Blogging

Effective Date: 10/1/2014

Minnesota Medical Solutions realizes that blogging has become a popular activity on the Internet and does not prohibit you from starting or maintaining a blog as long as the content of the blog is not related to the Company, its business practices, trade secrets, or other related information.

Employees are prohibited from blogging while on work time and are not to use company computers or other company-owned electronic devices to do so, unless specifically authorized. Minnesota Medical Solutions has the right to protect itself from the unauthorized disclosure of information. As such, blogs that pose a threat to Minnesota Medical Solutions' business are prohibited, and employees writing information about the Company will be subject to disciplinary action, up to and including termination of employment.

The above policy applies to other forms of social media on the Internet as well, including but not limited to: Wikipedia postings, MySpace and Facebook messages and postings, and video uploads.

Substance Abuse

Effective Date: 10/1/2014

Minnesota Medical Solutions is committed to maintaining a workplace free of substance abuse. No employee is allowed to consume, possess, sell, purchase, or be under the influence of alcohol or illegal drugs on any property owned by or leased on behalf of Minnesota Medical Solutions, or in any vehicle owned or leased on behalf of Minnesota Medical Solutions. The use of over-the-counter drugs and legally prescribed drugs is permitted as long as they are used in the manner for which they were prescribed and provided that such use does not hinder an employee's ability to safely perform his or her job.

Minnesota Medical Solutions will not tolerate employees who report for duty while impaired by the use of alcohol or drugs. All employees should report evidence of alcohol or drug abuse to their supervisor or Director of Human Resources immediately. In cases in which the use of alcohol or drugs creates an imminent threat to the safety of persons or property, employees are required by Minnesota Medical Solutions to report the violation. Failure to do so may result in disciplinary action, up to and including termination of employment.

As a part of our effort to maintain a workplace free of substance abuse, Minnesota Medical Solutions employees may be asked to submit to a medical examination and/or clinical testing for the presence of alcohol and/or drugs. Within the limits of federal, state, and local laws, Minnesota Medical Solutions reserves the right to examine and test for drugs and alcohol at our discretion.

As a condition of your employment with Minnesota Medical Solutions, employees must comply with this Substance Abuse Policy. Be advised that no part of the Substance Abuse Policy shall be

construed to alter or amend the at-will employment relationship between Minnesota Medical Solutions and its employees.

Employees found in violation of this policy may be subject to disciplinary action, up to and including termination of employment.

Sexual and Other Unlawful Harassment

Effective Date: 10/1/2014

Minnesota Medical Solutions is committed to a work environment in which all individuals are treated with respect. Minnesota Medical Solutions expressly prohibits discrimination and all forms of employee harassment based on race, color, religion, sex, national origin, age, disability, military or veteran status, or status in any group protected by state or local law.

Sexual harassment is a form of discrimination and is prohibited by law. For purposes of this policy sexual harassment is defined as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature when this conduct explicitly or implicitly affects an individual's employment, unreasonably interferes with an individual's work performance, or creates an intimidating, hostile, or offensive work environment. Unwelcome sexual advances (either verbal or physical), requests for sexual favors, and other verbal or physical conduct of a sexual nature constitute sexual harassment when: (1) submission to such conduct is made either explicitly or implicitly a term or condition of employment; (2) submission or rejection of the conduct is used as a basis for making employment decisions; or, (3) the conduct has the purpose or effect of interfering with work performance or creating an intimidating, hostile, or offensive work environment.

Sexual harassment may include a range of behaviors and may involve individuals of the same or different gender. These behaviors include, but are not limited to:

- Unwanted sexual advances or requests for sexual favors;
- Sexual or derogatory jokes, comments, or innuendo;
- Unwelcomed physical interaction;
- Insulting or obscene comments or gestures;
- Offensive email, voicemail, or text messages;
- Suggestive or sexually explicit posters, calendars, photographs, graffiti, or cartoons;
- Making or threatening reprisals after a negative response to sexual advances;
- Visual conduct that includes leering, making sexual gestures, or displaying of sexually suggestive objects or pictures, cartoons or posters;
- Verbal sexual advances or propositions;
- Physical conduct that includes touching, assaulting, or impeding or blocking movements; and/or
- Any other visual, verbal, or physical conduct or behavior deemed inappropriate by the company

Harassment on the basis of any other protected characteristic is also strictly prohibited.

Complaint Procedure:

Minnesota Medical Solutions strongly encourages the reporting of all instances of discrimination, harassment, or retaliation. If you believe you have experienced or witnessed harassment or discrimination based on sex, race, national origin, disability, or another factor, promptly report the incident to your supervisor. If you believe it would be inappropriate to discuss the matter with your supervisor, you may bypass your supervisor and report it directly to the Director of Human Resources.

Any reported allegations of harassment or discrimination will be investigated promptly, thoroughly, and impartially.

Any employee found to be engaged in any form of sexual or other unlawful harassment may be subject to disciplinary action, up to and including termination of employment.

Retaliation Prohibited:

Minnesota Medical Solutions expressly prohibits retaliation against any individual who reports discrimination or harassment, or assists in investigating such charges. Any form of retaliation is considered a direct violation of this policy and, like discrimination or harassment itself, will be subject to disciplinary action, up to and including termination of employment.

Off-Duty Conduct

Effective Date: 10/1/2014

Whether on-duty or not, an employee's actions represent Minnesota Medical Solutions. Employees are expected to uphold high moral ground and engage in only legal and ethical behaviors.

Clients, customers, and the general public associate the company, its stability, and its values with the employees who work for us. As such, company uniforms or other paraphernalia containing the company name or logo are not to be worn by the employee while off-duty.

Following a thorough investigation, employees found to have engaged in acts of moral turpitude or conduct that is contrary to the ethics of Minnesota Medical Solutions' mission, products, services or public image, while on or off-duty, may be subject to disciplinary action, up to and including termination of employment.

Minnesota Medical Solutions does not discriminate against and will not discipline, retaliate, or make other negative employment decisions based on an employee's involvement in off-duty protected activities.

Appendix – Clover Leaf University: Minnesota Education Protocol

Clover Leaf University's Minnesota Education Protocol, which provides an introduction to the courses that will be offered to train Minnesota Medical Solutions' employees, begins on the following page.

Minnesota Education Protocol

Licensed to: Minnesota Medical Solutions
Duration: 9/1/2014 -9/1/2019

The First Cannabis Education School Approved, Regulated, and Licensed by the Department of Higher Education's Private Occupational School Board

Clover Leaf University
600 17th Street Suite 2800 South
Denver, CO 80202 - 5428

Clover Leaf University is an early-stage specialized education program focused on providing an educational standard for training cannabis industry workers. Clover Leaf works to establish best practices for regulatory compliance and creating cannabis products with attention to public health and safety. It is also a goal to support research and development concerning cannabis, and raise awareness around the potential it has to benefit society through consumer education and creating a knowledgeable workforce. We are the first cannabis school of its kind to be approved, regulated, and licensed by the Colorado Department of Higher Education's Private Occupational School Board. By accepting and following this educational protocol, you are proving your commitment to creating a safe, compliant, and successful industry for the future.

Minnesota is very fortunate to have state legislatures with the vision and strength to embrace cannabis. The passing of laws spring-boarded a variety of medical and business opportunities. The industry is in an explosive, yet fragile, growth stage and has paved the way for CLU to build the platform for a learning community. One that will provoke thought and innovation, social responsibility, job creation, and provide societal benefits to the state. We thank you for committing to be a part of it.

Kind Regards,

Chloe Villano, President / Founder

Clover Leaf University

Clover Leaf University

Approved, Regulated, and Licensed by the Department
of Higher Education's Private Occupational School Board

Minnesota Education Protocol

The educational goal for the marijuana industry is to develop safe communities, consumer products, and compliant business procedures. Minnesota must maximize its training ability to establish a stable market that can grow to its full potential. This relies on the proper education of responsible industry workers. Clover Leaf University has been involved in creating safety procedures and compliant business training programs specific to the cannabis industry nationally for years. We are the first education program of its kind, approved by the Department of Higher Education's Private Occupational School Board. Safety and public health are priority when it comes to the implementation of this business procedures and it's our pleasure to develop a responsible training program for employees and consumers in Minnesota.

The proposed protocol will be a four-part approach:
1. Responsible Vendor Safety Training Certification (Mandatory yearly employee renewal)
2. Responsible Cultivator Certification (Mandatory yearly employee renewal)
3. Responsible Manufacturer Certification (Mandatory yearly employee renewal)
4. Responsible Consumer Certification

The vendor, cultivator, and manufacturer mandatory yearly certifications will begin with setting a base knowledge of local and state law. In each discipline, the applicable pieces will be taught concerning Minnesota Senate bill SF 2470. These courses are designed for industry workers as proof of their knowledge of the law, safety measures, and compliant procedures. When educating employees through such training, you are ensuring their focus is on public health and consumer safety, further empowering their work to be complaint, informative, and productive in society. Once the knowledge of law and safety has been established in each course, the curriculum will expand to learning the tools and best practices in each discipline. The responsible consumer course will be tailored to the public concerned with their own safety concerns by providing necessary information on the effects of cannabis products and safe dosing. The vendor, cultivator, and manufacturer certifications will be required of each employee to be completed within their first 90 days of on-the-job training, to be renewed yearly. Testing of specific knowledge will be required to pass each training course. On-site, hands-on training can be provided by CLU in order to educate your entire staff for certification in one setting. Each education program is summarized as follows:

Responsible Cannabis Vendor Certification

Summary:

Participants of the responsible vendor course will learn the details of the Minnesota state marijuana codes. Participants will understand the legislation, and how to follow established business processes to remain in compliance to each law with an emphasis on lawful / unlawful acts. Safe and responsible sales processes are outlined for students to understand the expectations of their role in the industry. Each student will learn compliant processes for proper identification of patients, record keeping, inventory control, measurement and labeling, security measures, and handling of product in storage and sale. The course is divided into four modules which are required for certification: legislative history, state and local marijuana code, bud tender skill training, and a discussion/exam section.

Objectives:

Beginning with the legislative history in the US and Minnesota, the course will set a base understanding for the historic influences on current legislation. Senate bill SF 2470 is outlined specific to vendors, followed by all local and more recent legislative developments. By knowing where each piece of legislation was sourced, each individual will have an informed approach for navigating current rules and regulations in their daily work. All Minnesota State Senate and House bills related to marijuana will be reviewed thoroughly and tested for understanding. By setting a high bar for employee self-regulation, CLU offers a certification that brings the most skilled employees to visibility in the workforce beyond the basic qualification requirements to be an industry worker in Minnesota.

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Once each employee is an expert in law compliance, the next steps in the course are tailored to make our bud tenders a trusted source of information. This stage of instruction begins with learning how to gauge a customer's experience level with cannabis, and learning how to serve their needs with a knowledge of consumption methods, product varieties, and the strain effects to match what is best for the consumer. After completion, this course will provide an expertise in law compliance and safety in the business processes of vending marijuana products. Customer service standards are also set by expecting a base knowledge of marijuana products, dosages, effects, and the ever-changing product development in the market currently.

<u>Module 1: Legislative History - Approx 30 Minutes</u>

- Compliance laws specific to vendors: SF 2470 Sec. 3. [152.23], Sec. 5. [152.25] Subdivision 1, Sec. 9. [152.29] Subdivision 1, Sec. 9. [152.29] Subdivision 3, Sec. 9. [152.29] Subdivision 4, Sec. 13. [152.33] Subdivision 1, Sec. 13. [152.33] Subdivision 2, Sec. 13. [152.33] Subdivision 3

<u>Module 2: Minnesota Medical Marijuana Code - Approx 120 Minutes</u>

The medical marijuana code is the basis for the retail code. As the marijuana code is more restrictive, a thorough understanding of this code is essential for every marijuana industry professional. This module will cover:

- Types of Medical Marijuana establishments
- Types of occupational licenses
- Regulations and responsibilities of each establishment type
- Responsibilities and civil and criminal liabilities of owners
- Responsibilities and civil and criminal liabilities of Key Employees
- Responsibilities and civil and criminal liabilities of Support Employees
- Acceptable forms of identification
- Duty to provide patients with information that is in their best interest
- Diversion prevention
- Good neighbor best practices
- How to establish Minnesota residency
- Possession limits
- How to identify if excise taxes have been properly paid
- Preventing youth diversion
- Consumer product guardianship
- Appropriate intake amounts for inexperienced users
- Driving under the influence prevention
- TRAINING ON PROVIDING CUSTOMERS WITH EDUCATION ABOUT RESPONSIBLE CONSUMPTION OF EDIBLE MARIJUANA PRODUCTS,WHICH MUST INCLUDE REMINDING PURCHASERS OF THE STANDARD SERVING SIZE OF THC AND THAT THE EFFECTS MAY BE DELAYED BY UP TO TWO HOURS

Module 3: Consumer Education Behind the Counter - Approx 60 Minutes
The informed consumer is the best consumer. This module is tailored to make your budtenders a trusted source of information on products. This module discusses product types, social media and other development skills so that your budtenders are your customers trusted resources for cannabis.

- How to gauge a customer's experience level with cannabis
- How to explain cannabinoids
- How to explain Indica vs. Sativa
- Know your strains and effects

Module 4: Review, Discussion, Exam -Required- Minimum 30 Minutes
30 minutes are reserved, however more time will be granted if required. This is an opportunity for participants to take a deep dive into points where they need or want more clarification of course information and how to apply it to their particular role in the industry. A short written exam is taken at the end to ensure retention of the information. The questions are randomized to ensure each participant has absorbed the material.

Responsible Cultivator Certification

Summary:

Participants of this course will be trained in current industry best practices for cannabis cultivation, with attention to Minnesota law compliance, safety, operations, and environmental/health considerations. The topics will include the organization of the grow space, fire and emergency planning, odor control, choosing your nutrients, organic practices, pest and problem control, and planning for success by taking all steps to make sure the cultivated product keeps consistent and safe from seed to sale. This course will boost the knowledge of those looking to manage or work at modern cultivation facilities by giving them the law compliance and cultivation knowledge needed to cultivate a successful product line.

Objectives:

The overarching objective of this course is that Minnesota cultivators are working with focused attention to public health and safety in an ever-complaint setting. Senate bill SF 2470 is outlined specific to cultivators, followed by all local and more recent legislative developments. Setting up a safe grow environment is a paramount step in the process, so all considerations in that setup are discussed. Spatial organization for designing a safe business process is covered so that planning for electricity, heat, nutrient handling, and all steps are done so with safety and efficiency in mind.

Beyond the setup of the industrial grow space, this course will educate in best practices in handling the marijuana product from seed to sale. Whether the plants are seedlings, vegetative, or flowering, their treatment will impact the final product immensely. Pest-control, nutrient schedules, and harvest/packaging processes will be a highlight of this portion of the training. Product testing for mold, fungus, and mildew awareness is very necessary for workers in this position of the process for public safety. Students will be tested in their understanding of all topics listed.

Module 1: Cultivator Law Compliance - Approx 60 Minutes

- Compliance laws specific to cultivators: SF 2470 Sec. 5. [152.25] Subdivision 1, Sec. 9. [152.29] Subdivision 1, Sec. 9. [152.29] Subdivision 2, Sec. 9. [152.29] Subdivision 3, Sec. 9. [152.29] Subdivision 4, Sec. 13. [152.33] Subdivision 1, Sec. 13. [152.33] Subdivision 2, Sec. 13. [152.33] Subdivision 3
- Transportation and labeling laws

Module 2: Designing and Operating a Safe Grow Environment - Approx 80 Minutes

- Safety in designing grow house layout
- Electricity considerations
- Grow house safety procedures in handling nutrients, PH balancer, and more
- Safe treatment of plants throughout life cycle
    - Handling clones/seeds
    - Care for plants in vegetative state
    - Care for plants in flowering state

Module 3: Safe Handling of Product from Harvest to Packaging - Approx 30 Minutes

- Curing without mold and other issues
- Safe handling

Module 4: Problem Control: Pests and More - Approx 40 Minutes

- Pest control
- Mold, fungus, and mildew awareness

Module 5: Discussion, Q&A, Testing - Minimum 30 Minutes

30 minutes are reserved, however more time will be granted if required. This is an opportunity for participants to take a deep dive into points where they need or want more clarification of course information and how to apply it to their particular role in the industry. A short written exam is taken at the end to ensure retention of the information. The questions are randomized to ensure each participant has absorbed the material.

Responsible Manufacturer Certification

Summary:

This program will ensure that each student is educated in the most up-to-date cannabis product manufacturing regulations. Coursework will focus on safety and law compliance involved in creating cannabis extraction products and edible products. Supplies, hardware, procedure, and safety will be covered in making a variety of extractions and infusions. Extraction topics will include CO2, butane, and solventless methods. Extraction machine approval is necessary for the safety of the workers and surrounding community. Edible product topics include dosage control, manufacturing, batch testing, labeling, handling standards, and child and consumer safety. This certification will provide the training needed to create these products with attention to safety, responsibility, and quality.

Objectives:

It is necessary to create an introductory respect for the laws in place to protect the public and workers in the industry. Senate bill SF 2470 is outlined specific to product manufacturers, followed by all local and more recent legislative developments. Once established, the safety around making extraction products is paramount, as any accidents can be a black mark on an industry that can be easily run without accident with simple attention to safety measures. Testing your equipment and using your using tools with proper methods will be tested with each individual in the course to ensure their understanding of the manufacturing processes.

Module 1: Legislative History - Manufacturer Regulation & Law Compliance - Approx 60 Minutes

- Compliance laws specific to manufacturers: SF 2470 Sec. 5. [152.25] Subdivision 1, Sec. 9. [152.29] Subdivision 1, Sec. 9. [152.29] Subdivision 3, Sec. 9. [152.29] Subdivision 4, Sec. 13. [152.33] Subdivision 1, Sec. 13. [152.33] Subdivision 2, Sec. 13. [152.33] Subdivision 3
- Dosage Laws
- Labeling Laws

Module 2: Cannabis Extraction and Infusion Basic Theory - Approx 30 Minutes

- What is extraction? Getting to know the basics
- Popular extraction methods today
    - Butane
    - CO2
    - Solventless
    - Other

Module 3: Extraction and Infusion: Methods and Safety Procedures - Approx 90 Minutes

- Butane
    - Setting up and knowing the tools needed
    - Safety measures
    - Process
- CO2
    - Setting up and knowing the tools needed
    - Safety measures
    - Process
- Solventless
    - Setting up and knowing the tools needed
    - Safety measures
    - Process
- Edible Product Manufacturing
    - Dosage safety regulation
    - Equipment and process set-up and safety
    - Packaging and labeling standards

Module 4: Creating Safe Workplaces - Approx 30 Minutes

- Designing a safe place to work
- Designing production rooms for commercial needs

Module 5: Discussion, Q&A, Testing - Minimum 30 Minutes

30 minutes are reserved, however more time will be granted if required. This is an opportunity for participants to take a deep dive into points where they need or want more clarification of course information and how to apply it to their particular role in the industry. A short written exam is taken at the end to ensure retention of the information. The questions are randomized to ensure each participant has absorbed the material.

Responsible Consumer Certification

Summary:

This course offering is designed for consumers entering Minnesota stores that may feel overwhelmed with choosing the right cannabis products for their safe usage. In this ever-changing industry, consumers can face a new set of choices concerning a product's efficacy and safety for their personal health each time they enter a store. By covering safety standards, understanding the effects of cannabis products, and the discussing the positives/negatives of each consumption method, the students will become more comfortable with making their own decision about what cannabis products will be suited to their personal needs. The class discussion of popular products on the market can help customers understand the full range of options available, so that they have an education to make smart and safe purchases.

Objectives:

Consumer focus law compliance centered on public use, driving limits, and possession limits is the introduction to this program. Senate bill SF 2470 is outlined specific to consumers, followed by all local and more recent legislative developments. To begin educating consumers in responsibility, one must understand where they stand in experience and tolerance. Then a discussion can begin on dosage safety and what forms of consumption best fit their needs. An understanding of flower, edible products, and extract products will be established so they know what category to look for a safe product. Within each category there are different methods of ingesting. To better understand the consumption of cannabis flower, customers will learn about the health effects of pipes, bongs, papers, vaporizers, and what hot products are on the market. When it comes to learning about edibles, understanding dosage limits is key. Smoking cannabis extract products will be outlined, as it is a relatively new consumption approach and has very interesting upsides for medical patients. After this consumer training, each will be empowered by their own understanding of cannabis products to make informed and safe consumption decisions.

Module 1: Know the Law – Responsible Consumers - Approx 15 Minutes

- Retail/Medical rules and regulations for consumers: SF 2470 Sec. 3. [152.23], Sec. 7. [152.27] subdivision 6, Sec. 10. [152.30], Sec. 13. [152.33] Subdivision 1, Sec. 13. [152.33] Subdivision 2, Sec. 13. [152.33] Subdivision 3, Sec. 13. [152.33] Subdivision 4

Module 2: Understanding Uses of Cannabis and its Properties - Approx 30 Minutes

- Understanding the effects of THC & CBD
- THC safe dosage discussion
- Sativa vs. Indica and judging effects

Module 3: Consuming Cannabis Responsibly - Approx 60 Minutes

- Forms of cannabis (flower restrictions, edibles, hash)
- Consumption options and the positives/negatives (pipes, bongs, papers, vaporizer,
- concentrate options)
- Choosing a product responsibly considering dosage, desired effect, and
- consumption method

Module 4: Discussion, Q&A, Testing - Minimum 30 Minutes

30 minutes are reserved, however more time will be granted if required. This is an opportunity for participants to take a deep dive into points where they need or want more clarification of course information and how to apply it to their particular role in the industry. A short written exam is taken at the end to ensure retention of the information. The questions are randomized to ensure each participant has absorbed the material.

3. Workforce Diversity (no longer than three pages): Provide a detailed description of any plans you have to address compliance with equal opportunity standards and recruitment and retention of under-represented populations.

As an Equal Opportunity Employer, Minnesota Medical Solutions is committed to ensuring equal employment opportunity for all Minnesotans. To achieve this goal, we will implement creative solutions aimed at recruiting, education and training under-represented populations. Specifically, we will adopt many of the strategies outlined in the *American Journal of Public Health* article "Lessons Learned from a Decade of Focused Recruitment and Training to Develop Minority Public Health Professionals" (Kreuter, 2001) including but not limited to building a community of minority employees (as opposed to a string of individual recruits), rewarding mentoring through employee incentives, committing to training employees with varying levels of experience, encouraging and incentivizing employee collaboration and communication, and collaborating with organizations that promote diversity.

MinnMed will strive to form partnerships with established entities, such as labor unions, that share our same goal of training and encouraging under-represented workers in this new industry. MinnMed understands that these types of initiatives will take time to develop, and we look forward to working with the state to optimize workforce diversity throughout the medical cannabis industry in the state of Minnesota.

Early in our application process, MinnMed met with the United Food & Commercial Worker Union (UFCW). We did this for two reasons: 1) MinnMed fundamentally believes in providing livable wages and benefits for our officers and employees. Many of us, including our CEO, grew up in union households. We realize the important role organized labor plays in protecting employees and overseeing their safety. 2) We realize this rapidly growing industry needs the strength of large institutions like UFCW to ensure access for all citizens to jobs in this industry. Joint recruiting and training with UFCW will be an integral part of our model.

In addition, MinnMed hopes to help secure funds to support state programs that enhance[1] workplace diversity. As MDH is well aware, there are a number of barriers to hiring under-represented Minnesotans into health care occupations in Minnesota. Chief among them is the lack of affordable training and educational opportunities, especially for first generation Minnesotans. MDH has made significant strides to address this problem with the initiation of numerous loan forgiveness programs, but funding for these vital programs has been impeded by the state's budgeting process. Currently affixed to MDH's Healthcare Workforce website is the declaration: "Funding for the Donated Dental Services Program, the Health Careers Promotion Grant and the Migrant Health Grant has been eliminated." It is this type of grant program Minnesota Medical Solutions would utilize to help recruit for our company. We also understand the importance of stabilizing funding for the loan forgiveness program itself. Therefore, Minnesota Medical Solutions is interested in helping to directly fund these programs through Minnesota CannaCare if deemed acceptable by the state of Minnesota. MinnMed is also interested in helping to secure additional state dollars through other proven strategies to help us recruit under-represented populations.

Through recruitment, education, and strategic partnerships, Minnesota Medical Solutions is committed to ensuring active outreach, training, and employment for Minnesota's under-

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[1]A.A. Illumoka, Ph.D., *Identification Strategies that Overcome Barriers to Women and Minorities in STEM*, American Society for Quality, http://rube.asq.org/edu/2012/06/best-practices/1-identification-of-strategies-that-overcome-barriers-to-women-and-minorities-in-stem.pdf ; Kweli R. Henry, *Organized Noise: Partnering with the Community to Address the Shortage of Underrepresented Minorities in the Health Professions*, Brooklyn Health Disparities Center, (http://www.downstate.edu/healthdisparities/pdf/Policy-Brief-on-Minorities-in-Health-Professions-.pdf); Maggie Swofford, *Gender Barriers in STEM Careers*, Plant Services, http://www.plantservices.com/blogs/stem-101/gender-barriers-in-stem-careers/; Minnesota Dept. of Health, *Loan Forgiveness and Repayment Programs*, http://www.health.state.mn.us/divs/orhpc/funding/loans/index.html; Steven H. Davis and Mary S. De Riso, *Horticulture Hiring People with Disabilities*, People Plant Relationships, http://horttech.ashspublications.org/content/2/2/183.full.pdf

represented populations in the medical cannabis industry, which will include career opportunities in at least four specific areas:

- clinical/scientific
- agricultural/horticulture
- executive/administrative/compliance
- ancillary businesses

This new industry provides a unique opportunity to actively encourage specific populations to enter careers related to health services, including medical cannabis production and delivery. This can begin as early as high school. We envision partnering with science, technology, engineering and math (STEM) programs in high schools in the communities where we have a presence to encourage science and math capabilities at an early age. This partnership could take many forms, and we understand that initially it is not likely that this will be acceptable to many schools. However, we feel that as the social stigma attached to the legitimate use of medical cannabis declines, this type of partnership will become more acceptable. MinnMed will work to show the medicine, science, and patient-centered nature of our approach to the medical cannabis industry. We feel it is just a matter of time until partnerships and support programs become acceptable to most parties. We also may be able to pursue these programs via our sister nonprofit Minnesota CannaCare.

4. Compassionate Need Plan (no longer than three pages): Provide a detailed description of any compassionate need program you intend to offer to assist those who may not have the financial resources to purchase medical cannabis at list prices.

MinnMed has put substantial resources and thought into its Compassionate Needs Plan to ensure access for low-income patients. There are several key components to the plan:

- A sliding scale payment system based on the Minnesota Care model and Sliding Fee Discount Schedule (SFDS) for those below 200% of poverty
- Evaluation of the SFDS on an annual basis to ensure patient access and financial sustainability
- Governing Board approval of policies and procedures related to the SFDS
- Patient's Word Price Policy (as defined below)
- Minnesota CannaCare contributions and donations

The MinnMed SFDS stands for 'Simple, Fair and Socially Responsible' methods, which emphasizes our goal to promote affordable access to our cannabis-based medicines for MinnMed's lower income patient base, while at the same time providing fiscally sustainable operating budget for our business. The SFDS allows adjustments to patient medications costs based on a low-income patient's ability to pay. The patient payment is based on an individual's family size and income expressed in terms of federal poverty guidelines, and MinnMed will rely upon the Census Bureau's definition of a family and family income when computing federal poverty level guidelines.

According to MDH, approximately 50% of patients eligible for cannabis-based medicine in Minnesota will be eligible for reduced fees and likely fit into the MinnMed SFDS. The MinnMed SFDS for our patients is based on the lowest price point of production cost plus 10%. This price point was set to prevent the likelihood diversion of medical cannabis. The MinnMed average price point is slightly above the national standard prices for top-quality cannabis extracts and due to the increased cost of production in a new, smaller market such as Minnesota and the increased cost of quality controls and manufacturing practices that MinnMed will bear.

The MinnMed SFDS: If the patient's income or household income falls within 200% of the published guidelines, the patient's cost will be reduced as follows:

- For those qualified patients who are between 100% and 200% of the federally recognized poverty level, the price will be reduced by 30%.
- For those qualified patients who are at or below the federally recognized poverty level, the price will be reduced by 60%.
- For hospice patients, veterans' home residents, and veterans, there shall be a reduced price, currently estimated at an average reduction of 10%.

A patient must fill out an application in order to participate in the Compassionate Needs Program which will require proof of income and enrollment in Medicaid or other state funded medical assistance programs. The application will also consider catastrophic circumstances such as death, disability, divorce, bankruptcy, etc. MinnMed staff will be specially trained to ensure the patient understands the corresponding price after applying the sliding fee schedule. MinnMed will rely upon the Census Bureau's definitions of family and family income when computing federal poverty guidelines. All information will be confidential and HIPPA protected.

To ensure an effective, accurate and fair program, MinnMed will re-evaluate the SFDS on a case-by-case basis annually. Specifically, MinnMed will evaluate:

- The eligibility of individual patients for the SFDS plan relative to total patients;
- The ease of use of the SFDS for both consumers and providers (i.e., number of income "tiers");
- The amount of "bad debt" attributed to the SFDS consumer base; and
- The impact of the SFDS related to the general business operations (i.e., the financial sustainability of the SFDS). MinnMed reserves the right to modify these rates accordingly if not sustainable at the stated rates or if profits allow MinnMed to pass more savings to our patients.
- MinnMed has established a patient, parent, and caregiver advisory committee and will take their input into consideration when modifying the SFDS.

Patient's Word Price Policy:

MinnMed understands that sometimes qualifying patients will not come to their first appointment with the appropriate documentation for the SFDS. In these cases, MinnMed will dispense a single gram of oil or other medicine (or smallest amount of other product available) to the patient

at the patient's stated SFDS income and household size. This will be a one-time event and in the future the patient will be required to have the appropriate documentation.

Minnesota CannaCare

MinnMed has also created a non-profit, Minnesota CannaCare, which will donate 3% of net profits to this organization. Minnesota CannaCare will also solicit donations from the public at large and foundations to further drive down patient costs. Funds will be used to augment the SFDS. Minnesota CannaCare will also fund the MinnMed House which will provide housing for pediatric seizure patients awaiting Minnesota residency in order to obtain cannabis-based medicine treatments in the state. MinnMed will reevaluate the fixed percentage contributed to Minnesota CannaCare on an annual basis and intends to increase the donation based on the needs of the patient community.

Free CBD Pediatric Patient Program

MinnMed also intends to provide high CBD medications (if less than 1% THC) to all pediatric seizure patients in the state. This will start as soon as MinnMed is profitable. Until then, the MinnMed high CBD, low-THC medications for pediatric patients will be at the lowest cost point on the SFDS.

5. Research Plan (no longer than three pages):

MinnMed has an extensive research plan to improve many facets of the patient experience and our understanding of cannabis as medicine, and looks forward to contributing to evidence based research for medical cannabis. MinnMed will begin modestly and proceed in a measured, calculated manner.

Initially, MinnMed will rely on its team and advisors to develop cost-effective research initiatives, including the development of intellectual property. MinnMed has formed and continues to build a scientific advisory board. The board consists of PhD-level scientists in medicine, horticulture, pharmacology and other disciplines. The group will meet quarterly to determine the direction and value in MinnMed research initiatives. We feel that an outside scientific oversight group is vital to a vigorous and adaptive research-based culture.

Research is built into the DNA of Minnesota Medical Solutions. The "MinnMed Spectrum," the color-coded naming system for our medications, was designed specifically with clinical research in mind in addition to patient convenience. The spectrum allows MinnMEd to further delineate the entourage effect and determine what other components are important in medicine. As we are not comfortable with the state of knowledge in the industry, there are several aspects of medical cannabis that we will start researching early on.

- **THC/CBD ratio:** MinnMed will provide a broad spectrum of THC to CBD ratios in our medications. This will include elevated THC medicines and high-CBD, 20:1 formulations. Analysis of the spectrum will allow us to analyze different combinations and cannabinoids and to determine the best ratios for particular diseases.
- **Sativa versus Indica:** Predominately sativa versus indica strains will also be placed in different color categories, even if they have the same THC/CBD ratio. This will allow a direct comparison of these two types of cannabis, which are reported to have substantial reported differences in subjective effects. This will allow us to determine which types are most effective for different diseases, and to determine the best combinations.
- **Other Cannabinoids:** The MinnMed spectrum allows for a wide array of other "colors" to be added. We seek to study several other cannabinoids in whole plant extracts and the

interplay of these cannabinoids with others. In particular CBC, CBG, THCA and other propyl-cannabinoids are gaining scientific attention.

Separation Technology

MinnMed has a substantial advantage in the realm of research because of our focus on separation technology. This technology is a common scientific practice, but is not yet commonplace in the medical cannabis industry. Jon Thompson and the United Science Corporation are highly adept at separation techniques. Using these techniques, MinnMed will be able to separate individual cannabinoids, or closely related groups of cannabinoids, and increase specific cannabinoid levels in extracts by adding these purified single cannabinoids to whole plant extracts. By changing only the single variable in whole plant extracts, MinnMed will be able to study the following:

- What level of CBD in whole plant extracts best increases the "CBD buffer" effect? The "CBD buffer" effect is the observation that some CBD present in the extracts seems to decrease the incidence of some adverse effects. MinnMed will trial different CBD buffer levels in our medications to optimize our patients' care and minimize side effects. MinnMed will eventually be able to change only the CBD level in the extract, something that, to-date, requires breeding of new plants or strains.
- Whether the addition of other single cannabinoids changes side effect profiles or efficacy.
- Whether any single cannabinoid extracts are clinically helpful (CBD, CBC, CBV etc).
- Delineating optimal dosing for our patients by specifically altering a single cannabinoid level, including THC.
- Highly patient-specific care. MinnMed's long term goal is to study and produce oils that can be directed toward an individual patient's specific cannabinoid profile and medical condition, possibly even created on-the-spot in the distribution facility. With its advanced technology, expert research team, and dedication, MinnMed is poised to be the frontrunner in extraction and separation sciences. Our connections with the main stream science world and commitment to this long-term work give us substantial advantages in improving the care of our patients.

Patient Feedback: Patient feedback will be the cornerstone of initial data gathering at MinnMed. Please see section E # 1 for more information on our patient feedback apparatus. MinnMed will have several means to facilitate patient feedback:

- Feedback kiosks in our distribution facilities in which our staff can receive patient feedback from patients, parents or caregivers. We will balance our need for feedback with our desire to retain the patient's privacy by strictly enforcing confidentiality and HIPPA compliance.
- MinnMed is developing a mobile patient feedback app that will provide a convenient mechanism by which patients, parents and caregivers can give feedback.
- MinnMed's "patient navigators" in our distribution facilities will also solicit patient feedback when appropriate, and we may require some feedback during the first few visits or annually.

MinnMed hopes to pursue more formal investigations on efficacy for specific conditions. MinnMed will seek to conduct ongoing studies in coordination with our distribution facilities to track the effectiveness of medical cannabis for pain and other symptom management in addition to the impact on normal functioning. Dosage and method of delivery will also be analyzed in order to help determine levels of effective potency and the most efficient treatment application for a variety of medical conditions. All data will be used by MinnMed to plan for the most medically beneficial crops, standardize dosage, recognize safe methods of delivery, and provide assistance when substance abuse patterns are noted in patients as described in the Substance Abuse and Prevention Section. MinnMed would also be happy

Breeding/Genetics: MinnMed will utilize a diverse core of initial genetics to determine the best genetic makeup for specific medical conditions. In particular, MinnMed will utilize high CBD strains, including those with a 20:1 ratio or greater of CBD to THC. MinnMed will not be strain-dependent given our advanced ability to separate individual cannabinoids and create ratio-specific medicines.

Cultivation/Extraction Methods: MinnMed will analyze different cultivation and extraction methods to research the impact of these methods on medical cannabis. We will compare the use of LED lights to standard lighting, and analyze the products resulting from different extraction processes, including the comparison of True Living Organics to other types of extractions.

Pharmaceutical Delivery Devices: MinnMed currently has two patent-pending delivery devices that it will study comprehensively. Patient feedback will be important to see if our vaporizer and oral delivery device are helpful and convenient for our patients. MinnMed will start studying these devices as soon as they are produced.

6. Substance Abuse Prevention Plan (no longer than three pages): Provide a detailed description of any plans you will undertake to combat potential abuse of medical cannabis, such as a proposed monthly limit for patients. The plan can include the extent to which you will partner, or otherwise work, with existing substance abuse programs.

Substance Abuse and Prevention

MinnMed will be pro-active in recognizing and preventing substance abuse. Brochures and educational information on substance abuse, including a list of local providers, will be readily available and displayed prominently at all dispensing facilities. In the event that, based on data collected or observation, a potential substance abuse problem is identified, the patient will be notified and provided with a list of local providers for patient assistance, drug and alcohol treatment, and family services that patients may access without MinnMed involvement. It is at the distribution facility agent's discretion the extent to which they will provide additional assessment, evaluation, counseling, and/or referral for treatment. MinnMed employees will be thoroughly trained on identifying substance abuse problems.

Introduction

Minnesota Medical Solutions will assure that our patients receive appropriate services and products to assist them in achieving their optimum level of health. The incidence of substance abuse problems in the adult general population of citizens in Minnesota is quite high in comparison to many other states. We recognize that our patients, because they come to us with conditions that cause them distress, may demonstrate an increased likelihood of problems associated with the use of alcohol or other drugs. It is important to identify those with addiction disorders quickly, and refer them to health assessments and associated care if needed.

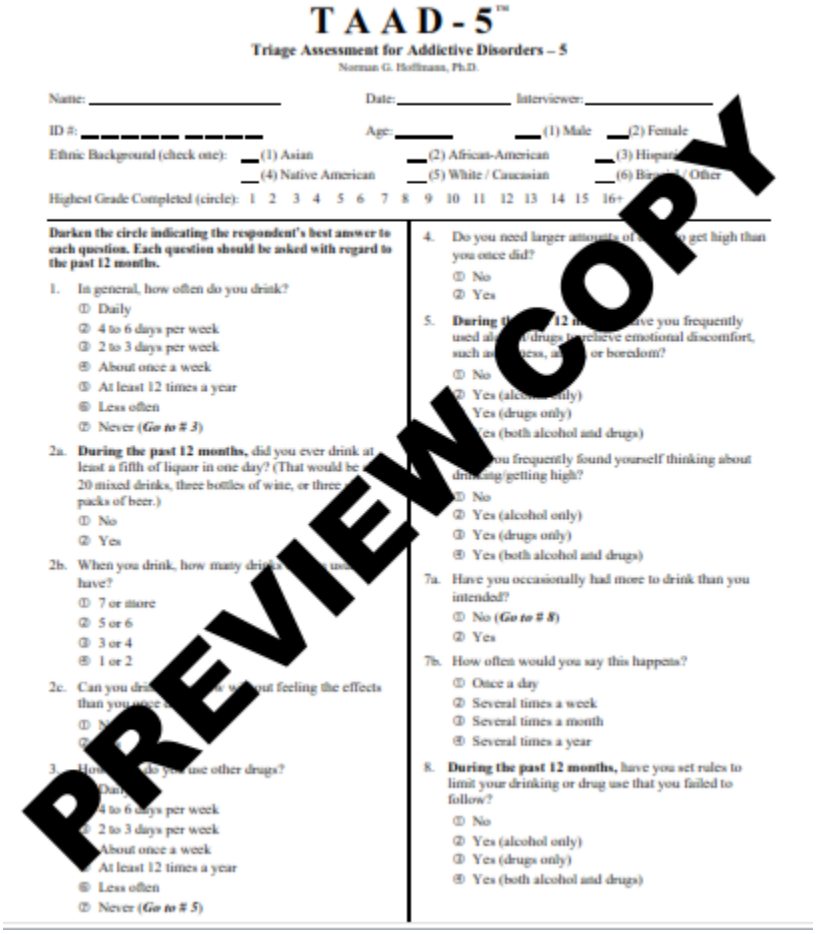
Identification

All Minnesota Medical Solution patients will be screened for addiction as follows:

- During initial evaluation
- Annually
- Upon request by the patient
- Whenever a staff member has a reasonable suspicion of problems with use.

The preliminary, more comprehensive screening tool which may be used by MinnMed for patients that request this evaluation or when distribution facility team members have concerns is

Triage Assessment for Addictive Disorders-5 (TAAD-5). We understand that this is more time intensive and may require modification moving forward. MinnMed will formulate a more concise, limited screening tool for initial visits and annual screening.



TAAD-5™

Triage Assessment for Addictive Disorders – 5

Norman G. Hoffmann, Ph.D.

Name: _____ Date: _____ Interviewer: _____

ID #: _____ Age: _____ ___(1) Male ___(2) Female

Ethnic Background (check one): ___(1) Asian ___(2) African-American ___(3) Hispanic
___(4) Native American ___(5) White / Caucasian ___(6) Biracial / Other

Highest Grade Completed (circle): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

Darken the circle indicating the respondent's best answer to each question. Each question should be asked with regard to the past 12 months.

1. In general, how often do you drink?
   ① Daily
   ② 4 to 6 days per week
   ③ 2 to 3 days per week
   ④ About once a week
   ⑤ At least 12 times a year
   ⑥ Less often
   ⑦ Never (***Go to # 3***)

2a. **During the past 12 months,** did you ever drink at least a fifth of liquor in one day? (That would be 20 mixed drinks, three bottles of wine, or three packs of beer.)
   ① No
   ② Yes

2b. When you drink, how many drinks usually have?
   ① 7 or more
   ② 5 or 6
   ③ 3 or 4
   ④ 1 or 2

2c. Can you drink without feeling the effects than you once did?
   ① No
   ② Yes

3. How often do you use other drugs?
   ① Daily
   ② 4 to 6 days per week
   ③ 2 to 3 days per week
   ④ About once a week
   ⑤ At least 12 times a year
   ⑥ Less often
   ⑦ Never (***Go to # 5***)

4. Do you need larger amounts of drugs to get high than you once did?
   ① No
   ② Yes

5. **During the past 12 months,** have you frequently used alcohol or drugs to relieve emotional discomfort, such as sadness, anxiety, or boredom?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

6. Have you frequently found yourself thinking about drinking/getting high?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

7a. Have you occasionally had more to drink than you intended?
   ① No (***Go to # 8***)
   ② Yes

7b. How often would you say this happens?
   ① Once a day
   ② Several times a week
   ③ Several times a month
   ④ Several times a year

8. **During the past 12 months,** have you set rules to limit your drinking or drug use that you failed to follow?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

The TAAD-5 is a brief structured interview designed to identify current alcohol and drug problems. This 10-minute assessment tool covers all DSM-5 criteria for substance use disorders and offers high internal reliability. The TAAD-5 produces alcohol- and drug-use disorder profiles similar to those of more time intensive instruments. Please see the attached TAAD-5

A technician or paraprofessional can administer the TAAD-5 for interpretation by a qualified professional. A scoring summary is incorporated into each instrument and can be completed in 2-3 minutes.

Applications:

- Any situation requiring fast, initial discrimination between a likely substance use disorder and no diagnosis.
- **Ideal for preliminary triage to determine if a treatment referral or intake assessment is needed.**

Benefits:

- Offers a quick assessment of current substance use disorder criteria.
- Provides support for substance use disorder diagnoses in minutes.
- Documents negative findings for those individuals who do not see problems.

Intervention:

Options:

- IPad version of screening tool, automatic scoring, automatic referral to resources, or
- Scoring by staff person (pharmacist) and discussion with patient, and referral for formal assessment.

Referral

MinnMed will refer to a licensed counselor (LADC) for assessment interview, recommendations, development of treatment plan if necessary, and coordination of admission to outpatient or inpatient program.

Coordination with Resources

We will instate meetings, discussions, and the possible creation of advisory board for health resources. Example members are Employee Assistance professionals, County Substance abuse staff, and other reputable resources in Minnesota. Please see following link for a detailed list of potential members: http://www.rpcmn.org/index.html.

In addition, MinnMed staff will be equipped to educate patients, parents, and caregivers on how to identify signs of substance abuse and how to deal with substance abuse. MinnMed will also have readily accessible information and educational materials available at distribution facilities relating to youth substance abuse prevention. Please see attached document regarding youth substance abuse prevention.

T A A D - 5™

Triage Assessment for Addictive Disorders – 5

Norman G. Hoffmann, Ph.D.

Name: _____ Date: _____ Interviewer: _____

ID #: _ _ _ _ _ _ _ _ _ _ _ _ Age: _____ ___ (1) Male ___(2) Female

Ethnic Background (check one): ___ (1) Asian ___ (2) African-American ___ (3) Hispani
___ (4) Native American ___ (5) White / Caucasian ___ (6) Biracial / Other

Highest Grade Completed (circle): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

Darken the circle indicating the respondent's best answer to each question. Each question should be asked with regard to the past 12 months.

1. In general, how often do you drink?
   - ① Daily
   - ② 4 to 6 days per week
   - ③ 2 to 3 days per week
   - ④ About once a week
   - ⑤ At least 12 times a year
   - ⑥ Less often
   - ⑦ Never (*Go to # 3*)

2a. **During the past 12 months**, did you ever drink at least a fifth of liquor in one day? (That would be a 20 mixed drinks, three bottles of wine, or three s packs of beer.)
   - ① No
   - ② Yes

2b. When you drink, how many drinks usu have?
   - ① 7 or more
   - ② 5 or 6
   - ③ 3 or 4
   - ④ 1 or 2

2c. Can you drin w without feeling the effects than you once d
   - ① N
   - ② Y

3. How do you use other drugs?
   - ① Dai
   - ② 4 to 6 days per week
   - ③ 2 to 3 days per week
   - ④ About once a week
   - ⑤ At least 12 times a year
   - ⑥ Less often
   - ⑦ Never (*Go to # 5*)

4. Do you need larger amounts of o get high than you once did?
   - ① No
   - ② Yes

5. **During th 12 m** ave you frequently used alc l/drugs to relieve emotional discomfort, such as ness, an , or boredom?
   - ① No
   - ② Yes (alco only)
   - ③ Yes (drugs only)
   - ④ Yes (both alcohol and drugs)

ou frequently found yourself thinking about drinking/getting high?
   - ① No
   - ② Yes (alcohol only)
   - ③ Yes (drugs only)
   - ④ Yes (both alcohol and drugs)

7a. Have you occasionally had more to drink than you intended?
   - ① No (*Go to # 8*)
   - ② Yes

7b. How often would you say this happens?
   - ① Once a day
   - ② Several times a week
   - ③ Several times a month
   - ④ Several times a year

8. **During the past 12 months**, have you set rules to limit your drinking or drug use that you failed to follow?
   - ① No
   - ② Yes (alcohol only)
   - ③ Yes (drugs only)
   - ④ Yes (both alcohol and drugs)

Darken the circle for the best answer to each question.

9. Have you ever wanted to stop drinking /using drugs but couldn't?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

10. Have you ever had any shakes, nausea, or other symptoms of withdrawal when you stopped drinking or using drugs?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

11a. **During the past 12 months**, have you ever had a drink to ease a hangover?
   ① No
   ② Yes

11b. Have you used any drug to make withdrawal symptoms go away?
   ① No
   ② Yes

12. **During the past 12 months**, did drinking or drug use cause any physical problems, such as numbness, ulcers, or nasal problems?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

13. Have you continued to drink or use drugs when you had a medical condition that might be made worse by it?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

14. **During the past 12 months**, have you had any emotional problems when using alcohol or drugs?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

15. **During the past 12 months**, have you neglected any responsibilities when drinking/using other drugs?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

16. Has anyone objected to your drinking/drug use?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

17. **During the past 12 months**, have you gotten into arguments while drinking/using drugs or had arguments about your drinking/drug use?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

18. Has your drinking or drug use damaged a relationship with someone you cared about?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

19. **During the past 12 months**, have you missed work or school because of your drinking/drug use?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

20. Have you had any other problems at work or school because of your drinking/drug use?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

21. **During the past 12 months**, have you had an injury that required medical attention when you were drinking /using drugs?
   ① No
   ② Yes (alcohol only)
   ③ Yes (drugs only)
   ④ Yes (both alcohol and drugs)

Darken the circle for the best answer to each question.

22. Have you had a motor vehicle accident after you had been drinking/using drugs?
    ① No
    ② Yes (alcohol only)
    ③ Yes (drugs only)
    ④ Yes (both alcohol and drugs)

23. **During the past 12 months,** have you occasionally driven when possibly under the influence of alcohol or drugs?
    ① No
    ② Yes (alcohol only)
    ③ Yes (drugs only)
    ④ Yes (both alcohol and drugs)

24. Do you crave drinking or using drugs when not drinking or using?
    ① No
    ② Yes (alcohol only)
    ③ Yes (drugs only)
    ④ Yes (both alcohol and drugs)

25. Have you been ticketed or arrested for any reason related to alcohol/drugs?
    ① No
    ② Yes (alcohol only)
    ③ Yes (drugs only)
    ④ Yes (both alcohol and drugs)

26. **During the past 12 months,** d you drink e drugs when you didn't intend t
    ① No
    ② Yes (alcohol onl
    ③ Yes (drugs on
    ④ Yes (both hol drugs)

27. Have you staye ica or high for a day or more?
    ①
    ② y)
    Ye s only)
    Yes (alcohol and drugs)

Have you had a compulsion to drink or use drugs that s difficult or impossible to resist?
    No
    ② Yes (alcohol only)
    ③ Yes (drugs only)
    ④ Yes (both alcohol and drugs)

Review weekly pattern of use before scoring this item. Refer to manual for instructions/suggestions.

29. How much **total time** in a typical week do you spend drinking/using drugs, including the time to get over the effects of using?
    ① More than 30 hours
    ② 20 to 30 hours per week
    ③ 11 to 19 hours per week
    ④ 5 to 10 hours per week
    ⑤ Less than 5 hours per week

30. Have you reduced or avoided a al or recreational activities b of y inking or drug use?
    ① No
    ② Yes (alcohol on
    ③ Yes (nly)
    ④ Yes th alco nd drugs)

31. **During** st **onths,** have you spent more time drinki g drugs than you intended?
    No
    Yes (alcohol only)
    s (drugs only)
    es (both alcohol and drugs)

During the past 12 months, have you given up or missed any work opportunities or work related activities due to drinking or drug use?
    ① No
    ② Yes (alcohol only)
    ③ Yes (drugs only)
    ④ Yes (both alcohol and drugs)

For all the events we have discussed, how long ago was the **most recent** one?
    ① Within a month
    ② Within six months
    ③ More than six months ago
    ④ Does not apply

Which drugs, if any, were used in the past 12 months:
    ① Marijuana or cannabis in any form
    ② Cocaine (powder or crack)
    ③ Stimulants of any kind
    ④ Other

Comments:

Interviewer: _____

DSM-5 Diagnostic Indications

For each item endorsed, circle "A" if a positive response pertains to alcohol and "D" if the item is positive for any other drug(s). Use the lower table to document which criteria are positive for alcohol or drugs.

DSM-5 Diagnostic Indicators			
Q #	Indication	Alcohol or Drug	DSM-5 Criterion

Summary of positive findings for each criterion

Criterion	Alcohol	Drugs
Total number of positive criteria		

The DSM-5 requires that at least two criteria of events or behaviors specific to a given substance occur during the same 12-month period for an individual to be diagnosed as having a substance use disorder.

DSM-5 Substance Use Disorder Criteria

DSM-5 Diagnoses (F codes refer to ICD-10)

Diagnostic Indications based on all clinical information

Alcohol	Drug*

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www.changecompanies.net

The following copy shall be utilized to produce a trifold informational to distribute through our dispensary partners to educate the community on the potential risks for children whom may consume cannabis:

Cannabis is a mixture of the dried shredded leaves, stems, seeds and flowers of the Cannabis plant. Cannabis contains the chemical THC and other active cannabinoids that cause the mind-altering effects of intoxication. Cannabis can have short- and long-term consequences on health and pose increased risks in youth.

Tips for Talking to Your Children about Cannabis

- Talk to your child about Cannabis before you suspect they are experimenting. Studies show that youth are most likely to initiate cannabis use between the ages of 13 and 15 - and during this time you have the most influence over their behavior. After age 15, teens tend to base their decisions more on peer influence.

- Before you talk to your teen, make sure you speak their language. Utilize the CPS website for insight into modern cannabis lingo and paraphernalia, and tips for recognizing the obvious and non-obvious signs of teen cannabis use.

- If you think your teen has been using cannabis, ask them about it right away. Teens say that losing the respect and trust of their parents is the most important reasons not to use drugs.

Help your children to understand all of the consequences of cannabis use - both physical and legal.

Effects on the Brain

Despite what you may have heard - pot is not harmless. Some studies indicate that problems with attention, learning, memory and processing speeds can be associated with heavy cannabis use during adolescence.

Effects on the Lungs

Regular cannabis smokers may have many of the same lung problems that tobacco smokers have. This may be because cannabis users inhale more deeply and hold the smoke in their lungs. The amount of tar inhaled by cannabis smokers and the level of carbon monoxide absorbed are three to five times greater than from tobacco smoke.

Psychological Effects

In a study of college students, heavy cannabis users made more errors, had more problems paying attention to changes in the environment, and had more problems learning, than students who used less often. Using cannabis weekly or more has also been shown to double a teen's risk of depression or anxiety. Using cannabis has been associated with a decrease in motivation, which can impact school, work, family, friends and life in general. Cannabis use can increase the risk of psychotic episodes or trigger a mental illness.

Addiction

Research has established that cannabis is addictive and that it is three times more likely to lead to dependence among adolescents than adults, who use cannabis regularly over a period of time. Relationships with family and other friends who don't use cannabis may become problematic. The cost of using cannabis can result in financial difficulties.

Other Concerns About Use of Cannabis by Adolescents

Use of cannabis by adolescents is illegal in Connecticut State and all other states in the U.S. It is an offence to cultivate, possess, use, sell or supply cannabis. Doing so could result in criminal prosecution or even incarceration, depending on the type of offence and which state it was committed in.

References

1: Mehmedic Z, et al (2010) Potency Trends of r9-THC and Other Cannabinoids in Confiscated Cannabis Preparations from 1993 to 2008. *Journal of Forensic Science, 55(5):1209-17*.

2: Hayatbakhsh, M.R. et al. (2007) Cannabis and anxiety and depression in young adults: A large prospective study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 46(3):408-17.

3: National Institute on Drug Abuse (2010) Research Report Series: Cannabis Abuse. U.S. Department of Health and Human Services, National Institute of Health.

4: Gfroerer, J. C., Wu, L.-T., & Penne, M. A. (2002). Initiation of Cannabis Use: Trends, Patterns, and Implications (Analytic Series: A-17, DHHS Publication No. SMA 02-3711). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.

5: de la Flor, A. (2009) Early intervention can reduce cannabis use initiation among youth. CADCA National Coalition Institute's Research into Action.

7. Environmental Plan: Provide a detailed description of any plans you will take to reduce the ecological footprint of your production facility and other business operations such as plans to use renewable energy sources.

Environmental Plan

From production to patients, we recognize that environmental sustainability is essential for the sustainability of our business. We deliberately integrate the environment as a key consideration for everything we do at Minnesota Medical Solutions. This started with the construction of our greenhouse facility in July of this year. Not only will we leverage the sun as our primary energy source, but we will also grow our plants in an organic living soil, providing a controlled but natural environment that will produce pharmaceutical grade medical cannabis. Please see the attached complete environmental plan for more in depth information. Our environmental stewardship is also reflected in our water stewardship efforts, our goal for maintaining industry-leading greenhouse gas emission levels, our promotion of sustainable organic-based agriculture, our product and packaging innovations, and much more. As residents of Minnesota, we are committed to protecting Minnesota's environment for both present and future generations. We consider this perspective a crucial element to both our immediate and long-term planning.

Sustainable Cultivation

In the report, "Realizing a New Vision for Agriculture: A roadmap for stakeholders," the World Economic Forum and McKinsey & Company estimate that up to 30 percent of greenhouse gas emissions are attributable to agriculture and growing. The report also indicates that agriculture accounts for 70 percent of worldwide water withdrawals. MinnMed has established principles to ensure our growing processes and practices are sustainable and have minimal impact on the environment.

Water Stewardship

Water is the most prized natural resource of the state of Minnesota. Water is essential to the MinnMed growing process, and we approach water management accordingly and aim to become intensely involved in water stewardship throughout the state. Water re-capture programs may include, but are not limited to: condensation capture of greenhouse water vapor, rainwater capture and use, and irrigation run-off recapture and reuse. Any reused water will be treated prior to reintroduction.

Source water vulnerability assessments will be conducted by third parties prior to commencing any operations. These assessments and plans take inventory of any risks to the water source supplying our operation and the surrounding community. The plan will include partnerships and mitigation activities with the city and local community (like 'Project Wet'), water agencies and nongovernmental organizations. Our internal treated wastewater requirements *exceed* those set by the state of Minnesota Pollution Control Agency and are represented by the following chart*:

5-day Biological Oxygen Demand	**<5 mg/mL**
pH level	6.5-8
Total suspended solids	<50 mg/mL
Total dissolved solids	<2000 mg/mL
Total Nitrogen	<5 mg/L
Total Phosphorus	<2 mg/L

*These are 6 of the more than 20 requirements set by MinnMed.

Energy: We seek to be industry leading in our efforts toward energy reduction and energy efficient operations. The use of natural light in a greenhouse facility dramatically decreases the energy needs for cannabis production. Using solar energy more efficiently enables us to reduce our carbon footprint, conserve natural resources and contain costs. Energy efficient and/or reduction initiatives MinnMed has committed to include:

- C***limate-friendly transportation*** – We will use a fleet that is powered by a mix of efficient fuels including electricity, natural gas, diesel-electric hybrids, and biodiesel.
- ***Best-in-class energy efficient lighting*** – Through the application of both natural light and best-in-class artificial light efficiency, we strive to be industry leaders in light efficiency in our growing houses. MinnMed plans to work toward substantial LED light use moving ahead.
- ***Geothermal, wind and/or solar power sources*** – MinnMed has the long-term goal of being "off the grid" (100% self-generated power) by 2020 through the application of wind, solar, and/or geothermal power generation technology.
- ***Restoration of native landscapes adjacent to MinnMed buildings*** – Under leadership of our partner Minnesota Native Landscapes, native landscapes can be restored on all

- MinnMed properties to aid in energy reduction (heating/cooling) and ensuring the sustainability of the local ecosystem and habitat.

Ecological Health Plan: *True Living Organics © (TLO)* is the only true methodology that adds nutrients back to the soil, leaving it more fertile with every usage. The cultivation team shall apply TLO in order to increase microbial life and nutrient profile with in the soil.

Sustainable Packaging: Packaging plays an important role for our business in meeting consumer expectations and preventing waste by protecting the integrity of our product during storage, distribution, and sale. Our goal is to eventually use only 100% recycled materials in all of our finished product packaging.

The following focus areas will consist of MinnMed's initial approach to ensuring a sustainable packaging platform:

- ***Biomaterials*** – The potential use of materials derived from biological material will be fully investigated and considered as part of our long-term sustainable packaging strategy.
- ***Sourcing –*** The utilization of sustainable purchasing principles to target materials such as previously recycled, post-consumer polymers and other packaging materials that are at the forefront of the packaging industry.
- ***Recovery*** – The recovery component of sustainable packaging is an oft-overlooked consideration into the overall strategy. MinnMed will provide appropriate labeling on finished product packaging as well as return/recovery receptacles in-outlet.

Smart Filtration: Water filtration is necessary in commercial agriculture to avoid contaminants often found in normal tap water. Such contaminants can destroy microbial life and defeat the purpose of following an organically grown cultivation regimen. All water with in the cultivation facility shall be tested and only filtered as needed.

Zero Waste Plans: Plans to reduce waste throughout the facility shall be accomplished through recycling and reuse whenever possible. The bulk of waste with in the facility shall be from used soil and green waste. All soil within the facility shall be composted and reused. TLO soil becomes healthier through the recycling process, greatly reducing facility waste and improving the growing environment for subsequent use. Please see the attached, more comprehensive energy conservation and environmental plan.

ENERGY CONSERVATION

The MinnMed Greenhouse

Minnesota Medical Solutions LLC is currently building (phase 1 completion in Nov, 2015) and intends to operate a state-of-the-art greenhouse cultivation facility in order to provide the patients of Minnesota with the highest quality, safest cannabis medicine in the state.

Utilizing a greenhouse for cannabis cultivation will provide the most energy-efficient means to produce medical cannabis year round. MinnMed intends to implement state-of-the-art growing techniques with full commitment to sustainable energy conversation, energy efficiency and renewable energy technologies. Specific factors that can be controlled within a greenhouse include temperature, levels of light and shade, irrigation**,** fertilizer application, CO2 levels and atmospheric humidity. Greenhouses are effective at addressing inconsistencies in key growing attributes such as a short growing season or poor light levels, and they can thereby improve plant production in marginal environments.

NATURAL (AMBIENT) & LED LIGHTING

Natural or ambient lighting is the preferred and primary source of growth lighting in greenhouses. This use of natural light is in stark contrast to warehouse cannabis production facilities which use no natural light. Efficient, practical and cost effective, exposure to natural light is one of the primary drivers to greenhouse installation and use and MinnMed feels this is the right choice for Minnesota. Supplemental lighting, including Light-Emitting Diode (LED) lighting is necessary to supplement natural light exposure for successful, reliable cannabis growth. Using LED light, it is also possible to promote different growth phases of the plant under cultivation. Red light, for example, encourages plants to grow in length, whereas blue light fosters bud formation for higher yields. MinnMed will be utilizing some LED technology for supplemental lighting in the MinnMed greenhouse; this option will provide efficiency for the light system and promote energy conservation. LEDs are brighter and cooler than traditional lamps. As a result, they consume less

energy to emit the same lumen/light level. MinnMed hopes to transition to increased LED use in the future as the technology is proven and becomes more reliable.

ENERGY EFFICIENCY

We seek to be industry-leading in our efforts toward energy reduction and energy efficient operations. Using energy more efficiently enables us to reduce our carbon footprint, conserve natural resources and contain costs. With widespread international recognition that human-caused carbon emissions are contributing to global warming, it is MinnMed's responsibility as a socially and environmentally conscious business to reduce our carbon footprint. To ensure our energy use and carbon footprint are at industry-leading levels, we will be tracking the following metrics:

- Indirect greenhouse gas emissions from electricity purchased and consumed
- Total megajoules of energy used by the MinnMed operations
- Energy use ratio (megajoules of energy used per gram of product produced)

Energy efficient and/or reduction initiatives MinnMed has committed to include:

- *climate-friendly transportation* – we will use a fleet that is powered by a mix of efficient fuels including electricity, natural gas, diesel-electric hybrids, and biodiesel
- *Geothermal, wind and/or solar power sources* – MinnMed has the long-term goal of being "off the grid" (100% self-generated power) by 2020 through the application of wind, solar, and/or geothermal power generation technology.
- *Restoration of native landscapes adjacent to MinnMed buildings* – Under leadership of our partner Minnesota Native Landscapes, native landscapes can be restored on all MinnMed properties to aid in energy reduction (heating/cooling) and ensuring the sustainability of the local ecosystem and habitat.

Radiant Floor Heat

Minnesota Medical Solution intent to utilize Radiant Floor Heat (RFH) to provide heating for the green house project, RFH has a number of advantages and more efficient than forced-air heating because it

eliminates duct losses. RFH will reduce the disbursement of allergies and mold spores that can be distributed by forced air systems, improving the work environment for our employees. Hydronic (liquid-based) systems use little energy. Hydronic systems can use a wide variety of energy sources to heat the liquid, MinnMed intends to utilize a combination of standard gas- boilers, with long term goals to use alternative energy sources.

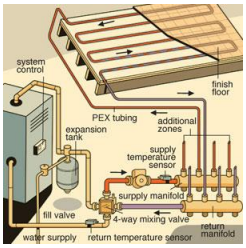
Hydronic Radiant Floors

There are three types of radiant floor heat -- radiant air floors (air is the heat-carrying medium), electric radiant floors, and hot water (hydronic) radiant floors. Hydronic (liquid) systems are the most popular and cost-effective radiant heating systems for heating-dominated climates. Hydronic radiant floor systems pump heated water from a boiler through tubing laid in a pattern under the floor. In some systems, controlling the flow of hot water through each tubing loop by using zoning valves or pumps and thermostats regulates room temperatures

The MinnMed greenhouse will use the hydronic system for this project, and will install the system into the concrete slab commonly referred to as a "wet installations," the installer embeds the radiant floor tubing midway in the slab to use the thermal mass of a concrete slab floor to create monolithic radiant block evenly distributing heat to the plants and throughout the facility.

Examples of in slab installation

Evenly dispersed heat



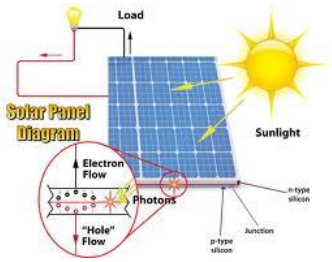
Example of Boiler

Renewable Energy Technologies

Solar panels

Solar-energy is the most abundant and easily available renewable resource, systems allow you to capture free sunlight and convert it into usable power. Solar energy can be used to heat and cool, but it has almost no impact on the global climate. Wherever sunlight shines, electricity can be generated, solar has its limitation and should not be utilized as the primary source of electrical power, but as a source to offsetting the electrical consumption. Having a system that creates solar energy means you use less electricity from your utility company that contributes to lower heating and cooling costs plus zero noise pollution and air emissions

MinnMed will be installing solar panel array on the roof of the Head House, the solar array will be mounted of the roof of the Head House (the operational building) and tilted to match the pan of the suns path. The system will consist of (photovoltaic) panels; each panel will be able to generate 250W.



How Photons are converted to energy


Roof Top Installation

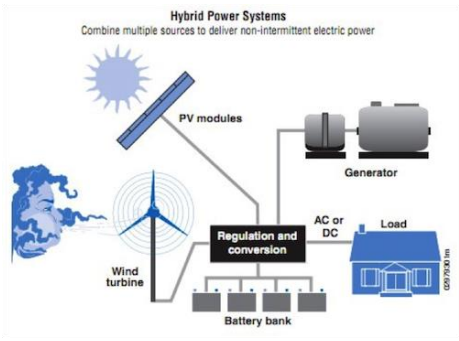

Ground Installation

Wind Power & Small Wind Turbine

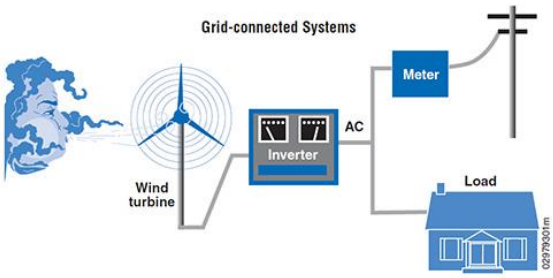
Wind power, as an alternative to fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation and uses little land. The effects on the environment are generally less problematic than those from other power sources. As of 2011, US is generating more than a 12% of its electricity from wind and 83 countries around the world are using wind power to supply the electricity grid.

Small wind turbines are defined as wind turbines with capacities of 100 kW or less. MinnMed intends to install a 10kw wind turbine if cleared by the city and state, in order to offset electrical production. Our

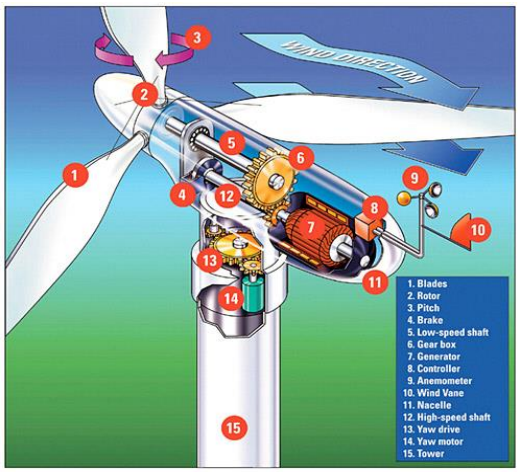
goal is to do this by 2017. MinnMed's building location has better wind energy potential than 70% of the US and may have an equivalent annual production of 42,720 kWH



Example of a Hybrid Solar and Wind installation



Example of the electrical generation form kenicke wind energy to electricity that can be used to run operations



Inside a small wind turbine

Bio Mass Energy

Biomass is biological material derived from living, or recently living organisms. It most often refers to plants or plant-based materials which are specifically called Lignocellulosic biomass.As an energy source, biomass can either be used directly via combustion to produce heat, or indirectly after converting it to

various forms of bio-fuel. Conversion of biomass to bio-fuel can be achieved by different methods which are broadly classified into: thermal, chemical, and biochemical methods. In MinnMed's case a Bio-Mass boiler could be installed to heat the Radiant Floor Heating system. MinnMed will work with the city and state to evaluate the possibility and utility of a biomass generator. MinnMed will work with local and state officials to determine if this is, as a whole, a beneficial practice.

Wood remains the largest biomass energy source to date; examples include forest residues (such as dead trees, branches and tree stumps), yard clippings, wood chips and even municipal solid waste. In the second sense, biomass includes plant or animal matter that can be converted into fibers or other industrial chemicals, including bio-fuels. Industrial biomass can be grown from numerous types of plants, including miscanthus, switchgrass, hemp, corn, poplar, willow, sorghum, sugarcane, bamboo, and a variety of tree species, ranging from eucalyptus to oil palm (palm oil). Minnesota Native Landscapes produces a large amount of biomass that could be used in the process.

Lignocellulose refers to plant dry matter (biomass), so called lignocellulosic biomass. It is the most abundantly available raw material on the Earth for the production of bio-fuels. MinnMed could use this form of abundant renewable energy to fuel the boiler that will heat the Greenhouse. MinnMed has negotiated an management with Minnesota Native Landscapes, Inc. located in Otsego, MN to supply lignocellulosic biomass fuel needed in order run the boiler heating system, Minnesota Native Landscape primary business is to clear raw material, collect and harvest dry waste plant material and sell it to facility for Bio-fuels heating operations. This renewable source of fuel will provide heat to the Greenhouse as a ***Carbon Neutral solution***.

Biomass is a Carbon Natural cycle, environmentally stainable

Fuel for Biomass boiler, can be harvested from dead trees, branches and tree stumps), yard clippings, wood chips

From our production to our patients, we recognize that environmental sustainability is essential for the sustainability of our business. We deliberately integrate the environment as a key consideration into everything we do at Minnesota Medical Solutions. This is reflected in our water stewardship efforts, our goal for maintaining industry-leading greenhouse gas emission levels, our promotion of sustainable agriculture, our product and packaging innovations and much more. As residents of Minnesota we are committed to protecting Minnesota's environment -- today and for future generations. We bring this perspective as a crucial element to both our immediate and long-term planning.

Water Stewardship

Water is the most prized natural resource of the state of Minnesota. Water is essential to the MinnMed growing process and we approach water management accordingly. We aim to become intensely involved in water stewardship throughout the state. Through application of new technologies, we commit to a goal of reducing the amount of water we use per gram of product, treating and recycling wastewater (in some cases discharging it cleaner than it was originally), and strive to develop programs to replenish water back to Minnesota and her residents. These programs may include, but are not limited to: *condensation capture of greenhouse water vapor; rainwater capture and use; irrigation run-off recapture and reuse.*

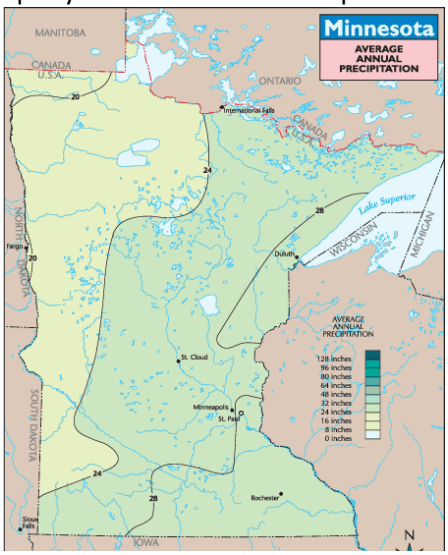
Source water vulnerability assessments will be conducted by third parties prior to commencing any operations. These assessments and plans inventory risks to the water source supplying our operation and the surrounding community. Once the assessment is complete, we will develop a relevant water source sustainability program detailing specific risk-mitigation actions that we can take to help preserve the sustainability of local water resources. This program addresses water challenges to watersheds, from hydrological vulnerability to local city management. The plan will include partnerships and mitigation activities with the city and local community (like 'Project Wet'), water agencies and nongovernmental organizations.

We believe that by focusing on water efficiency in parallel with appropriate treatment of our wastewater and returning it to the environment that we will effectively reduce our impact to the local water system and contribute to the overall water quality.

Rainwater Recapture

MinnMed will integrate a rain water recapture system for this project, in order to reduce or eliminate the water usage and conserve a natural resource. The rain water recovery system will provide some of the water needed to adequately hydrate the plants through the year and a winter months. MinnMed will be installing a 10,000 GL system; this system will provide approximately 10 days water continually for 500 plants. As the Greenhouse expands plant capacity, MinnMed will increase the gallons of the rain water recovery system reservoir tank to accommodate the number of plants in the cultivation center.

Minnesota has an age 64” Rain fall per year or 2.2-2.4” of rain per hour



Sustainable Cultivation

In the report, Realizing a New Vision for Agriculture: A roadmap for stakeholders, the World Economic Forum and McKinsey & Company estimate that up to 30 percent of greenhouse gas emissions are attributable to agriculture and growing. The report also indicates that agriculture accounts for 70 percent of worldwide water withdrawals. As such, MinnMed has established 5 guiding principles to ensure our growing processes and practices are sustainable and have a minimal impact on the environment and communities in which we operate:

1. Obey Minnesota and local (municipal) law.
2. Respect state labor standards.
3. Enhance sustainability by effectively managing input, production and processing efficiencies.
4. Actively manage biodiversity and ecosystem programs.
5. Continuously improve key areas of the cultivation/growing process.

Sustainable Packaging

Packaging plays an important role for our business in meeting consumer expectations and preventing waste by protecting the integrity of our product during storage, distribution, and sale. Our goal is to use recycled materials whenever feasible in all of our finished product packaging and to ensure materials used in production and distribution are fully recyclable wherever possible.

Sustainable packaging is not just a single, isolated strategy; it is a life cycle approach focusing on consumption and emission factors, design elements of the packaging "closing the loop" through appropriate labeling to improve recoverability at the end of the package's life.

The following focus areas will consist of MinnMed's initial approach to ensuring a sustainable packaging platform:

- *Biomaterials* – The potential use of materials derived from biological material will be fully investigated and considered as part of our long-term sustainable packaging strategy.
- *Sourcing* – The utilization of sustainable purchasing principles to target materials such as previously recycled, post-consumer polymers and other packaging materials are at the forefront of the packaging industry. MinnMed will incorporate this opportunity immediately into its finished product packaging.
- *Recovery* – The recovery component of sustainable packaging is an oft-overlooked consideration into the overall strategy. MinnMed will provide appropriate labeling on finished product packaging as well as return/recovery receptacles if appropriate.

8. Health Equity: Provide a detailed description of any plans you will take to reduce health disparities such as translation of patient information, increased employee health literary, contracting practices.

Health Equity

Health equity is an important goal for Minnesota Medical Solutions as it is integral to health care services. Our physician and healthcare provider team members are very aware of how difficult it can be for some communities of color and underserved populations to access healthcare services in a culturally competent fashion. In addition, underserved communities also face geographic and economic barriers to care that contribute to health disparities.

Communities of color in Minnesota are suffering from some of the greatest disparities regarding many of the diseases the medical cannabis program will serve. For example, according to 2013 data from the Minnesota Department of Health (MDH), the rate of persons living with HIV/AIDS in communities of color can be as low as four times the rate in the white population and as high as fifteen times the rate of the white population.

Table X | Rates per 100,000 of Persons Living with HIV/AIDS by Race/Ethnicity, Minnesota, 2013

Race/Ethnicity	Cases	Percent	Rate per 100,000
White, Non-Hispanic	3,901	51%	88.6
Black, African-American	1,703	22%	865.1
Black, African-Born	1,042	13%	1343.5
Hispanic	665	9%	265.7
American Indian	132	2%	216.7
Asian/Pacific Islander	140	2%	64.7
Other	140	2%	X
Total	7.723	100%	145.6

Data Source: MN HIV/AIDS Surveillance System

Populations suffering from disparities in Minnesota face a wide range of barriers to access care. Moreover, many "non-clinical" factors influence a patient's health outcome and status in Minnesota. By recognizing the social determinants of health in our approach to providing care, MinnMed will further narrow the disparities gap to the extent possible.

MinnMed will take several approaches to improve health equity for underserved populations:

- **Translation Services:** MinnMed intends to provide translation services for the common languages spoken in Minnesota's changing population by utilizing remote translation services. In its first year, MinnMed expects to offer translation services in Spanish, Somali and Hmong.We will do our best to optimize the timing of this translation service coverage in our distribution facilities. In addition, MinnMed will evaluate the use of these services in these languages and monitor the need to establish translation into additional languages as operations evolve.
- **Distribution Facility Locations:** MinnMed seeks to locate our distribution facilities in areas that are accessible to public transportation and all economic and ethnic groups. We will work with the other manufacturer to optimize patient access to our facilities and provide patients with resources for public transportation. We anticipate transportation challenges in rural areas of the state.
- **Patient Outreach and Education**: MinnMed will seek to partner with agencies that serve our target population to reach out to the public and inform them of the availability of MinnMed service in their community. Key examples of this type of work include participation at Health Fairs or outreach to specific organizations serving patients with the diseases covered by Minnesota's medical cannabis program (e.g., HIV/AIDS population or the Minnesota Department of Health's SAGE program for breast and cervical cancer screenings.) In addition, MinnMed will ensure that education is part of every patient's experience.
- **Patient Advisory Board:** MinnMed will establish a Patient Advisory Board to ensure MinnMed's governing board is aware of the efforts to improve the health accessibility gap for underserved populations. In addition, the Patient Advisory Board will identify key "gaps" in MinnMed's operations for the Board to consider. We hope to integrate a

broad range of patients, including low-income, culturally diverse and geographically isolated into our patient base.

- **Hiring Practices:** MinnMed will look to preferentially hire bilingual employees and employees of diverse ethnic backgrounds when possible to improve access for underserved populations. In addition, MinnMed will seek to hire qualified individuals from the communities in which the dispensaries are located. It is vital to MinnMed that we be community-based so that our services are accessed in a way that is comfortable for the patient.

9. Community Engagement (no longer than three pages):

Community Engagement

MinnMed recognizes that our presence in the lives of patients and employees will directly affect their communities. We are committed to making our impact positive and beneficial by contributing to and becoming regularly involved in local community programs and organizations.

There are two major components to MinnMed's community plan. The first is to address and eliminate, as much as possible, any potential negative consequences to the production and distribution of medical cannabis in the communities where our facilities are located. The following approaches have been designed to accomplish this goal:

- The location of our production facility in Otsego, where there are few immediate neighbors is ideal. Our presence will be silent and unobtrusive.
- Using a closed loop philosophy in which we will: 1) avoid reliance on the community's water supply by utilizing well and rainwater and containing our waste; 2) avoid reliance on the community for elimination of waste products by recycling and reusing the waste we generate for cannabis production, heat or energy.
- Lowering energy consumption with the use of natural light and highly efficient LED lighting. Most of our energy consumption will occur during off-peak hours.

The second major component of the plan will come in the form of annual monetary contributions to local communities and organizations. The city of Otsego, the location of our production facility, as well as all municipalities where our distribution facilities will be included in our donation activities. Over time, we would like to include state-wide programs. While MinnMed will always prioritize those locations where our facilities exist, we are committed to engagement with all that are affected by medical cannabis.

There will be two phases to this part of the plan. Phase one includes a fixed $20,000 donation to the city of Otsego starting day one, regardless of profitability. The city will determine how they will use the money, but we will encourage them to direct the money towards programs that support drug awareness and prevention programs, education, public parks and community health.

Phase two will begin when MinnMed becomes profitable. At that time a 5% contribution of net profit will be given to local communities and organizations with tax-exempt status under Section 501 (c)(3) of the U.S. Internal Revenue Code. 2% of the contribution will be given to the city of Otsego each year. Once again, with direction and encouragement from MinnMed, the city will decide how to distribute the money in order to best strengthen the local community.

The remaining 3% will be given to Minnesota CannaCare, a non-profit organization developed by MinnMed to help support its community of patients and neighbors. In addition to what is described in the Compassionate Need portion of the application, Minnesota CannaCare will act as a liaison between MinnMed and the local communities and organizations we intend to support, including the cities where distribution facilities are located.

Like our patient population and their varying communities, the areas that could benefit from MinnMed's community plan are broad and diverse. We will rely on Minnesota CannaCare administrators as well as the Board of Directors to determine how to disperse funds appropriately. This will likely differ year to year and location to location.

One area we seek to emphasize is drug awareness and prevention. We have had discussions with leaders at Hazelden (a part of the Hazelden Betty Ford Foundation), to brainstorm ways that MinnMed might get involved and/or introduce curriculum and instruction specific to drug awareness and prevention. Along with the existing packages available to communities to address these issues, we hope that Hazelden, and organizations like it, will be open to working with Minnesota CannaCare in the future in order to develop plans that are specifically geared towards medical cannabis.

Another area of focus for MinnMed is education. We hope to impact the lives of the children in Minnesota, especially the communities where we have a specific presence, by working to eliminate the achievement gap and supporting early childhood and post-secondary programs. We have contacted organizations such as The Children's Defense Fund of Minnesota and College Possible to start building potential connections in order to meet these goals.

Optimum health is at the core of MinnMed's mission. Accordingly, we will direct our attention and resources to community organizations and programs with the same point of view. As is true with all components of MinnMed's plan, we believe best medical practices come from research

and data. We will proudly support further research into cures and effective treatments for qualifying conditions.

MinnMed will also directly support the communities where our facilities are located by providing high-paying jobs and training for the unemployed, preferentially seeking out veterans and those living locally. Employees will be encouraged and incentivized to volunteer, and MinnMed will investigate best practices for employee volunteer programs and engagement. For example, we will support mentoring and tutoring programs through local youth centers and schools. Models implemented by organizations like College Possible and Teach For America are helpful resources we will utilize in developing our programs. In addition, MinnMed will support the improvement of low and moderate income communities through programs that create and sustain affordable housing and provide job training and workforce development.

MinnMed recognizes the benefits of collaboration. We believe it would be beneficial to all communities involved if the two selected distributors work together to support the programs and areas outlined in our plans. MinnMed's primary objective is improving the lives of the patients and their communities. We are committed to investigating any and all ways to make this a reality.

10. Other (no longer than three pages): Provide a detailed description of any other planned activity you will take that you believe would be of interest to the selection committee. Identify items not currently captured in any of the previous questions.
Other

Pharmacy Student Preceptor and Pharmacy Post-Graduate Residencies

While this application has detailed many of the tools and processes Minnesota Medical Solutions will use to educate and train the pharmacists who staff our dispensaries, we are also proud to describe our commitment to enhancing the knowledge and training of *tomorrow's pharmacists***.**

Minnesota Medical Solutions will actively pursue the opportunity for our pharmacists to serve as preceptors for students progressing toward a degree in pharmacy. Our pharmacists will initially serve as preceptors for interning pharmacists accumulating hours during the "Concurrent-time Internship" phase of their education. This means our pharmacists will mentor and supervise students enrolled in their second, third, and fourth academic years of a professional pharmacy curriculum of an accredited college or school of pharmacy. There will likely be some initial acceptance barriers on the side of the academic institutions, but MinnMed will work vigorously to overcome these barriers and make this a mainstream, accepted adjunct to the clinical training of future pharmacists.

Minnesota Medical Solutions will seek to partner with the University of Minnesota College of Pharmacy, which has campuses in the Twin Cities and Duluth, to provide additional preceptor sites that serve pharmacy students seeking to fulfill their Experiential Education Program requirements (a part of the pharmacy practice experience component of their professional pharmacy curriculum).

Understanding that the initial application and approval process takes upwards of 2-3 years to complete, Minnesota Medical Solutions will actively seek the opportunity to serve the training needs of tomorrow's pharmacists by providing recent pharmacy graduates from accredited colleges or schools of pharmacy from across the country the opportunity to participate in Post Graduate Year-1 (PGY-1) and Post Graduate Year-2 (PGY-2) pharmacy residencies. While PGY-1 residencies generally focus on honing and perfecting general pharmacist competencies, our PGY-2 residencies will focus on the formulation and clinical application of Cannabis Based Medicine.

All of the intern and residency programs developed by Minnesota Medical Solutions will expose pharmacy students and recent graduates to the clinical aspects (the distribution facilities) as well as the cultivation, refining, and manufacturing aspects of our company's operations.

To the best of our knowledge, there is currently no formal program in the nation that provides a medical cannabis experiential education opportunity to pharmacy students or graduates. Minnesota Medical Solutions hopes to serve as an industry leader in this endeavor.

The Minnesota Medical Solutions Scientific Advisory Board

In addition to our strong team of national and state leaders, MinnMed has started to build a robust scientific advisory team. This team will drive research for MinnMed in the coming years. Below is a brief outline of the current MinnMed scientific advisory board. Please see the attached full and partial resumes for the scientific advisory board.

Jerry Cohen PhD

Gordon and Margaret Bailey Professor of Environmental Horticulture, Department of Horticultural Science, University of Minnesota, Saint Paul, MN

James Miner, MD

Dr. Miner is currently chief of emergency medicine at Hennepin County Medical Center, where he served as the research director for 7 years from. Dr. Miner is a prolific researcher with a large number of pertinent, clinical publications over the last two decades.

Adrian Hegeman, PhD

Adrian Hegeman is an Associate Professor of Horticultural Science and Plant Biology and the director of the Plant Metabolomics laboratory at the University of Minnesota. He is an expert in genome-scale analysis of plant metabolism, and is keenly interested in understanding how plant natural products (specialized metabolites) can best be utilized for human health benefits.

Adrian Anderson, PhD

Dr. Anderson is a senior executive and quality director for operations for Gilead Sciences. The company specializes in biopharmaceuticals and is active in drug discovery, development,

manufacturing and commercialization of therapies for viral diseases, infectious diseases and cancer.

Rick Kingston, Pharm.D.

Rick is co-founder of Safety Call International. His organization will work with MinnMed to build a comprehensive post-market surveillance system to learn more about adverse events related to medical cannabis.

The MinnMed Patient Portal

Patient accessibility, education and feedback are critical components of success at Minnesota Medical Solutions. We recognize this and will develop a very robust Web and Mobile experience for our patients. The MinnMed website will be a robust public website for our current and prospective patients to highlight relevant information such as our patient experience focus, services, hours and location information. In addition, we will develop a secure HIPAA compliant authenticated Patient Portal for our patients to manage their medication and care experience. This authenticated portal will be built as part of our clinical development partnership we have created with our BioTrackTHC software provider. Please see Website and Web Portal Capture attachments earlier in this application in section A.3.a.

The website and Patient Portal will initially be developed with the following features:

- Data Privacy focused and HIPAA compliant
- Accessible. Web Browser, Tablet and Mobile enabled
- Extensible. Developed to support future needs and features.
- Patient Medication History
- Patient Contact profile
- Patient Registration forms
- Patient Medication Refill application
- Patient Feedback application
- Patient Research application
- Patient Education Materials

Thank you for taking the time to review our proposal.

Adrian B. Anderson, Ph.D.

772 W. 12th St, Claremont, CA 91711
612.817.2487
adrian_b_anderson@yahoo.com

PROFESSIONAL OBJECTIVE

Self-directing analytical leader seeks to apply technical experience and interpersonal skills to a scientific leadership position in a corporation that has the opportunity for significant scientific and social impact.

HIGHLIGHTS

- Senior leader with strong technical and interpersonal skills.
- Experienced in working closely with commercial manufacturing, contract laboratories, QA/QC, research and development, and regulatory affairs.
- Experienced in process flow diagrams and data mapping to understand data life cycles in quality control.
- Lead on several cross functional site initiatives involving Development, QC, QA, and Regulatory Affairs including training matrix development, method validation, Quality Control laboratory remediation and best practice implementation.
- Experience with method development and validation of a wide range of advanced analytical techniques including HPLC, GC, UPLC, LC-MS, GC-MS, SFC, and ICP.
- Strong background in small molecule structural elucidation using a broad range of MS platforms including single and triple quadrupole, linear ion trap, q-TOF, and MALDI-TOF.
- Demonstrated project management experience through validation of analytical test methods to meet local and global regulatory submission deadlines.
- Significant experience in technical leadership through supervising of direct reports, mentoring of junior level scientists, training colleagues, and cross-functional team leadership.
- Experienced with current compendia (USP/EP), CMC regulatory submissions, ICH guidelines for validation and analytical control, and cGMPs.
- Demonstrated right first time investigation experience in OOS/atypical results and exception reporting.
- Experienced in audit preparation, CAPA management, and FDA interaction.

EXPERIENCE

Associate Director, QC – Operations Gilead Sciences, San Dimas, California, 2014-present.

- Lead the QC – Operations group which is responsible for data review, instrument qualification, Quality Control information technology and administration, specifications and compendia compliance, CAPA management, training, and self-inspections.
- Provide strategic input on Quality Control continuous improvements.
- Duties include primary responsibility for laboratory investigations, Quality Events, CAPAs and all matters of a technical nature including approval of technical reports and protocols
- Interface with other Gilead sites on harmonization of quality control practices and processes.
- Provide strategic guidance on data integrity compliance for quality control specifically and San Dimas site generally.
- Facilitate logical resolution to organizational inefficiencies involving cross-functional interactions.

Group Leader, Hospira Boulder Inc., Boulder, Colorado, 2011-2014.

- Led the formation of Validation Research and Commercialization Support group within Development.
- Direct the work of seven direct reports including five analytical chemists and two data reviewers.
- Manage work and projects on method validation, remediation, transfer, and commercialization support.
- Worked with Hospira's Global Expansion (GE) group at our corporate headquarters and in Australia on filing a new assay and impurities method in Latin America and Japan for Hospira Boulder's largest volume drug substance. I led the development, validation, and CMC summary preparation for the method.
- Leader on a site-wide analytical method remediation initiative. Evaluate performance of methods in quality control labs and design experiments to remediate gaps while maintaining GMP and regulatory compliance. This initiative was part of an FDA audit commitment.
- Responsible for communication with key customers on methods used for commercial product release.
- Write, review, and approve laboratory investigations in Trackwise for Atypical and OOS results.
- Key point of contact for contract laboratories on outsourced FTE work, method validation and development.

- Provide leadership on method validation, development, and tech transfer.
- Primary contact for technology transfer and trouble-shooting of analytical methodology for Quality Control.
- Provide site senior management with regular status updates on method remediation and transfer to QC.
- Conduct structural elucidation of impurities using Agilent q-TOF MS.
- Responsible for drafting and reviewing method validation protocols, reports, method transfer documents, and other technical memos.
- Led the development of an HPLC assay and impurities method utilizing an NQAD universal detector.
- Provide data and reports for product filings and to address inquiries from domestic and international regulatory agencies.
- Interact closely with Quality Control on implementation and execution of methods for in-process and final API testing of commercial products.
- Authored site SOP on Reportable Results to improve compliance.
- Work with Quality Control to investigate and resolve Out Of Specification results.
- Provide analytical leadership and consult on HPLC-MS analysis and interpretation.
- Drafted the Hospira Boulder mission statement while serving on a cross-functional team on mindsets and behaviors as part of the site-wide LEAN initiative.
- Led the implementation of a recognition program for Hospira Boulder.

Scientist II, Abbott, North Chicago, Illinois, 2006-2011.

- Promoted from Senior Research Analytical Chemist to Scientist II in July 2008.
- Recipient of the Global Pharmaceutical Research and Development (GPRD) President's Award for my contributions to the Commercialization of the Improved Zotarolimus Manufacturing Process project.
- Analytical lead for ABT-578 (Zotarolimus) Chromatography Team. The team was awarded a 2007 Process Research and Development Impact Award success of this project.
- Contributing analytical chemist on ABT-578 Project Team. This team was the recipient of a 2006 Process Research and Development Impact Award. Our team was recognized for significant advances in the understanding and control of the manufacturing process.
- Worked closely with organic chemist and engineers to support process optimization and scale-up for pilot plant manufacturing campaigns to supply FIH, formulation development, and Phase I/II deliveries.
- Analytical functional lead in charge of testing and releasing active pharmaceutical ingredient (API) starting materials, intermediates, and drug substances during manufacturing process scale-up activities. Methods are developed for determination of API purity and potency, monitoring reaction completion and controlling process solvents.
- Subject mater expert for Process Analytical Chemistry on analysis of drug product formulations manufactured in Abbott's chemical pilot plant.
- Responsible for delegating and directing analytical project work to other members of the department.
- Responsible for developing project timelines, as well as general project management duties.
- Provide leadership and guidance to other members of the department.
- Identify, track and control critical impurities in API and API intermediates.
- Lead analytical chemist in the evaluation of the use of organic solvents for inductively coupled plasma-optical emission spectroscopy (ICP-OES). The innovative use of technology led to a nomination for a 2008 Process Research and Development Impact Award.
- Core member of the several technology focused user groups including LC-MS, GC-MS, and SFC groups. Led the Process Analytical Chemistry LC-MS User Group (2007). The focus of these user groups is to provide a forum for discussion of topics and issues relevant to Process Analytical Chemistry.
- Co-authored guidelines for use and maintenance of all mass spectrometers in the department.
- Authored guidelines for archival of data using Nugenesis, a part 11 GMP compliant software package for spectral data storage.
- Authored guidelines for use and maintenance of Karl Fischer titrators used for water determination.
- Co-authored guidelines for optimizing the use of existing data collection software (Atlas) to improve efficiency, reduce paperwork, and ensure compliance to Good Manufacturing Practices (GMP).
- Facilitated an interface with other analytical chemistry departments at Abbott to improve collaboration on API method development activities.
- Key member of Process Analytical Chemistry committee focused on university outreach and recruiting.
- Transferred analytical methods from Process Research and Development to commercial manufacturing at Abbott.
- Worked with Quality Assurance to develop an instrument qualification protocol for Corona/CAD universal detector.
- Conducted research with knowledge of and adherence to GLP and GMP guidelines.

Scientist, Amgen, Thousand Oaks, California, 2004-2006.

- Provided analytical method development support for Amgen small molecule projects. Methods are developed for testing and release of API and in-process control monitoring of API manufacturing.
- Developed a gas chromatography assay for determination of benzene in API at a concentration of two parts per million.
- Conducted structural elucidation of active pharmaceutical ingredient impurities using LC-MS.
- Developed methods for determination of chiral purity of active pharmaceutical ingredient by HPLC.
- Co-authored guidelines for developing chiral purity assays by capillary electrophoresis.
- Co-authored guidelines for developing HPLC analytical methods.
- Conducted research with knowledge of and adherence to GLP and GMP guidelines.

Research Assistant, University of Minnesota, Minneapolis, Minnesota, 1999-2003.

- Designed and built a capillary electrophoresis instrument equipped with laser-induced fluorescence detection.
- Researched doxorubicin (Adriamycin), an anti-cancer agent, in tumor cell models.
- Investigated the extraction of doxorubicin and doxorubicin metabolites from biological matrices.
- Developed a sensitive capillary electrophoresis with laser-induced fluorescence detection method for the separation and detection of doxorubicin and at least five metabolites in bulk cell preparations and in single cells.
- Isolated and detected doxorubicin metabolites that had not previously been reported.
- Developed analytical and characterization methods to study the distribution of low abundance doxorubicin metabolites in sub-cellular fractions by capillary electrophoresis.
- Repaired and maintained capillary electrophoresis instrumentation in the laboratory.
- Became proficient at operation of a Beckman Coulter P/ACE MDQ capillary electrophoresis instrument.
- Explored LC-MS methods for identification of doxorubicin metabolites.
- Supervised and mentored all analytical research interns within the Arriaga group.
- Led a team of researchers studying doxorubicin within the Arriaga group.
- Co-authored a successful National Institute of Health RO1 grant with Dr. Edgar Arriaga.

Visiting Faculty, Gustavus Adolphus College, Saint Peter, Minnesota, 2001.

- Conducted all classes for Dr. Lawrence Potts while he was on medical leave.
- Courses taught included Quantitative Analysis, Advanced Inorganic Chemistry and Instrumental Methods.
- Supervised all associated laboratory sessions.

PROFICIENCIES

Technical Skills

- HPLC (Reversed and Normal Phase)
- UPLC
- Mass Spectrometry (ESI/APCI)
- Gas Chromatography
- Instrument repair and maintenance
- ICP-OES
- Capillary Electrophoresis
- Ion Chromatography
- Spectroscopy (UV-Vis and IR)
- Gel Permeation Chromatography
- MALDI-TOF Mass Spectrometry
- Karl Fischer Titration

Software

- Trackwise
- Thermo Atlas
- Agilent ChemStation
- Empower Millennium
- Chromeleon
- Waters MassLynx
- Thermo Electron Excalibur
- Smart Analyzer Vision (ICP)
- Beckman Coulter 32 Karat
- ChemDraw and ISIS/Draw
- Microsoft Office (including Visio and Project)

EDUCATION

University of Minnesota Minneapolis, Minnesota, 1998-2004
Ph.D. Analytical Chemistry
GPA: 3.8

Thesis Title: "Strategies for Elucidating Doxorubicin Metabolism by Capillary Electrophoresis with Laser-Induced Fluorescence Detection"
Advisor: *Dr. Edgar A. Arriaga*

Gustavus Adolphus College Saint Peter, Minnesota, 1994-1998
Bachelor of Arts
GPA: 3.8
Major: Chemistry **Minor:** Biology

PUBLICATIONS

- **Anderson, A. B.**, Ciriacks, C., Fuller, K. M., and Arriaga, E. A. "Describing the Distribution of Zeptomole Abundant Doxorubicin Metabolites in Sub-cellular Fractions by Capillary Electrophoresis with Laser-Induced Fluorescence Detection." *Analytical Chemistry*, 75 (2003) 8-15.
- **Anderson, A. B.**, Gergen, J., and Arriaga, E. A. "Detection of Doxorubicin Metabolites in Cell Extracts and Single Cells by Capillary Electrophoresis with Laser-induced Fluorescence Detection." *Journal of Chromatography B*, 769 (2002) 97-106.
- **Anderson, A. B.** and Arriaga, E. A. "Subcellular metabolite profiles of the parent CCRF-CEM and the derived CEM/C2 cell lines after treatment with doxorubicin." *Journal of Chromatography B*, 808 (2004) 295-302.
- **Anderson, A. B.**, Xiong, G., and Arriaga, E. A. "Doxorubicin Accumulation in Individually Electrophoresed Organelles." *Journal of the American Chemical Society*, 126 (30) 9168-9169 (Communication).

PRESENTATIONS AND POSTERS

- **Anderson, A. B.** "Application of Organic Solvent Diluents for Analysis of Pharmaceutical Small Molecules for Trace Metals by ICP-OES." Pittcon 2009, Chicago, IL, March 2009.
- **Anderson, A. B.,** Benz, N. J., Leanna, R. "A study of the affect of trace metals on headspace gas chromatography of residual solvents in macrolide and non-macrolide active pharmaceutical ingredients" HPLC 2008, Baltimore, MD, March 2008.
- **Anderson, A. B.** "Strategies for Elucidating Doxorubicin Metabolism by Capillary Electrophoresis with Laser-Induced Fluorescence Detection." 24th Minnesota Chromatography Forum, Minneapolis, MN, May 2003.
- **Anderson, A. B.**, Arriaga, E. A. "Sub-cellular Localization of Doxorubicin Metabolites by Capillary Electrophoresis with Laser-induced Fluorescence Detection." Pittcon 2002, New Orleans, LA, March 2002.
- **Anderson, A. B.**, Gergen, J., Arriaga, E. A. "Single-cell Analysis of Doxorubicin Metabolites by Capillary Electrophoresis with Laser-induced Fluorescence Detection." 12th Frederick Conference on Capillary Electrophoresis, Frederick, MD, October 2001.
- Justin LaFountaine, Jonathan Miller, Lloyd Dias, **Adrian Anderson**, Timothy Robbins, Nancy Benz, Thomas Cullen, Radhika Chemburkar, Michael Widzinski, Lin Zhu, Kevin Engh, "Large Scale GLP/GMP Manufacture of ABT-099 Solid Dispersion by Rotary Evaporation" DPD Scientific Symposium: Amorphous solid dispersions from concept to commercialization, Abbott (internal), Lake County, IL, July 2010.
- Donghua (Alan) Zhu, Nathaniel Catron, Jason Christian, Timothy Robbins, **Adrian Anderson**, and Jack Nottingham "From mg to kg: Scalability of Rotavap Preparation of Solid Dispersions for Toxicology Studies" DPD Scientific Symposium: Amorphous solid dispersions from concept to commercialization, Abbott (internal), Lake County, IL, July 2010.

AWARDS AND HONORS

- TIP Recognition – Personal Commitment, ***Hospira***, Boulder, Colorado, 2011
- Process Research and Development Impact Award - Nominee, ***Abbott***, North Chicago, Illinois, 2008 and 2009
- Process Research and Development Impact Award-Process Development, ***Abbott***, North Chicago, Illinois, 2007
- GPRD President's Award, ***Abbott***, North Chicago, Illinois, 2007
- Process Research and Development Impact Award-Team, ***Abbott***, North Chicago, Illinois, 2006
- ACES Award, ***Amgen***, Thousand Oaks, California, 2005
- Ecolab Circle of Excellence Award, ***Ecolab***, Saint Paul, Minnesota, 2004
- NIH-Biotechnology Training Grant, University of Minnesota, Minneapolis, Minnesota, 1999-2001
- Graduate Student Fellowship, University of Minnesota, Minneapolis, Minnesota, 1998-1999
- Magna Cum Laude, Gustavus Adolphus College, Saint Peter, Minnesota, 1998
- Phi Beta Kappa, Gustavus Adolphus College, Saint Peter, Minnesota, Elected 1997

REFERENCES

Available upon request.

Jerry David Cohen
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University of Minnesota
Saint Paul, MN 55108
Office: (612) 624-9212; Lab (612) 624-1218; Home (651) 762-7618
Office Fax (612) 624-4941; Home Fax (651) 762-9509; email cohen047@umn.edu

Education

1967-1972 Univ. of California, Riverside B.S. Biology (Microbiology)

1972-1974 San Diego State University M.S. Plant Physiology

1974-1979 Michigan State University Ph.D. Plant Biochemistry

Employment

2000-present Gordon and Margaret Bailey Professor of Environmental Horticulture, Department of Horticultural Science, University of Minnesota, Saint Paul, MN

2008 Intermittent Program Director, Plant Genome Research Program, Division of Biological Infrastructure, National Science Foundation, Arlington, Virginia

2004-2005 Deputy Director, Division of Molecular and Cellular Biosciences, National Science Foundation, Arlington, Virginia

1999 Acting Deputy Director, Division of Molecular and Cellular Biosciences, National Science Foundation (extended administrative detail for Federal FY99/00), Arlington, Virginia

1998-1999 Program Director for Cell Biology, Division of Molecular and Cellular Biosciences, National Science Foundation (administrative detail during Federal FY99), Arlington, Virginia

1999 Plant Physiologist/Biochemist, GM-15; USDA/ARS Agricultural Research Center, Beltsville Human Nutrition Research Center, Phytonutrients Laboratory, Beltsville, Maryland

1995-1999 Plant Physiologist/Biochemist, GM-15; USDA/ARS Agricultural Research Center, Plant Science Institute, Horticultural Crops Quality Laboratory, Beltsville, Maryland

1993-1995 Plant Physiologist/Biochemist, GM-15; USDA/ARS Agricultural Research Center, Product Quality and Development Institute, Horticultural Crops Quality Laboratory, Beltsville, Maryland

1991-1993 Plant Physiologist/Biochemist, GM-14; USDA/ARS Agricultural Research Center, Product Quality and Development Institute, Horticultural Crops Quality Laboratory, Beltsville, Maryland

1988-1991 Plant Physiologist/Biochemist, GM-14; USDA/ARS Agricultural Research Center, Product Quality and Development Institute, Plant Hormone Laboratory, Beltsville, Maryland

1989-1990 Acting Research Leader, Plant Hormone Laboratory, USDA/ARS Agricultural Research Center, Product Quality and Development Institute, Beltsville, Maryland

1989 (May-June) Visiting Research Scientist (Norwegian Marshall Fund award), Department of Plant Physiology and Microbiology, University of Tromsø, Tromsø, Norway

1987 (May) Visiting Research Scientist, Department of Forest Genetics and Plant Physiology, Swedish Agricultural University, Umeå, Sweden

1987 (June) Visiting Research Scientist, Consiglio Nazionale delle Ricerche, Centro Studi di Tecnica Frutticola, Bologna, Italy

1985-1988 Plant Physiologist/Biochemist, GM-13; USDA/ARS Agricultural Research Center, Plant Physiology Institute, Plant Hormone Laboratory, Beltsville, Maryland

1982-1985 Plant Physiologist/Biochemist, GS-12; USDA/ARS Agricultural Research Center, Plant Physiology Institute, Plant Hormone Laboratory, Beltsville, Maryland

1981-1982 Research Associate, Cooperative Agreement with University of Maryland and USDA/SE, Beltsville Agricultural Research Center, Plant Hormone and Growth Regulators Laboratory

1980-1981 Postdoctoral Research Associate, National Aeronautics and Space Administration Grant, Michigan State University, Department of Botany and Plant Pathology, East Lansing, Michigan.

1980 (March) Visiting Research Scientist, Agricultural Research Organization, The Volcani Center, Institute of Horticulture, Bet Dagan, Israel

1979-1980 Postdoctoral Research Associate, National Science Foundation grant, Michigan State University, Department of Botany and Plant Pathology, East Lansing, Michigan.

Academic Honors, Awards and Professional Offices

2013	Award for Outstanding Contributions to Postbaccalaureate, Graduate, and Professional Education, University of Minnesota
2013	Member, Academy of Distinguished Teachers, University of Minnesota
2011	Member, NIH Study Section: Technology development of new affinity reagents against the human proteome, BST-M (51), June 2011
2010-2013	Past-President, Chair of Program Committee, Chair of Nominations Committee, International Plant Growth Substances Association (IPGSA)
2010-2016	Senator, University of Minnesota Faculty Senate (elected 2010; re-elected 2013)
2010-	Associated Professor, Consiglio Nazionale delle Ricerche Istituto di Biometerorologia, Bologna, Italy
2009	Creativity Award, Plant Genome Research Program, National Science Foundation
2008	Fellow, American Society of Plant Biologists
2008	Co-chair, NASA Space Biology, Plant Graviperception and Life Support Panel
2007-2013	Member, University of Minnesota Academic Senate Committee on Research
2007-2009	Member, Scientific Committee (ISHS), 11th International Symposium on Plant Bioregulators in Fruit Production, Bologna, Italy, September 20-14, 2009
2007-2010	President, International Plant Growth Substances Association (IPGSA)
2006	Chair, Symposium 09, Endogenous and Exogenous Plant Bioregulators, 27th International Horticultural Congress, Seoul, South Korea, August, 2006
2005	Pacifichem 2005 (Session organizer and introductory speaker)
2004 (Life)	Guest Professor, Tokyo University of Agriculture, Hokkaido, Japan
2003	Member, USDA-ARS Office of Scientific Quality Review, Human Nutrition Research panel

2002-2003 Panel member, Deutsche Forschungsgemeinschaft, Arabidopsis Functional Genomics Network

2001 Panel chair, NASA International Space Station, Plant Biology program

2001- Graduate faculty, Applied Plant Biology Program, University of Minnesota

2001-2003 Panel chair, NASA Space Biology program (Plant Biology)

2001-2007 Panel member, University of Minnesota, Office of the Vice President for Research, Grant-in-aid program

2001 Panel member, Deutsche Forschungsgemeinschaft, Arabidopsis Proteom project

2001 Session organizer (invited), International Plant Growth Substances Association, 17th International Conference, Brno, Czech Rep.

2000- Graduate faculty, Plant Biological Sciences Program, University of Minnesota

2000- Elected Member, Plant Molecular Biology Institute, University of Minnesota

2000- Member, Center for Microbial and Plant Genomics, University of Minnesota

2000- Steering Committee, Center for Plants and Human Health, University of Minnesota

1999 USDA Certificate of Merit with monetary performance award

1999 Member, International Organizing Committee, Auxins and Cytokinins in Plant Development meeting, Prague, Czech Republic

1998 Member, NCI/NIH site visit panel, Philadelphia PA

1998 USDA Certificate of Merit with quality step increase (performance award)

1997 USDA Certificate of Merit with quality step increase (performance award)

1997-2004 Editor-in-Chief, Plant Growth Regulation

1996 USDA Certificate of Merit with quality step increase (performance award)

1995 USDA Certificate of Merit with quality step increase (performance award)

1995-1998 Executive Committee Member, American Society of Plant Physiologists (Elected representative of the Washington, D.C. section)

1995-1998 Membership Committee, American Society of Plant Physiologists

1995-1997 Chair, Membership Committee, American Society of Plant Physiologists

1995	Member, Program Committee, International Plant Growth Substances Association
1995-1999	Project Officer, USDA-FAS-OCD and Croatian joint project, "Molecular tools for research on the plant hormone (auxin) indole-3-acetic acid."
1994	Panel Member, Department of Energy, Scientific Instrumentation Program, Plant Sciences and Fermentation panel
1994-1998	Project Officer, USDA-OICD and Czech Republic joint project, "Role of indoleacetylaspartate and its interaction with ethylene in plant growth regulation."
1992	USDA Certificate of Appreciation, Beltsville Area Mentoring Program
1992	ASPP Certificate of Appreciation, *Plant Physiology* ("in grateful recognition of years of dedicated service on the Editorial Board of *Plant Physiology*, to the science of plant physiology and to the Society")
1992	USDA Certificate of Appreciation, U.S. Savings Bond Program
1992	US Department of Treasury, Patriotic Service Award
1992-1993	USDA-ARS Mid-level Management Training Program (one of 11 selected nationally)
1992-2000	Adjunct Professor of Plant Biology, University of Maryland, College Park, Maryland
1990-1994	USDA Certificates of Merit with cash awards (4 Performance Awards, 1 EEO Award)
1990-1993	Project Officer, USDA-OICD and Yugoslavia Joint Board project, "Immunological determination of plant indole-3-acetic acid"
1990	900th Anniversary Medal, University of Bologna, Italy (for scholastic cooperation and international understanding; given by Consiglio Nazionale delle Ricerche, Centro Studi di Tecnica Frutticola)
1989-1991	Member, Corresponding Member's Committee, American Society of Plant Physiologists
1988-	Editorial Board, Plant Growth Regulation
1987-1990	Panel member, USDA-CSRS-CRGO Plant Growth and Development panel
1987, 1992	Panel member, US-AID Program in Science and Technology Cooperation, Plant Biochemistry panel

1987 Letter of Commendation, Dr. W. Klassen, Beltsville Area Director (for service on USDA Competitive Grants and Program Systems panel)

1986-1992 Editorial Board, Plant Physiology

1985-1992 Adjunct Associate Professor of Botany, University of Maryland, College Park, Maryland

1985 ASPP/NSF Travel Award, Heidelberg, F.RG.

1979 Ernst A. Bessey Award for Outstanding Research, Michigan State University, Department of Botany and Plant Pathology

1978 Approved GCMS operator, MSU/NIH mass spectrometry facility, Michigan State University, Department of Biochemistry

Grants and fellowships:

2013-2016 NSF-IOS Organism-Environmental Interactions, Resin to Propolis: Biological origins and role in honey bee social immunity and health. $857,220 (with M. Spivak and A. Hegeman)

2012-2017 NSF-IOS Plant Genome, Improving Dynamic Metabolic Flux Analysis for the Discovery of Molecular Determinants of Plant Phenotypes, $ 3,379,162 (with A. Hegeman)

2011-2013 NSF-MCB, Defining the function and mechanism of YUC1 in tryptophan-dependent indole-3-acetic acid metabolism, $75,000 (with A. Hegeman)

2010-2014 NSF-IOS Plant Genome, Improving the quantity and quality of metabolomics information: the stress response metabolome, $1,918,691 (with A. Hegeman)

2008-2012 NSF-IOS Functional analysis of an indoleacyl-modified protein from strawberry, $229,052 (with J. Slovin)

2008-2011 NSF-MCB-2010 Cellular and subcellular resolution of the tryptophan-related pathways, $857,000 (with J. Normanly and J. Celenza)

2007-2011 Novel antimicrobial properties of honeybee propolis in human and animal health. U Minnesota, College of Food, Agric, and Nat Res Sci grants $200,000 (with G. Gardner and M. Spivak)

2007-2009 Acquisition of a Real-Time PCR machine for plant breeding and functional genomics research. U Minnesota Graduate School Grant-in-aid program. $26,000 (with 6 coPIs)

2006-2007 NSF-MCB, SGER: “A novel protein-linked route for the biosynthesis of indole-3-acetic acid in maize endosperm.” $83,397.00

2006-2011 NSF-DBI Plant Genome, “Global measurement of turnover of plant proteins.” $1,667,807 (with W. Gary and A. Hegeman)

2005-2011 NSF-DBI-2010, Arabidopsis 2010: “International research experience for senior graduate students.” $94,119

2005-2010 USDA-NRI “Roles for multiple auxin biosynthetic pathways" $290,000

2003-2006 Renessen LLC contract support, “Measurements of indole and related compounds and the metabolic fate of anthranilate and tryptophan in developing seeds.” $120,943 + $72,923

2003 USDA-ARS Specific Cooperative Agreement, “Responses of higher plant proteins to rising carbon dioxide,” $23,063

2002-2004 University of Minnesota Grant-in-Aid, “Fractionation of anti-HIV activity in propolis,” $30,466

2002-2004 US National Science Foundation grant, “US-Germany Workshop on Arabidopsis Functional Genomics, June 29-30, 2002, Seville Spain”, $50,976

2001-2005 National Science Foundation grant, “Conjugation of indole-3-acetic acid to proteins and peptides,” $330,000

2001-2003 Minnesota SotaTec fund, “Environmental and cultural regulation of the chemopreventive constituents of vegetables in the diet” (no direct funds to program, supports one tech and one graduate student working in my lab)

2000-2004 US National Science Foundation Plant Genome grant “Development of new genetic resources for auxin biology,” $310,074

2000-2005 US Department of Energy grant, "Metabolic regulation of the plant hormone indole-3-acetic acid," $453,706

1997-2001 US National Science Foundation grant, “Conjugation of indole-3-acetic acid to proteins and peptides,” $300,000

1997-2000 US Department of Energy grant, "Metabolic regulation of the plant hormone indole-3-acetic acid," $276,000

1995-1998 US-Israel BARD grant, "Metabolism of auxins during fruit development and ripening," $300,000

1994-1997 US Department of Energy grant, "Metabolic regulation of the plant hormone indole-3-acetic acid," $260,100

1991-1994 USDA-NRI grant, "Biosynthesis of indole-3-acetic acid" $205,000

1990 USDA-ARS Research Associate Award, $43,000

1989 Research Fellowship Award, Norwegian Marshall Fund (for studies of plant hormones in native plants of polar regions at the University of Tromso, Norway), NK 24,000 (~$4,000 for 1 month with travel costs) [an additional award was given to the host laboratory]

1989-1992 US-Israel BARD grant, "Hormonal and developmental control of root initiation," $200,000

1989-1992 USDA-NRI grant, "Developmental biology of auxin containing peptides," $180,000

1987-1992 US National Science Foundation grant, "Synergistic approaches to understanding auxin metabolism," $295,000

1987-1989 USDA-CSRS-CRGO grant "Auxin-containing peptides from *Phaseolus seeds,"* $112,000

1987 USDA-ARS Research Associate award, $40,000

1986-1987 USDA-CSRS-CRGO grant "Characterization and developmental study of a peptide conjugate of indole-3-acetic acid," $83,000

1985-1988 US-Israel BARD grant, "Indole-3-butyric acid metabolism in relation to root initiation," $190,000

Society Memberships

American Association for the Advancement of Science
American Society for Mass Spectrometry
American Society of Plant Biologists
American Society for Cell Biology
International Plant Growth Substances Association
International Society for Horticultural Science
International Isotope Society

Teaching Experience

Course Instruction:

Biology 2 - General Biology Laboratory - Fall/Spring 1973-4 -SDSU

Botany 301 - Plant Physiology (Laboratory) - Fall/Spring 1974-5 - MSU

Botany 414 - Plant Biochemistry (Laboratory) - Winter 1975 - MSU

Botany 484 - Plant Biochemistry - Fall 1988 - UMCP

Botany 699c - Plant Hormones and Development [co-instructed with Dr. Cooke] - Spring 1991 -UMCP

PBIO 699m Plant Development [co-instructed with Dr. Cooke] - Spring 1998 - UMCP

Hort 3005 - Environmental Effects on Horticultural Crops – Spring 2001-2007; 2013 UMinn

Hort 5007 Advanced Plant Propagation, Spring 2008, 2010, 2012, 2014 UMinn

Hort 8044 - Manipulation of Plant Growth and Reproduction - Spring 2002, 2004, 2006 (with 6 other instructors) - UMinn

PBS 8132 Research Ethics (co-offered with 3 other graduate programs) Spring 2008, 2010, 2012 [co-instructed] – UMinn

Pbio 8901 Thesis Proposal Writing – Spring 2004, 2006, Fall 2008 [co-instructed] – UMinn

Ph.D. Dissertations (University of Maryland):

Dr. Anita Miller 1987 *Prunus persica Growth: A Study of Annual Dry Weight Growth of Mature Trees and Levels of Indole-3-Acetic Acid and Ethylene During Fruit Development*.

Dr. Kai-Hsien Chen 1987 *Analysis of Indole-3-Acetic Acid in Tobacco Genetic Tumors and Wheat GA_3 Insensitive Mutant "Tom Thumb"*.

Dr. Yuen Yee Tam 1996 *The Use of Lemna to Study the Turnover of Indole-3-acetic Acid*

Dr. David Ribnicky 1996 *The Role of Auxin in Carrot Embryogenesis*

Dr. Jyh-Ching Chou 1999 *Purification, Characterization, and Gene Cloning of an Inducible Indole-3-acetyl-L-aspartic Acid Hydrolase from Enterobacter agglomerans.*

Dr. Ester Sztein 1999 *Auxin metabolism in land plants.*

Dr. Nebjosa Ilic 1999 *Isotopic methods for elucidating indoleacetic acid biosynthetic pathways in plants.*

[All UMCP students were co-advised, as required for an off-campus faculty member, as follows: Chen (Dr. Glen Patterson), Miller (Dr. Chris Walsh), all others were co-advised with Dr. Todd Cooke]

Ph.D. Dissertations (University of Minnesota):

Dr. Alexander Walz 2003 *Molecular Cloning and Characterization of the IAP1 Gene from Bean encoding a Protein Modified by Indole-3-acetic Acid.* (with TU University, Dresden, Germany, *co-advised with Dr. Jutta Ludwig-Mueller*)

Dr. Angela Hendrickson Culler 2007 *Tryptophan-dependent indole-3-acetic-acid biosynthesis pathway in Zea mays*

Dr. Songqing Ye 2009 *Identification of pyruvate decarboxylase/indole pyruvate decarboxylase gene family members from Arabidopsis thaliana*

Dr. Xing Liu 2012 *Roles of multiple mechanisms in regulating auxin levels during plant growth and development*

Dr. Michael Wilson 2014 *Origin, composition, and role of antimicrobial plant resins collected by honey bees, Apis mellifera*

Current students:

Mr. Peng Yu, Plant Biological Sciences program, University of Minnesota

Ms. Yuan Xu, Plant Biological Sciences program, University of Minnesota

Ms. Molly Kreiser, Applied Plant Sciences program, University of Minnesota

Current Campus-wide Academic Committee appointments:

Senator (elected), University/Faculty Academic Senate, University of Minnesota

Member, Academic Senate Committee on Academic Freedom and Tenure, University of Minnesota

University of Minnesota Faculty Representative to the Federal Demonstration Partnership (a Cooperative initiative among 9 federal agencies and 120 institutions, sponsored by The National Academies)

PUBLICATIONS:

1. Cohen JD Relationship between cell wall glycosidases and cell extension in *Avena* coleoptiles. M.S. Thesis, San Diego State University, San Diego, California (1974).

2. Cohen JD, Nadler KD Calcium requirement for indoleacetic acid-induced acidification by *Avena* coleoptiles. Plant Physiol. 57:347-350 (1976).

3. Mentze J, Raymond B, Cohen JD, Rayle DL Auxin-induced H^+ secretion in *Helianthus* and its implications. Plant Physiol. 60:509- 512 (1977).

4. Bandurski RS, Schulze, A, Cohen JD Photo-regulation of the ratio of ester to free indole-3-acetic acid. Biochem. Biophys. Res. Comm. 79:1219-1223 (1977).

5. Nowacki J, Cohen JD, Bandurski RS Synthesis of ^{14}C-indole-3-acetyl-*myo*-inositol. J. Labeled Compounds 15:325-329 (1978).

6. Cohen JD, Bandurski RS The bound auxins: protection of indole-3-acetic acid from peroxidase-catalyzed oxidation. Planta 139:203-208 (1978).

7. Cohen JD The physiology and analysis of indole-3-acetic acid and its *myo*-inositol esters. Ph.D. Dissertation, Michigan State University, East Lansing, Michigan (1979).

8. Epstein E, Cohen JD, Bandurski RS Concentration and metabolic turnover of indoles in germinating kernels of *Zea mays* L. Plant Physiol. 65:415-421 (1980).

9. Cohen JD Synthesis of ^{14}C-labeled indole-3-acetylaspartate. J. Labeled Compounds 18:1393-1396 (1981).

10. Cohen JD, Schulze A Double standard isotope dilution assay I. Quantitative assay of indole-3-acetic acid. Anal. Biochem. 112:249-257 (1981).

11. Epstein E, Cohen JD Microscale preparation of pentafluorobenzyl esters: electron capture gas chromatographic detection of indole-3-acetic acid from plants. J. Chromatogr. 209:413-420 (1981).

12. Bandurski RS, Cohen JD Plant Hormones. In: McGraw-Hill Yearbook of Science and Technology 1982/1983. McGraw-Hill, New York, pp 360-363 (1982).

13. Cohen JD, Bandurski RS Chemistry and physiology of the bound auxins. Annu. Rev. Plant Physiol. 33:403-430 (1982).

14. Cohen JD Identification and quantitative analysis of indole-3-acetyl-L-aspartate from seeds of *Glycine max* L. Plant Physiol. 70:749-753 (1982).

15. Bialek K, Meudt WJ, Cohen JD Indole-3-acetic acid (IAA) and IAA conjugates applied to bean stem sections: IAA content and the growth response. Plant Physiol. 73:130-134 (1983).

16. Cohen JD, Meudt WJ Investigations on the mechanism of the brassinosteroid response. I. Indole-3-acetic acid metabolism and transport. Plant Physiol. 72:691-694 (1983).

17. Cohen JD, Baldi BG Studies of endogenous indole-3-acetyl-L-aspartate during germination of soybeans. Proc. Plant Growth Reg. Soc. Amer. 10:117-122 (1983).

18. Cohen JD Metabolism of indole-3-acetic acid. What's New in Plant Physiol. 14:41-44 (1983).

19. Cohen JD, Bialek K The biosynthesis of indole-3-acetic acid in higher plants. In: A. Crozier

and J.R. Hillman, eds., The biosynthesis and metabolism of plant hormones. Society for Experimental Biology Seminar 23. Cambridge Univ. Press (1984) pp. 165-181.

20. Cohen JD Convenient apparatus for the generation of small amounts of diazomethane. J. Chromatogr. 303:193-196 (1984).

21. Cohen JD, Caruso JL, Bandurski RS Hormone assay methods. In: The Molecular biology of Plant Hormone Action: Research Directions for the Future, L.N. Vanderhoeff and T. Kosuge, eds. Amer. Soc. Plant Physiologists, Rockville, MD pp. 8-11 (1984).

22. Epstein E, Baldi BG, Cohen JD Chromatographic evidence for the presence of indole-3-acetyl-glutamate in seeds of soybean. Proc. Plant Growth Reg. Soc. Amer. 11:184-188 (1984).

23. Hanson S, Cohen JD A technique for collection of exudate from pea seedlings. Plant Physiol. 78:734-738 (1985).

24. Cohen JD, Baldi BG, Bialek K The strongly acidic auxin indole-3-methanesulfonic acid (IMS). Synthesis of ^{14}C-IMS and studies of its chromatographic, spectral and biological properties. Plant Physiol. 77:195-199 (1985).

25. Baldi BG, Slovin JP, Cohen JD Synthesis of ^{14}C-labeled halogen substituted indole-3-acetic acids. J Labeled Compounds 22:279-285 (1985).

26. Cohen JD, Slovin JP and Bialek K Approaches to unraveling the mysteries of how plants regulate endogenous levels of indole-3-acetic acid. Current Topic in Plant Biochemistry and Physiology, Vol. 4, 1985, Univ. of Missouri-Columbia 4:75-82 (1985).

27. Bialek K, Cohen JD Isolation and partial characterization of the major amide-linked conjugate of indole-3-acetic acid from *Phaseolus vulgaris* L. Plant Physiol. 80:99-104 (1986).

28. Cohen JD, Baldi BG, Slovin JP $^{13}C_6$-[benzene ring]-indole-3-acetic acid: A new internal standard for quantitative mass spectral analysis of indole-3-acetic acid in plants. Plant Physiol. 80:14-19 (1986).

29. Epstein E, Baldi BG, Cohen JD Identification of indole-3-acetylglutamate from seeds of *Glycine max* L. Plant Physiol. 80:256-258 (1986).

30. Epstein E, Sagee O, Cohen JD, Garty J Endogenous auxin and ethylene in the lichen *Ramalina duriaei*. Plant Physiol. 82:1122-1125 (1986).

31. Wodzicki TJ, Hiroshi A, Wodzicki AB, Pharis RP, Cohen JD Investigation on the nature of the auxin-wave in the cambial region of pine stems: Validation of IAA as the auxin component by the *Avena* coleoptile curvature assay and by gas chromatography-mass spectrometry-selected ion monitoring. Plant Physiol. 84:135-143 (1987).

32. Miller AN, Walsh CS, Cohen JD Measurement of indole-3-acetic acid levels in peach fruit, (*Prunus persica* L. Batsch) during development. Plant Physiol. 84:491-494 (1987).

33. Cohen JD, Bausher MG, Bialek K, Buta JG, Pharis RP, Reed AN, Slovin JP Comparison of a commercial ELISA assay for indole-3-acetic acid and analysis by gas chromatography-selected ion monitoring-mass spectrometry using a $^{13}C_6$-labeled internal standard. Plant Physiol. 84:982-986 (1987).

34. Cohen JD, Slovin JP, Bialek K Biochemical and molecular studies of native auxin conjugates. In: Conjugated Plant Hormones: Structure, Metabolism, Function. K. Schreiber H.R. Schutte and G. Sembder, eds. VEB DeutscherVerlag der Wissenscheften, Berlin GDR, pp. 54-60 (1988).

35. Slovin JP, Cohen JD Levels of indole-3-acetic acid in *Lemna gibba* G-3 and in a large *Lemna* mutant regenerated from tissue culture. Plant Physiol. 86:522-526 (1988).

36. Chen K-H, Miller AN, Patterson GW, Cohen JD A rapid and simple procedure for purification of indole-3-acetic acid prior to GC-SIM-MS analysis. Plant Physiol. 86:822-825 (1988).

37. Cohen JD, Slovin JP, Bialek K, Chen K-H, Derbyshire M Mass spectrometry, genetics and biochemistry: Understanding the metabolism of indole-3-acetic acid. Beltsville Symposia on Agricultural Research 12. Biomechanisms Regulating Growth and Development: G.L. Steffens and T.S. Rumsey, eds. Kluwer Academic Publishers, Dordrecht, pp. 229-241 (1988).

38. Owens LD, Cohen JD, Seelke R Gene introduction to induce morphogenesis. HortScience 23:520-525 (1988).

39. Baraldi R, Chen K-H, Cohen JD Microscale isolation technique for quantitative GC-MS analysis of indole-3-acetic acid from cherry (*Prunus cerasus* L.) J. Chromatogr. 442:301-306 (1988).

40. Epstein E, Muszkat L, Cohen JD Identification of indole-3-butyric acid (IBA) in leaves of cypress and corn by gas-chromatography and gas chromatography-mass spectrometry (GC/MS) (in Hebrew). Alon. Hanoteah 42:917-919 (1988).

41. Cohen JD, Baldi BG Auxins. In: McGraw-Hill Encyclopedia of Science and Technology, 6th Edition, McGraw-Hill, New York (1989).

42. Cohen JD, Baldi BG, Baraldi R, Bialek K, Chen K-H, Slovin JP Genetic and analytical techniques for auxin studies. Giornale Botanico Italiano 123:355-365 (1989).

43. Epstein E, Chen K-H, Cohen JD Identification of indole-3-butyric acid as an endogenous constituent of maize kernels and leaves. Plant Growth Regulation 8:215-223 (1989).

44. Bialek K, Cohen JD Quantitation of indoleacetic acid conjugates in bean seeds by direct tissue hydrolysis. Plant Physiol 90:398-400 (1989).

45. Bialek K, Cohen JD Free and conjugated indole-3-acetic acid in developing bean seeds. Plant Physiol 91:775-779 (1989)

46. Baldi BG, Maher BR, Cohen JD Hydrolysis of indole-3-acetic acid esters exposed to mild alkaline conditions. Plant Physiol. 91:9-12 (1989)

47. Cohen JD Book review of "Physiology and Biochemistry of Auxins in Plants." Phytochemistry 28:2539 (1989).

48. Miller AN, Cohen JD, Walsh CS Early peach fruit development: Indole-3-acetic acid concentration in seeds and pericarp of fruits on a single shoot. Acta Horticulturae 254:117-123 (1989)

49. Cohen JD, Baldi BG, Bialek K, Chen K-H, Slovin JP Techniques for studies of auxin metabolism: 1. IAA containing peptides. 2. Isotope tracking of hormone mutations in selected plant lines. In: M. Kutacek, MC Elliott and I Machackova (eds), Molecular Aspects of Hormonal Regulation of Plant Development. SPB Academic Publishing bv, The Hague, pp 3-17 (1990)

50. Michalczuk L, Baldi BG, Cohen JD *Myo*-inositol esters of indole-3-acetic acid found in higher plants. In: DJ Morre, WF Boss and FA Loewus (eds.), Inositol Metabolism in Plants. Wiley-Liss, New York, pp 93-106 (1990).

51. Cohen JD, Bialek K, Slovin JP, Baldi BP, Chen K-H Development of genetic and analytical systems for studies of auxin metabolism. In: R.P. Pharis, S.B. Rood (eds.) Plant Growth Substances 1988. Springer-Verlag, Berlin. pp 45-56 (1990).

52. Baldi BG, Maher BR, Slovin JP, Cohen JD Stable isotope labeling *in vivo* of D and L tryptophan pools in *Lemna gibba* and the low incorporation of label into indole-3-acetic acid. Plant Physiology 95:1203-1208 (1991).

53. Cohen JD, Ernstsen A Indole-3-acetic acid and indole-3-acetylaspartate isolated from *Heracleum laciniatum* Horn. Plant Growth Regulation 10:95-101 (1991).

54. Jones AM, Cochran DS, Lamerson PM, Evans ML, Cohen JD Red light- regulated growth: I. Changes in the abundance of indoleacetic acid and the 22-kilodalton auxin-binding protein in the maize mesocotyl. Plant Physiol. 97:352-358 (1991).

55. Wright AD, Sampson MB, Neuffer MG, Michalczuk L, Slovin JP, Cohen JD Indole-3-acetic acid biosynthesis in the mutant maize *orange pericarp,* a tryptophan auxotroph. Science 254:998-1000 (1991).

56. Michalczuk L, Cooke TJ, Cohen JD Auxin levels at different stages of carrot somatic embryogenesis. Phytochemistry 31:1097-1103 (1992).

57. Auer CA, Laloue M, Cohen JD, Cooke TJ Uptake and metabolism of benzyl adenine during the induction period of shoot organogenesis in petunia leaf explants. Plant Growth Regulation 11:105-114 (1992).

58. Auer CA, Cohen JD, Laloue M, Cooke TJ Comparison of benzyl adenine metabolism in two

Petunia hybrida lines differing in shoot organogenesis. Plant Physiol. 98:1035- 1041 (1992).

59. Michalczuk L, Bialek K, Cohen JD Rapid determination of free tryptophan in plant samples by gas chromatography-selected ion monitoring mass spectrometry. J. Chromatogr. 596:294-298 (1992).

60. Auer CA, Laloue M, Cohen JD, Cooke TJ Benzyladenine uptake and metabolism during Petunia shoot organogenesis. In: Physiology and Biochemistry of Cytokinins in Plants, M Kaminek, DWS Mok and E Zazimalova (eds). SPB Academic Publishing, The Hague. pp 69-70 (1992).

61. Sutter EG, Cohen JD Measurement of indolebutyric acid in plant tissues by isotope dilution gas chromatography-mass spectrometry analysis. Plant Physiol. 99:1719-1722 (1992)

62. Bialek K, Cohen JD Amide-linked indoleacetic acid conjugates may control the levels of indoleacetic acid in germinating seedlings of Phaseolus vulgaris. Plant Physiol. 100:2002-2007 (1992)

63. Bialek K, Michalczuk L, Cohen JD Auxin biosynthesis during seed germination in *Phaseolus vulgaris*. Plant Physiol. 100:509-517 (1992).

64. Michalczuk L, Ribnicky DM, Cooke TJ, Cohen JD Regulation of indole-3-acetic acid biosynthesis in carrot cell cultures. Plant Physiol 100:1346-1353 (1992).

65. Slovin JP, Cohen JD Auxin metabolism in relation to fruit ripening. Acta Horticulturae 329:84-89 (1993)

66. Baraldi R, Bertazza G, Predieri S, Cohen JD Uptake and metabolism of indole-3- butyric acid during the in vitro rooting phase in pear cultivars (*Pyrus communis*). Acta Horticulturae 329:289-291 (1993)

67. Normanly J, Cohen JD, Fink GR *Arabidopsis thaliana* auxotrophs reveal a tryptophan-independent biosynthetic pathway for indole-3-acetic acid. Proc. Natl. Acad. Sci. USA 90:10355-10359 (1993)

68. Auer CA, Cohen JD Identification of a benzyladenine disaccharide conjugate produced during shoot organogenesis in *Petunia* leaf explants. Plant Physiol. 102:541-545 (1993).

69. Bandurski RS, JP Slovin, JD Cohen. Auxinas. In: J. Azcon-Bieto and M. Talon (eds), Fisiologia y Biochemica Vegetal (in Spanish). McGraw-Hill, Interamerica, NY. pp 285-300 (1993).

70. Cooke TJ, Racusen RH, Cohen JD The role of auxin in plant embryogenesis. Plant Cell 5:1494-1495 (1993)

71. Baraldi R, Bertazza G, Bregol A, Fasolo F, Rotondi A, Predieri S, Serafini Fracassini D, Slovin JP, Cohen JD Changes in auxins and polyamines during *in vitro* root induction on microcuttings of pear with different rooting response to indolebutyric acid. Plant Growth

Regulation 14:49-59 (1995)

72. Bandurski RS, Cohen JD, Slovin JP Auxin biosynthesis and metabolism. In: Plant Hormones: Physiology, Biochemistry and Molecular Biology. P.J. Davies, ed. Kluwer Academic Publ., Dordrecht, pp 35-57 (1995)

73. Tam YY, Slovin JP, Cohen JD Selection and characterization of ∀-methyltryptophan resistant lines of *Lemna gibba* showing a rapid rate of indole-3-acetic acid turnover. Plant Physiol. 107:77-85 (1995)

74. Normanly J, Slovin JP, Cohen JD Rethinking auxin biosynthesis and metabolism. Plant Physiol. 107:323-329 (1995)

75. Sztein AE, Cohen JD, Slovin JP, Cooke TJ Auxin metabolism in representative land plants. Amer J Botany 82:1514-1521 (1995)

76. Cohen JD, Ilic N, Taylor R, Dunlap JR, Slovin JP Auxin localization and metabolism during fruit growth and ripening in cantalope. Proc. Cucurbitaceae '94, G.E. Lester and J.R. Dunlap, eds. Gateway, Edinburg, TX. pp. 104-109 (1995)

77. Martin MN, Cohen JD, Saftner RA A new ACC-conjugating activity in tomato fruit. Plant Physiology 109:917-926 (1995)

78. Fisher RH, Barton MK, Cohen JD, Cooke TJ Hormonal studies of *fass*, an *Arabidopsis* mutant that is altered in organ elongation. Plant Physiology 110:1109-1121 (1996)

79. Nigovic B, Kojic-Prodic B, Antolic S, Tomic S, Puntarec V, Cohen JD Structural studies on monohalogenated derivatives of the phytohormone indole-3-acetic acid (auxin). Acta Crystallographica B52:332-343 (1996)

80. Dunlap JR, Slovin JP, Cohen JD Indole-3-acetic acid, ethylene, and abscisic acid metabolism in developing muskmelon (*Cucumis melo* L.) fruit. Plant Growth Regulation 19:45-54 (1996)

81. Cohen JD *In vitro* tomato fruit cultures demonstrate a role for indole-3-acetic acid in regulating fruit ripening. J Amer Soc Hort Sci 121:520-524 (1996)

82. Visser EJW, Cohen JD, Barendse GWM, Blom CWPM, Voesenek LACJ An ethylene-mediated increase of sensitivity to auxin induces adventitious root formation in flooded *Rumex palustris* Sm. plants. Plant Physiology 112:1687-1692 (1996)

83. Snjezana A, Kojic-Prodic B, Tomic S, Nigovic B, Magnus V, Cohen JD Structural studies on monofluorinated derivatives of the phytohormone indole-3-acetic acid (auxin). Acta Crystallographica B 52:651-661 (1996)

84. Ilic N, Normanly J, Cohen JD Quantification of free plus conjugated indole-3-acetic acid in *Arabidopsis* requires correction for the non-enzymatic conversion of indolic nitriles. Plant Physiology 111:781-788 (1996)

85. Snjezana A, Kojic-Prodic B, Cohen JD 2-(2,5-dichlorophenylhydrazono)-glutaric acid (1) and 2-(3,5-dichlorophenylhydrazono)-glutaric acid (2). Acta Crystallographica C52:2832-2835 (1996)

86. Ribnicky DM, Ilic N, Cohen JD, Cooke TJ The effect of exogenous auxins on endogenous indole-3-acetic acid metabolism: Implications for somatic embryogenesis in carrot. Plant Physiology 112:549-558 (1996)

87. Chou J-C, GA Kuleck, JD Cohen, WW Mulbry Partial purification of an inducible indole-3-acetyl-L-aspartate hydrolase from *Enterobacter agglomerans*. Plant Physiology 112:1281-1287 (1996)

88. Magnus V, Ozga JA, Reinecke DM, Pierson GL, LaRue TA, Cohen JD, Brenner ML 4-Chloroindole-3-acetic and indole-3-acetic acids in fruits and roots of *Pisum sativum*. Phytochemistry 46:675-681 (1997)

89. Tam YY, Slovin JP, Cohen JD Continuous light alters indole-3-acetic acid metabolism in *Lemna gibba*. Phytochemistry 49:17-21 (1998)

90. Barker-Bridges M, Ribnicky DM, Cohen JD, Jones AM Red light-regulated growth. II. Changes in the abundance of indoleacetic acid in the maize mesocotyl. Planta 204:207-211 (1998)

91. Chou J-C, Mulbry WW, Cohen JD The gene for indole-3-acetyl-L-aspartic acid hydrolase from *Enterobacter agglomerans*: molecular cloning, nucleotide sequence and expression in *Escherichia coli*. Molecular and General Genetics 259:172-178 (1998).

92. Slovin JP, Bandurski RS, Cohen JD Auxin. In: Biochemistry and Molecular Biology of Plant Hormones, Hooykaas P.J.J., Hall MA and Libbenga KR (eds.) Elsevier, Amsterdam, pp 115-140 (1999)

93. Moline HE, Hubbard JE, Karns JS, Buyer JS, Cohen JD A simple enrichment technique for selection of antagonists to *Botrytis cinerea*. European J Plant Pathology 105:95-101 (1999)

94. Ribnicky DM, Cooke TJ, Cohen JD A microtechnique for the analysis of free and conjugated indole-3-acetic acid in milligram amounts of plant tissue using a benchtop GC-MS. Planta 204:1-7 (1998)

95. Ashen JB, Cohen JD, Goff LJ GC-SIM-MS detection and quantification of free indole-3-acetic acid in bacterial galls on the marine red alga *Prionitis lanceolata* Harvey. J. Phycology 35:493–500 (1999)

96. Antolic S, Salopek B, Kojic-Prodic B, Magnus V, Cohen JD Structural characterization and auxin properties of dichlorinated indole-3-acetic acids. Plant Growth Regulation 27:21-31 (1999)

97. Ludwig-Müller J, Pieper K, Ruppel M, Cohen JD, Epstein E, Kiddle G, Bennet R. Indole glucosinolate and auxin biosynthesis in *Arabidopsis thaliana* glucosinolate mutants and the

development of clubroot disease. Planta 208:409-419 (1999)

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Education

1995 to 2001 — University of Wisconsin–Madison, Ph.D.
Biochemistry/Enzymology major; Chemistry minor
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1988 to 1992 — Oberlin College, B.A.
Biochemistry major

Positions Held

2013 to present — Associate professor – Departments of Horticultural Science and Plant Biology, University of Minnesota–Twin Cities

2008 to present — Member of the Microbial and Plant Genomics Institute, University of Minnesota–Twin Cities

2007 to 2013 — Assistant professor – Departments of Horticultural Science and Plant Biology, University of Minnesota–Twin Cities

2002 to 2007 — **Postdoctoral Research** – *Arabidopsis thaliana* Systems Biology
Professor Michael R. Sussman's laboratory
Biotechnology Center, University of Wisconsin–Madison
NIH Postdoctoral Fellow (Ruth L. Kirschstein NRSA)
Development of isotope assisted quantitative mass spectrometry for proteomics, metabolomics and phosphoproteomics applications
Mass spectrometry support for the Center for Eukaryotic Structural Genomics
Calcium dependent protein kinase superfamily (NSF 2010 project)

1995 to 2001 — **Graduate Study** – Mechanistic Enzymology
Under the guidance of Professor Perry A. Frey
Department of Biochemistry, University of Wisconsin–Madison
Developed a detailed mechanistic model for the water elimination-step catalyzed by the enzyme dTDP-glucose 4,6-dehydratase

1992 to 1994 — **Research Assistant** – Molecular Biology
In two laboratories run by Dr. Margaret I. Lomax
University of Michigan Medical School

Undergraduate Research

1990 to 1992	Oberlin College Research was conducted with Professor Miguel O. Mitchell on the synthesis of 6-brominated indole alkaloids isolated from the marine bryozoan *Flustra foliacea*.
1990, summer	Dartmouth College (NSF sponsored Research for Undergraduates program) Worked under the direction of Professor Michael A. Walters on the development of synthetic methodology related to a 3-aza-Claisen reaction.

Fellowships

2003 to 2005	Ruth L. Kirschstein National Research Service Award (NIH)
1995 to 1998	Molecular Biosciences Training Grant (NIH), University of Wisconsin
1989 to 1992	Dow Chemical Scholarship, Oberlin College
1990, summer	REU Summer Fellowship (NSF), Dartmouth College

Awards

2014	University of Minnesota Informatics Institute Transdisciplinary Research Fellowship
2012	Council of Graduate Students Outstanding Faculty Award, U of MN
2011	Arthur C. Neish Young Investigator Award, Phytochemical Society of North America
2006	Paul Boyer Award for Outstanding Postdoctoral Studies in Biochemistry
1992	Dean S. and Ann T. Tarbell Award, Oberlin College

Teaching

2011	Plant Metabolomics and Proteomics workshop (8/5/11–8/9/11, intensive summer workshop at the University of Minnesota)
2008 to present	Agricultural Biochemistry (HORT2100, University of Minnesota) 3 credit lecture course covering chemical and biochemical fundamentals and metabolism for undergraduate Horticultural Science majors
2007 to present	Metabolomics guest lecture (CHEN8754, Systems Analysis of Biological Processes)
2004	Mass Spectrometry (Chemistry 638 University of Wisconsin) 1 lecture on MS characterization of protein modifications
1998	Teaching assistant for Biochemistry laboratory techniques course 1 semester, University of Wisconsin (Biochemistry 651)
1995	Teaching assistant for Biochemistry for Nursing and Dental School lecture 1 semester, University of Michigan Medical School
1989 to 1992	Teaching assistant for Organic Chemistry laboratory 6 semesters, Oberlin College

Professional Societies

2011 – present	Phytochemical Society of North America
2009 – present	American Society of Plant Biologists
2007 – present	Metabolomics Society
2002 – present	American Society for Mass Spectrometry
1996 – present	American Chemical Society

Personal Information

Born July 23, 1970 in San Francisco, California
Moved to Bloomington, Indiana in 1972
Graduated from Bloomington High School South, Indiana in 1988
Married Erika L. Sanders in 1998
Daughters: Sylvia Sanders Hegeman born in Madison Wisconsin on March 18, 2005, and Ramona Sanders Hegeman born in Minneapolis Minnesota on May 30, 2008.

PUBLICATIONS (as of October 2014)

Textbook:
Frey, P. A., and Hegeman, A. D., *Enzymatic Reaction Mechanisms*, January 27, 2007, Oxford University Press, New York, NY.

Research papers:
54. Martin AC, Johnston E, Xing C, and Hegeman AD (2014) Measuring the chemical and cytotoxic variability of commercially available kava (Piper methysticum G. Forster), *PLOS One*, *accepted.*
53. Moore M, Ostry M, Hegeman AD, and Martin AC (2014) Inhibition of *Ophiognomonia clavigignenti-juglandacearum* by *Juglans* species bark extracts, *Plant Dis*, published ahead of print on line: http://dx.doi.org/10.1094/PDIS-06-14-0642-RE.
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Review Articles/Book Chapters, Letters:

14. Park S, Seo Y-S and Hegeman AD (2014) Plant metabolomics for plant chemical responses to belowground community change by climate change, *J Plant Biol*, **57:**137-149.
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12. Roe MR, Cohen JD, Hegeman AD (2014) Targeted deuteration of polyphenolics for their qualitative and quantitative metabolomic analysis in plant-derived extracts, *Methods Mol Biol*, **1083:**17-29. doi: 10.1007/978-1-62703-661-0_2.
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PRESENTATIONS (as of October 2014)

National Meetings:

72. Fan K-T, Freund DM, Jewett E, Peters C, Rendahl AK, Tivendale ND, Xu Y, Yu P, Cohen JD, and Hegeman AD (2014) NSF-Plant Genome Awardees Meeting, Arlington, VA, (poster).
71. Pawlus AD, Freund DM, Gentile C, Munter D, Starr E, Kegley S, Suresh J, Wyse DL, Hegeman AD (2014) Chemical profiles of American prickly ash, botanical dietary supplements from the *Zanthoxylum* genera, *Planta Medica*, **80(10):** PP36 (poster).
70. Hoffman L, Watkins E, and Hegeman AD (2014) Improving Winterhardiness of Temperate Perennial Grasses using Metabolomics-Assisted Breeding, American Society of Plant Biologists, Annual Meeting Plant Biology 2014, Portland, OR, (Minisymposium talk).

69. Tivendale ND, Cohen JD, and Hegeman AD (2014) Methylation of short-chain aliphatic carboxylic acids for metabolic flux analysis by GC-MS, Annual Meeting Plant Biology 2014, Portland, OR, (poster).
68. Freund DM, Cohen JD and Hegeman AD (2014) Direct Tissue Spray Ionization of Living Plants by Mass Spectrometry for Metabolomics, American Society of Plant Biologists, Annual Meeting Plant Biology 2014, Portland, OR, (Minisymposium talk).
67. Hegeman AD (2014) Biochemistry, American Society of Plant Biologists, Annual Meeting Plant Biology 2014, Portland, OR, (Minisymposium chair).
67. Carlson J, Roe M, McManimon T, Hegeman AD, and Tong C (2014) Anthocyanin degradation in red Norland potatoes, *The FASEB Journal*, **28** (1 Supplement), 259.2 (poster).
66. Peters C, Cohen JD, and Hegeman AD (2014) $^{13}CO_2$ growth chamber enabling high enrichment in vivo labeling over complete plant life cycle for metabolic flux analysis, *J. Am. Soc. Mass Spec.* **25(S1),** Baltimore, MD, (poster).
65. Brockman SA, Strauss M, Freund DM, Cohen JD, and Hegeman AD (2014)Identification of potential chemical giraffe-feeding deterrents in *Acacia robusta* using untargeted metabolomics with LC-ESI-HRMS, *J. Am. Soc. Mass Spec.* **25(S1),** Baltimore, MD, (poster).
64. Xu Y, Freund DM, Plesofsky N, Brambl R, Brockman SA, Hegeman AD, and Cohen JD (2014) Untargeted metabolomics of Neurospora crassa wild type and the Os-2 mutant under heat shock stress and 2-deoxyglucose treatment, *J. Am. Soc. Mass Spec.* **25(S1),** Baltimore, MD, (poster).
63. Yu, P, Slovin JP, Hegeman AD, and Cohen JD (2014) Indole metabolomics: a facile means for the identification of indolic compounds from plant tissues, *J. Am. Soc. Mass Spec.* **25(S1),** Baltimore, MD, (poster).
62. Freund DM, Martin AC, Cohen JD, and Hegeman AD (2014) Direct Tissue Spray Ionization of Living Plants by Mass Spectrometry for Metabolomics, *J. Am. Soc. Mass Spec.* **25(S1),** Baltimore, MD, (poster).
61. Abate-Pella D, Freund DM, Ma Y, Beck B, Schymanski E, Kind T, Hegeman AD, and Boswell P (2014) Retention 'Projection' Enables Reliable Use of Shared HPLC Metabolite Retention Data Across Labs and Methods, *J. Am. Soc. Mass Spec.* **25(S1),** Baltimore, MD, (poster).
60. Cohen JD, Boswell P, Freund DM, Jewett E, Peters C, Rendahl AK, Roe MR, Tivendale ND, Xu Y, Yu P, Hegeman, A. D. (September 2013) Plant Genome Awardees Meeting, Arlington, VA, (poster).
59. Teh SL, Haggerty L, Hegeman AD, and Luby J (July 2013) Patterns of Variation for Sugar and Organic Acid Composition during Berry Ripening in Cold Climate Wine Grape Cultivars, American Society for Horticultural Science annual meeting, July 22-25, 2013, Palm Desert, CA (poster).
58. Fan K-T, Cohen JD, Gray WM, and Hegeman AD (2013) Absolute quantification of TIR1/AFB proteins in Arabidopsis using the QconCAT strategy, *J. Am. Soc. Mass Spec.* **24(S1),** Minneapolis, MN, (poster).
57. Martin AC, Pawlus AD, Jewett E, Brockman S, Wyse DL, Hegeman AD (2013) Optimized plant extractions for phytochemical library construction: Evaluating solvent systems using metabolomics approaches, *J. Am. Soc. Mass Spec.* **24(S1),** Minneapolis, MN, (poster).
56. Gentle C, Roe MR, Hegeman AD, and Cohen JD (2013) Mild Base Catalyzed Deuteration of Polyphenolics for Improving their Quantification in Cold Hardy Wines by Multiple Reaction Monitoring Mass Spectrometry, *J. Am. Soc. Mass Spec.* **24(S1),** Minneapolis, MN, (poster).

55. Yu P, Ludwig-Müller J, Hegeman AD, and Cohen JD (2013) Identification of indole-3-acetic acid modified proteins of Arabidopsis, *J. Am. Soc. Mass Spec.* **24(S1),** Minneapolis, MN, (poster).
54. Yu P, Hegeman AD, and Cohen JD (2013) Indole Metabolomics: Identification and quantification of indole-3-acetic acid pathway related compounds, International Plant Growth Substances Association, 21st International Conference, June 18–22 2013, Shanghai, China, (poster).
53. Roe MR, Cohen JD, and Hegeman AD (2013) Solvent- and gas-phase deuteration of polyphenolics informs their identification by mass spectrometry, *J. Am. Soc. Mass Spec.* **24(S1),** Minneapolis, MN, (oral).
52. Roe M, Boswell P, Cohen JD, Hegeman AD (September 2012) Plant Genome Awardees Meeting, Arlington, VA, (poster).
51. Yu P, Adrian D. Hegeman AD, and Cohen JD (2012) A tandem MS strategy for identifying novel indole-3-acetic acid (IAA) conjugates in plant extracts, *J. Am. Soc. Mass Spec.* **23(S1)**, Vancouver, Canada, (poster).
50. Martin AC, Roe MR, Wilson MB, and Hegeman AD (2012) Evaluation of MS instrumentation and feature detection software for metabolic fingerprinting of plant extracts, *J. Am. Soc. Mass Spec.* **23(S1)**, Vancouver, Canada, (poster).
49. Menzel W, Wen-Ping Chen W-P, Hendrickson-Culler A, Harrigan GG, Drury S, Jensen P, Doom J, Cohen JD, and Hegeman AD (2012) Automated and modular growth chambers for in vivo labeling of plant metabolomes and proteomes with 13C-carbon dioxide, *J. Am. Soc. Mass Spec.* **23(S1)**, Vancouver, Canada, (poster).
48. Boswell P, Carr P, Cohen JD, and Hegeman AD (2012) Extremely Accurate Prediction of Gas Chromatographic Retention by Back-Calculation of Temperature and Hold-up Time Profiles, *J. Am. Soc. Mass Spec.* **23(S1)**, Vancouver, Canada, (poster).
47. Roe MR, Cohen JD, and Hegeman AD (2012) Towards Structure Elucidation of Phenolic Compounds in Complex Mixtures by Heated Electrospray Ionization (HESI) Induced Deuteration, *J. Am. Soc. Mass Spec.* **23(S1)**, Vancouver, Canada, (poster).
46. Hendrickson-Culler A, Harrigan GG, Chen W-P, Menzel WI, Drury S, Cohen JD, Hegeman AD, and Glenn KC (2011) Generation and Application of a ^{13}C-Labeled Soybean Metabolome, *Metabolomics Society, Annual Meeting*, Cairns, Australia, (poster).
45. Martin AC, Wyse DL and Hegeman AD (2011) Characterization of biologically active *Rhus typhina* extract using a bioassay-linked-metabolomics method, *American Society for Horticultural Science, Annual Meeting*, Waikoloa, HI, (poster).
44. Roe M, Boswell P, Cohen JD, Hegeman AD (September 2011) Plant Genome Awardees Meeting, Arlington, VA, (poster).
43. Wilson MW, Hegeman AD, Spivak M, and Cohen JD (2011) Determining the botanical origins of plant resins collected by honey bees (Apis mellifera) using metabolic fingerprinting analysis, in American Society of Plant Biologists, Annual Meeting Plant Biology 2011, Minneapolis, MN, (mini symposium talk).
42. Yu P, Roe MR., Hegeman AD, and Cohen JD (2011) Development of methods to detect and analyze IAA peptide conjugates using Orbitrap mass spectrometry, in American Society of Plant Biologists, Annual Meeting Plant Biology 2011, Minneapolis, MN, (poster).
41. Eberle CA, Clasen BM, Anderson NO and Hegeman AD and Smith AG (2011) Mechanisms and genes regulating Nicotiana interspecific incompatibility, in American Society of Plant Biologists, Annual Meeting Plant Biology 2011, Minneapolis, MN, (poster).

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39. Fan K-T, Yang X-Y, Hegeman AD, Cohen JD, Gray WM 2011. Dynamics of SCFTIR1/AFB ubiquitin ligase, Abstract #P16052 in American Society of Plant Biologists, Annual Meeting Plant Biology 2011, Minneapolis, MN, (poster).
39. Sutton F, Kontz BJ, Sabel S, Meyerink B, Menzel W, Hegeman A, Cohen JD, Karki A Development of ^{15}N-labelled wheat as a tool to study protein turnover. Abstract # P17009 in American Society of Plant Biologists, Annual Meeting Plant Biology 2011, Minneapolis, MN, (poster).
38. Boswell, P., Schellenberg, J. R., Carr, P. W., Cohen, J. D., Hegeman, A. D. (2011) Improved Metabolite Identification Using Cross-Platform LC-MS Retention Prediction By Flow Rate and Gradient Profile Back-Calculation, J. Am. Soc. Mass Spec. 22(5S), Denver, CO, (poster).
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35. Roe, M., Cohen, J. D., Hegeman, A. D. (2011) Towards Structure Elucidation of Flavonoid Compounds in Complex Mixtures by Higher-energy Induced Collisional Dissociation (HCD) on an LTQ-Orbitrap, J. Am. Soc. Mass Spec. 22(5S), Denver, CO, (poster).
34. Menzel W, Quiram G, and Hegeman AD, (2010) "Exploring Molecular Determinants of Invasion in Purple Loosestrife (*Lythrum salicaria*) using Metabolomics" Oral Presentation Abstract, Minnesota-Wisconsin Invasive Species Conference, St. Paul, Minnesota, November 8-10, 2010, (oral).
33. Koeritz E, Ehlke N, Watkins E, and Hegeman AD, (2010) "Development of Metabolomics-Assisted Selection Methods for Improving Rust Resistance in Perennial Ryegrass," Poster Abstract 76-6, American Society of Agronomy, Long Beach, California, October 31-November 3, 2010, (poster).
32. Roe, M., Boswell, P., Messner, M., Cohen, J. D., Hegeman, A. D. (September 2010) Plant Genome Awardees Meeting, Arlington, VA, (poster).
32. Sabel S, Kontz B, Karki A, Sutton F, Chen W-P, Hegeman A, and Cohen J 2010. ^{15}N Labeled wheat and the effect of drought on the flux through amino acid biosynthetic pathways. American Society of Plant Biologists, Annual Meeting Plant Biology 2010. Montreal, Quebec, Canada
31. Wen-Ping Chen; Xiao-Yuan Yang; Peng Yu; Adrian D. Hegeman; Aaron K. Rendahl; Thomas F. McGowan; Shahar Journo; William M. Gray; Jerry D. Cohen (May 2010) Improved methodology for stable isotope labeling and LC-MS/MS analysis for proteomic scale analysis of protein turnover in plants, American Society of Plant Biologists annual meeting, Montreal, Ontario, Canada (poster).
30. Martin, Amanda C, Hegeman, Adrian D, Donald, Wyse L, Peter, Gillitzer, Micheal, Kantar (July 2010) Bioactive compound identification from native and naturalized Minnesota plants for incorporation into multi-functional landscapes, American Society of Plant Biologists annual meeting, Montreal, Ontario, Canada (poster).

29. Alan G. Smith, Carrie Eberle, Neil O. Anderson and Adrian D. Hegeman (July 2010) A Novel Pollen Tube Growth Assay for the Identification of Interspecific Incompatibility Factors in Nicotiana, American Society of Plant Biologists annual meeting, Montreal, Ontario, Canada (poster).
28. Wilson M., Hegeman, A. D., Spivak, M., and Cohen, J. D. (June 2010) Metabolic fingerprinting of plant resins collected by the European honey bee, *Apis mellifera*, Metabolomics Society Annual Meeting, Amsterdam, Netherlands, (poster).
27. Mikel R. Roe, Jesse G. Meyer, Erica L. Rokke, Adrian D. Hegeman (June 2010) Towards quantitative mass spectral profiling of polyphenolic compounds in red wines from vineyards exposed to varying degrees of UV-B, IPGSA, Tarragona, Spain, (poster).
26. Mikel R. Roe, Jesse G. Meyer, Erica L. Rokke, Adrian D. Hegeman (May 2010) Towards quantitative mass spectral profiling phenolic compounds in red wine via selective solid-phase enrichment and isotope dilution analysis, J. Am. Soc. Mass Spec. 21(5S), Salt Lake City, UT, (poster).
25. Jesse G. Meyer, Mikel R. Roe, and Adrian D. Hegeman (May 2010) An analysis of anthocyanins and resveratrol in cold-hardy grapes using UPLC-DAD-MS and LDI-MS J. Am. Soc. Mass Spec. 21(5S), Salt Lake City, UT, (poster).
24. Wen-Ping Chen; Xiao-Yuan Yang; Peng Yu; Adrian D. Hegeman; Aaron K. Rendahl; Thomas F. McGowan; Shahar Journo; William M. Gray; Jerry D. Cohen (May 2010) Improved methodology for stable isotope labeling and LC-MS/MS analysis for proteomic scale analysis of protein turnover in plants, J. Am. Soc. Mass Spec. 21(5S), Salt Lake City, UT, (poster).
23. Meyer, J. G., and Hegeman, A. D. (July 2009) Peroxynitrite used to elucidate protein structure, Annual meeting of the Protein Society, Boston, MA (poster).
22. Chen, W.-P., Yang, X.-Y., Rendahl, A. K., McGowan, T. F., Weisberg, S., Hegeman, A. D., Gray, W. M., and Cohen, J. D. (July 2009) High-throughput measurement of protein turnover in plants using stable isotope labeling coupled with LC-MS/MS analysis, American Society of Plant Biologists annual meeting, Honolulu, HA, (poster).
21. Yang, X.-Y., Chen, W.-P., Hegeman, A. D., Gray, W. M., and Cohen, J. D. (July 2009) Using 2H2O to Measure Turnover Rates of Plant Proteins American Society of Plant Biologists annual meeting, Honolulu, HA, (poster).
20. Chen, W.-P., Yang, X.-Y., Rendahl, A. K., Weisberg, S., McGowan, T. F., Hegeman, A. D., Gray, W. M., and Cohen, J. D. (June 2009) High-throughput measurement of protein turnover in plants using stable isotope labeling coupled with LC-MS/MS analysis, J. Am. Soc. Mass Spec. 20(5S), Philadelphia, PA, (poster).
19. Yang, X.-Y., Chen, W.-P., Hegeman, A. D., Gray, W. M., and Cohen, J. D. (June 2009) Using Deuterium Oxide to Measure Turnover Rates of Plant Proteins, J. Am. Soc. Mass Spec. 20(5S), Philadelphia, PA, (poster).
18. Huttlin EL, Chen X, Barrett-Wilt GA, Halberg R, Hegeman AD, Ivancic M, Newton MA, Harms, AC, Dove WF, and Sussman MR (June 2009) "Discovery of Disease-related Proteins in the Min Mouse Model for Colorectal Cancer via 15N Metabolic Labeling and Microarray Analysis"J. Am. Soc. Mass Spec. 20(5S), Philadelphia, PA, (poster).
17. Huttlin EL, Chen X, Barrett-Wilt GA, Hegeman AD, Harms, AC, Dove WF, and Sussman MR (June 2008) "Quantitative Proteomic Characterization of Colorectal and Intestinal Tumors from the ApcMin Mouse via Metabolic Labeling" J. Am. Soc. Mass Spec. 19(5S), Denver, CO, (poster).

16. Hegeman AD, Schulte CF, Cui Q, Lewis IA, Nelson CJ, Huttlin EL, Eghbalnia H, Barrett-Wilt GA, Harms AC, Ulrich EL, Markley JL, and Sussman MR (June 2007) "Multiple isotopometric labeling of the Arabidopsis thaliana metabolome for feature assignment and quantitation" J. Am. Soc. Mass Spec. 18(5S), Indianapolis, IN, (poster).
15. Huttlin EL, Hegeman AD, Chen X, Barrett-Wilt GA, Harms, AC, Dove WF, and Sussman MR (June 2007) "Quantitative Proteomic Evaluation of Protein Abundance via Metabolic Labeling across Multiple Tissues in the ApcMin Mouse Model for Colorectal Cancer" J. Am. Soc. Mass Spec. 18(5S), Indianapolis, IN, (poster).
14. Huttlin, E. L., Hegeman, A. D., Chen, X., Nelson, C. J., Barret-Wilt, G., Harms, A. C., Dove, W. F., and Sussman, M. R. (May, 2006) Use of N-15 Metabolic Labeling for Biomarker Discovery in the Apcmin Mouse Model for Colorectal Cancer, J. Am. Soc. Mass Spec. 17(5S), Seattle, WA (poster).
13. Hegeman, A. D., Huttlin, E. L., Harms, A. C., and Sussman, M. R. (May, 2006) As Clear as Night and Day? Comparing 15N-Metabolic Labeling Relative Quantification Strategies with Light or Dark Grown Arabidopsis, J. Am. Soc. Mass Spec. 17(5S), Seattle, WA (poster).
12. Hegeman, A. D., Huttlin, E. L., Nelson, C. J., Harms, A. C., and Sussman, M. R. (June, 2005) Preliminary Findings from a Proteomic Characterization of the Auxin Response in Arabidopsis thaliana using 15N-Metabolic Labeling, Arabidopsis/AGA 2005 Conference, Madison, WI (poster).
11. Huttlin, E. L., Hegeman, A. D., Chen, X., Nelson, C. J., Ehrhardt, W. M., Harms, A. C., Dove, W. F., and Sussman, M. R. (June, 2005) A Proteomic Search for Colorectal Cancer Biomarkers Using the ApcMin Mouse Model, J. Am. Soc. Mass Spec. 16(5S), San Antonio, TX (poster).
10. Hegeman, A. D., Huttlin, E. L., Nelson, C. J., Harms, A. C., and Sussman, M. R. (June, 2005) Progress Toward a Quantitative Proteomic Profile of Auxin Response in Arabidopsis thaliana via 15N Metabolic Labeling, J. Am. Soc. Mass Spec. 16(5S), San Antonio, TX (poster).
9. Hegeman, A. D., Nelson, C. J., Tellez, G. M., Harms, A. C., Zhou W., Sharkey, T. D., and Sussman, M. R. (May, 2004) Metabolic Labeling of Arabidopsis thaliana Proteins Using 13C Carbon Dioxide and 15N Nitrate. J. Am. Soc. Mass Spec. 15(5S), Nashville, TN (poster).
8. Hegeman, A. D., Harms, A. C., and Sussman, M. R. (December, 2003) Characterizing Autophosphorylation Sites in Calcium Dependent Protein Kinases. Protein Phosphorylation Workshop, Asilomar, CA (poster).
7. Hegeman, A. D. (October, 2003) Autophosphorylation in Calcium Dependent Protein Kinases. Plant Protein Kinase Workshop, Clearwater, FL (oral presentation).
6. Hegeman, A. D., Harms, A. C., Bunner, A. E., Harper, J. F., and Sussman, M. R. (June, 2003) A Facile Isotopic Labeling Strategy for Measuring the Stoichiometry of Phosphorylation in Proteins Containing Multiple Phosphorylated Sites. J. Am. Soc. Mass Spec. 14(5S), Montreal, Quebec (poster).
5. Nelson, C. J., Hegeman, A. D., Harms, A. C., and Sussman, M. R. (June, 2002) Implementation of neutral loss experiments in the characterization of the Arabidopsis thaliana phosphorylome by one and two-dimensional LC ESI Q-TOF MS/MS. J. Am. Soc. Mass Spec. 13(5S), Orlando, FL (poster).
4. Hegeman, A. D., Gross, J. W., Frey, P. A. (2000) Walking the fine line between two enzyme activities: UDP-galactose-4-epimerase and dTDP-glucose-4,6-dehydratase. Abstr. Pap. Am. Chem. Soc. 219, American Chemical Society Meeting in San Francisco, CA (poster).

3. Hegeman, A. D., Gross, J.W., Frey, P. A. (2000) Using mass spectroscopy and rapid mixing techniques to help characterize the catalysis of water elimination by dTDP-glucose-4,6-dehydratase. Faseb J. 14, American Society for Biology and Molecular Biology meeting in Boston, MA (poster).
2. Hegeman, A. D., and Frey, P. A. (1999) Probing the division between two enzyme activities: UDP-galactose-4-epimerase and dTDP-glucose 4,6-dehydratase. Enzymes, Coenzymes and Metabolic Pathways Gordon Research Conference (poster).
1. Hegeman, A. D., and Frey, P. A. (1998) A comparative study of two sugar-nucleotide modifying enzymes: UDP-galactose-4-epimerase and dTDP-glucose-4,6-dehydratase. Faseb J. 12, American Society for Biology and Molecular Biology meeting in Washington D. C. (poster).

Invited Seminars:

31. Invited seminar, Department of Botany and Plant Pathology Seminar Series, "Stable isotopes and mass spectrometry for the analysis of plant metabolites", Purdue University, West Lafayette, IN (October 1, 2014). (upcoming)
30. Invited project update, NSF-Plant Genome Awardees Meeting, "Labeling intact plants with stable isotopes for metabolite quantification and turnover analysis", Arlington, VA, (September 5, 2014).
29. Invited seminar, 31st annual Mid-Atlantic Plant Molecular Biology Society Meeting, "Stable isotopes and mass spectrometry for the analysis of plant metabolites", USDA, Beltsville, MD (August 21, 2014).
28. Invited seminar, "Stable isotopes and mass spectrometry for the analysis of plant metabolites", Monsanto Corporation, St. Louis, MO (August 14, 2014).
27. Invited seminar, Driscoll's Molecular Genetics Deep Dive, "Linking Consumer Preferences and Demands to Breeding", Embassy Suites, Mandalay Beach, Oxnard, CA (April 15, 2014).
26. Invited seminar, Institute of Biological Chemistry Seminar Series, "Improving Methodology for Plant Metabolomics", Washington State University, Pullman, WA (May 23, 2013).
25. Invited speaker, American Society for Mass Spectrometry, Asilomar Conference on Mass Spectrometry in Food Safety and Quality, "Stable Isotopic Labeling Approaches for Food Quality Analysis", Asilomar Conference Center, Pacific Grove, CA (October 5 - 9, 2012).
24. Invited seminar, Samuel Roberts Noble Foundation, "Improving Methodology for Plant Metabolomics" Ardmore, OK (August 23, 2012)
23. Invited seminar, Microbial and Plant Genetics Institute retreat, "Improving Methodology for Plant Metabolomics", University of Minnesota, Twin Cities, MN (August 2012)
22. Invited seminar, Winona State University, "Approaches for Improving the Quantity and Quality of LC- and GC-MS Data for Plant Metabolomics", Winona, MN (April 12, 2012)
21. Panelist, Metabolomics Workshops, American Society for Mass Spectrometry Annual Meeting, "How Can We Improve Metabolomics Methodology?", Vancouver Canada (May 21 & 22, 2012)
20. Invited seminar, the Phytochemical Society of North America, 50th Annual Meeting," Approaches for Improving the Quantity and Quality of LC- and GC-MS Data for Plant Metabolomics", Kona HI (December, 2011)
19. Invited seminar, Chemical Biology Interface Training Grant Symposium, Minneapolis, MN (May 25, 2011)

18. Invited seminar, Department of Chemistry Analytical Chemistry Division weekly seminar, Minneapolis, MN (November 2010)
17. Invited seminar, Minnesota Chromatography Forum, 30th Annual Spring Symposium, Minneapolis, MN (May, 2009)
16. Invited seminar, Biotechnology Institute seminar, University of Minnesota, Twin Cities, MN (March, 2009)
15. Invited seminar, Proteomics Seminar series, University of Minnesota, Twin Cities, MN (October, 2008)
14. Invited seminar, Horticultural Sciences departmental seminar, University of Minnesota, Twin Cities, MN (October, 2008)
13. Invited seminar, Biotechnology Workshop, American Society for Horticultural Science Annual Conference, Orlando FL (July, 2008)
12. Invited seminar, Microbial and Plant Genetics Institute retreat, University of Minnesota, Twin Cities, MN (April 2008)
11. Invited seminar, Plant Biological Sciences graduate program seminar, University of Minnesota, Twin Cities, MN (March, 2008)
10. Invited seminar, Department of Biochemistry and Molecular Biology, University of Nevada, Reno, NV (February 2008)
9. Invited seminar, Department of Pharmacology, University of Virginia Medical School, Charlottesville, VA (May 2007)
8. Invited seminar, Division of Plant Sciences, University of Minnesota, Saint Paul, MN (April 2007)
7. Invited seminar, Center for Advanced Research in Biotechnology, Rockville MD (March 2007)
6. Invited seminar, Department of Biochemistry, University of Iowa Medical School, Iowa City, IA (March 2007)
5. Invited seminar, Department of Chemistry, Swarthmore College, Swarthmore, PA (December, 2006)
4. American Society for Mass Spectrometry, 52nd annual meeting, Agilent users meeting, Seattle, WA, (May, 2006)
3. Boyer Award Seminar Presentation, Madison, WI (May, 2006).
2. Plant Protein Kinase Workshop, Clearwater, FL (October, 2003).
1. Invited seminar, Department of Botany, University of Florida, Gainesville (October, 2003).

CURRICULUM VITAE

Richard L. Kingston

Home Address:	5 Island Rd. North Oaks, MN 55127 651-490-0446
Professional and Mailing Address:	SafetyCall International Poison Center 3600 American Blvd. W. Suite 725 Bloomington, MN 55431 952-852-4606
Academic Address:	Professional Education Division, College of Pharmacy University of Minnesota 308 Harvard St SE Weaver-Densford Hall 5-110 Minneapolis, MN 55455
Personal Data:	Date of Birth: February 18, 1953
Education:	Bachelor of Science, University of New Mexico, College of Pharmacy Albuquerque, New Mexico, 1976 Doctor of Pharmacy, University of Minnesota, College of Pharmacy -School of Medicine, Minneapolis, Minnesota, 1978 Post-Doctoral Fellowship in Clinical Toxicology/ Pharmacokinetics, Section of Clinical Pharmacology and the Clinical Toxicology Treatment Program, St. Paul-Ramsey Medical Center, University of Minnesota, Minneapolis, Minnesota, 1978-1979

On-going Professional/ Administrative Responsibilities & Academic Teaching Experience:	University of Minnesota Faculty Member: Previously serving as full time faculty in the Department of Experimental and Clinical Pharmacology, promoted through the ranks of Assistant, Associate, and Full Professor and currently serving as Clinical Professor, College of Pharmacy, University of Minnesota, Minneapolis, Minnesota, 1979-Present
	President, Regulatory and Scientific Affairs & Senior Clinical Toxicologist, SafetyCall™ International Poison Center, Bloomington, MN 55425, 2004-Present
	Forensic Toxicology Consultant, Office of the Medical Examiner, Ramsey County, St. Paul, Minnesota 1995-Present
	Faculty, Graduate Minor Program in Complementary Therapies and Healing Practices. Center for Spirituality and Healing and the Academic Health Center, University of Minnesota. 2000-Present
	Member: Scientific Advisory Board. American Botanical Council, Austin Texas, 2002- present
	Senior Consultant: NIH CAM Curriculum Project (1 R25 AT00556-01). July 2003-2007
	Course Director: Therapeutics of Herbal and Other Natural Medicinals. College of Pharmacy and the Academic Health Center, University of Minnesota, 1997-Present
	Doctor of Pharmacy Clerkship Preceptor (PHAR 5553/5/6) College of Pharmacy, University of Minnesota January 1997-Present
	Administrative/Content Advisor PharmD Thesis/Seminar (PHAR 5890,5894,5895,6182) College of Pharmacy, University of Minnesota 1997-Present
	Course Director: Natural Medicinals. A 3 Module, On-Line Certificate Program of the Office of Education and Outreach, University of Minnesota, 2000- 2006
	Board Member: IntegrativeCare Natural Compounding Pharmacy and CAM/Nutritional Clinical Practice. St. Paul, Minnesota, September 2001-2013

Course Faculty and Advisor: Drug Recognition Expert (DRE) Training Program for Law Enforcement Personnel. Minnesota Highway Patrol, Minnesota Department of Public Safety, State of Minnesota. 2001-Present

National Corporate Trainer: ProductCare International Product Stewardship – A Product Safety Initiative for Corporate members of the Consumer Specialty Products Association (CSPA), Washington DC. 2003-Present

Past Professional/ Administrative Responsibilities & Academic Teaching Experience:	Staff Pharmacist, Lovelace Bataan Medical Center, Albuquerque, New Mexico, 1976
	Poison Information Specialist, Hennepin County Medical Center, Minneapolis, Minnesota, 1976 - 1977
	Research Specialist, College of Pharmacy, University of Minnesota, Minneapolis, Minnesota, 1978 - 1979
	Staff Member, Section of Clinical Pharmacology, St. Paul-Ramsey Medical Center, 1979 - 1995
	Director, Contractual Pharmaceutical Programs, University of Minnesota, College of Pharmacy, Minnesota Department of Corrections, 1979 - 1993
	Clinical Toxicologist, Clinical Toxicology Service, St. Paul-Ramsey Medical Center, St. Paul, Minnesota 1979 - 1980
	Managing Director, Poison Consultation Center, St. Paul-Ramsey Medical Center, 1981 - 1982
	Managing Director and Co-Founder, Minnesota Regional Poison Center St. Paul-Ramsey Medical Center/Minnesota Department of Health, 1982 - 1988
	Program Director and Co-Founder, Hazard Information Services, St. Paul-Ramsey Medical Center/Ramsey Clinic Associates, 1984 - 1988
	Senior Clinical Toxicologist, Clinical Toxicology Service, Minnesota Regional Poison Center/St. Paul Ramsey Medical Center, 1988 – 1996
	Pharmacy Externship Preceptor (PHAR 5392) College of Pharmacy, University of Minnesota 1988 – 1996
	Administrative Director and Pharmacy & Therapeutics Committee Chair: Department of Pharmaceutical Services, Minnesota Department of Corrections 1989-1998
	Coordinator, Pharmacokinetic Training Course. Graduate Program in Pathology, University of Minnesota School of Medicine and the Department of Pathology, St. Paul Ramsey Medical Center 1989-1996
	President, Institutional Pharmacy Support Services, Inc. St. Paul, Minnesota 1993-1998

Doctor of Pharmacy Clerkship Preceptor
School of Pharmacy
North Dakota State University
1995, 1996, & 1997

Senior Consultant & Board Member, Electronic Medical Record, Inc. White Bear Lake, Minnesota. 1996-1997

Co-Founder, Chairman of the Board & Principal, International Poison Center Consortium, Inc. Minneapolis, Minnesota. January-June 1997

Co-Founder, Chairman of the Board & Principal, International Poison Center Consortium, Inc. Minneapolis, Minnesota. January-June 1997

Co-Principal Investigator: NIH CAM Curriculum Project (1 R25 AT00556-01). Sept 2000-July 31, 2003.

Lecturer
Elder Learning Institute
University of Minnesota
2000-2005

Vice President & Senior Clinical Toxicologist, PROSAR (Product Safety Resources), Inc. & the International Poison Center. June 1997-June 2004

Director, "Center for Dietary Supplement Safety", College of Pharmacy and the Academic Health Center, University of Minnesota, Minneapolis, Minnesota, 2004-2006

Affiliations/ Memberships:
American Association of Poison Control Centers
American Academy of Clinical Toxicology
Kappa Psi Alumni Association
Consumer Specialty Products Association
American Botanical Council
Society of Toxicology

Licensures/ Certifications:
Board of Pharmacy, New Mexico
Board of Pharmacy, Minnesota
Certified Specialist in Poison Information, American Association of Poison Control Centers: May 1992-2009

Special Honors:

Rho Chi Recognition Certificate, 1972 – 1973

University College Role of Distinction, 1971 – 1972

Kappa Psi Scholastic Achievement Award, 1976

Upjohn Outstanding Achievement Award, 1976

Minnesota Department of Corrections: State of Minnesota, Commendation for Outstanding Contributions to the Health Care System of the Minnesota Department of Corrections, 1980

Certificate of Recognition, American Society of Safety Engineers, 1986

Certificate of Appreciation for Contributions to the Medical Center, St. Paul-Ramsey Medical Center, November, 1987

CPDA National Annual Award to the Individual Outside of Industry Providing the Greatest Contributions To Agriculture And The Pesticide Industry, Presented by Chemical Producers and Distributors Association, (CPDA), Washington D.C. July, 1998

Outstanding Preceptor Award. Chosen by the Class of 2003. University of Minnesota, College of Pharmacy, May 2003

Chairman's Award. Presented for activities and achievement related to promoting and training on the concepts related to Corporate Product Stewardship for consumer product companies. Consumer Specialty Products Association (CSPA), Washington DC, December, 2013

Professional Assignments and Committee Work -- Past and Present:	Primary Clinical Toxicology Treatment Team St. Paul-Ramsey Medical Center September 1978 - 1996
	Clinical Toxicology Committee St. Paul-Ramsey Medical Center July 1978 - 1988
	Interviewer, PharmD. Program Admissions, 1978 - 1982
	PharmD. Clerkship Committee University of Minnesota, College of Pharmacy, 1979 - 1982
	Consultant, Pharmacy and Therapeutics Committee St. Paul-Ramsey Medical Center, 1979 - 1996
	Clinical Toxicology Task Force University of Minnesota, College of Pharmacy, 1980 - 1981
	Chairman: Pharmacy and Therapeutics Committee Minnesota Department of Corrections, 1980 - 1982
	Oak Park Heights Maximum Security Facility Health Care Planning Committee, Minnesota Department of Corrections, 1980 - 1982
	Member: Academic Guidance Committee University of Minnesota, College of Pharmacy, 1980 - 1983
	Member, DATA Collection Committee, American Association of Poison Control Center, 1982 - 1996
	Member, Community Education Committee, American Association of Poison Control Centers, 1982 - 1990
	Assistant Editor, Clinical Toxicology Consultant, University of Tennessee, Memphis, Tennessee 1982 - 1990
	Assistant Editor, Poisindex Toxicology Data Information System, Denver, Colorado, 1982 - 1999
	Member, Public Affairs Committee, Minnesota State Pharmaceutical Association, 1983 - 1986
	Member, Governor's Committee on Hazardous Material

Safety, Minnesota Department of Public Safety, 1983 - 1988

Member, Personnel Proficiency Committee, American Association of Poison Control Centers, 1983 – 1995

Member, Planning and Priorities Committee, United Way of Minneapolis Area, 1985 - 1989

Reviewing Editor, Journal of the American Society of Hospital Pharmacists, 1986 - Present

Abstract Review Committee Member, Annual Scientific Meeting of the American Association of Poison Control Centers and the American Academy of Clinical Toxicology. July 1986 - Present

Reviewer: Medical Toxicology; Ellenhorn Barceleux Elsevier Press, 1987

Chairman, Minnesota Regional Poison Centers Operation Committee, Minnesota Department of Health. 1987 - 1988

National Legislative Spokesman: Scientific value and clinical implications of animal testing. On behalf of the Soap and Detergent Association, and the Cosmetic, Toiletry and Fragrance Industry 1989-1990

Member: Institute for Clinical Systems Integration (ICSI), Attention Deficit Disorder Protocol Development Team. 1995-1997

Member: Poison Prevention Task Force. The Consumer Specialty Products Association (CSPA). Dec 1997-present

Member: Scientific Affairs Committee. The Consumer Specialty Products Association (CSPA). Dec 1997-present

Committee Member and Form Development Chair: FIFRA 6(a)(2) Industry Voluntary Incident Reporting Forms Committee. Sponsored by CPDA, CSPA, ISSA, ACC, and ACPA. Jan 1998-2000

Member: Herbal Products Task Force. Minnesota Pharmaceutical Association 1997-2004

Member and Reviewer: Consumer Labeling Initiative, United States Environmental Protection Agency (EPA), Washington, DC. 1998-1999

Editorial Review Panel: Journal of The American Nutraceutical Association. American Nutraceutical Association. 1998-2003

Member: American Pharmaceutical Association & American Dietetics Association Working Committee on Dietary Supplements. 1999-2000

Member: Childrens Health and Exposure Task Force. Scientific Affairs Committee of the Consumer Specialty Products Association. Washington D.C. 2000-Present

Vice Chair: Childrens Health and Exposure Task Force. Scientific Affairs Committee of the Consumer Specialty Products Association. Washington D.C. 2000-2002

Member: Poison Prevention Task Force. Scientific Affairs Committee of the Consumer Specialty Products Association. Washington D.C. 2000-Present

ViceChair: Poison Prevention Task Force. Scientific Affairs Committee of the Consumer Specialty Products Association. Washington D.C. 2002-2008

Member: Steering Committee on Product Stewardship. Consumer Specialty Products Association. Washington D.C. 2000-Present

Member: Ad-hoc Committee on Ingredient Disclosure. Consumer Specialty Products Association. Washington D.C. 2000-2004

Editorial Review Board and Section Advisor: Alternative Medicine. Drug InfoLine. Drug Information News for APHA Members sponsored by the American Pharmaceutical Association, Washington DC. 2000-2007

Member: Committee on CAM Curriculum Development. Center for Spirituality and Healing, Academic Health Center, University of Minnesota, 2000-2006

National Representative Appointed on behalf of the American Pharmaceutical Association. Federal Department of Health & Human Services (HRSA), Division of Maternal and Child Health Bureau, Project to Develop National Treatment Guidelines for Poison Centers. April 2001

Member: Steering Committee for the Town Meeting of the White House Commission on Complementary and Alternative Medicine. Minneapolis, Minnesota, Spring 2001

Section Coordinator and Speaker: Dietary Supplements. The White House Commission on Complementary and Alternative Medicine. Town Hall Meeting, Minneapolis, Minnesota. March 2001

Invited National Panel Member: Expert Review of the Safety and Benefits of Botanicals. An initiative of the American Botanical Association, and The Council for Responsible Nutrition. Spring 2001-2003

Member and Chair: Subcommittee on Developing Core Competencies for Pharmacy Graduates of the College of Pharmacy related to CAM Principles of Practice. Subcommittee of the Education Policy Committee, College of Pharmacy, University of Minnesota 2001-2004

Member: Capital Campaign, Herbal and Natural Medicinals, College of Pharmacy, University of Minnesota, 2001-2005

Member: Student Affairs Committee. College of Pharmacy. University of Minnesota. 2001-2004

Member: Academic Standing Committee. College of Pharmacy, University of Minnesota. 2001-2002

Steering Committee Member and Program Participant: The Center for Plants and Human Health. University of Minnesota. A New Initiative in Interdisciplinary Research and Post-Baccalaureate Education supported by the Office of the Vice President for Research, the College of Agricultural, Food and Environmental Sciences, and the Medical School. 2002-2005

Member: Patient Safety Committee. Minnesota Pharmacists Association, St. Paul, Minnesota. 2002-2005

Subcommittee Chair-Data Collection. Patient Safety Committee. Minnesota Pharmacists Association, St. Paul, Minnesota. 2002-2005

Member: Capital Campaign, Herbal Medicine Initiative, University of Minnesota, College of Pharmacy, Minneapolis, Minnesota 2002-2005

Invited Speaker on Use of Dietary Supplements by Military Personnel: National Institutes of Health, Panel on Dietary Supplement Safety in Military Personnel for the Department of Defense, February 2007

Consulting expert to the NIH (National Institutes of Health) Office of Dietary Supplements and the Department of Defense on Design and Implementation of a Global Dietary Supplement Adverse Effects Surveillance System for Military Personnel 2008

E10. Other
Scientific Advisory Board Resumes

Scientific Abstracts:

Kingston, RL, Cipolle, R.J., Neilan, B.A., Wilson, D.L., Zaske, D.E., Haus, E.: Individualized Dosing of Heparin Based on Pharmacokinetic Analysis. Pharmacokinetic Special Interest Group, Midyear Clinical Meeting of the American Society of Hospital Pharmacists, San Antonio, Texas, December, 1978.

Kingston, RL, Rotschafer, J.C., Crossley, K.B., Zaske, D.E., Solem, L., Sawchuk, R.J.: Vancomycin Pharmacokinetics. Pharmacokinetics Special Interest Group, Midyear Clinical Meeting of the American Society of Hospital Pharmacists, San Antonio, Texas, December, 1978.

Kingston, RL, Rotschafer, J.C., Crossley, K.B., Zaske, D.E., Solem, L., Sawchuk, R.J.: Vancomycin Pharmacokinetics. Pharmacokinetics Special Interest Group, Midyear Clinical Meeting of the American Society of Hospital Pharmacists, San Antonio, Texas, December, 1978.

Kingston, RL, Saxena, K.: Intentional Poisoning by Injection of Veterinary Euthanasia Drug. Emergency Toxicology/Patient Management Platform Session, 12th Annual Meeting of the American Academy of Clinical Toxicology/American Association of Poison Control Centers/American Board of Medical Toxicology and the Canadian Academy of Clinical and Analytical Toxicology, New Orleans, Louisiana, August, 1979.

Saxena, K., **Kingston, RL:** Acute INH Intoxication. Emergency Toxicology/Patient management Platform Session, 12th Annual Meeting of the American Academy of Clinical Toxicology/American Association of Poison Control Centers/American Board of Medical Toxicology and the Canadian Academy of Clinical and Analytical Toxicology, New Orleans, Louisiana, August, 1979.

Kingston, RL, Martin, D., Hall, S., Ehlers, S., Saxena, K.: Acetaminophen Poisoning - Utility of Nomogram and Half-Life Determination. The Annual Meeting of the American Academy of Clinical Toxicology and American Association of Poison Control Centers, Minneapolis, Minnesota, August, 1979.

Pfeifle, C., **Kingston, RL**, Cipolle, R.J., Zaske, D.E., Eells, C.B., Johnson, H.L.: Determination of Implementation of Pharmacy Services for a State Correctional Facility. Administrative Section, Midyear Clinical Meeting of the American Society of Hospital Pharmacists, Las Vegas, Nevada, December, 1979.

Kingston, RL, Montagne, M., Cipolle, R.J., Eells, C.B., Johnson, H.J., Zaske, D.E.: Pharmacy Services in Corrections. Minnesota Society of Hospital Pharmacists, Conference 80, April, 1980.

Montagne, M., **Kingston, RL**: Pharmacy and Prison Health Care. American Association of Colleges of Pharmacy - Administrative Section. Chicago, Illinois, June, 1980.

Kingston, RL, Saxena, K., Hall, S., Zaske, D., Haus, E., Ehlers, S.: A Multidisciplinary Team Approach for Poison Treatment. The Annual Meeting of the American Academy of Clinical Toxicology and American Association of Poison Control Centers, Minneapolis, Minnesota, August, 1980.

Ehlers, S., **Kingston, RL,** Saxena, K.: Morbidity and Mortality of Severe Drug Intoxication - Efficacy of Hemoperfusion. The Annual Meeting of the American Academy of Clinical Toxicology and American Association of Poison Control Centers, Minneapolis, Minnesota, August, 1980.

Kingston, RL, Montagne, M., Cipolle, R.J., Eells, C.B., Johnson, H.J., Zaske, D.E.: Pharmacy Services in Corrections. Minnesota Society of Hospital Pharmacists, Conference 80, April, 1980.

Saxena, K., **Kingston, RL**: Repeated Episodes of "Sani-Flush" Granular Toilet Bowl Cleaner Ingestion. The Annual Meeting of the American Academy of Clinical Toxicology and American Association of Poison Control Centers, Minneapolis, Minnesota, August, 1980.

Saxena, K., **Kingston, RL**: Morbidity of Street Speed - An Update. The Annual Meeting of the American Academy of Clinical Toxicology and American Association of Poison Control Centers, Salt Lake City, Utah, August, 1981.

Kingston, RL, McClure-Zola, E., Saxena, K.: Charcoal Hemoperfusion for Theophylline Toxicity: A Case Study. The 16th Annual ASHP Midyear Meeting, New Orleans, Louisiana, December, 1981.

Cipolle, R.J., Lesar, T.S., Zaske, D.E., Strand, L.M., Rotschafer, J.C., McCoy, H.G., Cloyd, J.C., **Kingston, R.L.**: Multinational Clinical Pharmacokinetic Service, Teaching and Consulting Program. Pan Pacific II Conference, Hawaii, April, 1982.

Kingston, RL, Davin, T., Saxena, K., Zola, E.: Theophylline Toxicity; Charcoal Hemoperfusion. International Congress of Clinical Toxicology, Snowmass, Colorado, August, 1982.

Saxena, K., Johnson, P., Hall, S., Warren, B., **Kingston, RL**: A Three Year Follow-up Study of Patients Exposed to PCB's in a School Fire. AACT/AAPCC/ABMT/CAPCC Annual Scientific Meeting, Kansas City, Missouri, August, 1985.

White, M., Lowe, T., Olson, D., **Kingston, RL:** Evaluation of a Comprehensive, Affordable Word-processing/Computer System for Poison Centers. AACT/AAPCC/ABMT/CAPCC Annual Scientific Meeting, Kansas City, Missouri, August, 1985.

Kingston, RL, Hall, S., Saxena, K., Warren, B., Sioris, L.: Evaluation of Poison Center Response to a Simulated Chemical Disaster. AACT/AAPCC/ABMT/CAPCC Annual Scientific Meeting, Kansas City, Missouri, August, 1985.

Qualley B, Sioris LJ, Hall SW, **Kingston RL**.: Implementation of a Comprehensive Quality Assurance Program for a Poison Center. AACT/AAPCC/ABMT/CAPCC Annual Scientific Meeting, Kansas City, Missouri, August, 1985.

Kingston, RL, Hall, S.W., Sioris, L.S. A survey of regional poison control centers with an emphasis on cost of services and source of revenue. AACT/AAPCC/ABMT/CAPCC Annual Scientific Meeting, Baltimore, Maryland, October, 1988

Kingston, RL, Hall, S.W., Sioris, L.S. Clinical Observation and Medical Outcome in 149 Consecutive Cases of Ingestion of a Sodium Arsenate Containing Ant Killer AACT/AAPCC/ABMT/CAPCC Annual Scientific Meeting, Atlanta Georgia, October 1989.

Kingston,RL, Sioris, L.J, Mjanger V, Qualley B, Hall, S. W. Telemarketing and direct Mail fundraising options for Poison Centers. AACT/AAPCC/ABMT/CAPCC Annual Scientific Meeting, Atlanta Georgia, October 1989.

Kingston RL, Sioris LJ: A New Optically Scanned Form For PC Case Documentation. AAPCC/AACT/ABMT/CAPCC Annual Scientific Meeting, Toronto, Ontario, Canada. October 3, 1991.

Kingston RL, Saxena K, Sioris LJ, Lelwica T: Alcohol Abuse in a 47-Month-Old Child. AAPCC/AACT/ABMT/CAPCC Annual Scientific Meeting, Toronto, Ontario, Canada. October 4, 1991.

Sioris LJ, **Kingston RL,** Ryan KA: Three Year Follow-Up of a Poison Center Managed In-House Telemarketing Program. AAPCC/AACT/ABMT/CAPCC Annual Scientific Meeting, Toronto, Ontario, Canada. October 3, 1991.

Sioris LJ and **Kingston RL**: A Clinical Pharmacist-Based Emergency Response/Hazard Communication Model for Chemical Manufacturers and Employees. American College of Clinical Pharmacy Winter Research Forum, Phoenix, Arizona. February 11, 1992.

Gruenhagen MS, **Kingston RL**, Skoglund RS, Sioris LJ: Product Label 1-800 Phone Numbers for Emergency Medical Product Information. AAPCC/AACT/ABMT/CAPCC Annual Scientific Meeting, New York, New York. September, 1993.

Kingston RL, Carmine E, Skoglund RS, Hovda L: Neutralization as a Treatment for Acid Ingestion. AAPCC/AACT/ABMT/CAPCC Annual Scientific Meeting, New York, New York. September, 1993.

Hovda L, **Kingston RL**: Cacoa Bean Mulch Poisoning in Dogs. AAPCC/AACT/ABMT/CAPCC Annual Scientific Meeting, Salt Lake City, Utah. September, 1994.

Kingston RL Gualtieri JF : Failure of Child Resistant Packaging to Prevent Poison Exposures. VII International Congress of Toxicology, Seattle, Washington July, 1995.

Sioris LJ., Skoglund RS, **Kingston RL**. Expansion of the Public Poison Center Model to an Emergency Response Regulatory Compliance Model for Chemical Manufacturers, Employers, and End-Users. 1995 Annual National Safety Congress: National Safety Council. Dallas Texas, Nov 3-6 1995.

Kingston RL, Heidelberger TR, Sioris LJ, and Ryan KA. Computerized On-Line Case Data Form for Poison Consultation. Second International Computers in Toxicology Symposia. Lille, France. December 1995.

Sioris LJ, Skoglund RS, **Kingston RL**, Abbott JC, Ryan KA. "The Electronic Poison Center". Presented at the Second Meeting of the European Association of Poison Centres and Clinical Toxicologist on Computers as an Aid in Poison Centres, Lille, France. Dec 6-8, 1995

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contract PCC. 1996 North American Congress of Clinical Toxicology Annual Meeting, Portland Oregon. October 1996

Kingston RL: "Child Resistant Packaging and Design Failures" Education Resource Council, National Safety Council, Annual Meeting. October 1996

Kingston RL. "Role of Child-Resistant Packaging in a National Poison Prevention Strategy". National Congress of Clinical Toxicology: Romanian Academy-Medical Sciences Department. Bucharist, Romania , December 1996

Kingston RL, Sioris LJ, Borron SW. Online Access to Postmarket Surveillance Incident Data. Third International Computers in Toxicology Symposia. Lille, France. December 2000.

Sioris LJ, **Kingston RL**, Qualley BA. A Survey of Knowledge and Attitudes Concerning Accidental Poisoning in Minnesota. 2001 North American Congress of Clinical Toxicology, Montreal, Quebec, Canada, October, 2001

Kingston RL, Prawer S, Van de Ligt, J. Best Practice Post-Market Surveillance For A Stevia Based Sweetener. 7th EUSTAS Stevia Symposium, Toulouse, France, June 2013

Brutlag AG, **Kingston R**, Forrester MB, Borron SW. Pet poisonings involving new, EPA-approved bromethalin rodenticides: Implications for pets and humans. Clin Toxicol (Phila) 2013;51:711.

Borron SW, Forrester MB, Brutlag AG, **Kingston R**. Bromethalin (BR) vs. long-acting anticoagulant (LAAC) rodenticides: A 10-year comparison of exposures and toxicity. Clin Toxicol (Phila) 2013;51:627-628.

Scientific Exhibits:

Zaske, D.E., Strate, R.G., Solem, L.D., Cipolle, R.J., **Kingston, RL**: Increased Patients Survival and Decreased Toxicity with Individualized Aminoglycoside Therapy. Sixty-third Annual Clinical Congress of American College of Surgeons, Dallas, Texas, October, 1977.

Publications:

Saxena, K., **Kingston, RL**: Repeated Episodes of "Sani-Flush" Granular Toilet Bowl Cleaner Ingestion. Veterinary and Human Toxicology, Vol. 22, Supplement 2, 1980.

Kingston, RL, Saxena, K.: Management of Acute Isoniazid Overdoses. Clinical Toxicology Consultant, Vol. 2, No. 2, 1980.

Saxena, K., **Kingston, R.L.**: Management of Acute Poisonings. Postgraduate Medicine Vol. 71. 5, 67-77, May, 1982.

Kingston, RL, Pfeifle, C.E., Cipolle, R.J., Zaske, D.E., Eells, C.B., Johnson, H.L.: Comprehensive Pharmacy Services for a State Correction Facility. American Journal of Hospital Pharmacy 39:86-89 (Jan), 1982.

Saxena, K., **Kingston, RL:** Morbidity of Street Speed. Veterinary and Human Toxicology. Vol. 23, Supplement I, 1981.

Kingston, RL: Poison Control Services. Minnesota Pharmacist, December, 1982.

Lesar, T., **Kingston, RL**, Dahms, R., Saxena, K.: Trazodone Overdose. Annals of Emergency Medicine 12: 4, 221-223, 1983.

Theophylline Toxicity: Warren, J., Hall, S., **Kingston, RL**: Minnesota Medicine December, 1984 Vol. 67, No. 12, p. 677-680.

Olson, D.K., **Kingston, RL**, Hall, S.W., White, M.S.: An Epidemiologic View of Poisoning. Veterinary and Human Toxicology 27; 5, October, 1985.

Kingston, RL: Pharmacists Should Encourage Consumers to "Keep a Lid on It"... Use Child Resistant Caps. Minnesota Pharmacist February, 1988.

Saxena, K., **Kingston, RL**: A Multidisciplinary Team Approach to Manage Poisoned Patients. Emergency Care, Vol. 2, No. 3, 1987.

Harris CR, **Kingston RL**: Gastrointestinal Decontamination. Post-Graduate Medicine. Vol. 92, No. 2, August, 1992.

Kingston RL, Hall SH, Sioris LJ: Clinical Observations and Medical Outcome in 149 Cases of Arsenate Ant Killer Ingestion. Clinical Toxicology, Vol 31, No. 4, 581-591 (1993)

Kingston RL: A Rational Guide to Plant Toxicity. Grounds Maintenance Magazine, June, 1994.

Kingston RL, Filandrinos D. Family Practice Monograph on Poisoning. American Academy of Family Practice. February 1997

Kingston RL, Chen WL, Harris CR, Sioris LJ. Chlorpyrifos: a ten-year US poison center exposure experience. Vet Hum Toxicol. 1999 Apr;41(2):87-92

Allen LV, Taylor-Bond J, **Kingston RL,** et al. A Healthcare Professional's Guide to Evaluating Dietary Supplements. An ADA/APhA Special Report from the Joint Working Group on Dietary Supplements. The American Pharmaceutical Association and The American Dietetics Association. March 2000.

Kingston RL, Ryan D, Ephedra in the Spotlight: Risks Benefits and Implications for Dietary Supplements. Minnesota Physician Volume XVII, No. 2 May 2003

Kingston RL, Borron SW. The relative safety of ephedra compared with other herbal products. Ann Intern Med. 2003 Sep 2;139(5 Pt 1).

Kingston R, Blumenthal M. A Rational Perspective on Adverse Events Reports on Herbs: Misinterpretation of Adverse Reactions Tabulated in the TESS Annual Report of the American Association of Poison Control Centers as They Relate to Ephedra Dietary Supplements. HerbalGram 2003;60:48-53.

Kingston R. Remarks concerning new tools and methodologies for research and clinical practice. Thrombosis Research (2005) 117, 119-121

Kingston R. Session IV: Comments and discussion. Thrombosis Research (2005) 117, 145-151

Kingston R. Challenges in collecting, accessing and evaluating post market surveillance AERS in patients receiving dietary supplements. Thrombosis Research (2005) 117, 137-144

Harris IM. **Kingston RL**. Rodriguez R. Choudary V.
Attitudes towards complementary and alternative medicine among pharmacy faculty and students. American Journal of Pharmaceutical Education. 70(6):129, 2006 Dec 15.

Thomas G. Osimitz, Nancy Sommers and **Richard Kingston**
Human exposure to insecticide products containing pyrethrins and piperonyl butoxide (2001–2003)
Food and Chemical Toxicology, Volume 47, Issue 7, July 2009, Pages 1406-1415

Pearson RL, Logan PW, Kore AM, Strom CM, Brosseau LM, Kingston RL. Isocyanate exposure assessment combining industrial hygiene methods with biomonitoring for end users of orthopedic casting products. Ann Occup Hyg. 2013 Jul;57(6):758-65.

Textbook Contributions:

Ambre, J., **Kingston, RL**: A Textbook for the Clinical Application of Therapeutic Drug Monitoring: Acetaminophen. Abbott Laboratories, 1986.

Kingston, RL: *Pesticide Poisoning*, Textbook of Critical Care Medicine, 5th edition, Edited by Mitchell P. Fink, Published by Saunders, 2005

Kingston, RL. Herbal, Traditional and Alternative Medicines. Haddad and Winchester's 4th Edition of Clinical Management of Poisoning and Drug Overdose. Elsevier Press, NY, NY. 2007

Tracy, TS. **Kingston, RL** (Co-Editors): Herbal Products Toxicology and Clinical Pharmacology, Second Edition. A volume of the Forensics Science and Medicine Series. -- Humana Press, Totowa, NJ. 2007

Kingston, RL: *Chapter 185: Pesticide Poisoning.* Textbook of Critical Care Medicine, Sixth Edition, Edited by Jean-Louis Vincent, Published by Elsevier Press, 2011

CURRICULUM VITAE FOR PROMOTION AND TENURE

JAMES R. MINER, M.D., FACEP

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IDENTIFYING INFORMATION

Education

Degree	Institution	Date Degree Granted
BA	Dartmouth College Hanover, NH	9/88-6/92
MD	Mayo Medical School Rochester, MN	7/92-6/96
Residency in Emergency Medicine	Hennepin County Medical Center Minneapolis, Minnesota	6/96/-6/99

Postdoctoral Training

4/2000 Emergency Medicine Basic Research Skills Course
American College of Emergency Physicians, Dallas, TX

Certifications, Licenses

Board Recertification, Emergency Medicine	2011
Fellow, American College of Emergency Physicians	2002
Advanced Trauma Life Support (ATLS) Provider, Instructor, Recertified	2002
Board Certified, Emergency Medicine	2000
Emergency Medicine Basic Research Skills Course	2001
Medicine, Minnesota, 41018	1999
DEA Registered, Minnesota	1999
Advanced Trauma Life Support (ATLS) Provider, Instructor	1999
Advanced Cardiac Life Support (ACLS) Provider, Instructor	1998
Advanced Pediatric Life Support (APLS) Provider, Instructor	1998

Academic Appointments

Professor of Emergency Medicine University of Minnesota Medical School	6/2013-present
Associate Professor of Emergency Medicine University of Minnesota Medical School	6/2006-6/2013
Research Investigator Minneapolis Medical Research Foundation	6/1999-Present
Clinical Faculty Augsburg College PA Program	6/2000-Present
Assistant Professor of Emergency Medicine University of Minnesota Medical School	6/2000-6/2006

Academic Administrative Appointments

Chief of Emergency Medicine Department of Emergency Medicine Hennepin County Medical Center	2/2014-present
Research Director Department of Emergency Medicine Hennepin County Medical Center	10/2007-2/2014
Research Associate Program Director Department of Emergency Medicine Hennepin County Medical Center	6/2000-Present
Assistant Research Director Department of Emergency Medicine Hennepin County Medical Center	6/2001-10/2007
Assistant Course Director, Basic Clinical Research Bachelor of Emergency Health Services Program University College, University of Minnesota	2001

Clinical/Hospital Appointments

Faculty Physician Department of Emergency Medicine	6/1999-Present

Hennepin County Medical Center

Medical Director for Quality Assurance 5/2001-2/2014
Department of Emergency Medicine
Hennepin County Medical Center

Physician Regulatory Analyst 5/2009-6/2012
Office of the Medical Director
Hennepin County Medical Center

Associate Medical Director for Professional Development 7/2012-2/2014
Office of the Medical Director
Hennepin County Medical Center

Chief of Emergency Medicine 2/2014-present
Department of Emergency Medicine
Hennepin County Medical Center

HONORS AND AWARDS FOR RESEARCH WORK, TEACHING, PUBLIC ENGAGEMENT, AND SERVICE

2014 Top Peer Reviewer, Annals of Emergency Medicine

2013 Top Peer Reviewer, Annals of Emergency Medicine

2012 Outstanding Peer Reviewer, Academic Emergency Medicine

2012 Top Peer Reviewer, Annals of Emergency Medicine

2011 Outstanding Peer Reviewer, Academic Emergency Medicine

2011 Top Peer Reviewer, Annals of Emergency Medicine

2010 Outstanding Peer Reviewer, Academic Emergency Medicine

2008 Top Peer Reviewer, Annals of Emergency Medicine

2007 Semi-Finalist for Medical Student Presentation Award at the Society for Academic Emergency Medicine Annual Meeting Mayerle J, Hubbard D,Miner JR, *Quantified Changes in End tidal CO2 as Markers for Clinical Signs of Respiratory Depression in ED Procedural Sedation,* SAEM Annual Meeting, May, 2007, Research Advisor/Project Director to J. Mayerle

2006 Top Peer Reviewer, Annals of Emergency Medicine

2004 Outstanding Peer Reviewer, Academic Emergency Medicine

2004 Semi-Finalist for Young Investigator – Clinical Science Presentation Award at the Society for Academic Emergency Medicine Annual Meeting, May, 2004. Miner JR, Huber D, Heegaard W, Biros M *Moderate vs. Deep Procedural Sedation for Fracture and Dislocation Reduction in the Emergency Department*

2004 Semi-finalist for Medical Student Presentation Award at the Society for Academic Emergency Medicine Annual Meeting, Miner JR, Beltram M, Hubbard D. *Demographic Assessment of Pain in the Emergency Department.* SAEM Annual Meeting, Orlando Fl, May 2004. Research Advisor/Project Director to M. Beltram

2004 Semi-Finalist for Medical Student Presentation Award at the Society for Academic Emergency Medicine Annual Meeting Gaetz A, Miner JR, Biros M. *Breath Alcohol, Bispectral Index, and a Standardized Scale as Predictors of Observation Time for Intoxicated Patients.* SAEM Annual Meeting May, 2004. Research Advisor/Project Director to A. Gaetz

2003 Ernest Ruiz Faculty Teaching Award, Department of Emergency Medicine, Hennepin County Medical Center

2001 Outstanding Clinical Educator Award, Augsburg College, Department of Physician Assistant Studies 2001

RESEARCH AND SCHOLARSHIP

Grants and Contracts

1/2013-3/2014	Grant from the National Institute of Health *PROCESS TRIAL* 5% effort, $165,000
6/2012-present	Unrestricted grant from TASER International *The Physiologic Effect of Stress Related Activities Associated with Arrest* $94000, 10% effort, $9000 salary support
11/2012-6/2015	Grant from the National Institute of Justice *Factors Leading to In Custody Death in Agitated Subjects* $386,000, 20% effort, $77,000 salary support
4/2012-Present	Unrestricted grant from TASER International *The Effect of a Charge Dispersion Probe on Cardiac Capture from TASER Application in Pigs* 2% Effort, $86,000, $25,200 salary support

3/2011-Present	Unrestricted Grant from Hutchinson Technical *Randomized Controlled Trial of Near Infrared Spectroscopy in Patient Presenting to the Emergency Department in Shock* Effort, $38,500, $12,800 salary support
12/2011-2/2014	Grant from the Agency for Healthcare Research and Quality *Randomized Controlled Trial of Ultrasound versus CT Scan for Patients in the ED with Suspected Renal Colic* $140,602, $51,000 salary support
7/2007-Present	Unrestricted Grant from TASER International *Comprehensive Evaluation of the Physiologic Effects of TASER Application on Healthy Adult Volunteers* to James Miner, Principal Investigator, 2% effort, $63,400, $37,600 salary support
11/2008-Present	Unrestricted Grant from Hutchinson Technical *Near Infrared Spectroscopy as a Measure of Perfusion and Undifferentiated Shock* 2% Effort, $38,112, no salary support
11/2008-12/2012	Unrestricted Grant from TASER International *Assessing the Cardiac Effects of TASER Conducted Electrical Weapon Device Application in the Presence of Methamphetamine Abuse* 2% Effort, $205,619, $72,000 salary support
1/2009-1/2012	Unrestricted Grant for the US Department of Defense *Cardiac Safety and Muscle Stimulation Effects of the TASER 40mm Projectile Circuit* 2% effort, $79,180, $32,980 salary support
5/2009-Present	Unrestricted Grant from Hutchinson Technical *Near Infrared Spectroscopy in Patient Presenting to the Emergency Department Triage* Effort, $39,878, $12,800 salary support
7/2009-12/2011	Unrestricted Grant from NewCardio, *EKG Changes in Acute Coronary Syndromes* $5,960, no salary support
1/2010-12/2012	Research Grant from Electrocore, LLC, *Resolve Airway System for the Treatment of Acute Bronchoconstriction in the ED; Pilot Study* 6% effort, $99,500, $48,000 salary support
3/2011-6/2012	Unrestricted Grant from TASER International *Assessing the Cardiac Effects of the Charge Dispersion Probe in Pigs* 2% Effort, $33,500, $22,000 salary support
6/2006-6/2007	EMF Medical Student Research Grant from the Emergency Medicine Foundation, Daniel Hubbard MS, *Capnographic Waveform as a Measure of Hypoventilation During Procedural Sedation* to Daniel Hubbard and

	James Miner, Principal Investigator, 2% effort, award $2,485, no salary support
6/2005-6/2008	Trauma/Burn Award from Minneapolis Medical Research Foundation *Assessment of the Prevalence, Risk Factors, and Natural History of Trauma in the Emergency Department* James R. Miner, Principal Investigator, 2% effort, Award, $14,880, no salary support
6/2005-6/2006	EMF Medical Student Research Grant from the Emergency Medicine Foundation Johanna Moore MS, *Oral Oxycodone vs. IV Morphine for the Treatment of Pain in Children* Mentor to Johanna Moore and Principal Investigator, 2% effort, award $2,496, no salary support
3/2003 - 12/2004	Unrestricted Research Grant from Glaxo Smith Kline, Principle Investigator, *Sumatriptan for the Treatment of Benign Headaches in the Emergency Department* James R. Miner, Principal Investigator, 2% effort, Award, $51,430.44, no salary support
2/2003 – 12/2004	Research Grant from Ortho-McNeil, Site Principle Investigator *A Comparison of the Efficacy and Safety of Tramadol HCL/Acetaminophen Versus Hydrocodone Bitartrate/Acetaminophen Versus Placebo in Subjects with Acute Musculoskeletal Pain* James R. Miner, Principal Investigator, 2% effort, Award, $106,410.00, no salary support
5/2004-5/2005	EMF Resident Research Grant, Advisor to Dr. Mark Danahy, *Etomidate vs. Propofol for Procedural Sedation in the Emergency Department* James R. Miner, Principal Investigator, 2% effort, Award, $5000, no salary support
6/2005-6/2008	Trauma/Burn Award from Minneapolis Medical Research Foundation *Oral Oxycodone vs. IV Morphine for the Treatment of Pain from Musculoskeletal Injuries in the Emergency Department* James R. Miner, Principal Investigator, 2% effort, Award, $14,921 no salary support

Publications

Peer-Reviewed Publications

1. Smith-Bindeman R, Aubin C, Bailitz J, Bengiamin R, Camargo C, Corbo J, Dean A, Goldstein R, Griffey R, Jay G, Lang T, Kriesel D, Ma O, Mallin M, Manson W, Melinkow J, Miglioretti D, Miller S, Mills L, **Miner JR,** Moghadassi M, Noble V, Press G, Stoller M, Valencia V, Wang J, Wang R, Cummings S *Ultrasonography versus Computed Tomography for Suspected Nephrolithiasis* The New England Journal of Medicine, 371; 1100-10, September 2014 (Conducted experimental studies, Data acquisition, Manuscript preparation, Manuscript editing, Manuscript review)

2. Lewis L, Graffeo C, Crosley P, Klausner H, Clark C, Frank A, **Miner J**, Iarrobino R, Chyung Y *Ecallantide for the Acute Treatment of Angiotensin-Converting Enzyme Inhibitor-Induced Angioedema: A Multicenter, Randomized, Controlled Trial* Annals of Emergency Medicine, published online July 1 , 2014 (Developed study design, Defined intellectual content, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing, Manuscript review)
3. Ho J, Dawes D, Nystrom P, Moore J, Steinberg L, Tilton A, **Miner J** *Effect of Simulated Resistance, Fleeing, and Use of Force on Standardized Field Sobriety Testing* Medicine, Science, and the Law published online at http://msl.sagepub.com/content/early/2014/05/30/0025802414536152 June 14, 2014 (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing, Manuscript review)
4. Dawes D, Ho JD, Vincent A, Nystrom P, Moore JC, Steinberg L, Tilton AM, Brave M, Berris MS, **Miner JR** *The Neurocognitive Effects of Simulated Use of Force Scenarios* Forensic Science Medicine and Pathology Volume 10 Issue 1 pp. 9-17 March 2014 (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)
5. Ho JD, Dawes D, Nystrom P, Collin D, Nelson R, Moore J, **Miner JR** *Markers of Acidosis and Stress in a Sprint Versus a Conducted Electrical Weapon* Forensic Science International 233 84-89, September 2013 (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)
6. **Miner JR**, Moore JC, Plummer D, Gray RO, Patel S, Ho JD *Randomized Clinical Trial of the Effect of Supplemental Opioids in Procedural Sedation with Propofol on Serum Catecholamines* Academic Emergency Medicine Vol 20 No 4, April 2013 (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript Writing, Manuscript editing, Manuscript review)
7. Dawes D, Ho JD, Moore JC, **Miner JR** *An Evaluation of two Conducted Electrical Weapons and Two Probe Designs Using Swine Comparative Cardiac Safety Model* Forensic Science, Medicine, and Pathology Volume 10, Number 3, Pages 329-335. 2014 (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing, Manuscript review)
8. **Miner JR**, Westgard B, Olives TD, Patel R, Biros MH *Hunger and Food Insecurity Among Patients Presenting to an Urban County Medical Center* Western Journal of Emergency Medicine vol 14, no 3, May 2013 (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing, Manuscript review)
9. Ho JD, Dawes D, **Miner JR**, Kunz S, Nelson R, Sweeney J *Conducted Electrical Weapon Incapacitation During A Goal-Directed Task as a Funciton of Probe Spread*

Forensic Science, Medicine and Pathology published online 18 May 2012 (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing, Manuscript review)

10. **Miner JR,** Lewis, LM, Mosnalm GS, Varon J, Theodoro D, Hoffmann TJ. Feasibility of Percutaneous Vagal Nerve Stimulation for the Treatment of Acute Asthma Exacerbations. *Academic Emergency Medicine*, April 2012; 19 (4): 421-429. (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

11. Moore JC, **Miner JR.** Subcutaneous Delivery of Sumatriptan in the Treatment of Migraine and Primary Headache. *Patient Preference and Adherence*. January 2012; 6: 27-37. Posted December 7, 2011, http://www.dovepress.com/subcutaneous-delivery-of-sumatriptan-in-the-treatment-of-migraine-and--peer-reviewed-article-PPA (Open access journal) (Guarantor of integrity of entire review, Developed review concept, Developed review design, Defined intellectual content, Conducted literature research and analysis, Manuscript preparation, Manuscript editing Manuscript review)

12. Patel R, **Miner JR**, Miner SL. The Need for Dental Care Among Adults Presenting to an Urban ED. *American Journal of Emergency Medicine*. January 2012; 30: 18-25. (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

13. Ho JD, Dawes DM, Heegaard WG, Calkins HG, Moscati RM, **Miner JR.** Absence of Electrocardiographic Change after Prolonged Application of a Conducted Electrical Weapon in Physically Exhausted Adults. *Journal of Emergency Medicine*, November 2011; 41 (5): 466-72. Epub May 12, 2009 (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

14. Olives T, Patel R, Patel S, Hottinger J, **Miner JR.** Health Literacy of Adults Presenting to an Urban ED. *American Journal of Emergency Medicine*. September 2011; 29: 875-882. (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

15. Dawes DM, Ho JD, Reardon RF, Strote S, Nelson R, Lundin E, Orozco B, Kunz S, **Miner JR.** The Respiratory, metabolic, and neuroendocrine effects of a new generation electronic control device. *Forensic Science International*, April 2011; 207:55-60. (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted

experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

16. Hanley O, **Miner JR**, Rockswold E, Biros MH. The Relationship Between Chronic Illness, Chronic Pain, and Socioeconomic Factors in the E. *American Journal of Emergency Medicine*. March 2011; 29 (3): 286-292. (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

17. **Miner JR**, Gray RO, Delavari P, Patel S, Patel R, Plummer D. Alfentanil for Procedural Sedation in the Emergency Department. *Annals of Emergency Medicine*. February 2011; 57 (2): 117-121. (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

18. Ho JD, Dawes DM, Ho JD, Reardon RF, Strote S, Nelson R, Lundin E, Orozco B, Kunz S, **Miner JR.** Human Cardiovascular Effects of a New Generation Electronic Control Device. *Forensic Science International*. January 2011; 204: 50-57. (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

19. Dawes DM, Ho JD, Reardon RF, **Miner JR.** The Cardiovascular, respiratory, and metabolic effects of a long duration electronic control device in human volunteers. *Forensic Science, Medicine, and Pathology,* December 2010; 6 (4): 268-74. Epub 2010 May 26 (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

20. Ho JD, Dawes DM, Nelson RS, Lundin EJ, Frank JR Overton KG, Zeiders AJ, **Miner JR.** Acidosis and Catecholamine Evaluation Following Simulated Law Enforcement "Use of Force" Encounters. *Academic Emergency Medicine*. July 2010; 17 (7): e60-e68. (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing, Manuscript review)

21. Hill C, Reardon R, Joing S, Falvey D, **Miner JR**. Cricothyroidotomy Technique Using Gum Elastic Bougie Is Faster Than Standard Technique: A Study of Emergency Medicine Residents and Medical Students in an Animal Lab. *Academic Emergency Medicine*. June 2010; 17 (6): 666-669. (Guarantor of integrity of entire study, Developed study design, Defined intellectual content, Conducted literature research, Conducted

experimental studies, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

22. **Miner JR**, Gray RO, Bahr J, Patel R, McGill JW. Randomized Clinical Trial of Propofol vs. Ketamine for Procedural Sedation in the Emergency Department. *Academic Emergency Medicine*. June 2010; 17 (6): 604-611. (Guarantor of integrity of entire study, Developed study concept, Developed study design, Defined intellectual content, Conducted literature research, Conducted experimental studies, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review)

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F. CONCLUSION

Minnesota Medical Solutions ("MinnMed") will bring the highest level of professionalism to the medical cannabis community in Minnesota. With a strong and well-rounded team consisting of multiple experts from diverse backgrounds, including physicians, pharmacists, cannabis cultivators, and privacy-focused, healthcare-specific IT professionals, MinnMed will operate medical cannabis facilities that serve the true needs of patients. Every aspect of the MinnMed medical cannabis operating plan is based on putting ourselves in our patients' shoes. We want to ensure that we are the safest possible choice for them, providing safe medicines in safe environments. Our operations will be guided by a unique "MinnMed Patient Experience", informed by medical practices and direct patient care experience. By bringing both science and medical professionalism to medical cannabis, our goal is to ensure that patients visiting our distribution facilities have compassionate, meaningful, and beneficial encounters.

MinnMed has employed a multi-expert approach that takes the uncertainty out of a single producer coming to the state. MinnMed has sought input from many national cannabis industry experts in order to determine the best industry practices, and the synergy between our core healthcare professional team and these experts will result in the best systems and medicine for our patients.

MinnMed will have an unmatched scientific approach to medical cannabis. It begins with our Board of Directors, which includes two M.D.'s and one Ph.D. From that foundation, we have taken the time to form an additional and substantial scientific advisory board that includes scientists, healthcare providers, and experts in medicine and botany. We will continue to add to our scientific advisory board and will draw on their knowledge regularly to direct research and improve our patients' lives.

MinnMed will rely on sound, conservative business practices including controlled, rational growth and expansion based on patient numbers and research needs. Our leadership team and partners have extensive business and startup experience. Laser-focused on providing top quality medical cannabis to our patients by July 1, 2015, we have gone to extreme lengths to make this a certainty by commencing the construction of a highly environmentally-sustainable greenhouse facility. We began construction in July of this year with completion scheduled for early November to ensure our patients' access to medications on July 1, 2015.

The focus on the safest possible route to medicines for our patients led us to *True Living Organics* © cultivation method. *True Living Organics* © is a highly sustainable means to produce the highest quality cannabis in the most environmentally responsible way. Our goal is to have the most sustainable, energy efficient cannabis cultivation facility in the state and eventually the country. We will use renewable energy and good water practices. We believe in closed loops that do not negatively affect the environment or the community.

MinnMed plans to redefine clean, cannabis-based medicine production on a national level. Our scientific capabilities of separation/fracturing will bring a wealth of beneficial changes to patients and the industry. MinnMed has multiple patents pending, including a vaporizer to help improve patients' care and safety. MinnMed is also currently pursuing the first medical cannabis adverse event registry with *Safety Call International*.

MinnMed believes in community involvement and enrichment, and we believe in personal, face-to-face meetings with stakeholders in communities with whom we may work with in the future. Our community plan will be the best in the industry, and it will grow as we do. MinnMed will donate a minimum of 2% of net profits to the communities in which we work. MinnMed also partners with and supports Minnesota companies. By partnering with Minnesota Native Landscapes and United Science Corporation, we will transform the extraction, separation, and lab testing process for the medical cannabis industry. MinnMed has also formed partnerships with the owners of Dan and Jerry's Greenhouse for their 35 acres of cold-weather greenhouse knowledge and personal commitment to our mission.

Given our primary emphasis on safety, MinnMed is proud to have cultivated a banking relationship with Stearns Bank in St. Cloud, Minnesota. A banking solution allows MinnMed to provide a safer environment for patients by limiting the amount of on-hand cash in distribution facilities. It also opens up traditional financing for real estate, construction, equipment, and expansion. MinnMed worked hard to open this door as we saw banking as a major hurdle to providing patients with medications in a safe and socially responsible way.

The "MinnMed Spectrum" labeling system is our way of categorizing and labeling our products. We feel this is a great way to give patients general direction as to what may work for them. It will also allow us to get away from the more traditional slang names of strains and help take cannabis as medicine in the right direction.

MinnMed will have an unparalleled employee plan. In addition to a beautiful, clean working environment, our employees will enjoy living wages, healthcare, retirement and education benefits for themselves and their families. We have committed to this even prior to our application by signing a collective bargaining agreement with the UFCW.

We have formed a patient and parent advisory board to gain vital feedback on our patient experience and our pricing. This group is vital to improving our understanding of how to improve our patients' lives. MinnMed will aggressively monitor the cost and availability of our medications to patients. As our efficiencies grow, our goal is to lower prices for patients. The MinnMed sliding scale will be altered as needed to improve patient access.

MinnMed has also created a non-profit called Minnesota CannaCare, and we intend to donate 3% of net profits to this organization in order to offset patients' costs, improve public education efforts, and help fund the MinnMed House. The MinnMed House will be a residence, or ideally, a large number of family homes or apartments that are either owned or rented by Minnesota CannaCare. These homes will be used to house out-of-state families who have children with severe seizure disorders and would like to obtain Minnesota residency so that they may then trial to high-CBD medications. Minnesota CannaCare will solicit funds from the public for the same causes and will seek out donations from appropriate foundations and organizations.

We plan to provide free CBD tinctures for children with seizure disorders once MinnMed is profitable. This strategy will be enacted for all medications with less than 1% THC as they do not have substantial intoxicating characteristics or street value. MinnMed's refining team's ability to perform separation of individual cannabinoids will lead to very affordable production of high-CBD tinctures. This will become an advantage over producers who are dependent on specific strains of cannabis to alter their medications.

Overall, Minnesota Medical Solutions will be the safest choice for Minnesota's medical cannabis patients. We have developed a team with the necessary medical, scientific, business startup, and cannabis-specific knowledge to make our state the standard by which all patient-centered systems are judged. We understand that our plan is bold, but our philosophy is to work toward gradual, incremental improvements from the current industry standard in order to develop something truly spectacular. Our experienced, measured, and analytic business style is balanced

Respectfully Submitted,

Kyle Kingsley MD

CEO and Managing Director, Minnesota Medical Solutions, LLC

On behalf of the owners and directors of Minnesota Medical Solutions, LLC

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