Minnesota Department of Health

Health Based Guidance for Water
Health Risk Assessment Unit, Environmental Health Division
651-201-4899

Web Publication Date: June 2016
Expiration Date: June 2021

Toxicological Summary for: Alachlor ESA and Alachlor OXA

CAS**: 142363-53-9 (ESA); 171262-17-2 (OXA)**

Synonyms:

Alachlor ESA: Alachlor ethanesulfonic acid, MON 5775, 2',6'-diethyl-N-methoxymethyl-2-sulfoacetanilide, sodium salt or 2-[2,6-diethylphenyl (methoxymethyl) amino]-2-oxoethane sulfonic acid, sodium salt.

Alachlor OXA: Alachlor oxanilic acid, MON 5760, 2',6'-diethyl-Nmethoxymethyloxanilic acid, 2-[(2,6-diethylphenyl)(methoxymethyl) amino]-2-oxoacetic acid

NOTE: Based on a comparison of the available toxicity studies and the structural similarities of alachlor ESA and OXA MDH has determined that the values derived for alachlor ESA are appropriate to use as Risk Assessment Advice (RAA) values for Alachlor OXA.

Acute Non-Cancer Risk Assessment Advice ($nRAA_{Acute}$) = Not Derived (Insufficient Data)

Short-term Non-Cancer Risk Assessment Advice ($nRAA_{Short\text{-}term}$) = Not Derived (Insufficient Data)

Subchronic Non-Cancer Risk Assessment Advice ($nRAA_{Subchronic}$) = 100 µg/L

$$\frac{\text{(Reference Dose, mg/kg-d) x (Relative Source Contribution) x (Conversion Factor)}}{\text{(Subchronic Intake Rate, L/kg-d)}}$$

$$= \frac{\text{(0.036 mg/kg-d) x (0.2)}^{*} \text{ x (1000 µg/mg)}}{\text{(0.070 L/kg-d)}^{**}}$$

= 103 rounded to **100 µg/L**

*Relative Source Contribution: MDH 2008, Section IV.E.1.
**Intake Rate: MDH 2008, Section IV.E.1 and US EPA 2011, Exposure Factors Handbook, Tables 3-1 and 3-81.

Reference Dose/Concentration:	(157 x 0.23)/1000 = 0.036 mg/kg-d (F-344 rat)
Source of toxicity value:	determined by MDH in 2015
Point of Departure (POD):	157 mg/kg-d (LOAEL, Heydens et al, 1996 aci EPA 1998 and WDHFS 2005)
Human Equivalent Dose (MDH, 2011):	157 x 0.23 = 36.1 mg/kg-d
Total uncertainty factor (UF):	1000
Uncertainty factor allocation:	3 for interspecies differences (for toxicodynamics), 10 for intraspecies variability, 10 for database uncertainty (lack of reproductive studies and

	studies in dogs which are more sensitive), and 3 for use of a minimal LOAEL and not a NOAEL
Critical effect(s):	decreased erythrocyte counts; hemolytic anemia; decreased hemoglobin, hematocrit, and red cells; increased mean corpuscular hemoglobin (MCH) and MCH concentration (MCHC) and decreased body weight and body weight gain
Co-critical effect(s):	None
Additivity endpoint(s):	Hematological (blood) system

Chronic Non-Cancer Risk Assessment Advice ($nRAA_{Chronic}$) = 50 µg/L

$$\frac{\text{(Reference Dose, mg/kg-d) x (Relative Source Contribution) x (Conversion Factor)}}{\text{(Chronic Intake Rate, L/kg-d)}}$$

$$= \frac{\text{(0.012 mg/kg-d) x (0.2)}^{*} \text{ x (1000 µg/mg)}}{\text{(0.044 L/kg-d)}^{**}}$$

= 54.5 rounded to **50 µg/L**

*Relative Source Contribution: MDH 2008, Section IV.E.1.
**Intake Rate: MDH 2008, Section IV.E.1 and US EPA 2011, Exposure Factors Handbook, Tables 3-1 and 3-81.

Reference Dose/Concentration:	(157 x 0.23)/3000 = 0.012 mg/kg-d (F-344 rat)
Source of toxicity value:	determined by MDH in 2015
Point of Departure (POD):	157 mg/kg-d (LOAEL, Heydens et al, 1996 aci EPA 1998 and WDHFS 2005) (subchronic study)
Human Equivalent Dose (MDH, 2011):	157 x 0.23 = 36.1 mg/kg-d
Total uncertainty factor (UF):	3000
Uncertainty factor allocation:	3 for interspecies differences (for toxicodynamics), 10 for intraspecies variability, 10 for database uncertainty (lack of reproductive studies and studies in dogs which are more sensitive), 3 for use of a minimal LOAEL and not a NOAEL, and 3 for use of a subchronic study and not a chronic study
Critical effect(s):	decreased erythrocyte counts; hemolytic anemia; decreased hemoglobin, hematocrit and red cells; increased MCH and MCHC; and decreased body weight and body weight gain
Co-critical effect(s):	None
Additivity endpoint(s):	Hematological (blood) system

Cancer Health Based Value (cRAA) = Not derived

Cancer classification:	Not classified
Slope factor (SF):	Not Applicable
Source of cancer slope factor (SF):	Not Applicable
Tumor site(s):	Not Applicable

Volatile: No

Summary of Guidance Value History:

Noncancer Subchronic and Chronic RAAs of 100 and 70 µg/L were derived in 2009. Noncancer Subchronic and Chronic RAAs of 100 and 50 µg/L were derived in 2016. The 2016 chronic value are lower than the previous RAAs as a results of using MDH's most recent risk assessment methodology.

Summary of toxicity testing for health effects identified in the Health Standards Statute (144.0751):

Even if testing for a specific health effect was not conducted for this chemical, information about that effect might be available from studies conducted for other purposes. MDH has considered the following information in developing health protective guidance.

	Endocrine	Immunotoxicity	Development	Reproductive	Neurotoxicity
Tested for specific effect?	No	No	Yes(ESA) No (OXA)	No	No
Effects observed?	-	-	No[1]	-	-

Comments on extent of testing or effects:

[1]Developmental effects: A single developmental study in rats has been conducted. No effects were observed at the dose levels tested. Because the two compounds are chemically similar, the results are considered applicable to both Alachlor ESA and Alachlor OXA.

Resources Consulted During Review:

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Wisconsin Department of Health and Family Services (WDHFS), 2005. Scientific support documentation for Cycle 8 revisions of NR 140.10 Groundwater Enforcement Standard and Preventive Action Limit Recommendations. Authors: Werner, Mark and Anderson, Henry.

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Wetmore, Barbara A., Ann D. Mitchell, Sharon A. Meyer, Mary Beth Genter. Evidence for the site specific bioactivation of alachlor in the olfactory mucosa of the Long-Evans rat. (1999) Toxicological Sciences 49, 202-212.