CHEMICAL UPDATE WORKSHEET

Chemical Name:	**Alachlor**
CAS #:	**15972-60-8**
Revised By:	RRD Toxicology Unit
Revision Date:	August 17, 2015

(A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
Molecular Weight (g/mol)	269.77	269.77	EPI	EXP
Physical State at ambient temp	Solid	Solid	MDEQ	
Melting Point (˚C)	---	40.00	EPI	EXP
Boiling Point (˚C)	---	400	PC	EXP
Solubility (ug/L)	1.83E+5	2.40E+05	EPI	EXP
Vapor Pressure (mmHg at 25˚C)	0.000022	2.20E-05	PP	EXP
HLC (atm-m³/mol at 25˚C)	8.32E-9	8.32E-09	EPI	EXP
Log Kow (log P; octanol-water)	3.52	3.52	EPI	EXP
Koc (organic carbon; L/Kg)	734	312.3	EPI	EST
Ionizing Koc (L/kg)		NR	NA	NA
Diffusivity in Air (Di; cm^2/s)	0.08	2.26E-02	W9	EST
Diffusivity in Water (Dw; cm^2/s)	8.0E-6	5.6913E-06	W9	EST
Soil Water Partition Coefficient	NR	NR	NA	NA

	Part 201 Value	Updated Value	Reference Source	Comments
(Kd; inorganics)				
Flash Point (˚C)	NA	137	PC	EXP
Lower Explosivity Level (LEL; unit less)	NA	NA	NA	NA
Critical Temperature (K)		NA	NA	NA
Enthalpy of Vaporization (cal/mol)		NA	NA	NA
Density (g/mL, g/cm^3)		1.133	CRC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm^2)	NA	2.20E-07	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm^2)	NA	2.20E-07	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm^2)	NA	2.66E-07	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm^2)	NA	2.66E-07	EMSOFT	EST

(B) Toxicity Values/Benchmarks

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
Reference Dose (RfD) (mg/kg/day)	1.0E-2	1.0E-2	IRIS, 1993	
RfD details	One-year dog study via gelatin capsule (Monsanto Co., 1984) NOAEL=1 mg/kg/day; UF=100; Critical effect = hemosiderosis, hemolytic anemia.	**Tier 1 Source:** **IRIS:** **Basis:** IRIS is the only available value. **Critical Study**: Monsanto Company. 1984a. MRID No. 00148923; HED Doc No. 004660. Available from EPA. (Unpublished). **Method(s)**: Beagles (6/dose/sex) were exposed once daily via gelatin capsules at 0, 1, 3, or 10 mg/kg/day for one year. **Critical effect**: hemosiderosis of the kidney and spleen and increased absolute and relative liver weight in male dogs **End point or Point of Departure (POD):** NOEL = 1 mg/kg/day **Uncertainty Factors**: UF =100; 10 for interspecies extrapolation and 10 for intraspecies-variability **Source and date:** IRIS, last revision date -9/01/1993. **Tier 2 Sources**: **PPRTV:** No PPRTV record available at this time. **MRL:** No MRL record available at this time. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD (date), value is based on IRIS.		Complete
Oral Cancer Slope Factor (CSF) (mg/kg-day)$^{-1}$)	9.6E-2	9.6E-2	MDEQ, 2000	
CSF details	Increased nasal turbinate tumors in female Long-Evans rats, dietary exposure (Monsanto, 1984a, also cited	**Tier 3 Source:** **MDEQ:** **Basis:** All of the located cancer slope factor values are based on the same Stout et al (1983) study. MDEQ and CALEPA applied the bodyweight scaling factor consistent with the more current EPA guidelines for carcinogens. CALEPA used the TOX_RISK linear model to develop their cancer slope factor. It is unclear how this model may differ from that which the MDEQ used to develop its value (Global		Complete

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
	as Stout, 1983). Revised species scaling factor of (BWh/BWa) to the 0.25 power used for q* calculation.	82). Therefore, it is recommended that the MDEQ-developed cancer slope factor be retained to preserve internal harmonization of cancer slope factors between divisions until a more thorough evaluation of the available data can be conducted. See details below. **Tier 1 and 2 Sources**: **IRIS:** Per IRIS (9/01/93), no value at this time. **PPRTV:** No PPRTV record available at this time. **MRL:** NA; MRLs are for non-cancer effects only. **Tier 3 Sources:** **MDEQ:** Per CCD/RRD (2000), CSF = 9.6E-2 $(mg/kg\text{-}day)^{-1}$ **Critical Study(ies)**: (Monsanto, 1984a, also cited as Stout, 1983) **Method(s)**: 1) *Dose response data*: *Tumor Type* - nasal turbinate tumors; *Test Species* - Long-Evans rats; *Route* - diet 2) *Extrapolation method*: linear; applied revised species scaling factor of (BWh/BWa) to the 0.25 power for q* calculation. **Source and Date**: MDEQ/RRD, 1/10/2000 **HEAST (07/1997):** CSF= 8E-2 $(mg/kg\text{-}day)^{-1}$ Stout. LD. et al. (1983). A Chronic Study of Alachlor Administered in Feed to Long Evans Rats. EHL #800218. Project No. Ml-80-186. Report MSL-3282/32. Vol. I And II. Unpublished Study Received Feb. 28. 1984 Under U.S. EPA Reg. No. 524-316. Prepared By Monsanto Environmental Health Laboratory (EHL). Submitted By Monsanto Co. Washington. DC. CDL: 252496-7. Slope factor development details are not described. **California OEHHA (12/1997):** CSF= 0.056 $(mg/kg\text{-}day)^{-1}$ **Critical studies:** Stout, L.D. et al. (1984a). A chronic study of alachlor administered in feed to Long-Evans rats. (Prepared by Environmental Health Laboratory) ML-80-186. St. Louis,		

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		MO: Monsanto Co. CDL: 252496 and 252497. Stout, L.D. et al.* (1984b). A chronic study of alachlor administered in feed to Long-Evans rats. (Prepared by Environmental Health Laboratory) ML-80-224. St. Louis, MO: Monsanto Co. CDL: 252498 OEHHA evaluated the carcinogenic risk for alachlor using in its assessment both non-threshold and threshold approach. In both approaches carcinogenic risk assessment was based on the development of nasal turbinate tumors in Long-Evans rats of both sexes. Calculations were performed by using the multistage model TOX_RISK computer program with a body weight scaling factor of $(BW)^{3/4}$. **Minnesota DOH (05/2009):** CSF= 0.08 $(mg/kg\text{-}day)^{-1}$ **Slope factor**: 0.08 per (mg/kg-d), however a nonlinear approach is recommended (EPA 1998, 2004) **Source of slope factor**: EPA (1998) which is the December, 1998 Registration Eligibility Document for alachlor. Basis of the slope factor is not described in the RED document, but is consistent with the HEAST slope factor value. **Tumor site(s):** nasal, stomach and thyroid tumors **New Jersey DEP:** CSF= 0.08 $(mg/kg\text{-}day)^{-1}$, which is based on HEAST (1997). **TCEQ** : CSF = 8.0E-2 $(mg/kg\text{-}day)^{-1}$, which is based on HEAST (1997). **Other Tier 3:** No value is available at this time from these Tier 3 sources/databases: NTP ROC, health and environmental agencies of Massachusetts and New York, WHO (IARC), WHO (IPCS/INCHEM), Canada, The Netherlands (RIVM), ECHA (REACH) and OECD HPV.		
Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) (µg/m³)	--	NA	MDEQ, 2015	

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
RfC/ITSL details	NA	**Tier 1 and 2 Sources**: **IRIS:** Per IRIS (9/01/93), no value at this time. **PPRTV:** No PPRTV record available at this time. **MRL:** No MRL record available at this time. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD, no AQD value at this time.		Complete
Inhalation Unit Risk Factor (IURF) ((µg/m^3)$^{-1}$)	--	NA	MDEQ, 2015	
IURF details	NA	**Tier 1 and 2 Sources**: **IRIS:** Per IRIS (9/01/93), no value at this time. **PPRTV:** No PPRTV record available at this time. **MRL:** NA; MRLs are for non-cancer effects only. **Tier 3 Source:** **MDEQ:** Per DEQ-CCD, no AQD value at this time.		Complete
Mutagenic Mode of Action (MMOA)? (Y/N)	--	NO	USEPA, 2015	
MMOA Details	--	NA Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List		
Developmental or Reproductive Effector? (Y/N)	No	No, the RfD is not based on a reproductive-developmental effect.	MDEQ, 2015	
Developmental or Reproductive Toxicity Details	NA	NA		
State Drinking Water Standard (SDWS) (ug/L)	--	2	SDWA, 1976	
SDWS details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399		

	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
Secondary Maximum Contaminant Level (SMCL) (ug/L)	--	NO	SDWA, 1976 and USEPA SMCL List	
SMCL details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399 and USEPA SMCL List		
Is there an aesthetic value for drinking water? (Y/N)	NO	Not evaluated.	NA	
Aesthetic value (ug/L)	NA	NA	NA	
Aesthetic Value details	NA	NA		
Phytotoxicity Value? (Y/N)	NO	Not evaluated.	NA	
Phytotoxicity details	NA	NA	NA	
Others				

(C) Chemical-specific Absorption Factors

	Part 201 Value	Update	Source/Reference/ Dates	Comments/Notes /Issues
Gastrointestinal absorption efficiency value (ABSgi)	---	1.0	MDEQ, 2015/USEPA RAGS-E	
ABSgi details		RAGS E (EPA, 2004) Default Value		
Skin absorption efficiency value (AEd)	---	0.1	MDEQ, 2015	
AEd details				
Ingestion Absorption Efficiency (AEi)		0.5	MDEQ, 2015	
AEi Details				
Relative Source Contribution for Water (RSC_W)		0.2	MDEQ, 2015	
Relative Source Contribution for Soil (RSC_S)		1.0	MDEQ, 2015	
Relative Source Contribution for Air (RSC_A)		1.0	MDEQ, 2015	
Others				

(D) Rule 57 Water Quality Values and GSI Criteria

Current GSI value (µg/L)	11 (X)
Updated GSI value (µg/L)	11 (X)
Rule 57 Drinking Water Value (µg/L)	3.5

	Rule 57 Value (µg/L)	Verification Date
Human Non-cancer Values- Drinking water source (HNV-drink)	270	2/1998
Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)	6,900	2/1998
Wildlife Value (WV)	NA	NA
Human Cancer Values for Drinking Water Source (HCV-drink)	3.5	2/1998
Human Cancer values for non-drinking water source (HCV-Non-drink)	91	2/1998
Final Chronic Value (FCV)	11	3/1998
Aquatic maximum value (AMV)	150	3/1998
Final Acute Value (FAV)	300	3/1998

Sources:

1. MDEQ Surface Water Assessment Section Rule 57 website
2. MDEQ Rule 57 table

(E) Target Detection Limits (TDL)

	Value	Source
Target Detection Limit – Soil (μg/kg)	20	MDEQ, 2015
Target Detection Limit – Water (μg/L)	1	MDEQ, 2015
Target Detection Limit – Air (ppbv)	NA	MDEQ, 2015
Target Detection Limit – Soil Gas (ppbv)	NA	MDEQ, 2015

CHEMICAL UPDATE WORKSHEET ABBREVIATIONS:

CAS # - Chemical Abstract Service Number.

Section (A) Chemical-Physical Properties

Reference Source(s):

CRC	Chemical Rubber Company Handbook of Chemistry and Physics, 95th edition, 2014-2015
EMSOFT	USEPA Exposure Model for Soil-Organic Fate and Transport (EMSOFT) (EPA, 2002)
EPA2001	USEPA (2001) Fact Sheet, Correcting the Henry's Law Constant for Soil Temperature. Office of Solid Waste and Emergency Response, Washington, D.C.
EPA4	USEPA (2004) User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. February 22, 2004.
EPI	USEPA's Estimation Programs Interface SUITE 4.1, Copyright 2000-2012
HSDB	Hazardous Substances Data Bank
MDEQ	Michigan Department of Environmental Quality
NPG	National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards
PC	National Center for Biotechnology Information's PubChem database
PP	Syracuse Research Corporation's PhysProp database
SCDM	USEPA's Superfund Chemical Data Matrix
SSG	USEPA's Soil Screening Guidance: Technical Background Document, Second Edition, 1996
USEPA/EPA	United States environmental protection agency's Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). July, 2004.
W9	USEPA's User Guide for Water9 Software, Version 2.0.0, 2001

Basis/Comments:

EST	estimated
EXP	experimental
EXT	extrapolated
NA	not available or not applicable
NR	not relevant

Section (B) Toxicity Values/Benchmarks

Sources/References:

ATSDR	Agency for Toxic Substances and Disease Registry
CALEPA	California Environmental Protection Agency
CAL DTSC	California Department of Toxic Substances Control
CAL OEHHA	CAEPA Office of Environmental Health Hazard Assessment
CCD	MDEQ Chemical Criteria Database
ECHA	European Chemicals Agency (REACH)
OECD HPV	Organization for Economic Cooperation and Development HPV Database
HEAST	USEPA's Health Effects Assessment Summary Tables
IRIS	USEPA's Integrated Risk Information System
MADEP	Massachusetts Department of Environmental Protection
MDEQ/DEQ	Michigan Department of Environmental Quality
DEQ-CCD/AQD	MDEQ Air Quality Division
DEQ-CCD/RRD	MDEQ Remediation and Redevelopment Division
DEQ-CCD/WRD	MDEQ Water Resources Division
MNDOH	Minnesota Department of Health

NJDEP	New Jersey Department of Environmental Protection
NYDEC	New York State Department of Environmental Conservation
OPP/OPPT	USEPA's Office of Pesticide Programs
PPRTV	USEPA's Provisional Peer Reviewed Toxicity Values
RIVM	The Netherlands National Institute of Public Health and the Environment
TCEQ	Texas Commission on Environmental Quality
USEPA	United States Environmental Protection Agency
USEPA OSWER	USEPA Office of Solid Waste and Emergency Response
USEPA MCL	USEPA Maximum Contaminant Level
WHO	World Health Organization
WHO IPCS	International Programme on Chemical Safety (IPCS/INCHEM)
WHO IARC	International Agency for Research on Cancers
NA	Not Available.
NR	Not Relevant.

Toxicity terms:

BMC	Benchmark concentration
BMCL	Lower bound confidence limit on the BMC
BMD	benchmark dose
BMDL	Lower bound confidence limit on the BMD
CSF	Cancer slope Factor
CNS	Central nervous system
IURF or IUR	Inhalation unit risk factor
LOAEL	Lowest observed adverse effect level
LOEL	Lowest observed effect level
MRL	Minimal risk level (ATSDR)
NOAEL	No observed adverse effect level
NOEL	No observed effect level
RfC	Reference concentration
RfD	Reference dose
p-RfD	Provisional RfD
aRfD	Acute RfD
UF	Uncertainty factor
WOE	Weight of evidence

Section (C) Chemical-specific Absorption Factors

MDEQ	Michigan Department of Environmental Quality
USEPA RAGS-E	United States Environmental Protection Agency's Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). July, 2004.

Section (D) Rule 57 Water Quality Values and GSI Criteria

GSI	Groundwater-surface water interface
NA	A value is not available or not applicable.
ID	Insufficient data to derive value
NLS	No literature search has been conducted