



## CHEMICAL UPDATE WORKSHEET

<b>Chemical Name:</b>	<b>Phenol (DD)</b>
<b>CAS #:</b>	<b>108-95-2</b>
<b>Revised By:</b>	RRD Toxicology Unit
<b>Revision Date:</b>	November 30, 2015

### (A) Chemical-Physical Properties

	Part 201 Value	Updated Value	Reference Source	Comments
<b>Molecular Weight (g/mol)</b>	147.01	94.11	EPI	EXP
<b>Physical State at ambient temp</b>	Liquid	Solid	MDEQ	
<b>Melting Point (°C)</b>	316	40.90	EPI	EXP
<b>Boiling Point (°C)</b>	181.8	181.80	EPI	EXP
<b>Solubility (ug/L)</b>	8.28E+7	82800000	EPI	EXP
<b>Vapor Pressure (mmHg at 25°C)</b>	0.4332	3.50E-01	EPI	EXP
<b>HLC (atm-m<sup>3</sup>/mol at 25°C)</b>	3.97E-7	3.33E-07	EPI	EXP
<b>Log Kow (log P; octanol-water)</b>	1.48	1.46	EPI	EXP
<b>Koc (organic carbon; L/Kg)</b>	17.8	187.2	EPI	EST
<b>Ionizing Koc (L/kg)</b>		NR	NA	NA
<b>Diffusivity in Air (Di; cm<sup>2</sup>/s)</b>	0.082	8.40E-02	W9	EST
<b>Diffusivity in Water (Dw; cm<sup>2</sup>/s)</b>	9.1E-6	1.04E-05	W9	EST
<b>Soil Water Partition Coefficient (Kd; inorganics)</b>	NR	NR	NA	NA

	Part 201 Value	Updated Value	Reference Source	Comments
Flash Point (°C)	175 F	79	CRC	EXP
Lower Explosivity Level (LEL; unitless)	0.018	0.018	CRC	EXP
Critical Temperature (K)		694.20	EPA2001	EXP
Enthalpy of Vaporization (cal/mol)		1.09E+04	EPA2001	EXP
Density (g/mL, g/cm <sup>3</sup> )		1.0722	PC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm <sup>2</sup> )	3.11E-06	1.92E-06	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm <sup>2</sup> )	3.11E-06	1.92E-06	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm <sup>2</sup> )	3.72E-06	2.42E-06	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm <sup>2</sup> )	3.72E-06	2.42E-06	EMSOFT	EST

**(B) Toxicity Values/Benchmarks**

	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
<b>Reference Dose (RfD) (mg/kg/day)</b>	6.0E-1	3.0E-1	IRIS, 2002	
<b>RfD details</b>	Rat oral developmental study; NOAEL = 60 mg/kg; LOAEL = 120 mg/kg; Critical effect = reduced fetal body weight in rats (NTP, 1983). UF = 100. CCD date -	<p><b>Tier 1 Source:</b></p> <p><b>IRIS:</b></p> <p><b>Basis:</b> Both the RED (2009) and the more recent Phenol and Salt Final Work Plan (2013) report the same Chronic Dietary RfD of 0.6 mg/kg/day based on a NOAEL of 60 mg/kg/day and an UF of 100. The study is a developmental toxicity study in rats (MRID 437354020 = Argus, 1997). However, neither reports an explanation for the UF of 100. I'm presuming that the OPP documents base the 100 UF on 10 for interspecies and intra-species variation and do not use an additional 3-fold factor for deficiencies in the database. IRIS uses the additional 3 fold UF for database deficiencies to account for the uncertainties regarding the immunological and hematological effects in mice. With this justification for the UF of 300 and benchmark dose modeling of the data, the IRIS RfD is selected over the OPP RfD.</p> <p><b>Critical Study:</b> Argus Research Laboratories, Inc. (1997). Oral (gavage) developmental toxicity study of phenol in rats. Horsham, Pennsylvania. Protocol number: 916-011.</p> <p><b>Methods:</b> Pregnant CrI:CDRBR VAF/Plus Sprague-Dawley rats (25/group) received phenol by oral gavage on gestation days 6 through 15. Dosing was three times daily with 0, 20, 40, or 120 mg phenol/kg/dosage, using a dosing volume of 10 mL/kg. The corresponding daily doses were 0, 60, 120, and 360 mg/kg-day.</p> <p><b>Critical effect:</b> decreased maternal body weight gain</p> <p><b>End point or Point of Departure (POD):</b> NOAEL = 60 mg/kg-day; BMDL = 93 mg/kg-day</p> <p><b>Uncertainty Factors:</b> UF = 300 (10 each for intraspecies variability and interspecies extrapolation and 3 for database deficiency)</p> <p><b>Source and date:</b> IRIS, Last revision date - 9/30/2002. An IRIS Toxicological Review is available.</p> <p><b>Tier 1 and 2 Sources:</b></p>		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		<p><b>EPA-OPP:</b> Per EPA final work plan for phenol registration review (June 2013) chronic RfD = 0.6 mg/kg/day. Developmental toxicity study in rats (MRID No. 43735402). Based on significant reductions from the control in mean fetal body weight/litter at 120 mg/kg/day.</p> <p><b>PPRTV:</b> No PPRTV record is available at this time.</p> <p><b>MRL:</b> Per ATSDR (final 9/2008), no chronic or intermediate oral MRL value at this time. Oral acute only = 1 mg/kg/ day based on body weight. UF = 100. From December 2014 ATSDR MRL list.</p> <p><b>Tier 3 Source:</b>  <b>MDEQ:</b> Per DEQ-CCD/RRD (1/16/1988), RfD = 6.0E-1 mg/kg/day. See Part 201 Value RfD details. Same RfD for WRD dated 1/23/1998.</p>		
<b>Oral Cancer Slope Factor (CSF) (mg/kg-day)<sup>-1</sup></b>	--	NA	MDEQ, 2015	
<b>CSF details</b>	NA	<p><b>Carcinogen Weight-of-Evidence (WOE) Class:</b> "inadequate for an assessment of human carcinogenic potential"</p> <p><b>IRIS WOE Basis:</b> Phenol was negative in oral carcinogenicity studies in rats and mice, but questions remain regarding increased leukemia in male rats in the bioassay as well as the positive gene mutation data and the positive results in dermal initiation/promotion studies at doses at or above the maximum tolerated dose (MTD)</p> <p><b>Source and Date:</b> IRIS, 9/30/2002. An EPA screening-level review in August 2003 did not identify any critical new studies.</p> <p><b>Tier 1 and 2 Sources:</b>  <b>IRIS:</b> Per IRIS (9/30/2002), no value at this time.  <b>PPRTV:</b> No PPRTV record available at this time.  <b>MRL:</b> NA; MRLs are for non-cancer effects only.</p> <p><b>Tier 3 Source:</b>  <b>MDEQ:</b> Per DEQ-CCD, no value at this time.</p>		Complete



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) ( $\mu\text{g}/\text{m}^3$ )	6.0E+2	2.0E+2	MDEQ, 2012	
RfC/ITSL details	The ITSL is based on the NIOSH ceiling limit of $60 \text{ mg}/\text{m}^3$ (15-minute ceiling) for irritancy. CCD/AQD date: 7/6/95.	<p><b>Tier 3 Source:</b>  <b>MDEQ:</b>  <b>Basis:</b> No Tier 1 or Tier 2 values are available. MDEQ value of <math>190 \text{ }\mu\text{g}/\text{m}^3</math> represents the most up to date value with available documentation. The value is rounded up to <math>200 \text{ }\mu\text{g}/\text{m}^3</math> which is the same as the CALEPA value dated 2000. MDEQ used the ACGIH TLV (5 ppm) as the endpoint while CALEPA derived the value using 2 studies (Sandage, 1961; Dalin and Kristofferson, 1974). See details below.</p> <p><b>Tier 1 and 2 Sources:</b>  <b>IRIS:</b> Per IRIS (9/30/2002), no value at this time.  <b>PPRTV:</b> No PPRTV record is available at this time.  <b>MRL:</b> Per ATSDR (final 9/2008), no inhalation MRL value at this time. From December 2014 ATSDR MRL List.</p> <p><b>Tier 3 Sources:</b>  <b>MDEQ:</b> Per DEQ-CCD/AQD (11/7/2012) ITSL = <math>190 \text{ }\mu\text{g}/\text{m}^3</math>. Averaging time = 8 hours. The ITSL is based on the ACGIH TLV of 5 ppm (<math>19 \text{ mg}/\text{m}^3</math>). The TLV of <math>19 \text{ mg}/\text{m}^3</math> was divided by a factor of 100 to get the ITSL of 190 rounded up to <math>200 \text{ }\mu\text{g}/\text{m}^3</math>.</p> <p><b>California DTSC, 2000 (CALEPA):</b> REL= <math>200 \text{ }\mu\text{g}/\text{m}^3</math>.                      Key Studies: Sandage, 1961; Dalin and Kristofferson, 1974                      Critical effect(s): Twitching, muscle tremors, neurological impairment; elevated serum liver enzymes in rats                      Endpoints: NOAEL - 5 ppm (Sandage, 1961); LOAEL = 26 ppm (Dalin and Kristofferson, 1974)</p>	Complete	



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		<p>Cumulative uncertainty factor: UF = 100 (10 for intraspecies variability, and 3 each for Intraspecies extrapolation and subchronic exposure)</p> <p>Strengths and Limitations in Developing REL: The major strength of the key study is the observation of a NOAEL from a continuous exposure study involving exposure of several different species. The primary uncertainties are the lack of adequate human health effects data, the lack of multiple concentration inhalation exposure studies demonstrating a dose-response relationship, the lack of animal studies longer than 90 days, and the lack of studies with guinea pigs, which have previously been identified as a sensitive species for phenol.</p> <p>Justification: The Sandage (1961) study was chosen since it was the longest in duration (90 days), had a continuous exposure, and evaluated three species (rats, mice, monkey). NOAELs determined in the Sandage study for systemic effects in all three species examined were 5 ppm, consistent with the idea that 5 ppm is a NOAEL for a number of species. The 5.0 ppm standard for phenol in the workplace (ACGIH, 1988; OSHA, 1985; NIOSH, 1976) is considered protective of the health of workers exposed occupationally but does not consider sensitive populations and is not for continuous exposure conditions. The workplace standard is consistent with reports indicating that no respiratory irritation occurred among workers exposed regularly to 4 ppm phenol (Connecticut Bureau of Industrial Hygiene, undated) and no adverse effects were mentioned among workers exposed to 3.3 ppm (Ohtsuji and Ikeda, 1972). Neither report was considered appropriate to be the basis of a REL. However, for the sake of comparison adjusting the reported NOAEL of 4 ppm to continuous exposure and dividing by an interspecies uncertainty factor of 10 results in an estimated chronic REL of 140 ppb, in reasonable agreement with the proposed REL of 50 ppb.</p> <p>Source: OEHHA 2008. Technical Supporting Document for Noncancerous RELs, Appendix D3, p. 429</p> <p><b>Massachusetts DEP:</b> RfC = 2.00E-01 µg/m<sup>3</sup> reported in the Massachusetts Air Guidelines Table was last updated in 1990.</p> <p><b>New Jersey DEP:</b> RfC= 200 µg/m<sup>3</sup> based on CA EPA REL (2008). Value selected in</p>		



	Part 201 Value	Updated Value	Source/Reference/ Date	Comments/Notes /Issues
		<p>2011.</p> <p><b>New York DEC (2006):</b> RfC = 20 µg/m<sup>3</sup> based on RIVM TCA (2001). Although the values from RIVM and CA EPA are based on the same single dose study showing an absence of effects in rats, mice and monkeys exposed continuously via inhalation, the RIVM value is the toxicity value recommended for phenol as RIVM applied a total uncertainty factor of 1000 including 10-fold to account for intraspecies variability, 10-fold for intraspecies variability, and 10-fold for the use of a subchronic study.</p> <p>CA EPA applied a total uncertainty factor of 100 including 3-fold to account for intraspecies variability, 10-fold to account for intraspecies variability, and 3-fold to account for the use of a subchronic study. While CA EPA's use of a pharmacokinetic adjustment (equal to one) for a systemic gas consistent with currently accepted risk assessment practice, CA EPA did not adequately justify the UF of 3 for use of a subchronic study. A full 10-fold uncertainty factor for use of a subchronic study is supported given the uncertainties in the critical study's dose-response and the point of departure estimate.</p> <p><b>RIVM:</b> TCA = 2E-2 µg/m<sup>3</sup> (2001).</p> <p><u>Basis:</u>                      POD Effects on liver enzymes, lungs, kidneys, and the cardiovascular system in rats were noticeable at 100 mg/m<sup>3</sup> (26 ppm). In ATSDR (1198) a NOAEC of 20 mg/m<sup>3</sup> (5 ppm) was reported for rhesus monkeys, rats, and mice for semi chronic inhalation. However, the database is restricted as the concentration of 5 ppm was the only dose tested.</p> <p><u>TCA Estimation:</u>                      NOAEC: 20 mg/m<sup>3</sup>                      UF: 1,000 (100 for intra- and interspecies extrapolation and an additional UF of 10 for use of a semi chronic study)                      TCA: 20 µg/m<sup>3</sup>. *The TCA is provisional (pTCA) as the NOAEC is based on a very poor database.</p> <p>Key Sources:ASTDR (1998): Toxicological Profile for Phenol (update). Agency for Toxic Substances and Disease Registry, US Public Health Service, Atlanta (GA) USA.</p>		



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
		<p><b>ECHA (REACH):</b> RfC= 1.32 mg/m<sup>3</sup>. Route to route extrapolation. Details not located.</p> <p><b>Other Tier 3:</b> No value is available at this time from these Tier 3 sources/databases: HEAST, NTP ROC, health and environmental agency of Texas, WHO (IARC), WHO (IPCS/INCHEM), Canada and OECD HPV.</p>		
<b>Inhalation Unit Risk Factor (IURF) ((µg/m<sup>3</sup>)<sup>-1</sup>)</b>	--	NA	MDEQ, 2015	
<b>IURF details</b>	NA	<p><b>Carcinogen Weight-of-Evidence (WOE) Class:</b> "inadequate for an assessment of human carcinogenic potential"</p> <p><b>IRIS WOE Basis:</b> Phenol was negative in oral carcinogenicity studies in rats and mice, but questions remain regarding increased leukemia in male rats in the bioassay as well as the positive gene mutation data and the positive results in dermal initiation/promotion studies at doses at or above the maximum tolerated dose (MTD).</p> <p><b>Source and Date:</b> IRIS, 9/30/2002. An EPA screening-level review in August 2003 did not identify any critical new studies.</p> <p><b>Tier 1 and 2 Sources:</b>  <b>IRIS:</b> Per IRIS (9/30/2002), no value at this time.  <b>PPRTV:</b> No PPRTV record available at this time.  <b>MRL:</b> NA; MRLs are for non-cancer effects only.</p> <p><b>Tier 3 Source:</b>  <b>MDEQ:</b> Per DEQ-CCD, no value at this time.</p>		Complete
<b>Mutagenic Mode of Action (MMOA)? (Y/N)</b>	--	NO	USEPA, 2015	
<b>MMOA Details</b>	--	<p>NA</p> <p>Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List.</p>		



	Part 201 Value	Updated Value	Source/Reference/Date	Comments/Notes/Issues
Developmental or Reproductive Effector? (Y/N)	YES	YES-oral, the RfD is based on a reproductive-developmental effect. Oral Exposure Pathways- Full Term Exposure No-inhalation, the RfC is not based on a reproductive-developmental effect.	MDEQ, 2015	
Developmental or Reproductive Toxicity Details	NA	<b>Critical effect:</b> decreased maternal body weight gain <b>Critical Study:</b> Argus Research Laboratories, 1997. Developmental study in rats (unpublished). <b>Method(s):</b> Pregnant Crl:CDRBR VAF/Plus Sprague-Dawley rats (25/group) received phenol by oral gavage on gestation days 6 through 15. Dosing was three times daily with 0, 20, 40, or 120 mg phenol/kg/dosage, using a dosing volume of 10 mL/kg. The corresponding daily doses were 0, 60, 120, and 360 mg/kg-day.		
State Drinking Water Standard (SDWS) (ug/L)	NO	NO	SDWA, 1976	
SDWS details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399		
Secondary Maximum Contaminant Level (SMCL) (ug/L)	NO	NO	SDWA, 1976 and USEPA SMCL List	
SMCL details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399 and USEPA SMCL List, 2015		
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	NA	NA	NA	



	<b>Part 201 Value</b>	<b>Updated Value</b>	<b>Source/Reference/ Date</b>	<b>Comments/Notes /Issues</b>
<b>details</b>				
<b>Others</b>				

**(C) Chemical-specific Absorption Factors**

	Part 201 Value	Update	Source/Reference/ Dates	Comments/Notes /Issues
Gastrointestinal absorption efficiency value (ABS <sub>gi</sub> )	---	1.0	MDEQ, 2015/USEPA RAGS-E, 2004	
ABS <sub>gi</sub> details		RAGS E (USEPA, 2004) Default Value		
Skin absorption efficiency value (AE <sub>d</sub> )	---	0.1	MDEQ, 2015	
AE <sub>d</sub> details				
Ingestion Absorption Efficiency (AE <sub>i</sub> )		1.0	MDEQ, 2015	
AE <sub>i</sub> Details				
Relative Source Contribution for Water (RSC <sub>w</sub> )		0.2	MDEQ, 2015	
Relative Source Contribution for Soil (RSC <sub>s</sub> )		1.0	MDEQ, 2015	
Relative Source Contribution for Air (RSC <sub>A</sub> )		1.0	MDEQ, 2015	
Others				

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

<b>Current GSI value (µg/L)</b>	450
<b>Updated GSI value (µg/L)</b>	450
<b>Rule 57 Drinking Water Value (µg/L)</b>	1,100

	<b>Rule 57 Value (µg/L)</b>	<b>Verification Date</b>
<b>Human Non-cancer Values- Drinking water source (HNV-drink)</b>	1,100	10/2003
<b>Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)</b>	1,200	10/2003
<b>Wildlife Value (WV)</b>	NA	NA
<b>Human Cancer Values for Drinking Water Source (HCV-drink)</b>	NA	NA
<b>Human Cancer values for non-drinking water source (HCV-Non-drink)</b>	NA	NA
<b>Final Chronic Value (FCV)</b>	450	3/2003
<b>Aquatic maximum value (AMV)</b>	3,400	3/2003
<b>Final Acute Value (FAV)</b>	6,800	3/2003

Sources:

1. MDEQ Surface Water Assessment Section Rule 57 [website](#)
2. MDEQ Rule 57 [table](#)

**(E) Target Detection Limits (TDL)**

	<b>Value</b>	<b>Source</b>
<b>Target Detection Limit – Soil (<math>\mu\text{g}/\text{kg}</math>)</b>	330	MDEQ, 2015
<b>Target Detection Limit – Water (<math>\mu\text{g}/\text{L}</math>)</b>	5	MDEQ, 2015
<b>Target Detection Limit – Air (ppbv)</b>	NA	MDEQ, 2015
<b>Target Detection Limit – Soil Gas (ppbv)</b>	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