

Risk Based Corrective Action Rules

Scoping Meeting - Risk Software



STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

Agenda

- Rulemaking
- Problem
- Proposal
- Screening Level Comparisons
- Risk Comparisons
- Soil Vapor Cost Comparisons



Rulemaking

- IDAPA 58.01.24, Standards and Procedures for Application of Risk Based Corrective Action at Petroleum Release Sites, is up for rule review in 2024
- Rulemaking must be initiated in compliance with Executive Order No. 2020-01, Zero-Based Regulation (ZBR), issued by Governor Little on January 16, 2020
- Under EO 2020-01, all agencies are required to perform a critical and comprehensive review of their rule chapters to reduce the overall regulatory burden, streamline various provisions, and increase clarity and ease of use

Draft Rulemaking Includes:

- ZBR – simple clarification changes, (ex. “shall” to “must”)
- Moving sections **800** (Hazardous & Deleterious Material Storage), **849** (Oil-Filled Electric Equipment), **850** (Hazardous Material Spills), **851** (Petroleum Release Reporting, Investigation, & Confirmation), and **852** (Petroleum Release Response & Corrective Action) from the Water Quality Standards (IDAPA 58.01.02) into 58.01.24
- Risk evaluation process changes



Problem - Risk Evaluation Process

- DEQ's current risk evaluation software is outdated
 - Screening levels must be updated
 - Cannot enter vapor point data because of the incorrect screening levels
 - Formulas and default parameters may be outdated (some from the 1980's)
 - Staff does not have knowledge on the decisions to include certain formulas, toxicity values, and default parameters or why some formulas were modified

RSL Calculator

The semiannual RSL/VISL update has been completed. The RML update will be completed May 15th.

Problem – Risk Evaluation Process

- DEQ does not have the personnel to evaluate EPA's toxicity changes as they are updated every 6 months
 - DEQ only has 1 toxicologist for the entire agency
- The cost to build a new risk evaluation platform is cost-prohibitive
 - **\$1,888,970**



Proposal

- Retire DEQ's risk evaluation software and utilize EPA's screening levels and calculators
 - Regional Screening Level (RSL) Calculator
 - Vapor Intrusion Screening Level (VISL) Calculator
- Retain the same petroleum chemicals of interest



EPA's Screening Levels

- EPA uses what they call “generic screening levels” because they are just that, generic. They do not take into account any site-specific information. They are simply to see if further investigation is warranted.
- Using EPA’s RSL Calculator is the key to an accurate representation of risk

Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1) November 2022

Toxicity and Chemical-specific Information													Contaminant		Screening Levels							Protection of Groundwater SSLs	
SFO (mg/kg-day) ¹	IUR (ug/m ³ -y) ¹	RfD _h (mg/kg-day)	RT _h (mg/m ³ -y)	LO _{EL} mutagen	GIABS	ABS _h	C _{soil} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	Industrial Soil (mg/kg)	Resident Air (ug/m ³)	Industrial Air (ug/m ³)	Tap Water (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)						
2.2E-06	I	3.0E-04	O	9.0E-03	I	V	1	1.1E+05	Acephate	30560-19-1	1.9E+01	n	2.5E+02	n	6.0E+00	n	1.3E-03	n					
2.0E-02	I	2.0E-02	I	1	1	0.1	1.1E+05	Acetaldehyde	75-07-0	1.1E+01	c**	4.9E+01	c**	1.3E+00	c**	5.6E+00	c**	2.6E+00	c**				
9.0E-01	I	9.0E-01	I	V	1	1	1.1E+05	Acetochlor	34256-82-1	1.3E+03	n	1.6E+04	n	3.5E+02	n	2.9E-01	n						
9.0E-01	I	9.0E-01	I	V	1	1	1.1E+05	Acetone	67-64-1	7.0E+04	n	1.1E+06	nms	1.8E+04	n	3.7E+00	n						
3.8E+00	C	1.3E-03	C	1.0E-01	I	V	1	2.5E+03	Acetone Cyanohydrin	75-96-5	2.8E+06	nm	1.2E+07	nm	2.1E+00	n	8.8E+00	n					
5.0E-01	I	1.0E-04	I	2.0E-03	I	6.0E-03	I	M	1	0.1	1.1E+05	Acetonitrile	75-05-8	8.1E+02	n	3.4E+03	n	6.3E+01	n	2.6E+02	n		
5.4E-01	I	6.8E-05	I	1.0E-02	A	2.0E-03	I	V	1	1.1E+04	Acetophenone	98-06-2	7.8E+03	ns	1.2E+05	nms	1.9E+03	n	5.8E-01	n			
									2.3E+04	Acetylaminofluorene, 2-	53-96-3	1.4E-01	c	6.0E-01	c	2.2E-03	c	9.4E-03	c	1.6E-02	c		
									1.1E+04	Acrolein	107-02-8	1.4E-01	n	6.0E-01	n	2.1E-02	n	8.8E-02	n	4.2E-02	n		
									1.1E+05	Acrylamide	79-06-1	2.4E-01	c	4.6E+00	c	1.0E-02	c	1.2E-01	c	5.0E-02	c		
									1.1E+05	Acrylic Acid	79-10-7	2.0E+01	n	8.3E+01	n	2.1E-01	n	8.8E-01	n	4.2E-01	n		
									1.1E+04	Acrylonitrile	107-13-1	2.5E-01	c*	1.1E+00	c*	4.1E-02	c*	1.8E-01	c*	5.2E-02	c*		
									1.1E+03	Ardonitrile	111-64-3	8.5E+06	nm	3.6E+07	nm	6.3E+00	n	2.6E+01	n	1.1E-05	c		

EPA's Screening Levels

- EPA derived their screening levels conservatively
 - Dilution Attenuation Factor (DAF) of 1 (could be much higher);
 - Assumes the source is infinite, no degradation or volatilization, aquifer is unconsolidated and homogeneous, contaminants are uniformly distributed; etc

acetylamino	53-96-3	1.4E-01	c	6.0E-01	c	2.2
acrylamide	107-02-8	1.4E-01	n	6.0E-01	n	2.1
acrylic Acid	79-06-1	2.4E-01	c	4.6E+00	c	1.0
acrylonitrile	79-10-7	2.0E+01	n	8.3E+01	n	2.1
adiponitrile	107-13-1	2.6E-01	c*	1.1E+00	c*	4.1
adiponitrile	111-69-3	8.5E+06	nm	3.6E+07	nm	6.3
adipic acid	15972-60-8	9.7E+00	c*	4.1E+01	c	
adipic acid	116-06-3	6.3E+01	n	8.2E+02	n	
adipic acid	1646-88-4	6.3E+01	n	8.2E+02	n	
adipic acid	1646-87-3					
adipic acid	309-00-2	3.9E-02	c*	1.8E-01	c	5.7
adipic acid	107-18-6	3.8E+00	n	1.5E+01	n	1.0
adipic acid	107-08-1	7.2E-01	c**	3.2E+00	c**	4.7
adipic acid	7429-90-5	7.7E+04	n	1.1E+06	nm	5.2
adipic acid	20889-73-6	3.1E+01	n	4.7E+02	n	
adipic acid	834-12-8	5.7E+02	n	7.4E+03	n	
adipic acid	92-87-1	2.6E-02	c	1.1E-01	c	4.7
adipic acid	591-27-5	5.1E+03	n	6.6E+04	n	
adipic acid	95-55-6	2.8E+02	n	3.3E+03	n	
adipic acid	123-30-8	1.3E+03	n	1.6E+04	n	
adipic acid	33089-61-1	1.6E+02	n	2.1E+03	n	
adipic acid	7664-41-7					5.2
adipic acid	131-74-8	1.3E+02	n	1.6E+03	n	
adipic acid	7773-06-0	1.6E+04	n	2.3E+05	nm	
adipic acid	75-95-4	8.2E+01	n	3.4E+02	n	3.1
adipic acid	62-53-3	9.5E+01	c**	4.0E+02	c*	1.0
adipic acid	84-85-1	1.4E+01	c**	5.7E+01	c*	
adipic acid	7440-36-0	3.1E+01	n	4.7E+02	n	3.1
adipic acid	1314-60-9	3.9E+01	n	5.8E+02	n	
adipic acid	1332-81-6	3.1E+01	n	4.7E+02	n	
adipic acid	1309-64-4	2.8E+05	nm	1.2E+06	nm	2.1
adipic acid	7449-39-2	6.8E-01	c**	3.0E+00	c**	6.5
adipic acid	7784-42-1	2.7E-01	n	4.1E+00	n	5.2
adipic acid	1332-81-4					
adipic acid	3389-71-1	2.3E+04	n	3.0E+05	nm	
adipic acid	1912-24-9	2.4E+00	c*	1.0E+01	c	
adipic acid	492-80-8	6.2E-01	c	2.6E+00	c	1.1
adipic acid	65195-55-3	2.5E+01	n	3.3E+02	n	
adipic acid	86-50-0	1.9E+02	n	2.5E+03	n	1.0
adipic acid	103-33-3	5.6E+00	c	2.6E+01	c	9.1
adipic acid	123-77-3	8.6E+03	n	4.0E+04	n	7.3
adipic acid	7440-39-3	1.5E+04	n	2.2E+05	nm	5.2
adipic acid	1861-40-1	3.9E+02	n	5.8E+03	n	
adipic acid	17804-35-2	3.2E+03	n	4.1E+04	n	
adipic acid	83055-99-6	1.3E+04	n	1.6E+05	nm	
adipic acid	25057-99-0	1.9E+03	n	2.5E+04	n	
adipic acid	100-52-7	1.7E+02	c*	8.2E+02	c	
adipic acid	71-43-2	1.2E+00	c*	5.1E+00	c*	3.6
adipic acid	6369-59-1	5.4E+00	c**	2.3E+01	c*	
adipic acid	108-98-5	7.8E+01	n	1.2E+03	n	
adipic acid	92-87-5	5.3E-04	c	1.0E-02	c	1.5
adipic acid	65-95-0	2.5E+05	nm	3.3E+06	nm	
adipic acid	98-07-7	5.3E-02	c	2.5E-01	c	

EPA's RSL Calculator

- EPA's RSL Calculator will allow you to calculate risk at 1×10^{-5} and enter site-specific data which will result in the typical risk evaluations you are accustomed to
- Screening levels will be less conservative for the soil to groundwater pathway if you are able to use a higher DAF

DAF Example, Benzene

Screening Levels

EPA = 0.00023 mg/kg (DAF 1)

DAF 20

0.0046 mg/kg

DAF 100

0.023 mg/kg

EPA's RSL Calculator

- EPA's program does not calculate/extrapolate vapor intrusion from soil
- Must collect soil vapor samples and use EPA's VISL Calculator to determine vapor intrusion risk
- This is now common - from EPA and other states

Select Hazard Quotient?

0.1

1

Other:

Select Target Risk?

10^{-6}

10^{-5}

10^{-4}

Other:

EPA VISL Calculator

7. Why can't I calculate VISLs for bulk soil samples?

Consistent with the 2015 [Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air](#) (268 pp, 3 MB) "bulk soil (as opposed to soil gas) sampling and analysis is not currently recommended for estimating the potential for vapor intrusion to pose unacceptable human health risk in indoor air, because of the potential for vapor loss due to volatilization during soil sampling, preservation, and chemical analysis. In addition, there are uncertainties associated with soil partitioning calculations."

EPA VISL Calculator

- “...analysis suggests that the use of the [J&E] model is limited due to its sensitivity to a number of parameters...”
 - “...extremely uncertain for a future use scenario”
 - ”...instead of relying exclusively on the model, data from a comprehensive soil-gas survey are recommended.”
 - “...site-specific information on soil permeability can be used to replace default parameters in the Johnson and Ettinger model to obtain a more reliable estimate...”
- Soil Screening Guidance: User’s Guide, EPA 1996 and the Supplemental Guidance, 2002

EPA VISL Calculator

- The J&E Model is not acceptable for use in VI assessment at contaminated sites unless site-specific parameter values are obtained for input parameters and the model is calibrated using field data to produce results that confirm one or more of the modeling results. The Division recommends the use of the EPA VISL calculator.
- Utah Division of Waste Management and Radiation Control, June 2022

EPA VISL Calculator

- “[Oregon] DEQ will use risk-based concentrations, or RBCs, that match EPA's screening levels, including lowering the soil vapor and groundwater screening levels. Additionally, soil RBCs will be removed because soil has been shown to be an unreliable method for screening out vapor intrusion at a site”.
- Oregon DEQ, June 2023

EPA's VISL Calculator

- Can either collect near-source or sub-slab soil vapor samples when collecting other samples or wait until soil and/or groundwater samples determine there may be a risk



Screening Level Comparisons

Screening Levels, DEQ and EPA

Comparison Chart

Screening Levels, Other States

	Benzene gw protect (mg/kg)	Toluene gw protect (mg/kg)	Ethylbenzene gw vapor (mg/L)	Naphthalene gw vapor (mg/L)
ID	0.025	6.6	0.05	0.07
WA	0.0017	0.27	2.8	.0025
OR	0.023	84	EPA	EPA
NV	EPA	EPA	EPA	EPA
UT	EPA	EPA	EPA	EPA
WY	0.00139	0.0406	EPA	EPA
MT	0.07	21	EPA	EPA

Risk Evaluation Comparisons and Demonstration

Risk Evaluation Comparison

GW Protection Pathway, Benzene

Aquifer thickness, depth of source, hydraulic conductivity, hydraulic gradient, source length, etc.

EPA Default Parameters

Screening Level

0.00023 mg/kg

EPA Site-Specific Parameters

Site-Specific Screening Level

0.078 mg/kg

Site-specific Soil to Groundwater Inputs

Variable	Default Value	Site-Specific Value
d_s (aquifer thickness) m - site-specific	.	30
DAF (dilution attenuation factor) unitless	1	20
DAF (dilution attenuation factor) unitless	1	20
d_c (depth of source) m - site-specific	.	1
ED_{res} (exposure duration) yr	70	70
foc (fraction organic carbon in soil) g/g	0.002	0.002
i (hydraulic gradient) m/m	.	.002
I (infiltration rate) m/yr	0.18	0.18
L (source length parallel to ground water flow) m	.	1
DAF Method	1	2
n (soil porosity) L_{pore}/L_{total}	0.434	0.434
p_b (dry soil bulk density) kg/L	1.5	1.5
p_c (soil particle density) kg/L	2.65	2.65
Θ_a (air-filled soil porosity) L_{air}/L_{total}	0.134	0.134

EPA RSL Demonstration

EPA RSL Calculator

Soil Vapor Cost Comparisons

Soil Vapor Sampling is Often Necessary

Soil vapor sampling is often necessary regardless of the software used

CR American, Middleton

- Did not pass DEQ groundwater vapor intrusion risk
- DEQ requested vapor point
- Site passed EPA VISL



Soil Vapor Costs

Nested (5 & 10 ft) Vapor Point

- Labor - \$1,200
- Mobilization & Mileage (50 mi) - \$1,000
- Nested Vapor Point (monument, concrete, bentonite, well, tubing, helium, drill rig) - \$1,400
- Lab Analysis - \$900
- Total = \$4,500



EPA VISL Demonstration

EPA VISL Calculator

Rulemaking Schedule

Scoping 2

Sept. 28, 2023

Rulemaking 1

Spring 2024

Rulemaking 2

Spring 2024

Thoughts, Questions?

Kristi Lowder
UST/LUST Program Manager
kristi.lowder@deq.idaho.gov

Eric Traynor
Brownfields Program Coordinator
eric.traynor@deq.idaho.gov

Keith Dyarmett
LUST Compliance Officer
keith.dyarmett@deq.idaho.gov



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