COVER SHEET
STANDARD OPERATING PROCEDURE

Operation Title: **DERIVING AND UPDATING THE MAINE REMEDIAL ACTION GUIDELINES USING THE EPA REGIONAL SCREENING LEVELS CALCULATOR**

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1.0 APPLICABILITY

This Standard Operating Procedure (SOP) applies to all programs in the Maine Department of Environmental Protection's (MEDEP) Bureau of Remediation & Waste Management (BRWM).

This SOP is not a rule and is not intended to have the force of law, nor does it create or affect any legal rights of any individual, all of which are determined by applicable statutes and law. This SOP does not supersede statutes or rules.

2.0 PURPOSE

The purpose of this document is to describe the procedure for deriving and updating the Department's Remedial Action Guidelines using the EPA Regional Screening Levels calculator.

3.0 DEFINITIONS AND ACRONYMS

3.1 EXPOSURE SCENARIO: For the purposes of this document, an Exposure Scenario is a hypothetical instance whereby a person may come into contact with a contaminated media. The Exposure Scenario includes both the situational setting of the exposure and the media (e.g. Residential Groundwater).
3.2 RAGs: Maine Remedial Action Guidelines
3.3 RSL: U.S. EPA Regional Screening Levels
3.4 TSD: RAGs Attachment A: Technical Support Document
3.5 RfD: Reference dose
3.6 RfC: Reference concentration

4.0 RESPONSIBLITIES

4.1 The Director of the Division of Remediation will review all RSL updates and about once every two years, convene a RAGs Working Group of subject experts. However, the Director will convene the RAG workgroup whenever there is a change to the RSL updates that will have a significant change to Remedial Program operations.

4.2 The RAGs workgroup will make recommendations for updates to the RAGs based on new information obtained or needed since the last RAGs updates.

4.3 All MEDEP/BRWM Staff must follow this procedure when performing this task. All Managers and Supervisors are responsible for ensuring that their staff are familiar with and adhere to this procedure.

5.0 GUIDELINES AND PROCEDURES

5.1 INTRODUCTION

The MEDEP uses the EPA RSL Calculator to generate risk-based RAGs. Attachment A to this SOP provides basic instruction on using the RSL Calculator for generating screening levels. The EPA RSL Home Page is located at https://www.epa.gov/risk/regional-screening-levels-rsls. This page contains links to useful web pages such as the What's New page, the RSL Calculator and the User's Guide. See the User's Guide for specifics on how to use the RSL Calculator. The EPA has stated that they anticipate an update to the RSL semiannually, in the Fall and Spring. The RSL "What's New" page provides information on updates. Once EPA provides notification that an RSL update has been completed, DEP staff responsible for updating the RAGs should check the "What's New" page to become familiar with the major changes to toxicity values, exposure parameters, chemical-specific parameters, equation formats and any other RSL changes.

All RAGs update files should be saved in a single location. The file path to the RAGs Update folders is H:\BRWM\Shared folders\RAGs Update. A new folder should be created in this location, labeled with the season and year of the update (e.g. Winter 2021).

5.2 EXPOSURE SCENARIOS

To update the RAGs, the RSL Calculator needs to be run for all exposure scenarios. The exposure scenarios are as follows, along with the RSL Calculator scenario used.

MEDIA TYPE	RAGs EXPOSURE SCENARIO	RSL CALCULATOR SCENARIO
Soil	Leaching to Groundwater	Soil to Water
Soil	Residential	Residential
Soil	Park User	Recreator
Soil	Commercial Worker	Composite Worker
Soil	Construction Worker	Construction Worker
Groundwater	Residential	Residential (Tapwater)
Groundwater	Construction Worker	Residential (Tapwater) with Construction Worker Modifications and External Workbook
Air	Residential	Residential
Air	Commercial Worker	Composite Worker
Air	Ambient Air	Residential
Sediment	Recreator	Recreator
Fish Tissue	Fish Tissue	Fish Tissue

If the RAGs workgroup determines that additional scenarios will "drive the risk" at numerous sites in Maine, then the additional scenario should be added. There will be three separate RSL Calculator runs for each exposure scenario: one for the Default Chemicals included in the RSL chemical database, one for the petroleum hydrocarbon fractions and one for the "Special Chemicals" not included in the RSL database. See the TSD attached to the RAGs for the list of Special Chemicals. All RAGs are to be calculated

as Regional Screening Levels. **All RAGs are calculated with a Hazard Quotient of 1 and a Target Risk of 10^{-5}**. Chronic RfDs/RfCs are used for all exposure scenarios, with the exception of the Construction Worker scenarios which use Subchronic values when available. See Table 12 of the RAGs TSD for Maine-specific Exposure Factors for each exposure scenario and Table 13 for Physical/Chemical Properties and Toxicity Values to be used for the Petroleum Hydrocarbon Ranges and Special Chemicals. The RAGs workgroup should review these factors and make appropriate adjustments based on any improvements in science since the last update. The State Toxicologist or his/her designee should develop toxicity factors or surrogates for newly added chemicals. Physical/chemical properties for new chemicals can be obtained from EPA's CompTox database.

5.3 CALCULATING REMEDIAL ACTION GUIDELINES

While the RSL Calculator runs can be performed in any order, experience has shown that it is best to perform them as follows.

1. Run the RSL Calculator selecting "All Chemicals" for all exposure scenarios.

2. Run the RSL Calculator for the Special Chemicals for all exposure scenarios, using the toxicity and physical/chemical parameters from the RAGs TSD.

3. Run the RSL Calculator for the Petroleum Hydrocarbon Ranges for all exposure scenarios, using the toxicity and physical/chemical parameters from the RAGs TSD. The Petroleum Hydrocarbon Ranges should be calculated without the CSat Substitution option selected and using the Mass-Limit volatilization model with a 3-meter source depth.

The RSL Calculator output screen has an option to download the results in either PDF or Excel Spreadsheet formats. The output from each successful RSL Calculator run should be saved as an Excel file in the update folder.

Make sure that the Parameter names and CAS numbers in each RSL Output spreadsheet for the Special Chemicals and Petroleum Hydrocarbon Ranges are correct.

5.4 CONSTRUCTION WORKER GROUNDWATER EXTERNAL EXCEL WORKBOOK

An external Excel Workbook is used to calculate and apply scenario specific volatilization factors to the calculated Construction Worker Water RSL, to calculate the Construction Worker Groundwater RAGs. The Workbook is called "CW_GW_RSL_Import_*Month Year*.xls". Open the Workbook form the previous RAGs update and save a copy to the current year update folder. Copy and paste the Construction Worker Groundwater RSL output for the RSL Default Chemicals, the Special Chemicals and the Petroleum Hydrocarbon Ranges into the CW_RSL_Output worksheet, overwriting the previous data. Get the current "Chemical Specific Parameters" Excel spreadsheet from the RSL Website

"Generic Tables" page and paste into the RSL_PhysChem worksheet. Look at the CW_Water_RAG worksheet and make sure that all CW-GW RAGs have updated and have valid values.

5.5 QUALITY ASSURANCE

All calculated Screening Levels/RAGs must be QC'd to make sure there are no errors. A second person should re-run the RSL Calculator for all exposure scenarios and all chemicals to verify the results. Screening Levels/RAGs with the highest potential for error are the Petroleum Hydrocarbon Ranges, the Special Chemicals and the Construction Worker Groundwater scenario.

5.6 CREATING RAGs TABLES

After QC, compile all calculated remedial action guidelines into a single Workbook with a separate Worksheet for each exposure scenario and Worksheets with the RAGs for each media type (soil/sediment, groundwater, air, fish). The Excel workbook at the following location (..\FOR_UPDATES_Master_RSL_Output&Tables.xlsx) can be used as a template. Values for Lead are calculated using the IBEUK and ALM models separately as described in the TSD, so must be added to the tables.

Tables in the RAG narrative are created from this Excel worksheet. Values in the RAGs tables are expressed in decimal form, rounded to two significant figures. Any fields for which a RAG value was not calculated should be denoted with "NC". The format can be modified by following these steps.

I. Begin by ensuring that the RAGs Excel tables are in the correct format. Use RSL Output files that are in the Excel workbooks and have confirmed Quality Assurance.
   A. Look at the existing MS Word tables in the existing RAGs Word narrative to determine which columns you are seeking,
   B. Move hidden columns from within the table to a column outside the table with the "Home/cut & insert" features in Excel,
   C. Add any missing columns like CAS no or Chemical Class,
   D. Ensure values are rounded to two significant digits. If they are not, you will have to round the values to two significant digits in another column, using the formula and copy down features in Excel. The formula "=ROUND(cell num,2-(1+INT(LOG10(ABS(cell num)))))" can be used for rounding,
   E. Add (& remove) extra decimal places (e.g. change 0.05 to 0.050) so that are numbers are expressed as two significant digits, using the data/filter & Home/number-format features in Excel,
   F. Add a comma for values over 999 using the using the Data/Filter & Home/Number format features in Excel,
      1. If necessary, correct "=IFERROR" function to include a comma when a ceiling is exceeded,

G. Confirm that a row for lead is added to the table. (This can be missed because it is calculated outside of the RSL calculator and needs to be manually inserted into the Excel table),
H. Add Notes, Header, & Wrap text as necessary.

II. Copy and Paste the Excel table into the MS Word document (use destination document format).
A. Include only one header row and the data.

III. Format table in MS Word, using the Layout tab.
A. Design: Select Table Style (per display in the existing RAGs).
B. Using Home/Font select Times New Roman, 11 point.
1. Bold the first row,
2. Unbold all other rows.
C. Get the numbers to all line-up and row heights to adjust to their contents, can be frustrating. Accomplish this by:
1. Select all number columns,
2. Use the Home/Replace function to remove all spaces,
3. Then from Home/Paragraph select Align Right,
4. Select the entire table, then use Home/Paragraph to set Spacing After to 0 pt, and Line Spacing to Single.
D. Adjust column widths to minimize the number of pages that the tables take up due to word wrapping but making sure each cell displays whole words.
1. Use Design/Layout/Properties to turn off Preferred width & Specified height in table rows, columns and cells,
2. Under View/Show check Ruler, then use the ruler & your cursor to adjust column widths.
E. Get the header row to repeat on each new page of the table using Design/Layout/Properties/Row.
1. Select the top row and check the box for “Top row to repeat”,
2. Select the table and in Row, uncheck “Allow to break across page”.
F. If you need to add any additional RAG Table Headers, Use Design/Layout/Insert row above.

6.0 REFERENCES

U.S. EPA Regional Screening Levels (RSLs) - User’s Guide;
https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide

Using the EPA RSL Calculator for Generating Screening Levels

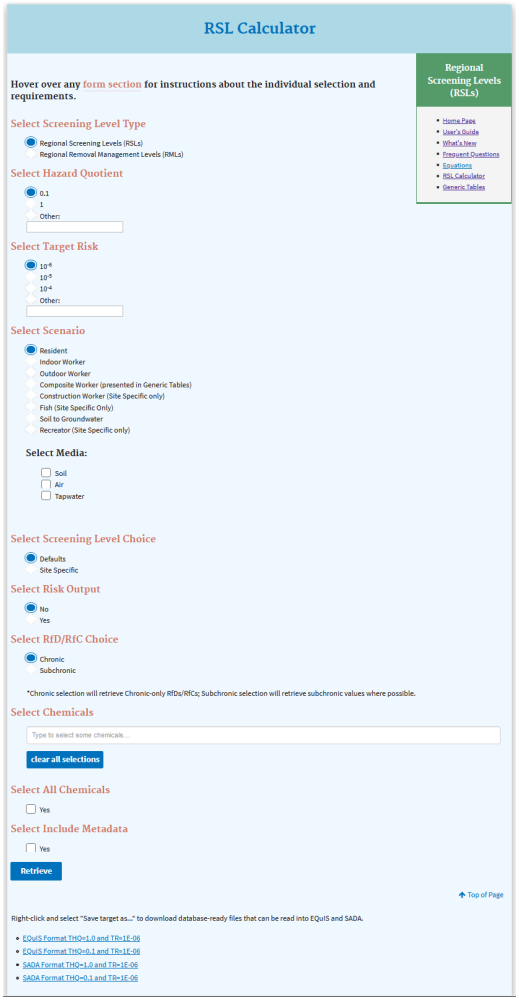
Introduction

This document provides basic instruction on using the EPA Regional Screening Level (RSL) calculator for generating screening levels. These screening levels may be for generic guidance (e.g. RAGs) or for site-specific risk assessment. This document is an attachment to BRWM SOP No. RWM-DR-029 which outlines the steps for updating the Department Remedial Action Guidelines (RAGs). Attachment A to the RAGs is the Technical Support Document, which includes tables of RSL calculator inputs used to generate the RAGs. Attachment B to the RAGs provides guidelines for conducting a site-specific risk assessment. Before conducting a site-specific risk assessment, it is recommended that the user have some familiarity with the risk assessment process, the variables used for modeling exposure scenarios and toxicological information.

For detailed guidance for using the EPA RSL calculator, including underlying equations, see the EPA RSLs Users Guide: https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide.

RSL Calculator Setup

The Department uses the EPA RSL calculator to generate the RAGs and for conducting site-specific risk assessments. The RSL calculator is located at https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search. To begin, open the RSL calculator. The following screenshot shows the opening setup screen.



This screen is where the risk level, exposure scenario and chemicals of concern are selected. Screening Levels (SLs) for general or site-specific risk assessment should be calculated as Regional Screening Levels. Make sure this option is selected.

Next, select the non-cancer Hazard Quotient and cancer Target Risk appropriate for the risk assessment.

Then, select the exposure scenario and media. The media types available may change depending on the scenario selected.

The "Select Screening Level Choice" section allows the user to accept the "Default" exposure factors for the given exposure scenario or to enter "Site Specific" exposure factors. If "Site Specific" is selected, the user then has the option of accepting the RSL "Database hierarchy defaults" chemical specific values or to enter "User-provided" chemical property data.

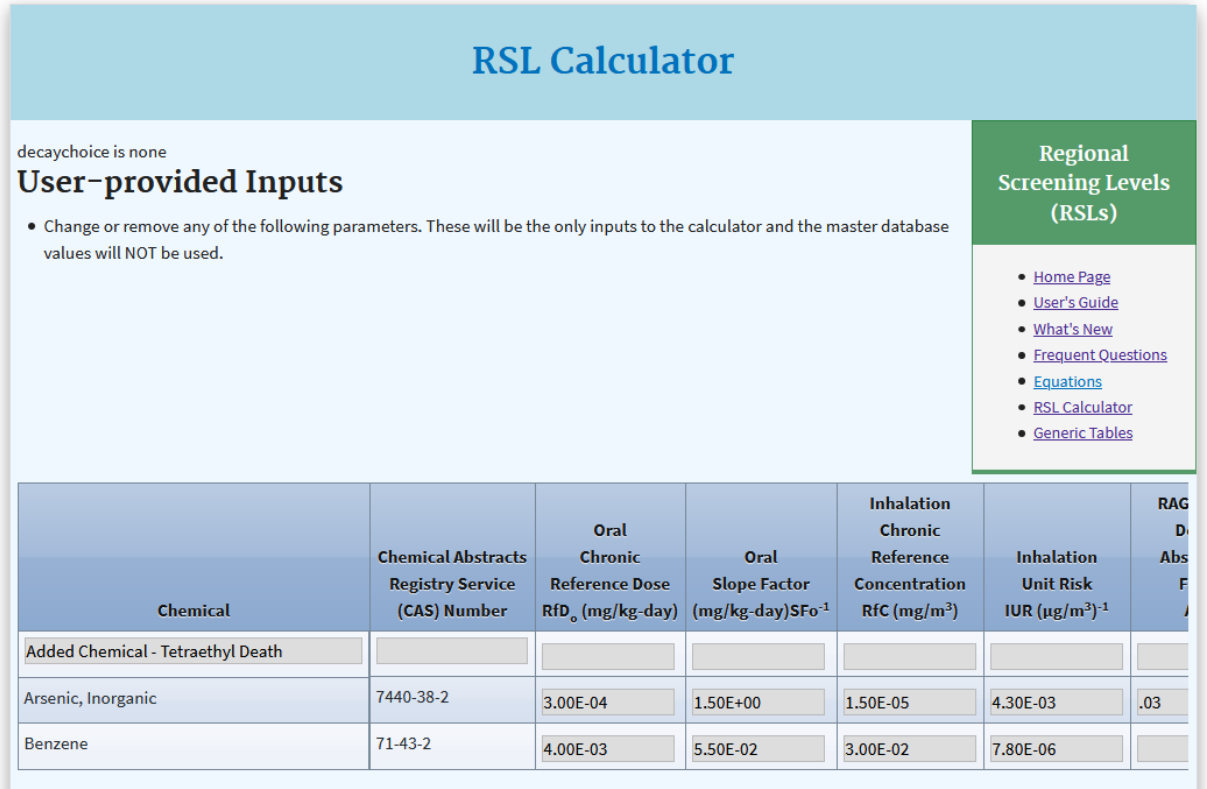
The "Select Risk Output" section gives the user the option of entering site-specific concentration data for the selected chemicals. Selecting "Yes" enables this option. The entered concentrations will ultimately be compared to the calculated SLs. The RSL calculator will also perform a cumulative risk assessment.

The “Select RfD/RfC Choice” allows the user to choose to use subchronic toxicity factors, where available. If subchronic toxicity factors are not available for a given chemical, the chronic values will be used. Subchronic toxicity factors should only be used for short-term exposure assessment, such as construction worker exposure during site redevelopment.

The “Select Chemicals” section provides a drop-down box for selecting the chemicals to be used for the risk assessment. Alternatively, the “Select All Chemicals” box may be checked to include all chemicals in the RSLs database. This will disable the Site Specific mode. You may type the chemical name or the CAS number into the drop-down box, to search for a chemical (CAS number is recommended). Select the chemical to add it to the risk assessment. If a chemical is not in the RSL database, the user can add a blank entry by typing the chemical name into the drop-down box and adding it to the chemical list. The calculator must be in Site Specific mode with User-provided Chemical Info Type selected in order to enter chemical specific info for a blank entry.

Once the scenario has been selected and the desired chemicals have been added to the list, click the “Retrieve” button. This will take you to one of two screens – the “User Provided Inputs” screen or the Screening Level Output screen. The “User Provided Inputs” screen only appears if Site Specific mode was selected.

The User Provided Inputs screen allows the user to enter chemical specific, scenario specific or site-specific data, depending on which options were selected in the opening setup screen. If the user selected the “User-provided” option for chemical info type, the User Provided Inputs screen will include the following data entry box at the top.



RSL Calculator

decaychoice is none

User-provided Inputs

- Change or remove any of the following parameters. These will be the only inputs to the calculator and the master database values will NOT be used.

Regional Screening Levels (RSLs)

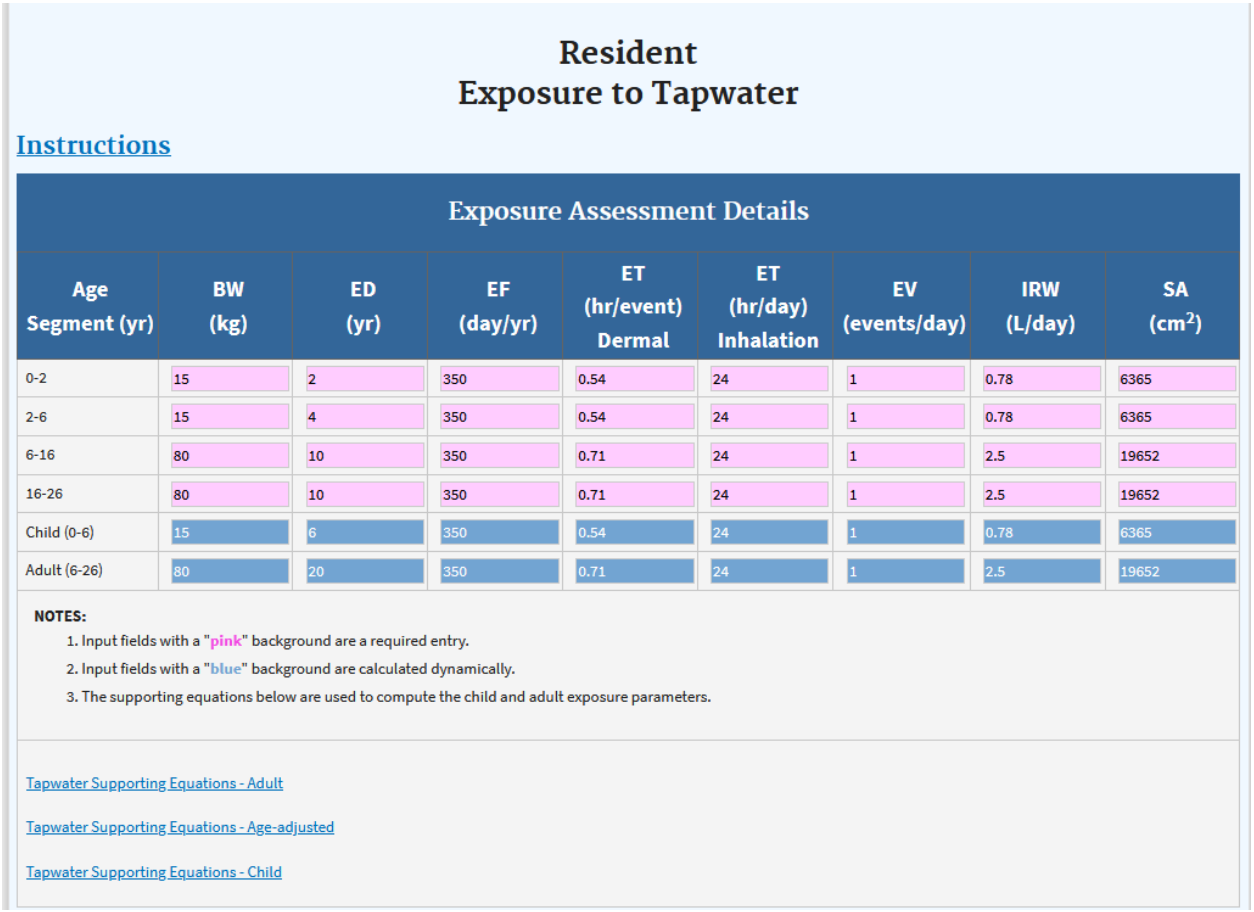
- Home Page
- User's Guide
- What's New
- Frequent Questions
- Equations
- RSL Calculator
- Generic Tables

Chemical	Chemical Abstracts Registry Service (CAS) Number	Oral Chronic Reference Dose RfD_o (mg/kg-day)	Oral Slope Factor (mg/kg-day)SFo^{-1}	Inhalation Chronic Reference Concentration RfC (mg/m^3)	Inhalation Unit Risk IUR $(\mu g/m^3)^{-1}$	RAG D Abs F
Added Chemical - Tetraethyl Death						
Arsenic, Inorganic	7440-38-2	3.00E-04	1.50E+00	1.50E-05	4.30E-03	.03
Benzene	71-43-2	4.00E-03	5.50E-02	3.00E-02	7.80E-06	

In the example, three chemicals have been selected for the risk assessment – Arsenic, Benzene and Tetraethyl Death. Arsenic and Benzene already have information available from the RSL database, but

these factors can be changed if there is reason to do so. Tetraethyl Death has no chemical specific information because this is a chemical added by the user with no RSL database entry. The user must provide the toxicity factors and chemical specific information for tetraethyl death. A slider bar below the chemical input box allows the user to scroll over to access all of the data entry fields for each chemical.

The next sections allow the user to change or add exposure factors for the given exposure scenario. The screen will look different depending on the exposure scenario selected. In the example below, the Resident Tapwater scenario was selected. Soil scenarios will have the option to select the Csat and Threshold Ceiling Limit options at the top of this box.



Resident
Exposure to Tapwater

Instructions

Exposure Assessment Details

Age Segment (yr)	BW (kg)	ED (yr)	EF (day/yr)	ET (hr/event) Dermal	ET (hr/day) Inhalation	EV (events/day)	IRW (L/day)	SA (cm^2)
0-2	15	2	350	0.54	24	1	0.78	6365
2-6	15	4	350	0.54	24	1	0.78	6365
6-16	80	10	350	0.71	24	1	2.5	19652
16-26	80	10	350	0.71	24	1	2.5	19652
Child (0-6)	15	6	350	0.54	24	1	0.78	6365
Adult (6-26)	80	20	350	0.71	24	1	2.5	19652

NOTES:
1. Input fields with a "pink" background are a required entry.
2. Input fields with a "blue" background are calculated dynamically.
3. The supporting equations below are used to compute the child and adult exposure parameters.

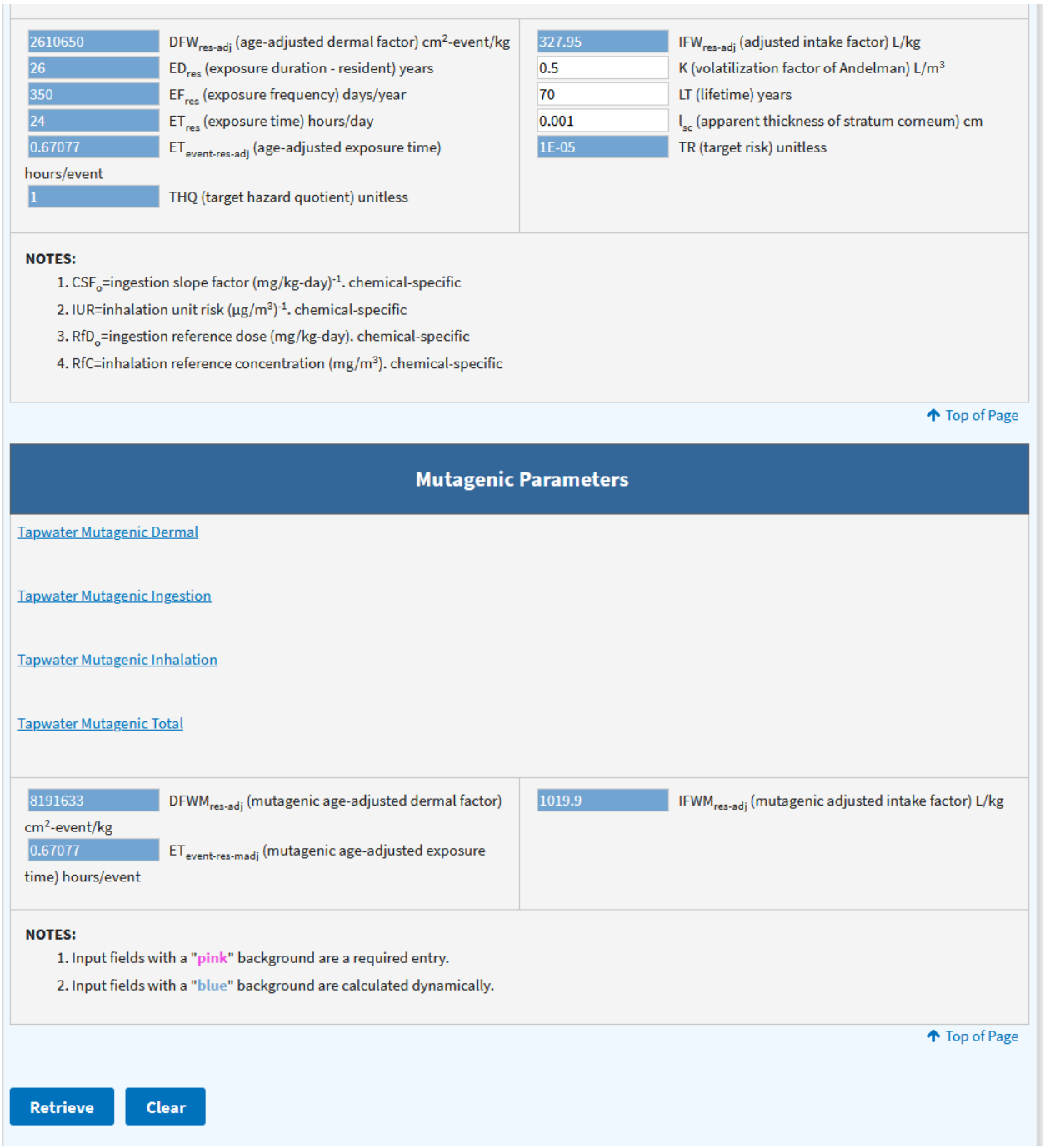
Tapwater Supporting Equations - Adult

Tapwater Supporting Equations - Age-adjusted

Tapwater Supporting Equations - Child

This section allows the user to change the various exposure factors. Exposure factors for a scenario should only be changed after careful consideration and with clear justification. Pink boxes can be entered/changed by the user, while blue boxes are calculated values and cannot be entered directly.

The next section has links showing the supporting equations for the given exposure scenario, and then additional scenario specific entry fields.



2610650	$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2-event/kg	327.95	$IFW_{res-adj}$ (adjusted intake factor) L/kg
26	ED_{res} (exposure duration - resident) years	0.5	K (volatilization factor of Andelman) L/m^3
350	EF_{res} (exposure frequency) days/year	70	LT (lifetime) years
24	ET_{res} (exposure time) hours/day	0.001	l_{sc} (apparent thickness of stratum corneum) cm
0.67077	$ET_{event-res-adj}$ (age-adjusted exposure time) hours/event	1E-05	TR (target risk) unitless
1	THQ (target hazard quotient) unitless		

NOTES:

1. CSF_o=ingestion slope factor $(mg/kg-day)^{-1}$. chemical-specific
2. IUR=inhalation unit risk $(\mu g/m^3)^{-1}$. chemical-specific
3. RfD_o=ingestion reference dose (mg/kg-day). chemical-specific
4. RfC=inhalation reference concentration (mg/m^3). chemical-specific

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Mutagenic Parameters

Tapwater Mutagenic Dermal

Tapwater Mutagenic Ingestion

Tapwater Mutagenic Inhalation

Tapwater Mutagenic Total

8191633	$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	1019.9	$IFWM_{res-adj}$ (mutagenic adjusted intake factor) L/kg
0.67077	$ET_{event-res-madj}$ (mutagenic age-adjusted exposure time) hours/event		

NOTES:

1. Input fields with a "pink" background are a required entry.
2. Input fields with a "blue" background are calculated dynamically.

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Retrieve Clear

The RAGs Technical Support Document provides scenario and media specific values used for generating the RAGs.

The exposure scenarios for soil include a particulate emission factor calculation and two methods for calculating volatilization factors. The volatilization models are the Infinite Source model (default) and the Mass-Limited model. See the RAGs Technical Support Document and the RSL Users Guide for discussion on the difference between the two models. The following screenshot shows the setup boxes for the two volatilization models.

Volatilization Factor and Soil Saturation

C_{sat} Equation

Diffusivity in air (D_{ia}) Equation

Diffusivity in water (D_{iw}) Equation

H` at Temperature other than 25 degrees Celsius

VF Unlimited Reservoir Equation - Method 1

Vapor Pressure at Temperature other than 25 degrees Celsius

0.006 foc (fraction organic carbon in soil) g/g	0.5 A_s (acres)
Default City (Climatic Zone) - Selection based on most likely climatic conditions for the site	25 T_w (groundwater temperature) degrees Celsius
1.5 ρ_b (dry soil bulk density) g/cm³	0.15 θ_w (water-filled soil porosity) L_{water}/L_{soil}
2.65 ρ_s (soil particle density) g/cm³	819936000 T (exposure interval) s
11.911 A (VF Dispersion Constant)	0.43396 n (total soil porosity) L_{pore}/L_{soil}
18.4385 B (VF Dispersion Constant)	68.18 Q/C_{vol} (inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source) g/m²-s per kg/m³
209.7845 C (VF Dispersion Constant)	0.28396 θ_a (air-filled soil porosity) L_{air}/L_{soil}

NOTES:

1. The Q/C_{vol} equation and the dispersion constants A, B and C were taken from Exhibit D-3 of the Supplemental Soil Screening Guidance.
2. θ_a(air-filled soil porosity) $L_{air}/L_{soil} = n-\theta_w$
3. H' (dimensionless Henry's law constant) - chemical-specific
4. n (total soil porosity) $L_{pore}/L_{soil} = 1-(\rho_b/\rho_s)$
5. K_d (soil-water partition coefficient) L/kg = $K_{oc} \times f_{oc}$ (organics) - chemical-specific
6. K_{oc} (soil organic carbon/water partition coefficient) L/kg - chemical specific

Volitization Factor - Mass Limit

VF Mass Limit Equation - Method 2

. d_s (average source depth) m	0.5 A_s (acres)
Default City (Climatic Zone) - Selection based on most likely climatic conditions for the site	26 T (exposure interval) yr
1.5 ρ_b (dry soil bulk density - Mass Limit) g/cm³	
11.911 A (VF Dispersion Constant - Mass Limit)	68.18 Q/C_{vol} (inverse of the ratio of the geometric mean air concentration to the emission flux at the center of a square source) g/m²-s per kg/m³
18.4385 B (VF Dispersion Constant - Mass Limit)	
209.7845 C (VF Dispersion Constant - Mass Limit)	. VF_{mlim} (volitization factor) m³/kg

NOTES:

1. Enter values for the missing variables in this section if you would like to use the VF Method 2 equation.
2. The Q/C_{vol} equation and the dispersion constants A, B and C were taken from Exhibit D-3 of the Supplemental Soil Screening Guidance.
3. The VF equation is from Equation 4-13 in the Supplemental Soil Screening Guidance.
4. t_c (hr) = T(s) per Equation E-16 in the Supplemental Soil Screening Guidance.
5. Mg = megagram

The first setup box shown is the Infinite Source model. This model will run automatically. Be sure to enter the city closest to your site to choose the appropriate climate information. The second box is the setup

for the Mass-Limit model. This model is disabled unless an entry is made for the "d_s (average source depth)". Again, be sure to select a town from the drop-down list for climate information.

Once the chemical specific data and exposure parameters have been entered, click the "Retrieve" button at the bottom of the page to generate the SLs. You will see the following screen. If you did not select Site Specific mode on the opening setup screen, then you would have been taken directly to this Screening Levels Output screen.

RSL Calculator Output

When generating SLs, the output screen will have two or three boxes with information. If no information is displayed on this screen, then more chemicals were selected than can be displayed; the user must use the "Output to Spreadsheet" or "Output to PDF" option to view the data and resulting SLs. If available, the first box shows all of the inputs and calculated values used to generate the resulting SLs. Any box highlighted orange has been changed from the default value.

Variable	Resident Soil Default Value	Form-input Value
$ET_{6\text{-}16}$ (mutagenic exposure time) hours/day	24	24
$ET_{16\text{-}26}$ (mutagenic exposure time) hours/day	24	24
$ET_{res\text{-}a}$ (adult exposure time) hours/day	24	24
$ET_{res\text{-}c}$ (child exposure time) hours/day	24	24
THQ (target hazard quotient) unitless	0.1	1
$IFS_{res\text{-}adj}$ (age-adjusted soil ingestion factor) mg/kg	36750	36750
$IFSM_{res\text{-}adj}$ (mutagenic age-adjusted soil ingestion factor) mg/kg	166833.3	166833.3
$IRS_{0\text{-}2}$ (mutagenic soil intake rate) mg/day	200	200
$IRS_{2\text{-}6}$ (mutagenic soil intake rate) mg/day	200	200
$IRS_{6\text{-}16}$ (mutagenic soil intake rate) mg/day	100	100
$IRS_{16\text{-}26}$ (mutagenic soil intake rate) mg/day	100	100

Output generated 19JAN2021:15:08:35

The next box shows the chemicals selected for the risk assessment, with the chemical specific information. Using the slider bar at the bottom allows the user to scroll to the right to see the calculated SLs, highlighted red.

Site-specific

Resident Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	Ingestion SL Child THQ=1 (mg/kg)	Dermal SL Child THQ=1 (mg/kg)	Inhalation SL Child THQ=1 (mg/kg)	Noncarcinogenic SL Child THI=1 (mg/kg)	Ingestion SL Adult THQ=1 (mg/kg)	Dermal SL Adult THQ=1 (mg/kg)	Inhalation SL Adult THQ=1 (mg/kg)	Noncarcinogenic SL Adult THI=1 (mg/kg)	Screening Level (mg/kg)
Arsenic, Inorganic	3.91E+01	3.30E+02	2.13E+04	3.49E+01	4.17E+02	1.98E+03	2.13E+04	3.39E+02	6.77E+00 ca
Benzene	3.13E+02	-	1.11E+02	8.18E+01	3.34E+03	-	1.11E+02	1.07E+02	1.16E+01 ca

If the user selected the "Select Risk Output" option and entered concentration data for the selected chemicals, then a third box will be displayed showing the results of the site-specific risk assessment. This box displays the results of assessing the relative risk of the chemical(s) at the entered concentrations, at the selected acceptable risk levels. The following screenshot show a portion of this box.

Site-specific

Resident Risk for Tap Water

Chemical	MCL (ug/L)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Inhalation Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Inhalation Child HQ	Noncarcinogenic Child HI	Ing A
Arsenic, Inorganic	1.00E+01	1.00E+01	1.93E-04	1.03E-06	-	1.94E-04	1.66E+00	7.32E-03	-	1.67E+00	9.9
Benzene	5.00E+00	1.00E+00	7.06E-07	1.02E-07	1.39E-06	2.20E-06	1.25E-02	1.65E-03	1.60E-02	3.01E-02	7.4
*Total Risk/HI	-	-	1.93E-04	1.13E-06	1.39E-06	1.96E-04	1.67E+00	8.98E-03	1.60E-02	1.70E+00	1.01

In this example, a risk assessment was conducted at a HI=1 and a TR=1x10^{-5}. The exposure scenario is Resident Tapwater and the contaminants are Arsenic at 10 ug/L and Benzene at 1 ug/L. The output shows that the acceptable carcinogenic risk level is exceeded for arsenic (highlighted red) and is close to exceeding for benzene. The bottom row shows the estimated cumulative risk for exposure to both arsenic and benzene at this site. For additional discussion on using the RSL calculator for site-specific risk assessment, see the RSLs Users Guide and the RAGs Attachment B.

Select the "Output to Spreadsheet" option to open an Excel file with the data and screening levels. The Excel file will have two or three tabs - one with the input information, one with the chemical specific information and resulting screening levels, and one with the site-specific risk assessment results (if selected).

029-RSL Calulator SOP-3242021 - B Blais

Final Audit Report 2021-12-23

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