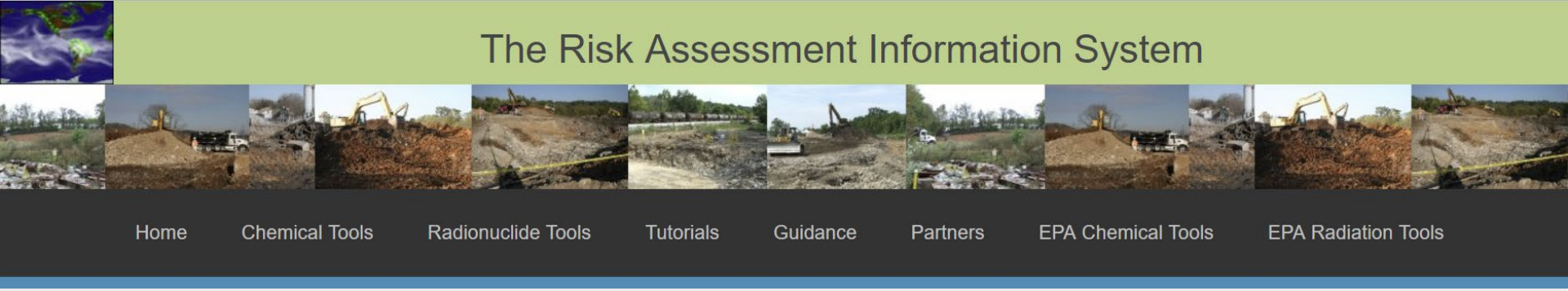


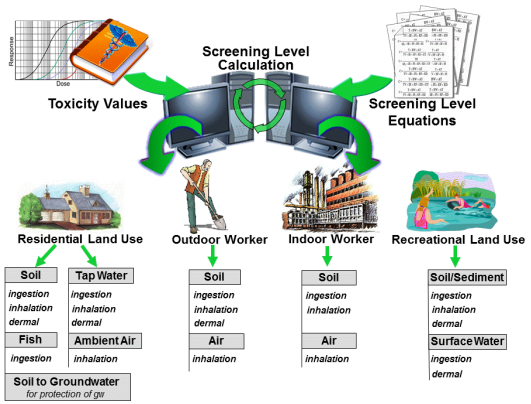
US EPA RSL Webinar

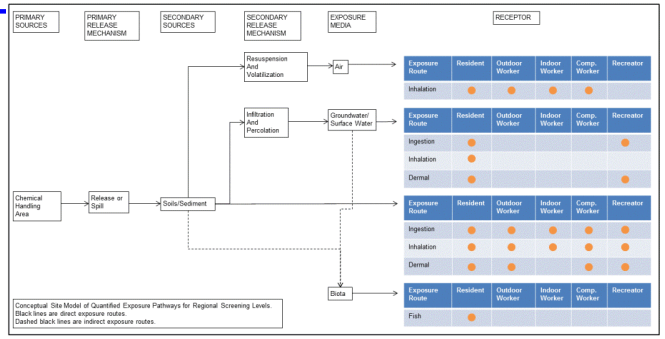
Fred Dolislager

December 2020

NEWMOA

https://rais.ornl.gov/





https://www.epa.gov/risk/regional-screening-levels-rsls

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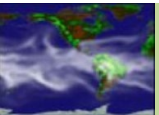
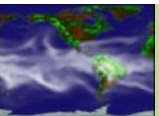


Goals for Today

This webinar will be a fast-paced introduction and demonstration of the RSL calculator. We will also go through the supporting documentation to help the user quickly find answers to questions. We are going to start at the beginning when the RSLs were first conceived and then discuss what happens behind the scenes during the semiannual update process. You will learn how you can have your opinions on the RSLs heard. The hierarchies of toxicity values and chemical parameters and their sources will be discussed. We will visit some of the “problem chemicals” that seem to break the rules. The main focus will be on demonstrating the calculator. Examples of default runs will be provided and then we will progress to site-specific and user-provided mode. Time permitting, the forward risk option will be featured. Plenty of time will be left to have your questions answered.



RSL History

- RSL = Regional Screening Levels
- Individual tables for Regions 3, 6 and 9 with constant maintenance and differences.
- Last published region tables: Region 3 - 2004, Region 6 - 2007, Region 3 - 2006.
- Combined Headquarters (OSRTI) table in 2008 .
- Website on an ORNL-UT server for the first year.
- Subsequently moved to R3 to maintain the static pages; ORNL-UT still operates the calculator page.
- As of 2018, all html pages are on Drupal.
- 2008 to present: What's New page provides pertinent history of the changes.
- Unified tables are shared on Region 3, 6 and 9 websites as well as other Regional websites.
- We have an app for Apple and Android.

What RSLs Are and Are Not

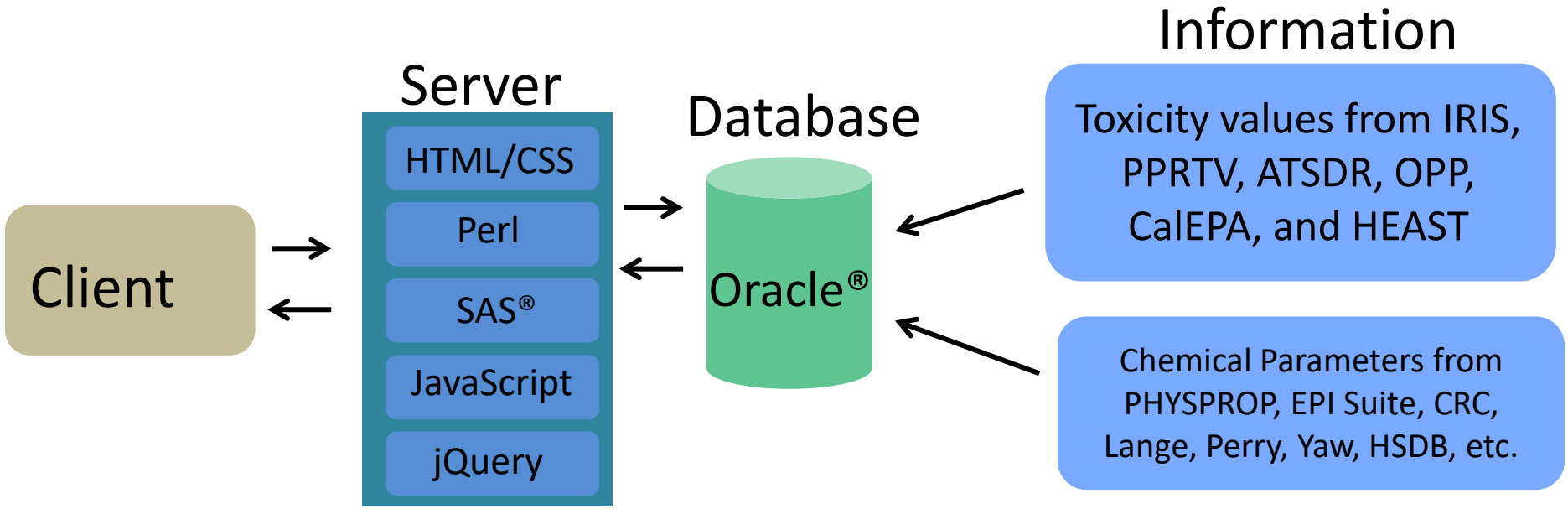
- Default Screening levels - yes
- De facto Remediation levels- maybe. Only if your PRG equations are same as RGOs.
- Site-specific screening levels – yes. Simply use the calculator to derive appropriate numbers.
- Site-specific remediation levels – yes. Simply use the calculator to derive appropriate numbers.

RSL Regulatory Basis

- RAGS Part A-F
- Supplemental Soil Screening Guidance and Technical Background Document
- Guidelines for Carcinogen Risk Assessment
- Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (mutagen information)

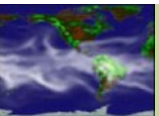
How Does it Work?

- ORACLE
- SAS
- Java script, PHP, Perl, etc.
- General hierarchy for toxicity and chemical parameters (see Section 2.3 and 2.4 of RSL for details)



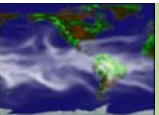
What is the Update Process?

- Dynamic Agenda of issues
- Conference Calls
- Toxicity Updates
- Chemical-parameter Updates
- MCL Updates
- Text updates (FAQ, What's New)
- Freeze database
- QA check of calculations
- QA tables (by hand and with computer programs)
- The RSL Checklist (around 52 steps)
- Go Live



Spring 2019 Agenda

- Old Issues
  - Use HgCl RfD for Hg.
  - Using subchronic values more protective than chronic.
  - Where is the mutagen list website?
  - Maybe use other state tox values as tier 3.
  - DWSHA tox value use.
  - Should the adult high contact soil IR rate be updated?
  - Asbestos.
- New Issues
  - Enthalpy and Tcrit values for the TPH fractions.
  - Month in the tables match the month tables released.
  - Unit conversion resource.
  - Review the Aroclor MWs.
  - Fix some CAS issues.
  - Volatility status change with temperature change.



Toxicity Sources

1. EPA Integrated Risk Information System (IRIS)
2. EPA Provisional Peer Reviewed Toxicity Values (PPRTV)
3. EPA Office of Pesticide Programs (OPP) Human Health Benchmarks for Pesticides (HHBPs)
4. Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels (MRLs)
5. California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA)
6. EPA PPRTV Appendix Screening Values
7. EPA Health Effects Assessment Summary Table (HEAST)

(https://semspub.epa.gov/work/03/2218797.pdf)

Chemical-specific Parameter Sources

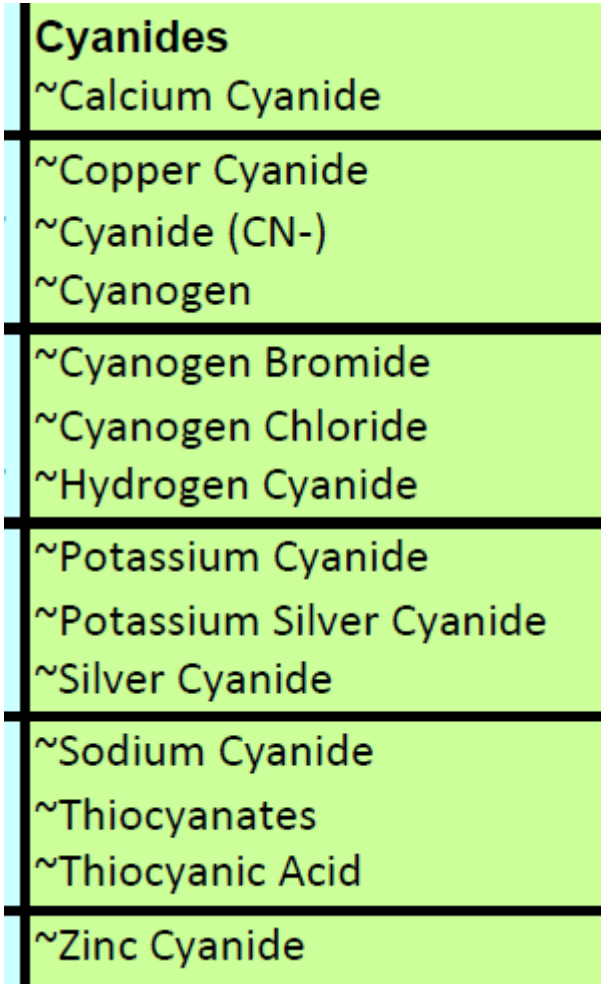
- PHYSPROP
- EPA Suite™
- EPA Soil Screening Level (SSL)
- WATER9
- CHEMFATE
- Yaws' Handbook of Thermodynamic and Physical Properties of Chemical Compounds
- Baes, C.F (SCDM)
- NIOSH Pocket Guide to Chemical Hazards (NPG)
- CRC Handbook of Chemistry and Physics
- Perry's Chemical Engineers' Handbook
- Lange's Handbook of Chemistry
- RAGS Part E, Supplemental Guidance for Dermal Risk Assessment)
- ARS Pesticide Properties Database
- OTHER

Chemical-specific Parameters

- Organic Carbon Partition Coefficient (Koc)
- Dermal Permeability Coefficient (Kp)
- Effective Predictive Domain (EPD)
- Fraction Absorbed (FA)
- Molecular Weight (MW)
- Water Solubility (S)
- Unitless Henry's Law Constant (H')
- Henry's Law Constant
- Diffusivity in Air (Dia)
- Diffusivity in Water (Diw)
- Fish Bioconcentration Factor (BCF)
- Soil-Water Partition Coefficient (Kd)
- Density
- Melting Point (MP)
- log Octanol-Water Partition Coefficient (logKow)
- Vapor Pressure (VP)
- Critical Temperature (Tc)
- Enthalpy of vaporization at the normal boiling point
- ABS
- GIABS

Generic Tables

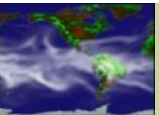
- Landuses
- Resident – child
- Why 3 workers?
- SSL (soil2gw)
- Media (Fish and Region 3 are exception)
- Targets (TR, THQ)
- Csat, max
- Key symbols (e.g., I = IRIS; P = PPRTV; F = See FAQ; M = mutagen; c = cancer; n = noncancer; s = concentration may exceed Csat)
- What's New
  - Tox compare
  - Params compare
  - RAGS E compare (EPD, FA, Kow)
- Chemical Groups



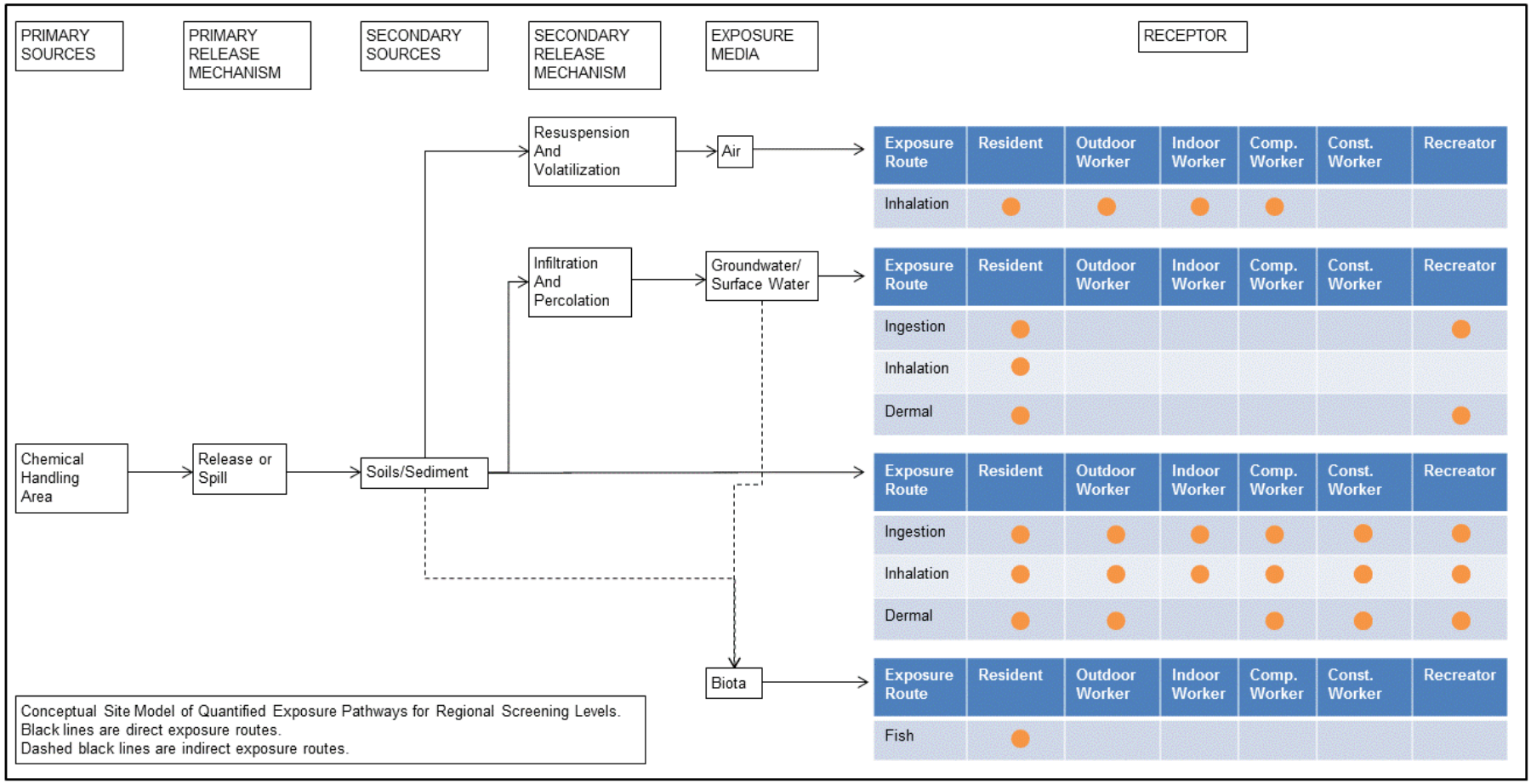
Generic Tables cont.

Toxicity and Chemical-specific Information												
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	voc	muta-gen	GIABS	ABS	C_{sat} (mg/kg)
1.8E-02	C	5.1E-06	C	1.5E-01	I					1	0.1	
8.7E-03	I			4.0E-03	I					1	0.1	
		2.2E-06	I			9.0E-03	I	V		1		1.1E+05
				2.0E-02	I					1	0.1	
				9.0E-01	I	3.1E+01	A	V		1		1.1E+05
						2.0E-03	X	V		1		1.1E+05

Screening Levels									
Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key
2.7E+01	c	9.6E+01	c	4.8E-01	c	2.4E+00	c	3.7E+00	c
5.6E+01	c**	2.0E+02	c*					7.7E+00	c**
1.0E+01	c**	5.2E+01	c**	1.1E+00	c**	5.6E+00	c**	2.2E+00	c**
1.2E+03	n	1.2E+04	n					2.7E+02	n
6.1E+04	n	6.3E+05	nms	3.2E+04	n	1.4E+05	n	1.2E+04	n
5.3E+01	n	2.2E+02	n	2.1E+00	n	8.8E+00	n	4.2E+00	n
8.7E+02	n	3.7E+03	n	6.3E+01	n	2.6E+02	n	1.3E+02	n
7.8E+03	ns	1.0E+05	nms					1.5E+03	n
1.3E-01	c	4.5E-01	c	1.9E-03	c	9.4E-03	c	1.3E-02	c



Landuses

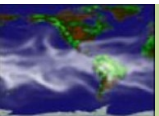

PRIMARY SOURCES
PRIMARY RELEASE MECHANISM
SECONDARY SOURCES
SECONDARY RELEASE MECHANISM
EXPOSURE MEDIA
RECEPTOR
Chemical Handling Area
Release or Spill
Soils/Sediment
Resuspension And Volatilization
Air
Infiltration And Percolation
Groundwater/ Surface Water
Biota
Exposure Route | Resident | Outdoor Worker | Indoor Worker | Comp. Worker | Const. Worker | Recreator
Inhalation
Exposure Route | Resident | Outdoor Worker | Indoor Worker | Comp. Worker | Const. Worker | Recreator
Ingestion
Inhalation
Dermal
Exposure Route | Resident | Outdoor Worker | Indoor Worker | Comp. Worker | Const. Worker | Recreator
Ingestion
Inhalation
Dermal
Exposure Route | Resident | Outdoor Worker | Indoor Worker | Comp. Worker | Const. Worker | Recreator
Fish
Conceptual Site Model of Quantified Exposure Pathways for Regional Screening Levels.
Black lines are direct exposure routes.
Dashed black lines are indirect exposure routes.

Calculator

- What's not in the table
  - Recreator
    - Sediment
    - Surface water
  - Indoor worker
  - Outdoor worker
  - Construction worker
  - Fish

Calculator cont.

- Site-specific
  - Exposure parameters
  - Toxicity and chem-specific parameters
  - Volatility
  - Mutagenicity
  - Age cohorts
  - New Chemical
- Chronic vs. Subchronic
- New features (Csat and max)

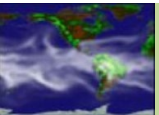


Calculator cont.

- Metadata
- EQuIS format
- Changing target risk or HQ
- VF changes
- PEF changes
- SSL changes

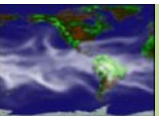
Confusing Chemicals

- **Lead** (why not use the Cal EPA tox values?)
- **Benzene** (Slope factors for benzene are actually ranges, yet the SL table shows a single number. The upper end of the range was chosen, because the SL Table is a screening tool. The consequences of screening out a chemical that could pose a significant risk are more serious than carrying the chemical through the risk assessment process.)
- **Cadmium and Manganese** ("Food" is for food and soil use; "water" is for water only. Cadmium RfDs on IRIS are based on the same study. The food RfD incorporates a 2.5% absorption adjustment while the water RfD incorporates a 5% absorption adjustment. For another medium (e.g., soil), choose the value with an absorption factor that most closely matches the expected site conditions. In most cases, the expected absorption is unknown and the RfD for food should be used. Manganese IRIS RfD is for all sources, including diet. IRIS recommends using a modifying factor of 3 when calculating risks associated with non-food sources. IRIS also recommends subtracting dietary exposure (default assumption in this case is 5 mg). Thus, the IRIS RfD has been lowered by a factor of 2 x 3, or 6. The table now reflects manganese for "non-food" sources.)



Confusing Chemicals cont.

- **Coppe**r (Currently, the RfD is 0.04 mg/kg-day with a reference of HEAST. Actually, HEAST presents a drinking water screening level of 1.3 mg/L. In order to use the value to assess oral exposures to other media, we "back out" the adult exposure assumptions (e.g., body weight of 70 kg, ingestion rate of 2 L/day) that go into the calculation of a drinking water screening level.)
- **Chromium** (In the RSL Table, the Cr(VI) specific value (assuming 100% Cr(VI)) is derived by multiplying the IRIS Cr(VI) Inhalation Unit Risk value by 7. This is considered to be a health-protective assumption and is also consistent with the State of California's interpretation of the Mancuso study that forms the basis of Cr(VI)'s estimated cancer potency. It’s a mutagen but controversial.)
- **Mercury** (Where is the oral RfD from Cal EPA? The EPA RSL group removed it. Not standard practice to pick apart the individual tox values.)



Confusing Chemicals cont.

- **Vinyl chloride** (unique set of equations that combine the prorated cancer with non-prorated child)
- **Dioxins and Furans** (TEFs; however if IRIS has a value, we present the RSL based on that value)
- **PAHs** and RPFs based on BaP
- **TCE** (Uses a CAF and MAF so one tox value can be used)
- **TPHs** (Noncancer only)

RSL Website Pages

Regional Screening Levels (RSLs)

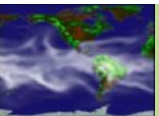
- Home Page
- User's Guide
- What's New
- Frequent Questions
- Equations
- RSL Calculator
- Generic Tables
- Contact Us

Join the Notification List

To download the most recent Regional Screening Level tables, please go to the Generic Tables page. For assistance/questions please use the RSL Contact Us page.

NOTICE: Any message you send via this form may be forwarded to other government employees or contractors in order for us to gather the necessary information to answer your question, and thus is not subject to confidentiality. If you wish to receive notifications when Regional Screening Levels are updated, use the signup form.

https://www.epa.gov/risk/forms/receive-notifications-regional-screening-level-updates



The Table of Tables

Screening Levels	(TR=1E-06 THQ=1.0)	(TR=1E-06 THQ=1.0)	(TR=1E-06 THQ=0.1)	(TR=1E-06 THQ=0.1)
Summary Table	PDF	XLS	PDF	XLS
Resident Soil	PDF	XLS	PDF	XLS
Composite Worker Soil	PDF	XLS	PDF	XLS
Resident Air	PDF	XLS	PDF	XLS
Composite Worker Air	PDF	XLS	PDF	XLS
Resident Tapwater	PDF	XLS	PDF	XLS
Resident Soil to Groundwater	PDF	XLS	PDF	XLS
Composite Table (Every Table)	PDF	XLS	PDF	XLS

Other Tables	PDF	XLS
Chemical Specific Parameters	PDF	XLS
Subchronic Toxicity Values	PDF	XLS

Quick Calculator Example

- Benzene
- New Chemical (jennifaldehyde)
- User-Provided
- With Risk
- Pink and Blue Cells
- Output

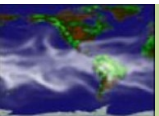
Advanced Training

- https://rais.ornl.gov/home/spring2020.html
- **Location:** Oak Ridge National Laboratory, Oak Ridge, Tennessee
- **Meeting Dates:** April 14-17, 2020
- **Topics:**
  human health risk assessment, U.S. EPA guidance, cancer risk, hazard index, exposure assessment, toxicity assessment, risk characterization, regional screening Levels (RSLs), regional removal management levels (RMLs), vapor intrusion screening levels (VISL), radionuclide preliminary remediation goals for radionuclides (PRGSs), radionuclide dose compliance calculators (DCCs), the risk assessment information system (RAIS), RSL/RML app.

Questions?

Questions Asked in Advance

- I am assuming that the “Residential Soil” RSL is for the 0 – 2 foot soil depth. Is the “Industrial Soil” RSL, for the same soil depth or a different one?
- What does the “SCREEN current” mean in the RfD source?
- What if my receptor isn't an option?
- What about lead contamination in soils?
- Is it possible to print different physical properties of all the chemicals? For example, if I wanted to have all the dermal absorption values. I have to update our soil values and I wanted to verify I am using the most recent dermal absorption values (with references).



Questions Asked in Advance

- can you please describe the status of developing RSLs for ingestion of nonradionuclide chemicals in foods (e.g., produce, dairy, milk), similar to what exists for the PRG Calculator Tool for radionuclides in foods (https://epa-prgs.ornl.gov/radionuclides/) for the resident and farmer?
- Difference in results if any between the use of the RAIS Calculator and the RSL Calculator in risk assessment evaluation.
- Advantages if any in the use of either calculator
- The objective of developing the RAIS Calculator given the existence of the RSL Calculator.
- Construction worker calculator