



Development of Tools to Support Risk-based Clean Ups

Why is this important?

As we work to improve and update Connecticut's cleanup programs, there has been a recognition that providing new tools for aiding the regulated community in expediting processes to close out cleanups are needed. Several tools are in development to support specific evaluations of risks associated with the cleanup of releases. These tools will help calculate risk-based cleanup values for chemicals or evaluate total risks from site exposures. The purpose of these tools is to facilitate the work done by those addressing pollutant releases. Currently, four types of risk calculators are in development.



How will these calculators work?



The calculators are being developed using Microsoft Excel. Each calculator will allow the user to enter information needed to perform site-specific environmental risk calculations. Additional information and equations needed to support the calculations will already be included in each calculator.

What types of Calculators are being developed?

Calculating Risk-based Cleanup Criteria for Chemicals not included in the Draft Release-based Cleanup Regulations:

For chemicals that do not currently have clean up criteria in regulation, this **Additional Pollutant Criteria Calculation Tool** will allow for calculation of types of criteria currently included in the regulations. These include criteria for soil exposures (e.g., Residential, Industrial /Commercial). The calculator will also include calculations for the newly proposed criteria for use for Managed Multifamily Residential or Passive Recreation scenarios. Additionally, the calculator will support the calculation of Groundwater Protection Criteria, Surface Water Protection Criteria and Volatilization Criteria.

The user will have to provide information on the chemicals to be used in the calculation along with information on the toxicity of those chemicals and the analytical levels that can be achieved during analysis.

Calculating Risk-based Cleanup Criteria for New Scenarios not included in the Draft Release-based Cleanup Regulations:

For properties where property uses do not match well with the existing exposure scenarios in the regulations, this **New Exposure Scenario Tool** will allow users to develop release-specific soil exposure scenarios and calculate associated criteria. The user will be able to calculate criteria for either chemicals included in the regulations or others present at the property. For chemicals not included in the regulations, additional information will be needed about the chemical, its toxicity, and the analytical levels achievable for laboratory evaluations.

Calculating Total Risks from Site Exposures

The draft Release-based Cleanup Regulations include the ability to adjust clean up plans based on the consideration of the total risks at a particular site. This means that risks associated with the various potential exposures (soil contact, inhalation of indoor air, drinking water exposures, etc.) can be evaluated and combined to determine the level of total site risks. The **Cumulative Risk Calculation Tool** contains

the various equations necessary for this evaluation. The user identifies which chemicals are present on site and the amount of each chemical present.

Additionally, the Tool will include the ability to evaluate cumulative risks associated with site-specific soil concentrations to be proposed as a clean-up goal consistent with provision in the Remediation Regulations.

Table 1 shows the Conceptual Site Model that supports development of the Cumulative Risk Calculation Tool. “Yes” indicates that the exposures pathway is included in the analysis for the scenarios which are listed across the top of the table. “No” indicates that the pathway is not included. The “pink shading” indicates that the Tool will provide an opportunity for the user to propose an alternative soil direct exposure clean up criteria based on the cumulative risk provisions in the Remediation Regulations and evaluate total risks considering that proposal.

Total risk calculations will be provided for both cancer and non-cancer-based effects, with the risks for non-cancer effects evaluated based on the target organ for the chemical.

Table 1: Conceptual Site Model for Evaluating Cumulative Risks at Remediation Sites in Connecticut

		Resident	Multi-family Residential	Passive Recreation	Construction Worker	Outdoor Worker	Indoor Worker
Exposure Media	Pathway	Adult & Child Exposure Scenarios			Adult Only		
Soil	Ingestion	Yes	Yes	Yes	Yes	Yes	Yes
	Dermal	Yes	Yes	Yes	Yes	Yes	No
	Inhalation	Yes	Yes	Yes	Yes	Yes	No
Groundwater	Ingestion	Yes	Yes	No	Yes	Yes	Yes
	Dermal	Yes	Yes	No	No	No	No
	Inhalation	Yes	Yes	No	No	No	No
Indoor Air	Inhalation	Yes	Yes	No	No	No	Yes

The following data will be needed to use the Cumulative Risk Calculator:

- Identification of chemicals present on site
- Expected concentration of each chemical in soil or groundwater. This value is expected to be the lower of the default remediation clean up criteria or the actual concentration found on site.
- If site-specific direct exposure criteria for soil are to be evaluated, the proposed soil concentration is needed

Calculating Release- and Site-specific Volatilization Criteria

The **Site-specific Volatilization Criteria Calculation Tool** will allow for calculation of soil- and groundwater-based volatilization criteria considering site-specific adjustments to the volatilization models used to develop the criteria. The user will need to provide information on the site that can affect the movement of chemicals from groundwater or soil vapor into an overlying building.

Next Steps

As these calculators are completed, CTDEEP will share them on a public website and provide information and instructions on how to use the calculators.