

Welcome to our advanced forward risk assessment calculator. We hope you find it easy to use and understand. With this tool, you can take concentrations of hazardous waste constituents in soil and ground water, and quickly assess potential risks to human health at your site. We recommend that a qualified risk assessment expert review these materials prior to making any critical risk management decisions.

### Background Assumptions

A simple conceptual site model was used, which should be applicable to a wide range of site-specific contamination. A source unit is assumed to directly contaminate soil and/or ground water. Human adults and children (receptors) are assumed to be living on the site, and using the ground water. For both media, the pathways considered are ingestion, dermal contact, and inhalation of released volatiles. Inhalation of contaminated soil particles is also considered.

Risk from toxic effects are considered separately for adults and children. Excess lifetime cancer risks are evaluated on an 'age adjusted' basis. This means that we assume that the receptor spends six years being exposed to child-like exposure factors<sup>1</sup>, and the rest exposed to adult-like exposure factors. Simple additivity of toxic and carcinogenic effects is assumed. This means that risks from individual constituents are considered to damage the receptor equally, and totally.

The exposure factors we used are the same as in the May 2006 *Closure Plan Review Guidance*, published by the Ohio EPA's Division of Hazardous Waste Management. Similarly, the chemical-specific data, and the toxicity values and slope factors<sup>2</sup>, are taken from this document. They are the same values used to calculate our Generic Cleanup Numbers<sup>3</sup>, and are available on-line.<sup>4</sup> (The equations used are similarly taken from the closure guidance.) Excel sheet tabs are available in the calculator: 'Chemical Specific Values' and 'Default Exposure Parameters'.

Risk from each medium and all pathways can be found under individual Excel sheet tabs. The exposure factors and equations can be found at the top of each sheet. In this version of the calculator, the exposure factors are set to a simple residential scenario.

The constituents of concern available in this calculator are identical to the Generic

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<sup>1</sup> Exposure factors are used to calculate how much of a constituent is actually ingested, inhaled or absorbed by the receptor.

<sup>2</sup> These are figures used to estimate the toxicity or carcinogenicity of a constituent.

<sup>3</sup> Note that the GCNs are not valid when BOTH soil and ground water are contaminated. However, this calculator may be used when both media are affected.

<sup>4</sup> [http://epa.ohio.gov/portals/32/pdf/Chem\\_Phys\\_ToX.PDF](http://epa.ohio.gov/portals/32/pdf/Chem_Phys_ToX.PDF) Also Table 3 of the Generic Cleanup Numbers tables.

Cleanup Number list. If a particular constituent of concern is not included, the calculator is not valid. Contact a qualified risk assessment expert.

### Procedures

The first step is to download the application titled *Default Residential Risk Calculator* onto your local drive. The application is based on an Excel platform. To use the tool, open Excel, then use 'File→Open' to launch *Default Residential Risk Calculator* from the folder you saved it to.

At the bottom of the screen, you will see a number of tabs. Click on the tab labeled 'EPC'. This stands for exposure point concentration. Column A lists potential constituents of concern, and Column B gives their Chemical Abstracts Registry Service identification numbers.

The green columns are where you enter your data. Column C is for soil exposure point concentrations, in milligrams per kilogram. Column D is for ground water exposure point concentration, in milligrams per Liter. Enter the appropriate concentrations in the same row as the constituent. Leave all of the other fields blank.

Click on the 'Summary' tab. Again, Column A lists the potential constituents of concern, and Column B gives their Chemical Abstracts Registry Service identification numbers. Adjacent to each constituent (Columns C through H) you will find the individual risks totaled from all three pathways for toxic risks for children and adults, and cancer risks, broken out by medium. At the top of this sheet, high-lighted in yellow, are the total risks for all constituents. These high-lighted numbers should be used in evaluating overall risk at your site. Indications of possible unacceptable risk at your site would be a total noncancer value greater than 1, or a total cancer value greater than 1E-05 (from the yellow columns at the top).

Individual sheets may be viewed for soil inhalation, soil dermal contact, and soil ingestion. A sheet totaling all soil risks is also included. Just click on the appropriate tabs. Similar tabs are available for the ground water medium. You may find this feature useful in evaluating what is driving hazards at the site, and help you formulate remedial strategies.