

Steps in Risk Assessment:

4. Risk Characterization:

Health risk assessments are based on the relationship between risk, dose, and toxicity:

$$Risk = Dose * Toxicity$$

Since dose is the product of the contaminant concentration multiplied by exposure (the intake), equation (1) becomes:

$$Risk = Intake\ rate * Contaminant\ conc. * Toxicity$$

To estimate the intake, the exposure equations and assumptions are used. The intake estimates for each route of exposure are then combined with the RfDs or SFs to determine the resulting risk.

For Carcinogens Risk:

$$\begin{aligned} Cancer\ Risk = & (Dermal\ Slope\ Factor \times Dermally\ Absorbed\ Dose) + \\ & (Oral\ Slope\ Factor \times Chronic\ Daily\ Intake) + \\ & (Inhalation\ Unit\ Risk \times Exposure\ Concentration) \end{aligned}$$

where, taking into account all COCs and relevant exposure pathways, the acceptable excess cancer risk is below 10^{-4} .

For Noncarcinogens:

$$\begin{aligned} Hazard\ Index = & (Dermally\ Absorbed\ Dose / Dermal\ RfD) + (Chronic\ Daily\ Intake / Oral\ RfD) \\ & + (Exposure\ Concentration / RfC) \end{aligned}$$

where, taking into account all COCs and relevant exposure pathways, the acceptable hazard index is below 1.0.

The facility may consult the Virginia DEQ document titled "Guidance for Development of Health-based Cleanup Goals Using Decision Tree/REAMS Program (November 1, 1994)", as well as applicable EPA guidance documents to perform quantitative risk assessments.

The result of the quantitative risk assessment can be presented as follows (the facility may use RAGS part D tables for data presentation found at <http://www.epa.gov/oswer/riskassessment/ragsd/tables.htm>):

1. For each unit or group of units, the cumulative risk from all constituents of concern in all media for residential child receptor, residential adult receptor, and/or industrial adult receptor, carcinogenic and non-carcinogenic; OR
2. For the entire site, the cumulative risk from all constituents of concern in all media for residential child receptor, residential adult receptor, and/or industrial adult receptor, carcinogenic and non-carcinogenic;
3. The contribution of each constituent in each medium to the cumulative risk;
4. If initial assessment indicates an HI greater than one, then an evaluation of hazard index for specific target organs and health effects may be included;
5. If applicable, a characterization of risk to ecological receptors.