

Supplemental Guidance for Risk Assessments

The Contaminated Sites Regulation allows “responsible persons” (such as property owners) to conduct site-specific risk assessments as a strategy for the remediation of part or all of a contaminated site. As the ministry begins implementing the Roster of Approved Professionals under the Regulation, it will start allowing responsible persons to use approved professional services for those risk assessments.

The goal of this change is to provide further efficiencies in the remediation process being overseen by approved professionals (see Protocol 6, “Eligibility of Applications for Review by Approved Professionals”).

To assist members of the Roster in their expanded role, this document provides further guidance on risk and toxicity assessment to supplement that provided in Director’s protocols for risk assessment.

Screening level risk assessments

Screening level risk assessments are intended to evaluate whether contamination at a specific site poses acceptable or unacceptable risks to human health and the environment. Such a process involves a simple assessment of exposure pathways and receptors.

Contaminated sites that are deemed not to have any unacceptable risks are considered to satisfy provincial risk-based standards. No further remediation is required at these sites as long as site conditions do not change.

Screening level risk assessments (discussed in Protocol 13) can be performed by Standards Assessment Specialists and Risk Assessment Specialists on the roster of approved professionals.

Quantitative risk assessments

Human health risk assessments

Deterministic methods using Ministry of Environment or Health Canada default exposure parameters are allowed, as long as practitioners follow the risk assessment guidance listed below:

Risk Assessment Guidance for Superfund (RAGS) (U.S. Environmental Protection Agency)

- [RAGS, Volume 1, Part A \(1989\)](#)
- [Supplement to RAGS, Volume 1, Part A: Community Involvement in Superfund Risk Assessments \(1999\)](#)
- [RAGS, Volume 1, Part B \(1991\)](#)
- [RAGS, Volume 1, Part C \(1991\)](#)
- [RAGS, Volume 1, Part D \(2001\)](#)
- [RAGS, Volume 1, Part E \(2004\)](#)
- [RAGS, Volume 3, Part A: Process for Conducting Probabilistic Risk Assessment](#)
- [Policy for Use of Probabilistic Analysis in Risk Assessment at the U.S. Environmental Protection Agency \(1997\)](#)

- [Guiding Principles for Monte Carlo Analysis, U.S. Environmental Protection Agency \(1997\)](#)
- [Proposed Guidelines for Carcinogen Risk Assessment, U.S. Environmental Protection Agency \(1996\)](#)
- [Guidelines for Reproductive Toxicity Risk Assessment, U.S. Environmental Protection Agency \(1996\)](#)
- [Guidelines for Neurotoxicity Risk Assessment, U.S. Environmental Protection Agency \(1998\)](#)

Health Canada risk assessment guidance

- Guidance on Peer Review of Human Health Risk Assessments for Federal Contaminated Sites in Canada (Environmental Health Assessment Services, Safe Environments Programme, Health Canada, September 2004):
http://www.hc-sc.gc.ca/ewh-semt/pubs/contamsite/part-partie_i/index_e.html
- Guidance on Peer Review of Human Health Risk Federal Contaminated Site Risk Assessment in Canada - Health Canada Toxicological Reference Values (TRVs) (Environmental Health Assessment Services, Safe Environments Programme, Health Canada, September 2004):
http://www.hc-sc.gc.ca/ewh-semt/pubs/contamsite/part-partie_iii/index_e.html

Hierarchy for chemical toxicity assessment

- For human health risk assessments, the ministry recommends that the U.S. EPA IRIS database be used as the principal source of information on human health effects from exposure to various chemicals in the environment. The ministry believes that IRIS

provides a valuable tool for expediting the assessment of health risk posed by sites. The IRIS values are given primacy because of the commitments to maintenance, updating and peer review provided by the US EPA. Their use enhances the consistency among risk assessments performed for sites:

<http://www.epa.gov/iriswebp/iris/index.html>

- For substances with no IRIS values, then toxicity reference values (TRVs), reference doses (RfDs), reference concentrations (RfCs), acceptable daily intakes (ADIs), or minimum risk levels (MRLs) should be obtained from the following agencies, in the following descending order of preference:
 1. Health Canada:
http://www.hc-sc.gc.ca/ewh-semt/pubs/contamsite/part-partie_ii/index_e.html
 2. U.S. EPA provisional peer-reviewed toxicity values (PPRTVs) developed by the U.S. EPA's National Center for Environmental Assessment/Superfund Health Risk Technical Support Center
 3. U.S. EPA Region 9 Preliminary Remediation Goals
<http://www.epa.gov/region09/waste/sfund/prg/files/04prgtable.pdf>
 4. Agency for Toxic Substances and Disease Registry (U.S.):
<http://www.atsdr.cdc.gov/toxpro2.html>
 5. World Health Organization, various sources including:
<http://www.inchem.org/>;
<http://jecfa.ilsa.org/index.htm>;
<http://www.who.dk/document/e71922.pdf>
 6. Netherlands National Institute of Public Health and the Environment:
<http://www.rivm.nl/bibliotheek/rapporten/711701025.pdf>

7. California Environmental Protection Agency toxicity values
<http://www.oehha.ca.gov/risk/ChemicalDB/index.asp>

Ecological risk assessments

- Recommended Guidance and Checklist for Tier 1 Ecological Risk Assessment of Contaminated Sites in British Columbia, prepared for Ministry of Environment, Lands and Parks, January 1998 (by W.G. Landis, A.J. Markiewicz, V. Wilson, A. Fairbrother, and G. Mann):
http://www.env.gov.bc.ca/epd/epdpa/contam_sites/policy_procedure_protocol/protocols/tier_1/index.html
- A Guidance Manual to Support the Assessment of Contaminated Sediments in Freshwater, Estuarine, and Marine Ecosystems in British Columbia, November 2003 (by D. D. MacDonald and C.G. Ingersoll):
http://www.env.gov.bc.ca/epd/epdpa/contam_sites/guidance/technical/pdf/tech19.pdf

Ecological benchmarks or toxicity reference values (TRVs)

The ministry's Tier I ecological risk assessment requirements provided in Protocol 1 prefers the use of specified effects levels (ECx values) for estimating risks to ecological receptors. For many contaminants, ecological benchmarks will not be readily available. In these cases, toxicity reference values (TRVs) need to be calculated. TRVs are the ecological equivalent of calculating a human health reference dose (RfD).

TRVs are accepted as intake values on the premise that ecological risk assessments are designed to protect the population of a species and not the individual response. While this may

not always be the case given that legislation can require the protection of individuals of a species, in general the types of endpoints that ecological risk assessments need to address for non-endangered species include reproduction, growth, maintenance, and critical developmental processes. Cancer is not usually selected as a chronic ecological endpoint.

The following sources should be used for ecological benchmarks:

- Ecological Soil Screening Levels, US EPA
<http://www.epa.gov/ecotox/ecossl/>
- Ecological Benchmarks, Oak Ridge National Laboratory, The Risk Assessment Information System:
http://rais.ornl.gov/cgi-bin/eco/ECO_select
- California Wildlife Exposure Factor and Toxicity Database:
<http://endeavor.des.ucdavis.edu/calecotox/species.asp>
- U.S. EPA ECOTOX database:
<http://cfpub.epa.gov/ecotox/>
- IRIS:
<http://www.epa.gov/iriswebp/iris/index.html>
- other professionally peer-reviewed documents as needed and as approved by the ministry on a case-by-case basis.

For more information, contact the Environmental Management Branch at site@gov.bc.ca.