

## 6.1 Overview of Assessment of Ecological and Human Health Risk

As set forth in 40 CFR §264.601, “Permits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment...” Assessment of potential risk to human health and the environment for permitting of a combustion unit includes assessment of releases of chemicals through air emissions and migration of waste or residues to groundwater, surface and subsurface soil, surface water, and wetlands. The guidance provided herein for assessment of human and ecological risk for permitting of a combustion unit is consistent with that provided by other EPA guidance for incineration and combustion units (EPA 1985, 1989, 1990, 1993, 1994, 1998a, 1999c), while incorporating information specific to operations of combustion units, the waste streams they generate, and the hazards they pose. The most recent EPA risk assessment guidance documents for combustion facilities are *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (HHRAP)* (EPA 1998a) and its *Errata* (EPA 1999a) and *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities (SLERAP)* (EPA, 1999c).

A tiered, risk-based approach to screening is recommended for evaluation of potential human and ecological risks attributable to emissions, leachate, and runoff released from combustion units, as well as to residual chemicals in the soil. The risk-based screening approach is a hierarchical decision-making strategy that incorporates increasing levels of complexity to facilitate and expedite the permitting process. The first tier is a risk-based screening assessment, and the second is a detailed risk assessment.

The risk-based screening evaluation is designed to estimate risks to human health and the environment on the basis of non-site-specific, default exposure assumptions and maximum exposure concentrations. Calculation of risks and hazard indices (HIs) is

based on potentially complete direct and indirect exposure pathways, according to EPA's standard default exposure parameters for relevant exposure scenarios, such as off-site residential, occupational, and recreational receptors. Information necessary for the estimation of risks and HIs in the screening evaluation is specified under each of the subsections of the risk assessment components. If risks and HIs affecting humans calculated in the screening level evaluation are below  $10^{-5}$  and **0.25**, respectively, no further evaluation is necessary (EPA 1994, 1998b). If estimated risks and HIs exceed acceptable levels, the site should be assessed through a detailed risk evaluation.

The first tier of an ecological assessment is a preliminary screening that uses conservative assumptions to ensure that potential ecological risks are not underestimated. HIs are calculated directly through the use of maximum chemical concentrations and ecological benchmarks or, key species, indirectly through the use of conservative assumptions and information obtained through an initial reconnaissance survey.

In a detailed ecological risk assessment, additional site-specific information is collected, and risks and HIs are recalculated through the application of more sophisticated statistical and contaminant fate and transport analyses than those used in a screening assessment, as well as site-specific parameters. Additional site-specific information may include hydrogeologic and geologic characteristics, measured concentrations of chemicals of concern (COC) in media of concern, and refinements of site-specific estimates of parameters that improve the accuracy of models. For an ecological assessment, additional site-specific information can include a comprehensive list of species and trophic web, refined estimates of site-specific parameters and relevant exposure pathways, and further evaluation of the environmental fate and transport and bioavailability of chemicals at the site. In addition, measurement endpoints are developed that link the existing conditions at the site to the assessment endpoints.

A facility may elect to conduct a detailed human health or ecological risk assessment instead of a screening level evaluation if sufficient site-specific information is readily available. If risks or HIs do not exceed acceptable levels, the risk evaluation is complete. However, if risks or HIs exceed acceptable levels, the permit writer must require the applicant to (1) change the engineering or operational approach for the unit to reduce emissions or (2) implement containment strategies to reduce the indices to acceptable levels. If such changes are not made, the permit writer must deny the permit.

This section will provide guidance for determining which media may require evaluation; identifying data needs; and evaluating screening level and detailed risk evaluations. It will outline the information necessary for the permit application and identify applicable EPA guidance for reviewing each section of the risk assessment. The section also discusses optional information that may be considered in the risk management process and identifies some multimedia assessment software that can assist in the evaluation of fate and transport and site-related risks.

**How Ecological Risk Assessment Differs from Human Health Risk Assessment:**

- Protects populations rather than individuals
- Investigator must determine values and species to protect
- More professional judgement is necessary