

APPENDIX A
SCOPE OF WORK FOR SCREENING-LEVEL RISK ASSESSMENT

Screening-Level Risk Assessment

1. Introduction.

a. A section of the *Preliminary Assessment/Site Inspection* (PA/SI) Report for the site needs to be entitled *Screening-Level Risk Assessment*. Subdivide this section into *Human Health Risk Assessment* (HHRA) and *Ecological Risk Assessment* (ERA) subsections. The Screening-Level Risk Assessment is used to evaluate the site to see if it can be eliminated from further concern or if it needs additional investigation. If this is the case, a Remedial Investigation (RI), including a Baseline Risk Assessment (BRA), must be conducted.

b. Use the Technical Project Planning (TPP) Process (EM 200-1-2) for planning data collection required to prepare the screening-level risk assessment. Use of the TPP process will help to ensure that only necessary data are collected. The Contractor shall evaluate a site's location, history, and possible contaminants present, and recommend to the U.S. Army Corps of Engineers (USACE) the utility of collecting adequate samples to establish a statistically robust, significant, and defensible set of background concentrations, both naturally occurring and anthropogenic. Although not typically done at the PA/SI stage, on-site concentrations can be compared to background levels to help determine whether or not site-related chemicals pose significant risks. The work plan shall document Data Quality Objectives (DQOs) for all data collection activities. The Contractor shall ensure that quantitation limits for all dual-purpose samples (i.e., those required for both the HHRA and ERA) are low enough that site concentrations can be evaluated against levels that are known to affect potentially exposed receptors.

2. Human Health Risk Assessment (HHRA). As is done for ERAs, planning for the HHRA should include agreement on the receptor populations, and which exposure pathways and routes are to be evaluated. This effort will guide selection of health-based screening levels and allow the risk screening process to proceed smoothly. The HHRA shall conservatively evaluate the potential for adverse human health effects attributable to site contamination. This evaluation will be based on comparing site media concentrations with health-based screening levels, calculated according to protocol contained in *Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual (Part A)* (EPA/540/1-89/002). Again, use conservative exposure assumptions.

a. *Exposure Assessment.* Two primary elements of the screening-level risk assessment are identifying the appropriate receptor group or groups and selecting appropriate exposure point concentrations.

(1) You must select the population group with the highest reasonable exposure. The Contractor shall prepare a preliminary Conceptual Site Model (CSM) to help identify this group, using current and reasonable future land uses. The Contractor shall clearly justify all assumptions used.

(2) The highest detected chemical concentration in a medium shall be used as the exposure point concentration unless the range of concentrations detected, as well as the number of samples collected, allows a 95% Upper Confidence Limit (UCL) to be calculated. The Contractor shall clearly justify all assumptions used.

b. Health-Based Screening Levels. The Contractor shall evaluate the CSM for appropriate exposure pathways and exposure factors, and select or calculate the health-based screening levels that most accurately reflect site conditions. The health-based screening levels shall be selected on the basis of state and regional requirements. The following is a partial list of health-based screening levels available:

(1) United States Environmental Protection Agency (USEPA) Region 9 Preliminary Remediation Goals (PRG) Tables. These values can be accessed on the Internet at: <http://www.epa.gov/region09/waste/sfund/prg/index.htm>.

(2) USEPA Region 6 Human Health Media-Specific Screening Levels. These values can be accessed on the Internet at: http://www.epa.gov/region6/6pd/rcra_c/pd-o/./pd-n/screen.htm.

(3) USEPA Region 3 Risk-Based Concentration (RBC) Table. These values can be accessed on the Internet at: <http://www.epa.gov/reg3hwmd/risk>.

(4) USEPA Soil Screening Levels (EPA/540/R-95/128 and EPA/540/R-96/018)  Guidance and procedures can be accessed on the Internet at: <http://www.epa.gov/superfund/resources/soil/>.

c. Risk Screening. The exposure point concentration shall be compared with the health-based screening level using the hazard quotient (HQ) method (dividing the exposure point concentration by the health-based screening level). To evaluate non-carcinogenic effects, the health-based screening level will be divided by 10. This procedure is to allow for the presence of multiple chemicals, while screening below a hazard index (HI) of one.

d. Characterization of Uncertainty. The uncertainties associated with the HHRA shall be clearly presented as part of the screening-level risk assessment. The potential effect of the following factors should be discussed:

- (1) Uncertainties associated with the limited chemical data base for the site.
- (2) Use of maximum chemical concentrations for exposure point concentrations.
- (3) Use of highest exposure receptors.

(4) The application of the health-based screening value and the inherent assumptions used in its derivation.

d. Results of the HHRA. The Contractor shall summarize the HHRA, indicating the strengths and weaknesses of the screening-level assessment. The Contractor shall discuss the range of chemical concentrations detected, how far the health-based screening level or levels have been exceeded, the effects of dividing the health-based screening levels by 10, and the appropriateness of the values themselves. This information will assist in the process of deciding whether the site should be eliminated from further concern or if an RI and BRA are warranted, based on human health concerns.

3. Ecological Risk Assessment (ERA). The ERA shall conservatively evaluate the potential for adverse ecological effects ascribable to site contamination. The screening-level ERA shall be consistent with Steps 1 and 2 of the USEPA guidance, *Ecological Risk Assessment Guidance for Superfund (ERAGS): Process for Designing and Conducting Ecological Risk Assessments* (USEPA 1997).

b. Planning. Before beginning the screening-level problem formulation, the Contractor, customer, project manager, risk assessor, and other stakeholders, as directed by USACE, shall meet to establish clearly articulated Site-Specific Management Objectives (SSMOs) and to characterize the decisions to be made within the context of those objectives.

c. Step 1: Screening-Level Problem Formulation and Ecological Effects Evaluation.

(1) *Screening-Level Problem Formulation.* For the screening-level problem formulation, the Contractor shall develop a preliminary Ecological Conceptual Site Model (ECSM) for the site. Based on the site history and an initial site reconnaissance, the ESCM shall address the following five issues:

- (a) Characterization of the environmental setting and known or suspected contaminants.
- (b) Fate and transport mechanisms that might exist at the site.
- (c) Mechanisms of ecotoxicity associated with chemicals and likely categories of receptors that could be affected.
- (d) Complete exposure pathways.
- (e) Selection of appropriate endpoints supporting the SSMOs to screen for ecological risks.

(2) *Screening-Level Ecological Effects Evaluation.* The next part of the ERA is to evalu

ate preliminary ecological effects and establish chemical exposure levels that represent conservative thresholds for adverse ecological effects. The conservative thresholds are called screening ecotoxicity values. The Contractor shall locate and use an adequate benchmark as the screening ecotoxicity value. The Contractor shall evaluate the ECSM for appropriate exposure pathways, exposure factors, and the assessment endpoints (tied to the SSMOs), then select the benchmark values that most accurately reflect site conditions. The following is a partial list of sources for benchmark values:

- (a) State and Federal Ambient Water Quality Criteria (AWQC).
- (b) USEPA, National Oceanic and Atmospheric Administration (NOAA) and Ontario sediment criteria.
- (c) USEPA online databases (ECOTOX, AQUIRE, etc.).
- (d) Oak Ridge National Laboratory (ORNL) benchmarks.
- (e) U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) (military unique compounds [MUCs]).
- (f) USEPA Region or state benchmark or guidance values.

(3) *Uncertainty Assessment.* After the screening-level problem formulation, the Contractor shall briefly evaluate the uncertainties associated with the benchmarks used as the screening ecotoxicity values, the study design, and the selected endpoints.

c. Step 2: Screening-Level Exposure Estimate and Risk Calculation.

(1) *Screening-Level Exposure Estimate.* In this step, the Contractor shall estimate chemical exposure levels to screen for potential ecological risks. For all complete exposure pathways, the Contractor shall use the maximum detected site-related chemical concentration as the exposure point concentration. For wildlife, exposure parameters used shall be the conservative assumptions listed below:

- (a) Area use factor of 100%.
- (b) 100% bioavailability.
- (c) Most sensitive life stage present.
- (d) Average body weight—normalized ingestion rate.

(e) 100% of the diet consists of the most contaminated dietary component.

(2) *Screening-Level Risk Calculation.* For the screening-level risk calculation, the HQ approach shall be used, comparing the dose (estimated contaminant intake) with the screening ecotoxicity value. The Contractor shall determine if the chemicals present have similar toxic mechanisms, requiring summing of the HQs to produce an HI. Justification for calculating an HI shall be clearly documented within the text of the assessment.

(3) *Scientific/Management Decision Point (SMDP).* The Contractor shall write a summary of the screening-level ERA, including the range of chemical concentrations detected, the number of chemicals exceeding their benchmarks, the degree of the exceedance of the benchmark (or benchmarks), and the appropriateness of the benchmarks themselves. In addition, the Contractor shall relate the results back to the SSMOs, and ensure that the information provided assists the risk manager in making one of the following decisions:

(a) That there is adequate information to conclude that ecological risks are negligible and, therefore, no need for remediation on the basis of ecological risk.

(b) That the information is not adequate to make a decision at this point, and the ecological risk assessment process will continue to Step 3 (a baseline ERA).

(c) That the information points to a potential for adverse ecological effects, and a more thorough assessment is warranted.

(d) The USEPA (1999) guidance, *Ecological Risk Assessment and Risk Management Principles for Superfund Sites* should be consulted to assist in this aspect. If it appears that further assessment is warranted, the Contractor shall clearly identify those chemicals that need to be carried forward, those pathways found to be complete and significant, and the potentially affected receptors. This information will help focus the Problem Formulation for the baseline ERA.

(4) *Refinement of the Screening-Level ERA.* If the results of the screening-level HHRA indicate no significant human health risks, but there are potential ecological risks, the screening-level ERA will be refined. Since the screening-level ERA uses very conservative assumptions, the Contractor shall evaluate the list of chemicals detected and the corresponding HQs generated to determine if the use of site-specific exposure parameters would cause the HQs to drop to or near unity. Additionally, the Contractor shall evaluate on-site concentrations against both naturally occurring and anthropogenic background concentrations, if site-specific background concentrations are available (note that this step is not included in ERAGS, but may be used to minimize the number of Chemicals Of Potential Ecological Concern [COPECs] carried through the baseline ERA). For this refinement, the Contractor shall reevaluate the following parameters, as appropriate, and recalculate HQs for those pathways indicating a risk:

- (a) Area use percentage (home range).
- (b) Bioavailability < 100%.
- (c) Diet composition < 100% from the most contaminated media.
- (d) Food concentration.
- (e) Detection frequency.

3. Examples of Guidance. The following documents are provided for reference. Additional documentation may be used as required.

a. Department of the Army Publications.

DA Pam 40-578

Health Risk Assessment Guidance for Installation Restoration Program and Formerly Used Defense Sites.

AR 200-1

Environmental Protection and Enhancement.

b. U.S. Army Corps of Engineers (USACE) Publications.

EM 200-1-2

Technical Project Planning (TPP) Process.

EM 200-1-4

Risk Assessment Handbook, Volume I: Human Health Evaluation.

EM 200-1-4

Risk Assessment Handbook, Volume II: Environmental Evaluation.

c. U.S. Environmental Protection Agency (USEPA) Publications.

EPA/540/1-89/002

Risk Assessment Guidance for Superfund: Vol. 1 - Human Health Evaluation Manual (Part A).
Office of Emergency and Remedial Response.

EPA/600/3-89/013

EP 200-1-15
15 Dec 01

Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference. Office of Research and Development.

EPA/600/P-95/002Fa, b, and c
Exposure Factors Handbook.

EPA/600/Z-92/001
Guidelines for Exposure Assessment. 57 FR 22888.

EPA/630/R-95/002F
Guidelines for Ecological Risk Assessment. Final.

EPA/540/R-95/128
Soil Screening Guidance: Technical Background Document.

EPA/540/R-96/018
Soil Screening Guidance: User's Guide.

EPA/540/R-97/006
Ecological Risk Assessment Guidance for Superfund (ERAGS): Process for Designing and Conducting Ecological Risk Assessments. Interim Final.

USEPA
OSWER Directive 9285.7-01B. *Human Health Evaluation Manual, Part B: Development of Risk-Based Preliminary Remediation Goals.* Office of Emergency and Remedial Response.

USEPA
OSWER Directive 9285.7-09A. *Guidance for Data Useability in Risk Assessment (Part A).* Final report. Office of Emergency and Remedial Response.

USEPA
OSWER Directive 9285.7-081. *Supplemental Guidance to RAGS: Calculating the Concentration Term.* Office of Solid Waste and Emergency Response.

USEPA
OSWER Directive 9285.7-09B. PB92-963362. *Guidance for Data Useability in Risk Assessment.*

USEPA
OSWER Directive 9285.7-28 P. *Ecological Risk Assessment and Risk Management Principals for Superfund Sites.*

USEPA

On-Line Database: *Integrated Risk Information System (IRIS)*.

<http://www.epa.gov/ngispgm3/iris/index.html>

d. Other Publications.

Wentsel et al.

R.S. Wentsel, *Tri-Service Procedural Guidelines for Ecological Risk Assessments*. U.S. Army Edgewood Research, Development and Engineering Center (ERDEC), Aberdeen Proving Ground, MD, ADA297968.