

RAW Quick Reference Guide

Assessing Non-Default Exposures in Human Health Risk Assessment (HHRA)

Problem Statement and Objective

Remedial Project Managers (RPMs) are often faced with regulators or stakeholders requesting human health risk assessments (HHRAs) utilizing non-default or unusual exposure parameters, pathways, or scenarios. The objective of this Reference Guide is to provide examples of non-default exposure scenarios and guidance so RPMs can recognize the types of exposure scenarios that may arise and when they may be applicable to their sites. This will allow the RPM to more effectively communicate with their respective risk assessors and regulators regarding the use of appropriate parameters.

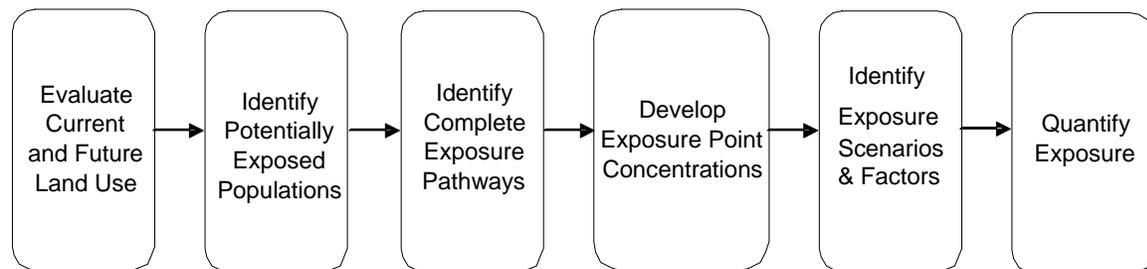
Why this is important to an RPM

A simple change in a numeric parameter used for calculating risk or evaluation of an unusual exposure pathway/scenario can lead to significantly different calculated risks relative to utilizing the default exposure assumptions and standard HHRA protocols. It is important to recognize the differences and/or potential ramifications of utilizing site- or region-specific exposure parameters, pathways, or scenarios. Consistent with [Navy Policy](#) (February 2001), RPMs should consider realistic exposure scenarios, pathways, and parameters consistent with reasonably anticipated current and future land use. Refer to [Land Use in the CERCLA Remediation Process](#) for more information regarding U.S. Environmental Protection Agency (EPA) land use recommendations (USEPA, 1995). Information for standard exposure scenarios are detailed in [Navy HHRA Guidance](#) (DON, 2008).

Exposure Assessment Process

The exposure assessment process consists of six general steps, as depicted in Figure 1. For more detailed information on the HHRA exposure assessment process refer to the [U.S. Navy Human Health Risk Assessment Guidance](#) (2008) and [Risk Assessment Guidance for Superfund Volume I. Human Health Evaluation Manual \(Part A\) Interim Final](#) (1989).

Figure 1. Exposure Assessment Process



Receptors and Exposure Parameters

There are certain receptors that are evaluated in a majority of the baseline HHRAs (e.g., residents, industrial workers, construction workers). For some of the receptors, there are exposure parameter values which are considered defaults for the exposure scenario. The use of these receptors and values is not required by the U.S. Department of the Navy (DON) or EPA policy or guidance; however their use has become relatively standard in the risk assessment practice.

Sometimes the typical receptors and exposure pathways described above are not relevant to the current or reasonably anticipated future land use at a site (e.g., recreational use). When this occurs, the RPM should work with their risk assessor (contractor risk assessor, NAVFAC risk assessors and/or risk assessors at the Navy and Marine Corps Public Health Center [NMCPHC]), regulators, and stakeholders to determine which receptors and exposure scenarios should be evaluated. Keep in mind that risk assessments may not be needed for all identified land uses if the DON, regulators, and stakeholders agree that a risk assessment completed for one type of land use will be adequately protective of a similar land use (e.g., using an industrial use scenario to represent a commercial use). For unusual exposure scenarios that will be evaluated, the DON risk assessment team should work with regulators and stakeholders to identify appropriate receptors and develop conservative but realistic exposure factors that can be used to quantify exposure and thus risk for this land use.

Another situation that sometimes occurs is for different regions to use slightly different default exposure factors to account for differences in climate or culture. For example, it is standard practice for risk assessments in California to use a higher default value for exposed skin area under the industrial and commercial land use scenarios than is recommended in EPA's [*Risk Assessment Guidance for Superfund Volume 1, Human health Evaluation Manual \(Part A\)*](#), because of the temperate climate and casual dress that is common in California. Because women wearing skirts in the workplace often have exposed legs, DON has accepted the logic of this exposure factor and uses it routinely when assessing commercial or industrial land use scenarios. When a regulator requests a regionally specific variation of default exposure factors, the RPM should work with their DON risk assessor (contractor NAVFAC risk assessor and/or risk assessors at the NMCPHC) to evaluate whether the new exposure scenario is reasonable and appropriate for the identified receptor. If not, then DON should propose alternate exposure factors that they believe are more appropriate for the receptor and/or land use.

Examples of unusual risk exposure situations and outcomes

- 1) *Most Sensitive Receptor May Not be the Child Resident*: The child resident is typically expected to be the most sensitive receptor in a baseline HHRA, but sometimes the distribution of contamination at the site creates a situation where another type of receptor is at greater risk. For example, a future construction worker might be at greater risk than a child resident if there are high concentrations of chemicals in subsurface soils that are toxic via the inhalation route of exposure (e.g., manganese).
- 2) *Residential Use Scenario May Not Define Unrestricted Use/Unlimited Exposure*: Human exposure to some hazardous chemicals occurs mostly through the food chain. For compounds like dioxins, most human exposure is through consumption of meat or egg products, and it has been determined that this contamination occurs when food production occurs on areas with dioxin present in surface soil. As a result, some regulatory agencies have developed more conservative risk screening values for agricultural land use than for residential use. However, default exposure parameters that can be used in a baseline HHRA have not been developed for the agricultural use scenario, so this exposure scenario might only be evaluated by comparison with screening values.
- 3) *Adjusting Default Parameters for Site-Specific Exposures / Land Use*: The baseline HHRA process incorporates default exposure parameters in risk calculations for most receptors. An example of an adjustment to a default parameter is ingestion rates associated with fish consumption (e.g., American Indian Tribal communities where fish consumption rates may be higher).
- 4) *Regulatory Request to Evaluate Unrealistic Exposure Factors*: For example, California Department of Toxic Substances Control (DTSC) has issued guidance that recommends default exposure factors to be used when evaluating site risks to construction workers at military bases. Three of the default exposure factors seemed unrealistic, and DON has developed alternate exposure factors for DON risk assessors to use when evaluating the construction worker risk scenario in California.

- 5) Exposure Concentration: For example, regulators may want to use a maximum detected concentration as the exposure point concentration (EPC) rather than a 95% upper confidence limit of the mean (UCL).

There is no single solution to addressing these non-default parameters/pathways/scenarios. However, it is important to ensure the conceptual site model is adequately reflected in all aspects of the risk assessment.

Recommendations

Your contractor's risk assessor can and should assist you in identifying which exposure parameters differ from known default values. Remember that at any time during project planning or execution, Navy risk assessment technical resources (e.g., NAVFAC Atlantic/Pacific, NMCPHC, NAVFAC SW, ESC, Headquarters, etc.) are available to the RPM to assist with project review, selection of receptors and exposure parameters, etc.

Whenever a regulatory agency requests a new or unusual exposure scenario or parameter that the Navy has not previously accepted or may be precedent-setting:

- Contact your Facilities Engineering Command (FEC) Risk Assessment Workgroup (RAW) representative. The RAW should be aware of these situations and can help the RPM identify the appropriate technical experts (e.g., NAVFAC Atlantic/Pacific, NMCPHC, NAVFAC SW, ESC, Headquarters, etc.).

Whenever the RPM feels that controversial or potentially precedent-setting decisions are being made:

- RPMs should confer with their Environmental Restoration (ER) Manager and / or NAVFAC Headquarters.

References

Chief of Naval Operations (CNO) Policy. 2001. Conducting Human Health Risk Assessments Under Environmental Restoration Program. N453E/1U595168, February 2001. (online at: <http://www.nmcphc.med.navy.mil/downloads/ep/Risk%20Assessment/hrapolicy.pdf>)

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