



2.0 How Good the Impact Assessment Results Must Be

This section consists of requirements that specify the fidelity of the assessment results. Fidelity, as discussed earlier, is used in this assessment in the same sense it is used in high fidelity sound reproduction; that is, it expresses the degree to which the reproduction (the assessment in this case) represents the actual performance (reality), overcoming any intrusion of factors that introduce distorting noise or bias.

Appendix II-B lists these requirements in four subject areas: 1) achieving sufficient assessment sensitivity to detect any potential adverse effects/impact, 2) ensuring seamless consistency across all models and calculation modules, 3) selecting the study set of factors and the specific fidelity requirements for the candidate factors discussed in, Sections II-A.1 through II-A.9, 4) ensuring that key results are reported, and 5) ensuring software characteristics meet assessment needs.

2.1 Fidelity of Detecting Harmful Effects

These requirements specify that the assessment must be designed and conducted well enough that if an adverse effect is occurring or will occur, the assessment will identify or predict it. Deciding what constitutes an impact is discussed in “Principles and General Requirements.” The expected users of the assessment results and their use of the results (see “Introduction”) should be kept in mind.

Applying such a qualitative concept as fidelity to modeling and calculation tasks requires identifying what is important to the diverse affected people. Relative importance, or value, is rooted in one’s culture and life style. What is seen as an impact to which the assessment must be sensitive is very much a matter of who the affected people are and what is important to them. Especially for this reason the CRCIA Board’s guidance or approval must be sought in these types of issues.

Two general factors will be frequent threats to needed fidelity. One is the fineness of definition in determining the timing of contaminant releases, groundwater migration rates, food chain, and other pathway assimilation rates, and eventually, the duration and intensity of the exposures — especially combinations of exposures. The second factor is that it may be difficult to resolve the large geographic area being assessed into elements that are fine enough to detect contamination hot spots and the degree to which they coincide with critical uptake locations such as municipal water intakes and favored habitat. These are particularly critical considerations to the assessment and must be dealt with effectively.

In keeping with the principle of dominance (see “Principles and General Requirements”), resources may not always be sufficient to support enough assessment work to include all the factors necessary to detect all impact for all the selected receptors of interest. Difficult choices may have to be made between assessing all potential impact or all receptors of interest. The CRCIA Board must make these decisions. To define the Board’s choices, analysts will have to develop and use the relevant trade study methods. The trade studies will quantify cost and benefit comparisons.



2.2 Model Integration and Consistency

These requirements are aimed at ensuring the insightful integration of the many assessment models and calculations such that overall fidelity is not degraded. For example, unless uncertainty is managed with consistency across all models, detecting important effects may be needlessly masked by the error band surrounding the final results. As discussed in Section II-1.0 (see Figure 3), the assessment task modules, especially those involving modeling and calculations, are highly dependent on one another. If output of one module is inadequate to properly enable the next module to function, fidelity will be lost to the overall assessment results. Seamlessness must be achieved across module boundaries. For instance, mass and momentum must be conserved between vadose zone models and groundwater models. This illustrates why the analysts must be cautious in accepting results and tools from other studies.

2.3 Selecting Factors for Assessment: The Study Set

This section deals with the fidelity requirements that apply to respective modules of the assessment addressed in Appendix II-A and Sections II-1.0 through 1.9. The following topics are included:

- ◆ screening candidate contaminants to identify those having the most dominant effects
- ◆ developing and using transport models to preserve the needed sensitivity to timing and location (see Section II-2.1)
- ◆ searching, discovering, and modeling the most important habitat and uptake locations
- ◆ selecting receptors and modeling exposure pathway webs
- ◆ calculating chemical and radiological doses for single and multiple contaminants
- ◆ selecting dominant effects

2.4 Required Assessment Reporting

This section contains requirements for interpreting and reporting assessment results. The section specifies that risk be adequately characterized, that specific types of impact results be reported, and that environmental justice implications be evaluated and reported.

2.5 Assessment Software Requirements

This section contains the requirements to be observed in using commercial modeling software and in developing assessment-specific software. The section specifies that software specifications will be prepared, that software verification and validation will be performed, and that a software quality assurance plan will be prepared and implemented.