Introduction

The Columbia River system is the center of the regional ecosystem and has supported indigenous cultures for over 10,000 years. The river is a dynamic, living entity consisting of many linked aquatic and terrestrial habitats with many overlapping spatial and temporal scales. The part of the Columbia River which flows through the Hanford Site is known as the Hanford Reach and constitutes the last free flowing, non-tidal segment of river in the United States. The Hanford Reach section of the Columbia River, and a small distance downstream, has been designated by the Washington State Department of Ecology (Ecology) as a Class A (excellent) surface water body. This designation requires all industrial surface water uses to be compatible with other uses, including drinking water, wildlife, and recreation.

The Hanford Reach is also known for its exceptionally high biodiversity of plants and animals. It features several habitats which are rare or are in decline along the Columbia River. These features include riparian habitats, White Bluffs, upland shrub-steppe communities, and wetlands. After flowing nearly 80 kilometers (50 miles) through the Hanford Site, the Columbia River continues for another 500 kilometers (300 miles) past Washington and Oregon communities to the Pacific coast, flowing through Oregon's most heavily populated urban area and important agricultural, commercial, and recreational areas. Nearly one million Oregonians, somewhat fewer Washingtonians and several Native American tribes live directly downriver from the Hanford Site. They rely on the Columbia River for commerce, fisheries, irrigation, recreation, and transportation.

Authority

The authority underpinning these requirements for a comprehensive assessment of Hanford impact on the Columbia River is DOE's need for acceptance of cleanup decisions and this assessment's results by the affected people. DOE is providing only publications services for Part II of this document. It is not issued as an expression of DOE's endorsement. Like DOE, the other Tri-Party agencies, Ecology and the U.S. Environmental Protection Agency (EPA), are members of the CRCIA Team which originated these requirements. However, these requirements have been promulgated by the CRCIA Team, not by the Tri-Party agencies, even though preparation of these requirements is the subject of Tri-Party Agreement (TPA) commitments (milestone M-15-80).

Background

The CRCIA Team first met in August 1995 for the purpose of forming with DOE a steering force to define the requirements for a fully comprehensive assessment of the Hanford Site's effect on river-dependent life. Additionally, the CRCIA Team has acted as an advisory body for the screening assessment, which the Tri-Party agencies initiated in 1993 as the original comprehensive assessment of river impact. This effort was recognized in the TPA in January 1994 by including milestones for the comprehensive assessment, now the screening assessment. Dates for these milestones have since been modified, in part because the scope and priorities of CRCIA have been controversial with respect to what constitutes a comprehensive assessment. This contention has essentially disappeared, primarily because of the

effectiveness of the CRCIA Team as a new predecisional paradigm in allowing the guidance of the screening assessment to rest in the hands of technical representatives of key socio-economic groups affected by Hanford's cleanup decisions. Development of these requirements has been the key condition in settling the controversy over comprehensiveness.

Those represented by the CRCIA Team are the Confederated Tribes of the Umatilla Reservation, Nez Perce Tribe, Yakama Indian Nation, Hanford Advisory Board, Oregon Department of Energy, DOE and their Hanford contractors, Ecology, and EPA.

How These Requirements Were Developed

Working to define a common ground on which the Tri-Party agencies and all participants could comfortably stand, the CRCIA Team developed the requirements through weekly facilitated workshops. Most participants had suggestions, criticisms, issues and concerns about previous, similar analyses. These were elicited from the participants in a systematic structure which, with some reorganization, became the framework for Part II of this document. The CRCIA Team had neither the expertise to design an analysis of this significance nor was it appropriate to preempt the performing contractor from designing the most effective approach. Therefore, the participants' issues and concerns were translated into the requirements to be met in designing and performing the analysis. DOE opted only for the role of a participant in these workshops rather than to develop the document directly or through their contractors. The CRCIA Team provided its own facilitator and clerical support from among its members. DOE provided publication services. Thus, CRCIA Team defined requirements are provided in this document. These requirements are not a DOE negotiated position, even though DOE and their contractors were active contributors to the effort. The CRCIA Team strove for completeness. Judgments on relative importance of the issues and requirements were not allowed pending formal work to define which considerations dominate the assessment and which contribute little.

> WHAT IS DOE's COMMITMENT
> TO CRCIA AND THESE REQUIREMENTS?
>
> DOE is pursuing follow-on work based on the "Requirements for a Comprehensive Assessment." As part of completing TPA Milestones M-15-80A, M-15-80B, and M-15-80B-T01, DOE is working with the CRCIA Team to identify specific work tasks which 1) are necessary for a comprehensive assessment, 2) are prioritized and address the most dominant risk factors first, and 3) can be performed within budget guidelines dictated. Agreed to tasks will be included in the multi-year work plan packages for FY 1998 and beyond.

Problem Statement

The previous assessments of Hanford impact on the Columbia River were performed to provide information for specific projects and were not comprehensive. Here is a partial list of examples of why previous assessments were not comprehensive:

- Previous assessments have not addressed the Hanford Site in its post-cleanup end state as a single, composite source of potential contamination. This is partly because the source term data used was drawn from lists of known inventories of materials and wastes in their existing states. The planned end states of the wastes has not been reflected in the data used.

- A composite source term has not been used which combines the effects of all chemical and nuclear materials and wastes within the geographical boundaries of the Hanford Site.

- Predictive cumulative effects of Hanford's multiple contaminant sources have not been addressed.

- The time frame considered for potential effects to occur has been inconsistent with (1) the point at which planned waste containment devices can be expected to be breached allowing contaminant migration to the Columbia River and (2) the period during which potential contaminants remain intrinsically dangerous.

- River-borne contaminant impact on human health has not considered the full suite of potential health effects or all human exposure scenarios. For example, previous assessments have only considered incremental cancer risk and hazard quotients.

- The cultural impact on potentially affected people has not been evaluated.

- Ecological effects have not been adequately considered.

- Existing environmental regulations are, as the only guidance, inadequate because they are generally not site specific and because they do not adequately consider protection of the affected peoples. Only a site-specific assessment of risk can meet these needs.

If the assessment prescribed in Part II is performed so as to eliminate prior inadequacies, it should satisfy the need for a final Hanford Site risk assessment in so far as potential impact to the Columbia River is concerned.

Purpose of the Assessment

The purpose of CRCIA is to assess the effects of Hanford-derived materials and contaminants on the Columbia River environment, river-dependent life, and users of river resources.

For CRCIA to be comprehensive, representatives of the major community groups (CRCIA Team members who are other than the Tri-Party agencies) on the CRCIA Team have agreed that the following objectives must be achieved if the results and conclusions are to be acceptable by all concerned:

- Estimate, with useful certainty, river-related human health and ecological risks for the time period that the Hanford materials and contaminants remain intrinsically hazardous

- Evaluate the sustainability of the river ecosystem, the interrelated cultural quality-of-life, and the viability of socio-economic entities for the time period that Hanford materials and contaminants remain intrinsically hazardous

- Provide results that are useful for decision making on Hanford waste management, environmental restoration, and remediation

Relationship to the Screening Assessment

The requirements specified in Part II strive to be comprehensive for any assessment of Hanford impact on the Columbia River. Since the screening assessment in Part I was conceived and evolved from a Tri-Party Agreement commitment to determine only the current state of the Columbia River as a basis for decisions on interim remedial actions, the screening assessment must be regarded as only an initial subset of any comprehensive assessment. The screening assessment was conducted simultaneously with the development of these requirements. While every effort was made to revise the screening assessment as individual requirements stabilized in the comprehensive definition, time and funding constraints made it impractical to achieve complete accord. To the extent that the screening assessment meets the comprehensive requirements, its data and results will be used to avoid unnecessary duplication of effort.

Uses and Users

WHAT IS A REQUIREMENT?

Use of the term "requirement" as used throughout Part II of this document is meant as a minimal constraint on the choices to be made in defining, planning, and conducting this assessment.

The requirements herein are prescribed in the following three forms:

1. Guiding principles and general requirements common to all aspects of the assessment. These requirements are found primarily in the narrative section.
2. Conceptual descriptions of requirements with actual or hypothetical examples. These statements are typically found as a statement of purpose at the beginning of each requirements section in the appendixes. Explanations are usually included in the narrative section as well. It is intended that the analysts add specific instances as applications become apparent in the course of the assessment. Direction may be included for the analysts to identify the remaining instances of these requirements.
3. Explicitly stated requirements make up the preponderance of the appendixes.

When conducted in accordance with the requirements in Part II, the results from a comprehensive assessment of the Columbia River will provide a sound basis for essentially two types of decision-making. The first is the group of decisions which, taken together, define how well the Hanford Site is cleaned up and how permanent the selected containment methods are expected to be. To provide a reliable basis for this class of decisions, the requirements must realistically specify how to calculate the effects on the species of interest. In turn, scenarios must be applicable for both individuals and socio-economic groups postulated to be affected. The users of the assessment results in this decision-making group include DOE, Ecology, EPA, other technical, management, and public groups directly involved in the Hanford cleanup and disposal decision-making process.

The second group of decisions includes those made in response to Hanford conditions by the

people and groups affected by the cleanup decisions. The assessment results are intended to objectively reflect the effect of Hanford's potential contamination assuming the approved cleanup and waste containment plan is accurately defined, effectively implemented, kept current with technical and funding decisions, and CRCIA is updated as cleanup decisions change. This group of users is extensive. It includes the communities and individuals who depend on the Columbia River for drinking water, agriculture and irrigation, sustenance/sport/commercial fishing, transportation or its support activities such as dredging, hydroelectric power generation, and recreation.

The CRCIA Board, as defined in Appendix II-D, must seek advice and recommendations from these groups in planning and directing the assessment. Periodic reports of findings will be made available to these groups. Special attention will be given to the timing of cleanup and disposal decisions making results available which are relevant to those decisions.

Avoiding Duplication of Other Work

Some elements of the assessment prescribed may have been performed, or are being performed, in other studies. Such efforts will be sought out and used in lieu of redoing the work if the studies were performed in an acceptable manner as defined in Part II. The CRCIA Team became aware of some efforts underway at the time of this writing which appear to be similar to CRCIA. Upon inquiry, however, each effort was found to be fundamentally lacking in one or more facets, much as discussed in the Problem Statement section above. Efforts will be undertaken with those performing those studies to try to find an accommodation of CRCIA needs. Several smaller studies involving the Columbia River also are underway or planned which are of more limited scope and focus on a specific problem. They are, by design, less than comprehensive. To the degree that these and similar limited scope studies in the future meet CRCIA requirements, their findings and conclusions can be used in CRCIA assessments.

CRCIA efforts also will be integrated with other Hanford Site activities. Examples of special interest are strategic planning documents and products such as environmental impact statements and budget planning documents. CRCIA is a tool with which effectiveness can be estimated for each alternative considered in strategic planning exercises and project studies.

About the Appendixes

The requirements in the appendixes were developed from the issues and concerns held by the constituencies of the CRCIA Team members. As such, the appendixes are not complete from the standpoint of comprising the total guidance needed for the assessment. The CRCIA Team members are generally conversant with technical work but had little or no direct experience in designing an analytical effort like CRCIA. It is, therefore, left to the analysts to not only design and conduct the assessment to meet the requirements in Part II but to also grasp the spirit and intent of each subject area and flesh out the requirements as needed to be consistent with the CRCIA Team's intent as well as adhering to good technical practice.

Four appendixes have been structured to organize these issues and concerns into technical and management requirements. Generally, a hierarchical pattern has been followed in which the requirements at any given level comprise a subset of a higher level parent requirement for that subject area. Figure 1 provides an example of this hierarchical organization. The reader will notice many of the requirement statements to be conceptual in nature while others are quite explicit. Some of these conceptually described requirements do not yet have lower level requirements and, therefore, may appear to contradict the hierarchical pattern. Nevertheless, the intent should be sufficiently clear to support the analysts' implementation. Questions may always be referred to the CRCIA Board for clarification.

This initial publication of Part II purposely truncates most of the lower level requirements because of insufficient time to develop an orderly presentation reasonably free of error and redundancy. Therefore, the reader may not find many instances of the complete requirements hierarchy depicted in Figure 1. However the temporarily missing requirements should be available by this draft's publication date for those who would like to request a copy.

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A-1.0   Hanford Materials and Contaminants (Sources and Inventories)
        - [overview and conceptual requirements]
        1.1   Radioisotopes and Chemicals (existing)
                (1)  [source term scoping criteria]
        1.2   Materials and Contaminant Inventories (includes future receipts)
                (1)  source term scoping criteria
                        (a)  [explicit requirement]
                        (b)  [explicit requirement]
                        (c)  [explicit requirement]
                (2)  composite source term criteria
                        - [illustrative requirement]
                        - [illustrative requirement]
                        - [illustrative requirement]
                        to be completed by analysts
                        (a)  facilities to be included
                                - [illustrative requirement]
                                - [illustrative requirement]
                        (b)  special nuclear materials
                        (c)  uncontained contaminants
                        (d)  contaminants in river locations
                                - [illustrative requirement]
                (3)
                (n)
        1.3   Inventory Measurements and Investigations
A-2.0   Containment Failure and Contaminant Release
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Figure 1. Typical Requirements Hierarchy