



Preface

The Columbia River is a critical resource for residents of the Pacific Northwest. It provides for basic needs and is interrelated with the life style and quality of life for the Columbia Basin's many human and non-human residents. This resource was one of the key features that drew the Manhattan Project's planners to the site now called Hanford to produce nuclear weapon materials. Production of those materials has left behind a legacy of chemical and radioactive contaminants and materials that have affected and may be continuing to affect the Columbia River for the foreseeable future.

To evaluate the impact to the river from these Hanford-derived contaminants, the U.S. Department of Energy (DOE), U.S. Environmental Protection Agency, and Washington State Department of Ecology (the Tri-Party agencies) initiated a study referred to as the Columbia River Comprehensive Impact Assessment (CRCIA). To address concerns about the scope and direction of CRCIA as well as to enhance regulator, tribal, and public involvement, the CRCIA Management Team (CRCIA Team) was formed in August 1995. The CRCIA Team has met weekly to share information and provide input to decisions made by the Tri-Party agencies concerning CRCIA. Representatives from the Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, Yakama Indian Nation, Hanford Advisory Board, Oregon State Department of Energy, Tri-Party agencies, and Hanford contractors are active participants on the team.

Purpose and Objectives of the Comprehensive 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 as long as these contaminants remain intrinsically hazardous.

For CRCIA to be comprehensive, representatives of the major community groups (non-DOE) 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 risk for the time period that 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



The CRCIA screening assessment was, by definition, limited in some respects. The CRCIA screening assessment was restricted to 1) current conditions, 2) the Columbia River and adjacent riparian zone between Priest Rapids Dam and McNary Dam, 3) a limited number of contaminants, 4) a limited amount of monitoring data, 5) a limited number of species, and 6) a limited number of scenarios. For the assessment results to be useful, these limitations, the study's assumptions, and the study's approach to conducting the assessment must be understood and considered in context with the intended use. Site-specific considerations should be added to the general results presented here during the decision making process to ensure responsible actions that protect the Columbia River.

Project Approach

To address CRCIA objectives, the CRCIA Team agreed to conduct CRCIA using a phased approach. The initial phase, which is required and described in Tri-Party Agreement milestones M-15-80 and M-15-80-T01, includes two components: 1) a screening assessment to evaluate the potential impact to the river, resulting from current levels of Hanford-derived contaminants, in order to support decisions on Interim Remedial Measures, and 2) a definition of the essential work remaining to provide an acceptable comprehensive river impact assessment. The results of the screening assessment are described in Part I of this report. The requirements for the essential work remaining are described in Part II of this report.

Additional phases of CRCIA will be identified and decisions will be made regarding the conduct of the remaining work based on submittal of information as required by Tri-Party Agreement milestones M-15-80A, M-15-80B, and M-15-80B-T01.

The primary contractor conducting the screening assessment was the Pacific Northwest National Laboratory. Bechtel Hanford, Inc., provided technical and public involvement coordination with environmental restoration activities. Independent technical peer reviewers evaluated the initial phase of the CRCIA work under the guidance of the Directors of the Oregon Water Resources Research Institute and State of Washington Water Research Center. Eight of these reviewers were chosen by the Directors based on nominations from the public, regulatory agencies, and contractors. Also, the Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, and Yakama Indian Nation each chose a reviewer. The reviewers evaluated CRCIA work independently. No attempt was made to coordinate consensus opinion among the reviewers.

Background

The Hanford Site occupies approximately 1450 square kilometers (560 square miles) in the southeastern portion of Washington State. It is located northwest of the Tri-Cities of Richland, Kennewick, and Pasco. The site is partially bordered on the north and east by the Columbia River and includes a buffer zone north of the river referred to as the Wahluke Slope.

From 1944-1987, DOE conducted nuclear production operations at the Hanford Site along the Hanford Reach of the Columbia River. The Hanford Reach extends 85 kilometers (51 miles) downstream from



Priest Rapids Dam to the head of Lake Wallula (created by McNary Dam) near the city of Richland, Washington. Past nuclear operations resulted in the release of hazardous chemicals and radionuclides to the Columbia River, soil, and groundwater. These operations also resulted in the storage of wastes and nuclear materials, some of which have escaped containment or have the potential for doing so depending on the effectiveness of DOE waste management decisions and activities. Current conditions of the Columbia River reflect that contamination is reaching the river primarily via the groundwater pathway.

In addition to contamination resulting from past and present Hanford operations, the potential exists for more contamination because the Hanford Site is being used for storage and disposal of nuclear materials, radioactive waste, chemically hazardous waste, and mixed waste (nuclear materials mixed with hazardous chemicals). For example, presently two-thirds of the nation's high-level defense nuclear waste is being stored at the Hanford Site with continuing shipments of nuclear waste being received (DOE 1993). Much of this nuclear waste may remain at the Hanford Site. The storage of these nuclear wastes could potentially contribute to the contamination of the Columbia River (depending on the performance of the chosen containment solution) for thousands of years.

As a result of the known contamination, in 1989 the U.S. Environmental Protection Agency placed four areas of the Hanford Site (the 100, 200, 300, and 1100 Areas) on the national priorities list for cleanup. The national priorities list is a component of the "Comprehensive Environmental Response, Compensation, and Liability Act of 1980" (CERCLA) (42 USC 9601) enacted by the U.S. Congress. Because the 1100 Area has since been cleaned up, it was removed from the national priorities list.

To address the cleanup needs mandated by CERCLA and to address the requirements for handling currently stored/generated wastes as mandated by the "Resource Conservation and Recovery Act of 1976" (RCRA) (42 USC 6901), DOE entered into a "Federal Facility Agreement and Consent Order" (unofficially known as the Tri-Party Agreement) (Ecology et al. 1994) in 1989 with EPA and the State of Washington. Milestones have been adopted for the Tri-Party Agreement that identify actions needed to ensure acceptable progress toward Hanford Site compliance with CERCLA, RCRA, and the "Washington State Hazardous Waste Management Act" (RCW 1985).

During 1993, the Tri-Party agencies began work toward a comprehensive assessment of the impact of Hanford operations (past and present) on the current conditions of the Columbia River (DOE 1994). In January 1994, the Tri-Party Agreement was revised to reflect this project. This revision included a new Milestone, M-13-80B (later changed to M-15-80), that established CRCIA. In December 1995, the CRCIA milestone was revised, enhancing the review process and specifying target dates. In April and December 1996, changes to the Tri-Party Agreement provided additional time to perform the work in the initial phase.



How to Use This Report

The CRCIA report is divided into two parts. Part I describes the results of the screening assessment. Part II defines the requirements for the essential work remaining to provide an acceptable comprehensive assessment of impact to the Columbia River. The lists of references and appendixes can be found at the end of each part.

Part I of the CRCIA report is organized according to the process followed in the screening assessment. First, the contaminants to be assessed were determined (Section 2.0). Then, the data were gathered for those contaminants (Section 3.0). Next, the species to be studied were selected (Section 4.1) and the risk to these species assessed (Section 4.2). Finally, the scenarios to be used were developed (Section 5.1) and the risk to humans assessed (Section 5.2). A synthesis of the results is provided in Section 6.0.

Supporting information relative to the respective sections and appendixes in Part I was published on diskettes in the draft April 1997 report. For those of you who requested and received diskettes with the April draft report, please note that the diskettes for Appendixes I-A thru I-E are not being reissued with the final report. These diskettes were issued in the April draft report and have not been changed. A new appendix has been added to the final report, which is now Appendix F (“Calculated Risks for Reference Segment”), but which does not have any supplemental information provided on a diskette. Also, even though the title for Appendix A has changed in the final report, the content of the Appendix A diskette remains as it was issued in April. One new diskette has been attached to the report for those requesting diskettes. That diskette, which is Appendix G, contains the comments and responses for the April draft report. This final CRCIA report and information on all diskettes are available on the Internet at <http://www.hanford.gov/crcia/crcia.htm>. Copies of the diskettes are also available from S.M. Finch (509-372-6205). Copies of the report also may be seen at the locations listed behind the title page.

Part II of the CRCIA report is organized according to four key components of the requirements necessary for a comprehensive assessment: what the assessment must include (Section 1.0), how good the impact assessment results must be (Section 2.0), what analytical approach and methods should be used (Section 3.0), and how the assessment should be conducted (Section 4.0). The detailed requirements corresponding to each section are found in the respective appendixes: Appendix II-A contains the requirements for Section 1.0, Appendix II-B for Section 2.0, Appendix II-C for Section 3.0, and Appendix II-D for Section 4.0.

References

42 USC 6901 et seq. (as amended). October 21, 1976. “Resource Conservation and Recovery Act of 1976.” Public Law 94-580.

42 USC 9601 et seq. (as amended). December 11, 1980. “Comprehensive Environmental Response, Compensation, and Liability Act of 1980.” Public Law 96-510.



DOE - U.S. Department of Energy. 1993. *Integrated Data Base for 1993: U.S. Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics*. DOE/RW-006, Rev. 9, Oak Ridge, Tennessee.

DOE - U.S. Department of Energy. 1994. *Columbia River Impact Evaluation Plan*. DOE/RL-92-28, Rev. 1, Richland, Washington.

Ecology - Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy. 1994. "Hanford Federal Facility Agreement and Consent Order." Document No. 89-10, Rev. 3 (The Tri-Party Agreement), Ecology, Olympia, Washington.

RCW - Revised Code of Washington. 1985. "Hazardous Waste Management Act." RCW 70.105, Olympia, Washington.