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Rev. 0

Proposed Plan for an Amendment of the Interim Remedial Action at the 100-HR-3 Operable Unit

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Proposed Plan for an Amendment of the Interim Remedial Action at the 100-HR-3 Operable Unit

June 1999

United States Department of Energy

P.O. Box 550, Richland, Washington 99352

PROPOSED PLAN FOR AN AMENDMENT OF THE INTERIM REMEDIAL ACTION AT THE 100-HR-3 OPERABLE UNIT

Hanford Site, Richland, Washington

INTRODUCTION

This is a proposed plan to support public comment to treat the toxic chromium in the groundwater at the Hanford Site that discharges to the Columbia River. The plan is being issued by the Washington State Department of Ecology (Ecology), the lead regulatory agency, with concurrence of the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Energy (DOE) as the response agency. The three parties are proposing an amendment to the selected alternative at the 100-HR-3 Operable Unit specified in the interim action Record of Decision (ROD) for the 100-HR-3 Operable Unit signed by the three parties in April 1996. The 100-HR-3 Operable Unit is located at the Hanford Site, Richland, Washington (Figure 1).

The proposed amendment recommends deployment of a new innovative technology (**In Situ Redox Manipulation [ISRM]**) for remediation of a recently characterized chromium-contaminated groundwater plume within the 100-D Area. This plume is not within the current treatment zone for the 100-HR-3 interim remedial action. Groundwater treatment by pump and treat will continue at the 100-HR-3 Operable Unit as described in the 1996 ROD. The ISRM process has been developed, at the Hanford Site, to reduce the discharge of chromium-contaminated groundwater to the Columbia River. The ISRM process involves creating a treatment barrier that reduces the mobility and toxicity of chromium-contaminated groundwater (Figure 2). This plan summarizes the ISRM technology and provides a comparison to the current remedial action (groundwater **pump and treat**) for deployment in the 100-HR-3 Operable Unit (100-D Area). The recently characterized plume is relatively small with high chromium concentrations and is ideal for ISRM remediation. Deployment of ISRM will continue to be evaluated by the three parties for other areas. Before expansion of ISRM in other areas, an additional opportunity for public comment will be provided.

This proposed plan is provided to encourage public participation in the cleanup decision for the 100-HR-3 Operable Unit and is consistent with Section 117(a) of the ***Comprehensive Environmental Response, Compensation, and Liability Act*** **(CERCLA)**. The DOE is also issuing this proposed plan as part of its responsibilities under the ***National Environmental Policy Act*** **(NEPA)**. NEPA values are addressed in the Focused Feasibility Study Report for the 100-HR-3 Operable Unit.

PUBLIC PARTICIPATION

It is important for the public to recognize that this amendment is a proposed recommendation. This alternative may be subject to modification or possible rejection based on public comments. Therefore, the public is encouraged to consider this remedial alternative and provide comments. A public comment period will be held from July 23, 1999 to August 23, 1999. A public meeting will be held if a request is received by Mr. Wayne Soper of Ecology. After considering all comments, Ecology may either issue the proposed amendment, issue an amendment modified by public comments received, or implement the remedy selected in the 1996 100-HR-3 interim action ROD.

All submitted written comments will be placed in the **Administrative Record** for 100-HR-3 Operable Unit. Comments are due by August 23, 1999, and should be sent to:

Washington State Department of Ecology
1315 W. 4th Avenue
Kennewick, Washington 99335-6018
Attn: Wayne Soper

Technical terms and other text in bold are defined in the glossary at the end of this document.

Figure 1. 100-HR-3 Operable Unit.

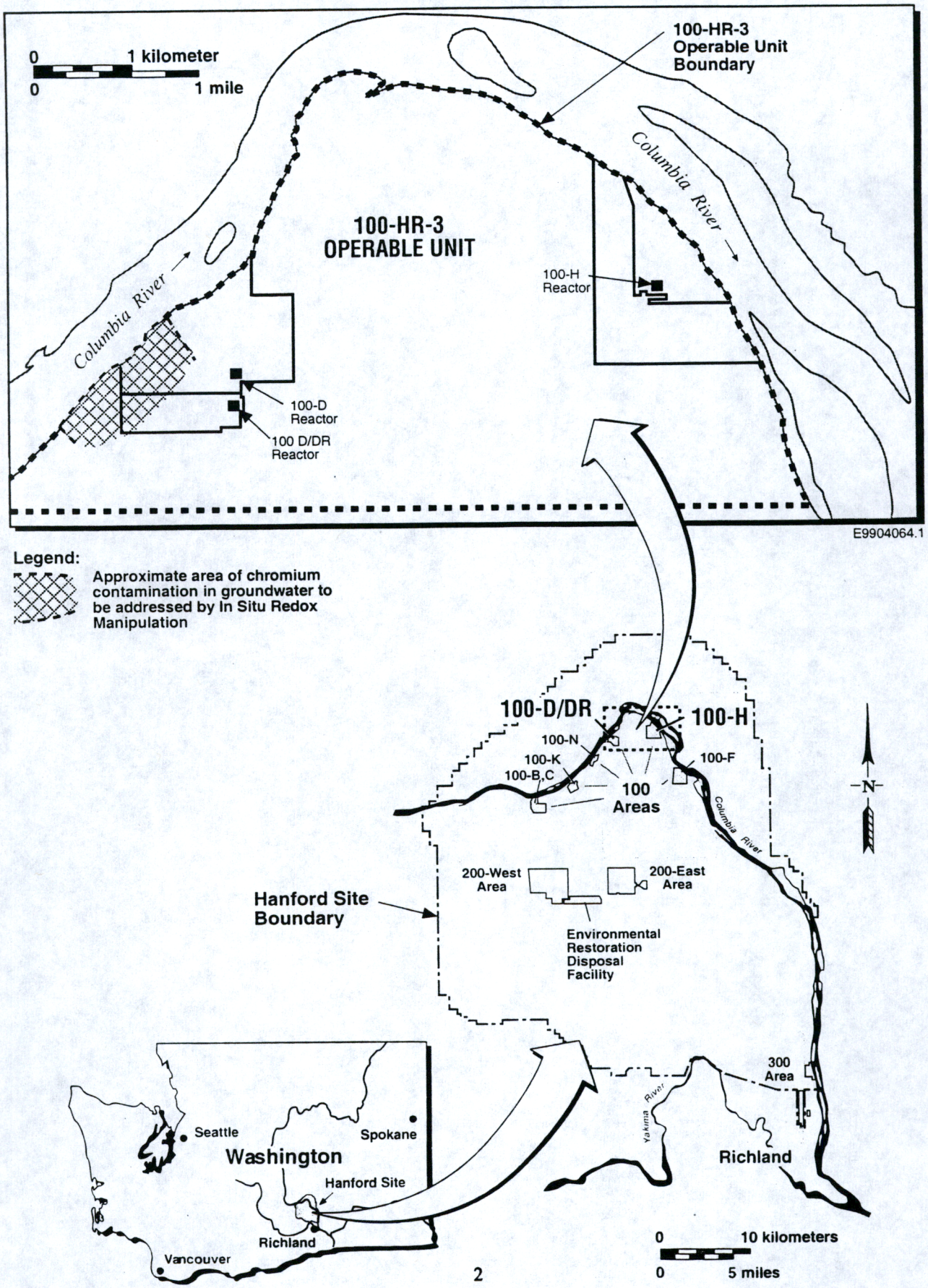
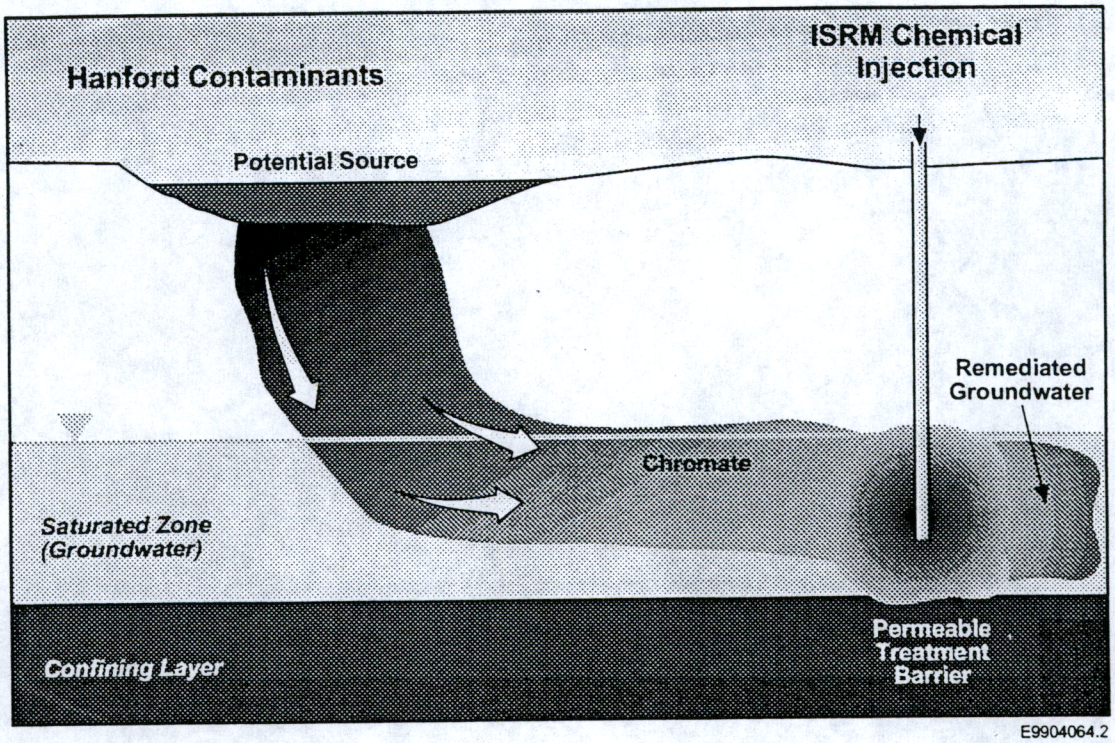


Figure 2. ISRM Concept Design.



SITE BACKGROUND

The 100-HR-3 Operable Unit is located in the north-central part of the Hanford Site along the Columbia River. This operable unit includes groundwater underlying other source operable units associated with the 100-D/DR and 100-H Reactor areas and the area between the two sites. The 100-D/DR Area consists of two deactivated reactors: the D Reactor, which operated from 1944 to 1967, and the DR Reactor, which operated from 1950 to 1965. The 100-H Area consists of one reactor that operated from 1949 to 1965.

During the years the reactors operated, large volumes of water were pumped from the Columbia River to cool the reactors. During the cooling process, sodium dichromate was added to reduce corrosion of piping within the reactor. During this process, concentrated sodium dichromate leaked to the soil, contaminating the groundwater. Groundwater contaminated with chromium is present beneath the 100-D/DR and 100-H Reactor areas and is flowing towards the Columbia River. Groundwater in the 100-D Area is approximately 24 m (80 ft) below the ground surface. The contaminated groundwater aquifer is approximately 6 m (20 ft) in depth. The groundwater enters the Columbia River through upwelling in the river bottom and seeps along the shoreline.

Contaminated groundwater entering the river poses a risk to aquatic organisms in the Columbia River. Most of the chromium found in the groundwater is in the form of **hexavalent chromium**. The chromium dissolves very easily in water, moves freely in the groundwater, and is toxic to aquatic organisms. The relevant standard for protection of freshwater aquatic life is 11 µg/L (Washington State Ambient Water Quality Standard). Chromium concentrations in groundwater at the proposed ISRM site exceed 2,000 µg/L.

An interim action ROD for the 100-HR-3 Operable Unit was issued in April 1996. The selected remedial action was installation of groundwater pump and treat systems in the 100-D and 100-H Reactor areas. This system was installed and began operations in 1997. As of May 1999, nearly 550,000,000 L of groundwater has been treated, removing approximately 60 kg of chromium.

During sampling activities in November 1995, high chromium concentrations were detected along the 100-D Area shoreline. Additional characterization activities are currently ongoing to define the extent of groundwater contamination. In 1997, a treatability test was implemented at this site to evaluate the feasibility of deploying ISRM at this site. Based on positive results from this study, the preferred

alternative in this proposed plan is full deployment of ISRM at this site. The groundwater associated with this recently characterized chromium plume is not within the current pump and treat capture area. The approximate location for deployment of ISRM is shown in Figure 3.

SUMMARY OF SITE RISKS

Potential risks to human and ecological receptors were evaluated in the **qualitative risk assessment (QRA)** for the 100-HR-3 Operable Unit. Human health and ecological risks estimated in the QRA were based on conservative assumptions that may overstate the level of potential risks.

The human risk assessment concluded that there were no current unacceptable risks from contaminants in the groundwater, primarily because exposure is precluded by DOE site controls. The ecological risk assessment concluded that concentrations exceeded the EPA Water Quality Criteria for protection of freshwater aquatic life for chromium, indicating that chromium poses potential risk to ecological receptors. The QRA finding is based on sampling results from groundwater monitoring wells. Data collected since the QRA have detected higher concentrations of chromium. Potential ecological receptors due to groundwater discharges to the river include fish and other organisms that live and spawn in the river, on or in the river bottom, and along the shoreline; and birds and other animals that use the river.

Of particular concern is the potential for chromium-contaminated groundwater to enter **pore water** in the gravel river-bottom habitat used by salmon eggs, alevin, and fry. During the early life stages, salmon are significantly more vulnerable to contamination exposure than are adults. Pore water sampling activities conducted in 1995 measured chromium concentrations above the Washington State standard for protection of aquatic life.

In addition to determining potential ecological risk from chemical contaminants in the groundwater, the QRA also examined the effects from radioactive contaminants. Calculations indicate that no aquatic or riparian organism will receive dose from radionuclides in excess of the DOE Order 5400.5 limit of 1 rad/day.

Ecological considerations indicate that an interim remedial action is warranted for the 100-HR-3 Operable Unit because chromium concentrations may locally exceed levels that are toxic to salmon eggs, alevin, and other aquatic organisms in the Columbia River substrate. Locally spawning salmon and steelhead trout have been recently listed under the *Endangered Species Act*.

SCOPE AND ROLE OF ACTION

This proposed plan identifies the preferred alternative for an interim remedial action that will address a recently characterized chromium plume located in the 100-D Area of the 100-HR-3 Operable Unit. The interim remedial action will be implemented through an amendment to the existing 100-HR-3 ROD. Because this action is interim, it will be followed by a final remedy for the site that will attain **applicable or relevant and appropriate requirements (ARARs)**. Subsequent actions that may be planned to address other potential risk posed by this operable unit are not included in this proposed plan for a ROD amendment. Additionally, the existing pump and treat system in the other area of the 100-HR-3 Operable Unit is not affected by the proposed amendment.

The preferred alternative recommended in this proposed plan is an interim action that would become part of a total remedy for the site and would attain all ARARs as provided for in Section 121 of CERCLA. As with interim remedial actions, final remedy selection will occur only after taking public comments into consideration. Subsequent actions are planned to fully address any other potential risk posed by this operable unit.

The preferred interim remedial action will address chromium contamination in groundwater as a result of past reactor operations. Remediation of disposal facilities and contaminated soils that are the source of the groundwater plume are separate actions being addressed under other remediation efforts.

INTERIM REMEDIAL ACTION GOALS

Remedial action objectives (RAOs) of this action are the same as those stated in the 1996 ROD. These RAOs are to protect human health and the environment, as described in the 1996 ROD, and include the following three components:

- Protection of aquatic receptors in the river substrate from contamination in groundwater entering the Columbia River.

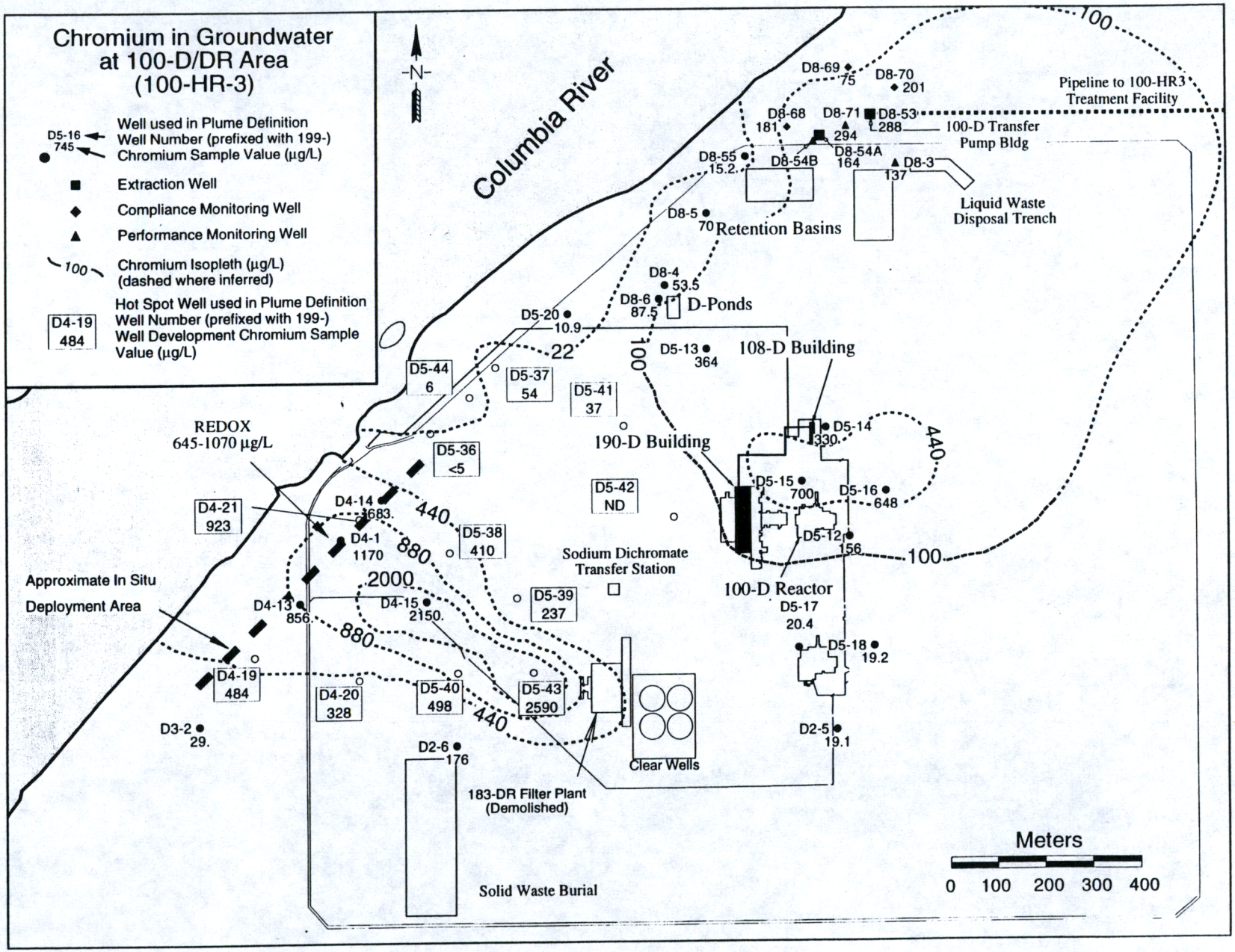


Figure 3. 100-D Area, ISRM Deployment Area.

- Protection of human health by preventing exposure to contaminants in the groundwater.

- Provide information that will lead to the final remedy.

The goal of the interim remedial action is to prevent discharge of chromium at levels exceeding concentrations that are considered protective to aquatic life in the Columbia River and riverbed sediments. The aquatic receptor exposure point is within the river substrate at depths up to 18 in., where salmon eggs and alevin are present during parts of the year. The standard is the Washington State chronic Ambient Water Quality Standard for Protection of Freshwater Aquatic Life for chromium of 11 µg/L. To account for dilution within the aquifer between the monitoring location on-shore and the aquatic receptor exposure point of concern within the river substrate, a preliminary dilution factor of 1:1 is proposed based on the available data (i.e., 22 µg/L chromium in a near-river well). The dilution factor is the same as selected in the 1996 ROD.

The preferred alternative presented in this proposed plan is deployment of the ISRM technology at the 100-D Area. Monitoring and data analysis will be performed as defined in the Remedial Design Report/Remedial Action Work Plan, as approved by Ecology, to assess the effectiveness of this remedial action in meeting the Ambient Water Quality Standard. Revisions to monitoring methodology will be developed during remedial design. Monitoring will include analysis of chromium, dissolved oxygen, and other analytes, as appropriate.

Deployment of ISRM will achieve substantial treatment of chromium and currently meet the RAOs. Based on periodic reviews of compliance monitoring data, the barrier will be modified as appropriate, or pump and treat will be implemented to meet RAOs. The final ROD will consider human health and ecological risks posed by other co-contaminants found in the groundwater.

SUMMARY OF ALTERNATIVES CONSIDERED

This proposed plan provides a comparison between deployment of ISRM and installing a pump and treat system. The no-action alternative was not included because this is an amendment to the existing 1996 ROD, which rejected no action as not meeting threshold criteria of protection of the environment. This ROD amendment is for the selected technology, not the need for action.

In Situ Redox Manipulation: As part of the 1996 ROD, innovative technologies continue to be evaluated for final cleanup of this operable unit. The DOE has completed studies on the ISRM technology that show excellent results for long-term remediation of chromium contamination in the groundwater. Treatability testing of ISRM technology was initiated in 1995 in the 100-H Area to evaluate the potential of changing the chromium into a less-toxic and less-mobile form of chromium (**chromium^{+3}**). The process involves injecting chemicals into the aquifer through a series of wells parallel to the Columbia River shoreline to create a permeable barrier that the contaminated groundwater can flow through (Figure 2). The main chemical (**sodium dithionite**) reacts fairly rapidly with the naturally occurring iron in the soil creating a treatment zone. The chemical is then pumped out of the treated portion of the aquifer and disposed.

In 1997 a second treatability test was started within this recently characterized high-concentration plume proposed for ISRM remedial action. The treatability test in the 100-D Area showed that 80% to 90% of the sodium dithionite was recovered. The residual chemicals degrade to potassium/sodium sulfate at nontoxic levels. Sulfate levels in the groundwater will be temporarily above the secondary drinking water standard (based on taste and odor) and are expected to return to below this standard prior to discharge to the Columbia River. As upgradient contaminated groundwater passes through the treatment area, the chromium reacts with the reduced iron and changes to chromium^{+3}. During this process the dissolved oxygen levels are reduced. Treatability studies at the site indicate that the groundwater is reoxygenated to 75% to 95% before discharging to the Columbia River. Oxygen levels are further enhanced by dynamic mixing in the river bottom. Current studies indicate that the treatment barrier will remain effective for 20 to 25 years. After that time the treatment barrier would become less effective in remediating the contaminated groundwater. At that time, chemicals could be reinjected, if necessary, to reestablish the barrier.

The ISRM treatment barrier initially will be deployed in the recently characterized chromium plume in the 100-D Area. A series of injection wells will be installed to form a barrier to intercept the contaminated groundwater. The treatability test

indicated the treatment barrier does not impede groundwater flow. The final length of the treatment barrier will be determined by plume characterization activities and will meet the 22 µg/L chromium standard at the compliance monitoring wells. The compliance wells will be positioned and sampled adequately to define the boundaries of the plume and the effectiveness of the treatment zone.

Installation of the treatment wall would take approximately 18 months. Performance monitoring is included in the operation and maintenance cost. Assuming installation of 40 wells creating a barrier 609.6 m (2,000 ft) long, the net present value for 5, 10, and 20 years is estimated at $4.1, $4.3, and $4.5 million, respectively (Table 1).

Table 1. Remediation Cost Comparison.

	ISRM	Pump and Treat
Capital $	$3,920,000	$1,750,000
Operation and Maintenance	$555,000	$4,915,000
Net Present Value (5-year period)	$4,097,000	$4,534,000
Net Present Value (10-year period)	$4,275,000	$7,330,000
Net Present Value (20-year period)	$4,524,000	$11,237,000

Ion-Exchange Pump and Treat: Groundwater would be removed through a series of extraction wells placed within the groundwater plume. Chromium would then be removed by **ion-exchange** treatment. The ion-exchange media will be regenerated offsite to the extent practicable and then replaced. The exhausted media will be disposed at the **Environmental Restoration Disposal Facility (ERDF)** or other approved disposal facility. This alternative would prevent migration of contaminated groundwater from entering the Columbia River.

It is important to note that the newly characterized chromium plume in the 100-D Area is not within the current pump and treat capture area. Modifications to the existing facility or installation of a new system would be required to remediate this area of the groundwater plume. The comparison within this plan assumes installation of another system.

A treatment system could be constructed and operational in approximately 15 months. The net present value for 5, 10, and 20 years is estimated at $4.5, $7.3, and $11.2 million, respectively (Table 1).

EVALUATION OF CONSIDERED ALTERNATIVES

The preferred alternative for remediation of the recently characterized chromium plume at the 100-D Area is to implement ISRM. Based on current information, this alternative would provide the best balance of tradeoffs with respect to the nine criteria EPA uses to evaluate alternatives.

The two alternatives are evaluated against these criteria to identify a preferred alternative. The community acceptance criterion will be evaluated following the public comment period for this proposed plan. The following presents a brief analysis of each alternative for implementation in the 100-D Area against the EPA's nine criteria in the National Contingency Plan.

Overall Protection of Human Health and the Environment: Because institutional controls were established in the 1996 ROD, human health is protective under all alternatives. The ISRM and pump and treat alternatives are equally protective of the environment by reducing chromium concentration and exposure to ecological receptors.

Compliance with Applicable or Relevant and Appropriate Requirements: The ARARs, point of compliance, and cleanup levels set forth in the 1996 ROD will not change. The major ARAR for ISRM is the Ambient Water Quality Standard for surface water. The major ARARs identified for the pump and treat alternative include Ambient Water Quality Standard for surface water; state standards for discharges of treated groundwater (***Washington Administrative Code*** 173-218); and ***Resource Conservation and Recovery Act*** **(RCRA)** hazardous waste management standards for secondary waste generated by groundwater treatment (in particular spent resins). An interim remedial action is an interim action designed to reduce immediate ecological risks. Therefore, an interim remedial action, by its nature, is not intended to specifically meet ARARs that would be applicable to a final remedial action. The ARARs for this interim remedial action will be met. Levels of chromium in the treated groundwater will be below drinking water standards and below target risk levels.

EXPLANATION OF CERCLA EVALUATION CRITERIA

The EPA uses the following nine criteria for evaluating cleanup alternatives and, when modifications of the remedy are proposed, compares the proposal against the original decision using the same criteria. The evaluation criteria fall into three categories: Threshold, Balancing, and Modifying. A brief description of the criteria and how they are used is presented below.

Threshold Criteria:

1. **Overall Protection of Human Health and the Environment** – How well does the alternative protect human health and the environment, both during and after construction?

2. **Compliance with Federal or State Environmental Standards (ARARs)** - Does the alternative meet all applicable or relevant and appropriate state and federal laws?

Balancing Criteria:

3. **Long-Term Effectiveness and Performance** - How well does the alternative protect human health and the environment after completion of the cleanup? What, if any, risks will remain at the site?

4. **Reduction of Toxicity, Mobility, and Volume Through Treatment** - Does the alternative effectively treat the contamination to significantly reduce the toxicity, mobility, and volume of the hazardous substance?

5. **Short-Term Effectiveness** - Are there potential adverse effects to either human health or the environment during construction or implementation of the alternative? How fast are cleanup goals reached if the alternative is implemented?

6. **Implementability** - Is the alternative both technically and administratively feasible? Has the technology been used successfully on other similar sites?

7. **Cost** - What are the estimated costs of implementing the alternative?

Modifying Criteria:

8. **State Acceptance** – What are the States comments or concerns about the preferred alternative?

9. **Community Acceptance** – What are the community's comments or concerns about the preferred alternative? Does the community generally support or oppose the preferred alternative?

Long-Term Effectiveness and Performance: ISRM achieves long-term effectiveness and performance by passive treatment. ISRM converts chromium to a chemically stable form. The treatment barrier is expected to last 20 to 25 years without additional maintenance. The pump and treat requires an active process to remain effective. It has a 10-year design life, and components may need to be replaced as they wear out.

Reduction of Toxicity, Mobility, or Volume through Treatment: The ISRM process reduces the toxicity, mobility, and volume of chromium in the groundwater. Pump and treat removes and reduces mobility of contaminants from the aquifer. However, the toxicity of contaminants is not reduced.

Short-Term Effectiveness: The ISRM and pump and treat alternatives meet this criterion. However, it will take about 2 years for the treated groundwater to have an effect on groundwater quality adjacent to the Columbia River. This is based on a groundwater flowrate of 1 ft/day. Concentrations in excess of 22 µg/L may be observed in the compliance wells during the early stages of ISRM deployment.

Implementability: ISRM would require drilling additional wells and injecting/extracting reagents to form treatment zones around each well. The wells will be located to form a treatment barrier.

The pump and treat technology is well established and easily implemented. This requires installation of wells to ensure capture of the chromium plume.

Implementation of any of the remedial alternatives would include close coordination with state and federal resource agencies, Tribal Nations, and Natural Resource Trustees to avoid or minimize further impacts to ecological receptors while conducting remedial activities.

Cost: Net present worth values for both options are included in Table 1. Costs presented are preliminary,

and are presented for comparison purposes only. A definitive cost estimate for the preferred alternative will be prepared as part of remedial design.

State Acceptance: The State of Washington concurs with the preferred alternative.

Community Acceptance: Ecology, the EPA, and the DOE are soliciting input from the community on the interim remedial action in the form of written comments and participation in a public meeting, if requested. Community acceptance of the preferred alternative will be evaluated after the 45-day public comment period ends. Comments received from the public, combined with information in the Administrative Record, will be used to evaluate community acceptance in a responsiveness summary in the ROD amendment.

SUMMARY OF PREFERRED ALTERNATIVE

The recently characterized 100-D Area chromium plume has higher concentration than other plumes being treated by pump and treat within the 100-HR-3 Operable Unit. Long-term treatment of this plume is necessary due to the length of time its concentration will be above the cleanup standard. Therefore, ISRM is more cost effective to address this long-term problem. Treatability studies have demonstrated that this technology is effective for this plume at this site with minimal risk.

Deployment of ISRM at the recently characterized plume in the 100-D Area is consistent with the RAOs identified in the 1996 ROD. This alternative is believed to provide the best tradeoffs among alternatives with respect to the evaluation criteria. Based on the information available at this time, DOE, Ecology, and EPA believe the preferred alternative would be cost effective and would use permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because the preferred alternative would treat chromium contamination in the groundwater, this remedy would also meet the statutory preference for the use as a remedy that involves treatment as a principal element.

It is important for the public to recognize that this recommendation for an amendment to the 100-HR-3 1996 ROD is only preliminary and will be finalized once public comments have been adequately addressed. It should be noted that operation of the current pump and treat systems in the 100-HR-3 Operable Unit will continue as required in the 1996 ROD. The public is encouraged to provide comments on this plan and examine all relevant material associated with making this amendment.

POINTS OF CONTACT

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ADMINISTRATIVE RECORD	PUBLIC INFORMATION REPOSITORIES
The public is encouraged to review the documents and all information used for prior decisions at the 100-HR-3 Operable Unit. The Administrative Record file, which contains the information used to propose ISRM deployment, is available at the following location: U.S. Department of Energy, Richland Operations Office Administrative Record Center 2440 Stevens Center place Richland, Washington 99352	All documents in the regulatory packages are available for review at the Hanford Tri-Party Agreement Public Information Repositories. Gonzaga University Foley Center E. 502 Boone Spokane, Washington 509-328-4220 ext. 3125 University of Washington Suzzallo Library Government Publication Room Seattle, Washington 206-543-4664 Portland State University Bradford Price Millar Library Science and Engineering Floor SW Harrison and Park Portland, Oregon 503-724-4729 Washington State University, Tri-Cities U.S. DOE Public Reading Room Consolidated Information Center, Room 101L Richland, Washington 509-372-7443

GLOSSARY

The first usage of technical terms and other specialized text in this Proposed Plan is shown in bold in the document and defined below.

Administrative Record – The files containing all the documents used to select a response action at a Superfund site.

Applicable or Relevant and Appropriate Requirements (ARARs) – These are requirements promulgated under federal or state law that specifically address the circumstances of a CERCLA cleanup action.

Chromium – A chemical added to water during reactor operations to reduce corrosion.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – A federal law that established a program that enables the U.S. Environmental Protection Agency to identify hazardous waste sites, ensure that they are cleaned up, and allow other government entities to evaluate damages to natural resources. CERCLA is also known as the "Superfund" law. CERCLA applies to the 100-HR-3 Operable Unit.

Environmental Restoration Disposal Facility (ERDF) – A landfill constructed in the central portion of the Hanford Site used to dispose of hazardous and radioactive waste.

Hexavalent Chromium – A form of chromium that is toxic to aquatic organisms (e.g., salmon fry).

In Situ – This refers to a study or an activity being conducted "in place."

In Situ Redox Manipulation (ISRM) – An in-place treatment technology used to remediate chromium-contaminated groundwater.

Ion Exchange – A treatment technology for groundwater where contaminants present in extracted groundwater are captured by a selective resin. The exchange occurs within an aboveground treatment facility. The technology is commonly used to remove heavy metals from groundwater.

National Environmental Policy Act (NEPA) – A federal law that requires federal agencies to consider the environmental impacts of their actions.

Pore Water – Water that fills the spaces between riverbed sediment particles.

Pump and Treat – A treatment technology where water is pumped out of the ground through wells and treated at the ground surface to remove contaminants using one or more treatment technologies.

Qualitative Risk Assessment – An evaluation of risk for a predefined set of human and environmental exposure scenarios that assists Tri-Party Agreement signatories in making defensible decisions on the necessity of interim remedial actions.

Resource Conservation and Recovery Act (RCRA) – A federal law that establishes requirements for the storage, treatment, and disposal of hazardous waste.

Sampling Tubes – A one-inch-diameter pipe driven into the soil (1 to 10 ft) used to sample near-surface river and groundwater samples.

Sodium Dithionite – A chemical use to change chromium (hexavalent chromium) to chromium^{+3} that is less mobile and toxic to aquatic organisms.

SUPPORTING DOCUMENTS

The public is encouraged to review the following documents at the Administrative Record to gain a better understanding of the 100-HR-3 Operable Unit.

- *RCRA Facility Investigation/Corrective Measurement Study Work Plan for the 100-HR-3 Operable Unit*, (DOE/RL-88-36), Rev. 0
- *Limited Field Investigation for the 100-HR-3 Operable Unit* (DOE/RL-93-43), Rev. 0
- *Qualitative Risk Assessment for the 100-HR-3 Groundwater Operable Unit* (WHC-SD-EN-RA-007), Rev. 0
- *100 Area Feasibility Study Phases 1 and 2* (DOE/RL-32-11), Rev. 0
- *100-HR-3 Operable Unit Focused Feasibility Study* (DOE/RL-94-67), Rev. 0
- *Declaration of the Record of Decision for the 100-HR-3 and 100-KR-4 Operable Units, USDOE Hanford Site 100 Area, 1996* (EPA/ROD/R10-96/134)

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