CHAPTER 2.0
RECOMMENDED CORRECTIVE MEASURES FOR 100-NR-1 OPERABLE UNIT

This page intentionally left blank.

CHAPTER 2.0
RECOMMENDED CORRECTIVE MEASURES FOR 100-NR-1 OPERABLE UNIT

TABLE OF CONTENTS

This page intentionally left blank.

2.0 RECOMMENDED CORRECTIVE MEASURES FOR 100-NR-1 OPERABLE UNIT

According to U.S. Environmental Protection Agency (EPA) guidance, a Resource Conservation and Recovery Act (RCRA) corrective measures study should identify the recommended corrective measure. This section is included for consistency with EPA RCRA guidance, and the recommended corrective measures presented in this section correspond to the preferred remedial alternatives that will be identified in the integrated Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Proposed Plan and RCRA Permit Modification proposal for the 100-NR-1 and 100-NR-2 Operable Units (OUs). The preferred alternative that will be presented in the Proposed Plan is only a preliminary recommendation, and changes to the preferred alternative, or a change from the preferred alternative to another alternative, may be made based on public comment. The recommended corrective measures presented in this section will be revised, if necessary, to reflect the remedy eventually selected by the CERCLA Record of Decision (ROD).

In addition to identifying the recommended corrective measure, the RCRA process requires that the specific permit conditions associated with the recommendation be identified. This section includes detailed information to be referenced for purposes of establishing RCRA permit conditions. If, as a result of public comment, the preferred alternative is changed, then the permit conditions and information presented in this section will be modified accordingly.

The Tri-Party Agreement defines the 100-NR-1 and 100-NR-2 OUs as RCRA past-practice sites. RCRA corrective action authority applies to releases of dangerous[1] waste and dangerous constituents including releases from solid waste management units and to releases of mixed waste (mixtures of hazardous waste and radiological contaminants), but not to waste that only contains radiological contaminants. Since many of the waste sites in the operable units contain radiological contaminants, and because they are in the 100 Area, which is listed on the National Priorities List (NPL), the adequacy of any action taken under another regulatory authority will be evaluated against CERCLA program criteria. The recommended RCRA corrective measures[2] that are discussed in this section have been developed to satisfy requirements for both RCRA corrective action and CERCLA remedial action. By applying CERCLA authority concurrently with RCRA corrective action requirements through an integrated plan, all regulatory and environmental obligations at the 100-NR-1 and 100-NR-2 OUs can be met as effectively and efficiently as possible. Also, by applying CERCLA authority jointly with that of RCRA, additional options for disposal of corrective action and remedial action wastes at the Environmental Restoration and Disposal Facility (ERDF) are possible. By allowing flexibility in final disposal options, disposal costs can be minimized while still being protective of human health and the environment.

The following discussion explains RCRA corrective action performance standards, which must be met by the recommended corrective measures.

2.1 RCRA Corrective Action Performance Standards

The RCRA corrective action performance standards found at WAC 173-303-646(2) state that the corrective measure:

1. *Shall protect human health and the environment from all releases of dangerous wastes and dangerous constituents, including releases from all solid waste management units at the facility.* For purposes of corrective action at the 100-NR-1 and 100-NR-2 Operable Units, protection is generally determined as follows:

[1] RCRA authority with respect to hazardous waste management and corrective action has been delegated to the State of Washington. The State of Washington has published regulations for this authority at WAC 173-303, "Dangerous Waste Regulations." The State terms "dangerous waste" and "dangerous constituents" are generally equivalent to the RCRA terms "hazardous waste" and "hazardous constituents."

[2] RCRA corrective measures are essentially equivalent to CERCLA remedial actions.

a. Human health[3] will be protected by preventing exposure to contaminants above unacceptable levels (i.e., Model Toxic Control Act (MTCA) B with a residential land-use scenario for soil sites).

b. Protection of the Columbia River will be enhanced by removing contamination from the source sites and by utilizing the existing pump-and-treat system (via hydraulic controls) to reduce discharges of contaminated groundwater.

c. Ecological resources will be protected by minimizing impacts resulting from corrective measures, by cleaning up source sites (except the shoreline site) to levels that are protective of human health, and by continuing the existing pump-and-treat operations to reduce discharges of contaminated groundwater to the river.

d. Cultural resources will be protected by minimizing impacts resulting from corrective measures.

A discussion of how these performance standards will be achieved is provided in Permit Sections 9.2 and 9.3.

2. *Is required regardless of the time at which waste was managed at the facility or placed in such units, and regardless of whether such facilities or units were intended for the management of solid or dangerous waste;*

The 100 Area was evaluated to identify sites where waste was placed or handled. The results of this investigation are provided in a variety of documents listed in DOE/RL-95-111, Rev. 0, Section 2.2. Based on three principle resources (i.e., 100 Area Technical Baseline Report, RCRA Facility Investigation/Corrective Measure Study Work Plan, and WIDS), DOE/RL-95-111, Rev. 0 identifies 114 potentially contaminated source sites in the 100-NR-1 Operable Unit. Thirty three of these have been eliminated from further consideration in the evaluations of alternatives because either they were never contaminated, are not currently contaminated, or they fall under other regulatory jurisdictions and are not subject to RCRA regulations. The remaining 81 potentially contaminated waste sites would be subject to RCRA corrective measures because dangerous constituents were handled at and potentially released from the sites. Corrective measures recommended for the various categories of waste sites are described in Section 9.2.1 below.

3. *Must be implemented by the owner/operator beyond the facility property boundary, where necessary to protect human health and the environment.*

The recommended corrective measures are interim actions that address contaminated soils and groundwater within the 100-NR-1 and 100-NR-2 Operable Units. There have been releases of dangerous constituents to locations beyond the boundaries of the areas addressed by DOE/RL-95-111, Rev. 0 and the DOE is undertaking studies of the impacts of these releases and how they will need to be addressed in final actions for the Hanford Site. Although the recommended corrective measures will reduce the potential for future off site releases, this performance standard will be addressed during final remediation of the Hanford Site as discussed in Section 9.1 above.

In addition to the performance standards cited in the WAC, the following also applies:

4. Corrective action must be conducted in compliance with training requirements established in 29 *CFR* 1910.120(e) and Permit Condition II.C.2.

Training to be implemented to meet this requirement is described in Section 9.2.5 below.

[3] It is assumed that protection of human health will also result in the protection of various ecological receptors (i.e., plants and animals) that could come into contact with the potentially contaminated sites as discussed in Section 4.3. It is also a basic assumption in recommendations for corrective measures that they will not preclude any future land use.

2.2 Corrective Measures for The 100-NR-1 Operable Unit Source Sites

The 100-NR-1 OU addresses contaminated soils and underground pipelines. It also includes the shoreline site, which is composed of the riverbank seeps in the 100-N Area (N-Springs) and the contaminated soil associated with waste site 100-N-65. The 100-NR-1 Operable Unit does not include the contaminated groundwater underlying this area. The groundwater is addressed in the 100-NR-2 OU.

Based on the types of contaminants that occur at the waste sites, the 81 waste sites included in the 100-NR-1 OU have been categorized into the following types:

- Radioactive waste sites (37)[4].
- Inorganic waste sites (6).
- Burn pits (6).
- Surface solid and miscellaneous waste sites (9).
- Surface petroleum sites (20).
- Deep petroleum sites (2).
- Shoreline site (1).

2.2.1 Recommended Actions and Justifications

Different corrective measures have been recommended for the various categories of waste sites in the 100-NR-1 OU. The recommended corrective measures are as follows:

- Remove/Dispose for the radioactive and inorganic waste sites, the burn pits, and the surface solid and miscellaneous waste sites. The Remove/Dispose corrective measure would consist of removing contaminated media that exceed cleanup levels; disposing media at the ERDF; backfilling, grading, and revegetation excavated areas; and land-use restrictions and access controls as described in detail in DOE/RL-95-111, Rev. 0, Section 5.3.4.
- Remove/Ex Situ Bioremediation/Dispose for near-surface petroleum sites. The Remove/ Ex Situ Bioremediation/Dispose corrective measure would consist of removing contaminated media that exceed cleanup levels; treating excavated soil through biodegradation to reduce toxicity (ex situ bioremediation); disposing residual, contaminated media at the ERDF; backfilling and revegetation excavated areas; and groundwater monitoring as described in detail in DOE/RL-95-111, Rev. 0, Section 5.3.5.
- In Situ Bioremediation for deep petroleum sites. The In Situ Bioremediation corrective measure would consist of treating contaminated soil in place through biodegradation to reduce toxicity (in situ bioremediation); revegetating disturbed areas; and groundwater monitoring as described in detail in DOE/RL-95-111, Rev. 0, Section 5.3.6.
- Institutional Controls under a modified Columbia River Comprehensive Risk Assessment (CRCIA) ranger/industrial scenario for the shoreline site. The Institutional Controls corrective measure would consist of land-use and/or access controls and groundwater monitoring as described in detail in DOE/RL-95-111, Rev. 0, Section 8.7.2.

In developing the recommended corrective measures, the various alternatives were compared against both the CERCLA evaluation criteria and the RCRA performance standards. Alternatives that met the two CERCLA threshold criteria (i.e., overall protection of human health and the environment and compliance with Applicable or Relevant and Appropriate Requirements [ARAR]), would also meet the RCRA performance standards numbered 1 through 3 in Section 9.1. All the recommended corrective measures provide protection of human health (performance standard 1.a).

[4] These sites are called radioactive waste sites because radioactive constituents are the primary concern; however, these sites are also potentially contaminated with dangerous constituents.

The measures that include a removal or treatment component will be protective by removing and disposing of contaminated soil or treating contaminated soil to reach acceptable levels in accordance with ARARs. Similarly, the in situ component will treat contaminated soil to ARARs. The institutional controls recommendation will be protective of human health by preventing exposure through the use of access controls and land-use restrictions.

In addition, the recommended corrective measures, except for institutional controls, would be protective of the environment (performance standard 1.b). By removing or treating contaminated soils, no contaminants above acceptable cleanup levels would remain at the site. Therefore, the potential for contaminants to migrate to other environmental resources is minimized. Institutional controls would not be protective of the environment because they are not effective in preventing migration of contaminants to the groundwater or the river. However, the recommendation to implement institutional controls is viewed as only an interim measure pending availability of information that would support selection of a final remedy for the shoreline site. Attaining ARARs for final cleanup are beyond the scope of the recommended corrective measures, but they will be addressed as part of final cleanup of the site.

All of the recommended corrective measures would minimize impacts to ecological and cultural resources (performance standards 1.c and 1.d). For recommendations with removal components, impacts would be minimized through careful adherence to ecological and cultural resources mitigation planning. With the in situ treatment component, little disturbance of the site would be required, therefore impacts to ecological or cultural resources would be minimal. In addition, both the remove and treatment recommendations should have a beneficial impact on ecological and cultural resources by reducing the amount of contamination discharged to offsite sources. Institutional controls, which are already widely used at Hanford, would present no additional risk to ecological or cultural resources.

Performance standard 2 is being met with these recommended corrective measures because all of the sites that have been identified as being potentially contaminated in the 100-NR-1 are being addressed by one of the corrective measures.

By removing or treating contaminated soils to acceptable cleanup levels, and by controlling migration of contaminants to the groundwater, the potential for releases beyond the boundaries of the 100-NR-1 or 100-NR-2 Operable Units is greatly reduced. Therefore, the recommended corrective measures would satisfy performance standard 3, both in the near term and the future. In addition, this performance standard will be addressed during final remediation of the Hanford Site as discussed in Section 9.1 above.

Performance standard 4 pertaining to training is discussed in Section 9.2.5 below.

2.2.2 Cleanup Standards for the 100-NR-1 Operable Unit

The cleanup standards for the 100-NR-1 OU are MTCA Method B values identified for the contaminants of concern listed in DOE/RL-95-111, Rev. 0, Table 4-7. If there are sites where deep soil contamination (more than 4.6 m below surrounding grade) is in excess of the cleanup standards, several factors will be considered to determine the extent of additional corrective actions. These factors include protection of human health and the environment, remediation costs, size of the ERDF, worker safety, presence of ecological and cultural resources, the use of institutional controls, and long-term monitoring costs. The extent of remediation must also ensure that contaminant levels in the soil are protective of groundwater and the Columbia River. The decision of whether to proceed with the Remove/Dispose recommendation below 4.6 m will be made by the regulators in consideration of the factors listed above.

2.2.3 Cost

The estimated cost for the various Remove/Dispose alternatives that are recommended for the 80 source sites (which excludes the shoreline site) is $48.7 million. The cost for the Institutional Controls under the Modified CRCIA Ranger/Industrial Alternative that would be applicable to the shoreline site is estimated to be $63,358. Detailed cost analyses for all the alternatives are contained in Permit Attachment 47, Chapter 7.0, §7.2.

2.2.4 Schedule

Corrective measures for the 100-NR-1 Operable Unit will begin upon completion of all the Treatment, Storage, and Disposal (TSD) units and will follow the duration schedule identified in the *Engineering Evaluation/Cost Analysis for the 100-N Area Ancillary Facilities and Integration Plan* (Permit Attachment 48).

2.2.5 Training

All personnel working at the Hanford Site, including at sites associated with the 100-NR-1 Operable Unit, will be provided with and will successfully complete general site training as specified in Permit Condition II.C.2 of the Hanford Facility Dangerous Waste Permit. The general requirements specified in Permit Condition II.C.2 are as follows:

All Hanford Facility personnel shall receive general training within 6 months of hire. This training shall provide personnel with orientation of dangerous waste management activities being conducted on the Hanford Facility. This training shall include:

- Description of emergency signals and appropriate personnel response.
- Identification of contacts for information regarding dangerous waste management activities.
- Introduction to waste minimization concepts.
- Identification of contact(s) for emergencies involving dangerous waste.
- Familiarization with the Hanford Facility Contingency Plan.

In addition to the training specified in the permit condition, personnel who work at or visit the 100-NR-1 OU sites and who have the potential for exposure to contaminants above permissible levels will be provided with training in accordance with 29 CFR 1910.120(e). All such personnel shall receive the required training before they are permitted to engage in hazardous waste operations that could expose them to hazardous substances, safety, or health hazards. The training shall consist of provision of the following information:

- Names of personnel and alternates responsible for site safety and health.
- Safety, health, and other hazards present on the site.
- Use of personal protective equipment.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazards.
- Familiarization with the site safety and health plan.

This information shall be provided both initially and in annual refresher courses, and certifications shall be made as summarized in subsection 9.2.5.3.

2.2.5.1 Initial Training

- For general site workers, initial training shall consist of a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor.
- For workers who are on site only occasionally for a specific limited task, or those who will work only in areas where no health hazards or the possibility of an emergency exists (i.e., are not required to wear respirators), initial training shall consist of a minimum of 24 hours of instruction off the site, and a minimum of 1 day of supervised field experience.

- For on-site managers and supervisors directly responsible for employees engaged in hazardous waste operations, initial training shall consist of a minimum of 40 hours of instruction and 3 days of field experience. This may be reduced to 24 hours of instruction and 1 day of field experience if supervision is limited to those workers who are on site only occasionally or work in areas where no health hazards exist. Managers and supervisors must also have 8 hours of specialized training on such topics as employer's safety and health program and associated employee training program, personal protective equipment program, spill containment program, and health hazard monitoring procedures and techniques.
- For trainers, they shall have academic credential and instruction experience in the subjects they are expected to teach, or must have satisfactorily completed a training program for teaching the subjects, and shall demonstrate competent instructional skills and knowledge of the subject matter.
- For those employees engaged in responding to hazardous emergency situations at hazardous waste cleanup sites that may expose them to hazardous substances shall be trained in how to respond to such expected emergencies.

2.2.5.2 Refresher Training

Employees and supervisors required to have completed the initial training as described above shall receive 8 hours annually of refresher training in the required topics and/or a critique of incidents that occurred during the previous year that could serve as training examples.

2.2.5.3 Certification

Employees and supervisors that have received and successfully completed the training and field experience shall be certified by their instructor as evidenced by a written certificate. Uncertified employees shall be prohibited from engaging in hazardous waste operations.