## 5.18 Potential Mitigation Measures

**Mitigation Measures**

Mitigation measures as discussed in the following sections are those actions not already included in the alternative groups that could further reduce or avoid adverse impacts potentially resulting from waste management operations at Hanford.
As defined by regulation (40 CFR 1508.20), mitigation includes

- avoiding the impact altogether by not taking a certain action or parts of an action
- minimizing impacts by limiting the degree or magnitude of the action and its implementation
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- compensating for the impact by replacing or providing substitute resources or environments.

This section describes mitigation measures that could avoid or reduce environmental impacts caused by Hanford solid waste management operations. Several mitigation measures have been built into the alternative groups addressed in the HSW EIS, including installation of barriers, installation of liners and leachate collection systems, treatment of MLLW to meet applicable LDRs, use of mobile units (APLs) to accelerate certification and shipment of TRU waste to WIPP, and in-trench grouting and use of HICs for Cat 3 LLW and MLLW. Additional measures would be reviewed and revised as appropriate, depending on the relevant actions to be taken at a facility, the level of impact, and other pertinent factors. Following the publication of the Record of Decision (ROD), a mitigation action plan would be prepared, if warranted, to address actions specific to the alternative group selected for implementation. That plan would be implemented as necessary to mitigate significant adverse impacts of solid waste management activities. Possible mitigation measures are generally the same for all alternative groups and are summarized in the following sections.

### 5.18.1 Pollution Prevention/Waste Minimization

DOE is implementing Executive Order 13148, *Greening the Government Through Leadership in Environmental Management* (65 FR 24595), and associated DOE orders or guidelines by reducing toxic chemical use; improving emergency planning, response, and accident notification; and encouraging the development and use of clean technologies. Program components include waste minimization, recycling, source reduction, and buying practices that prefer products made from recycled materials. The Pollution Prevention Program at the Hanford Site is formalized in a Hanford Site Waste Minimization and Pollution Prevention Awareness Program Plan (DOE-RL 2001b). The plan includes an overview of pollution prevention and waste minimization at Hanford, how the program is implemented at Hanford, and specific objectives and goals to be obtained.

The solid waste management activities have been and would continue to be conducted in accordance with this plan. Implementation of the pollution prevention and waste minimization plans would minimize the generation of secondary wastes.

### 5.18.2 Cultural Resources

In the HCP EIS (DOE 1999), the Central Plateau was designated for Industrial-Exclusive use and Area C was designated for Conservation (mining). The activities described in this HSW EIS would be consistent with those designations. To avoid loss of cultural resources during construction of solid waste management facilities on the Hanford Site, cultural resources surveys have been and would continue to be made of the areas of interest. If any cultural resources were discovered during construction, construction would be halted. The appropriate authorities would be notified so the find could be evaluated to determine its appropriate management or its effect on continuation of activities.

Because Area C is within the viewshed from Rattlesnake Mountain, operation of the borrow pit there might have an indirect effect on the characteristics that contribute to the cultural and religious significance of Rattlesnake Mountain to local tribes. However, at the end of borrow pit operations, the area would be restored to natural contours and revegetated (see Volume II, Appendix D). Additional information on aesthetic and scenic impacts of these activities is presented in Section 5.12.

Given the possibility for buried cultural resources, some methodology would likely be needed to observe the subsurface. Ground-penetrating radar, shovel testing, or backhoe testing might be appropriate, as would monitoring for cultural resources during construction. Depending on conditions of the area, the frequency of monitoring may range from continuous to intermittent to periodic.

### 5.18.3 Ecological Resources

In the HCP EIS (DOE 1999) the Central Plateau was designated for Industrial-Exclusive use and Area C was designated for Conservation (mining). Most ecological resources in the Industrial-Exclusive zone of the Central Plateau were destroyed or displaced during the 24 Command Fire or by previous disturbances of the area. However, the fire did not affect the 200 East Area. Consequently, the mature sagebrush (*Artemisia tridentata*) habitat in the candidate disposal site near the PUREX Plant, if selected, would be subject to mitigation under current DOE guidelines, as prescribed in the *Hanford Site Biological Resources Management Plan* (DOE-RL 2001a) and the *Hanford Site Biological Resources Mitigation Strategy* (DOE-RL 2003c). In addition, some other habitats and species found in the burned area would be subject to mitigation under existing biological conditions and current mitigation guidelines. These are the element occurrences (see Volume II, Appendix I) and purple mat (*Nama densum* var. *parviflorum*) found in Area C.

Volume II, Appendix I sets forth what the mitigation requirements for the above habitats/species would be if these were to be disturbed in their current condition under current mitigation guidelines. For example, disturbance of ground-nesting birds and their young could be avoided by limiting major construction during the nesting season, or loss of sensitive habitat could be mitigated by restoration of lower quality habitat or by preservation of similar high quality habitat in another location. This is done primarily for the purpose of comparison of impacts among the alternative groups. Current biological conditions and mitigation guidelines are appropriate for determining mitigation requirements for impacts that would occur in the near term. However, they are not suitable for judging mitigation requirements that would occur some years hence because habitats and species assemblages may change in time (for

example, fire-damaged habitats may recover), as might mitigation guidelines at Hanford. Consequently, the actual mitigation requirements for later activities will depend on the results of field surveys conducted just prior to initiating operations and the mitigation guidelines in effect at Hanford at that time.

### 5.18.4 Water Quality

No activities associated with the proposed action or alternative groups would result in direct discharges to surface water such as the Columbia River. Therefore, any impacts on water quality would result from waste disposal and the potential for contamination of groundwater and, ultimately, the river. Many of the activities associated with waste disposal incorporate mitigating measures as part of normal operations. For example, disposal practices include the use of a rain curtain, or placing interim soil covers over trenches and contouring the soil to minimize water infiltration through the waste. Disposal facilities are also maintained to minimize intrusion of plants and animals into the waste. Higher-activity wastes are disposed of in high-integrity containers or are grouted in place to reduce the release rates of contaminants to the surrounding soil. Use of liners and leachate collection systems in disposal facilities would afford the opportunity to take corrective actions if necessary during the time when the facility was actively monitored; however, such measures would not prevent groundwater contamination over the long term. Use of reactive barriers beneath disposal facilities has also been proposed to delay migration of contaminants. In addition, treating MLLW may delay and slow release of some contaminants. Capping the disposal facility provides a greater opportunity to minimize water infiltration and contaminant transport. Recent studies indicate there may be some benefit from early capping in reducing long-term contaminant concentrations in groundwater (Bryce et al. 2002).

DOE's approach is to protect groundwater through the Performance Assessment process. Disposal facility performance assessments are routinely reviewed to ensure that facilities meet requirements established in DOE Orders 435.1 and 5400.5 (DOE 2001b, 1993). Changes in the disposal facility waste acceptance criteria would be made if the review indicates that groundwater contamination could exceed applicable requirements. As a result, some waste could require further treatment (for example, macro-encapsulation) prior to disposal, or additional confinement such as disposal in high-integrity containers or by grouting the waste in place. The waste could also be disposed of at another facility where it would meet the waste acceptance criteria, or it could be stored until another method was found to treat or dispose of the waste. In no case would DOE knowingly dispose of waste in violation of applicable legal requirements.

### 5.18.5 Health and Safety – Routine Operations

It is not expected that the public would experience any adverse consequences from routine waste management activities. Current and anticipated design, construction, and operation of waste management facilities would incorporate the best available technology to control discharge of potentially hazardous materials to the environment.

Under routine operations, exposure of workers to radioactive or other potentially hazardous materials would be maintained within permissible limits and, further, would be reduced under the as low as

reasonably achievable (ALARA) principle. This principle involves formal analysis by the workers, supervisors, and radiation and or chemical protection personnel of the work in a hazardous environment to reduce exposure of workers to the lowest practicable level.

There is some potential for contamination reaching the affected environment from waste in LLBGs via uptake through deep roots by nuisance weeds such as Russian thistle (tumbleweeds). Before capping of LLBGs, herbicides could be used to control such weeds. After the LLBGs are capped, they could be planted with vegetative species (such as wheatgrass [*Agropyron* sp.]) that could, in effect, choke out the nuisance weeds and assist in evapotranspiration.

### 5.18.6 Health and Safety – Accidents

Although the safety record for operations at Hanford and other DOE facilities is good, DOE-RL and all Hanford Site contractors have established emergency response plans to prepare for and mitigate the consequences of potential emergencies on the site (DOE-RL 1999). These plans were prepared in accordance with DOE orders and other federal, state, and local regulations. The plans describe action that will be taken to evaluate the severity of a potential emergency and the steps necessary to notify and coordinate the activities of other agencies having emergency response functions in the surrounding communities. The plans also specify the level at which the hazard to workers and the public is of sufficient concern that protective action should be taken. The site holds regularly scheduled exercises to help ensure that individuals with responsibilities in emergency planning are properly trained in the procedures that have been implemented to mitigate the consequences of potential accidents and other events. As necessary, Hanford Site emergency response plans would be updated to include consideration of new solid waste management facilities and activities.

### 5.18.7 Traffic and Transportation

Transport of LLBG capping materials from the borrow pit in Area C across SR 240 to the 200 Areas was determined to have the potential for traffic congestion and accident hazards. As a consequence, an underground conveyor system could be used to move the materials to a staging area east of SR 240 and to minimize crossings of trucks and other equipment. Further, additional safety measures would be expected to take the form of dust control; restrictions on crossings to off-shift-change hours; signs and warning lights along SR 240 to the north, south, and well in advance of the crossing; and a traffic control light at the crossing itself.

Many measures to mitigate transportation impacts are incorporated into regulatory requirements for shipping hazardous materials. Shipment of hazardous materials is regulated by the U.S. Department of Transportation (DOT), and many states have established additional requirements. The DOT regulations for shipping hazardous materials can be found in the Hazardous Material Regulations (49 CFR 171-180), the Federal Motor Carrier Safety Regulations (49 CFR 390-397), and "Packaging and Transportation of Radioactive Material" (10 CFR 71). Other regulations and requirements for the shipment of radioactive materials can be found in DOE's Radioactive Material Transportation Practices (DOE 2002b). These regulations address many specific subjects including shipper and carrier responsibilities, planning information, routing and route selection, notifications, shipping papers, driver qualifications and training,

vehicles and required equipment, equipment inspections, labeling (information on containers), placarding (information on the shipping vehicle), emergency planning, emergency notification, emergency response, and security.

DOE operates a Radiological Assistance Program with eight Regional Coordinating Offices staffed with experts available for immediate assistance in offsite radiological monitoring and assessment. Radiological Assistance Program teams assist state, local, and tribal officials in identifying the material and monitoring to determine if there is a release, as well as providing general support. Like private-sector shippers, DOE must provide emergency response information required on shipping papers, including a 24-hour emergency telephone number. Shippers have overall responsibility for providing adequate technical assistance for emergency response, should the carrier fail to do so.

Security requirements and shipping containers used for transporting radioactive and hazardous materials are commensurate with the hazard associated with those materials. Low-hazard shipments, such as most LLW and MLLW shipments, would not represent attractive targets for sabotage or terrorism because they have relatively low potential for producing human casualties. Relatively high-hazard shipments, such as TRU waste, also are not highly attractive targets because the accident-resistant packaging used to transport the higher-hazard materials provides a measure of protection against potential terrorist actions.

In summary, offsite shipments of LLW, MLLW, and TRU waste can be conducted safely. This is ensured by a number of means that emphasize preventing releases of radioactive and hazardous material in transit, including appropriate packaging, route selection, communications, vehicle safety, and driver training. In addition, in the unlikely event that an accidental release occurs, DOE would provide the necessary support to local first responders to effectively mitigate, clean up, monitor potential releases and provide any necessary medical treatment.

### 5.18.8 Area and Resource Management and Mitigation Plans

DOE or its contractors have prepared, or are preparing, a number of area and resource management and mitigation plans. These plans have been completed, are in draft form, or are being revised. These plans include the following:

- *Hanford Cultural Resources Management Plan* (DOE-RL 2003a)
- *Hanford Site Biological Resources Management Plan* (DOE-RL 2001a)
- Hanford Bald Eagle Management Plan
- Noxious Weed Management Plan
- Chinook Salmon – Upper Columbia River Spring Run Hanford Management Plan
- Steelhead – Middle Columbia River Run Hanford Management Plan
- Steelhead Upper Columbia River Run Hanford Management Plan
- Aesthetic and Visual Resources Management Plan
- Facility and Infrastructure Assessment and Strategy
- Mineral Resources Management Plan (that is, soils, sand, gravel, and basalt)

- Hanford Site Watershed Management Plan
- *Hanford's Groundwater Management Plan: Accelerated Cleanup and Protection* (DOE-RL 2003d)
- *Sitewide Institutional Controls Plan for Hanford CERCLA Response Actions* (DOE-RL 2002b)
- *Hanford Site Biological Resources Mitigation Strategy* (DOE-RL 2003c).

All of the plans listed above would be expected to be available as DOE guidance by the time the activities described in this HSW EIS would be underway and for which special management or mitigation might be appropriate.

**Potential Mitigation Measures**

- Continue implementing DOE's pollution prevention/waste minimization program.
- Perform cultural surveys prior to construction.
- Implement guidelines (such as the replacement of shrub-steppe community disturbed by construction or capping activities) consistent with the *Hanford Site Biological Resources Management Plan* and the *Hanford Site Biological Resources Mitigation Strategy*.
- Continue implementing As-Low-As-Reasonably-Achievable principles during operations and construction.
- Continue training and practices to prepare for possible emergencies and accidents.
- Perform large movements of construction and capping materials during low traffic times.
- Prepare and implement resource management plans and mitigation plans associated with the *Hanford Comprehensive Land Use Plan.*
- Construct new facilities and trenches in areas that have already been disturbed. This would minimize the chances for encountering items of cultural significance or disturbing items of cultural significance that have not been disturbed. It would also minimize the impacts to animals, plants, and ecosystems.
- Construct new trenches in uncontaminated areas within the Low Level Burial Grounds to minimize potential health impacts to workers.
- Construct final closure barriers that would allow the growth or re-growth of shrub-steppe habitat.
- Plan construction activities to avoid nesting seasons.
- Reuse soils removed during construction of disposal trenches for construction of final closure caps to the extent possible.
- Install and use rain curtains in operating trenches. This would prevent some of the rainwater and snow melt from coming into contact with waste already in place. This, in turn, would reduce the amount of waste that could leach into the rainwater, reduce the amount of contaminated rainwater (leachate) that would have to be treated, and reduce the amount of leachate that could possibly reach the vadose zone or groundwater.
- Use soil fixants to minimize dust generated during construction activities, waste disposal, and final closure activities.
- Treat and dispose of mixed-low level waste in storage as quickly as possible to minimize accidents and exposure to workers from aboveground storage.
- Certify and ship transuranic waste in storage as quickly as possible to minimize accidents and exposure to workers from aboveground storage.
- Keep areas around facilities and trenches clear of combustible material to limit impacts from wildfires.
- Keep trenches clear of deep-rooted plants and burrowing animals to minimize the potential for spreading contamination.
- Provide additional waste treatment prior to disposal.

### 5.18.9 Long-Term Stewardship and Post Closure

Cleanup plans and decisions strive to achieve an appropriate balance between contaminant reduction, use of engineered barriers to isolate residual contaminants and retard their migration, and reliance on institutional controls. Decisions are influenced by several factors:

- risks to members of the public, workers, and the environment
- legal and regulatory requirements
- technical and institutional capabilities and limitations
- current state of scientific knowledge
- values and preferences of interested and affected parties
- costs and related budgetary considerations
- impacts on, and activities at, other sites.

Reliance on institutional controls after contaminants have been reduced and engineered barriers have been put in place is referred to as long-term stewardship. Specific long-term stewardship activities depend on the specific hazards that remain and how those hazards are being controlled. Long-term stewardship activities are intended to continue isolating hazards from people and the environment.

DOE does not rely solely on long-term stewardship to protect people and the environment. As indicated in the DOE-sponsored report *Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites* (National Research Council 2000), "contaminant reduction is preferred to contaminant isolation and the imposition of stewardship measures." Contaminant reduction is a large part of the ongoing cleanup efforts at Hanford. The long-term stewardship plan for the Hanford Site was approved in August 2003 (DOE-RL 2003b).

**Typical Long-Term Stewardship Activities**

- monitoring to verify the integrity of barriers placed over disposal sites
- maintaining barriers to ensure their continued integrity
- monitoring groundwater and the vadose zone to determine whether systems to contain hazards are working
- monitoring for surface contamination
- monitoring animals, plants, and ecosystems
- performing groundwater pump-and-treatment operations
- installing and maintaining fences and other barriers
- posting warning signs
- establishing easements and deed restrictions
- establishing zoning and land-use restrictions
- maintaining records on cleanup activities, remaining hazards, and locations of the hazards
- maintaining necessary infrastructure (for example, utilities, roads, communication systems).