Environmental Restoration and Waste Management Site-Specific Plan for the Richland Operations Office

**Hanford Site Five-Year Plan
Fiscal Years 1993-1997**

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1.0 INTRODUCTION

1.1 FIVE-YEAR PLANNING DOCUMENTS

This document was prepared to implement and support the U.S. Department of Energy-Headquarters (DOE-HQ) national plan. The national plan, entitled *Environmental Restoration and Waste Management Five-Year Plan* (DOE 1990b) (hereinafter referred to as the DOE-HQ Five-Year Plan), is the cornerstone of the U.S. Department of Energy's (DOE) long-term strategy in environmental restoration and waste management. The DOE-HQ Five-Year Plan addresses overall philosophy and environmental and waste-related activities under the responsibilities of the DOE Office of Environmental Restoration and Waste Management. The plan also reaffirms DOE-HQ goals to bring its nuclear sites into environmental compliance in cooperation with its regulators and the public, and to clean up and restore the environment by 2019 (the commitment for the Hanford Site is for one year sooner, or 2018).

This document is part of the site-specific plan for the U.S. Department of Energy-Richland Operations Office (DOE-RL). It is the first revision of the original plan, which was dated December 1989 (DOE-RL 1989a). This document is a companion document to the *Overview of the Hanford Cleanup Five-Year Plan* (DOE-RL 1989d) and *The Hanford Site Environmental Restoration and Waste Management Five-Year Plan Activity Data Sheets* (DOE-RL 1991). Although there are three documents that make up the complete DOE-RL plan, this detailed information volume was prepared so it could be used as a standalone document. The overview volume and the activity data sheet (ADS) volume are supplements to the information in this document.

The overview document presents some information that this detailed information document does not, such as a concise description of the extent of the waste, the status of restoration at the Hanford Site, and additional historical information. The overview document also presents nontechnical summaries of the detailed planning in this document and, for this reason, is useful as an introduction to this document. A paper entitled "Five-Year Vision for Hanford Cleanup" (see Appendix D) was originally included with the overview document. It contains goals and guiding principles which form the basis of the commitment to clean up the Hanford Site.

1.2 CHANGES TO THE PLAN

Major changes in this revision of the plan include the following:

- Incorporation of applicable public comments on the first issuance of the plan (the 90-day comment period ended in July 1990). This plan has many changes in response to public comments. The comments themselves, as well as responses, are in a separately issued document.

- Preliminary agreements from Tri-Party Agreement Negotiations (May 15, 1991) have been added. Due to the relative early issuance of the ADSs (prior to negotiations) the site specific plan contains the latest available information.
- Addition of a chapter that deals with special topics, such as ferrocyanide and hydrogen issues with waste storage tanks, ultimate use of Hanford Site land, description of culture change at the Hanford Site, transportation, results of the Tiger Team review, and an overview of the dose reconstruction project.
- Addition of sections within the major chapters describing accomplishments since last year.
- Consolidation of the waste management plan into the site-specific plan.
- Incorporation of final fiscal year (FY) 1991 funding appropriation numbers.
- Updates to the current planning information and use of the latest issued ADSs (DOE-RL 1991). These are the FY 1993 sheets, which include FY 1991 and FY 1992 as well as the 5-year planning period (FY 1993 to FY 1997). The latest ADSs do not include the May 15, 1991 Tri-Party Agreement negotiated changes.
- Addition of glossary of terms.
- The primary mission of former Hanford production facilities (including Plutonium-Uranium Extraction [PUREX], Plutonium Finishing Plant, and T Plant) is to support site cleanup. These are now included in the scope of Environmental Restoration and Waste Management.

1.3 SCOPE

Four major chapters in this plan (2.0 through 5.0) provide the supporting details for the activities in the following four areas: (1) waste management operations, (2) environmental restoration, (3) corrective activities, and (4) technology development. References to specific ADSs are provided when appropriate. These references are expressed as "ADS XXXX," which refers to the identification number of the sheet in the ADS document (DOE-RL 1991). The detailed ADS information document covers the activities in the ADSs that were issued in June 1991 to support the FY 1993 budget submission.

This plan provides a summary of environmental and waste management activities planned at the Hanford Site. Activities planned through FY 1997 are covered in more detail than longer range activities. This plan covers activities funded by the Office of Environmental Restoration and Waste Management within DOE. Some of these activities were funded under Nuclear Energy, Energy Research, and Defense Programs before November 1989.

Waste management operations include those activities associated with the minimization, treatment, storage, or disposal of all radioactive, hazardous, or mixed wastes. Environmental restoration is concerned with the assessment and cleanup of facilities and sites that are no longer part of active operations. Environmental restoration includes remedial actions and decontamination and decommissioning (D&D). Corrective activities are those projects and activities required to bring active and standby facilities into compliance with environmental regulatory requirements and internal DOE requirements for air, surface water, and solid waste. Technology development is concerned with the development and availability of new technologies in order for DOE to achieve its 30-year cleanup goals and to do so with the lowest possible cost.

The *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1990), hereinafter referred to as the Tri-Party Agreement, signed in May 1989, is a legally enforceable agreement between DOE, the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology). It covers cleanup of the Hanford Site, compliance with the *Resource Conservation and Recovery Act of 1976** (RCRA), integration of RCRA and *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) activities, public involvement, and prioritization of work.

This site-specific plan provides implementation details in support of the Tri-Party Agreement. However, this document covers additional activities than covered by the Tri-Party Agreement, particularly in the waste management area. It also integrates the activities of the Tri-Party Agreement, which are primarily related to cleanup and regulatory compliance, with all other planned environmental and waste management activities. Other examples of activities discussed in this plan, but not in the Tri-Party Agreement, include:

- Environmental restoration D&D activities
- *National Environmental Policy Act of 1986* (NEPA) compliance
- Additional research and development activities
- Many specific upgrades to waste management and chemical processing facilities.

1.4 PURPOSE

The documents that make up the site-specific plan serve multiple planning purposes. These documents are written to do the following.

- Provide Hanford Site implementation detail for the DOE-HQ Five-Year Plan (DOE 1990b).

*Throughout this document, references to RCRA are intended to include the implementing State of Washington regulations.

- Describe the activities and strategy for waste management operations, environmental restoration, and corrective activities, with emphasis on FY 1991 to FY 1997.
- Summarize long-range planning and scheduling for waste management and environmental restoration activities.
- Assist in the evolution from a high-security, production-oriented culture toward a culture of open communication, clearly understood and demonstrated priorities for environmental stewardship, and accountable management.
- Provide a baseline for planning, budgeting, and measuring progress from FY 1991 to FY 1997.
- Meet DOE requirements that each field organization have a long-range environmental protection plan and waste management plan.
- Describe the policies of DOE and its contractors related to meeting waste management and environmental restoration objectives.
- Prioritize work needed from FY 1991 to FY 1997 on the basis of potential risks to the public, workers, and the environment.
- Reaffirm the FY 1992 program and provide the basis for the FY 1993 budget.

1.5 MISSION

The Hanford Site was acquired by the Federal Government in 1943 for the construction and operation of facilities to produce plutonium for the atomic weapons program during World War II. The Hanford Site now encompasses approximately 1,450 square kilometers (560 square miles) within the Columbia River Basin of southeastern Washington State (Figure 1-1).

For more than 30 years, Hanford Site facilities were primarily dedicated to the production of plutonium for national defense and management of the wastes generated by chemical processing operations. In later years, programs at the Hanford Site became increasingly diverse, involving research and development for advanced reactors, renewable energy technologies, waste disposal technologies, as well as cleanup of contamination from past practice.

Now, DOE has ended the production mission at the Hanford Site and is reorienting activities toward management of its wastes and cleanup of the Site. The mission now is one of environmental management, demonstration and application of advanced remediation technologies, and restoration of the Hanford Site.

By DOE policy, the Hanford Site is to be a national flagship for environmental restoration and waste management and a center for excellence in developing advanced waste treatment, storage, and disposal (TSD) technologies.

Figure 1-1. Location and Regional Map of the Hanford Site.

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In fulfilling its goal of bringing all of the Hanford Site facilities into full environmental compliance and cleaning up its waste sites as required through the regulatory process, DOE intends to:

- Comply with laws and regulations aimed at protecting public health and the environment.
- Change the Hanford Site culture to one of clear and open communication.
- Work diligently to achieve congressional support for meeting the objectives.
- Support the establishment of interagency agreements and fulfill the requirements of compliance agreements already in place.
- Continue to expand public participation.
- Recognize Tribal sovereignty and treaty rights related to Tribal and ceded lands.
- Continually examine environmental regulations to ensure DOE's compliance actions effectively reduce risk to human health and the environment.
- Contain known waste at inactive sites and vigorously assess the uncertain nature and extent of waste at other sites to enable realistic planning, scheduling, and budgeting for cleanup.
- Treat and dispose of existing and future wastes to fully meet regulatory requirements.
- Remediate required waste sites on a schedule to meet the 30-year cleanup goal.

1.6 POLICY

It is the policy and practice of the DOE-RL, as an operational unit of the DOE, to conduct its operations in a safe and environmentally sound manner. Secretary Watkins has made it clear that protection of the environment and the public are responsibilities of paramount importance to our facilities.

We are firmly committed to ensuring the incorporation of all departmental and national environmental protection goals in the daily conduct of our business. We have an equal commitment to advance the goals of restoring and enhancing environmental quality and ensuring public health.

It is the DOE-RL's policy and practice to conduct our operations in compliance with the letter and spirit of applicable environmental statutes, regulations, and standards. We are committed to good environmental management of all our programs and facilities and to correcting existing environmental problems before they pose a threat to the quality of the environment or public

welfare. Consistent with the Secretary's goals, we will work with the appropriate offices of the State of Washington and the EPA to implement the requirements of the DOE-HQ Five-Year Plan to achieve environmental compliance and cleanup and meet our obligations under the NEPA.

The DOE-RL's contractors also share the responsibilities for good environmental management. We expect our management and operating contractors to conduct programs and project operations in an environmentally sound manner that limits the risks to the environment and protects the public health. Our contractors must recognize and accept that the department's criteria for awarding their fees reflect DOE's increased emphasis on environment, safety, and health.

In addition, it is the DOE-RL's policy to undertake appropriate measures to prevent the generation of contaminants, wastes, and other residual materials requiring disposal or release to the environment through source reduction and recycling. When the generation of such wastes cannot be avoided, we will take actions to reduce their volume and toxicity through treatment.

Our goal is to create a pollution-prevention ethic within the work place. To this end, all program mission statements and project plans will recognize a requirement for pollution prevention. Further, pursuant to DOE policy, a program to develop employee pollution prevention awareness through specific training, special campaigns, and incentive programs will be implemented at the Hanford Site. As part of this program, employee initiative in the establishment of sound pollution prevention and waste minimization practices will be encouraged by all levels of facility management.

1.7 PRIORITIES

Activities that may be conducted in the FY 1991 to 1997 period are assigned to one of four major priority levels. The priority levels of individual activities are listed on the ADSs (DOE-RL 1991). These priority levels were established by DOE-HQ in March 1989.

- **Priority 1**--Priority 1 includes activities necessary to prevent near-term adverse impacts to workers, the public, or the environment. Examples include containment to prevent the spread of contamination, actions to prevent or minimize releases to the environment, and ongoing waste management activities required to maintain safe conditions. Also included as Priority 1 are ongoing activities that, if terminated, could result in significant program and/or resource impacts. Impacts could include significantly increased risk to the environment or to workers, or significantly increased costs.
- **Priority 2**--Priority 2 items encompass those activities required to meet the terms of agreements (in place or in negotiation) between DOE and local, Federal, State, and Tribal agencies, such as the Tri-Party Agreement. These agreements represent legal commitments to complete activities on the schedules agreed to by DOE.

- **Priority 3--**Priority 3 includes activities required for compliance with external environmental regulations that were not covered by Priority 1 or 2. Other actions included in Priority 3 are in compliance with DOE orders that implement external regulations or that set specific DOE regulatory standards, actions that would reduce risks or costs, and actions that would prevent disruption of the DOE production mission.
- **Priority 4--**Priority 4 includes activities that are not required by regulation but, that would be desirable. Examples of Priority 4 actions include the following: (1) complying with DOE orders that are more stringent than external regulations, (2) implementing good management practices, (3) reducing personnel exposures below levels required by regulations or standards, and (4) accelerating actions to satisfy an agreement or milestone ahead of schedule.

Waste Management has expanded its priority system to include subcategories under the "1-4" priority system. Priority subcategory definitions are as follows:

Priority Subcategory 1A: Provides Safe Operation

- Addresses an imminent human health and safety problem or an imminent release that could cause a widespread environmental impact.
- Reduces probability of major damage to equipment/facilities to avoid impacts to human health and/or the environment.
- Necessary to maintain safe condition.

Priority Subcategory 1B: Prevents Potential Releases to the Environment

- Monitoring and surveillance of waste problem.
- Contain, treat, or remove materials that could potentially cause near-term impact.

Priority Subcategory 1C: Maintains Ongoing Activities

- Completes an activity being conducted to minimize near-term health and safety or environmental impacts on which substantial funding has previously been expended.
- Maintains ongoing activities that, if terminated, could result in significant Environmental Restoration and Waste Management Program and/or resource impacts.

Priority Subcategory 2A: Complies with Agreement Provisions that have Criminal or Civil Liability Penalties

- Includes those activities necessary to comply with agreement provisions that if not conducted could result in criminal or civil liabilities (fines and/or incarceration) imposed through the courts.

Priority Subcategory 2B: Complies with Agreement Provisions that have Administrative Penalties

- Includes those activities necessary to comply with agreement provision that if not conducted could result in an immediate action, normally imposed by the regulatory agency's administrative process, which is less severe than Priority Subcategory 2A.

Priority Subcategory 2C: Complies with Other Agreement Provisions

- Includes those activities necessary to comply with agreement provisions that if not conducted could result in missing milestones or nonachievement of other commitments agreed to by DOE without legal or administrative enforcement impacts.

Priority Subcategory 3A: Complies with External Regulations and DOE Regulatory Standards

- Provides for compliance with environmental, health, and safety regulations, standards, and permits

Priority Subcategory 3B: Maintains Supporting Activities

- Construct or maintain supporting activities (e.g., laboratory services) needed to comply with regulations.

Priority Subcategory 3C: Provides for Long-Term Mission Continuation and Cost Benefits

- Operations and critical path construction necessary to meet mission requirements.
- Activities initiated to provide long-term cost benefits/savings.

Priority Subcategory 4A: Provides Supplementary Environmental, Safety, and Health Improvements

- Provides for reduction in health and safety or environmental risks that are beyond the reductions mandated by law and/or regulation.
- Addresses compliance with DOE standards and requirements that are more stringent than imposed by law and/or regulation.

Priority Subcategory 4B: Improves Other Practices

- Implements operational and/or management practices that will provide long-term benefits to waste operations.

Priority Subcategory 4C: Accelerates Schedules

- Provides for acceleration of actions to meet required milestones ahead of schedule.

These priority subcategories are used in the Waste Management ADSs (see Chapter 2.0)

The DOE-RL and its contractors recognize the importance of completing all of the activities listed and the necessity and commitment to achieve full compliance with the law in the shortest achievable time. The DOE-RL will continue to work with the EPA and Ecology to ensure that work is being performed in accordance with agreed-upon priorities and legally binding agreements, such as the Tri-Party Agreement. It will also work with affected Indian tribes to assure that their treaty rights are protected and the Federal Trust responsibility is fulfilled. As with past years, it currently appears that lower priority activities may not be funded (refer to Section 1.11).

Section 1.10 and Chapters 2.0 through 4.0 present summary tables and graphs of activity titles, priorities, and costs. These are based on the FY 1991 ADSs (see Section 1.12), which reflect the activities that DOE-RL has determined to be necessary to be accomplished, as reflected by their priority level.

A revised priority system is currently being developed by DOE-HQ with the assistance of States, Tribes, and other external groups. However, it was not ready in time to be used on the current ADSs. The new system is being tested at DOE-HQ on Environmental Restoration activities. The system uses a risk-based approach with the following three categories: (1) emergency activities, (2) activities needing attention soon to prevent further damage in the future, and (3) other activities with high benefits. Each activity receives a numerical score. This year's Hanford Environmental Restoration ADSs (Chapter 3.0) use the 1-4 priority system described previously.

1.8 MANAGEMENT AND EXTERNAL INTERACTIONS

The following sections define the roles and responsibilities for organizations performing environmental activities at the Hanford Site. The sections also discuss the roles of external agencies with respect to the environmental activities at the Hanford Site.

1.8.1 The U.S. Department of Energy Management Structure and Approach

The DOE consists of line organizations fully responsible for their own activities. Operational programs and activities related to environmental protection, radiation and reactor safety, and worker and public health and safety are included in those responsibilities.

The DOE-HQ has established and manages field offices around the country, including DOE-RL. The DOE-HQ sets national energy policy; provides guidance to the field offices, including headquarters-level DOE orders; provides oversight for field office activities; assembles budget requests from field office input for submittal to the U.S. Congress; prepares and issues top-level plans, such as the DOE-HQ Five-Year Plan (DOE 1990b); and guides preparation of field office plans (such as this plan).

The DOE-HQ has assigned to DOE-RL the responsibility and authority for the management of the Hanford Site, including responsibility for the Hanford Site's environmental activities. Figure 1-2 shows the DOE-RL organization.

The DOE-RL prepares budget submittals necessary to meet environmental and waste management requirements. The DOE-RL also reviews and approves all information related to Hanford Site environmental and waste management activities being transmitted to agencies and organizations outside of the Hanford Site. Due to increased emphasis on the Hanford Site's environmental missions, the DOE-RL manager now reports directly to the director of the DOE-HQ Office of Environmental Restoration and Waste Management. This change was announced in July 1990. The DOE-RL manager formerly reported to the Secretary of Energy.

The Office of Deputy Manager for Environmental Restoration and Projects contains the Office of Assistant Manager for Projects and the Office of Assistant Manager for Environmental Management. The Projects Office is responsible for vitrification, the Waste Receiving and Processing Plant, and other projects. The Environmental Management Office contains the Research and Development Division and the Environmental Restoration Division.

The Office of Deputy Manager for Operations and Support contains the Office of Assistant Manager for Operations, Office of Assistant Manager for Technical Support, and the Tank Farm Project Office.

The balance of the DOE-RL organizations shown in Figure 1-2 have direct or indirect responsibilities for the activities in this plan.

1.8.2 Hanford Site Prime Contractor Organization and Responsibilities

Hanford Site contractors include the following: Westinghouse Hanford Company (Westinghouse Hanford), the operating and engineering contractor (including its subcontractor BCS Richland, Inc.); the Pacific Northwest Laboratory (PNL) operated by Battelle Memorial Institute; Kaiser Engineers Hanford, the engineering and construction services contractor; and the Hanford Environmental Health Foundation. Each contractor is responsible for the following: (1) the safe, environmentally sound maintenance and operation of its designated facilities, (2) specific facility upgrades, (3) operational support, (4) waste management, and (5) monitoring of operations and effluents for environmental compliance. Plant or building managers have first-line responsibility to operate their facilities in a safe, environmentally sound manner.

Most waste operations activities, environmental corrective activities and remedial actions, and D&D of surplus facilities conducted at the Hanford Site are performed by or under contract to Westinghouse Hanford, the operations and engineering contractor. Westinghouse Hanford has been assigned the responsibility for management of the defense waste management program, implementation of the environmental restoration program and the Tri-Party Agreement, and management of the Hanford Environmental Compliance project.

Figure 1-2. Department of Energy-Richland Operations Office Organization.

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Kaiser Engineers Hanford ensures that environmental design requirements are met and provides project and construction support. The Hanford Environmental Health Foundation provides nonradiological environmental, effluent, and sanitary water surveillance services for the Hanford Site.

The PNL, research and development contractor, performs environmental and waste management research and development, provides an independent sitewide environmental surveillance program, remediates assigned facilities, and applies waste management technology to support operations and environmental restoration at other DOE sites. The PNL is responsible for waste management and environmental compliance at its assigned facilities. The PNL will manage and staff the newly created Environmental Science Research Center, which will conduct research and development activities to support technologies for waste site characterization and environmental cleanup and site characterization. The PNL is also responsible for developing, jointly with Westinghouse Hanford, and implementing the Hanford Science and Technology Program to provide site-specific science and technology support to environmental restoration and waste management operations.

The Hanford Site contractors also conduct programs that apply waste management technology to support waste management operations, environmental restoration, and environmental corrective activities at other DOE sites.

1.8.3 Interaction With Offsite Agencies and Organizations

Several Federal, State, and local agencies are responsible for enforcing environmental regulations at the Hanford Site. Principal among these agencies are the EPA; the State of Washington Departments of Ecology and Health; the Benton-Franklin County Health Department; and the Benton, Franklin, and Walla Walla Counties Air Pollution Control Authority. These agencies issue permits, review compliance reports, participate in joint monitoring programs, inspect facilities and operations, and/or enforce compliance with applicable regulations.

The EPA develops, promulgates, and enforces environmental protection standards and regulations as directed by statutes passed by the Congress. In instances where regulatory authority can be delegated, the EPA delegates regulatory authority to Ecology for state programs that meet or exceed EPA requirements. Where regulatory authority is not delegated (e.g., CERCLA), EPA Region 10 (which includes the State of Washington and the Hanford Site) is responsible for reviewing and evaluating compliance with the EPA regulations as they pertain to the Hanford Site. This includes interpreting regulations, consulting with DOE-RL and its contractors to aid regulation implementation, inspecting facilities and operations at the Hanford Site, and assisting appropriate state agencies in regulating operations at the Hanford Site.

The Tri-Party Agreement is a legally enforceable agreement that establishes jurisdictions, authorities, and other legal responsibilities among the State of Washington, EPA, and DOE. The Tri-Party Agreement represents a commitment by DOE-HQ and DOE-RL to the citizens of the Pacific Northwest to meet specific milestones and complete specified actions by the year 2018.

The agreement includes three attachments: (1) a letter from the Department of Justice recognizing the enforceability provision of the Tri-Party Agreement, (2) an action plan for carrying out the Tri-Party Agreement, and (3) a mutual funding agreement between DOE and the State of Washington. The action plan defines how the parties will work together, describes the processes and procedures to be followed, defines the units to be addressed, and provides a schedule with enforceable milestones for conduct of work. The agreement addresses those actions necessary to achieve the full RCRA compliance and a final RCRA permit for the Hanford Site (including closure of inactive RCRA TSD units) and cleanup of inactive waste sites as remedial actions under CERCLA or under RCRA corrective action authority. Other requirements necessary for the Hanford Site's environmental compliance, such as those required by the Clean Air Act or Clean Water Act, are not covered under the agreement.

The U.S. Army Corps of Engineers, North Pacific Division, Washington, has entered into an Interagency Agreement with the DOE-RL to participate in the environmental restoration and cleanup of hazardous materials and waste at the Hanford Site. Under the Interagency Agreement, the Corps of Engineers Walla Walla District will provide support for waste management and environmental compliance activities and the cleanup of inactive hazardous, mixed, and radioactive waste sites, which include the following:

- Technical and cost engineering services
- Sitewide topographic and geographic surveys of monitoring wells and inactive waste sites
- Management of certain operation units' assessment and cleanup activities.

The Corps of Engineers will establish a project office in the Tri-Cities to manage their onsite workload and coordinate with DOE-RL. Initially, the majority of the Corps of Engineers work will be done at Walla Walla; however, as the project field work increases in scope, additional personnel will be located at the Hanford Site. The Corps of Engineers cleanup efforts will be conducted in full compliance with the agreed-to milestones within the Tri-Party Agreement.

Other external organizations are also involved in the Hanford Site's environmental activities. The Corps of Engineers, in addition to their new role discussed above, regulates activities and land use up to the high-water marks on the banks of the Columbia River on the Hanford Site. The U.S. Department of Transportation regulates interstate transport of commodities, hazardous substances, and hazardous waste. The State of Washington Department of Health provides radiological support to State agencies, is the primary authority for Washington State drinking water and radionuclide air emission permit programs, and participates with DOE-RL in radiological monitoring of the environment. The U.S. Fish and Wildlife Service and Washington State Departments of Fisheries and Game assist in wildlife and fisheries management on and around the Hanford Site. The Washington State Department of Agriculture certifies and licenses all Hanford Site applications of pesticides. The Agency for Toxic Substances and Disease Registry is required to

perform health assessments for each of the four National Priorities List (NPL) sites at the Hanford Site (see Chapter 3.0). The National Park Service is preparing an EIS on the Hanford Reach of the Columbia River.

1.8.4 Interactions with Indian Governments

The DOE recognizes Tribal sovereignty and applicable treaty rights for affected nations regarding both activities on the Hanford Site and Headquarters activities which may affect such rights.

Tribal participation in five-year plan efforts is as follows: the Yakima Indian Nation and the Confederated Tribes of the Umatilla Indian Reservation participate in the DOE-HQ State and Tribal Government Working Group (so do the Shoshone and Bannock Tribes of the Fort Hall Indian Reservation near the Idaho National Engineering laboratory). The Yakima Indian Nation and the Confederated Tribes of the Umatilla Indian Reservation receive grants from the DOE-RL to support their review of the Hanford Site five-year plan. They participate in the working group for the Hanford Site five-year plan, as does the Nez Perce Tribe. The DOE is considering a grant to the Nez Perce Tribe. The DOE invited affected Indian government participation in the Hanford Site five-year plan in respect of their interest in site remediation interests.

The Hanford Site is located on lands ceded to the United States Government by the Yakima and Umatilla Indians and is adjacent to lands ceded by the Nez Perce Indians. The Yakima Indian Nation and Confederated Tribes of the Umatilla Indian Reservation have reservations near the Hanford Site. Treaties with these entities in 1855* established the reservations and provided the basis for the ceded lands. The treaties also retained for the tribes certain rights and privileges on lands that had been ceded. As part of the 1855 treaty, the three Indian tribes were assured the right to fish at all of their usual and accustomed places. The treaty also retained the privilege of hunting, gathering roots and berries, and pasturing horses and cattle on open and unclaimed lands.

There are other Indian tribes in the area whose ceded lands did not include any portion of the Hanford Site. These tribes make use of the Columbia River for fishing or may be affected by transportation of wastes to or from the Hanford Site.

Although the Hanford Site is located outside the boundaries of any present Indian reservation, DOE recognizes that tribes have retained treaty rights in off-reservation areas, including those lands ceded in the treaties.

Under the laws of the United States, Indian nations have been treated as "dependent" sovereign nations, reserving unto the tribes all governmental power not granted to the United States. For instance, the Yakima Reservation, the exclusive homeland of the Yakima Nation, is explicitly subject to the laws

*Reference "Treaty Between the United States and the Yakima," 1855, 12 Stat. 95 and "Treaty with the Walla Walla, Cayuse, etc.," 1855, 12 Stat. 945, "Treaty with the Nez Perce," 1855, 12 Stat. 957.

of the governmental body of the Yakima Indian Nation. The treaty with the Yakima ("1855 Treaty" or "Stevens Treaty") clearly states that the signatory fourteen tribes and bands "for the purposes of this treaty are to be considered as one nation."

The United States of America has long recognized the treaty-reserved possessory and usage rights to off-reservation fisheries. The United States of America has long recognized the treaty-reserved rights to fish at all usual and accustomed places, hunt, gather, pasture animals, and travel in open unclaimed lands within their ceded areas. Further, the United States of America and the Supreme Court recognize and respect the Indian nations' cultural and religious relationship with the land, water, and all growing things within their native area, and their fundamental beliefs that the interdependence and protection of the land, water, and all living things are a sacred duty under the Creator's law.

The tribes retain certain rights as sovereign governments and in order for these rights to be respected and protected, a government-to-government relationship between the tribes and the United States must be maintained. As part of its trust responsibility, DOE will work with the Indian governments on a government-to-government basis.

1.8.5 Public Involvement

The DOE is committed to the participation of affected States, such as Washington and Oregon and the public in the planning and implementation process. Activities such as involving these groups in preparation of major planning documents, such as this site-specific plan, will continue even though they are not required by law.

This plan will have a 60-day public comment period and a series of public meetings will be conducted. Responses to comments will be issued late in 1991 in a comment response document and will be incorporated into next year's plan.

Cleaning up past-practice waste sites and permitting active TSD units require considerable public involvement. Details of how public input for the Hanford Site will be sought, accepted, and acted upon have been developed into the *Community Relations Plan for the Hanford Site* (Ecology et al. 1989).

The goal of the Community Relations Plan is to meet or exceed all legal community involvement requirements of the CERCLA, RCRA, and the *Washington Hazardous Waste Management Act of 1975-1976* [Revised Code of Washington (RCW) 70.105] (RCWA 1991). Community involvement for specific cleanup activities also will be required to meet the public participation requirements of the NEPA, as necessary.

Following are the objectives of the Community Relations Plan.

- Present understandable, consistent information to the public.
- Assist in establishing two-way communication between the three agencies and affected or interested communities...
- Provide opportunities for the public to become involved in the decision-making processes for permitting, closure, and selecting remedial alternatives.

To accomplish the objectives of the Community Relations Plan, certain activities are conducted, including the following.

- Hold information meetings to be held throughout the state, additional public meetings as required, and public hearings when they are specifically requested for draft permits.
- Provide speakers to group meetings and forums whenever possible.
- Accept and respond to written comments by the EPA, Ecology, and other regulatory agencies during specific comment periods.
- Provide briefings for elected and appointed officials, agency representatives, and Indian nations.
- Conduct news media activities such as news releases, editorial board meetings, and news conferences.
- Produce publications such as brochures, fact sheets, and a newsletter.
- Operate information repositories at Seattle, Richland, and Spokane, Washington; and Portland, Oregon.

A similar level of involvement will be sought for planning and decision making in the waste management area, particularly where related to NEPA, the State Environmental Policy Act, and decisions on treatment, storage, and/or disposal of Hanford Site waste inventories. There has been a commitment for a supplemental environmental impact statement (EIS) to address the issue of single-shell tank (SST) waste disposal. Additional NEPA documentation may also be prepared which will be subject to public review.

Additional material on public involvement, as well as cultural goals and status within DOE, is located in Section 6.1 of this plan. Included is discussion of a new openness with the public, two-way dialogue with affected parties and the public, an active public outreach program, more seeking of public advice, and easier and more timely access to information.

1.9 BASE ASSUMPTIONS

A number of assumptions were made in the preparation of this site-specific plan. Key assumptions are listed below.

- Required funding to meet Tri-Party Agreement commitments per requested changes in early 1991, are included in the plan as the required level for FY 1993 to FY 1997. Milestones in the Tri-Party Agreement are included in the site-specific plan as Priority 2 items or Priority 1 items if health or safety-related, or they are near-term activities (see priority definitions in Section 1.7).
- The plan assumes that no new environmental regulations will be issued between FY 1991 and 1997. Any new environmental regulations issued will have an unpredictable effect on costs. Therefore, effects from new regulations cannot be factored in.
- When facilities or waste sites constructed or in use before November 1988 become inactive, funding for their closure will be included in the environmental restoration category.
- The N Reactor is assumed to remain in a dry lay-up status. Future handling of N Reactor stored fuel is dependent upon the results of an EIS decision process.
- Oversight funding (i.e., State, EPA, or outside agency involvement) will not increase from current levels in ADSs.
- The Waste Isolation Pilot Plant (WIPP) will operate and receive transuranic (TRU) waste from the Hanford Site.
- The Fast Flux Test Facility (FFTF) is assumed to be operating from FY 1991 to 1997. The funding source will transfer back to the Nuclear Energy Program after FY 1991, which is outside of the scope of this plan, which addresses Environmental Management.

1.10 PLANNING CASES

Two planning cases for 1993 to 1997 are represented in this plan. They are known as the "Preliminary Unvalidated Case" and the "Validated Target Level." The Preliminary Unvalidated Case represents a preliminary estimate of funding needing to ensure protection of the public and worker health and safety, to carry out the agreements entered into by DOE, to ensure compliance with applicable environmental requirements, and to implement other desired improvements. The Preliminary Unvalidated Case is a success-oriented case intended to support site safety, compliance with all regulatory statutes and laws, and Tri-Party Agreement commitments and proposed change requests.

(Change requests were submitted in February 1991 followed by negotiations and public meetings). The Validated Target Level provides a 10 percent annual increase for the defense-related Environmental Restoration and Waste Management Program. The program grows at 10 percent per year even in the context of declining statutory caps for the overall defense category which were insisted upon by Congress. Under the Validated Target Level, consistent with the Environmental Restoration and Waste Management Program prioritization philosophy, priority 1 activities would be funded at the largest percentage of the Preliminary Unvalidated Case. Priority 4 activities would receive the lowest percentage of the field-office requested funding.

Neither the Preliminary Unvalidated Case nor the Validated Target Level necessarily reflects the actual amount of money that will be allocated to the Environmental Restoration and Waste Management Program between FY 1993 and FY 1997. Actual funding will depend upon further priority setting in the context of the annual budget and appropriations process.

The Validated Target Level is a much lower budget planning case based on guidance from the Office of Management and Budget. Most Tri-Party Agreement milestones are significantly delayed with this case. In some cases, the delay cannot be quantified until the actual appropriation level associated with each activity is determined. The text of this plan is written around the Preliminary Unvalidated Case. Budgets and schedules are presented for both cases at the ends of the waste management, environmental restoration, and corrective activities chapters. The two cases are intended to bracket the amount of funding that can be realistically expected to be received. Any delays to currently negotiated Tri-Party Agreement Milestone dates would require renegotiation. As examples, the following Tri-Party Agreement major milestones would be delayed if the Hanford Site received funding at the Validated Target Level:

• M-02-00	Initiate Pretreatment Operations for Double-Shell Tank Waste	To be determined
• M-03-00	Hanford Waste Vitrification Plant Hot Startup	Delay to be determined
• M-05-09	SST Stabilization and isolation	1-2 year delay
• M-17-02	200 Area Treated Effluent Disposal Facility	Delay to be determined
• M-17-08	B Plant Environmental Compliant Upgrades	Delay to be determined
• M-18-00	Waste Receiving and Processing Plant Phase I Operations	Delayed beyond 1997
• M-19-00	Waste Receiving and Packaging Plant Phase II Operations	Delayed beyond 2000

1.11 FUNDING SUMMARY

Total summary costs for waste management operations, environmental restoration, and corrective activities are presented in Table 1-1. These costs are those projected to be necessary in the Preliminary Unvalidated Case and Validated Target Level ADSs issued in 1991 (DOE-RL 1991), which cover the period FY 1991 to FY 1997. All priority levels are included (1 through 4) as defined in Section 1.7. Section 1.12 gives more detail on the ADS planning process. Figures 1-3 and 1-4 presents this cost information in bar graph form for the two cases. The data are further broken down by priority in Table 1-2 and Figures 1-5 and 1-6.

Further detail on costs is located in Chapters 2.0 through 5.0 for waste management operations, environmental restoration, corrective activities, and technology development.

1.12 PLANNING PROCESS

Figure 1-7 is a chart covering the planning cycles for the DOE-HQ Five-Year Plan, this site-specific plan, and the ADSs. The preparation of ADSs will coincide with the annual Federal budget preparation process, which starts two years before the year of authorization. The DOE-RL site-specific plan will be updated annually to reflect changes developed during the ADS completion process. The DOE-HQ Five-Year Plan will be updated annually. The annual updates will be prepared with field office input in the form of ADSs.

The ADSs are the backbone of the site-specific and DOE-HQ plans. These sheets are four-page (average) reports on activities planned in the categories of waste management operations, environmental restoration, and corrective activities. The sheets include information on budget requirements for the activity, the category, the priority, milestones, and a brief narrative description. These sheets for DOE-RL were revised and issued in 1991 (DOE-RL 1991). An example ADS is shown in Figure 1-8. (This plan is based on the 1991 ADSs.)

Federal and State regulators and affected Indian nation representatives will be involved in the review of the site-specific plan and ADSs each year. The plan will also be issued for public review and comment for 60 days. A comment response document will be produced several months later. Comments will be incorporated into the next scheduled update. The review period for this plan is scheduled to begin in September 1991.

1.13 PLAN ORGANIZATION

The remainder of this plan is divided into twelve major chapters.

- Chapters 2.0 through 5.0 present DOE-RL activities in the categories of waste management operations, environmental restoration, corrective activities, and technology development. Funding details and schedules are located in Chapters 2.0 through 5.0.

Table 1-1. Total Funding Summary for the Hanford Site by Category.

Category totals	Site-specific plan dollar summary (\$000)						
	FY 1991 budget ^a	FY 1992 Bush ^b	FY 1993 target	FY 1994 target	FY 1995 target	FY 1996 target	FY 1997 target
PRELIMINARY UNVALIDATED CASE							
Waste Management ^d	643,539	763,785	1,274,565	1,438,395	1,552,623	1,737,298	1,745,000
Environmental Restoration ^c	130,851	154,900	236,604	313,949	411,218	419,485	430,208
Corrective Activities	<u>22,795</u>	<u>13,977</u>	<u>2,455</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
SUBTOTAL	797,185	932,662	1,513,624	1,752,344	1,963,841	2,156,783	2,175,208
Incremental Tri-Party Agreement Funding Requirement ^e	2,500	135,900	140,200	0	0	0	0
Technology Development	<u>23,456</u>	<u>36,117</u>	<u>37,454</u>	<u>129,913</u>	<u>83,500</u>	<u>50,417</u>	<u>TBD</u>
TOTAL	823,141	1,104,679	1,691,278	1,882,257	2,047,341	2,207,200	2,175,208
VALIDATED TARGET LEVEL							
Waste Management	643,539	763,785	900,567	929,781	986,526	1,149,346	1,262,181
Environmental Restoration	130,851	154,900	169,514	172,907	181,790	189,877	200,238
Corrective Activities	22,795	13,977	2,455	0	0	0	0
Technology Development	<u>23,456</u>	<u>36,117</u>	<u>37,454</u>	<u>129,913</u>	<u>83,580</u>	<u>50,417</u>	<u>TBD</u>
TOTAL	820,641	968,779	1,109,990	1,232,601	1,251,896	1,389,640	1,462,419

^a FY 1991 does not include \$14,600k carryover but does include requested \$40,200k supplemental funding.

^b FY 1992 includes a reduction of \$40,200k which was accelerated to FY 1991 (refer to footnote a).

^c FY 1995-1997 are in constant FY 1994 (no escalation factored in dollars).

^d Waste Management includes landlord activities. Incremental funding requirements identified for waste tank safety and tank farm upgrades are not included.

^e Represents incremental funding requirements resulting from the May 1991 renegotiated Tri-Party Agreement. These negotiations occurred subsequent to the submittal of the Hanford Activity Data Sheets therefore the requirements are not reflected in the totals. No incremental requirements have been identified at this time for FY 1994 through 1997.

Figure 1-3. Total Costs by Category for All Activities - Preliminary Unvalidated Case.

Figure 1-4. Total Costs by Category for All Activities - Validated Target Level.

Table 1-2. Total Funding Summary by Category and Priority.

Category totals	Site-specific plan dollar summary (\$000)						
	FY 1991 budget ^a	FY 1992 Bush ^b	FY 1993 target	FY 1994 target	FY 1995 target	FY 1996 target	FY 1997 target
PRELIMINARY UNVALIDATED CASE							
Waste Management ^d							
Priority 1	576,482	649,524	1,088,711	1,209,911	1,220,847	1,339,872	1,241,169
Priority 2	61,591	96,831	165,287	203,868	260,982	315,689	389,685
Priority 3	5,077	17,237	20,127	20,813	61,976	74,805	110,017
Priority 4	389	193	440	3,803	8,818	6,932	4,129
Subtotal	643,539	763,785	1,274,565	1,438,395	1,552,623	1,737,298	1,745,000
Environmental Restoration ^c							
Priority 1	25,002	29,677	20,884	20,884	33,154	30,366	26,479
Priority 2	105,149	124,414	215,479	277,168	372,965	383,273	397,918
Priority 3	700	284	0	0	1,251	742	894
Priority 4	0	525	241	241	3,848	5,104	4,917
Subtotal	130,851	154,900	236,604	313,604	411,218	419,485	430,208
Corrective Activities							
Priority 1	22,795	13,977	2,455	0	0	0	0
Technology Development	23,456	36,117	37,454	129,913	83,500	50,417	TBD
SUBTOTAL	820,641	968,779	1,551,078	1,882,257	2,047,341	2,207,200	2,175,208
Incremental ^e Tri-Party Agreement Funding Requirement	2,500	135,900	140,200	0	0	0	0
TOTAL	823,141	1,104,679	1,691,278	1,882,257	2,047,341	2,207,200	2,175,208
VALIDATED TARGET LEVEL							
Waste Management							
Priority 1	576,482	649,524	748,900	748,057	792,163	940,785	1,042,611
Priority 2	61,591	96,831	135,055	164,105	181,352	194,676	200,965
Priority 3	5,077	17,237	16,540	13,803	11,482	10,280	10,594
Priority 4	389	193	72	3,816	1,529	3,605	8,011
Subtotal	643,539	763,785	900,567	929,781	986,526	1,149,346	1,262,181
Environmental Restoration							
Priority 1	25,002	29,677	17,950	23,658	24,642	25,675	23,359
Priority 2	105,149	124,414	151,564	149,249	157,148	164,202	176,879
Priority 3	700	284	0	0	0	0	0
Priority 4	0	525	0	0	0	0	0
Subtotal	130,851	154,900	169,514	172,907	181,790	189,877	200,238
Corrective Activities							
Priority 1	22,795	13,977	2,455	0	0	0	0
Technology Development	23,456	36,117	37,454	129,913	83,500	50,417	TBD
TOTAL	820,641	968,779	1,109,990	1,232,601	1,251,816	1,389,640	1,462,419

^aFY 1991 does not include \$14,600k carryover but does include requested \$40,200k supplemental funding.

^bFY 1992 includes a reduction of \$40,200k which was accelerated to FY 1991 (refer to footnote a).

^cFY 1995-1997 are in constant FY 1994 (no escalation factored in dollars).

^dWaste Management includes landfill activities. Incremental funding requirements identified for waste tank safety and tank farm upgrades are not included.

^eRepresents incremental funding requirements resulting from the May 1991 renegotiated Tri-Party Agreement. These negotiations occurred subsequent to the submittal of the Hanford Activity Data Sheets therefore the requirements are not reflected in the totals. No incremental requirements have been identified at this time for FY 1994 through 1997.

Figure 1-5. Preliminary Unvalidated Case - Total Costs by Priority for All Activities (excluding Technology Development).

Figure 1-6. Validated Target Level - Total Costs by Priority for All Activities (excluding Technology Development).

Figure 1-7. Five-Year Planning Process.

Figure 1-8. Example Activity Data Sheet. (sheet 1 of 8)

Environmental Restoration and Waste Management Five-Year Plan
 REPORT ON BOTH CASE 1 AND CASE 3
 DATE: 05/01/1991 Activity Data Sheet TIME: 10:56:13

Operations Office: RL ID No.: 9215-2K Last Update: 03/18/1991
 Activity Title: HAZARDOUS WASTE MANAGEMENT
 Installation: HANFORD-200 RCRA/CERCLA: OM NEPA: N/A
 Category: WM Program: EM Desc.: Storage Sub Desc:
 Fac/WAG: 616 HAZARDOUS WASTE STORAGE BLDG Prior: 1 -A
 Cost LOC: H Sched LOC: H Scope LOC: Waste Type: Haz/Toxic TDD #:
 LI No.: TEC - Contingency: 0 TEC: 0
 Regulatory Drivers: RCRA, , , ,

CASE 1

		(Dollars in Thousands)						
	B&R Code	FY91	FY92	FY93	FY94	FY95	FY96	FY97
OP	EW301030	0	0	1,645	1,776	1,847	1,921	1,998
CE	35EW30107	0	250	250	0	0	0	0
GPP	39EW30107	0	100	150	0	0	0	0
LI	39EW30107	0	0	0	0	0	0	0
TOT		0	350	2,045	1,776	1,847	1,921	1,998

Pre-Existing Waste: 0 % Current/Future DP Waste: 0 %
 Current/Future EM-40 Waste: 0 % Current/Future Other Waste: 100 %

CASE 3 Last Update: 03/18/1991 Approved Date: 04/30/1991
 RCRA/CERCLA: OM NEPA: N/A
 Cost LOC: H Sched LOC: H Scope LOC: Waste Type: Haz/Toxic
 LI No.: TEC - Contingency: 0 TEC: 0
 Regulatory Drivers: RCRA, , , ,

		(Dollars in Thousands)						
	B&R Code	FY91	FY92	FY93	FY94	FY95	FY96	FY97
OP	EW301030	0	0	1,802	1,874	1,948	2,021	2,098
CE	35EW30107	0	250	250	0	0	0	0
GPP	39EW30107	0	100	150	0	0	0	0
LI	39EW30107	0	0	0	0	0	0	0
TOT		0	350	2,202	1,874	1,948	2,021	2,098

Pre-Existing Waste: 0 % Current/Future DP Waste: 0 %
 Current/Future EM-40 Waste: 0 % Current/Future Other Waste: 100 %

A-106:

Tiger Team: WM/BMPF-3 - 08/10/1990

Approved By: BRACKEN, KW
 Auxiliary Fields:

App. Date: 04/30/1991

ADS Relation: ADS SAME

ADS#'s: 9215

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Percent Breakdown of Cost Change (must total 100%)
-----New Scope: 0%
DOE Orders: 0%New Activities: 0%
Revised Est: 0%Agreement: 0%
Other: 100%

Reason:

Escalated 1993 through 1997 per DOE-HQ guidance.

ADS CASE 1 NARRATIVE HAZARDOUS WASTE MANAGEMENT

---01. ACTIVITY SCOPE:---

This provides funding for the operations of a permitted 616 Nonradioactive Dangerous Waste Storage Facility, per WAC 173-303. The 616 Building services as a centralized Hanford Facility to segregate and store dangerous wastes prior to offsite shipment for treatment/disposal. Approximately 12 to 15 times per year the waste is manifested, inspected, and shipped offsite for treatment/disposal. The DOE has committed to direct fund approximately 60 percent of this Solid Waste activity. The remaining 40 percent will be funded as part of the chargeback/assessment program. The 1992 required budget case was adjusted to reflect the 60/40 split.

---02. HISTORICAL TO DATE:---

The facility receives 1,000 - 2,000 drums a year from onsite generators to be shipped offsite for processing.

---03. FIVE-YEAR PROJ PLAN:---

A capital work order will be issued (Project W-196) to construct a facility covered dock which provides spill containment and prevents water intrusion and ice build-up in the drum handling area. The capital equipment provides a chemical vapor hood to allow for waste package sampling and verification. Detailed design is scheduled to be completed August 1992 and begin construction November 1992 - May 1993.

---04. ACTIVITY TERM:---

No start/end date - continuing operations.

---05. CURRENT YEAR DESC:---

See activity scope for base program. Additional funding will be spent to repair cracks in the concrete walls of 616 holding cells.

---06. BUDGET YEAR DESC:---

Begin detailed design on CWO W-196 to construct a covered loading dock and install a chemical vapor hood. This CWO will allow for waste packaging sampling and verification. Expand the drum unloading pad (asphalt) to provide better staging of hazardous waste transport vehicles.

---07. PLANNING YEARS DESC:---

Continue to receive, store, and ship 1,000 to 2,000 drums of nonradioactive hazardous waste annually. Complete CWO W-196 construction of a facility

Figure 1-8. Example Activity Data Sheet. (sheet 3 of 8)

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covered dock with sampling capabilities.

---08. KEY ASSUMPTIONS:---

Funding a base program from the Waste Management Financial Plan will provide a stable disposal rate allowing waste generators to adequately plan for future disposal costs. The DOE has committed to direct fund approximately 60 percent of this activity in 1993. The remaining 40 percent will remain as part of the chargeback/assessment program. The costs were derived from operating history gained since 1985 when the facility began operating along with engineering estimates for the upgrade work.

---09. DRIVERS:---

This activity is necessary to ensure that hazardous waste generated from Hanford activities are safely managed in compliance with WAC 173-303 and DOE Order 5400.1. Severe onsite program and resource impacts would occur if this work was suspended. RCRA and Washington State requires the sampling of waste for offsite shipment treatment (Project W-196).

---10. CONSEQUENCES:---

Sampling is not available at the 616 Facility. The requirement for sampling is expected to be mandated by WDOE. This would result in each hazardous waste generator storing waste in excess of the 90-day regulatory requirements, thereby shutting down operations. Each waste generator could then submit permits as storage facilities. This would result in a severe duplication of effort and waste of money. Rather than direct funding, chargeback/assessment could be utilized. Without direct funding, repairs and upgrades will be deferred to out years.

ADS CASE 3 NARRATIVE HAZARDOUS WASTE MANAGEMENT

---01. ACTIVITY SCOPE:---

This provides funding for the operations of a permitted 616 Nonradioactive Dangerous Waste Storage Facility, per WAC 173-303. The 616 Building services as a centralized Hanford Facility to segregate and store dangerous wastes prior to offsite shipment for treatment/disposal. Approximately 12 to 15 times per year the waste is manifested, inspected, and shipped offsite for treatment/disposal. The DOE has committed to direct fund approximately 60 percent of this Solid Waste activity. The remaining 40 percent will be funded as part of the chargeback/assessment program. The 1992 required budget case was adjusted to reflect the 60/40 split.

---02. HISTORICAL TO DATE:---

The facility receives 1,000 - 2,000 drums a year from onsite generators to be shipped offsite for processing.

---03. FIVE-YEAR PROJ PLAN:---

A capital work order will be issued (Project W-196) to construct a facility covered dock which provides spill containment and prevents water intrusion and ice build-up in the drum handling area. The capital equipment provides a chemical vapor hood to allow for waste package sampling and verification. Detailed design is scheduled to be completed August 1992 and begin construction November 1992 - May 1993.

Figure 1-8. Example Activity Data Sheet. (sheet 4 of 8)

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---04. ACTIVITY TERM:---

No start/end date - continuing operations.

---05. CURRENT YEAR DESC:---

See activity scope for base program. Additional funding will be spent to repair cracks in the concrete walls of 616 holding cells.

---06. BUDGET YEAR DESC:---

Begin detailed design on CWO W-196 to construct a covered loading dock and install a chemical vapor hood. This CWO will allow for waste packaging sampling and verification. Expand the drum unloading pad (asphalt) to provide better staging of hazardous waste transport vehicles.

---07. PLANNING YEARS DESC:---

Continue to receive, store, and ship 1,000 to 2,000 drums of nonradioactive hazardous waste annually. Complete CWO W-196 construction of a facility covered dock with sampling capabilities.

---08. KEY ASSUMPTIONS:---

Funding a base program from the Waste Management Financial Plan will provide a stable disposal rate allowing waste generators to adequately plan for future disposal costs. The DOE has committed to direct fund approximately 60 percent of this activity in 1993. The remaining 40 percent will remain as part of the chargeback/assessment program. The costs were derived from operating history gained since 1985 when the facility began operating along with engineering estimates for the upgrade work.

---09. DRIVERS:---

This activity is necessary to ensure that hazardous waste generated from Hanford activities are safely managed in compliance with WAC 173-303 and DOE Order 5400.1. Severe onsite program and resource impacts would occur if this work was suspended. RCRA and Washington State requires the sampling of waste for offsite shipment treatment (Project W-196).

---10. CONSEQUENCES:---

Sampling is not available at the 616 Facility. The requirement for sampling is expected to be mandated by WDOE. This would result in each hazardous waste generator storing waste in excess of the 90-day regulatory requirements, thereby shutting down operations. Each waste generator could then submit permits as storage facilities. This would result in a severe duplication of effort and waste of money. Rather than direct funding, chargeback/assessment could be utilized. Without direct funding, repairs and upgrades will be deferred to out years.

CASE 1
MILESTONES

UPDATE NONRADIOACTIVE DANGEROUS WASTE
PACKAGING AND DISPOSAL
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF
NONRADIOACTIVE HAZ WAS

Start Date	End Date	Lev
/ /	03/31/1991	
/ /	09/30/1991	

Figure 1-8. Example Activity Data Sheet. (sheet 5 of 8)

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BEGIN DETAILED DESIGN OF W-196 LOADING DOCK UPGRADES	/ /	01/31/1992
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING AND DISPOSAL	/ /	03/31/1992
COMPLETE DETAILED DESIGN OF W-196 LOADING DOCK UPGRADES	/ /	08/30/1992
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1992
BEGIN CONSTRUCTION OF DOCK UPGRADES AND VAPOR HOOD	/ /	11/30/1992
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING AND DISPOSAL	/ /	03/31/1993
COMPLETE CONSTRUCTION OF DOCK UPGRADES AND VAPOR HOOD	/ /	05/30/1993
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1993
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING AND DISPOSAL	/ /	03/31/1994
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1994
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING & DISPOSAL	/ /	03/31/1995
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1995
UPDATED NONRADIOACTIVE DANGEROUS WASTE PACKAGING & DISPOSAL	/ /	03/31/1996
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1996
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING & DISPOSAL	/ /	03/31/1997
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1997

CASE 3
MILESTONES

	Start Date	End Date	Lev
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING AND DISPOSAL	/ /	03/31/1991	
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1991	
BEGIN DETAILED DESIGN OF W-196 LOADING DOCK UPGRADES	/ /	01/31/1992	
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING AND DISPOSAL	/ /	03/31/1992	
COMPLETE DETAILED DESIGN OF W-196 LOADING DOCK UPGRADES	/ /	08/30/1992	
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1992	
BEGIN CONSTRUCTION OF DOCK UPGRADES AND VAPOR HOOD	/ /	11/30/1992	
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING AND DISPOSAL	/ /	03/31/1993	
COMPLETE CONSTRUCTION OF DOCK UPGRADES AND VAPOR HOOD	/ /	05/30/1993	

Figure 1-8. Example Activity Data Sheet. (sheet 6 of 8)

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RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1993
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING AND DISPOSAL	/ /	03/31/1994
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1994
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING & DISPOSAL	/ /	03/31/1995
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1995
UPDATED NONRADIOACTIVE DANGEROUS WASTE PACKAGING & DISPOSAL	/ /	03/31/1996
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1996
UPDATE NONRADIOACTIVE DANGEROUS WASTE PACKAGING & DISPOSAL	/ /	03/31/1997
RECEIVE/STORE/SHIP 1000-2000 DRUMS OF NONRADIOACTIVE HAZ WAS	/ /	09/30/1997

FY93 BUDGET NARRATIVE

---12. FY 1993 NARRATIVE:---

Continue to operate the nonradioactive hazardous waste facility per current budget guidance. Begin construction of CWO W-196 for a facility covered dock and vapor hood for sampling capabilities in November 1992. Construction is scheduled to be completed in May 1993.

Figure 1-8. Example Activity Data Sheet. (sheet 7 of 8)

ADS FIELD DEFINITIONS

FIELD TITLE	DEFINITION
Last update	Date of last revision to the ADS
Date	Date the ADS was printed
Time	Time the ADS was printed
Operations Office - RL	Richland Operations Office - 4 character code indicating the Operations Office that controls the funding for an activity package
ID No.: 5303-EN	The first 4 numbers are the data sheet number, followed by a 2 space character field which may be used to associate records of the same project which have different funding sources, priorities, or any other reason
Activity Title	Brief description of activity described in the ADS
Installation - Hanford 300	The general name of each geographically separate facility. (Hanford 300 Area)
RCRA/CERCLA - RA	Phase of RCRA/CERCLA compliance - RA=Interim Action, Removal Action
NEPA - CE	Required NEPA (National Environmental Policy Act) documentation - CE=Categorical Exclusion
Category - ER	Environmental Restoration
Program - EM	Funding Source - Environmental Monitoring
Descriptor - RCRA/CERCLA	The B&R code descriptor which combined with the category and funding source and sub-descriptor will define the B&R code
Sub Desc - C	C=Cleanup
Facility/WAG - 300-FF-2	Specific location, specific building, or work area where activity is conducted
Priority - 2	Meet the terms of existing agreements between DOE and local, State and Federal agencies
Cost LOC - L	Cost Level of Confidence - Low (Project in early planning stages)
Sched LOC - L	Schedule Level of Confidence - Low (Project in early planning stages)
Case 1	Preliminary Unvalidated Case
Case 3	Validated Target Level

Figure 1-8. Example Activity Data Sheet. (sheet 8 of 8)

FIELD TITLE	DEFINITION
Scope LOC - L	Should reflect the degree of confidence that scope data presented in the ADS are realistic (low)
Waste Type - LLW-Mixed	Low Level Mixed Waste
TDD #	Technology Demonstration Number - EM-30 or EM-40 cross-reference to co-funded tech. projects
LI NO	Line Item number
TEC Contingency - 0	Total Estimated Line Item (LI) or General Plant Project (GPP) cost without contingency
TEC - 0	Total estimated cost of the LI or GPP number
Regulatory Drivers- RCRA, CERCLA, ORD, TRI	List of applicable statutes, agreements, regulations, permits, consent decrees and DOE orders that are key to the ADS activities. The first field should show the most important driver. RCRA=Resource Conservation and Recovery Act; CERCLA=CERCLA/SARA (Superfund) Reauthorized; ORD=Admin-, Consent-, or Compliance Order; TRI=DOE/EPA/State Agreements
B&R Code	Budget and Reporting Code - beginning with a letter = operating expenses (OBR), with 35 = capital equipment expenditures (CBR), with 39 = GPP or LI Plant expenditures (GBR or LBR)
OP	Operating Expense
CE	Capital Equipment Expense
GPP	General Plant Project
LI	Line Item
TOT	Total
A-106	The A-106 number associated with an activity
Tiger Team	The Tiger Team Finding number referenced in an Action Plan for an activity
App Date	Approval date
Auxiliary Fields	Field for future use
ADS Relation	Intended to provide a complete crosswalk from last years ADS's while still allowing the field the flexibility to add new, split, combine, or delete ADS's
Approved by	Name of the approving DOE individual for this activity

- Chapter 6.0 covers special topics of importance to stakeholders in Hanford Site cleanup--affected State and Indian governments, Congress and regulators, DOE-HQ, Hanford Site staff, and concerned citizens.
- Chapter 7.0 provides an overview of the applicability of quality assurance on planned activities.
- Chapter 8.0 discusses the Tri-Party Agreement.
- Chapter 9.0 lists applicable requirements, statutes, and DOE orders, and summarizes Indian nation treaty rights.
- Chapter 10.0 is an overview of NEPA activities.
- Chapter 11.0 lists required routine reports submitted to regulatory agencies and DOE-HQ and presents the status of records management activities.

Appendixes giving more detailed information follow the body of the document.

2.0 WASTE MANAGEMENT OPERATIONS

2.1 OVERVIEW

2.1.1 Requirements

The DOE-RL is committed to achieving and maintaining compliance with laws, regulations, and agreements to protect human health and the environment in the management of waste at the Hanford Site. The primary DOE orders governing waste management are as follows:

- DOE Order 5820.2A, *Radioactive Waste Management* (DOE 1988a)
- DOE Order 5400.1, *General Environmental Protection Program* (DOE 1990c)
- DOE Order 5400.3, *Hazardous and Radioactive Mixed Waste Program* (DOE 1989e).

Compliance with these DOE orders helps ensure the protection of the health and safety of the public, DOE and contractor employees, and the environment. These DOE orders require the reduction of waste generation and compliance with all applicable Federal, State, and local environmental, safety, and health laws and regulations.

The DOE-RL is committed to meeting the milestones set forth in the Tri-Party Agreement (Ecology et al. 1990). The Tri-Party Agreement is described in Chapter 8.0. Tri-Party Agreement milestones are included throughout the description of waste management activities.

2.1.2 Strategy

The waste management goals of the DOE-RL are to minimize the generation of waste and to maintain safe and environmentally sound TSD of:

(a) radioactive waste, (b) hazardous waste, and (c) radioactive waste containing hazardous components (mixed waste). Strategies to achieve these goals have been developed for the following waste types:

- Double-shell tank (DST) waste
- SST waste
- Cesium and strontium capsules
- Solid waste
 - Solid TRU waste
 - Solid low-level waste (LLW)

- Radioactive and hazardous (mixed) waste
- Hazardous waste.
- Contaminated liquid effluents.

The following TSD strategies are planned for these waste types:

- Double-Shell Tank Waste--Disposal of DST waste first requires separation of the waste into three fractions: high-level waste (HLW), TRU, and LLW. The HLW and TRU waste will be processed into a solid, vitrified material similar to glass and disposed of in a geologic repository. The LLW will be mixed with a cement-like material and allowed to harden in near-surface concrete vaults.
- Single-Shell Tank Waste--Disposal of SST waste is currently being developed under the environmental restoration program (see Chapter 3.0). The strategy is in accordance with the Hanford Site Defense Waste-Environmental Impact Statement (HDW-EIS) (DOE 1987b).
- Cesium and Strontium Capsules--Cesium and strontium capsules will continue to be stored for eventual disposal in a geologic repository. Conformance to repository waste acceptance criteria may require dismantling the capsules and treating the contents before final disposal.
- Solid Waste--Solid waste storage and disposal strategies are summarized below for the various types of waste material.
 - Retrievable solid TRU waste that has been stored since 1970 will be sorted and packaged in the planned Waste Receiving and Processing Facility for shipment to the WIPP in New Mexico.
 - Newly generated 55-gallon drums of TRU waste are labeled TRU or TRU-mixed waste and stored for eventual shipment to WIPP.
 - Storage and disposal of solid LLW requires continued use of onsite near-surface trenches. Performance assessments have been initiated to demonstrate compliance with the performance objectives of DOE Order 5820.2A (DOE 1988a).
 - Contact-handled LLW-mixed waste will be stored in RCRA-approved buildings for eventual treatment in the Waste Receiving and Processing Facility or other facilities, if needed, for eventual disposal in RCRA-approved, double-lined, near-surface trenches.
 - The option of land disposal of remote-handled mixed waste was requested of Ecology and is still under review. This is felt to be desirable for as low as reasonably achievable exposure considerations.

- Nonradioactive hazardous waste will continue to be shipped offsite for treatment and disposal.
- Contaminated Liquid Effluents--The strategy to dispose of contaminated liquid effluents presently discharged to the soil column is to apply the best available technology for treatment and disposal. Plans and schedules to discontinue the disposal of contaminated liquids into the soil column at the Hanford Site have been prepared.

Wastes will continue to be stored in a manner that protects human health and the environment. Storage will continue until treatment and disposal processes are implemented.

An overview of the present inventory and projected receipts is provided in Table 2-1.

Table 2-1. Overview of Present and Projected Waste Inventory.

Types of wastes	Present inventory in cubic meters	Projected 30-year receipts in cubic meters
1. Double-shell tank wastes	88,200	104,000 ^a
2. Single-shell tank wastes	139,000 ^b	None
3. Encapsulated cesium and strontium	4	None
4. Solid waste ^f		
Solid transuranic wastes	15,500	13,600
Solid low-level waste	574,000 ^c	230,000
Mixed wastes	10,800	45,000
Hazardous wastes	None ^d	Not projected ^d
5. Contaminated liquid effluents	e	e

^a Twenty-four year projection.

^b There are 26,800 cubic meters of drainable liquid (called interstitial liquor) contained within the pores of the saltcake and sludge.

^c Disposal is considered complete.

^d Held for 90-day storage and offsite treatment and disposal by commercial facilities.

^e The 32 streams will be cleaned up. As these are wastestreams, rather than stored wastes, inventory and receipts do not correlate to the other categories in the table.

^f Specific volumes for future receipts of wastes from offsite generators other than Battelle Columbus Laboratory have not been finalized between DOE-RL and DOE-HQ.

With one exception, indicated receipts are cumulative projections above and beyond current inventory levels. The exception is 26,800 cubic meters of interstitial liquor which is included in the 104,000 cubic meters of projected DST wastes. Concentration of this projected DST waste in the 242-A Evaporator and eventual treatment and disposal as summarized in Figures 2-2 and 2-5 is planned to occur during the next 30 years. DST waste includes the following waste streams: SST interstitial liquor, Plutonium Finishing Plant stabilization wastes, PUREX neutralized acid and decladding wastes, waste treatment facilities' complex concentrate, HWVP pretreatment wastes, and LLW wastes generated at other Hanford facilities. Solid waste sources include all projected offsite and onsite waste generators who produce solid waste during their operational activities and are authorized to ship solid waste to Hanford solid waste management receivers. Included in these solid waste projections

are defueled nuclear submarine reactor compartments, and other LLW material which will be segregated and either stored for later treatment, or buried.

2.1.3 Accomplishments

The following list contains the major waste management operations accomplishments since the last revision of this plan.

- Forty-five of 49 FY 1990 Tri-Party Agreement milestones were completed on or ahead of schedule. (This takes into account several delays from the original schedule that were approved through change requests).
- The million gallon phosphate-sulfate waste grout demonstration was completed in July 1989.
- Construction of four grout vaults (102 through 105) continues.
- Began construction of the Liquid Effluent Retention Facility.
- The 242-A Evaporator upgrade activities continued on schedule for an FY 1991 startup.
- Jet pumping on 4 SSTs to remove liquid contents was completed.
- All FY 1990 SST core sampling milestones were completed. (Safety issues are delaying completion of FY 1991 SST core sampling milestones).
- Storage facilities for groundwater monitoring well purgewater were built and began operating in December 1989.
- The conceptual design report for the Treated Effluent Disposal facilities located in the 200 and 300 Areas was approved. These projects were also validated.
- All normal-form cesium capsules were returned to the Hanford Site on schedule.

2.2 FIVE-YEAR VISION FOR HANFORD SITE CLEANUP

Along with the initial issuance of the site-specific plan (DOE-RL 1989a), a "Five-Year Vision for Hanford Cleanup" paper was issued (Appendix D). This paper included a list of goals for cleanup progress over the first 5 years. The list included goals applicable to waste management operations.

Many of these goals are legally enforceable milestones contained in the Tri-Party Agreement. Changes to the milestones must be agreed to by the three parties. Some of these milestones need to be changed and have been the

subject of recent negotiations by the parties. The agreed to changes are described in Section 8.8. The goals and their status for waste management operations listed in the Five-Year Vision are as follows.

GOAL

Solidify in grout liquid LLW from 40 percent of the DSTs and dispose of the grout in underground vaults built for that purpose.

STATUS

The first of 14 grout campaigns was completed in July 1989. Construction started on the next four vaults. A change request was negotiated in May 1991 to delay completion of the 14 grout campaign milestones until December 1996, a 27-month delay. This change was initiated for the following reasons:

- The changing complexity of the Grout Facility Final Safety Analysis Report has added additional requirements to the program for new equipment which must be designed, procured, fabricated and installed.
- Grout reformulation and verification is required to resolve excessive grout temperatures due to heat of hydration and to verify agreement with the new U.S. Nuclear Regulatory Commission's waste form technical position for cementitious waste forms.

The technical issues involved in the grout reformulation are complex and involve, in addition to excessive temperature rise, low leach resistance, low compressive strength, and excess liquid remaining after grout curing. Besides the resources of Westinghouse Hanford and PNL, the Oak Ridge National Laboratory is providing assistance to help correct these deficiencies.

GOAL

Build the Hanford Waste Vitrification Plant (HWVP) that will solidify liquid HLW in glass logs for disposal in the national HLW repository.

STATUS

The HWVP construction is scheduled to start in April 1992. Hot startup remains scheduled for December 1999, however, Ecology will provide a letter to DOE acknowledging that these milestone dates may need to be revised based on December 1991 decisions related to waste retrieval, the pretreatment process, and resulting HWVP design and construction changes. DOE will ensure meaningful and fully funded participation by Ecology in this decision-making process.

GOAL

Remove all liquids that can be pumped from nearly all of the old SSTs and seal openings in those tanks from which the liquid has been removed until decisions are made on permanent disposal.

STATUS

Liquids have been pumped (interim stabilization) from 105 of the originally scheduled 106 SSTs. Openings have been sealed (interim isolation) in 94 of these SSTs. Completion of interim stabilization and isolation of all 149 SSTs by September 1996 is still achievable. A Tri-Party Agreement change request was approved in May 1991 to revise specific tanks being stabilized but not the total stabilized through September 1996. This rescheduling of tank stabilization is due to unresolved ferrocyanide, organics, and flammability issues.

GOAL

Develop and test methods for removing highly radioactive salts, sludges, and remaining liquids from old SSTs.

STATUS

Conceptual design of a facility for testing alternative methods for retrieval of waste from SSTs has begun. An engineering study of SST retrieval technologies has been issued.

GOAL

Determine the nature of the salts and sludges in about 50 percent of the SSTs.

STATUS

A total of 16 core samples (80 core sample segments) were collected from two of the 149 SSTs. The core samples are being analyzed for radioactive, hazardous, and mixed waste components. The results of the analysis will be used to direct methods for obtaining samples from future tanks and for developing treatment technology.

GOAL

Develop the means to address the wastes that have leaked or been discharged from the SSTs.

STATUS

Technology development activity may be required to determine what wastes have leaked. It will follow efforts on the characterization program to determine what is actually in the tanks. This issue will be a major focus of the environmental restoration program.

GOAL

Meet interim regulations for current waste facilities to ensure near-term protection of human health and safety and the environment.

STATUS

Meeting interim RCRA regulations is a major focus and is a requirement of the Tri-Party Agreement (see Chapter 4.0 for more detail).

GOAL

Obtain the permits needed to continue to use, cleanup, or close recent and current waste facilities.

STATUS

Part A Dangerous Waste Permit Applications for interim status of all existing facilities have been submitted to Ecology. Part B Permit Applications for about 25 percent of all RCRA TSD units have been submitted for review by DOE and Ecology. The Part B Permit Applications for an additional 25 percent of all RCRA TSD units are in preparation.

GOAL

Build the Waste Receiving and Processing Plant to inspect, treat, and repackage solid plutonium-contaminated wastes for transport.

STATUS

The DOE-HQ validated the Waste Receiving and Processing Facility Module I as an FY 1991 Line Item in FY 1989. Advance conceptual design began in March 1990. Definitive design began January 1991. The functional design criteria for Waste Receiving and Process Facility Module II was completed in FY 1990. A conceptual design report will be completed in July 1991.

GOAL

Either stop discharging liquid contaminants to the soil or treat those liquid contaminants discharged to the soil in nearly all waste streams.

STATUS

A major system acquisition (Hanford Environmental Compliance Project), consisting of 14 subprojects, is under way to upgrade Hanford Site facilities to eliminate or treat discharges of contaminated liquids to the soil column. Conceptual design reports have been completed for all 14 subprojects; definitive design has been started and/or completed for 12 of the 14 subprojects; construction has been started on all FY 1989 and 1990 subprojects.

GOAL

Identify needed resources and make the commitment to meet future milestones in the Tri-Party Agreement. Implement a schedule to meet these milestones.

STATUS

Resources were sufficient to meet all FY 1990 Tri-Party Agreement major and interim milestones. However, resources were not sufficient to provide adequate funding to maintain the Tri-Party Agreement schedule for pretreatment of DST wastes starting in October 1993. New direction to construct a new pretreatment facility in lieu of using B Plant would further impact the schedule. The emphasis on tank safety has impacted available resources for characterization. Efforts to seek adequate funding are being aggressively pursued and every effort will be made to maintain the current milestone schedule.

GOAL

Develop contingency plans to safely treat and store Hanford Site's wastes if onsite or offsite disposal facilities are delayed or not available.

STATUS

Contingency plans are being formed to deal with delayed opening of the geologic repository or WIPP. The Hanford Site is developing the storage capability it needs.

Many questions are still unanswered about repositories for TRU and HLW. This makes it very difficult to formalize all of the contingencies that would arise from the decision not to open either repository. The Hanford Site will construct the additional necessary storage facilities for TRU waste if the WIPP does not open. The vitrification plant's design allows canister capacity for all DST wastes now planned to be vitrified. Additional storage buildings can be built if they are needed. Options for onsite treatment and disposal are also being explored.

GOAL

Develop a clear understanding of what wastes will be shipped to the Hanford Site from other locations.

STATUS

The Hanford Site works with waste generators preparing forecasts of the quantity and types of waste to be shipped to the Hanford Site. We agree that these shipments make sense. We have the means to safely treat, store, and dispose of these wastes. Within the next 3 years, the national programmatic EIS will address "what goes where" in the DOE complex.

GOAL

Prevent future waste cleanup problems.

STATUS

We understand the wastes that will be produced by future operations. We are reducing the amount and hazards of new wastes. New wastes are treated, and either safely stored or disposed. All stored waste is being prepared for disposal as soon as possible. The funds needed for disposal are available. The Hanford Site experience in 1990 regarding 6 ferrocyanide and hydrogen buildup in tanks (refer to Section 7.2) highlights the need for progress in this area. Strengthening of the management team, increased use of consultants on specific issues, external review, and technical exchanges with other sites have resulted from these issues. The *U.S. Department of Energy-Richland Operations Office Waste Minimization and Pollution Prevention Awareness Plan* (DOE-RL 1990a) was issued and is being implemented. Planned waste management projects are described in Chapters 2.0 and 4.0.

**2.3 DESCRIPTION OF WASTE MANAGEMENT
OPERATIONS MISSIONS**

Waste management consists of the safe and effective management of active and standby facilities and the TSD of radioactive, hazardous, and mixed waste. The missions are: (1) DST waste, (2) SST waste, (3) capsules, (4) solid wastes, and (5) elimination of liquid radioactive effluent discharge to the soil column.

Issues related to the safety of wastes stored in DSTs and SSTs are now a major area of activity. Refer to Section 6.2 for a discussion of waste tank safety.

2.3.1 Double-Shell Tank Waste

2.3.1.1 Storage (ADSs 9100, 9101, 9105, 9106, 9107, 9120, and 9121).

A cutaway sketch of a DST is illustrated in Figure 2-1. Twenty-eight of these underground tanks are in service with a total capacity of 118,400,000 liters. There are 88,200,000 liters of DST waste that have accumulated as of December 31, 1990 with a total radionuclide content of 74.6 million curies.

Neutralized current acid waste from Plutonium-Uranium Extraction Plant (PUREX) fuel processing is self-boiling and can be stored in four DSTs that are specially designed to contain self-boiling waste. These four DSTs are called "aging waste tanks" and are located in the 200 East Area (two in the AY Tank Farm and two in the AZ Tank Farm). Only the two AZ aging waste tanks currently contain neutralized current acid waste. Fuel was processed last at PUREX in 1988.

A unique feature of aging waste tanks is the incorporation of air-lift circulators to control boiling of the waste due to radiolytic decay. Circulators are necessary to prevent pressure surges, to minimize entrainment of radionuclides in the offgas caused by uneven boiling and to prevent overheating of tanks from sludge hot spots.

The remaining 24 DSTs are designed to store low-heat mixed waste and are called "nonaging waste tanks." Plutonium Finishing Plant waste is stored in one of three nonaging waste tanks in the SY Tank Farm in the 200 West Area.

The complexant concentrate, resulting mostly from former fractionization processes (recovery of cesium and strontium) at B Plant, and neutralized cladding removal waste from PUREX Plant fuel dissolving operations are stored in 6 select tanks within the AN, AP, and AW Tank Farms. The remaining DSTs either store LLW, are used for staging material transfers or are designated as spares.

Up to several million liters of dilute LLW go to DSTs from operating facilities throughout the Hanford Site. The streams from the 200 Areas are transferred by underground piping and collected in the DST system. The streams from the 100 and 300 Areas are delivered by railcar to the 204-AR Unloading Facility and transferred to the DST system (ADS 9080). These dilute LLW streams are received and concentrated in the 242-A Evaporator shown in Figure 2-2. The concentrated bottoms product from evaporation of DST supernatants and SST interstitial liquors are referred to as "double-shell slurry". The 242-A Evaporator is presently shut down since the process condensate can contain a listed waste which cannot be discharged to the soil column.

Current operations of DSTs focus on the following activities:

- Assuring safe storage
- Surveillance of DSTs to comply with DOE Order 5820.2A (DOE 1988a) requirements

Figure 2-1. Cutaway View of a Double-Shell Tank.

RCP7911-16A

Figure 2-2. The 242-A Evaporator Simplified Schematic.

RCP8001-18

- Evaporating the excess water from neutralized current acid waste, and the decanted supernatant from the Plutonium Finishing Plant, complexant concentrate, neutralized cladding removal waste, and DST slurry waste in order to store a concentrated slurry in the least amount of space (ADS 9109).
- Upgrades in tank farm facilities, practices and procedures, and personnel for both DSTs and SSTs. Upgrade tasks can be organized into:
 - Program management (ADS 9801)
 - Project definitions (ADS 9802)
 - Major maintenance upgrades (ADS 9803)
 - Operations and administration upgrades (ADS 9804)
 - General plant project upgrades (ADS 9805)
 - Line item project upgrades (ADS 9806)
 - High-heat Tank 106-C stabilization (ADS 9807)
 - Tank safety interim treatment development (ADS 9808).

Additional information related to tank safety aspects of upgrades is located in Section 6.2

A major effort is devoted to projecting the volume of liquid waste to be received from Hanford Site sources over the next 20 years and determining if there will be adequate tank space available.

Current waste volume projections forecast a potential tank space shortage in the early 1990's. This potential space shortage has given increased importance to the maximum operation of the 242-A Evaporator and the Grout Treatment Facility in the next 5 years.

In accordance with Tri-Party Agreement negotiations in May 1991, eight additional DSTs will be constructed in support of tank safety efforts (with priority on Tank 101-SY) and tank waste pretreatment activities. A milestone date of September 1992 is set for the completion of conceptual design of the first four tanks. Additional milestones for these and the remaining four tanks are being determined. Construction of these tanks will prevent a space shortage.

2.3.1.2 Treatment (ADSs 9103, 9109, 9110, 9113, 9114, 9115, 9117, and 9118).

2.3.1.2.1 242-A Evaporator Operation (ADS 9109). Liquid radioactive and mixed waste undergo evaporation in the 242-A Evaporator Facility (Figure 2-2). Approximately 19 to 38 million liters (5 to 10 million gallons) of waste volume reduction are achieved on an annual basis.

Waste concentration has saved more than 378.5 million liters (100 million gallons) of waste storage space in DSTs. The 242-A Evaporator Facility is the cornerstone of the waste management treatment facilities because it maximizes the use of available DST space and minimizes the need to construct additional DSTs.

The 242-A Evaporator is currently shut down and is undergoing a \$15 million capital life extension upgrade to ensure liquid waste treatment capabilities (by concentration) for an additional 10 years. The use of this facility will minimize disposal of effluents to the soil column. Plans are being made to install a process condensate treatment process in FY 1992. For further detail, refer to Section 2.3.1.2.2. The treatment process will remove most radionuclides with the exception of tritium. Disposal options for the treated condensate are being studied to select a disposal method that will reduce the Hanford Site contribution to the Columbia River water content.

2.3.1.2.2 Liquid Effluent Retention Facility (ADSs 9097 and 9406). The Liquid Effluent Retention Facility (formally called the Hanford Site 200 East Area Interim Retention Basins) is being constructed to provide interim storage of the 242-A Evaporator which contains listed waste constituents and ammonia concentration sufficient to be a dangerous waste. Because of the process condensate listed components in the effluent, including past effluent discharges, continued discharge and use of the existing soil column disposal sites has been discontinued. Discharge of these effluents cannot resume until a suitable disposal alternative is in place.

The operation of the 242-A Evaporator is vital for supporting environmental restoration milestones, for stabilization of SST waste, and for pretreatment and disposal of DST waste as identified in the Tri-Party Agreement. The DST space to support tank stabilization is insufficient unless the 242-A Evaporator can reduce stored waste volumes.

The strategy developed is as follows. A treatment facility will be built to remove constituents of concern to allow effluent disposal to comply with all applicable regulations. Treated effluent will be discharged to an approved soil column disposal site. The Liquid Effluent Retention Facility will provide interim retention capacity until the treatment facility is available. The treatment facility will then be used to treat current and stored effluents.

The Liquid Effluent Retention Facility will consist of a retention basin system which is composed of three separate cells. Each cell will have a design capacity of 24.6 million liters (6.5 million gallons). Two cells will be dedicated to the evaporator effluent, and one cell will be reserved for spare capacity.

Each basin cell will have a floating cover and a primary and secondary composite liner. These composite liners will consist of high-density polyethylene membranes and clay mixtures. A leachate collection system will be installed between the two liners, consistent with RCRA requirements. Each cell will be approximately 82 meters (270 feet) wide by 100 meters (330 feet) long with an operating storage depth of 6.4 meters (21 feet). The design life of the basin and associated piping is 30 years.

Land will also be set aside for the construction of 4 additional storage cells, which could provide an additional 99 million liters (26 million gallons) of storage capacity. These cells will be constructed if a future need is demonstrated.

After a treatment system has been constructed and implemented for the 242-A Evaporator, the Liquid Effluent Retention Facility will cease to be used for storage of these effluents and will be incorporated into the 200 Areas Treated Effluent Disposal System.

At the time of closure all of the hazardous material, including any contaminated residues, will be removed. Soil sampling will be required to ensure that no hazardous constituents have migrated into the soil. Any residual soil contamination will be removed.

All of the operational procedures, closure requirements, and construction specifications will be contained in the RCRA permit application to be submitted in June 1991. This application will specify all the actions necessary to ensure the Liquid Effluent Retention Facility maintains compliance and ultimately achieves clean closure. Ecology will review this document and base the operating permit on the application. The operating permit, as well as any document upon which it is based, will be available for public review and comment.

The 200 Areas Treatment System is currently under design to treat the material stored in the Liquid Effluent Retention Facility. This treatment system will be designed as a best available technology system. This system will in turn be incorporated into the 200 Areas Treated Effluent Disposal System. The treatment system will be designed to treat a mix of constituents, including heavy metals, organics, and radionuclides. Similarly, the treatment system will be large enough to take a direct feed from the 242-A Evaporator as well as treating waste stored in the Liquid Effluent Retention Facility. This system is scheduled to become operational in January 1994 (see Section 2.3.5.2.14 for a description of this project). All of the liquid waste stored in the interim retention basins will be removed by December 1994, and all residual waste will be removed within 6 months.

2.3.1.2.3 Grout Treatment Facility Operation (ADSs 9175 and 9176). Liquid low-level mixed waste stored in DSTs is treated in the Grout Treatment Facility prior to disposal in near-surface concrete vaults (Figures 2-3 and 2-4). The Grout Treatment Facility blends low-level mixed waste liquid with dry blended cementitious materials such as cement, flyash, blast furnace slag, and other designated dry-materials to make a slurry, which is pumped to the near-surface vaults. There, the grout slurry cures into a solid grout waste form. This process results in a waste form that, when coupled with engineered barriers, chemically and physically immobilizes radionuclides and hazardous chemicals. This system of grout disposal ensures protection to the public and to the environment.

The Grout Treatment Facility processes liquid LLW in approximate 3.8 million liter (1 million gallon) campaigns. A renegotiated Tri-Party Agreement milestone is to complete 14 grout campaigns through December 1996. (This renegotiated date is subject to public review.)

Figure 2-3. Grout Treatment Facility.

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Figure 2-4. Grouted Waste Disposal Vaults.

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A demonstration campaign in the Grout Treatment Facility began in August 1988 and ended in July 1989. In this campaign, a nonhazardous LLW, phosphate/sulfate waste from the decontamination of N Reactor process systems, was grouted and disposed of in a near-surface grout vault. Following the construction of new vaults and preparations for the next campaign in FY 1992, the DST slurry, which contains hazardous components, will be grouted. Thereafter, the low-level fractions resulting from waste pretreatment will be grouted.

Ecology submitted a petition to the U.S. Nuclear Regulatory Commission in 1991 for rule-making concerning the definition or classification of high-level radioactive waste at the Hanford Site. This petition could affect the grout program. On December 17, 1990 the U.S. Nuclear Regulatory Commission publicized a notice seeking public comment on the State's request for rule-making. These comments were due back by March 18, 1991. Resolution of this petition remains the responsibility of the U.S. Nuclear Regulatory Commission.

In accordance with the U.S. Nuclear Regulatory Commission's current position, the waste scheduled for grouting is LLW and disposal in an U.S. Nuclear Regulatory Commission-licensed facility is not required. The DST waste is to be included in the grout process, and the waste will be disposed of in a way that is protective to the health, safety, and will of the public. The waste will be parallel to the LLW concentration limits in 10 CFR 61.

2.3.1.2.4 Pretreatment of Double-Shell Tank Waste (ADSs 9104, 9110, 9127, 9128, 9129, 9130, 9131, 9133, 9134, 9135, and 9150). Future plans are to pretreat 26.9 to 30.8 million liters (7 to 8 million gallons) of DST waste to separate it into HLW, TRU, and LLW fractions (Figure 2-5). The low volume HLW and TRU fractions will be stored for future vitrification in the HWVP. The high volume LLW fraction will be stored in DSTs for future immobilization in grout at the Grout Treatment Facility.

Four wastestreams will be pretreated. These streams are as follows:

- High-level neutralized current acid waste from the reprocessing of spent fuel at PUREX Plant
- The neutralized cladding removal waste from the fuel decladding process at PUREX Plant
- The complexant concentrate waste resulting from past cesium and strontium recovery operations
- The TRU waste from plutonium reclamation and processing at the Plutonium Finishing Plant.

The potential pretreatment processes include solid-liquid separation and sludge washing, ion-exchange, TRU solvent extraction, selective leaching, and organic destruction. Solids and liquids will be separated and neutralized current acid waste sludge washed in the 244-AR Vault. The remaining pretreatment processes will be performed in a facility to be determined. (Former plans were to use B Plant).

Figure 2-5. Double-Shell Tank Waste Treatment, Storage, and Disposal Flowchart.

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A Tri-Party Agreement milestone for the start of pretreatment of neutralized current acid waste is currently being negotiated because of questions raised over the viability of B Plant to meet compliance requirements of Washington State regulations and DOE orders.

2.3.1.2.5 Treatment of High-Level Waste and Transuranic Fractions from Double-Shell Tank Waste (ADSs 4000, 4001, and 9190). The HLW and TRU fractions of DST waste will be sent to the HWVP and treated by combining them with glass-forming materials in a glass melter, thereby immobilizing the waste in a glass matrix (Figure 2-5). The glass will be packaged in special stainless steel canisters which will be stored onsite until a geologic repository is available for permanent disposal. The canister storage building is designed to hold 2,000 canisters of vitrified waste. A second canister storage building can be built if additional interim storage is required (e.g., if the geologic repository is delayed).

Current HWVP design activities are important to meet the Tri-Party Agreement milestone for the start of HWVP construction (April 1992). Other Tri-Party Agreement milestones are the completion of construction (June 1998) and the start of treatment operations (December 1999). Ecology will provide a letter to DOE acknowledging that these milestone dates may need to be revised based on December 1991 decisions related to waste retrieval, the pretreatment process and resulting HWVP design and construction changes. DOE will assure Ecology meaningful and fully funded participation in this decision making process.

The HWVP is designed with a 40-year life to provide for the vitrification of SST waste if the decision is made to retrieve some or all of this waste.

2.3.1.3 Disposal. A flowchart for DST wastes is shown in Figure 2-6. The HWVP will produce canisters of vitrified HLW (620 liters each) for eventual shipment to a HLW repository. The HWVP will also produce canisters (620 liters each) of vitrified TRU waste.

The Grout Treatment Facility has converted phosphate/sulfate waste into grout filling one underground, concrete vault (5,000 cubic meters) in July 1989. Disposal of double-shell slurry grout will begin during the next campaign.

A Tri-Party Agreement milestone to eventually fill 14 vaults with grout was renegotiated to a December 1996 completion date. Eventually, a minimum of 44 vaults (5,000,000 liters each) of grouted LLW will be disposed of at the Hanford Site.

2.3.2 Single-Shell Tank Waste

2.3.2.1 Storage (ADSs 9302 and 9308). The waste management program is funding the interim storage, surveillance and the interim stabilization and isolation of the SST waste. The Environmental Restoration Remedial Action program is funding characterization and assessment, and will fund future remedial actions and closure.

Figure 2-6. Hanford Waste Vittrification Plant Process Flowsheets.

There are approximately 139,000,000 liters of waste (containing 131 million curies of radionuclides as of December 31, 1989), consisting of damp saltcake and sludge, contained in 149 underground storage tanks. These tanks range in capacity from 210,000 to 3,800,000 liters (Figure 2-7).

Within the interstices of the saltcake and sludge, there are 26,500,000 liters of interstitial liquor (containing 23 million curies of radionuclides as of December 31, 1989). Interstitial liquor removal by saltwell pumping is illustrated in Figure 2-8. Removal of pumpable liquid to the DST system is called "interim stabilization." Interim stabilization of all 149 tanks is scheduled to be completed by September 1996 (Tri-Party Agreement milestone).

The waste represents an accumulation from 1944, the start of operations at the Hanford Site, until 1980 when all transfers of newly-generated waste were directed to DSTs. Former processing included removal of water by pumping supernatant from the tanks for evaporation and returning the concentrated salt solution back to the tanks. The early fuel reprocessing activities did not remove uranium and it was sent to the tanks. During the late 1950's, a major program was undertaken to recover the uranium. Programs implemented in the late 1960's removed the bulk of the radioactive cesium and strontium for encapsulation.

Starting in the 1960's, some SSTs were identified as leakers. These leaks are the reason for stabilizing and isolating the tanks. The total leakage volume has previously been reported as approximately 2,800,000 liters (750,000 gallons). Recently, an additional potential leak has been identified.

Perhaps as much as 3.8 million liters (one million gallons) of clean cooling water were sprayed into SST 241-A-105 in the 1970's to aid in evaporative cooling. It is likely that much of this water (189,000 to 3,000,000 liters) did not evaporate and therefore, may have leaked some of the sludge and added to the waste released from this tank. Past and current practice is to exclude the cooling water from the leak volume estimate because of uncertainties involved.

In addition to the above unintentional discharges, documents show that from 1946 to 1966, 456,725,000 liters (120,661,000 gallons) of liquid wastes were intentionally discharged from SSTs at the Hanford Site directly to the ground on the 200 Areas plateau (Waite 1991). The majority of this waste was discharged from 1946 to 1958 as a result of the early plutonium and uranium recovery processes conducted in the 221-B Facility (B Plant)/the 221-T Facility (T Plant) and the 221-U Facility (U Plant), respectively. In addition, from 1960 to 1966 laboratory wastes from the 300 Area and equipment decontamination wastes from the 200 West Area were routed through SSTs before discharge to the ground. No wastes have been discharged intentionally to the ground from SSTs since 1966, and no wastes have ever been discharged directly to the ground from the newer DSTs located at the Hanford Site.

All of the discharges described above will be remediated as necessary through the Environmental Restoration Program (Chapter 3.0).

Figure 2-7. Cross-Sectional Views of the Hanford Site Single-Shell Tanks.

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Figure 2-8. Cut-Away View of a Typical Single-Shell Tank.

Surveillance is required to detect any failure of containment. Monitoring and leak detection systems are incorporated in the engineered system to serve this purpose. Best available data on tank monitoring and leak detection are published monthly in a publicly available report entitled *Tank Farm Surveillance and Waste Status Summary for XX*, WHC-EP-0182-XX (Hanlon 1991). Also see Section 6.2.4.5(d) for information on this issue.

Liquid level monitoring, where a liquid surface exists, is used as the primary means of leak detection. Liquid observation wells have been installed in all tanks that contain or have the potential to contain more than 190,000 liters (50,000 gallons) of interstitial liquor. A series of drywells located outside to the tanks are routinely monitored to detect any change in gross gamma-ray radiation. Tanks in which high temperatures could occur are equipped with thermocouples for temperature measurements.

Area radiation monitors are located within the tank farms to provide indication of a gross loss of confinement, which would represent an immediate radiation hazard to personnel. Information on the status of modifications and upgrades to tank farm radiation monitors and monitoring procedures is now being compiled for a report.

Forced ventilation currently provides cooling for 10 tanks containing materials that, through radioactive decay, generate heat that could exceed established concrete temperature limits. Single-stage high-efficiency particulate air filters allow atmospheric breathing for tanks that do not require cooling. Gases generated by radiolytic decomposition disperse in this manner. All engineered systems undergo preventive maintenance, inspection and calibration in accordance with approved procedures.

The Waste Tank Safety organization is preparing assessments of the ferrocyanide, hydrogen, and organic issues related to the DSTs and SSTs. Activities including vapor space sampling and analysis, and tank waste sampling and analysis, are underway or planned (ADSs 9123, 9850, 9851, 9853, 9854, and 9855). Refer to Section 6.2 for more information. An upgrade program for tank farms is underway. Refer to Section 2.3.1.1 for more information.

2.3.2.2 Treatment. Future plans include completion of interim stabilization and isolation of all 149 SSTs by September 1996, including those tanks subjected to heat management (ADSs 9300, 9305, and 9307). Interim stabilization is considered treatment because pumpable liquid is removed from within the solids, thus changing the solid/liquid ratio. The current stabilization schedule is discussed in Section 2.5, 105 SSTs have been stabilized to date.

The process of interim isolation includes removing unnecessary pipelines, blanking remaining lines, and sealing openings to prevent inadvertent inward leakage of liquid (primarily rainwater or snowmelt). Only lines required for surveillance are left in place.

Future plans for retrieval of SST waste and treatment are being evaluated. Decisions regarding future treatment of SST wastes depend on the results of the characterization activity (see Section 2.3.2.3).

2.3.2.3 Disposal. The SST characterization and assessment in support of remedial actions and closure are funded by the Environmental Restoration Remedial Actions program. These activities are described in Chapter 3.0.

Recently identified core drilling and tank storage safety issues have prompted a negotiated change in the FY 1991 Core Sampling Milestone (Tri-Party Agreement Milestone M-10-04). The revised date for obtaining the 4 core samples was delayed 8 months from December 1990 to September 1991.

2.3.3 Encapsulated Cesium and Strontium

2.3.3.1 Storage (ADSs 9500 and 9550). During the late 1960's and early 1970's a program was undertaken to remove cesium and strontium from liquid waste in SSTs. The cesium and strontium were placed in double-walled metal cylinders (capsules) about 50 centimeters in length and 6 centimeters in diameter, which were then stored in the Waste Encapsulation and Storage Facility.

The facility layout is shown in Figure 2-9, and the capsules are stored in a series of water-filled pools shown on the right side of the sketch. Storage of the capsules is a continuing activity that requires cooling water, makeup water, ventilation, capsule inspection, and facility maintenance.

When the encapsulation process was completed in 1985, 1,577 cesium and 640 strontium capsules were produced. As of April 1, 1991, 959 cesium capsules and 597 strontium capsules (includes 180 strontium waste capsules) were stored in the pool cells. The remainder of the capsules have been dismantled and the radioisotopes will not be returned to the Hanford Site, or they are currently being returned from commercial users to the Site.

An effort is underway to return all commercially leased cesium capsules to the Hanford Site. This is because a leased capsule developed a small leak, and other capsules have shown signs of bulging. Radiation Sterilizers Inc. originally had 431 capsules which have all been returned to the Hanford Site. All leased capsules from two other commercial irradiators are tentatively scheduled to be returned by February 1, 1993.

All cesium capsules are inspected upon receipt, and only those that pass all inspection criteria are stored in the Waste Encapsulation and Storage Facility capsule storage pool (cold storage cell). Capsules failing to pass inspection are stored in Waste Encapsulation and Storage Facility dry storage hot cells pending final disposition.

PNL is now examining and analyzing the leaking cesium capsule along with the 11 other cesium capsules that show signs of bulging. When complete, the results of this study will be made public.

The decay of radioactive cesium and strontium produces heat. The surface temperature of a strontium capsule is 430 °C (806 °F) in air and 71 °C (160 °F) in water. The surface temperature of a cesium capsule is 200 °C (392 °F) in air and 58 °C (136 °F) in water (Figure 2-10).

Figure 2-9. Waste Encapsulation and Storage Facility Layout.

PS8501-105

Figure 2-10. Capsule Design Information for Encapsulated Waste.

	Form	Loading	Percent of Theoretical Density Based on Total Void Space of Capsule	Temperature			
				Air		Water	
				Center Line	Surface	Center Line	Surface
Strontium Fluoride	Compacted Powder	150 kCi (Max)	88	860 °C	430 °C	660 °C	71 °C
Cesium Chloride	Melt-Cast	70 kCi	88	450 °C	200 °C	327 °C	68 °C

	Capsule									
	Inner					Outer				
	Material	Wall Thickness	Outside Diameter	Total Length	Total Cap Thickness	Material	Wall Thickness	Outside Diameter	Total Length	Total Cap Thickness
Strontium Fluoride	Hastelloy C-276 (UT)	0.305 (UT)	8.72	48.39	1.02	Stainless Steel 316-L (UT)	0.277 (UT)	6.67	61.06	1.02
Cesium Chloride	Stainless Steel 316-L (UT)	0.241 (UT)	8.72	50.10	1.02	Stainless Steel 316-L (UT)	0.277 (UT)	6.67	62.77	1.02
Note: All Dimensions are in cm										

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2.3.3.2 Treatment. There are presently no plans to treat the capsules before disposal, although a study of treatment options is planned.

2.3.3.3 Disposal. The HDW-EIS (DOE 1987b) identified the HLW repository as the disposal site for cesium and strontium capsules. For assumption purposes, the HDW-EIS discussed the base case of overpacking the capsules for disposal. The final waste form of the cesium and strontium has not been determined. The disposition of the one leaking cesium capsule and approximately eleven other cesium capsules that show signs of bulging is being evaluated at this time. The recommended method of disposal is to cut up and dissolve the radioactive cesium chloride capsules in the Waste Encapsulation and Storage Facility and transfer this solution to a DST. This material then would be treated in the HWVP where it would be packaged as a glass.

2.3.4 Solid Waste

The four major categories of solid waste are TRU waste, LLW, mixed waste, and hazardous waste. Mixed waste must be further categorized as either TRU or LLW. Each waste has further: (1) hazard classifications such as acids, caustics, oxidizers, etc., (2) radionuclide concentration classifications if it is LLW or low-level mixed waste. Each of the four major categories of waste will be discussed with respect to TSD. Alkali metal storage and treatment are also included in this section even though some of these alkali metals are not considered wastes.

The following brief definitions are provided to help in the understanding of the discussions that follow:

- The TRU wastes are wastes that are contaminated with alpha-emitting TRU radionuclides (e.g., plutonium) with half-lives greater than 20 years and radioactivity greater than 100 nanocuries/gram (10 nanocuries/gram from 1970 to 1982) of waste. Other wastes such as radium sources and uranium-233 are also managed as TRU. The TRU wastes are designated contact-handled or remote-handled depending on the level of radioactivity at the surface of the waste package.
- The LLWs contain radioactivity and are not classified as HLW (i.e., resulting from reprocessing of spent nuclear fuel), TRU wastes, or spent nuclear fuel.
- Mixed wastes are those that are both radioactive and hazardous.
- Hazardous wastes are defined by regulations as hazardous (called dangerous or extremely hazardous in Washington State). They are not radioactive. Examples are waste antifreeze, waste acids, and used oil.

Historical data on quantities of buried LLW and mixed waste are located in Appendix B. The *Solid Waste Management Program Plan* (Duncan 1990) contains addition detail on solid waste topics.

2.3.4.1 Transuranic Waste. Before 1970, the concept of TRU waste did not exist. Solid waste containing TRU radionuclides was buried in near-surface, unlined trenches. Such waste is called "pre-1970, suspect TRU-contaminated waste."

Since 1970, solid TRU waste, with TRU radionuclide concentrations greater than 100 nanocuries/gram, has been segregated from LLW and is retrievably stored in near-surface unlined trenches or aboveground buildings. This waste is called "retrievably stored TRU waste."

Beginning in 1986, certain newly generated 55-gallon drums of solid TRU waste have been certified to WIPP waste acceptance criteria and stored in the Transuranic Storage and Assay Facility. This waste is called "certified TRU waste."

2.3.4.1.1 Pre-1970, Suspect Transuranic-Contaminated Waste. The record of decision for the HDW-EIS states the DOE-RL will further develop and evaluate all pre-1970 sites, except one, to determine which remedial action options to implement. Development and evaluation activities associated with these sites, now referred to as past-practice units, is funded by environmental restoration and is addressed in Chapter 3.0 of this document. The one remaining site, designated the 618-11 burial ground, contains remote-handled TRU waste that will be exhumed, treated as necessary, and shipped to the WIPP site for disposal. Remote-handled waste is waste with a surface dose rate greater than 200 mrem/hour.

2.3.4.1.1.1 Storage. In addition to the stored solid TRU waste, 9 pre-1970 solid-waste sites and 24 contaminated soil sites are suspected of containing TRU concentrations in excess of 100 nanocuries/gram. The TRU waste will be left in these sites until further development and evaluation are completed.

2.3.4.1.1.2 Treatment. Treatment of waste from the 618-11 burial ground will include sorting into LLW and TRU fractions, repackaging and potential volume reduction. Other treatment options will be implemented as required to meet best demonstrated available technology for hazardous components of LLW and WIPP waste acceptance criteria and TRU packaging transporter shipping requirements. Probable best demonstrated available technology treatment includes thermal treatment, neutralization, and stabilization with grout.

2.3.4.1.1.3 Disposal. The LLW from the 618-11 burial ground will be disposed of onsite in trenches. Mixed waste will be disposed of in trenches with liners and a leachate collection system. The TRU waste from the 618-11 burial ground will be shipped to WIPP. If the WIPP site does not open for full operation, the Hanford Site will store the TRU waste at the Hanford Site Central Waste Complex or other approved locations until a permanent repository for TRU waste is available.

2.3.4.1.2 Retrievably Stored Solid Transuranic Waste.

2.3.4.1.2.1 Storage. Since 1970, about 15,300 cubic meters of solid TRU waste has been placed in 55-gallon drums or in boxes and stored for eventual retrieval and transfer to WIPP. Most of the solid TRU waste is stored on

asphalt pads and requires some degree of processing in order to provide certification before shipment. Processing will include assaying, which is expected to result in identification and redesignation of approximately one-half the waste as LLW (less than 100 nanocuries/gram of TRU radionuclides).

The stored, solid TRU waste is contained in 58 concrete containers, 202 fiberglass-reinforced polyester boxes, 344 metal boxes, 37 plywood boxes, 499 miscellaneous containers, and 38,159 55-gallon drums (as of December 31, 1990). These containers will be stored until the moderate hazard storage facility is operational (FY 1998) and full-scale retrieval of stored TRU begins in FY 1999. The TRU waste will be stored in the moderate hazard storage facility before treatment (ADS 9203). If the WIPP site does not open for full operation, the Hanford Site will continue to expand aboveground storage capacity at the Hanford Site Central Waste Complex or other approved locations until a permanent repository for TRU waste is available. Engineering for waste retrieval and operations will be necessary (ADS 9206).

Fifteen containers of TRU waste are stored in the 231-Z Building (ADS 8164) and will be transferred to other facilities for storage.

It is estimated that 137 cubic meters of the retrievably stored TRU in trenches and in underground caissons will require remote handling (ADS 9223).

2.3.4.1.2.2 Treatment. A small portion of the drums and boxes will be inspected during FY 1991 to characterize container conditions as well as the waste itself. Current records on these wastes, particularly with respect to hazardous components, are general in nature. More specific and detailed information is desirable before designing waste handling and treatment equipment planned for the Waste Receiving and Processing Facility (ADS 9205). This facility is shown in Figure 2-11 as part of the Hanford Site Central Waste Complex which will centralize storage and treatment of Hanford Site solid wastes (ADS 9208). Additionally, it is necessary to determine the state of waste container materials (time-dependent degradation analysis) to allow proper design of retrieval equipment, to avoid contamination spread, and to determine appropriate phasing of container retrieval.

Packaging and sorting of retrievably stored TRU will start in FY 1997 at the Waste Receiving and Processing Facility (ADS 9208). A decision was made to partition the Waste Receiving and Processing Facility into two phases. Module I (ADS 9208) will provide services such as package inspection, opening and sorting, assaying, waste segregation, compaction, repackaging, and certification. Module II (ADS 9218) will be operational in FY 1999 for treatment of low-level mixed waste, large packages, and remote-handled waste.

About 16,027 cubic meters (565,913 cubic feet) of solid TRU waste (current inventory plus future receipts) have been projected to be treated in the Waste Receiving and Processing Facility. It is estimated that approximately half this volume is LLW that can be separated by opening, sorting, and assaying the solid waste.

Figure 2-11. The Hanford Site Central Waste Complex Conceptual Layout.

2.3.4.1.2.3 Disposal. The plan is to retrieve stored solid TRU waste, treat it in the Waste Receiving and Processing Facility, and ship repackaged solid TRU waste to WIPP for disposal (ADSs 9208 and 9216). Disposal would begin in FY 1997 and would conclude when WIPP closes.

2.3.4.1.3 Newly Generated Transuranic Waste. The waste forecasts in this plan include the assumption that the PUREX will not be used for defense materials production, but will operate to stabilize irradiated fuel elements currently stored under water in the Hanford Site's 100-K Area storage basins. The PUREX plant's operation depends on an EIS record of decision which is scheduled for completion in 1993.

2.3.4.1.3.1 Storage. Contact-handled TRU waste is projected to be generated at an annual rate of approximately 80 cubic meters from FY 1991 until FY 1994; the rate will fluctuate between 1 and approximately 28 cubic meters annually from FY 1995 until FY 2013. In FY 1990 approximately 120 cubic meters was generated. There were 144 cubic meters generated in 1989.

Remote-handled TRU waste is projected to be generated at an annual rate of approximately 30 cubic meters from FY 1991 through FY 1999, and will vary between 149 and 344 cubic meters annually from FY 2000 through FY 2013. In FY 1990, approximately 59 cubic meters was generated. The potential exists for these forecast figures to be much larger as a result of uncertainties in characterization of wastes such as PUREX Plant tunnel waste.

Newly generated solid TRU waste too large to fit into a 55-gallon drum is placed in metal boxes. These metal boxes are stored at generator facilities in the Central Waste Complex or on asphalt pads in the burial grounds until treatment or certification processes are developed. In FY 1991, a metal box specifically designed for a shipping cask will be used to package these items. The use of these boxes will be limited because of their size. Each box is approximately 1.8 cubic meters (64 cubic feet) in volume.

As solid TRU waste is generated, the lack of storage space makes compliance with DOE Order 5820.2A (DOE 1988a) regarding temporary storage requirements increasingly difficult. The Hanford Site Central Waste Complex will be used to store solid TRU waste (ADS 9203). The size of this complex will be expanded to store TRU waste in accordance with storage regulations. This expansion will continue as necessary until the WIPP site becomes operational. If the WIPP site does not open for full operation, the Hanford Site will continue to expand aboveground storage capacity at the Hanford Site Central Waste Complex or other approved locations until a permanent repository for TRU waste is available.

2.3.4.1.3.2 Treatment (ADSs 9208, 9218, and 9224). Newly generated solid TRU waste is not presently treated. Treatment will begin for contact-handled TRU waste when Module I of the Waste Receiving and Processing Facility begins operation. Treatment for mixed wastes, large packages, and remote-handled TRU waste will begin when Module II begins operation.

2.3.4.1.3.3 Disposal. Newly-generated solid TRU waste will be certified and shipped to WIPP for disposal. Shipment to WIPP will begin when the Waste Receiving and Processing Facility begins operation.

2.3.4.2 Solid Low-Level Waste.

2.3.4.2.1 Storage. Solid LLW is typically not stored for more than a few days. Solid LLW may accumulate at the generating site but is periodically removed directly to the disposal site (ADS 9210).

2.3.4.2.2 Treatment. Treatment of solid LLW is limited to compaction at certain generating sites and the 213-W waste compactor (ADS 9217). Consideration is being given to the development of volume reduction processes to be included in the Waste Receiving and Processing Module II. A project is planned to install a LLW receiving, segregation, and incineration system for Plutonium Finishing Plant wastes (ADS 402). The conceptual design report scheduled for 1994 will include a NEPA determination.

2.3.4.2.3 Disposal (ADSs 8014, 9070, and 9210). Solid LLW is currently placed in unlined near-surface trenches (landfills). Industrial trenches accommodate large pieces of waste such as 5-meters-long burial boxes from canyon facilities (ADSs 414, 2005, and 9070). Final disposal methods depend on the results of the NEPA process started by the HDW-EIS (DOE 1987b).

An advanced solid LLW disposal facility has been proposed as a contingency project if the performance assessment mandates a change in disposal practices (ADS 9212).

Approximately 8,000 cubic meters of LLW was disposed in FY 1990. It is forecast that more than 9,900 cubic meters will be disposed of in FY 1991 and more than 200,000 cubic meters from FY 1992 through FY 2020.

The Hanford Site continues to receive LLW from offsite generators for disposal. Specific volumes of future wastes from offsite generators other than Battelle Columbus Laboratory have not been finalized between DOE-RL and DOE-HQ. Projected volumes are, however, included in the table in Section 2.1.2 of this document. Table 2-2 summarizes the waste receipts between 1987 and 1990.

Closures of five groupings of LLW burial grounds will occur as specified in the burial grounds permit application (ADS 9204).

Disposal of solid LLW at the Hanford Site requires a site-specific radiological performance assessment to comply with Chapter III, DOE Order 5820.2A (DOE 1988a). Performance assessments for the disposal of phosphate/sulphate waste grout, DST slurry grout, LLW, and SST waste are in various stages of completion. An initial performance assessment for the 218-W-5 Low-Level Burial Ground will be presented to a DOE-HQ Peer Review Panel in FY 1992. A schedule for other low-level burial grounds performance assessments will be identified this fiscal year.

Table 2-2. Waste Receipts Summary.

Year	Volume (cubic meters)	Radioactivity (curies)	Major contributors of waste
1987	7,000	68,000	Bechtel, Albany, OR; Shippingport, PA; Puget Sound Naval Shipyard, WA; Wood River, Charleston, RI.
1988	5,000	107,000	Puget Sound Naval Shipyard, WA; Shippingport, PA; Brookhaven Nat'l Lab, NY; Lawrence Berkeley Labs, CA.
1989	600	1,500	Brookhaven Nat'l Lab, NY; Lawrence Berkeley Labs, CA.
1990	5,500	240,000	Puget Sound Naval Shipyard, WA.

2.3.4.3 Mixed Waste.

2.3.4.3.1 Storage. Approximately 10,800 cubic meters of mixed waste was in temporary storage at the end of FY 1990. This waste is segregated according to the hazardous characteristics of ignitability, corrosivity, reactivity, and toxicity. During FY 1991, 754 cubic meters will be added to storage. Approximately 46,800 cubic meters will be generated at the Hanford Site from FY 1992 to FY 2020.

Thirteen small metal buildings (15 meters x 24 meters) have been recently constructed for temporary storage of mixed waste. The buildings will be filled with mixed waste by mid-FY 1991.

The mixed waste storage facility (ADS 9207) with a total floor space of 15,000 square meters in four separate buildings, will be available for storage of mixed waste storage beginning in mid-FY 1991; the last building will be operational in FY 1994.

Mixed waste was not considered as a separate category and was not separated before 1988.

2.3.4.3.2 Treatment. There is no current treatment process for solid mixed waste. Treatment of solid mixed waste is being evaluated as part of the design of Module II of the Waste Receiving and Processing Facility (ADS 9218). A project is planned to investigate the feasibility of the engineering, shipping, incineration, and ash disposal of Hanford Site mixed waste at the Idaho National Engineering Laboratory (ADS 9209). Thermal treatment at the Hanford Site is addressed in ADS 9224 for a potential new facility near the Central Waste Complex. This project will require NEPA documentation and may include incineration or new technologies such as microwave or infrared heating.

2.3.4.3.3 Disposal (ADS 9070). Contact-handled mixed waste is stored pending the construction of treatment and disposal facilities. A trench with

a liner and leachate collection system meeting RCRA requirements for disposal will be operational in FY 1992 (ADS 9214). Alternatives to land disposal are being investigated (ADSs 9200 and 9603). Ecology was requested to approve the option of land disposal of large, remote-handled mixed waste material. This request is still under review.

The Hanford Site continues to receive mixed waste from offsite in the form of miscellaneous solid waste. The Shippingport, Pennsylvania reactor pressure vessel is an example of the miscellaneous mixed waste. The vessel was received in 1989 and placed in a disposal trench. Ecology formally agreed that radiation exposure considerations made land disposal the preferred option.

The Hanford Site also continues to receive defueled submarine reactor compartments. The compartments are managed as a mixed waste in accordance with an agreement with Ecology. Several compartments are received each year and are placed in a burial trench.

2.3.4.4 Hazardous Waste.

2.3.4.4.1 Storage (ADS 9215). During calendar years 1988, 1989, and 1990 the Hanford Site generated approximately 343,125 kilograms, 429,820 kilograms, and 180,473 kilograms of nonradioactive hazardous solid waste, respectively.

The Nonradioactive Dangerous Waste Storage Facility (616 Building) and the 305-B Waste Storage Facility are the only active facilities storing non-radioactive hazardous waste (other than less than 90-day storage areas). These facilities are operating under RCRA interim status pending issuance of operating permits from Ecology.

The design of the Nonradioactive Dangerous Waste Storage Facility meets the requirements of the applicable codes, standards, and regulations for the safe-handling, storage, packaging, and sampling of hazardous waste. It is a permanent structure constructed of precast concrete. The storage facility has six storage cells, as shown in Figure 2-12, for the interim storage of hazardous waste. The cells are designated by waste type.

The storage cells have liquid-tight slabs sloped to a collection trench to accumulate spilled or leaking liquids. Each collection trench is covered by a removable steel grate for personnel protection. A curb surrounds each cell with a sloped ramp on one end for access. All of the storage cells are provided with emergency exit doors and surface-mounted industrial fluorescent light fixtures.

The 305-B Waste Storage Facility is a greater than 90-day waste storage facility used for the collection, consolidation, and packaging of PNL's hazardous waste and mixed waste. This facility is a two-story metal and concrete building the 300 Area and was recently upgraded to meet requirements for the storage of hazardous waste and mixed waste.

Figure 2-12. Nonradioactive Dangerous Waste Storage Facility Floor Plan.

2.3.4.4.2 Treatment. There is currently no treatment facility for solid hazardous waste at the Hanford Site. Solid hazardous waste is shipped offsite for treatment and disposal.

The future treatment of hazardous PNL waste is being planned. The proposed PNL Hazardous Waste Treatment Facility is scheduled to be operating in FY 1993 (ADS 8017). This facility will enable the development of treatment technology and will treat the small volume, nonradioactive, hazardous waste resulting from the research activities at PNL. A small-scale ceramic melter that will vitrify and render nonhazardous the chemical wastes generated from defense research and development programs will be included.

2.3.4.4.3 Disposal (ADS 9070). Hazardous waste is shipped offsite for disposal. Potential treatment and disposal options will be evaluated over the next several years to determine which, if any, wastes can be handled entirely onsite.

Seventeen polychlorinated biphenyl (PCB) transformers at the FFTF will be removed or retro-filled during FY 1990 and FY 1991 (ADS 2002). The PCBs will be shipped offsite for disposal. Disposal of N Reactor transformers containing PCBs will also occur (ADS 3008).

2.3.4.5 Alkali Metal.

2.3.4.5.1 Storage. More than 1,000 metric tons of alkali metal (primarily sodium with lesser amounts of potassium, lithium, and mixtures of these elements) are stored at the Hanford Site. Most of the stored alkali metal is associated with the operation of the FFTF and is not considered waste.

Other quantities of sodium (about 140 metric tons) are surplus from deactivated research reactor facilities. Storage of sodium in the 3718-F Alkali Metal Treatment and Storage building and in the 4843 Alkali Metal Storage Facility requires surveillance and monitoring (ADSs 2000 and 2004).

2.3.4.5.2 Treatment. The surplus quantities of sodium are being safely stored but tentatively plans are under way to convert the metal to a hydroxide form at Idaho Falls for reuse in PUREX (if PUREX does not run again, these plans will change). A new Sodium Hydroxide Storage Facility (Project W-012) and a new Sodium Hydroxide Distribution Facility (Project W-013) will handle the introduction of the slightly contaminated sodium hydroxide into PUREX (ADS 9202) where it will be used as a neutralization agent. Currently this activity is on hold pending NEPA documentation on the restart of PUREX.

2.3.4.5.3 Disposal. Since surplus sodium will be treated for recycling, disposal is not applicable.

2.3.4.6 N Reactor Fuel. The DOE currently stores about 2,100 metric tons of N Reactor fuel, 10 metric tons of FFTF fuel, 16 metric tons of Shippingport reactor fuel and about 3 metric tons of miscellaneous fuels. All of these fuels have been irradiated and contain plutonium.

The DOE has determined that this plutonium is not needed for the defense program. As a result, the Secretary of Energy directed that an environmental impact statement (EIS) be prepared to evaluate alternatives for the disposition of these fuels. This EIS is expected to take 2 1/2 to 3 years to complete after which a decision on the best alternative can be made.

The alternatives to be considered include, at a minimum:

- No action
- Processing to recover uranium and plutonium
- Construction of a new extended-storage facility at the Hanford Site
- Construction of a new conversion facility to prepare the fuel for emplacement in a geological repository
- Shipping the fuel offsite for disposal or processing.

Until then, most of the fuel will continue to be stored in two underwater storage basins. The N Reactor fuel, which is stored in containers without lids, will be encapsulated to reduce the chance of a release of radioactivity to the environment (presently, only about half of this fuel is encapsulated). In addition, the basins where the N Reactor fuel is stored are being evaluated against current construction standards. If found deficient, the basins will be upgraded or the fuel will be moved to an alternate location.

2.3.5 Discontinue Disposal of Contaminated Liquids into the Soil Column (ADSs 400, 401, 405, 408, 1001, 1032, 5403, 7014, 9094, 9097, 9126, 9132, 9218, and 9446)

2.3.5.1 Facility Effluents (ADSs 400, 405, 408, 7014, and 9132, most ADSs under Section 2.3.5.2). A program is under way to discontinue the discharge of contaminated liquid effluents into the soil column at the Hanford Site. Thirty-three major liquid effluent streams were identified for which action is required. The discontinuation of liquid effluent discharge has been prioritized into 19 Phase I streams and 14 Phase II streams. The higher-priority Phase I effluents will have alternative treatment and disposal systems implemented by FY 1995. Phase II streams will be addressed after the completion of Phase I. An FY 1990 study and related reports provide detailed characterization of these streams (WHC 1990c, WHC 1990a).

The treatment of Phase I streams, as depicted in Figure 2-13, includes (1) treatment based on the best available technology economically achievable, (2) a waste disposal system for secondary waste generated as a result of effluent treatment (e.g., spent resin), and (3) treated effluent disposal options. Treatment may consist of facility modification or end-of-pipe treatment systems.

Figure 2-13. Soil Column Effluent Options.

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In response to a congressional request, a document entitled *Plan and Schedule to Discontinue Disposal of Contaminated Liquids into the Soil Column at the Hanford Site* (DOE-RL 1987) was issued and submitted to Congress in March 1987. The document summarized ongoing effluent remediation activities and provided plans and schedules for additional activities. Updates to this plan were issued annually in September.

The EPA and Ecology recently submitted review comments on the liquid effluent study. The regulators requested a series of meetings to discuss the Hanford Site liquid effluent program. Negotiations between the DOE-RL and the regulators will require substantial changes to the plan and schedule. Any update to the plan and schedule at this time would quickly become outdated. The changes will be incorporated in the next revision (probably as an appendix).

2.3.5.2 Hanford Environmental Compliance Project (ADS 9900). The Hanford Environmental Compliance project is a compilation of subprojects supporting the Hanford Site's intent to achieve sitewide compliance with Washington State and Federal environmental regulations. Most of the Hanford Environmental Compliance Project is driven by the plan and schedule (DOE-RL 1987) and is included under the soil column topic for this reason.

The Hanford Environmental Compliance project has several objectives:

- Discontinue practices that use the soil column to treat or retain contaminated liquids (Tri-Party Agreement Milestone M-17-00)
- Provide the capabilities for analysis to ensure environmental standards are met
- Enhance TSD of waste
- Minimize quantities of waste
- Minimize future environmental impacts from Hanford Site operations.

The DOE has declared that the Hanford Environmental Compliance Project is a major system acquisition to be managed in accordance with DOE Order 4700.1 (DOE-RL 1989d). It is composed of a total of 14 subprojects with a total estimated cost of \$224.3 million. Table 2-3 lists the line item numbers, titles and funding for each.

For technical planning, the Hanford Environmental Compliance subprojects fall into four major categories: (1) groundwater monitoring, (2) sample analysis, (3) existing systems and facilities upgrades, and (4) waste and effluent storage and treatment.

2.3.5.2.1 Groundwater Monitoring Wells, W-017H (ADSs 9062 and 9065). Solidify in grout liquid LLW from 40 percent of the DSTs and dispose of the grout in underground vaults built for that purpose. This subproject is a corrective activity described in Section 4.3.3.2.

Table 2-3. Hanford Environmental Compliance Subprojects.
(Cost in \$000's)

Subproject	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	Total estimated cost
FY 1989:							
W-017H Groundwater monitoring wells ^a	3,800	5,000	1,900	1,300	--	--	12,000
W-007H B Plant Condensate Treatment Facility	2,600	7,500	3,900	700	--	--	14,700
W-020H Cathodic protection ^a	3,700	--	--	3,400	--	--	7,100
V-791H 300/400 Area waste facilities	1,500	--	--	--	--	--	1,500
V-016H Radioactive mixed waste storage facilities ^a	400	2,900	1,800	1,800	1,800	--	8,700
FY 1990:							
B-680H Plutonium Finishing Plant liquid low-level waste system modification	--	1,500	4,000	1,400	--	--	6,900
C-031H Plutonium Finishing Plant liquid effluent treatment with transuranic extraction	--	--	800	3,800	8,130	4,670	17,400
W-010H B Plant environmental compliance upgrades	--	800	2,700	--	--	--	3,500
W-011H Environmental Support Facility	--	9,500	7,100	--	--	--	16,600
FY 1991:							
W-024H B Plant radiological and containment upgrades	--	--	--	4,300	4,700	3,000	12,000
W-041H Environmental hot cell expansion	--	--	2,400	10,000	1,400	--	13,800
C-018H 242-A Condensate Treatment/Plutonium Uranium Extraction Plant liquid effluent treatment ^b	--	--	17,860	21,900	12,840	--	52,600
FY 1992:							
L-045H 300 Area treated effluent disposal facility	--	--	--	2,400	6,100	6,200	14,700
W-049H 200 Area treated effluent disposal facility--Phase I	--	--	--	4,500	15,800	22,500	42,800
TOTAL	12,000	27,200	42,460	55,500	50,770	36,370	224,300

^aThese projects are corrective activities (see Chapter 4.0) that are shown here in order to show a complete list of Hanford Environmental Compliance subprojects.

^bProject C-018H includes formerly separate Project W-046H, 242-A Condensate Treatment.

2.3.5.2.2 B Plant Process Condensate Treatment Facility, W-007H. Remove all liquids that can be pumped from nearly all of the old SSTs and seal openings in the tanks from those from which the liquid has been removed until decisions are made on permanent disposal. The B Plant upgrade subproject will provide treatment to remove contaminants from the process condensate streams before discharge to the environment. The process condensate is a secondary stream of the pretreatment process. The subproject is in support of Tri-Party Agreement Milestone M-17-00, for completing Phase I Liquid Effluent Treatment Facilities. This subproject is currently on hold pending the August 1991 completion of the pretreatment risk assessment of B Plant. This subproject will not be completed if B Plant is determined to be unusable for tank waste pretreatment.

2.3.5.2.3 Cathodic Protection, W-020H. Develop and test methods for removing highly radioactive salts, sludges, and remaining liquids from old SSTs. This subproject is a corrective activity described in Section 4.3.3.2.

2.3.5.2.4 300/400 Area Waste Water Facilities, V-791H. Either stop discharging liquid contaminants to the soil or treat those liquid contaminants discharged to the soil in nearly all waste streams. Upgrades in the 400 Area will install a new pipeline to the Washington Public Power Supply System waste treatment plant. When this connection is completed, the 400 Area septic system will be abandoned. Improvements in the 300 Area will adequately dispose of backwash water from the 300 Area filter plant through the use of two sedimentation ponds that can be utilized alternately to allow periodic clean out of sedimentation. These ponds are being completed.

2.3.5.2.5 Radioactive Mixed Waste Storage Facilities, W-016H. Identify needed resources and make the commitment to meet future milestones in the Tri-Party Agreement. Implement a schedule to meet these milestones. This subproject is a corrective activity described in Section 4.3.3.2.

2.3.5.2.6 Plutonium Finishing Plant Liquid Low-Level Waste System Modification, B-680H. Identify needed resources and make the commitment to meet future milestones in the Tri-Party Agreement. Effluents from Plutonium Finishing Plant drain systems that are collected in the chemical sewer will be treated to remove contaminants. In addition, a closed-loop cooling system for the process equipment cooling water will be installed to eliminate the discharge of potentially contaminated cooling water.

2.3.5.2.7 Plutonium Finishing Plant Liquid Effluent Treatment with Transuranic Extraction, C-031H. Five existing Waste Retention Facility storage and neutralization tanks 16,300 liters (4,300 gallons) each will be replaced. The wastestream piping and trench connecting these tanks to Plutonium Finishing Plant will be upgraded. These upgraded facilities and systems will eliminate the possibility of leaks from the existing piping and storage tanks and minimize waste production. This subproject originally included a process for removal of TRU waste from the Plutonium Finishing Plant, but has since been deleted as a result of changes in mission for the Hanford Site. This subproject is currently on hold until FY 1992.

2.3.5.2.8 B Plant Environmental Compliance Upgrades, W-010H. Remove 30 percent of the old contaminated buildings and facilities and clean up the

sites. Spill containment for the storage tanks in the B Plant chemical tank farm and an independent drain system for the B Plant chemical staging and measuring tanks will be provided. The B Plant chemical makeup tank room ventilation system will be upgraded to minimize potential release of airborne contaminants, and structural supports for chemical storage tanks and transfer piping will be upgraded to meet current Uniform Building Code seismic requirements. Also, upgraded instrumentation, controls, and alarms for storage, chemical staging, and measuring tanks will be provided. These upgrades will prevent or mitigate releases of hazardous materials to the environment.

2.3.5.2.9 Environmental Support Facility, W-011H. Make decisions regarding the decommissioning of the old plutonium production reactors. Assure that the decisions are reasonable, cost effective, and have broad public support. A new facility will be constructed to analyze low-level and nonradioactive samples from various environmental and operating programs on the Hanford Site. This facility is needed because of the volume of samples necessary to support waste site characterization, permitting activities, and operating effluent compliance verifications, in accordance with environmental requirements.

2.3.5.2.10 B Plant Radiological and Containment Upgrades, W-024H. Develop and test new cleanup technologies based on knowledge of wastes in the environment advanced by the Environmental and Molecular Science Laboratories. Evaluate cleanup costs using these new technologies and make the technologies available for general use if cost effective. The B Plant Cell drain header will be relined, a new vessel vent system will be installed, and selected overflow drains will be routed through a new monitoring and diversion system. These upgrades will reduce the possibility for discharge of untreated mixed waste and LLW to the soil column or atmosphere. This subproject is currently on hold pending the August 1991 completion of the pretreatment risk assessment. This subproject will not be completed if B Plant is determined to be unusable for tank waste pretreatment.

2.3.5.2.11 Environmental Hot Cell Expansion, W-041H. Perform cleanup work based on mutual guidelines and encourage extensive public involvement. Seek open support of cleanup activities by State and Indian officials. Additional hot cells will be built in conjunction with the 222-S Laboratory to accommodate the large added volume of high-level radioactive sample analyses required for RCRA and CERCLA sampling, for waste site characterizations, and for support of Grout Treatment Facility and HWVP operations.

2.3.5.2.12 242-A Evaporator/PUREX Plant Process Condensate Treatment Facility, C-018H. Take positive measures to assure that the Northwest Congressional delegation and other key members of Congress understand and support Hanford cleanup and work to obtain needed. Encourage Congress to establish long-term funding for cleanup. A new facility will be built with the best available technology to treat and prepare for disposal, the effluents from PUREX and the 242-A Evaporator process condensates. The best available technology for these streams includes a combination of filtration, reverse osmosis, organic destruction, and ion exchange. Secondary wastes shall be

concentrated and drummed in preparation for RCRA permitted land disposal. This subproject will comply with the derived concentration guide limits of DOE Order 5400.5 (DOE 1990e).

2.3.5.2.13 300 Area Treated Effluent Disposal Facility, L-045H. Take positive measures to assure that our organizations and people work together as a team with a "can do" approach to solving problems. Designate one person that is clearly and ultimately accountable for each program or problem. Delegate other persons with related or partial responsibility to work as a team under the leader's guidance. A new facility will be built with the best available technology to treat and dispose of 30 combined effluent streams (the process sewer) currently disposed of in the 300 Area process trenches. The best available technology for these streams includes filtration, carbon adsorption, reverse osmosis, and ion exchange. Secondary wastes shall be concentrated and drummed before disposal at existing land disposal sites in compliance with RCRA.

2.3.5.2.14 200 Areas Treated Effluent Disposal Facility, W-049H. This subproject will provide the collection system, upgrade and use existing retention basins, and provide a disposal system for all Phase I and selected Phase II liquid effluents generated at the 200 Area process facilities that are presently discharged to soil columns. This facility will collect, store, and dispose of treated liquid effluent from the 200 Areas. These are the streams that result from primary treatment of soil column plan--Phase I streams. Detection and sampling systems will control diversion of upsets in the effluent to the C-018H Treatment Facility for further treatment before discharge.

2.4 OTHER WASTE MANAGEMENT AND RELATED ACTIVITIES

2.4.1 Waste Minimization

2.4.1.1 Background. A waste minimization and pollution prevention awareness plan (DOE-RL 1990a) has been developed by DOE-RL and is being implemented by the four primary contractors across the Hanford Site. The program focuses on minimizing of the amount of waste generated with priority given first to source reduction and second to recycling activities. Generated wastes shall be treated to reduce both volume and toxicity.

Wastes targeted for minimization include radioactive (high-level, TRU, low-level), radioactive mixed, hazardous, and non-RCRA regulated wastes. These wastestreams were prioritized based on their minimization potential and will undergo a detailed evaluation to determine methodologies needed to eliminate or reduce the volume and toxicity of wastes generated. Many waste minimization ideas generated by wastestream reviews have been implemented and have resulted in a substantial reduction in wastes generated.

2.4.1.2 Strategy. The Hanford Site waste minimization and pollution prevention awareness plan (DOE-RL 1990a) provides guidance from DOE-RL to each of the four primary contractors for use in developing contractor-specific

programs. Each contractor uses the DOE-RL guidance to develop company-specific waste minimization plans that are tailored to their own specific activities. Actual waste minimization initiatives typically come from teams or individuals working within the operation that generates the waste. Consequently, the strategy of company and facility programs is to motivate individuals within an operation to provide waste minimization initiatives.

2.4.1.3 Implementation. Waste minimization activities at the DOE-RL includes program development and implementation, overview of waste minimization program activities by the contractors and reporting responsibility. Key elements of the program includes:

- Top management support
- Employee training, awareness, and incentives
- Program scope, objectives, and goals
- Waste minimization assessments and audits
- Cost accounting
- Waste accounting
- Technology transfer
- Program evaluation.

The four primary Hanford Site contractors have taken the DOE-RL guidance and developed and implemented waste minimization and pollution prevention programs. These programs encourage waste minimization at each of the Hanford Site contractors. Waste minimization programs are in the process of being upgraded to reflect new guidance from DOE-HQ. The programs will be more prescriptive in evaluating hazardous products used in the workplace and in evaluating wastestreams for minimization.

2.4.1.4 Waste Minimization Funding. Funding for waste minimization activities is provided by the Hanford Environmental Management Program (ADSs 9050 through 9054). The scope of work supported by this funding is program development and reporting of waste minimization activity at the Hanford Site. Waste minimization will have its own ADS starting in 1993 (ADS 9035) and the scope will be expanded to include the land disposal restriction report required by the Tri-Party Agreement Milestone M-26-01. Base funding is expected, to remain at a constant level through FY 1993.

2.4.1.5 Program Development and Progress. The waste minimization and pollution prevention awareness plan (DOE-RL 1990a) is being rewritten and reflects DOE-HQ guidance which is consistent with EPA guidelines. The DOE-RL has developed an environmental protection policy statement that supports waste minimization and pollution prevention awareness activities (see Chapter 1.0). Waste minimization goals and milestones are included in performance evaluations of operating contractors. The accomplishment of waste minimization goals and milestones are included in the evaluation of award fees.

The plans for the four Hanford Site contractors will be rewritten to reflect new DOE-RL guidance in this area. Since the facility-specific waste minimization plans have been written, these plans will require updating during the next year to reflect the change in format and content prescribed in the new guidance.

Waste minimization teams were established at many of the waste generating facilities to coordinate waste minimization activities. Preliminary wastestream identification and characterization are complete at a number of facilities, and this effort is continuing at others. Detailed assessments of wastestreams for minimization potential is ongoing across the Hanford Site.

The benefits of waste minimization at the Hanford Site are numerous. Specific benefits realized include cost savings from avoided waste disposal and product purchasing costs, a reduced hazard of operations, and in one specific case, the continued safe operation of the Hanford Site facilities.

Waste disposal costs are usually avoided whenever a wastestream is minimized. In 1990, approximately 5,906,000 kilograms of waste were avoided using waste minimization techniques, for an estimated \$633,000 cost savings. The actual cost savings from avoided disposal, including avoided liability costs, are difficult to determine because final treatment and disposal methods for most of the waste have yet to be finalized.

Many of the waste minimization successes in 1990 resulted from finding users for excess chemicals using onsite contacts via the Surplus Chemical Exchange or informal channels. Approximately 2,700 kilograms of waste were avoided across the Hanford Site through exchanges directly related to the Surplus Chemical Exchange. The sorting table at 100-N, initially designed to sort radioactive waste for compaction, was successful in recovering numerous reusable items such as masks, boots, gloves, and overalls. Savings of approximately \$15,000 in purchasing costs were realized in 1990.

Waste minimization techniques help to ensure the health and safety of workers. Identifying and using less hazardous materials to perform an activity reduces the hazard of the operation. Several Hanford Site facilities have successfully substituted less hazardous materials in their activities.

Waste minimization efforts were successful in allowing the continued operation of Hanford Site facilities while work to restart the evaporator was in progress. Task teams were established at each plant to evaluate the minimization potential for each radioactive liquid wastestream. The task teams established maximum waste generation limits at each plant. In addition, a multifunction Tank Space Management Board consisting of plant managers was established to review waste reduction efforts and to provide review and approval of activities that would cause a plant to exceed established volumes. The volume of liquid waste avoided through waste reduction efforts to date exceeds 11 million liters.

Specific examples of waste minimization successes are documented below.

2.4.1.5.1 Source Reduction.

- Hazardous Waste

- In three separate instances, the 2703E Engineering Laboratory was able to develop, through pre-job planning, suitable substitutes for chromates, sulfates, sulfites and radioactive tritium that were nonhazardous and had chemical and physical properties similar enough to validate the tests performed. These efforts resulted in the avoidance of 12,800 kilograms of hazardous waste.
- A combination of source reduction and recycling has reduced the amount of waste generated from road-striping activities. Paint that was originally purchased in 19-liter nonreturnable buckets is now purchased in 1,300-liter returnable containers. The paint supplier also accepts all liquid wastes associated with the cleanup of the paint and allows the waste to be returned in the usable containers. Waste minimization activities implemented in 1989 and 1990 reduced waste generation by 56 percent.

- Radioactive Waste

- Since late 1987, all low-level operations waste packaged for disposal from the N Reactor has been opened and sorted. Potentially salvageable items are retrieved and monitored for radioactivity before release for reuse. Items with radiation levels above background levels are decontaminated when possible and reused. Some items, such as tools, that cannot be decontaminated are made available for use at other facilities or disposed of as LLW. Since the sorting started, the LLW was reduced from 637 cubic meters to 170 cubic meters by recovering salvageable items and using compaction. Reusing the salvageable items saved an estimated \$98,000 in new products costs.

- Radioactive Mixed Waste

- Procedures for liquid transfers, both between and within facilities, were examined for many of these streams. Changes to transfer routes, line flushing volume requirements, and methods used to facilitate the transfers resulted in a 879,000-kilogram reduction in the volume of waste generated.
- The start-up parameters for the solvent extraction portion of the PUREX process were fine tuned which resulted in a 15 percent, or 2,661,000-kilogram, reduction in the amount of waste normally generated during this process.
- The PNL Crafts and the Reactor Technology Center personnel designed and fabricated fixtures that allowed the facility to

save two manipulator slave ends. Doing so eliminated approximately 1.4 cubic meters of TRU waste and saved \$50,000 in manipulator parts replacement costs.

2.4.1.5.2 Recycling.

- Hazardous Waste
 - Construction Forces at Kaiser Engineers Hanford have contracted with a local firm to provide and recycle degreasing solvents. The firm will provide both the solvent for the parts washer retained by Kaiser Engineers Hanford and a combination of equipment and solvent for the parts washer being removed from service. The service will include removing the spent solvent from the washers and recharging them with recycled materials. This recycling activity will significantly reduce the hazardous waste normally produced by this cleaning process, which is necessary in vehicle and heavy equipment maintenance.
 - Recycling of waste antifreeze (ethylene glycol) from fleet maintenance has reduced the waste generated by this source by 93 percent.
- Radioactive Waste
 - Tools, equipment, clothing, etc., from the sorting facility at N Reactor are reused. Tools that cannot be decontaminated are offered to other organizations instead of being disposed of as waste.
- Radioactive Mixed Waste
 - More than 1,300 kilograms of excess contaminated lead shielding at the FFTF was recycled by making it available for use as shielding elsewhere on the Hanford Site.

2.4.1.5.3 Incentive, Training, and Employee Awareness. The DOE-RL has integrated a pollution prevention awareness program into its waste minimization program. Each Hanford Site contractor has developed and implemented specific activities and is working toward an integrated sitewide approach to achieve the program objectives. The objectives of the program are as follows:

- Encourage environmental awareness in the community
- Measurably raise the consciousness of Hanford Site employees so they perform their jobs in ways that prevent pollution and minimize waste
- Keep employees informed about environmental cleanup and compliance activities, thus better equipping them to address these issues
- Make the Hanford Site a model of environmental awareness and responsibility

- Build a team of representatives from across the Hanford Site that will provide input on program elements and monitor progress.

Information is provided to employees through bulletins, brochures and newsletters such as the *Hanford Heartbeat*, the *Hanford Reach*, and the *Safety Exchange*. In addition, a sitewide campaign called "Team Hanford" was held in 1990 to promote pollution prevention awareness in the work force and in management across the Hanford Site. The 1990 campaign was very successful with more than 5,500 participants submitting more than 300 waste minimization suggestions. This campaign is planned again for 1991.

Numerous training and retraining programs have been developed to provide specific job-related information and general waste reduction information to employees based on their current workscope. These include Hanford General Employee Training, and regulatory and company requirements in the Hazardous Waste Shipment Certification and Waste Site-Basic. New employees are also briefed in waste minimization as part of the New Employee Safety Orientation.

Some of the obvious incentives for minimizing waste are reduced exposure to handlers and users, lower waste handling and disposal costs, and improved environmental conditions. In addition, Hanford Environmental Health Foundation, Kaiser Engineers Hanford, and Westinghouse Hanford have developed one or more programs that encourage employee participation through monetary rewards. These programs include an employee suggestion program at Hanford Environmental Health Foundation; Savings Bonds awards through the Quality/Productivity Improvement program at Kaiser Engineers Hanford; a monetary sharing of savings through "Great Ideas" program at Westinghouse Hanford, and individual or group awards for environmental excellence through the "Thanks You Make the Difference" Program also at Westinghouse Hanford.

2.4.1.6 Planned Activities. The following activities are planned for FY 1991 and 1992.

- Company waste minimization and pollution prevention awareness plans will be revised and updated to reflect recent DOE-RL requirements.
- Westinghouse Hanford will issue a corporate statement regarding goals for waste minimization. The establishment of facility-specific waste minimization goals for 1992 is scheduled for completion by January 1992.
- The process of wastestream identification and characterization will continue at those facilities that have not completed this task. Detailed waste assessments will be conducted to determine and evaluate minimization opportunities.
- Annual and semi-annual progress reports for the overall Waste Minimization Program will be prepared. The ongoing effort by the facilities to issue quarterly progress reports will continue.
- The material procurement process will be reviewed to determine the best methods to minimize the potential for purchased products to be disposed of as regulated waste.

- The Waste Minimization Team will examine material substitution issues and investigate recycling options for regulated wastes such as fluorescent tubes, batteries, etc.
- Methods will be developed to "measure" waste minimization by comparing quantity and toxicity for identified streams.
- Techniques will be devised to develop waste baselines and to measure waste minimization achieved versus established waste minimization goals.
- The cost accounting system will be reviewed to improve the incentive for minimizing waste.
- Activities in technology transfer will continue with meetings, discussions, and the interchange of ideas with onsite facilities and other facilities within the DOE complex. The Waste Information Network, and EPA Pollution Prevention Information Clearinghouse will be used to increase information exchange throughout the DOE complex and industry.
- Environmental awareness will continue with expanded training and waste minimization articles in company publications. Recognition of outstanding waste minimization accomplishments will also continue.

2.4.1.7 Waste Minimization Technology Development. Specific waste minimization technology needs have been identified and proposals have been submitted for potential funding. The process of identifying technology needs is ongoing. As waste assessments are performed, specific technology deficiencies will be identified for development.

2.4.2 Analytical Laboratory Support

As the mission at the Hanford Site has evolved into environmental cleanup, the mission of the analytical laboratories has changed. Any cleanup effort occurring at the Hanford Site will require the services of a qualified contract laboratory or equivalent to accomplish the following: (1) characterization of the waste, (2) selection or development of a method for cleanup, (3) remediation of the designated areas, and (4) verification that the cleanup was effective.

An extensive assessment performed in 1987 determined that the Hanford Site had very limited contract laboratory program and RCRA protocol capability. It did, however, indicate that the potential existed to acquire contract laboratory capability if some basic upgrades were performed. Strategic planning for accomplishing the upgrades was divided into four categories:

1. Upgrades to existing facilities
2. New construction

3. Offsite laboratory utilization

4. Pursuit of onsite private labs

The first three have been ongoing since the start of the Laboratory Upgrade Program. The fourth is a new innovation that DOE-HQ has asked to be considered.

The upgrades were divided into two categories. Capability upgrades will provide for base capability to assure that the Hanford Environmental Laboratories have the ability to run a large array of determinations. The following are examples of capability upgrades required to run contract laboratory program RCRA protocols: (1) implementation of a chain-of-custody system, (2) procedures for cleaning and storing sampling equipment, (3) provisions for storage of samples at specific temperatures, and (4) facilities for archiving samples. Capacity upgrades, on the other hand, will address the throughput requirements in a production-type environment. The following are among the capacity issues considered: (1) procurement of additional analytical equipment, (2) hiring and training of personnel, (3) space optimization upgrades, and (4) the implementation of an automated Laboratory Information Management System.

2.4.2.1 Upgrades to Existing Facilities. A major deficiency was a shortage of hot cell space onsite. To accomplish the throughput necessary to support the Tri-Party Agreement and other regulatory agency requirements, more hot cell space was essential. Thus, the 222-S Laboratory hot cell addition was validated as Project W-041H, an FY 1991 subproject to the Hanford Environmental Compliance line item. In addition, the 325 Laboratory in the 300 Area (operated by PNL) contained hot cells that could be used if certain upgrades were performed.

Other upgrades to existing facilities include development of methodologies consistent with the stringent RCRA/CERCLA protocols: procurement of analytical equipment and other equipment to comply with storage and chain-of-custody requirements; and hiring and training of personnel to operate the laboratories.

2.4.2.2 New Construction. Another deficiency of the Hanford Site laboratories is the inability to perform analyses to drinking water standards, primarily because the background radiation is too high in the areas where present labs are located. Yet, quick turnaround times are required to provide analytical support to operating facilities to preclude production delays or even partial or complete shutdown. A new low-level lab is needed to fill this void. The Waste Sampling and Characterization Facility is seen as the solution to the problem. This facility was validated as an FY 1990 subproject (W-011H) to the Hanford Environmental Compliance line item, a major system acquisition. It is currently on hold (see Section 2.4.2.4), but planned for startup in January 1993.

Several general plant projects and line items have been validated and/or are being planned to support various aspects of the Hanford Site Laboratories.

2.4.2.3 Offsite Laboratory Utilization. Utilizing offsite laboratories has always been a part of the Hanford Site laboratories strategy. The intent was originally to use these labs to handle peak sample loads and to provide alternatives when Hanford Site labs did not have the capability and/or capacity to provide timely turnaround. Since the original planning for the upgrades it has become apparent that sample load projections have made it necessary to off-load some of the more routine samples to provide space in onsite labs. This may be especially true in the next few years as the Hanford Site laboratories go through expansion and upgrading activities.

2.4.2.4 Pursuit of Onsite Private Laboratories. It is almost certain that even with the laboratory upgrades fully completed and implemented there will still be enough analytical work to use additional onsite laboratories. In fact, the Waste Sampling and Characterization Facility has been placed on hold to further study the possibilities of privatizing a large portion of the environmental analytical work.

Privatization of onsite laboratories is being reviewed in a separate study by the DOE-RL. There is also strong impetus from local politicians and business leaders to pursue privatization.

2.4.2.5 Funding for Operation of the Laboratories. The Hanford Environmental Laboratories will be funded as two distinct categories. Facility operations address issues that affect the ready-to-serve status of the various laboratories. These include such items as (1) maintenance, (2) utilities, (3) engineering, (4) building operations, (5) Health Physics support. Analytical operations, which are funded via various Hanford Site "customers", deals with issues pertaining to the actual running of the analyses and include such things as (1) methodology and procedure preparation, (2) operation of the analytical equipment, (3) preparation of standards for verification of analytical results, and (4) issuance of reports of the results.

2.4.3 Environmental Monitoring and Control
(ADSS 8000, 9060, 9061, 9062, 9063,
9064, 9065, 9067, 9400, and 9403)

Environmental monitoring and control activity supports general environmental monitoring capabilities for stack discharges (and other potential airborne releases), liquid effluent discharges, and groundwater. It provides for monitoring trends and assessing the impact of operations to the environment, and provides support to operations for effluent disposal facilities, maintenance upgrades, and/or construction.

The PNL issues an annual Hanford Site Environmental Monitoring Report (PNL 1990a). These reports are prepared for each calendar year and provide a historical record of radionuclide and radiation levels attributable to natural causes, worldwide fallout, and Hanford Site operations. Columbia River monitoring data is included.

Environmental monitoring activity supports RCRA site characterization and sitewide effluent sampling of hazardous wastestreams and supports well drilling to meet RCRA requirements. After the wells are drilled, this

activity is responsible for required sampling/monitoring and analysis of data and associated reports. Environmental monitoring activity is responsible for assessing any hazardous waste operational impacts to the environment, recommending corrective actions, and implementing required actions.

An aggressive schedule is being undertaken, as a corrective activity, to install RCRA groundwater monitoring wells at the rate of 30 in calendar year 1990 and 50 per year thereafter until all land disposal units and SSTs have monitoring systems that comply with RCRA.

The operational groundwater monitoring program is a third monitoring program at the Hanford Site. The mission of this program is to provide information and documentation necessary to demonstrate compliance with DOE groundwater protection policies as outlined in DOE Orders 5400.1 (DOE 1990c) and 5484.1 (DOE 1990a). This program samples, analyses, and reports on groundwater analyses in all operational areas on the Hanford Site. Until recently, this monitoring focused almost exclusively on radionuclide constituents. Other constituents have been added to the program so that the operational groundwater monitoring program routinely includes both radiological and nonradiological constituents in analyses.

To remove artifacts of drilling, to obtain representative samples, and to test aquifer hydraulic properties, water must be pumped from groundwater wells. The water thus generated is purgewater. Purgewater management is governed by terms agreed between DOE, Ecology, and the EPA.

There are no treatment capabilities for purgewater, so storage capabilities were being installed while regulators evaluated and discussed the issue (ADS 9068). Installation of the first two 3,785,000 liter (1 million gallon) modular storage tanks was completed in the 200 East Area and all existing purgewater was transferred to one tank. The preferred alternative for ultimate disposal of the stored purgewater is to use these modular storage tanks as solar evaporation basins when air permits have been obtained. Failing approval of air permits, purgewater will be processed in the 200 East Area Treated Effluent Disposal Facility beginning in June 1995.

2.4.4 Vadose Zone Monitoring

The vadose zone is the area above the water table and below the ground surface. The vadose zone is monitored by making periodic nuclear logging measurements in boreholes, or wells, drilled specifically for monitoring subsurface regions surrounding active and inactive disposal facilities, such as cribs and tanks. The options relative to vadose zone monitoring are found in DOE Order 5400.1 (DOE 1990c), 5400.3 (DOE 1989e), 5400.5 (DOE 1990e).

The present monitoring activity consists of passive gross gamma-ray logging, single-detector gamma-gamma (density) logging, and single-detector neutron-neutron (moisture content) logging in the tank farms. These logging systems are obsolete and are scheduled for replacement by spectral gamma-ray systems, compensated gamma-gamma systems, and compensated neutron-neutron systems. Hardware renovations will be accompanied by improved methods for calibration, data analysis, data interpretation, and data storage.

2.4.5 Groundwater Protection Management Program

The *Hanford Site Groundwater Protection Management Program* (DOE-RL 1989c), and related planning documentation, required by DOE Order 5400.1 (DOE 1990c) will be reviewed annually and revised as necessary. This management activity is currently covered under ADS 9060 and includes establishment of an Office of Groundwater Protection Management to ensure that all program elements are addressed and funded in a timely manner. The first edition of the groundwater protection program has been issued.

The primary purposes of the Hanford Site groundwater protection program are to (1) establish a uniform groundwater protection strategy and policy for the Hanford Site, (2) comply with all DOE Order 5400.1 (DOE 1990c) program elements, (3) ensure effective resource management and regulatory compliance, and (4) integrate and coordinate various groundwater-related activities.

The basic groundwater protection strategy for the Hanford Site involves both near- and long-term action. Near-term action includes the phased elimination of liquid waste disposal to the ground (except for tritium). The target completion date for Phase I streams is FY 1995. Long-term groundwater protection will be accomplished by removal, stabilization and/or treatment of stored wastes and wastes released to the ground. Engineered barriers will be used to restrict infiltration over disposal sites. Performance assessment and subsurface monitoring will be used to design appropriate engineered barriers and to assess effectiveness of controls. Both natural attenuation processes and groundwater treatment will be used to mitigate groundwater contamination.

Additional sitewide characterization of the groundwater regime, hydrologic model refinement and geotechnology development are needed soon to support design and decision aspects of this strategy and to promote effective resource management.

The specific requirements of DOE Order 5400.1 (DOE 1990c) are:

- Document the groundwater regime
- Design and implement a groundwater monitoring program to support resource management and comply with applicable laws and regulations
- Implement a management program for groundwater protection and remediation
- Summarize and identify areas that may be contaminated with hazardous waste
- Provide strategies for controlling these sources
- Implement a remedial action program.

The latter five elements are required by the Tri-Party Agreement and are implemented by existing operational groundwater monitoring, RCRA groundwater

monitoring, and CERCLA/RCRA corrective action programs at the Hanford Site. The first element, document the groundwater regime, requires additional characterization activities that currently are not funded.

Work plans to fully implement the groundwater protection program were prepared in FY 1990. Specific work plans currently identified include:

- Performance assessment (vadose and groundwater pathways)
- Vadose zone characterization
- Groundwater characterization at liquid waste disposal and other sites
- Soil and groundwater baseline data
- Documentation of the Hanford Site area groundwater regime.

Once the program is started, approximately 1 million dollars per year will be required.

2.4.6 Seismic Monitoring System

The Hanford Site is approximately 320 kilometers (200 miles) east of the seismically active portion of Washington State (i.e., the land between Cascade Mountain Range and the Pacific Ocean). While there has not been a damage-causing seismic event in the short 47-year history of the Hanford Site, the Nuclear Regulatory Commission, for licensing purposes considers faults associated with Gable Mountain and Rattlesnake Mountain to be capable of producing earthquakes of up to 5.5 and 6.5 magnitude (Richter scale), respectively.

The DOE Orders 5480.1B (DOE 1987d) and 5480.5 (DOE 1986) require monitoring to record natural events or manmade activities that may substantially affect or threaten performance, reliability, or safe operation of DOE facilities. Even though in 47 years no events have occurred that have threatened performance or safe operation, some uncertainty exists about the occurrence of future seismic events. A conservative approach has been developed to design new facilities to meet rigid seismic standards and to continue Hanford Site seismic monitoring.

The Hanford Site is considered an alternative for a new production reactor and is included as such in the DOE EIS for the new production reactor. The Nuclear Regulatory Commission and DOE nuclear power plant safety policies make it imperative that the seismic network remain fully operative at least until the record of decision is made for the new production reactor. This decision is currently scheduled for December 1991.

Currently, seismicity is monitored at the Hanford Site through about 40 stations on and near the Hanford Site, and throughout eastern Washington. This monitoring is accomplished in a cooperative effort with the University of Washington and the United States Geologic Survey. Seismic monitoring is covered by ADS 94303-4A-0.

2.4.7 Landlord Program

A landlord program has been established at the Hanford Site to provide general purpose infrastructure support for multiprogram missions. The Hanford Site landlord program is a focal point, identifying facility deficiencies and providing funding for needed capital construction and equipment replacements and upgrades.

The landlord program funds capital equipment and construction for the following systems and services:

- Steam (Process and Heating)
- Radioactive and Nonradioactive Laundry
- General Purpose Buildings and Equipment
- Telecommunications System
- Railroad System
- Road System
- Process and Potable Water System
- Medical Services
- Security (partial)
- Warehousing
- Transportation
- General Purpose Site Support Laboratories
- Electrical Distribution System
- Site Automated Data Processing Systems
- Fire Protection Services
- Machine/Fabrication Shops
- Process/Sanitary Sewer Systems
- Site Sanitary Landfill.

The landlord program does not operate or provide routine maintenance for these services, but rather determines deficiencies in the physical plant associated with these services and funds their upgrade or replacement. Without these services, neither waste management nor environmental restoration activities could continue.

This update of the plan incorporates more landlord activities than the previous release. This is because the responsibilities for the landlord program have been assumed by the DOE Office of Environmental Restoration and Waste Management. The previous plan included only three landlord line item activities: the steam system upgrade, the radioactive laundry system, and underground storage tank upgrades. The following activities are included in this plan (consisting of the Preliminary Unvalidated Case, Priority 1, Line Item activities).

200 Areas Steam System (ADS 1000). The 200 Areas Steam System Upgrades provide needed reliability upgrades to allow continuity of operations for Waste Management, Environmental Restoration, and D&D activities on the Hanford Site. The upgrades will consolidate the current dual plant operations to one plant, utilizing some of the old boilers for peaking and maintenance outage service.

Hanford Site Laundry System (ADS 1001). This activity provides a new radiological and nonradiological laundry facility and mask cleaning facility. The laundry facility is needed to discontinue disposal of contaminated effluents to the soil column (Tri-Party Agreement Milestone M-17-00), and to address concerns about insufficient capacity in the current facility and radiological concerns due to inadequate air flow patterns inside the facility. This laundry system is needed for Site cleanup activities, waste management operations, and any future PUREX/chemical process operations.

Continuity of Operations Core Activities (ADS 1005). Requirements compromise core activities for the landlord program. Infrastructure systems include the following: (1) steam, (2) water/sewer, (3) electrical, (4) fire protection, (5) medical services, (6) standards laboratory, (7) environmental monitoring, (8) Site communications, and (9) fabrication shops. Other core activities include Site planning and facility inspections.

Safety Compliance-Phase I (ADS 1006). This ongoing line item activity provides capital improvements necessary to resolve safety deficiencies in existing landlord systems and facilities. Included are fire protection upgrades, railroad rail replacements, and steam plant safety and electrical upgrades.

300 Area Electrical Distribution Conversion and Safety Improvement (ADS 1007). This project is required to provide a system that is safe, efficient, reliable and maintainable as required by DOE Orders 5480.4 (DOE 1989d). The existing system does not meet the national electrical safety code for safe working clearances, separation of cables, and shock prevention.

Demolition of Infrastructure Facilities (ADS 1010). This activity provides for the asbestos removal and demolition of nonradioactive general purpose facilities in accordance with the chartered responsibilities of the Hanford Site Landlord Program. The buildings which are currently an overhead burden for surveillance and maintenance are referred to as orphan facilities.

Safety Analysis Reports (Nuclear Facilities) (ADS 1012). Safety Analysis Reports for nuclear facilities (324, 325, and 327 buildings) are out of compliance with DOE Orders 5480.5 (DOE 1986) and 5481.1B (DOE 1987d).

Safety Compliance-300 Area Laboratories (ADS 1013). This activity includes the following: (1) upgrade of facility radiological air sampling and monitoring equipment, (2) new radionuclide and nonradionuclide liquid effluent monitors; (3) fire protection sprinkler systems, and (4) other safety compliance items.

324 Facility Compliance/Renovation (ADS 1014). This old, but strategically important support laboratory requires compliance upgrade modifications to ventilation and air filtration systems and monitoring stations to control radionuclide emissions for compliance with the *Clean Air Act of 1977* and other requirements. Upgrade of waste water piping for waste water pollution control is also required.

325 Facility Compliance/Renovation (ADS 1015). This old, but strategically important support laboratory requires compliance upgrade modifications to ventilation and air filtration systems and monitoring stations to control radionuclide emissions for compliance with the *Clean Air Act* and other requirements. Upgrade of waste water piping for waste water pollution control is also required.

This activity will bring the 325 Building into compliance; avoid near-term adverse impact on workers, the public, and the environment; and assure continuity of operations to meet requirements of key Hanford Site programs.

Landlord Program Safety Compliance Phase II (ADS 1021). Landlord Program Safety Compliance, Phase II (L-073) Line Item contains two subprojects; L-025, Railroad Upgrade, and L-097, Fire Alarm Improvements in the 300 Area.

The Safety Compliance Phase II is required for ongoing program activities and for maintenance of safe conditions for workers, the public, and the environment. This infrastructure activity, if terminated, could result in significant program and/or resource impacts.

200 Areas Unsecured Core Area Fabrication Shops (ADS 1023). This project will provide the onsite engineering and construction contractor with a single 4,740 square meters fabrication shop for the permanent installation of large fabrication equipment, including craft lunchroom and storage space for materials, tools, and supplies. The facility shall include work space for electrical, carpentry, piping, light metal, structural and plate fabrications, including welding qualification and measurement and test equipment functions. The existing facilities are becoming structurally unsound and will soon become a worker safety issue.

Asbestos Abatement (ADS 1025). This program addresses asbestos abatement activities in general purpose facilities on the Hanford Site which will not be demolished. Many of the facilities which currently house personnel were built in the 1940's, contain asbestos insulation and siding, and will not be demolished. Activities include stabilization and remediation of facilities to ensure compliance with Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1926.58 (OSHA 1990), the Federal requirements for all work which may involve asbestos, including demolition, salvage, removal, encapsulation, maintenance and spill/emergency clean up of asbestos-containing materials. Washington Administrative Code (WAC) 296-62-077 (DLI

1989) - Washington State requirements for all occupational exposures to asbestos are covered by the *Washington Industrial Safety and Health Act* (WISHA 19xx).

300 Area Process Sewer Piping System Upgrade (ADS 1032). This activity includes the necessary design, safety, and construction documentation and reviews for completion for the 300 Area Process Sewer System Upgrade. The existing 300 Area process sewer system primarily consists of 10,500 lineal meters of vitreous clay pipe connected to approximately 60 facilities which was installed in the early 1940's. The process sewer piping was used previously for unregulated discharge of hazardous and low-activity radioactive materials such as uranium, acids, solvents, organics and other chemicals used throughout the laboratories. Project L-070 will replace the deteriorated process sewer piping with high integrity piping to ensure compliance to State and Federal laws (WAC 173-303, RCRA 3008(a) and 7003), which regulate releases to the soil column.

2.5 SCHEDULE AND BUDGETS

Figure 2-14 is a schedule of waste management activities. It is based on the Preliminary Unvalidated Case budget level. Where the Validated Target Level budget level would cause a delay in an activity, this is noted on the schedule. (These two cases are intended to bracket the likely future amount of funding).

Receiving Validated Target Level level funding will significantly impact many waste management activities. Table 2-4 shows the Tri-Party Agreement major milestones that would be affected. (Refer to the Chapter 4.0 for other related milestones).

In addition, the following impacts would occur:

- Waste tank safety issue resolution (see Section 6.2) would be extended.
- Infrastructure upgrades would be further delayed, including safety compliance, steam plant upgrades, and electrical upgrades. These delays will affect waste management and environmental restoration activities.

Overall, accomplishment of the Hanford Site 30-year cleanup mission would be delayed unless additional funding in the future was available to makeup delays.

Tables 2-5 and 2-6 are listings of costs from the individual Preliminary Unvalidated Case and Validated Target Level ADSs for waste management. These tables present the DOE-HQ authorized ADS costs. The listings are divided by priority level of the ADSs. Figures 2-15 and 2-16 are bar graphs of total waste management costs for both cases, by year and priority level.

Figure 2-14. Waste Management Operations Schedule. (sheet 1 of 5)

H9009027.1

Figure 2-14. Waste Management Operations Schedule. (sheet 2 of 5)

H9009027.2

Figure 2-14. Waste Management Operations Schedule. (sheet 3 of 5)

H9009027.3

Figure 2-14. Waste Management Operations Schedule. (sheet 4 of 5)

H9009027.4

Figure 2-14. Waste Management Operations Schedule. (sheet 5 of 5)

H9009027.5

Table 2-4. Milestones Affected by Validated Target Level Funding.

Milestone	Completion dates	
	Preliminary Unvalidated Case	Validated Target Level
M-02-00 Initiate Pretreatment Operations	To be determined	To be determined
M-03-00 Initiate Hanford Waste Vitrification Plant Operations	December 1999	Beyond 2001
M-05-09 Complete SST Interim Stabilization	September 1996	1-2 year delay
M-17-00 Complete Liquid Effluent Treatment Facilities/Upgrades	June 1995	To be determined
M-18-00 Waste Receiving and Processing Plant Operational (Phase 1)	September 1996	Beyond 1997
M-19-00 Waste Receiving and Processing Plane Operational (Phase 2)	September 1999	Beyond 2000

Table 2-5. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Preliminary
Unvalidated Case. (sheet 1 of 7)

ACTIVITY DATA SHEET NUMBER		ACTIVITY DATA SHEET TITLE	FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
(Costs, \$,000)*									
PRELIMINARY UNVALIDATED CASE WM PRIORITY 1									
1	DECONTAMINATE LAUNDRY FACILITY		9900	0	0	0	0	0	0
2	B Plant Safety Vent Upgr		0	4400	0	0	0	0	0
414	CHEM PROCESS SOLID WASTE DISPOSAL		6137	7819	4102	4485	3954	4090	4234
415	T-PLANT OPERATIONS		1341	13284	12654	15338	16039	14448	14835
416	PUREX/UO3 OPERATIONS		22793	67059	57897	62386	65385	67882	70375
417	CHEMICAL PROCESSING CHANGE IN INVENTORY		0	211	215	0	0	0	0
428	DEFENSE PROGRAMS SUPPORT		0	-30000	0	0	0	0	0
430	GENERAL PROGRAM AND PROJECT SUPPORT		875	25881	19960	20350	20900	21300	22000
435	PFP OPERATIONS		5646	93705	91290	76512	53578	55493	57406
444	221-T RCRA DECON CELL		0	200	193	50	5400	8400	2100
1000	200 AREA STEAM SYSTEM (LANDLORD)		459	1932	18879	19025	14549	356	205
1001	HANFORD SITE LAUNDRY SYSTEM (LANDLORD)		60	4135	1066	883	1238	441	690
1005	CONTINUITY OF OPERATIONS CORE ACTIVITIES		20124	15877	20991	30144	26832	38431	52555
1006	LANDLORD PROGRAM SAFETY COMPLIANCE - PHASE I		8305	9010	4813	62	64	0	0
1007	300 AREA ELECTRICAL UPGRADE		993	5659	12267	1018	92	0	0
1009	HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJ (LANDLORD)		3500	3500	0	0	0	0	0
1010	DEMOLITION OF INFRASTRUCTURE FACILITIES		0	2100	2000	2080	2161	2243	2328
1013	SAFETY & ENVIRONMENTAL COMPLIANCE-300 AREA LABORATORIES		0	1000	2938	499	1890	78	0
1014	324 FACILITY COMPLIANCE/RENOVATION		0	0	72	1559	3592	96	0
1015	325 FACILITY COMPLIANCE/RENOVATION		0	0	1557	3589	1092	96	0
1021	LANDLORD PROGRAM SAFETY COMPLIANCE-PHASE II		206	69	1557	11589	92	96	0
1023	200 AREA UNSECURED CORE AREA FAB SHOP		0	0	1057	5589	2592	96	0
1025	ASBESTOS ABATEMENT PROGRAM		0	0	1500	2080	2161	2243	2328
1026	INFRASTRUCTURE REPAIR AND REPLACEMENT		0	0	1750	2080	2161	2243	2328
1027	SURVEILLANCE & MAINTENANCE OF NONRADIATION EXCESS FACILITIES		0	0	550	580	600	625	650
1028	NEPA COMPLIANCE		0	0	200	208	216	224	233
1032	300 AREA PROCESS SEWER PIPING SYSTEM UPGRADE		253	343	72	1059	4192	96	0
1033	ENGINEERING AND CONSTRUCTION SUPP.FAC. 200E UNSEC.CORE AREA		0	0	0	75	1101	17096	100
1034	RAILROAD MAINTENANCE FACILITY		117	343	0	75	1101	7376	2180
1037	CORE OUTYEAR GENERAL PLANT PROJECTS		0	534	5650	4165	4640	5622	3908
2000	NUCLEAR ENERGY ENVIRONMENTAL COORDINATION		1601	0	2571	2270	1440	1325	1036
2002	NUCLEAR ENERGY WASTE MINIMIZATION		0	0	970	0	0	0	0
2003	308 BUILDING OPERATIONS		12490	525	636	550	440	125	130

Table 2-5. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Preliminary
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ACTIVITY DATA SHEET NUMBER		ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*						
			FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
PRELIMINARY UNVALIDATED CASE WM PRIORITY 1									
2005	NUCLEAR ENERGY WASTE ASSESSMENT		51	599	389	300	393	395	393
2100	FFTF OPERATION		70259	0	0	0	0	0	0
3008	N REACTOR SOLID WASTE DISPOSAL/CLEANUP		2762	3028	2147	2302	1670	1391	1112
3012	RESIDUAL MATERIALS MANAGEMENT PROGRAM		1925	1110	2026	3401	5540	2852	0
3014	N REACTOR FACILITY SHUTDOWN		0	25232	19549	17550	20000	16150	9600
3015	NUCLEAR FUEL MANAGEMENT		0	36245	31581	33842	31197	33560	40770
4000	HANFORD WASTE VITRIFICATION PLANT TREATMENT		96500	61289	223928	239690	254018	252282	171533
7008	324 BUILDING B-CELL		0	0	9847	1035	0	0	0
8000	ENVIRONMENTAL MONITORING/SURVEILLANCE (PNL)		7571	10860	10583	12300	12900	13500	14200
8002	WASTE MANAGEMENT OPERATIONS (PNL) (CONT OF OPER)		2266	2375	3124	3336	3465	3595	3730
8011	329 BUILDING COMPLIANCE (PNL)		1611	3200	2489	0	0	0	0
8180	HANFORD PERSONNEL DOSIMETRY UPGRADE		0	1786	201	0	0	0	0
8218	WASTE MANAGEMENT OPERATIONS (PNL) (CONTINUITY OF OPERATIONS)		0	0	0	0	0	0	0
8221	327 BUILDING SURVEILLANCE AND MAINTENANCE (PNL)		0	0	1156	1300	1300	1400	1400
9010	PROJECTS TECHNICAL SUPPORT FOR DOE-HQ/EH-34		2321	2300	2326	2536	2662	2796	2936
9060	ENV. MONITORING GROUNDWATER PROTECTION MANAGEMENT PROGRAM		0	0	0	1544	1224	1014	1052
9061	ENVIRONMENTAL MONITORING - PROGRAM MGMT & GW SUPPORT		1315	1389	1600	2110	2214	2297	2384
9063	ENVIR. MON. WELL SAMPLING & ANALYSIS		1470	9414	11594	12404	14031	15592	17426
9064	ENVIR MONITORING - GW MON WELL MAINTENANCE & REMEDIATION		655	705	2570	2736	2877	3343	3455
9065	ENVIR MONITORING - RCRA GW MON WELL INSTALLATION & DEVL		1411	0	10250	12950	13450	14500	0
9080	300 AREA RADIOACTIVE LIQUID WASTE FACILITY		2286	2400	3812	6178	4714	5777	3969
9090	HANFORD FILTER TEST FACILITY - HFTF		250	289	268	314	300	311	323
9091	AIR PERMITTING/COMPLIANCE (FEMP IMPLEMENTATION)		616	0	2020	2099	2564	2663	2766
9094	LIQUID EFFLUENT TREATMENT HEC LINE ITEM SUPPORT		4903	5997	9000	6106	3007	1550	0
9097	LIQUID EFFLUENT RETENTION FACILITY (LERF)		9600	0	0	0	0	0	0
9098	PLANNING AND INTEGRATION		8985	5511	14636	15997	16892	17839	18837
9100	JOB CONTROL SYSTEM UPGRADES (W1B/W3B)		0	1243	2028	2187	2220	2000	1200
9106	TANK FARMS PROGRAM SUPPORT (W1B/W3B)		9869	12355	12511	14988	16819	19028	21717
9108	TANK FARMS STORAGE OPERATIONS (W1B)		34917	42553	61678	71130	77400	81850	86260
9109	DST TREATMENT OPERATIONS (W1B)		5169	7907	12039	13000	13600	14400	15700
9110	244-AR VAULT--INACTIVE STATUS (W1B)		477	477	705	762	791	821	852
9122	DST PERMITTING (NOO)(TPA) (W1B)		0	484	0	0	0	0	0
9123	WASTE TANK HYDROGEN STABILIZATION (W1W)		12839	11000	32260	27500	24500	24000	11000
9126	PROJECT SUPPORT- HEC LINE ITEMS (1W1D3)		1037	2836	3129	1249	900	0	0

Table 2-5. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Preliminary
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ACTIVITY DATA		(Costs, \$,000)*							
SHEET NUMBER	ACTIVITY DATA SHEET TITLE	FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
PRELIMINARY UNVALIDATED CASE WM PRIORITY 1									
9127	B PLANT CONTINUITY OF OPERATIONS	6883	6982	8034	10816	10889	9114	7768	
9129	OPERATIONS- TREATMENT	34161	19014	29153	30597	31841	33378	34790	
9130	PROJECT SUPPORT- PLANT AND PROCESS	4231	2110	1961	1660	1320	1415	1480	
9131	B PLANT CANYON CRANE REPLACEMENT	4430	6260	0	5490	822	500	500	
9133	PROJECT SUPPORT- SAFETY CLASS VENT. UPGRADES	239	0	0	0	0	0	0	
9138	DST STORAGE AGING WASTE TRANSFER LINES	4369	6540	144	4195	1045	348	0	
9139	244-AR VAULT PRETREATMENT ACTIVITIES	38	0	0	0	0	0	0	
9141	244-AR VAULT OPERATIONS	0	0	0	0	0	0	0	
9142	MAJOR B PLANT UPGRADES	170	200	48	2800	7875	7820	7520	
9190	HANFORD WASTE VITRIFICATION PLANT OPERATIONS	589	1300	2898	3719	6456	10056	19848	
9203	SOLID MIXED WASTE STORAGE FACILITIES	1515	2002	2207	8680	24786	34894	36062	
9205	CONTACT-HANDLED TRU CHARACTERIZATION	0	200	3571	2000	750	0	0	
9206	CONTACT-HANDLED RETRIEVAL FACILITIES	0	0	6141	11072	14146	27423	34206	
9208	WASTE RECEIVING AND PROCESSING FACILITY MODULE 1	3300	11500	29597	23200	5500	5000	5600	
9210	SOLID WASTE OPERATIONS	460	3498	11573	11339	11734	14734	12350	
9215	HAZARDOUS WASTE MANAGEMENT	0	350	2045	1776	1847	1921	1998	
9216	TRU WASTE MANAGEMENT	0	100	2036	1929	2006	2086	2169	
9217	LOW LEVEL WASTE VOLUME REDUCTION	0	0	2115	1204	1252	1302	1355	
9218	WASTE RECEIVING AND PROCESSING FACILITY MODULE 2	0	0	21139	60960	93270	105600	56900	
9220	SOLID WASTE SAFETY ANALYSIS SUPPORT	1800	1800	3371	4500	3000	3000	3000	
9223	RH-TRU CHARACTERIZATION/RETRIEVAL FACILITY	0	0	193	2500	4500	10500	14156	
9224	RADIOACTIVE SOLID RCRA/TSCA THERMAL TREATMENT	0	0	1156	1850	775	14925	13850	
9305	SST TREATMENT OPERATIONS (TPA)(W38)	11430	13376	16177	15938	12480	5613	2856	
9400	ENVIR SURV & CONTROL-GENERAL PROGRAM SUPPORT	2246	2370	2405	2599	2700	2801	2908	
9402	EFFLUENT TECHNOLOGY STUDIES	105	125	2046	2125	625	125	125	
9403	ENVIR SURV & CONTROL-SURVEILLANCE AND MAINTENANCE	6922	6417	7430	8951	8373	8685	9019	
9404	ENVIR SURV & CONTROL - 2727-S CLOSURE	150	150	0	0	0	0	0	
9405	ENVIR SURV & CONTROL-242-S & 242-T EVAPORATORS	600	634	643	695	722	749	778	
9406	EFFLUENT TREATMENT FACILITY OPERATIONS	86	600	2985	9800	16925	18600	18600	
9500	CESIUM CAPSULE RECOVERY	0	0	0	0	0	0	0	
9550	Waste Encapsulation & Storage Facility	4526	4050	3942	4290	4499	4719	4950	
9645	222-S LABORATORY FACILITY COMPLEX (W6L)	9233	9434	17703	23748	24515	25291	26092	
9646	222-S LABORATORY HVAC/ELECTRICAL UPGRADE (W-001)(W6L320C)	4318	1366	193	0	0	0	0	
9691	INVENTORY ADMINISTRATION	2547	1700	1902	2112	2194	2276	2363	

Table 2-5. Waste Management Operations Costs Listed by
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ACTIVITY DATA SHEET NUMBER		ACTIVITY DATA SHEET TITLE		(Costs, \$,000)*						
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997		
PRELIMINARY UNVALIDATED CASE WM PRIORITY 1										
9692	INVENTORY CHANGE	-878	0	303	315	315	315	315		
9803	TANK FARM MAJOR MAINTENANCE UPGRADES	1180	2310	8578	16015	13075	11285	9180		
9804	DESIGN FIELD VERIFICATION AND CONFIGURATION CONTROL UPGRADES	780	5990	4849	6615	8220	7750	5720		
9805	TANK FARM GENERAL PLANT PROJECT UPGRADES	4010	6450	3854	4835	1590	970	780		
9806	LINE ITEM HANFORD PROJECT UPGRADES	880	0	16383	42040	49210	80115	121245		
9807	TANK 106-C HIGH-HEAT WASTE REMOVAL	240	545	5393	0	0	0	0		
9808	TANK SAFETY INTERIM TREATMENT DEVELOPMENT (W1R)	0	0	0	0	0	0	0		
9809	CONTAMINATION ZONE REDUCTION	500	3155	2042	3600	6800	7200	7500		
9810	TANK FARM VENTILATION UPGRADES	3960	4981	7674	2500	900	600	0		
9811	NEW DST TANK FARM (95 LI)	0	280	1156	200	10680	13550	21850		
9812	NEW DST TANK FARM (93 LI)	0	1200	10666	13550	21850	24550	14650		
9825	242-A EVAPORATOR CONFINEMENT UPGRADES (W-085)	765	2500	406	770	950	400	7000		
9826	242-A EVAPORATOR FACILITY CLEAN OUT BOX REMOVAL (W-183)	0	0	0	0	0	0	0		
9827	242-A EVAPORATOR FACILITY ADDITIONAL UPGRADES	0	0	385	1900	3000	4160	2050		
9828	242-A Evaporator Facility Restart	6413	0	0	0	0	0	0		
9850	WASTE TANK FERROCYNANIDE STABILIZATION (W1W)	6262	6000	16556	17500	18000	16500	8500		
9851	OTHER WASTE TANK SAFETY ISSUES (W1W)	0	0	1752	2650	3200	3000	0		
9852	WASTE TANK ORGANICS STABILIZATION (W1W)	68	1000	8778	9600	11300	15000	16000		
9853	TANK SAFETY, STRUCTURAL AND CONTENTS DOCUMENTATION (W1W)	1751	2400	12080	7100	4900	2300	1800		
9878	HANFORD SITE PHASE II EFF TREATMENT AND DISP FACILITY	400	0	1156	1050	900	13875	31100		
9900	HANFORD ENVIRONMENTAL COMPLIANCE (HEC) PROJECT 89-D-172	67298	30465	47039	39980	960	0	0		
10061	LANDLORD PROGRAM SAFETY COMPLIANCE - PHASE I	2640	0	0	0	0	0	0		
SUBTOTAL WM PRIORITY 1		576482	649524	1088711	1209911	1220847	1339872	1241169		
PRELIMINARY UNVALIDATED CASE WM PRIORITY 2										
400	T PLANT WASTEWATER LINE ITEM	48	180	326	0	1116	1061	64		
407	CHEM PROCESS FACILITY ENVIRONMENTAL COMPLIANCE	1724	2510	3181	2266	2579	2442	2779		
408	DISCONTINUE DISPOSAL TO SOIL COLUMN	595	923	2453	1683	191	137	142		
420	PART B PERMITTING - PUREX	0	866	397	233	0	0	0		
421	PART B PERMITTING - PFP, T-PLANT	0	298	520	146	0	0	0		
425	WASTE STATUS OF PFP SPECIAL NUCLEAR MATERIAL	350	568	241	57	0	0	0		
431	FACILITY OPERATIONS DIVISION NEPA ACTIVITIES	0	3564	3123	4572	3285	0	0		
440	PUREX STEAM CONDENSATE TREATMENT FACILITY	434	5168	0	0	15059	40061	5064		
1002	UNDERGROUND STORAGE TANK UPGRADES (LANDLORD)	83	355	4145	464	1153	4096	100		

Table 2-5. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Preliminary
Unvalidated Case. (sheet 5 of 7)

ACTIVITY DATA SHEET NUMBER		ACTIVITY DATA SHEET TITLE		(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997			
PRELIMINARY UNVALIDATED CASE WM PRIORITY 2											
3013	REGULATORY RESPONSE	0	5409	7435	9236	10890	10079	7361			
7014	LIQUID WASTE SOURCE CONTROL	3666	534	0	0	0	0	0			
8009	RMW STORAGE TANK UPGRADES (PNL)	0	475	963	1000	1500	500	0			
8010	BUILDING UTILITIES--PHASE I--FACILITY COMPLIANCE/RENOVATION	199	32	0	0	0	0	0			
8014	LLW SORTING/SCANNING TABLE (PNL)	0	0	0	700	700	200	200			
8017	HAZARDOUS WASTE TREATMENT FACILITY (PNL)	868	3030	680	618	642	666	692			
8198	HANFORD SCIENCE AND TECHNOLOGY PROGRAM	0	0	2889	5000	6000	7000	8000			
8219	HANFORD INTEGRATED PLANNING (HIP)	0	0	3371	2500	2000	1500	1000			
9035	WASTE MINIMIZATION (W4H5)	0	0	863	1870	2119	2220	2302			
9036	YAKIMA INDIAN NATION REVIEW	1175	0	1166	1063	1105	1145	1189			
9037	NEZ PERCE INDIAN NATION REVIEW	80	0	212	192	199	206	214			
9038	UMATILLA INDIAN NATION REVIEW	280	0	567	515	535	555	577			
9050	ENVIRONMENTAL PLANNING & REPORTING (W4H)	4909	4969	5872	6342	6591	6837	7100			
9055	TRI-PARTY AGREEMENT MANAGEMENT (W4H)	594	999	1007	1088	1130	1173	1218			
9059	TRI-PARTY AGREEMENT STATE FUNDING (W4H)	3433	2433	3727	4481	4656	4830	5016			
9067	ENVIR MONITORING - PURGEWATER DISPOSAL	396	792	614	844	707	718	745			
9128	B PLANT PRETREATMENT	0	0	0	0	0	0	0			
9132	SOIL COLUMN DISPOSAL PLAN PROJECTS (W1D3E)	36	0	0	0	0	0	0			
9134	B PLANT TRUEX UPGRADE	20	0	0	0	0	0	0			
9137	PARTITIONING FACILITY FOR TANK WASTE	0	0	15918	8800	34000	58000	172000			
9150	DEFENSE HIGH-LEVEL WASTE TECHNOLOGY (W1H)	6892	10637	23986	48800	57760	61080	51300			
9151	W151 101-AZ RETRIEVAL SYSTEM PROJECT	759	7300	4160	8650	1000	100	0			
9152	DOUBLE SHELL TANK RETRIEVAL SYSTEMS	0	200	3419	2670	14400	23020	38875			
9175	GROUT DISPOSAL PROGRAM	29895	31000	54070	71997	71405	73585	76260			
9176	GROUT DISPOSAL PROGRAM (W1P)	0	0	0	0	0	0	0			
9200	LAND DISPOSAL ALTERNATIVES	0	75	5	6	6	6	6			
9202	SODIUM INVENTORY REDUCTION	50	220	1905	382	289	179	100			
9204	SOLID WASTE BURIAL GROUND CLOSURE	0	0	4822	3749	3895	4043	4191			
9214	RMW DISPOSAL TRENCH (W-025)	0	50	0	0	0	0	0			
9219	SOLID WASTE MANAGEMENT PERMITTING	0	0	1542	1175	875	1550	490			
9222	SPECIAL CASE WASTE STORAGE FROM HOT CELLS	0	0	1282	500	500	500	500			
9446	ENVIRONMENTAL LABORATORY UPGRADES (W4L)	4624	13694	6719	8169	11295	7000	1000			
9693	STATE ENVIRONMENTAL OVERSIGHT & EMERGENCY PREPAREDNESS	481	550	1059	1200	1200	1200	1200			
9854	TANK SAFETY EIS SUPPORT (W1W)	0	0	2648	2900	2200	0	0			

Table 2-5. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Preliminary
Unvalidated Case. (sheet 6 of 7)

ACTIVITY DATA SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*						
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
PRELIMINARY UNVALIDATED CASE WM PRIORITY 2								
9855	TANK SAFETY EIS (W1W)	0	0	0	0	0	0	0
	SUBTOTAL WM PRIORITY 2	61591	96831	165287	203868	260982	315689	389555
PRELIMINARY UNVALIDATED CASE WM PRIORITY 3								
401	PFP LIQUID LLW PROCESS WASTE SOLIDIFICATION	231	564	598	91	2095	4098	5102
402	PFP SOLID WASTE REDUCTION SYSTEM (CP)	0	507	511	91	95	2998	5102
422	CHEMICAL PROCESSING CAPITAL SUPPORT	1537	3935	2395	3788	3859	3598	3549
423	AIR PERMITTING/COMPLIANCE CHEMICAL PROCESSING	0	1385	553	573	584	595	606
424	OUTDOOR STORAGE OF WASTE EQUIPMENT	234	1031	1445	1055	0	0	0
441	221-T VENTILATION UPGRADE (94-C-077)	0	350	63	3270	5070	4070	70
442	PFP OUTYEAR LINE ITEM PROJECTS	0	450	578	370	2470	9100	14200
443	MAJOR PROCESS UPGRADES	0	400	453	0	10090	20090	50090
1004	INFRASTRUCTURE SUPPORT-CONTINUITY OF OPERATIONS	2504	3368	841	261	2122	9192	1200
1008	ROAD, GROUND AND LIGHTING SAFETY IMPROVEMENTS, 300/1100 AREA	22	855	6586	89	92	0	0
1012	SAFETY ANALYSIS REPORTS (NUCLEAR FACILITIES)	0	0	0	135	140	150	155
1017	SAFETY & ENVIRONMENTAL UPGRADES	0	2000	201	268	538	39	0
1020	HANFORD SCIENTIFIC ENGINEERING SYSTEM (HSES) SUPER COMPUTER	0	0	0	0	0	0	0
1022	SOUTH OPERATIONS SUPPORT FACILITY	403	69	360	180	0	900	0
1029	GLOVE BOX REPLACEMENT	0	0	22	174	1876	1947	40
1030	NEC COMPLIANCE IN 300 AREA FOR HANFORD SUPPORT FACILITIES	0	0	532	549	570	592	614
1031	HANFORD SCIENTIFIC & ENGINEERING SYSTEM REPLACEMENT COMPUTER	0	0	0	0	0	0	20000
1036	CENTRALIZED MAINTENANCE FACILITY	146	343	72	2059	18092	7596	100
1038	OUTYEAR GENERAL PLANT PROJECTS	0	890	2828	5108	5513	5354	5701
1040	BUILDING UTILITIES REPLACEMENT, 300 AREA	0	0	0	75	4221	96	100
1041	FIRE SEPARATIONS 324 AND 325 BUILDINGS	0	0	0	75	2141	3216	2180
8008	MATERIALS CHARACTERIZATION CENTER DEFENSE WASTE SUPPORT- PNL	0	0	0	0	0	0	0
8164	TRU WASTE STORAGE	0	850	120	0	0	0	0
8211	ADVANCED HLW TREATMENT TECHNOLOGIES	0	0	0	0	0	0	0
9209	RMW CHARACTERIZATION AND INCINERATION	0	90	751	811	842	874	908
9212	ADVANCED LOW LEVEL WASTE DISPOSAL	0	0	1218	1641	1366	0	0
9221	SOLID WASTE NEPA DOCUMENTATION	0	150	0	150	200	300	300
9489	LEASE OF HANFORD SCIENTIFIC AND ENGINEERING SYSTEM (HSES)	0	0	0	0	0	0	0
	SUBTOTAL WM PRIORITY 3	5077	17237	20127	20813	61976	74805	110017

Table 2-5. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Preliminary
Unvalidated Case. (sheet 7 of 7)

ACTIVITY DATA SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997			
PRELIMINARY UNVALIDATED CASE WM PRIORITY 4									
1003	INFRASTRUCTURE SUPPORT-CONTINUITY OF OPERATIONS								
1019	COMPUTER AIDED DESIGN (CAD)/ENGINEERING EQUIPMENT								
1024	200 EAST OFFICE FACILITY								
1035	SOUTH OFFICE FACILITY								
1039	OUTYEAR GENERAL PLANT PROJECTS								
1043	LIGHT/HEAVY DUTY VEHICLES AND HEAVY EQUIPMENT								
9211	TRUPACT SHIPMENTS TO WIPP								
SUBTOTAL WM PRIORITY 4		389	193	440	3803	8818	6932	4129	
TOTAL WM		643539	763785	1274565	1438395	1552623	1737298	1745000	

Table 2-6. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Validated
Target Level. (sheet 1 of 7)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	FY 1991	FY 1992 8	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
(Costs, \$,000)*								
VALIDATED TARGET LEVEL WM PRIORITY 1								
1	DECONTAMINATE LAUNDRY FACILITY	9900	0	0	0	0	0	0
2	B Plant Safety Vent Upgr	0	4400	0	0	0	0	0
414	CHEM PROCESS SOLID WASTE DISPOSAL	6137	7819	3272	2956	2593	2691	2794
415	T-PLANT OPERATIONS	1341	13284	11647	14437	15037	13446	13832
416	PUREX/UO3 OPERATIONS	22793	67059	57897	61886	65385	67882	70375
417	CHEMICAL PROCESSING CHANGE IN INVENTORY	0	211	215	0	0	0	0
428	DEFENSE PROGRAMS SUPPORT	0	-30000	0	0	0	0	0
430	GENERAL PROGRAM AND PROJECT SUPPORT	875	25881	15443	16840	17139	17491	18201
435	PFP OPERATIONS	5646	93705	91290	76479	53578	55493	57406
444	221-T RCRA DECON CELL	0	200	193	0	0	0	0
1000	200 AREA STEAM SYSTEM (LANDLORD)	459	1932	648	7490	557	260	105
1001	HANFORD SITE LAUNDRY SYSTEM (LANDLORD)	60	4135	1066	783	1238	441	690
1005	CONTINUITY OF OPERATIONS CORE ACTIVITIES	20124	15877	19644	16244	17597	19261	20539
1006	LANDLORD PROGRAM SAFETY COMPLIANCE - PHASE I	8305	9010	4813	62	64	0	0
1007	300 AREA ELECTRICAL UPGRADE	993	5659	2831	10454	92	0	0
1009	HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJ (LANDLORD)	3500	3500	0	0	0	0	0
1010	DEMOLITION OF INFRASTRUCTURE FACILITIES	0	2100	2000	2080	2161	2243	2328
1013	SAFETY & ENVIRONMENTAL COMPLIANCE-300 AREA LABORATORIES	0	1000	2680	185	1890	78	0
1014	324 FACILITY COMPLIANCE/RENOVATION	0	0	0	0	0	0	0
1015	325 FACILITY COMPLIANCE/RENOVATION	0	0	0	0	0	0	0
1021	LANDLORD PROGRAM SAFETY COMPLIANCE-PHASE II	206	69	0	0	0	0	0
1023	200 AREA UNSECURED CORE AREA FAB SHOP	0	0	0	0	0	0	0
1025	ASBESTOS ABATEMENT PROGRAM	0	0	500	520	540	562	584
1026	INFRASTRUCTURE REPAIR AND REPLACEMENT	0	0	531	552	574	597	621
1027	SURVEILLANCE & MAINTENANCE OF NONRADIATION EXCESS FACILITIES	0	0	0	0	0	0	0
1028	NEPA COMPLIANCE	0	0	1520	1679	1746	1816	1889
1032	300 AREA PROCESS SEWER PIPING SYSTEM UPGRADE	253	343	72	0	0	0	0
1033	ENGINEERING AND CONSTRUCTION SUPP.FAC. 200E UNSEC.CORE AREA	0	0	0	0	0	0	0
1034	RAILROAD MAINTENANCE FACILITY	117	343	72	0	0	0	0
1037	CORE OUTYEAR GENERAL PLANT PROJECTS	0	534	5463	4165	4640	5622	3908
2000	NUCLEAR ENERGY ENVIRONMENTAL COORDINATION	1601	0	0	0	0	0	0
2002	NUCLEAR ENERGY WASTE MINIMIZATION	0	0	0	0	0	0	0

Table 2-6. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Validated
Target Level. (sheet 2 of 7)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*						
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
VALIDATED TARGET LEVEL WM PRIORITY 1								
2003	308 BUILDING OPERATIONS	12490	525	636	690	725	760	800
2005	NUCLEAR ENERGY WASTE ASSESSMENT	51	599	330	350	370	385	400
2100	FFTF OPERATION	70259	0	0	0	0	0	0
3008	N REACTOR SOLID WASTE DISPOSAL/CLEANUP	2762	3028	1546	1660	1252	1081	897
3012	RESIDUAL MATERIALS MANAGEMENT PROGRAM	1925	1110	1929	3900	4700	0	0
3014	N REACTOR FACILITY SHUTDOWN	0	25232	16355	15566	13416	13954	1950
3015	NUCLEAR FUEL MANAGEMENT	0	36245	31105	34542	31197	31560	32770
4000	HANFORD WASTE VITRIFICATION PLANT TREATMENT	96500	61289	66725	73525	111823	228607	225718
7008	324 BUILDING B-CELL	0	0	2079	2000	2000	2000	2000
8000	ENVIRONMENTAL MONITORING/SURVEILLANCE (PNL)	7571	10860	4841	13761	17543	20189	15028
8002	WASTE MANAGEMENT OPERATIONS (PNL) (CONT OF OPER)	2266	2375	3124	3336	3465	3595	3730
8011	329 BUILDING COMPLIANCE (PNL)	1611	3200	2489	0	0	0	0
8180	HANFORD PERSONNEL DOSIMETRY UPGRADE	0	1786	0	0	0	0	0
8218	WASTE MANAGEMENT OPERATIONS (PNL) (CONTINUITY OF OPERATIONS)	0	0	0	0	0	0	0
8221	327 BUILDING SURVEILLANCE AND MAINTENANCE (PNL)	0	0	1156	1300	1300	1400	1400
9010	PROJECTS TECHNICAL SUPPORT FOR DOE-HQ/EM-34	2321	2300	0	0	0	0	0
9060	ENV. MONITORING GROUNDWATER PROTECTION MANAGEMENT PROGRAM	0	0	0	0	962	998	1037
9061	ENVIRONMENTAL MONITORING - PROGRAM MGMT & GW SUPPORT	1315	1389	1467	1523	2214	2297	2384
9063	ENVIR. MON. WELL SAMPLING & ANALYSIS	1470	9414	11594	12404	14031	15592	17426
9064	ENVIR MONITORING - GW MON WELL MAINTENANCE & REMEDIATION	655	705	743	773	2935	3343	3455
9065	ENVIR MONITORING - RCRA GW MON WELL INSTALLATION & DEVL	1411	0	0	1501	13892	12627	14453
9080	300 AREA RADIOACTIVE LIQUID WASTE FACILITY	2286	2400	2500	2500	2500	2500	2500
9090	HANFORD FILTER TEST FACILITY - HFTF	250	289	268	314	300	311	323
9091	AIR PERMITTING/COMPLIANCE (FEMP IMPLEMENTATION)	616	0	1320	2099	2564	2663	11766
9094	LIQUID EFFLUENT TREATMENT REC LINE ITEM SUPPORT	4903	5997	4205	1840	0	1000	3200
9097	LIQUID EFFLUENT RETENTION FACILITY (LERF)	9600	0	0	0	0	0	0
9098	PLANNING AND INTEGRATION	8985	5511	6200	7000	7000	11400	9200
9100	JOB CONTROL SYSTEM UPGRADES (W1B/W3B)	0	1247	950	950	400	1600	1650
9106	TANK FARMS PROGRAM SUPPORT (W1B/W3B)	9869	12555	11662	12000	12550	15300	16885
9108	TANK FARMS STORAGE OPERATIONS (W1B)	34917	42553	52998	54510	55305	74179	79288
9109	DST TREATMENT OPERATIONS (W1B)	5169	7907	8350	8615	8395	12700	14125
9110	244-AR VAULT--INACTIVE STATUS (W1B)	477	477	500	525	550	821	852
9122	DST PERMITTING (NOO)(TPA) (W1B)	0	484	0	0	0	0	0

Table 2-6. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Validated
Target Level. (sheet 3 of 7)

ACTIVITY DATA SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
VALIDATED TARGET LEVEL WM PRIORITY 1									
9123	WASTE TANK HYDROGEN STABILIZATION (W1W)	12839	11000	32260	17650	27600	26800	35300	
9126	PROJECT SUPPORT- HEC LINE ITEMS (1W1D3)	1037	2836	3129	2470	0	0	0	
9127	B PLANT CONTINUITY OF OPERATIONS	6883	6982	8034	12544	13153	8245	8657	
9129	OPERATIONS- TREATMENT	34161	19014	29153	31603	32892	34922	40233	
9130	PROJECT SUPPORT- PLANT AND PROCESS	4231	2110	800	1100	700	700	700	
9131	B PLANT CANYON CRANE REPLACEMENT	4430	6260	0	322	0	500	500	
9133	PROJECT SUPPORT- SAFETY CLASS VENT. UPGRADES	239	0	0	0	0	0	0	
9138	DST STORAGE AGING WASTE TRANSFER LINES	4369	6540	144	995	0	0	0	
9139	244-AR VAULT PRETREATMENT ACTIVITIES	38	0	0	0	0	0	0	
9141	244-AR VAULT OPERATIONS	0	0	0	0	0	0	0	
9142	MAJOR B PLANT UPGRADES	170	200	48	100	100	2650	5150	
9190	HANFORD WASTE VITRIFICATION PLANT OPERATIONS	589	1300	2898	3719	3905	4120	7170	
9203	SOLID MIXED WASTE STORAGE FACILITIES	1515	2002	2207	2550	1886	1994	12162	
9205	CONTACT-HANDLED TRU CHARACTERIZATION	0	200	3571	2000	750	0	0	
9206	CONTACT-HANDLED RETRIEVAL FACILITIES	0	0	0	0	2646	3200	11606	
9208	WASTE RECEIVING AND PROCESSING FACILITY MODULE 1	3300	11500	29597	16600	3000	4000	5600	
9210	SOLID WASTE OPERATIONS	460	3498	11573	11339	10534	10934	11350	
9215	HAZARDOUS WASTE MANAGEMENT	0	350	2045	1874	1948	2021	2098	
9216	TRU WASTE MANAGEMENT	0	100	2036	2006	2084	2154	2246	
9217	LOW LEVEL WASTE VOLUME REDUCTION	0	0	2115	1339	1391	1444	1498	
9218	WASTE RECEIVING AND PROCESSING FACILITY MODULE 2	0	0	0	0	0	0	12000	
9220	SOLID WASTE SAFETY ANALYSIS SUPPORT	1800	1800	3371	4500	2000	2000	2000	
9223	RH-TRU CHARACTERIZATION/RETRIEVAL FACILITY	0	0	0	0	0	0	12814	
9224	RADIOACTIVE SOLID RCRA/TSCA THERMAL TREATMENT	0	0	0	0	0	0	500	
9305	SST TREATMENT OPERATIONS (TPA)(W3B)	11430	13376	13935	13225	13192	14197	8800	
9400	ENVIR SURV & CONTROL-GENERAL PROGRAM SUPPORT	2246	2370	2405	2599	2700	2801	2908	
9402	EFFLUENT TECHNOLOGY STUDIES	105	125	125	970	1890	1075	1750	
9403	ENVIR SURV & CONTROL-SURVEILLANCE AND MAINTENANCE	6922	6417	7430	8059	8373	8685	9019	
9404	ENVIR SURV & CONTROL - 2727-S CLOSURE	150	150	0	0	0	0	0	
9405	ENVIR SURV & CONTROL-242-S & 242-T EVAPORATORS	600	634	643	695	722	749	778	
9406	EFFLUENT TREATMENT FACILITY OPERATIONS	86	600	2070	5940	7810	10825	10900	
9500	CESIUM CAPSULE RECOVERY	0	0	0	0	0	0	0	
9550	Waste Encapsulation & Storage Facility	4526	4050	3942	7637	8432	9229	9538	

Table 2-6. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Validated
Target Level. (sheet 4 of 7)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
(Costs, \$,000)*								
VALIDATED TARGET LEVEL WM PRIORITY 1								
9645	222-S LABORATORY FACILITY COMPLEX (W6L)	9233	9434	12362	14195	14995	15685	24595
9646	222-S LABORATORY HVAC/ELECTRICAL UPGRADE (W-001)(W6L320C)	4318	1366	200	0	0	0	0
9691	INVENTORY ADMINISTRATION	2547	1700	1700	1700	1700	1700	1700
9692	INVENTORY CHANGE	-878	0	0	0	0	0	0
9803	TANK FARM MAJOR MAINTENANCE UPGRADES	1180	2310	4000	4000	5180	11550	16500
9804	DESIGN FIELD VERIFICATION AND CONFIGURATION CONTROL UPGRADES	780	5990	4849	5625	5990	7750	7000
9805	TANK FARM GENERAL PLANT PROJECT UPGRADES	4010	6450	1260	4375	0	0	0
9806	LINE ITEM HANFORD PROJECT UPGRADES	880	0	3132	3600	7830	6200	23880
9807	TANK 106-C HIGH-HEAT WASTE REMOVAL	240	545	5393	0	0	0	0
9808	TANK SAFETY INTERIM TREATMENT DEVELOPMENT (W1R)	0	0	0	0	0	0	0
9809	CONTAMINATION ZONE REDUCTION	500	3155	2042	3600	3800	7200	7500
9810	TANK FARM VENTILATION UPGRADES	3960	4981	7674	1000	600	500	0
9811	NEW DST TANK FARM (95 LI)	0	280	1156	200	10680	13550	21850
9812	NEW DST TANK FARM (93 LI)	0	1200	10666	13550	21850	24550	14650
9825	242-A EVAPORATOR CONFINEMENT UPGRADES (W-085)	765	2500	406	3000	7000	9400	7300
9826	242-A EVAPORATOR FACILITY CLEAN OUT BOX REMOVAL (W-183)	0	0	0	0	0	0	0
9827	242-A EVAPORATOR FACILITY ADDITIONAL UPGRADES	0	0	0	0	0	0	0
9828	242-A Evaporator Facility Restart	6413	0	0	0	0	0	0
9850	WASTE TANK FERROCYNANIDE STABILIZATION (W1W)	6262	6000	17000	11200	15000	16500	17000
9851	OTHER WASTE TANK SAFETY ISSUES (W1W)	0	0	0	1800	2650	3200	3000
9852	WASTE TANK ORGANICS STABILIZATION (W1W)	68	1000	8778	7500	12000	11500	11950
9853	TANK SAFETY, STRUCTURAL AND CONTENTS DOCUMENTATION (W1W)	1751	2400	8850	14550	10350	8500	7750
9878	HANFORD SITE PHASE II EFF TREATMENT AND DISP FACILITY	400	0	0	0	0	0	3150
9900	HANFORD ENVIRONMENTAL COMPLIANCE (HEC) PROJECT 89-D-172	67298	30465	37032	32330	28610	1000	3000
10061	LANDLORD PROGRAM SAFETY COMPLIANCE - PHASE I	2640	0	0	0	0	0	0
SUBTOTAL WM PRIORITY 1		576482	649524	748900	748057	792163	940785	1042611
VALIDATED TARGET LEVEL WM PRIORITY 2								
400	T PLANT WASTEWATER LINE ITEM	48	180	326	0	116	61	64
407	CHEM PROCESS FACILITY ENVIRONMENTAL COMPLIANCE	1724	2510	3181	2266	2579	2442	2779
408	DISCONTINUE DISPOSAL TO SOIL COLUMN	595	923	1963	1683	191	137	142
420	PART B PERMITTING - PUREX	0	866	397	233	0	0	0
421	PART B PERMITTING - PFP, T-PLANT	0	298	520	146	0	0	0

Table 2-6. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Validated
Target Level. (sheet 5 of 7)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
VALIDATED TARGET LEVEL WM PRIORITY 2									
425	WASTE STATUS OF PFP SPECIAL NUCLEAR MATERIAL	350	568	241	57	0	0	0	
431	FACILITY OPERATIONS DIVISION NEPA ACTIVITIES	0	3564	3123	2074	787	0	0	
440	PUREX STEAM CONDENSATE TREATMENT FACILITY	434	5168	0	0	0	0	0	
1002	UNDERGROUND STORAGE TANK UPGRADES (LANDLORD)	83	355	3786	389	92	0	0	
3013	REGULATORY RESPONSE	0	5409	7435	7236	4890	5079	7361	
7014	LIQUID WASTE SOURCE CONTROL	3666	534	0	0	0	0	0	
8009	RMW STORAGE TANK UPGRADES (PNL)	0	475	0	250	250	250	250	
8010	BUILDING UTILITIES--PHASE I--FACILITY COMPLIANCE/RENOVATION	199	32	0	0	0	0	0	
8014	LLW SORTING/SCANNING TABLE (PNL)	0	0	0	0	0	0	0	
8017	HAZARDOUS WASTE TREATMENT FACILITY (PNL)	868	3030	102	618	642	666	692	
8198	HANFORD SCIENCE AND TECHNOLOGY PROGRAM	0	0	0	0	0	0	0	
8219	HANFORD INTEGRATED PLANNING (HIP)	0	0	0	0	0	0	0	
9035	WASTE MINIMIZATION (W4H5)	0	0	863	936	973	1009	1047	
9036	YAKIMA INDIAN NATION REVIEW	1175	0	1166	1063	1105	1145	1189	
9037	NEZ PERCE INDIAN NATION REVIEW	80	0	212	192	199	206	214	
9038	UMATILLA INDIAN NATION REVIEW	280	0	567	515	535	555	577	
9050	ENVIRONMENTAL PLANNING & REPORTING (W4H)	4909	4969	5483	5702	5925	6219	6536	
9055	TRI-PARTY AGREEMENT MANAGEMENT (W4H)	594	999	1007	1088	1130	1173	1218	
9059	TRI-PARTY AGREEMENT STATE FUNDING (W4H)	3433	2433	3091	3215	3340	3464	3596	
9067	ENVIR MONITORING - PURGEWATER DISPOSAL	396	792	614	844	707	718	745	
9128	B PLANT PRETREATMENT	0	0	0	0	0	0	0	
9132	SOIL COLUMN DISPOSAL PLAN PROJECTS (W103E)	36	0	0	0	0	0	0	
9134	B PLANT TRUEX UPGRADE	20	0	0	0	0	0	0	
9137	PARTITIONING FACILITY FOR TANK WASTE	0	0	0	0	0	0	0	
9150	DEFENSE HIGH-LEVEL WASTE TECHNOLOGY (W1H)	6892	10637	23986	47050	62550	65950	56450	
9151	W151 101-AZ RETRIEVAL SYSTEM PROJECT	759	7300	4160	7650	1000	100	0	
9152	DOUBLE SHELL TANK RETRIEVAL SYSTEMS	0	200	3419	2670	14400	23020	38875	
9175	GROUT DISPOSAL PROGRAM	29895	31000	57528	70562	71760	73940	76510	
9176	GROUT DISPOSAL PROGRAM (W1P)	0	0	800	50	3315	5300	105	
9200	LAND DISPOSAL ALTERNATIVES	0	75	5	290	302	313	325	
9202	SODIUM INVENTORY REDUCTION	50	220	732	382	289	179	100	
9204	SOLID WASTE BURIAL GROUND CLOSURE	0	0	0	0	0	0	0	
9214	RMW DISPOSAL TRENCH (W-025)	0	50	0	0	0	0	0	

Table 2-6. Waste Management Operations Costs Listed by
Activity Data Sheets and Priority - Validated
Target Level. (sheet 6 of 7)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
VALIDATED TARGET LEVEL WM PRIORITY 2									
9219	SOLID WASTE MANAGEMENT PERMITTING	0	0	1542	1175	875	1550	490	
9222	SPECIAL CASE WASTE STORAGE FROM HOT CELLS	0	0	1282	500	0	0	500	
9446	ENVIRONMENTAL LABORATORY UPGRADES (W4L)	4624	13694	5715	1169	0	0	0	
9693	STATE ENVIRONMENTAL OVERSIGHT & EMERGENCY PREPAREDNESS	481	550	1059	1200	1200	1200	1200	
9854	TANK SAFETY EIS SUPPORT (W1W)	0	0	750	800	700	0	0	
9855	TANK SAFETY EIS (W1W)	0	0	0	2100	1500	0	0	
SUBTOTAL WM PRIORITY 2		61591	96831	135055	164105	181352	194676	200965	
VALIDATED TARGET LEVEL WM PRIORITY 3									
401	PFP LIQUID LLW PROCESS WASTE SOLIDIFICATION	231	564	598	0	0	0	0	
402	PFP SOLID WASTE REDUCTION SYSTEM (CP)	0	507	511	91	0	0	0	
422	CHEMICAL PROCESSING CAPITAL SUPPORT	1537	3935	2395	2788	2859	2698	2549	
423	AIR PERMITTING/COMPLIANCE CHEMICAL PROCESSING	0	1385	553	573	584	595	606	
424	OUTDOOR STORAGE OF WASTE EQUIPMENT	234	1031	1445	1055	0	0	0	
441	221-T VENTILATION UPGRADE (94-C-077)	0	350	0	0	0	0	0	
442	PFP OUTYEAR LINE ITEM PROJECTS	0	450	85	600	370	0	0	
443	MAJOR PROCESS UPGRADES	0	400	0	420	156	0	0	
1004	INFRASTRUCTURE SUPPORT-CONTINUITY OF OPERATIONS	2504	3368	123	111	0	0	0	
1008	ROAD, GROUND AND LIGHTING SAFETY IMPROVEMENTS, 300/1100 AREA	22	855	6586	89	92	0	0	
1012	SAFETY ANALYSIS REPORTS (NUCLEAR FACILITIES)	0	0	0	0	0	0	0	
1017	SAFETY & ENVIRONMENTAL UPGRADES	0	2000	72	268	538	39	0	
1020	HANFORD SCIENTIFIC ENGINEERING SYSTEM (HSES) SUPER COMPUTER	0	0	0	0	0	0	0	
1022	SOUTH OPERATIONS SUPPORT FACILITY	403	69	0	0	0	0	0	
1029	GLOVE BOX REPLACEMENT	0	0	0	0	0	0	0	
1030	NEC COMPLIANCE IN 300 AREA FOR HANFORD SUPPORT FACILITIES	0	0	0	0	0	0	0	
1031	HANFORD SCIENTIFIC & ENGINEERING SYSTEM REPLACEMENT COMPUTER	0	0	0	0	0	0	0	
1036	CENTRALIZED MAINTENANCE FACILITY	146	343	72	0	0	0	0	
1038	OUTYEAR GENERAL PLANT PROJECTS	0	890	3349	4997	5041	5774	6231	
1040	BUILDING UTILITIES REPLACEMENT, 300 AREA	0	0	0	0	0	0	0	
1041	FIRE SEPARATIONS 324 AND 325 BUILDINGS	0	0	0	0	0	0	0	
8008	MATERIALS CHARACTERIZATION CENTER DEFENSE WASTE SUPPORT- PNL	0	0	0	0	0	0	0	
8164	TRU WASTE STORAGE	0	850	0	0	0	0	0	
8211	ADVANCED HLW TREATMENT TECHNOLOGIES	0	0	0	0	0	0	0	

Table 2-6. Waste Management Operations Costs Listed by Activity Data Sheets and Priority - Validated Target Level. (sheet 7 of 7)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
VALIDATED TARGET LEVEL WM PRIORITY 3									
9209	RMJ CHARACTERIZATION AND INCINERATION	0	90	751	811	842	874	908	
9212	ADVANCED LOW LEVEL WASTE DISPOSAL	0	0	0	0	0	0	0	
9221	SOLID WASTE NEPA DOCUMENTATION	0	150	0	2000	1000	300	300	
9489	LEASE OF HANFORD SCIENTIFIC AND ENGINEERING SYSTEM (HSES)	0	0	0	0	0	0	0	
SUBTOTAL WM PRIORITY 3		5077	17237	16540	13803	11482	10280	10594	
VALIDATED TARGET LEVEL WM PRIORITY 4									
1003	INFRASTRUCTURE SUPPORT-CONTINUITY OF OPERATIONS	0	67	0	0	0	0	0	
1019	COMPUTER AIDED DESIGN (CAD)/ENGINEERING EQUIPMENT	0	0	0	0	0	0	0	
1024	200 EAST OFFICE FACILITY	175	69	0	0	0	0	0	
1035	SOUTH OFFICE FACILITY	214	57	72	0	0	0	0	
1039	OUTYEAR GENERAL PLANT PROJECTS	0	0	0	3816	1529	3605	8011	
1043	LIGHT/HEAVY DUTY VEHICLES AND HEAVY EQUIPMENT	0	0	0	0	0	0	0	
9211	TRUPACT SHIPMENTS TO WIPP	0	0	0	0	0	0	0	
SUBTOTAL WM PRIORITY 4		389	193	72	3816	1529	3605	8011	
TOTAL WM		643539	763785	900567	929781	986526	1149346	1262181	

Figure 2-15. Waste Management Operations Costs by Year and Priority - Preliminary Unvalidated Case.

Figure 2-16. Waste Management Operations Costs by Year and Priority - Validated Target Level.

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3.0 ENVIRONMENTAL RESTORATION

3.1 OVERVIEW

A past major mission of the Hanford Site has been the production of nuclear materials, primarily plutonium. As a part of that mission, the Hanford Site generated radioactive, hazardous (chemically hazardous), and mixed wastes. Before the enactment of specific environmental legislation, primarily RCRA and CERCLA, DOE managed the storage and disposal of these wastes under requirements established by the *Atomic Energy Act of 1954*.

Since passage of RCRA and CERCLA, the DOE, including the DOE-RL, has established programs to achieve compliance with these laws. The DOE programs include activities to comply with regulations for the generation, TSD, and transportation of wastes produced in operating facilities, and for the characterization and cleanup of wastes at inactive waste sites. The DOE has also set up D&D programs for the management of radioactively contaminated surplus facilities in response to the Atomic Energy Act. The D&D programs are controlled by DOE orders.

All environmental restoration work at the Hanford Site is done by the DOE and its contractors including the U.S. Army Corps of Engineers.

The Environmental Restoration program within the scope of this site-specific plan is divided into two areas: (1) Environmental Restoration Remedial Actions and (2) D&D.

3.1.1 Environmental Restoration Remedial Actions Program

The Environmental Restoration Remedial Action program was established to comply with regulations for characterization and cleanup of inactive past-practice waste sites. The primary objective of the Environmental Restoration Remedial Action program is to bring all known waste sites at the Hanford Site into compliance with applicable Federal laws and regulations, treaty laws, and State and local environmental laws and regulations.

In order to carry out this objective, the Hanford Site has been divided into 4 aggregate areas (Figure 3-1), 78 operable units (Table 3-1), and over 1,500 waste management units. The waste management unit is the entity which is assessed, characterized and remediated. Of the waste management units that have been identified (Appendix A), about 1,135 are addressed by the Environmental Restoration Remedial Action program. The remainder of the waste management units are not addressed by the Environmental Restoration Remedial Action program because they are either D&D units, active TSD units, or are unplanned releases that are part of an existing waste unit in the Environmental Restoration Remedial Action program scope. Assessment, characterization, and remedial activities on individual waste management units are done in groupings called operable units. These operable units form the basis for planning, scheduling, and budgeting.

Figure 3-1. Aggregate National Priorities List Sites.

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Table 3-1. Hanford Site Environmental Restoration Remedial Actions Program Operable Units Listing.

Operable Unit	Aggregate Area	Working Order	Category	Operable Unit	Aggregate Area	Working Order	Category
1100-EM-1	1100	1	CPP	200-ZP-2	200	B	
300-FF-1	300	2	CPP	200-IU-3	200	B	
300-FF-5	300	2A	CPP	300-FF-2	300	B	CPP
200-BP-1	200	3	CPP	300-FF-3	300	B	CPP
100-HR-1	100	4	RPP	100-IU-2	100	C	
100-HR-3	100	4A	RPP	100-IU-3	100	C	
100-DR-1	100	5	RPP	1100-EM-2	1100	C	
100-BC-1	100	6	CPP	1100-EM-3	1100	C	
100-BC-5	100	6A	CPP	1100-IU-1	1100	C	
100-KR-1	100	7	CPP	200-BP-10	200	C	
100-KR-4	100	7A	CPP	200-BP-3	200	C	
100-NR-1	100	8	RPP	200-BP-6	200	C	
100-FR-1	100	9	CPP	200-BP-8	200	C	
100-NR-3	100	10	RPP	200-BP-9	200	C	
200-UP-2	100	11	CPP	200-NO-1	200	C	
100-BC-2	100	12	CPP	200-PO-6	200	C	
200-BP-5	200	13	CPP	200-RO-1	200	C	
100-DR-2	100	14	RPP	200-RO-2	200	C	
200-ZP-1	200	15	CPP	200-RO-3	200	C	
100-KR-2	100	16	CPP	200-TP-3	200	C	
200-BP-4	200	17		200-UP-1	200	C	
200-BP-11	200	18	RPP	200-ZP-3	200	C	
200-PO-2	200	19		200-IU-4	200	C	
200-PO-5	200	20		300-IU-1	300	C	
100-BC-3	100	B	CPP	300-FF-4	300	C	
100-BC-4	100	B	CPP	100-IU-4	100	D	
100-DR-3	100	B	RPP	100-IU-5	100	D	
100-FR-2	100	B		200-SS-1	200	D	
100-HR-2	100	B	RPP	200-SS-2	200	D	
100-KR-3	100	B	CPP	200-IU-1	200	D	
100-NR-2	100	B		200-IU-6	200	D	
100-IU-1	100	B		200-IU-2	200	D	
200-BP-2	200	B		200-IU-5	200	D	
200-PO-1	200	B		200-BP-7	200	*	RPP
200-PO-4	200	B		200-PO-3	200	*	RPP
200-SO-1	200	B		200-RP-4	200	*	RPP
200-TP-1	200	B		200-TP-5	200	*	RPP
200-TP-2	200	B		200-TP-6	200	*	RPP
200-TP-4	200	B		200-UP-3	200	*	RPP

RPP = RCRA past-practice.

CPP = CERCLA past-practice.

* = Single-shell tank operable unit which has not been prioritize.

Working order represents the priority order for remedial action, as appropriate, within the environmental restoration program. These activities are generally priority 2 per the ads prioioity system.

The DOE, its contractors, and the regulators are discussing ways to combine operable units into larger units to take advantage of economies of scale and other factors to reduce the overall time and cost of environmental restoration at the Hanford Site. One of the major assumptions of this plan is the partial implementation of the aggregate area management strategy. This plan has incorporated changes into the text, figures, or tables that reflect the Tri-Party Agreement Change Requests M-90-03 and M-90-04 which is currently going through the public review process prior to final approval. As a result, portions of this plan do not agree totally with the ADSs submittal dated March 28, 1991. This strategy is discussed in more detail in Sections 3.3.1 and 3.7.3.

3.1.2 Decontamination and Decommissioning

The original production mission undertaken during the World War II era left buildings contaminated with radioactivity. The D&D program at the Hanford Site manages these facilities in accordance with DOE Order 5820.2A, *Radioactive Waste Management* (DOE 1988). The D&D work has been ongoing since the 1970's, when facilities were being shutdown and declared surplus due to changing missions.

The Hanford Site's D&D projects are not specifically included in the Tri-Party Agreement; however, the D&D work is being coordinated at the M&O Contractor program office level with other cleanup actions onsite to insure consistency in planning and to reduce redundancy when allocating resources. In addition, the waste generated and/or removed as part of a D&D action must be managed in accordance with RCRA, CERCLA, and other applicable regulations. The NEPA documentation is also prepared for D&D projects.

3.2 FIVE-YEAR VISION FOR THE HANFORD SITE CLEANUP

Along with the initial issuance of the site-specific plan (DOE-RL 1989a), a paper entitled "Five-Year Vision for Hanford Cleanup" was issued (Appendix D). This paper contained a list of goals for cleanup progress over the first 5 years. These goals support our commitments to complete cleanup of inactive facilities and waste sites by 2018. The 5-year goals and their status are summarized below.

GOAL

Develop a clear and complete understanding of where all the wastes are located, and to have a clear understanding of the risks and priorities regarding characterization and cleanup.

STATUS

A preliminary assessment/site investigation has been conducted. It identified about 1,500 waste sites which have been organized into 78 operable units. A significant amount of characterization is scheduled over the next 5 years to establish the correlation and confidence level with the preliminary assessment/site investigation results. To have a complete and clear understanding of the types and locations of waste, all operable units must go through the RCRA/CERCLA investigation process.

GOAL

Take early actions whenever required to prevent immediate risk and to reduce the spread of contamination.

STATUS

Potentially higher risk sites were identified during the hazard ranking system process, and action has taken place to either reduce the risk or to contain it until a remedial action is taken for the operable unit. As part of the preliminary actions for preparing the operable unit work plan, the operable unit is surveyed to determine whether interim response actions are required before characterizing and subsequently cleaning up all waste sites within the operable unit.

The most common form of an interim response action is radiation area remedial actions, using a cover of clean soil to prevent migration of contaminated waste. This approach has been used, and will continue to be used when ever applicable.

Depending upon risks, and subsequent cleanup cost and time factors, another early action that is being used to achieve the goal is an expedited response action. This action removes and/or significantly reduces the hazard and/or the waste from the site, and is much closer to final remediation of the waste sites than other interim actions. To date, three expedited response actions have been identified for early action. (See Section 3.4.3 for their status.)

GOAL

Meet or surpass all milestones due in the Tri-Party Agreement.

STATUS

To date, most all of the Tri-Party Agreement milestones in the Environmental Restoration program have been met on or ahead of schedule. When it becomes obvious that a Tri-Party Agreement milestone will not meet the agreement, negotiations will be opened with the regulators to address and solve the problem or issues.

GOAL

Complete 39 remedial investigation/feasibility study (RI/FS) and/or RCRA facility investigation/corrective measures study (RFI/CMS) work plans by the end of FY 1997.

STATUS

Activities are currently on schedule to meet this goal. Fourteen RI/FS work plans have been drafted and sent to the regulators for review and approval, and four feasibility studies have been started.

GOAL

Acquire the needed resources and obtain the necessary commitment to meet the future milestones in the Tri-Party Agreement.

STATUS

We are on schedule to meet the stated goal. However, adherence in the future to this goal depends on early enough appropriation of the required funding to acquire the resources needed to accomplish characterization and cleanup in accordance with the Tri-Party Agreement. This is particularly true when long-lead times are involved in the acquisition cycle (e.g., special laboratory capacity for mixed waste).

GOAL

Remove 30 percent of the old contaminated buildings and/or structures and cleanup those sites by the end of FY 1997.

STATUS

In compliance with the goal, the following facilities are being cleaned up and/or removed: (1) the water-intake tunnels, (2) other major facilities, and (3) most of the reactor support facilities. Actual D&D on the surplus reactors is not scheduled to start until after the current 5-year period, although some of the engineering documentation will be prepared.

GOAL

Decide on the method of decommissioning for the old plutonium production reactors that is reasonable, cost-effective, and has broad public support.

STATUS

The final EIS was issued late in 1990. A final EIS and record of decision is expected by the end of FY 1991.

GOAL

Develop and commit to a comprehensive plan, schedule, and set of priorities to complete cleanup of inactive facilities and waste sites by 2018.

STATUS

A comprehensive plan has been produced and priorities have been set for cleanup of inactive facilities and waste sites. This plan is dynamic, and will probably go through significant changes as experience is gained, issues are raised, or problems are encountered.

GOAL

Work with the regulators and the public to clearly define what cleanup means. Develop overall goals and standards for the long-term risks that will remain after cleanup is done. Address future land uses, work with the public, and integrate regulatory requirements with technical assessments of risks and capabilities, social concerns and values, and fiscal realities.

STATUS

In accordance with the Tri-Party Agreement, participation in the investigations, remedy selection, and remedial actions by the regulators and the public is assured. Before work can proceed on either investigations or remedial actions, the EPA and Ecology must approve the appropriate plans and documentation. During the investigation and remedy-selection process, models are developed that evaluate the risks and performance of various remedy options. As long as we adhere to this principal, adherence to the stated goal will be maintained.

3.3 ENVIRONMENTAL RESTORATION REMEDIAL ACTIONS PROGRAM DESCRIPTION

This section describes the overall work scope which must be done to accomplish the objectives of the 30-year cleanup for the Hanford Site as stipulated in the Tri-Party Agreement.

The Environmental Restoration Remedial Actions program assessments and cleanup actions will be conducted in accordance with provisions of RCRA and/or CERCLA. The RCRA cleanup requirements are set forth in operating, closure, or postclosure permits, while cleanup requirements identified in CERCLA are set forth in the Tri-Party Agreement.

The overall remediation process at the Hanford Site is derived from RCRA and CERCLA and consists of two phases: assessment and cleanup.

3.3.1 Operable Unit Assessments

The assessment phase is defined more specifically as the RI/FS process. The RI/FS for each operable unit is detailed in its work plan.

- Remedial Investigation--A preliminary review of site records and reports is conducted to determine whether the site may pose a hazard or potential hazard to human health or the environment.

Site sampling, monitoring, and analysis activities determine the extent and nature of the problem presented by a release. Characterization provides the basis for acquiring the necessary technical information to develop, screen, analyze, and select appropriate remediation. This includes the CERCLA remedial investigation and/or the RCRA facility investigation.

- **Aggregate Area Management Strategy**--Currently, an aggregate area management strategy is being pursued for the assessment of the past-practice waste sites. The objectives of this strategy are the following:
 - Use scoping studies to gather and analyze existing data before the preparation of work plans
 - Start early expedited remedial actions where the existing data, scoping information, and remedial investigation data indicate expedited actions would be beneficial for risk reduction
 - Integrate the source term and groundwater operable units so that the highest risk sites are addressed first.
- **Feasibility Study**--Characterization data and other information are analyzed and used to develop and assess alternative approaches to remedial action. The objectives of such action are defined, and alternative approaches are screened. Following screening, the remaining alternatives are subjected to detailed technical analysis to develop a recommended approach.

A proposed plan is prepared and made available for public review and comment after concurrence with the lead regulatory agency in accordance with the Tri-Party Agreement.

- **Record of Decision**--After the public comment period, the record of decision describing the decision-making process for remedy selection is prepared by the lead regulatory agency. The record of decision summarizes the alternatives developed, screened, and evaluated in accordance with CERCLA. The record of decision is signed and published in the *Federal Register* by the EPA and becomes part of each operable unit's administrative record.

3.3.2 Operable Units Cleanup

The cleanup phase is the remediation of an operable unit after the cleanup approach is selected. This phase involves the following:

(1) expedited remedial actions, (2) remedial design, (3) remedial actions, and (4) compliance.

- **Expedited Remedial Actions**--Both CERCLA and RCRA include provisions for expedited responses when warranted by the lead regulatory agency because of an actual or threatened release from a past-practice unit. These expedited responses are used in cases where early remediation will prevent the potential for an imminent and substantial endangerment or an imminent hazard to develop. Any proposal for expedited remedial actions must be approved by the EPA before the initiation of field work and shall be consistent, to the extent practicable, with anticipated alternatives for final selection of remedial action or corrective measures.

- Remedial Design--Once a cleanup approach is selected and a record of decision has been issued, a remedial design (CERCLA) or corrective measures design (RCRA) is developed that includes the detailed engineering plans, designs, and specifications. These include the specifications of construction materials and procedures for all constraints and requirements. A design report is then prepared that includes the designs, budget estimates, and schedules for construction of the remediation activity including development of support facilities.
- Cleanup Process--The cleanup process is initiated in accordance with an agreed upon schedule (CERCLA) or the schedule of compliance specified in the RCRA permit. This process is the implementation of the detailed actions (CERCLA) or corrective measures (RCRA) developed under the remedial design process and is undertaken on the basis of such a design for a remedy of a hazard or potential hazard to human health or the environment. The cleanup process may include the construction and operation of a support facility to effect the selected remedial action at the operable unit. Upon satisfactory completion of the remedial action (CERCLA) or corrective measures implementation (RCRA) for a given operable unit, the lead regulatory agency shall issue a certificate of completion to the DOE for that operable unit.
- Compliance--Compliance includes any measures taken (i.e., monitoring, facility or site inspections, facility or site report examinations, or other operations) to verify compliance with remediation actions. The necessary operations and engineering and/or postclosure monitoring plans, personnel training, and equipment required to maintain compliance after transition will be provided to the responsible organization.

3.3.3 Description of Ongoing Work Items

3.3.3.1 Operable Units Assessment.

- 1100-EM-1 Operable Unit--This operable unit is the first of 78 operable units identified for investigation in the Tri-Party Agreement. It includes seven waste units in the 1100 Area, which is located in the southeastern corner of the Hanford Site near the City of Richland (see Figure 3-1). This unit has been used as a maintenance area, warehouse facility, and equipment storage yard in support of Hanford Site operations.
- 200-BP-1 Operable Unit--The first operable unit involving an investigation of waste units contaminated with radioactive substances such as tritium, cobalt, uranium, cesium, strontium, and plutonium. It is located approximately in the center of the Hanford Site, along the northern boundary of the 200 East Area (see Figure 3-1). The 200-BP-1 operable unit includes nine inactive cribs and three unplanned release sites designated as waste units. The cribs received low-level liquid waste from U Plant uranium

reclamation operations and waste storage tank condensate from the adjacent 241-BY Tank Farm. The 200-BP-1 operable unit is a high priority because of its contribution to groundwater contamination observed in the vicinity, and because of its proximity to the SSTs.

- **300-FF-1 Operable Unit**--The operable unit is located in the southeastern corner of the Hanford Site in the 300 Area, adjacent to the Columbia River (see Figure 3-1). This operable unit consists of 19 waste units which includes process trenches, retention basins, burial grounds, and process ponds that have received and/or continue to receive wastes from reactor fuel fabrication, laboratory operations, filter backwash from the water treatment plant, power house operation (flyash slurry), and sanitary sewers.
- **300-FF-5 Operable Unit**--This unit is a groundwater operable unit and includes the aquifer beneath the 300-FF-1, 300-FF-2, and 300-FF-3 operable units. Ultimately, the extent of the operable unit will include all significant contamination emanating from the 300-FF-1, 300-FF-2, and 300-FF-3 operable units. The 300-FF-5 operable unit is located next to the Columbia River, on the southeastern section of the Hanford Site.
- **100-HR-1, 100-HR-3, and 100-DR-1 Operable Units**--These operable units are located in the 100-D, 100-DR, and 100-H Areas of the Hanford Site (see Figure 3-1) adjacent to the Columbia River.

The 100-HR-1 operable unit is composed of 10 waste sites that include percolation cribs and trenches, burial grounds, and evaporation basins. Present in these waste units are the following: (1) process liquid wastes, (2) reactor exhaust stack emissions, (3) radioactive solid wastes, (4) sanitary liquid wastes, and (5) reactor fuel fabrication wastes.

The 100-HR-3 unit is a "groundwater only" operable unit that addresses the groundwater plume(s) associated with the 100-HR-1, 100-HR-2, 100-DR-1, 100-DR-2, 100-DR-3, and 100-IU-4 operable units plus the associated surface water, sediments, and aquatic biota. Both the 100-HR-1 and 100-HR-3 operable units are being addressed under RCRA corrective action authority.

The 100-DR-1 operable unit is in the 100-D/DR Area of the Hanford Site, and adjacent to the Columbia River (see Figure 3-1).

The 100-D/DR Area contains two of the old reactors that are awaiting decommissioning along with their support facilities. There are also numerous waste units within the 100-D/DR Area that were used in past operations. These include the following: (1) cribs, (2) trenches, (3) retention basins, and (4) septic tanks. The 100-DR-1 operable unit covers the northern section of the 100-D/DR Area, where most of the liquid disposal sites are located. There are 19 waste units identified in the 100-DR-1 operable unit, including the 100-D Ponds that still receive liquid. The ponds are regulated as RCRA TSD units as a result of prior discharges.

- 100-KR-1 and 100-KR-4 Operable Units--These operable units are located at the 100-KW and KE Area (see Figure 3-1) on the north-central part of the Hanford Site along the southern shoreline of the Columbia River. The 100-K Area contains the facilities associated with operation of the KE and KW Reactors.

The 100-KR-1 operable unit contains the following: (1) a liquid waste disposal trench, (2) effluent crib, (3) outfall structure, and (4) retention basins. The scope of the 100-KR-1 source operable unit includes these sources of contamination and the associated contamination of soils above the water table.

The 100-KR-4 operable unit is a groundwater operable unit. It is located in the 100 KW and KE Area on the north-central part of the Hanford Site along the southern shoreline of the Columbia River (see Figure 3-1).

The 100 KW and KE Area contains the facilities associated with operation of the KE and KW Reactors and is divided into three source operable units: 100-KR-1, 100-KR-2, and 100-KR-3. The 100-KR-4 groundwater operable unit includes the following: (1) groundwater below these source operable units and the groundwater, (2) surface water, (3) sediments, and (4) aquatic biota impacted by 100 KW and KE Area operations.

- 100-BC-1 and 100-BC-5 Operable Units--The 100-BC-1 operable unit is located in the 100 B and C Area on the north-central part of the Hanford Site along the southern shoreline of the Columbia River, (see Figure 3-1).

The 100-BC-1 operable unit is an assemblage of individual waste units associated with the B and C Reactors, which includes the following: (1) liquid waste disposal trenches, (2) french drains, (3) cribs, (4) outfall structures, (5) retention basins, (6) septic tanks, (7) solid waste disposal burial grounds, (8) ash pits, (9) burn pits, (10) a reactor building, (11) storage buildings, and (12) a reactor exhaust stack. The scope of the 100-BC-1 operable unit investigation includes these sources of contamination and the associated contamination of soils above the water table and terrestrial plants and animals.

The 100-BC-5 is a groundwater operable unit is located in the 100 B and C Areas on the north-central part of the Hanford Site along the southern shoreline of the Columbia River, (see Figure 3-1). The 100 B and C Area contains the facilities associated with operation of the B and C Reactors and is divided into four source operable units: 100-BC-1, 100-BC-2, 100-BC-3, and 100-BC-4. The 100-BC-5 operable unit includes the following: (1) groundwater below these source operable units plus the groundwater, (2) surface water, (3) sediments, and (4) aquatic biota impacted by 100 B and C Area operations.

- 100-NR-1 and 100-NR-3 Operable Units--The 100-N Area is located on the north-central part of the Hanford Site along the southern shoreline of the Columbia River (see Figure 3-1) and contains the N Reactor and its related facilities, and has been subdivided into three operable units: 100-NR-1, 100-NR-2, and 100-NR-3. The 100-NR-1 operable unit has been designated an aggregate source/groundwater operable unit, which contains 13 identified individual waste management units. Of these 13 units, 2 are TSD units (116-N-1 Crib and 116-N-3 Crib) that are currently planned to undergo closure in parallel with the RFI/CMS. The operable unit contains waste units that received several types of liquid wastes including the following: (1) reactor coolant, (2) ruptured fuel storage liquid effluents, (3) decontamination wastestreams, and (4) miscellaneous liquid waste. In addition, because it is the groundwater operable unit, all groundwater, surface water, and aquatic biota investigations related to releases from the 100-NR-1, 100-NR-2, and 100-NR-3 operable units will be carried out as part of the 100-NR-1 investigation.

The 100-NR-3 operable unit has been designated as a source operable unit and received predominately liquid wastes resulting from reactor operations and some solid wastes. This operable unit contains 31 identified individual waste management units, including 2 TSD units (120-N-1 pond [T-1-2] and 120-N-2 neutralization unit [T-1-2]) and 15 spills. Waste sites within these units are predominantly nonradioactive liquid disposal sites. Water treatment chemicals and their byproducts represent the major types of contaminants associated with these units.

- 100-FR-1 Operable Unit--The 100-F Area is located on the north-eastern part of the Hanford Site along the southwestern shoreline of the Columbia River (see Figure 3-1) contains the F Reactor and its related facilities, and has been subdivided into two operable units: 100-FR-1 and 100-FR-2.

The 100-FR-1 operable unit has been designated an aggregate source/groundwater operable unit, which contains 10 identified individual waste management units. The operable unit contains waste units that received several types of liquid wastes including the following: (1) reactor coolant, (2) ruptured fuel storage liquid effluents, (3) decontamination wastestreams, and (4) miscellaneous liquid waste. In addition, because it is the groundwater operable unit, all groundwater, surface water, and aquatic biota investigations related to releases from the 100-FR-1 and 100-FR-2 operable units will be carried out as part of the 100-FR-1 investigation.

3.3.4 Single-Shell Tank Characterization, Development, and Demonstration

Six of the 78 operable units include both RCRA 3004(u) past-practice units and 149 SST TSD units. During the five-year planning period, the Hanford Site waste management operations program will continue to interim

stabilize and isolate the SSTs units. Refer to Section 2.3.2 for more information on this activity. At the same time, the Environmental Restoration Remedial Actions program will support promising technology development of optimal waste retrieval and in-place disposal technologies for sludge, saltcake, and liquids in the SST wastes, and will prepare RFI/CMS work plans to integrate the investigation of the operable units with the closure process of the 149 SSTs.

The Environmental Restoration Remedial Actions program will also support SST waste characterization. This effort includes taking and analyzing at least 2 waste core samples from each of the 149 SSTs. Since the SSTs are a part of operable units that contain numerous waste sites associated with the SSTs, the closure of SSTs and the cleanup of their respective operable unit will closely coincide.

3.3.5 Expedited Response Actions

- 618-9 Burial Ground Remediation--The 618-9 hexone burial ground is located immediately west of the 300 Area of the Hanford Site (see Figure 3-1). About 100 55-gallon drums filled with hexone, an organic solvent, were buried there more than 30 years ago. The waste hexone was produced during research and development activities in the 300 Area. An expedited response is being performed on this site because of the proximity of the buried waste to the Columbia River.
- 300 Area Process Trenches Sediments Removal--These trenches are located at the north end of the 300 Area of the Hanford Site (see Figure 3-1). These two trenches currently receive nonregulated process and cooling waters from operations in the 300 Area, and have historically received mixed wastes from several research and development laboratories, and from the fuels fabrication process. These wastes were discharged to the 300 Area process trenches and allowed to percolate through the soil column underlying the trenches. An expedited response is being performed on this site because of the proximity of the waste disposal site to the Columbia River.
- 200 West Area Carbon Tetrachloride Treatment--The third expedited cleanup project will remove carbon tetrachloride from contaminated soil in the 200 West Area of the Hanford Site (see Figure 3-1). An estimated 1,000 metric tons of carbon tetrachloride was discharged to the soil from various chemical processes and production operations from 1960 to 1975.

3.3.6 Other Program Activities

3.3.6.1 Program Management and Program Support. The overall objective of program management is to manage and control the program so it is conducted within budget, on schedule and in compliance with all applicable laws and regulations.

Program management includes overall management, planning, and program control activities as described in the *Environmental Restoration Field Office Management Plan* (DOE-RL 1989d). The program control activities within program management provides the following: (1) cost and schedule information tracking, (2) performance analysis, (3) reporting, and (4) developing, implementing, and documenting other management control systems.

The objective of program support is to provide overall support in a variety of areas including community relations, media relations, records management, technical data management, configuration management, quality assurance, and compliance with the requirements of the NEPA. Also included in program support is funding for Ecology's role in the Tri-Party Agreement.

Community relations efforts include planning and implementing the activities identified in the community relations plan for the Hanford Site (Ecology et al. 1989) as well as the specific community relations activities required to meet the Tri-Party Agreement. Records, data, and configuration management efforts ensure compliance with applicable requirements for the following: (1) validation, (2) retention, (3) retrieval, and (4) use of records and data. Quality assurance includes overall quality assurance planning, documentation for the Environmental Restoration Remedial Actions program, and development and maintenance of a Quality Assurance Requirements Document. The NEPA support to the program includes NEPA compliance planning as well as preparation of a proposed programmatic EIS.

3.3.6.2 Technical Support to Remedial Actions. The objective of technology support is to pursue existing technologies that have a high potential for resulting in a permanent and cost effective remediation. Technology utilized under this category would include technologies with a specific applicability to waste units within the Hanford Site. These site-specific technology activities form, in part, the environmental restoration portion of the Hanford Science and Technology Program. Technologies being developed for wider-based applications are covered in the technology development plans.

3.3.6.3 Facility, Systems, and Equipment Upgrades. To support the characterization of SSTs and past-practice units numerous facility, system, and equipment upgrades are required. As the Environmental Restoration Remedial Actions program continues to grow, the need for drilling and laboratory support will also grow.

The drilling upgrades include the following: (1) procedure development, (2) drill rigs, (3) drilling equipment, (4) onsite support facilities, (5) sampling equipment, (6) sample trucks, (7) decontamination facilities, (8) support vehicles, (9) maintenance, repair, or replacement as applicable. The laboratory upgrades includes procedure development, and construction or modification of laboratory space for handling radioactive samples, analytical equipment, and data management systems.

3.3.6.4 Radiation Area Remedial Actions. The objectives of radiation area remedial action is to take field actions in advance of approved remedial actions to reduce and/or prevent the spreading radioactive surface contamination. The major elements of this effort include surveillance and

maintenance, decontamination and stabilization of specific areas, and underground storage tanks remediation.

3.3.6.5 RCRA Closures. The Environmental Restoration Remedial Actions program contains 169 TSD units subject to closure under RCRA. Out of the 169 TSD units, 149 are SSTs, which were covered in Sections 2.3.2, and 3.3.4. Activities on the remaining 20 TSDs are described in the following paragraphs and include a description of separate closure actions being taken on some of 20 TSDs within the scope of this plan. Appendix A contains a listing of all waste management units including TSDs within the Environmental Restoration Remedial Actions program scope.

- **Process Trenches--Three Tri-Party Agreement interim milestones** have been established for the 300 Area process trenches (waste management unit 316-5). They include activities necessary to select a treatment option and to design and construct a treatment system so that discharges of wastes to the soil column will cease. A closure/postclosure plan for the 300 Area process trenches is also prepared in parallel with the RI/FS activities. Submittal of this closure/postclosure plan is an interim milestone in the Tri-Party Agreement.
- **Nonradioactive Dangerous Waste Landfill--The Nonradioactive Dangerous Waste Landfill** is a TSD located in the central portion of the Hanford Site. This TSD is part of the 200-IU-3 operable unit and is classified as a hazardous waste operable unit. This operable unit is primarily a municipal waste landfill that received steam cleaning waste and sewer sludge to provide a possible source for release of contamination to the groundwater. This TSD is 1 of 6 identified waste management units within the 200-IU-3 operable units, and is currently undergoing a separate closure/postclosure action.
- **B Pond--The B Pond TSD** is located within the 200-BP-11 operable unit, a RCRA past-practice unit with the closure/postclosure plan scheduled to be submitted to the EPA and Ecology prior to the investigation of the 200-BP-11 operable unit.

The 216-B-3-3 ditch and 216-B-3 pond will be taken out of service and interim stabilized. This action is being taken to remove from service operating disposal sites known to have received radioactive and hazardous waste discharges.

Actions to characterize B Pond are currently underway in support of June 1995 clean closure milestone. The Tri-Party Agreement action plan states that any demonstration for clean closure of a land disposal unit (e.g., B Pond) must include documentation that groundwater and soils have not been adversely impacted by that TSD unit.

- **Other Environmental Restoration Remedial Actions Program Treatment, Storage, and Disposal Units--The TSDs** are to be closed as part of the remediation phase of the operable unit to which it is assigned.

In the event that the schedule for any TSD conflicts with the operable unit schedule, separate action may be taken like B Pond so that the TSD closure plan submittal would be in compliance with negotiated agreements. During the investigation and study phase of the applicable operable units, closure plans for each TSD will be prepared and submitted in accordance with RCRA, and will be submitted along with the proposed plan for the operable unit in which it resides. Appendix A contains a complete listing of TSDs.

3.4 ENVIRONMENTAL RESTORATION REMEDIAL ACTION ACCOMPLISHMENTS/FUTURE WORK ACTIVITIES

Figure 3-2 and Table 3-2 provides schedules and a milestone listing activities for the site-specific plan. These are based on the Preliminary Unvalidated Case budget level.

3.4.1 Operable Unit Assessments

- 1100-EM-1 Operable Unit (ADS 5100)--The 1100-EM-1 Phase I remedial investigation report, the Phase I and II feasibility studies, and the Phase II supplemental work plan have been completed as scheduled in the Tri-Party Agreement. Both the feasibility study and the supplemental work plan are awaiting regulatory approval. Groundwater sampling was performed in March 1991.

A series of meetings have been held between the EPA, Ecology, and DOE to discuss land-use scenarios that should be applied to the risk assessment and cleanup of the 1100-EM-1 operable unit.

Future activities includes the continuance of work leading to the submittal of the remedial investigation Phase II report to the regulators by December 1991 (Tri-Party Agreement Milestone M-15-01B), and the feasibility study Phase III report by April 1992 (Tri-Party Agreement Milestone M-15-01C)

- 200-BP-1 Operable Unit (ADS 5125)--The remedial investigation Phase I groundwater well installation was completed in late February 1991. A total of 9 monitoring wells, including 6 unconfined and 3 confined aquifer wells, were installed.

Groundwater sampling continues with 33 of the 44 wells being sampled currently.

Figure 3-2. Environmental Restoration/Remedial Actions Milestones Schedules. (sheet 1 of 2)

Figure 3-2. Environmental Restoration/Remedial Actions Milestones Schedules. (sheet 2 of 2)

Table 3-2. Environmental Restoration/Remedial Actions
Program Milestones. (sheet 1 of 5)

ADS Number	OU or WBS Area	Milestone Description	TPA Milestone No.	Milestone Date	Target Date
5009-E2	Prog. Mgmt.	Issue the Draft Major Systems Acquisition (MSA) Plan			9/30/92
5016-E2		Issue the Draft QA Program Plan			9/30/91
		Issue the Revised QA Requirements Document			9/30/92
5026-EB	100-HR & DR	Submit Rescoped RFI/CMS Work Plan on OU 100-HR-1	*M-12-05a	9/30/91	
		Submit Rescoped RFI/CMS Work Plan on OU 100-DR-1	*M-12-06a	9/30/91	
		Submit Rescoped RFI/CMS Work Plan on OU 100-HR-3	*M-12-07a	9/30/91	
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			4/30/93
		Submit the 100-D Pond Draft Closure Plan to EPA and Ecology	M-20-40	5/31/94	
		Submit the RFI Phase 2 Report to EPA and Ecology			1/31/98
		Submit the Proposed Plan to EPA and Ecology			11/30/98
5029-EB	100-BC	Submit Rescoped RFI/CMS Work Plan on OU 100-BC-1	*M-12-08a	9/30/91	
		Submit Rescoped RFI/CMS Work Plan on OU 100-BC-5	*M-12-09a	9/30/91	
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			10/31/94
		Submit the RI Phase 2 Report to EPA and Ecology			7/31/96
		Submit the Proposed Plan to EPA and Ecology			5/31/97
5031-EB	100-KR	Submit Rescoped RFI/CMS Work Plan on OU 100-KR-1	*M-12-10a	10/31/91	
		Submit Rescoped RFI/CMS Work Plan on OU 100-KR-4	*M-12-11a	10/31/91	
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			12/31/93
		Submit the RI Phase 2 Report to EPA and Ecology			1/31/97
		Submit the Proposed Plan to EPA and Ecology			5/31/98
5032-EB	100-N	Submit Rescoped RFI/CMS Work Plan on OU 100-NR-1	*M-12-12a	12/31/91	
		Submit Rescoped RFI/CMS Work Plan on OU 100-NR-3	*M-12-14a	12/31/91	
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			7/31/94
		Submit the 1324-N/1324-NA Closure Plan to EPA and Ecology	M-20-35	9/30/94	
		Submit the 1301-N/1325-N Closure/Postclosure Plan to EPA and Ecology	M-20-31	6/30/96	
		Submit the RI Phase 2 Report to EPA and Ecology			10/31/97
		Submit the Proposed Plan to EPA and Ecology			4/30/98
5034-EB	100-FR	Submit the 100-FR-1 Draft Operable Unit Work Plan to EPA and Ecology	M-12-13a	4/30/91	
		Submit Rescoped RFI/CMS Work Plan on OU 100-FR-1	M-12-13	11/30/91	
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			6/30/94
		Submit the RI Phase 2 Report to EPA and Ecology			3/31/97
		Submit the Proposed Plan to EPA and Ecology			7/31/98

Table 3-2. Environmental Restoration/Remedial Actions
Program Milestones. (sheet 2 of 5)

ADS Number	OU or WBS Area	Milestone Description	TPA Milestone No.	Milestone Date	Target Date
5035-EB	100-BC-2	Submit the 100-BC-2 Draft Operable Unit Work Plan to EPA and Ecology	*M-12-16	Deleted	
5036-EB	100-DR-2	Submit the 100-DR-2 Draft Operable Unit Work Plan to EPA and Ecology	*M-12-18	Deleted	
5037-EB	100-KR-2	Submit the 100-KR-2 Draft Operable Unit Work Plan to EPA and Ecology	*M-12-20	Deleted	
5075-EC	300-FF-1	Submit the Feasibility 1 & 2 Report to EPA and Ecology	M-15-03A	9/15/92	
		Submit the RI Phase 2 Report to EPA and Ecology	M-15-03B	12/15/93	
		Submit the Proposed Plan to EPA and Ecology	M-15-03C	8/15/94	
5076-EC	300-FF-5	Submit the Feasibility 1 & 2 Report to EPA and Ecology	M-15-04A	7/15/93	
		Submit the RI Phase 2 Report to EPA and Ecology	M-15-04B	8/15/94	
		Submit the Proposed Plan to EPA and Ecology	M-15-04C	6/15/95	6/30/95
5077-EB	300-FF-3	Submit the 300-FF-3 Draft Operable Unit Work Plan to EPA and Ecology			
5100-ED	1100-EM-1	Submit the RI Phase 2 Report to EPA and Ecology	M-15-01B	11/30/91	
		Submit the FS Phase 3 Report to EPA and Ecology	M-15-01C	4/30/92	
5125-EE	200-BP-1	Submit the Feasibility 1 & 2 Report to EPA and Ecology	M-15-02A	5/31/93	
		Submit the RI Phase 2 Report to EPA and Ecology	M-15-02B	4/30/94	
		Submit the Proposed Plan to EPA and Ecology	M-15-02C	3/31/95	
5126-EE	200-UP-2	Submit the 200-UP-2 Draft Operable Unit Work Plan to EPA and Ecology	*M-12-15	6/30/92	10/31/96
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			
5127-EE	200-BP-5	Submit the 200-BP-5 Draft Operable Unit Work Plan to EPA and Ecology			
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			
5128-EE	200-ZP-1	Submit the 200-ZP-1 Draft Operable Unit Work Plan to EPA and Ecology	*M-12-17	Deleted	5/31/96
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			
5129-EE	200-BP-4	Submit the 200-BP-4 Draft Operable Unit Work Plan to EPA and Ecology	*M-12-19	Deleted	
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			
5130-EE	200-BP-11	Submit the 200-BP-11 Draft Operable Unit Work Plan to EPA and Ecology			6/30/94
		Submit the Feasibility 1 & 2 Report to EPA and Ecology			2/28/97
5131-EE	200-PO-2	Submit the 200-PO-2 Draft Operable Unit Work Plan to EPA and Ecology			8/31/94
5132-EE	200-PO-5	Submit the 200-PO-5 Draft Operable Unit Work Plan to EPA and Ecology			8/31/97
5133-EE	200-TP-1	Submit the 200-TP-1 Draft Operable Unit Work Plan to EPA and Ecology			10/31/94
5134-EE	200-BP-2	Submit the 200-BP-2 Draft Operable Unit Work Plan to EPA and Ecology			12/31/94
					4/31/95
					8/31/95

Table 3-2. Environmental Restoration/Remedial Actions
Program Milestones. (sheet 3 of 5)

ADS Number	OU or WBS Area	Milestone Description	TPA Milestone No.	Milestone Date	Target Date
5135-EE	200-TP-4	Submit the 200-TP-4 Draft Operable Unit Work Plan to EPA and Ecology			12/31/95
5136-EE	200-TP-2	Submit the 200-TP-2 Draft Operable Unit Work Plan to EPA and Ecology			12/31/95
5137-EE	200-ZP-2	Submit the 200-ZP-2 Draft Operable Unit Work Plan to EPA and Ecology			2/28/96
5138-EE	200-PO-1	Submit the 200-PO-1 Draft Operable Unit Work Plan to EPA and Ecology			4/30/96
5139-EE	200-PO-4	Submit the 200-PO-4 Draft Operable Unit Work Plan to EPA and Ecology			8/31/96
5140-EE	200-SO-1	Submit the 200-SO-1 Draft Operable Unit Work Plan to EPA and Ecology			10/31/96
5141-EE	200-IU-3	Submit the 200-IU-3 Draft Operable Unit Work Plan to EPA and Ecology			4/30/97
5175-EF	SST Waste Characterization Support	Complete SEIS & Issue Draft for Public / Ecology Review Issue Systems Engineering Design Report Submit Closure Plan to Ecology for Approval Submit Tank Farm Demonstration Closure Plan to Ecology	M-09-01 M-09-02 M-08-03	6/30/02 12/31/03 12/31/03	12/31/94 5/31/95
5176-EF	SST Waste Characterization	Obtain 4 Core Samples from 2 Tanks Obtain 16 Core Samples from 8 Tanks Second Core Sampling Truck is Ready for Rotary-Mode Drilling and Hard Salt-Cake Sampling Completion of Improved Organic Clean-Up Analytical Method Complete R&D and Installation of Both the Hard Salt-Cake Sampler and the Improved Hydrostatic Balance System	M-10-04 M-10-05 *M-10-13 *M-10-13-T1 *M-10-13-T2	6/30/91 3/31/92 9/30/92	1/31/92 6/30/92
5178-EF & 5179-EF	SST, ER -- TD Integration SST, ER Tech. Support	Obtain 24 Core Samples from 12 Tanks Obtain 44 Core Samples from 22 Tanks Obtain 48 Core Samples from 24 Tanks Obtain 48 Core Samples from 24 Tanks Obtain 48 Core Samples from 24 Tanks Submit Tank Selection Criteria to Ecology for Approval Ecology concurrence/ non-concurrence of Tank Selection Criteria Complete Design for Installation of Required Waste Removal Equipment Initiate Full-Scale Demonstration of Waste Retrieval Technology	M-10-06 M-10-07 M-10-08 M-10-09 M-10-10 M-10-11 M-07-01 M-07-02 M-07-03 M-07-04	9/30/92 9/30/93 9/30/94 9/30/95 9/30/96 9/30/97 10/31/93 12/31/93 12/31/94 10/31/97	

Table 3-2. Environmental Restoration/Remedial Actions
Program Milestones. (sheet 4 of 5)

ADS Number	OU or WBS Area	Milestone Description	TPA Milestone No.	Milestone Date	Target Date
5202-EG	Technical Support to Remedial Actions	Issue Plan for Testing Alternative Site Stabilization, Revegetation, etc.			9/30/91
		Issue Technical Support Plan			9/30/93
		Combine RAAS and HEIS for Hanford Use			9/30/95
		Complete Characterization / Permitting Support for Field Experimental Site			3/31/97
5204-EG	General NEPA Support	Publish Notice of Intent			1/31/92
		Issue Final Technical Support Document			3/30/93
		Issue Final Hanford Remedial Actions Environmental Impact Statement			3/31/94
		Issue Draft Hanford Remedial Actions Environmental Impact Statement			6/30/95
5225-EJ	RARA Decon	Issue Surface Soil Radioactive Contamination Control Program Plan			4/30/91
		Complete Stabilization of 12 Acres -- UN-216-E-17			9/10/91
5228-EJ	Inactive USTs	Complete Removal of 4 USTs in the 3000 Area			2/28/91
		Complete Removal of 5 USTs			9/30/92
		Complete USTs Removal (s) In Accordance with Regulatory Requirements			9/30/97
5229-EJ	USTs Compli.	Document Compliance with 40 CFR 280 & 281 (annually)			9/30/91
5230-EJ	Site Asbestos Abatement Laboratory Upgrades	Complete Detailed Abatement Cost Estimate (Top 25)			9/30/91
		Complete Mobile Asbestos Vacuum Procurement / Service Agreement			9/30/92
5250-EK		Complete Definitive Design for a WSCF	M-14-01	11/30/90	
		Complete Definitive Design of Hot Cell Expansion	M-11-02	3/30/92	
		Complete Construction/Initiate Operations of the WSCF	M-14-00	7/31/92	
		Complete Construction/Initiate Operations of the Hot Cell Expansion	M-11-00	6/30/94	
5301-EN	300-FF-5	Initiate Remedial Action Design			7/31/96
5303-EN	300-FF-2 ERA	Initiate Expedited Response Action			10/1/91
		Complete the 618-9 Expedited Response Action			9/30/92
5325-EP	1100-EM-1	Initiate Remedial Action Design			10/31/92
		Initiate Remedial Actions			12/31/93
5375-ES	200-BP-1	Initiate Remedial Action Design			10/30/95
		Initiate Remedial Actions			12/31/96
5378-ES	200-ZP-1	Initiate Expedited Response Action			11/30/91
		Complete Definitive Engineering and Initiate Stabilization			9/30/91
5400-EV	A-29 Ditch	Complete A-29 Ditch Interim Stabilization			9/30/92
		Submit Draft A-29 Ditch Closure/Postclosure Plan to EPA and Ecology	M-20-36	5/31/96	

Table 3-2. Environmental Restoration/Remedial Actions
Program Milestones. (sheet 5 of 5)

ADS Number	OU or WBS Area	Milestone Description	TPA Milestone No.	Milestone Date	Target Date
5401-EV	183-H Solar Basins	Complete Soil Sampling Under Basins 2 and 3. Complete Vadose Zone Sampling Complete Facility Demolition and Closure			6/30/91 9/30/91 9/30/92
5402-EV	NRDWL	Complete Sampling of the NRDWL Complete Remediation of the NRDWL Site Complete Closure and Submit Postclosure Permit Application			9/30/93 9/30/95 9/30/97
5403-EV	B-Pond BY-Pass	Complete the Definitive Design Report for the Phase 2 By-Pass Complete Construction of the Phase 2 By-Pass			9/30/91 9/30/92
5404-EV	B-Pond Stabilization and Closure	Complete Phase 3 Sampling to Support Closure Complete Revision to Closure/Postclosure Plan Complete Public Review and Approve Closure/Postclosure Plan			9/30/91 8/30/93 2/28/94
5405-EV	216-A-10 Crib	Submit Draft A-10 Crib Closure/Postclosure Plan to EPA and Ecology	M-20-33	3/31/96	
5406-EV	216-U-12 Crib	Submit Draft U-12 Crib Closure/Postclosure Plan to EPA and Ecology	M-20-37	11/30/94	
5407-EV	216-A-36B Crib	Submit Draft A-36B Crib Closure/Postclosure Plan to EPA and Ecology	M-20-34	3/31/96	
5408-EV	300 Area Process Trench	Submit Draft 300-PT Closure/Postclosure Plan to EPA and Ecology Complete Characterization of Process Trenches to Support Closure Plan	M-20-32	8/15/94	
5411-EV	216-S Pond & Ditch	Submit Draft 216-S Pond & Ditch Closure/Postclosure Plan	M-20-39	5/31/96	6/30/96
* New or Revised Tri-Party Agreement Milestones per Change Requests M-10-90-2 and M-12-90-4 Currently Being Proposed.					

Necessary safety documentation is being prepared before the start of vadose zone drilling and well remediation activities.

The background samples in Phase I of the 200-BP-1 remedial investigation have been analyzed using onsite laboratories. The Phase II (source and vadose zone sampling) of the 200-BP-1 remedial investigation is being impacted by the limited availability of onsite laboratory services.

Future activities includes the continuance of work leading to the submittal of the feasibility study Phase I and II report to the regulators by May 1993 (Tri-Party Agreement Milestone M-15-02A), the remedial investigation Phase II report by April 1994 (Tri-Party Agreement Milestone M-15-02B), and the proposed plan by March 1995 (Tri-Party Agreement Milestone M-15-02C).

- 300-FF-1 Operable Unit (ADS 5075)--The 300 Area process trenches will be closed, under RCRA requirements, in conjunction with the RI/FS and subsequent remedial actions associated with the 300-FF-1 operable unit.

Preparations are ongoing to initiate nonintrusive field investigation activities with the drilling of vadose zone monitoring holes in July 1991.

The 300-FF-1 remedial investigation sample analyses are currently being impacted due to the delay in obtaining offsite laboratory support. Most of the sample analyses have been performed by two offsite laboratories, however a third is needed. Procurement is currently underway to acquire a third offsite laboratory for supporting quality assurance sample analysis.

Samples of wild asparagus from the 300-FF-1 operable unit have been obtained and are being prepared for shipment to offsite laboratories for analysis.

Future activities includes the continuance of work leading to the submittal of the feasibility study Phase I and II report to the regulators by September 1992 (Tri-Party Agreement Milestone M-15-03A), the remedial investigation Phase II report by December 1993 (Tri-Party Agreement Milestone M-15-03B), and the proposed plan by August 1994 (Tri-Party Agreement Milestone M-15-03C).

- 300-FF-5 Operable Unit (ADS 5076)--The NEPA documentation has been submitted to DOE-HQ for approval prior to the start of groundwater well drilling. A floodplain and wetlands assessment must be put into the *Federal Register* for public comment before DOE-HQ can provide approval.

Future activities includes the continuance of work leading to the submittal of the feasibility study Phase I and II report to the regulators by July 1993 (Tri-Party Agreement Milestone M-15-04A),

the remedial investigation Phase II report by August 1994 (Tri-Party Agreement Milestone M-15-04B), and the proposed plan by June 1995 (Tri-Party Agreement Milestone M-15-04C).

- The 100-HR-1, 100-HR-3, and 100-DR-1 Operable Units (ADSs 5025, 5026, 5027, 5036, 5043, and 5045)--Because the Aggregate Area Management Strategy assumption was used for the 100-H and 100-DR aggregate reactor area, the budget forecast and target milestone projections were all combined on ADS 5026.

Initial geophysical surveys have been completed. Additional safety documentation is being prepared for other field activities. Since intrusive characterization cannot start until the work plans are approved by the regulators, groundwater and vadose drilling has been deferred until FY 1992.

Future activities assumes that work in the 100-H and 100-DR Areas are conducted utilizing the aggregate area management strategy. Based on that assumption and the FY 1993 ADS submittal dated March 28, 1991, the following target milestones are projected for these two reactor area. Nonintrusive investigation is currently underway for the aggregate reactor area, and will continue for Phase I through December 1992. Borehole drilling for the groundwater and the vadose zones high priority waste sites is scheduled to begin in October 1992, with a target completion for both the remedial investigation Phase I and the feasibility study Phase I and II Reports submitted to regulators by April 1993. Based upon the 100-H and 100-DR Reactor area's model for the Preliminary Unvalidated Case dated March 28, 1991, the proposed plan would be submitted to the regulators in November 1998.

- The 100-KR-1 and 100-KR-4 Operable Units (ADSs 5030, 5031, 5037, and 5039)--Because the aggregate area management strategy assumption for the 100-KR Aggregate Reactor Area, the budget forecast and target milestone projections were all combined on ADS 5031.

The EPA and Ecology comments are being resolved and incorporated into the draft RI/FS work plan.

Future activities assumes that work in the 100-K Area is conducted utilizing the aggregate area management strategy. Based on that assumption and the FY 1993 ADS submittal dated March 28, 1991, the following target milestones are projected for this reactor areas. Nonintrusive investigation should start this spring, and continue for Phase I through December 1992. Borehole drilling for the groundwater and the vadose zones high priority waste sites is scheduled to begin in June 1992, with a target completion for both the remedial investigation Phase I and the feasibility study Phase I and II reports submitted to regulators by December 1993. Based upon the 100-KR Reactor area's model for Preliminary Unvalidated Case dated March 28, 1991, the proposed plan would be submitted to the regulators in May 1998.

- The 100-BC-1 and 100-BC-5 Operable Units (ADSs 5028, 5029, 5035, 5041, and 5042)--Because of the aggregate area management strategy assumption for the 100-BC aggregate reactor area, the budget forecast and target milestone projections were combined on ADS 5029.

The draft RI/FS work plan for the 100-BC-1 and 100-BC-5 have been submitted, and are currently undergoing comment resolution with the EPA and Ecology.

Future activities assumes that work in the 100-BC Area is conducted utilizing the aggregate area management strategy. Based on that assumption and the FY 1993 ADS submittal dated March 28, 1991, the following target milestones are projected for this reactor areas. Nonintrusive investigation should start this spring, and continue for Phase I through December 1992. Borehole drilling for the groundwater and the vadose zones high priority waste sites is scheduled to begin in January 1992, with a target completion for both the remedial investigation Phase I and the feasibility study Phase I and II reports submitted to regulators by December 1993. Based upon the 100-BC Reactor area's model for Preliminary Unvalidated Case dated March 28, 1991, the proposed plan would be submitted to the regulators in November 1997.

- The 100-NR-1 and 100-NR-3 Operable Units (ADSs 5032, 5033, and 5038)--Because of the aggregate area management strategy assumption for the 100-FR Aggregate Reactor Area, the budget forecast and target milestone projections were combined on ADS 5032.

The RFI/CMS Work Plan for the 100-NR-1 and the 100-NR-3 operable units were submitted to the EPA and Ecology on October 12, 1990. This submittal completed Milestones M-12-12 and M-12-14, which were due on December 31, 1990. The work plans are currently being reviewed by the EPA and Ecology.

Future activities assumes that work in the 100-NR Area is conducted utilizing the aggregate area management strategy. Based on that assumption and the FY 1993 ADS submittal dated March 28, 1991, the following target milestones are projected for this reactor areas. Nonintrusive investigation should start this spring, and continue for Phase I through December 1992. Borehole drilling for the groundwater and the vadose zones high priority waste sites is scheduled to begin in October 1992, with a target completion for both the remedial investigation Phase I and the feasibility study Phase I and II reports submitted to regulators by July 1994. Based upon the 100-NR Reactor area's model for Preliminary Unvalidated Case dated March 28, 1991, the proposed plan would be submitted to the regulators in October 1997.

- The 100-FR-1 Operable Unit (ADSs 5034 and 5044)--Because of the aggregate area management strategy assumption for the 100-NR aggregate reactor area, the budget forecast and target milestone projections were all combined on ADS 5034.

The draft RI/FS work plan for the 100-FR-1 operable unit was submitted to the EPA and Ecology in April 1991 on schedule. This submittal completes the Tri-Party Agreement Milestones M-12-13, which was due on April 30, 1991. The work plan is currently being reviewed by the EPA and Ecology.

Future activities assumes that work in the 100-FR Area is conducted utilizing the aggregate area management strategy. Based on that assumption and the FY 1993 ADS submittal dated March 28, 1991, the following target milestones are projected for this reactor area. Nonintrusive investigation should start this spring, and continue for Phase I through December 1992. Borehole drilling for the groundwater and the vadose zones high priority waste sites is scheduled to begin in October 1992, with a target completion for both the remedial investigation Phase I and the feasibility study Phase I and II reports submitted to regulators by June 1994. Based upon the 100-FR reactor area's model for the Preliminary Unvalidated Case dated March 28, 1991, the proposed plan would be submitted to the regulators in July 1998.

3.4.2 SST Sampling and Characterization, Development, and Demonstration Accomplishments (ADSs 5175, 5176, 5178, and 5179)

On February 6, 1991, a Tri-Party Agreement change form was submitted to the EPA and Ecology that specified a delay from December 1990 to September 1991 for Milestone M-10-04 "Obtain Four Core Samples From Two Single-Shell Tanks." Tri-Party Agreement Milestone M-10-04 has been impacted by a recent issue raised over the safety of core sampling operations and higher priority being given to sampling Tank 101-SY to address an immediate safety concern regarding hydrogen releases in this tank.

As a result of high drill bit temperatures reached during testing of the core drill bit on synthetic hardcake, all core sampling operations have been suspended until it can be demonstrated that core sampling can be performed safely. The SSTs selected to be sampled to meet Tri-Party Agreement Milestone M-10-04 (Tanks B-201, B-202, and/or T-203) are expected to be soft wastes that can be sampled without rotation of the drill bit and should not exhibit the high temperatures observed during hardcake tests. Additional testing and analysis of the core drilling equipment in a push mode (no rotation) is required before performing additional core sampling. As a result, an instrumented test in simulated waste, measuring drill bit temperature and an analysis of the push mode safety envelope will be performed. Following this effort, a comprehensive readiness review to provide assurance that the safety envelope will not be violated in actual operation will be performed. When the readiness review is completed, the tank sampling can proceed.

It has been determined that the optimal time to sample Tank 101-SY is during the May 1991 time frame, after the anticipated "burp" (offgassing) within the tank. Because of the priority given to this task, personnel and

related resources common to the SST sampling task are being assigned to the Tank 101-SY sampling effort, further impacting the SST core sampling activities.

An integrated SST and DST core sampling and characterization schedule based upon priority criteria for core sample selection is being developed to address the multiprogrammatic needs of the Hanford Site. Programs requiring support include the following: (1) safety, (2) environmental restoration, (3) waste retrieval, (4) waste pretreatment, (5) HWVP, and (6) grout disposal.

Milestone M-10-05, "Obtain 16 Cores From 8 Tanks," which is due in September 1991, will be impacted by the Tank 101-SY sampling priority. A Tri-Party Agreement change form will be prepared and submitted for approval of a rescheduled completion date based upon the results of the integrated schedule.

As a first step in addressing retrieval technology issues leading towards "Initiating Scale Model Testing" (Milestone M-06-02), an interlab coordinated demonstration is scheduled to be performed at the Hanford Site during the summer of 1991. The demonstration will address robotics and remote systems technologies applicable to the remediation of tanks located on the Hanford Site and at other DOE laboratories. The team includes robotics technology experts from Sandia National Laboratory, Oak Ridge National Laboratory, Idaho National Engineering Laboratory, PNL, and Westinghouse Hanford.

This activity is the lead technology demonstration of the Underground Storage Tank Integrated Demonstration currently in the planning phase as a focal point for development and demonstration of all appropriate tank remediation technologies.

3.4.3 Expedited Response Actions (ADS 5379)

On October 18, 1990, DOE, EPA, and Ecology signed an agreement reaffirming their commitment to the Tri-Party Agreement and their commitment to attempt to accelerate cleanup of certain waste sites at the Hanford Site as part of the Tri-Party Agreement.

- 618-9 Burial Ground Remediation (ADS 5303)--Excavation of the 618-9 burial ground began on February 28, 1991, and the drums have been uncovered. The first drums encountered were severely deteriorated, although others have been found intact. Samples have been taken and sent to a laboratory for analysis. Preliminary field analyses indicate the presence of kerosene in some drums and a liquid that is probably hexone in others; these materials were both expected to be present. Initial tests have shown no radioactivity in the waste. Drums found containing liquids will be pumped out and stored to await final disposal. The target completion milestone for 618-9 burial ground is September 1992.
- 300 Area Process Trenches Sediments Removal (ADS 5379)--This expedited cleanup project will involve removing and isolating contaminated soil in the process trenches to prevent further spread of the contaminants. An expedited response action proposal has been

developed and submitted to the EPA and Ecology. The proposal contains engineering evaluations and cost analyses for performing the excavation and consolidation activities. After the expedited response action proposal has been approved by the regulators, specific cost estimates and schedules will be created.

- 200 West Area Carbon Tetrachloride Treatment (ADS 5378)--Plans currently include the use of a vapor extraction system which will force air through the contaminated soil and draw the vaporized carbon tetrachloride to the surface. Then, the carbon tetrachloride will be captured using filters, so it can be treated and disposed of properly.

A vapor extraction system was successfully tested in April 1991 near the Plutonium Finishing Plant in the 200 West Area. Four wells were used to install equipment and to perform the vapor extraction test. The test results will be used to help prepare for a full-scale installation to remove as much carbon tetrachloride as possible over the next few years.

This site is the candidate for demonstration activities in the integrated demonstration cleanup of volatile organic compounds from arid soil and associated groundwater. The integrated demonstration, currently in the planning phase, is the focal point for development and demonstration of all appropriate technologies for remediation of arid site soils and groundwater.

Ongoing site characterization includes the following:
 (1) evaluation of existing dry and groundwater wells,
 (2) measurement of water levels, and (3) assessments of the integrity of the wells using cameras.

3.4.4 Program Management and Support (ADSs 5000, 5002, 5004, 5008, 5009, 5016, 5017, and 5204)

Accomplishments to date included covering the day-to-day oversight and control of the Environmental Restoration Remedial Actions program including the preparation of short- and long-term program plans and schedules, development of program management systems, update of the community relations/public outreach plan, and the creation of the DOE-HQ Five-Year Plan. A majority of the work in the program management and support areas is repeated yearly, and grows in direct relationship to the programs that it supports. Future discrete activities include the development of a Major Systems Acquisition implementation plan by September 1992, the issuance of a draft Quality Assurance Program Plan in September 1991, issuance of a revised Quality Assurance Requirements Document, and demonstration of the Basic Applicability Matrix in March 1992.

Five engineering studies were also conducted covering the following:
 (1) transportation, (2) physical treatment, (3) soil storage/disposal,
 (4) excavation, and (5) containment. All of these studies are in various

stages of signoff and approval. A sixth area study has been identified and will be conducted which evaluates the no treatment option. These studies directly support NEPA and the preparation of an environmental restoration programmatic EIS statement.

3.4.5 Technical Support (ADS 5202)

Various areas of technological needs for planning in FY 1992 and 1993 were identified. An engineering study for alternative stabilization techniques was completed and one small field test was completed during October and November 1990. A large-scale field test is planned for fall 1991, using a variety of grass/mulch combinations in support of Radiation Area Remedial Actions.

3.4.6 Facility, Systems, and Equipment Upgrades

3.4.6.1 Waste Sampling and Characterization Facility Support and Laboratory Upgrades (ADS 5250). To deal with the rapidly increasing need for laboratory capacity, a new analytical laboratory called the Waste Sampling and Characterization Facility has been planned. This new facility will include a shielded counting room and areas devoted to organic and inorganic analysis, low-level radionuclide separations, and sample receiving and preparation. The Environmental Restoration Remedial Actions program continues to partially support efforts required to make the newly constructed facilities operational and to qualify the Hanford Environmental Laboratories to perform RCRA/CERCLA Contract Laboratory Program protocols analysis. Also, to keep up with the demand, additional existing hot cell capacity Contract Laboratory Program in the 222-S Building will be expanded by June 1994 (Tri-Party Agreement Major Milestone M-11-00).

Construction of the Waste Sampling and Characterization Facility has been placed on hold to assess the possibility of private industry constructing and operating the facility. In the interim, many of the sample analysis needs could be met within the commercial sector with privately operated laboratories. Rescoping of the project is currently underway to determine what government-owned and -operated facilities will still be required should private industry be used.

Other work besides construction continues in support of the Waste Sampling and Characterization Facility startup scheduled for July 1992 (Tri-Party Agreement Major Milestone M-14-00) which includes the development of a Laboratory Information Management System for tying all Hanford Site laboratories together plus other activities such as training and procedure development.

3.4.6.2 Facility, Systems, and Equipment Upgrades (ADS 5252). The major efforts and accomplishments to date have included the procurement of drilling equipment such as the following: (1) three cable tool rigs, (2) mobile field offices, (3) equipment trailers, (4) three delivery vans and associated equipment, (5) two soil sampling facilities, (6) mobile change trailer, and (7) a variety of drilling support equipment. Also purchased were tanker

trucks and modular storage tanks to support purgewater activities. Additional miscellaneous equipment, i.e., engineering work stations, file servers, and computers were also procured. Additional leases for field screening labs have been initiated with an option to purchase in FY 1992.

Future activities include the following: (1) the procurement of drilling equipment, (2) characterization equipment, (3) training facilities, and (4) the continued support of purgewater activities, background investigations, other engineering studies, and baseline documentation.

3.4.7 Radiation Area Remedial Action

3.4.7.1 Interim Decontamination and Stabilization (ADSs 5225, 5226, and 5227). The interim decontamination and stabilization activity of surface soil on and around inactive waste sites continued in FY 1991, with approximately 4.85 hectare (12 acres) currently undergoing interim stabilization. A surface soil contamination control plan is being drafted and will be completed during FY 1991. This plan will be used to manage the interim stabilization work, set priorities, request budget, etc.

3.4.7.2 Inactive Underground Storage Tanks (ADS 5228). There were 19 underground storage tanks which were removed in FY 1990. The activities scheduled for this current fiscal year include the removal of 5 underground storage tanks and the documentation of compliance with the applicable regulations for the previous fiscal year. Future effort include continued compliance with the regulations governing nonradioactive underground storage tank removal as required.

3.4.7.3 Site Asbestos Abatement (ADS 5230). This is a new activity which has been started by the Hanford Site Asbestos Abatement plan which was completed in December 1990. Future activity includes the initiation of actions and management to support or sustain abatement work beyond a maintenance activity. This activity will ensure that the Hanford Site remains in regulatory compliance with statutes governing the control of asbestos fiber and minimize asbestos exposure to onsite personnel and the general public.

3.4.8 RCRA Closures

3.4.8.1 The 183-H Solar Evaporation Basins Closure (ADS 5401). The cleanout of the 183-H Solar Evaporation Basins has been successfully completed. During the cleanout, the liquid from the basins was pumped out and mixed with a cement-like material and poured into 55-gallon drums to harden. The sludge that settled to the bottom was allowed to dry and also placed in 55-gallon drums. The drums were then sealed and transported to the Hanford Site Central Waste Complex for temporary storage. Most of the solid material that had settled to the bottom of the basins was sodium nitrate, but there were also some trace quantities of cyanide, uranium, and technetium. Final disposition of the waste has not yet been determined.

The next phases of the basins are to complete the vadose zone sampling by the end of FY 1991 and to demolish the structure and clear the site by the end

of 1992. Little contamination has been detected so far beneath the structure, which could make final cleanup of the site simpler. This could possibly allow the site to be released for other uses once any contaminated soil is excavated and disposed of in accordance with Washington State regulatory requirements.

3.4.8.2 The 216-B-3 Pond Closure (ADS 5404). The final notice-of-deficiency response table for the 216-B-3 Pond System Closure/Postclosure plan was transmitted to Ecology on November 3, 1990. Future actions include the completing of Phase III sampling and its report leading to the stopping of liquid discharges to hazardous land disposal units by June 1995 (Tri-Party Agreement Milestone M-17-10).

3.4.8.3 Nonradioactive Dangerous Waste Landfill (ADS 5402). A closure/postclosure plan for the nonradioactive dangerous waste landfill was submitted to the EPA and Ecology for review on August 31, 1990. Discussions with Ecology, regarding clean closure versus closing the site as a landfill are continuing. Preliminary cost estimates have been proposed for both options. A decision on closure strategy is required to support completion of the closure plan before public review. Future activities include releasing an approved closure/postclosure plan in support of completing remediation by the end of FY 1995 and closure by the end of FY 1997.

3.4.8.4 Other Environmental Restoration Remedial Action Program Treatment, Storage, and Disposal Units.

- A-29 Ditch Stabilization and Closure Plan (ADS 5400)--Definitive engineering has been ongoing for the stabilization of the A-29 ditch which is a part of the B Pond system. Future plans include the completion on interim stabilization by the end on FY 1992 and the submittal of a draft closure/postclosure plan by May 1996 (Tri-Party Agreement Milestone M-20-36).
- B Pond By-Pass (ADS 5403)--Future work activity includes the completing of the B Pond by-pass conceptual design by June 1991, completion of definitive design by the end of FY 1991, leading to completion of construction by the end of FY 1992.
- 216-A-10 Crib Closure (ADS 5405)--Future work includes the preparation of a closure/postclosure plan which is to begin in FY 1995 leading to the submittal of a draft plan to the regulators by March 1996 (Tri-Party Agreement Milestone M-20-33).
- 216-U-12 Crib Closure (ADS 5406)--Future work includes the preparation of a closure/postclosure plan which is to begin in FY 1993 leading to the submittal of a draft plan to the regulators by November 1994 (Tri-Party Agreement Milestone M-20-37).
- 216-A-36B Crib Closure (ADS 5407)--Future work includes the preparation of a closure/postclosure plan which is to begin in FY 1993 leading to the submittal of a draft plan to the regulators by November 1994 (Tri-Party Agreement Milestone M-20-34).

- 300 Area Effluent Treatment (ADS 5408)--Future work includes the preparation of a closure/postclosure plan which is to begin in FY 1993 leading to the submittal of a draft plan to the regulators by August 1994 (Tri-Party Agreement Milestone M-20-32).
- 216-S-10 Pond and Ditch (ADS 5411)--Future work includes the preparation of a closure/postclosure plan which is to begin in FY 1995 leading to the submittal of a draft plan to the regulators by May 1996 (Tri-Party Agreement Milestone M-20-39).

3.4.9 Remedial Action (ADSs 5325 and 5375)

Through FY 1997, two remedial actions are scheduled to start. Remedial actions design for 1100-EM-1 is targeted to start in October 1992 and remedial actions are targeted to start in December 1993. Remedial actions design for the 200-BP-1 operable unit is targeted to start in October 1995 and remedial actions are targeted to start in December 1996.

3.5 DECONTAMINATION AND DECOMMISSIONING PROGRAM

More than 100 radioactively contaminated surplus production reactors, chemical process buildings, and other structures, as well as ancillary structures are in the scope of the Environmental Restoration D&D program at the Hanford Site (some of the major D&D facilities are listed in Table 3-3). The program is divided into three major categories: (1) surveillance and maintenance, (2) D&D, and (3) program management.

Certain activities related to D&D of structures by DOE may be subject to RCRA. Whenever D&D activities result in the generation of hazardous wastes, the TSD of those wastes shall be subject to the Tri-Party Agreement. Specific requirements (i.e., milestones) will be incorporated into the Tri-Party Agreement action plan, as appropriate.

If a contaminated structure is found to be the source of a release (or presents a substantial threat of a release) of hazardous wastes or constituents to the environment, the investigation and remediation of such a release (to include remediation of structures, as necessary), will be subject to CERCLA or RCRA, and the Tri-Party Agreement (Tri-Party Agreement Section 7.2.3). Specific requirements will be incorporated into the Tri-Party Agreement action plan as appropriate. Releases that have already been identified have been included in this action plan as waste management units and are assigned to operable units.

As part of any action being taken under either RCRA or CERCLA for a contaminated structure, EPA and Ecology shall consider available information related to D&D activities, including EISs. All hazardous wastes generated by the D&D activities shall be managed in accordance with applicable Federal and State hazardous waste regulations.

Table 3-3. Surplus Facility Activities Fiscal Year 1991 through 1996.

<u>FACILITY NAME</u>	<u>AGGREGATE AREA</u>	<u>ACTIVITY</u>	<u>FY START</u>	<u>FY COMPLETE</u>
100-B/C Effluent Lines	100	D&D	1994	1996
103-B Fuel Element Storage	100	D&D	1998	1998
103-D Fuel Element Storage	100	D&D	1996	1996
104--B1 Tritium Vault	100	D&D	1998	1998
104--B2 Tritium Lab	100	D&D	1998	1998
105-B Reactor Decommissioning	100	D&D	2007	2010
105-B Water Tunnels	100	D&D	1999	1999
105-C Reactor Decommissioning	100	D&D	2002	2005
105-C Water Tunnels	100	D&D	1999	1999
105-D Reactor Decommissioning	100	D&D	2001	2004
105-DR Reactor Decommissioning	100	D&D	2003	2006
105-DR Water Tunnels	100	D&D	1999	1999
105-F Basin Fill Removal	100	D&D	1994	1996
105-F Reactor Decommissioning	100	D&D	2006	2009
105-H Basin Fill Removal	100	D&D	1997	1998
105-H Reactor Decommissioning	100	D&D	1999	2003
105-KE Reactor Decommissioning	100	D&D	2004	2007
105-KE Water Tunnels	100	D&D	1999	1999
105-KW Reactor Decommissioning	100	D&D	2005	2008
105-KW Water Tunnels	100	D&D	1999	1999
108-F Laboratory/Office	100	D&D	2001	2003
115-B/C Gas Recirculation Bldg.	100	D&D	1989	1989
115-KE Gas Recirculation	100	D&D	1999	1999
115-KW Gas Recirculation	100	D&D	2000	2000
116-B Exhaust Air Stack	100	D&D	1998	1998
116-D Exhaust Air Stacks	100	D&D	1996	1996
116-DR Exhaust Air Stacks	100	D&D	1997	1997
116-KE Exhaust Air Stack	100	D&D	1998	1998
116-KW Exhaust Air Stack	100	D&D	1998	1998
117-C Exhaust Air Filter	100	D&D	1989	1989
117-DR Exhaust Air Filter Bldg.	100	D&D	1996	1997
117-KE Exhaust Air Filter	100	D&D	1997	1997
117-KW Exhaust Air Filter	100	D&D	1997	1998
119-DR Exhaust Air Sampling Bldg.	100	D&D	1996	1996
119-KE Exhaust Air Sampling	100	D&D	1997	1997
119-KW Exhaust Air Sampling	100	D&D	1997	1997
1706-KE/KEL/KER Test Facility	100	D&D	2000	2002
201-C Strontium Semiworks	200	D&D	1985	2000
B/C, KE/KW Riverlines	100	D&D	1995	1995
Surplus Production Reactors	100	EIS	1986	1991

*Note: Table 3-3 Represent a Partial Lists of Surplus Facilities within the scope of the Environmental Restoration/Decontamination and Decommissioning Program

3.5.1 Surveillance and Maintenance

The Hanford Site D&D program includes a regular program of scheduled surveillance and maintenance. The purposes of the surveillance and maintenance functions include the following: (1) to ensure that radioactive contamination is controlled in accordance with DOE orders regarding environmental protection, safety, and health protection, and (2) to provide security controls and safety evaluations and enhancements to minimize potential hazards to the public and site personnel. The maintenance and surveillance activities include routine radiological monitoring, access control, and repairs to the buildings and structures. Because the cost of maintenance and surveillance is high and increases as the shutdown facilities continue to deteriorate, long-term solutions are currently being sought for managing the facilities. Possible alternatives range from decontaminating the facilities for reuse to complete decommissioning.

3.5.2 Decontamination and Decommissioning Surplus Facilities

Since the mid-1940's, hundreds of facilities have been constructed, operated, and shut down and declared surplus. The kind of facilities that the D&D program includes are the eight radioactively contaminated graphite-moderated reactors, which were constructed between 1945 and 1955, and includes their housing structures, and spent-fuel storage basins, etc. These facilities have been shut down for approximately 21 years and require routine repair to control residual radioactive material. Other surplus facilities that the D&D program includes are ancillaries, other radioactively contaminated facilities in the 100 Area that supported operation of the reactors, and surplus processing facilities in the 200 Areas and 300 Areas. All of these facilities require routine surveillance, maintenance and/or repair to control residual radioactivity.

At some point in time, when the surveillance and maintenance program can no longer control residual radioactive contamination, D&D may become the only viable option.

3.5.3 Program Management

The D&D program management includes such specific activities as the following: (1) project management, (2) planning and scheduling, (3) quality assurance, (4) records and data management, (5) budget preparation, and (6) reporting. Also included under D&D Program Management is the requirement to coordinate and integrate D&D activities with the Environmental Restoration Remedial Action program. It is the responsibility of the D&D program office to evaluate and make recommendations regarding future activity on surplus Hanford Site facilities.

3.6 ENVIRONMENTAL RESTORATION DECONTAMINATION AND DECOMMISSIONING PROGRAM ACCOMPLISH- MENTS/FUTURE WORK ACTIVITIES

Figure 3-3 and Table 3-4 provides a schedule and a milestone listing for this site-specific plan. These are based on the Preliminary Unvalidated Case budget level.

3.6.1 Surveillance and Maintenance (ADS 6150)

Surveillance and maintenance have been ongoing activities since the surplus facilities were shut down and will continue until such time as final decommissioning is completed. The surveillance and maintenance continued including routine inspection, repairs, and major work (e.g., roof repairs, repainting, overhauling system support equipment, etc.) such as the repair of the roof at the 221-U Facility. Surveillance and maintenance activities will continue into the future as long as radioactively contaminated surplus facilities exist.

3.6.2 Surplus Reactors (ADSs 6251 and 6375)

Eight shutdown production reactors are scheduled to be decommissioned at the Hanford Site. The draft final EIS has been prepared, and the issuance of the record of decision is anticipated toward the end of FY 1991. Other reactor work included the completion of definitive engineering for the 105-F and 105-H reactor fuel storage basin fill removal (the 105-F and 105-H fuel basins were backfilled with soil in the 1960's following the removal of fuel after shutdown). Procurement of fill removal equipment started in FY 1991 in preparation for decommissioning of the basins. Cleanout of the 105-F basin is scheduled for September 1996 and cleanout of the 105-H basin is scheduled for September 1998. Other ongoing work includes the development of definitive engineering for the surplus reactors from October 1994 to September 1997. Also removal of the 100 Area effluent lines is scheduled to take place from the beginning of FY 1994 to the end of FY 1996.

3.6.3 201-C Strontium Semiworks (ADS 6276)

The 201-C Strontium Semiworks Complex decommissioning project has been ongoing since FY 1985. The major decommissioning of contaminated facilities at the complex has been completed, and the remaining work includes remediation of three below-grade tanks: 241-CX-70, 241-CX-71, and 241-CX-72. These three tanks supported various processes when the plant was operated. The definitive engineering for the remediation of 241-CX-72 and sampling of 241-CX-71 has been completed. The decommissioning phase of this project including tank remediation (waste removal as appropriate) is scheduled to be completed in FY 1994. The Strontium Semiworks Complex is located within the 200-SO-1 Operable Unit, and final remediation will be integrated with the operable unit work.

Figure 3-3. Environmental Restoration/Decontamination and Decommissioning Schedules.

Table 3-4. Environmental Restoration Decommissioning Milestone Listing. (sheet 1 of 2)

ADS Number	OU or WBS Area	Milestone Description	TPA Milestone No.	Milestone Date	Target Date
6255-UA	100 Area Ancillaries	Complete Decommissioning of the 115-KE Gas Recirculation Building			9/30/95
		Complete Demolition of the 116-D Exhaust Air Stacks			9/30/96
		Complete Decommissioning of the 117-KE Exhaust Air Filter Building			6/30/97
		Complete Decommissioning of the 117-DR Exhaust Air Filter Building			9/30/97
		Complete Demolition of the 116-DR Exhaust Air Stacks			9/30/97
6251-UB	100 Area Reactors	Issue the SPRD-EIS Record of Decision			9/30/91
		Complete Characterization of the 105-H Basing			6/30/91
		Complete the 105-F Basin Equipment Setup/Site Preparation			3/31/95
		Complete the 105-F Fuel Storage Basin Cleanup			9/30/96
		Complete Definitive Engineering for Reactor Decommissioning			9/30/97
6276-UE	201-C Semiworks D&D	Complete 105-F Basin Equipment Setup/Site Preparation			9/30/97
		Sample Tank 241-CX-72			10/7/91
		Complete Tank 241-CX-72 Waste Disposal			12/31/93
		Complete Preparation of the 241-CX-70, -71, -72 Closure Plan If Rqd.			12/31/94
		Complete Decommissioning Engineering Study			9/30/91
6277-UE	233-S Facility D&D	Complete NEPA Documentation			9/30/92
		Complete Detailed Engineering			6/30/93
		Complete Readiness Review and Site Preparation			9/30/93
		Complete 233-S Decommissioning			9/30/96
		Complete 233-S Decommissioning Documentation/Verification			9/30/97
6278-UE	232-Z Facility D&D	Complete NEPA Documentation and Engineering			9/30/92
		Complete Decommissioning of 232-Z			3/31/94
		Complete Decommissioning Facility Report			9/30/94
6375-UC	100 Area Effluent Lines	Complete Characterization of the 100-B/C and 100-KE/KW Area River Lines			9/30/94
		Complete Disposal of the 100-F/H/D/DR Area River Lines			9/30/95
		Complete Removal of the 100-B/C & KE/KW Area River Lines			9/30/95
		Complete Disposal of the 100-B/C and 100-KE/KW Area River Lines			9/30/96
7009-PE	324 & 325 Hot Cell Restoration	Complete 324 Building Galleries and Cask Handling Area Cleaning			9/30/92
		Complete 324 Building A-Cell Cleanup and Decontamination			3/30/94
		Complete 325 Building A-Cell Cleanup and Decontamination			9/30/94
		Complete 325 Building C-Cell Cleanup and Decontamination			6/30/95
		Complete 325 Building B-Cell Cleanup and Decontamination			9/30/95

Table 3-4. Environmental Restoration Decommissioning
Milestone Listing. (sheet 2 of 2)

ADS Number	OU or WBS Area	Milestone Description	TPA Milestone No.	Milestone Date	Target Date
7020-PE	209-E Critical Mass Laboratory	Complete Study and Plans for Decontamination of 209-E Complete Removal of Storage Tanks from the Assembly Room Complete Removal of Storage Tanks from the Mix Room			12/31/93 3/31/96 9/30/97
8182-PE	324 Shielded Material Facility Cleanout	Complete Concrete Block/IRRAD Pin Storage Facility Disposal Complete Clean-Out of Contaminated Equipment			9/30/94 9/30/94

3.6.4 Other Surplus Facilities

In addition to the eight shutdown production reactors, approximately 100 other surplus facilities at the Hanford Site are scheduled to be decommissioned (some of the major D&D facilities are listed in Table 3-3). No major decommissioning work was completed on these facilities this fiscal year.

- 233-S Plutonium Concentration Facility (ADS 6277)--This facility was sampled in an effort to better characterize the residual waste and plan for either additional surveillance and maintenance upgrades or decommissioning. The current plan is to have the facility completely characterized by September 1993 which includes the completion of NEPA documentation by September 1992.
- 232-Z Waste Incineration Facility (ADS 6278)--Ongoing surveillance and maintenance of this facility has revealed a higher than expected level of plutonium contamination, and as a consequence has been given a higher priority. Future work now includes the completion of NEPA documentation by September 1992, leading now to completion of decommissioning by September 1994.

3.7 SCHEDULES AND BUDGETS

The schedule and budgets included in this section follow the work breakdown structure and the ADS priority respectively for the Environmental Restoration Remedial Action and D&D programs as presented in the Five-Year Plan Activity Data Sheets (DOE-RL 1991) Preliminary Unvalidated Case and Validated Target Levels. For purposes of comparison, the budget spreadsheet for the Validated Target Level has also been included.

3.7.1 Master Program and Long-Range Schedules

The schedule included is divided into two categories: (1) the Environmental Restoration Remedial Actions program and (2) the D&D program, and covers major actions and objectives over a 30-year period. The schedule represents a plan that is consistent with the budget forecast as submitted in the ADSs (DOE-RL 1991) and reflects either compliance with or impact to the Tri-Party Agreement at the major milestone level. Where the schedule conflicts with the Tri-Party Agreement, it is reflected by the appropriate symbol as identified in the legend of Figures 3-2 and 3-3.

3.7.1.1 Environmental Restoration Remedial Actions Master Program Schedule. Figure 3-2 shows the Environmental Restoration Remedial Action program's master program schedule and notes the Tri-Party Agreement milestone with the corresponding number listed near the interim or major milestone symbol. The Environmental Restoration Remedial Action master schedule covers the time period from FY 1990 through FY 1997.

3.7.1.2 Decontamination and Decommissioning Master Program Schedule. Figure 3-3 shows the major Environmental Restoration D&D program's master program schedule and corresponds to the work effort that was described in the

Hanford Surplus Facilities Program Plan Fiscal Year 1991 (WHC 1990b). The Environmental Restoration D&D master plan schedule covers the time period from FY 1990 through FY 1997.

3.7.1.3 Environmental Restoration Long-Range Schedule. Figure 3-4 shows the long-range activities for both the Environmental Restoration Remedial Action and the D&D programs. The Environmental Restoration program's long-range schedule is based on the budget forecast submitted in the Five-Year Plan activity data sheets (DOE-RL 1991) submittal dated March 28, 1991 called the Preliminary Unvalidated Case. The schedule shows principally major milestones that are currently part of that Tri-Party Agreement for the 30-year period.

3.7.2 Budgets

The projected budgets for the Environmental Restoration Program at the Hanford Site is presented in Tables 3-5 and Table 3-6. These tables present the DOE-HQ authorized ADS costs.

3.7.2.1 Environmental Restoration Five-Year Budget Forecast. Tables 3-5 and 3-6 show Environmental Restoration's budget forecast for the Preliminary Unvalidated Case and the Validated Target Level, and are organized by priority and ADS number. The numbers listed on the tables are in thousands of dollars and correspond to the number shown on the referenced ADSs (DOE-RL 1991). The priorities listed in this table were assigned according to guidance as described in Section 1.7. Figures 3-5 and 3-6 present bar graphs of costs by year and priority for both the Preliminary Unvalidated Case and the Validated Target Level. These budget forecasts will most likely bracket the amount of actual funding.

3.7.3 Environmental Restoration Program Comparisons between Preliminary Unvalidated Case and the Validated Target Level

3.7.3.1 Major Preliminary Unvalidated Case Assumptions. The Preliminary Unvalidated Case assumes that an aggregate area management strategy will be used in the 100 Area. It also assumes that waste sites fall into one of two categories: (1) high priority waste sites which will be addressed first and go through two remedial investigation phases, and (2) low priority waste sites which will only undergo one phase of remedial investigation resulting in significant cost savings.

An aggregate area study is also to be used in the 200 Areas, but since that study will not be completed until September 1992. The Preliminary Unvalidated Case assumes that the operable units in the 200 Area are investigated individually.

3.7.3.2 Major Validated Target Level Assumptions. The Validated Target Level also assumes that an aggregate area management strategy will be used in the 100 Areas. It also assumes that waste sites fall into one of two categories:

Figure 3-4. Environmental Restoration Long-Range Planning Schedule.

Table 3-5. Environmental Restoration Costs by Activity Data Sheets and Priority - Preliminary Unvalidated Case. (sheet 1 of 4)

ACTIVITY DATA SHEET NUMBER		ACTIVITY DATA SHEET TITLE		(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997			
PRELIMINARY UNVALIDATED CASE ER PRIORITY 1											
5226	RADIATION AREA REMEDIAL ACTION SURVEILLANCE AND MAINTENANCE	4080	4302	4396	4748	4751	4756	4754			
5228	INACTIVE UNDERGROUND STORAGE TANKS	300	500	431	466	466	466	466			
5230	SITE ASBESTOS ABATEMENT	0	0	2696	3500	3463	4640	4649			
5401	183-H SOLAR BASINS D&D	8000	6700	482	520	519	520	519			
6100	HANFORD SITE D&D MANAGEMENT/ADMINISTRATION	2353	1900	1926	2300	2405	2598	2771			
6150	100/200/300 AREAS SURVEILLANCE AND MAINTENANCE	5200	6000	6741	7200	7215	7238	7241			
6251	100 AREA REACTORS	2264	500	482	2850	3848	4176	5364			
6276	201-C SEMIWORKS	2115	2600	1541	3600	144	0	0			
6277	233-S FACILITY DECON & DECOM	90	300	578	3500	5772	4454	626			
6278	232-Z FACILITY DECOMMISSIONING	0	500	770	1100	0	0	0			
7006	209-E SURVEILLANCE AND MAINTENANCE (PNL) - NON-DEFENSE	0	75	80	87	88	89	89			
7009	324 & 325 BUILDING HOT CELL RESTORATION PROGRAM	0	5550	0	4410	3906	1336	0			
7010	SURVEILL/MAINT 324/325 BLDGS HOT CELLS - NON-DEFENSE	0	750	761	700	577	93	0			
8172	327 BUILDING SURVEILLANCE AND MAINTENANCE (PNL)	0	0	0	0	0	0	0			
8216	209-E SURVEILLANCE & MAINTENANCE (PNL) - DEFENSE	75	0	0	0	0	0	0			
8217	SURVEILL & MAINT, 324/325 BUILDING HOT CELLS - DEFENSE	525	0	0	0	0	0	0			
SUBTOTAL ER PRIORITY 1		25002	29677	20884	34981	33154	30366	26479			
PRELIMINARY UNVALIDATED CASE ER PRIORITY 2											
5000	ERRA PROGRAM MANAGEMENT	5346	5012	6577	7689	7884	8363	8643			
5002	DOE-RL SUPPORT TO THE ERRA PROGRAM	2186	3170	4353	4975	5267	5582	5914			
5004	STATE OVERSITE	2500	2500	2648	2980	3107	3248	3379			
5008	ERRA PUBLIC AND MEDIA RELATIONS	400	380	621	743	891	1021	1109			
5009	ERRA MANAGEMENT SYSTEMS	5500	3901	5489	6000	5195	5197	5364			
5016	QA PROGRAM DEVELOPMENT	1452	968	1620	1243	853	854	854			
5017	QA AUDIT AND SURVEILLANCE	310	0	523	597	565	705	705			
5025	100-HR-1 CHARACTERIZATION AND ASSESSMENT	971	0	0	0	0	0	0			
5026	100-HR-3 CHARACTERIZATION AND ASSESSMENT	3716	16608	14838	21471	21120	17887	8885			
5027	100-DR-1 CHARACTERIZATION AND ASSESSMENT	1977	0	0	0	0	0	0			
5028	100-BC-1 CHARACTERIZATION AND ASSESSMENT	2246	0	0	0	0	0	0			
5029	100-BC-5 CHARACTERIZATION AND ASSESSMENT	3685	8618	7763	11448	21686	3734	4308			
5030	100-KR-1 CHARACTERIZATION AND ASSESSMENT	350	0	0	0	0	0	0			
5031	100-KR-4 CHARACTERIZATION AND ASSESSMENT	238	4341	6578	8641	15492	9989	3841			

Table 3-5. Environmental Restoration Costs by Activity Data Sheets and Priority - Preliminary Unvalidated Case. (sheet 2 of 4)

ACTIVITY DATA SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
PRELIMINARY UNVALIDATED CASE ER PRIORITY 2									
5032	100-NR-1 CHARACTERIZATION AND ASSESSMENT	277	2750	6925	3693	5503	2528	2559	
5033	100-NR-3 CHARACTERIZATION AND ASSESSMENT	487	0	0	0	0	0	0	
5034	100-FR-1 CHARACTERIZATION AND ASSESSMENT	683	1842	7195	2814	14155	5536	2182	
5035	100-BC-2 CHARACTERIZATION AND ASSESSMENT	525	0	0	0	0	0	0	
5036	100-DR-2 CHARACTERIZATION AND ASSESSMENT	277	0	0	0	0	0	0	
5037	100-KR-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5038	100-NR-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5039	100-KR-3 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5040	100-IU-1 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5041	100-BC-3 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5042	100-BC-4 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5043	100-DR-3 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5044	100-FR-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5045	100-HR-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5075	300-FF-1 CHARACTERIZATION AND ASSESSMENT	3990	5943	6103	2757	986	55	0	
5076	300-FF-5 CHARACTERIZATION AND ASSESSMENT	5826	4588	5865	2078	2073	657	0	
5077	300-FF-3 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	1000	7737	6432	
5078	300-FF-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	194	
5100	1100-EM-1 CHARACTERIZATION AND ASSESSMENT	5000	3000	1926	0	0	0	0	
5125	200-BP-1 CHARACTERIZATION AND ASSESSMENT	7000	8500	6724	6096	3381	702	0	
5126	200-UP-2 CHARACTERIZATION AND ASSESSMENT	604	920	0	10287	15390	5492	4873	
5127	200-BP-5 CHARACTERIZATION AND ASSESSMENT	416	3890	4591	6331	9343	2592	7706	
5128	200-ZP-1 CHARACTERIZATION AND ASSESSMENT	139	0	822	11210	6474	3341	8684	
5129	200-BP-4 CHARACTERIZATION AND ASSESSMENT	0	0	0	754	3811	7269	3054	
5130	200-BP-11 CHARACTERIZATION AND ASSESSMENT	0	0	0	841	4468	10930	2503	
5131	200-PO-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	624	3108	13982	7704	
5132	200-PO-5 CHARACTERIZATION AND ASSESSMENT	0	0	0	395	2685	9402	13113	
5133	200-TP-1 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	1524	7565	5948	
5134	200-BP-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	841	4963	9970	
5135	200-TP-4 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	394	2687	11417	
5136	200-TP-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	394	2687	12271	
5137	200-ZP-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	197	2183	10458	
5138	200-PO-1 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	1525	8130	
5139	200-PO-4 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	842	4537	

Table 3-5. Environmental Restoration Costs by Activity Data Sheets and Priority - Preliminary Unvalidated Case. (sheet 3 of 4)

ACTIVITY DATA SHEET NUMBER		ACTIVITY DATA SHEET TITLE	FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
(Costs, \$,000)*									
PRELIMINARY UNVALIDATED CASE ER PRIORITY 2									
5140	200-SO-1 CHARACTERIZATION AND ASSESSMENT		0	0	0	0	0	624	3770
5141	200-IU-3 CHARACTERIZATION AND ASSESSMENT		0	0	0	0	0	0	1525
5175	SINGLE-SHELL TANK WASTE CHARACTERIZATION & ASSESSMENT SUPPORT		3144	2496	27536	18166	30652	23173	19419
5176	SINGLE-SHELL TANK (SST) WASTE CHARACTERIZATION		10820	11504	19446	28415	32641	30933	29203
5178	SINGLE-SHELL TANK ER-TD INTEGRATION		0	0	5408	8772	19831	26637	16215
5179	SINGLE-SHELL TANK ER TECHNICAL SUPPORT		0	0	7345	20740	39506	60489	22608
5202	TECHNICAL SUPPORT TO REMEDIAL ACTION		677	0	3178	11820	14082	15148	12805
5204	GENERAL NEPA SUPPORT		1330	1385	2793	2656	630	277	277
5225	RAD AREA REMEDIAL ACTION DECON/STABILIZATION		830	1198	3833	4800	6287	6296	6298
5250	DRILLING UPGRADES		11000	7346	6860	4632	1794	1796	1796
5251	LABORATORY UPGRADES		7400	10554	14108	14550	16186	13744	13946
5275	100-HR-1 REMEDIAL ACTION		0	0	0	0	185	2138	10853
5277	100-DR-1 REMEDIAL ACTION		0	0	0	0	0	529	3057
5278	100-BC-1 REMEDIAL ACTION		0	0	0	0	0	0	1730
5280	100-KR-1 REMEDIAL ACTION		0	0	0	0	0	0	1359
5282	100-NR-1 REMEDIAL ACTION		0	0	0	0	0	0	765
5284	100-NR-3 REMEDIAL ACTION		0	0	0	0	0	0	666
5300	300-FF-1 REMEDIAL ACTION		2000	500	0	0	0	2705	13660
5301	300-FF-5 REMEDIAL ACTION		0	0	0	0	0	768	2961
5303	300-FF-2 REMEDIAL ACTION		5000	2000	0	0	0	0	0
5325	1100-EM-1 REMEDIAL ACTION		0	0	2658	14550	17778	14588	14054
5375	200-BP-1 REMEDIAL ACTION		0	0	0	0	454	5256	29127
5378	200-ZP-1 REMEDIAL ACTION		3500	6500	1926	2000	1924	1856	1788
5399	EXPEDITED RESPONSE ACTIONS		0	0	22630	23000	20202	21344	20562
5400	A-29 DITCH STABILIZATION AND CLOSURE PLAN		600	500	0	0	866	928	268
5402	NON-RADIOACTIVE DANGEROUS WASTE LANDFILL (NRDWL) CLOSURE		651	1100	1637	2600	7023	557	581
5403	B-POND BY-PASS		288	800	0	0	0	0	0
5404	B-POND STABILIZATION AND CLOSURE		957	1600	674	2900	673	928	715
5405	216-A-10 CRIB CLOSURE		0	0	0	0	866	464	715
5406	216-U-12 CRIB CLOSURE		0	0	626	400	577	464	447
5407	216-A-36B CRIB CLOSURE		0	0	0	0	866	464	715
5408	300 AREA EFFLUENT TREATMENT		0	0	289	400	231	520	402
8182	324 SHIELDED MATERIAL FACILITY CLEAN-OUT		0	0	0	600	0	0	0
8214	HANFORD INTEGRATED PLANNING (HIP)		0	0	3371	2500	1924	1392	894

Table 3-5. Environmental Restoration Costs by Activity Data Sheets and Priority - Preliminary Unvalidated Case. (sheet 4 of 4)

ACTIVITY DATA SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
PRELIMINARY UNVALIDATED CASE ER PRIORITY 2									
8220	DOE-HQ ER PLANNING & TECHNICAL SUPPORT	851	0	0	0	0	0	0	0
SUBTOTAL ER PRIORITY 2		105149	124414	215479	277168	372965	383273	397918	
PRELIMINARY UNVALIDATED CASE ER PRIORITY 3									
5022	NEZ PERCE INDIAN NATION REVIEW	0	20	0	0	0	0	0	0
5023	YAKIMA INDIAN NATION REVIEW	350	194	0	0	0	0	0	0
5024	UMATILLA INDIAN NATION REVIEW	350	70	0	0	0	0	0	0
6225	100 AREA ANCILLARY FACILITIES	0	0	0	0	0	464	894	894
6275	224-B CONCENTRATION FACILITY	0	0	0	0	0	0	0	0
6375	EFFLUENT FACILITIES	0	0	0	300	1251	278	0	0
SUBTOTAL ER PRIORITY 3		700	284	0	300	1251	742	894	
PRELIMINARY UNVALIDATED CASE ER PRIORITY 4									
6351	100/200/300 AREAS SITE CLEANUP OF EXCESS SUPPORT FACILITIES	0	0	0	0	0	0	0	0
7020	209-E DECONTAMINATION & DECOMMISSIONING (PNL)	0	525	241	1500	3848	5104	4917	4917
SUBTOTAL ER PRIORITY 4		0	525	241	1500	3848	5104	4917	
TOTAL ER		130851	154900	236604	313949	411218	419485	430208	

Table 3-6. DOE-HQ Authorized Activity Data Sheets -
Validated Target Level. (sheet 1 of 4)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
VALIDATED TARGET LEVEL ER PRIORITY 1									
5226	RADIATION AREA REMEDIAL ACTION SURVEILLANCE AND MAINTENANCE	4080	4302	4306	4748	4751	4756	4754	4754
5228	INACTIVE UNDERGROUND STORAGE TANKS	300	500	431	466	466	466	466	466
5230	SITE ASBESTOS ABATEMENT	0	0	0	0	0	0	0	0
5401	183-H SOLAR BASINS D&D	8000	6700	482	520	519	520	519	519
6100	HANFORD SITE D&D MANAGEMENT/ADMINISTRATION	2353	1900	1926	2300	2405	2598	2771	2771
6150	100/200/300 AREAS SURVEILLANCE AND MAINTENANCE	5200	6000	6741	7200	7215	7238	7241	7241
6251	100 AREA REACTORS	2264	500	482	2000	3848	4176	5364	5364
6276	201-C SEMIWORKS	2115	2600	1541	3600	144	0	0	1520
6277	233-S FACILITY DECON & DECOM	90	300	578	1000	4570	5197	0	0
6278	232-Z FACILITY DECOMMISSIONING	0	500	770	1100	0	0	0	0
7006	209-E SURVEILLANCE AND MAINTENANCE (PNL) - NON-DEFENSE	0	75	80	87	88	89	89	89
7009	324 & 325 BUILDING HOT CELL RESTORATION PROGRAM	0	5550	0	0	0	0	0	0
7010	SURVEILL/MAINT 324/325 BLDGS HOT CELLS - NON-DEFENSE	0	750	613	637	636	635	635	635
8172	327 BUILDING SURVEILLANCE AND MAINTENANCE (PNL)	0	0	0	0	0	0	0	0
8216	209-E SURVEILLANCE & MAINTENANCE (PNL) - DEFENSE	75	0	0	0	0	0	0	0
8217	SURVEILL & MAINT, 324/325 BUILDING HOT CELLS - DEFENSE	525	0	0	0	0	0	0	0
SUBTOTAL ER PRIORITY 1		25002	29677	17950	23658	24642	25675	23359	23359
VALIDATED TARGET LEVEL ER PRIORITY 2									
5000	ERRA PROGRAM MANAGEMENT	5346	5012	6577	7200	7884	8363	8661	8661
5002	DOE-RL SUPPORT TO THE ERRA PROGRAM	2186	3170	3950	3500	4690	4640	5914	5914
5004	STATE OVERSITE	2500	2500	2648	2500	3107	3202	3129	3129
5008	ERRA PUBLIC AND MEDIA RELATIONS	400	380	621	743	891	1021	1109	1109
5009	ERRA MANAGEMENT SYSTEMS	5500	3901	5489	6000	5195	5197	5364	5364
5016	QA PROGRAM DEVELOPMENT	1452	968	1620	1243	853	854	854	854
5017	QA AUDIT AND SURVEILLANCE	310	0	523	597	565	705	705	705
5025	100-HR-1 CHARACTERIZATION AND ASSESSMENT	971	0	0	0	0	0	0	0
5026	100-HR-3 CHARACTERIZATION AND ASSESSMENT	3716	16608	14838	21471	21120	17887	8885	8885
5027	100-DR-1 CHARACTERIZATION AND ASSESSMENT	1977	0	0	0	0	0	0	0
5028	100-BC-1 CHARACTERIZATION AND ASSESSMENT	2246	0	0	0	0	0	0	0
5029	100-BC-5 CHARACTERIZATION AND ASSESSMENT	3685	8618	7763	11448	21686	3734	4308	4308
5030	100-KR-1 CHARACTERIZATION AND ASSESSMENT	350	0	0	0	0	0	0	0

Table 3-6. DOE-HQ Authorized Activity Data Sheets -
Validated Target Level. (sheet 2 of 4)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
VALIDATED TARGET LEVEL ER PRIORITY 2									
5031	100-KR-4 CHARACTERIZATION AND ASSESSMENT	238	4341	6578	8641	15492	9989	3841	
5032	100-NR-1 CHARACTERIZATION AND ASSESSMENT	277	2750	6925	3693	1639	2528	2559	
5033	100-NR-3 CHARACTERIZATION AND ASSESSMENT	487	0	0	0	0	0	0	
5034	100-FR-1 CHARACTERIZATION AND ASSESSMENT	683	1842	7195	2814	0	5536	2182	
5035	100-BC-2 CHARACTERIZATION AND ASSESSMENT	525	0	0	0	0	0	0	
5036	100-DR-2 CHARACTERIZATION AND ASSESSMENT	277	0	0	0	0	0	0	
5037	100-KR-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5038	100-NR-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5039	100-KR-3 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5040	100-IU-1 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5041	100-BC-3 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5042	100-BC-4 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5043	100-DR-3 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5044	100-FR-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5045	100-HR-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5075	300-FF-1 CHARACTERIZATION AND ASSESSMENT	3990	5943	6103	2757	986	55	0	
5076	300-FF-5 CHARACTERIZATION AND ASSESSMENT	5826	4588	5865	2078	2073	657	0	
5077	300-FF-3 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5078	300-FF-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5100	1100-EM-1 CHARACTERIZATION AND ASSESSMENT	5000	3000	1926	0	0	0	0	
5125	200-BP-1 CHARACTERIZATION AND ASSESSMENT	7000	8500	6724	6096	3381	702	0	
5126	200-UP-2 CHARACTERIZATION AND ASSESSMENT	604	920	0	2002	0	5492	4873	
5127	200-BP-5 CHARACTERIZATION AND ASSESSMENT	416	3890	1500	0	0	2592	7706	
5128	200-ZP-1 CHARACTERIZATION AND ASSESSMENT	139	0	0	0	0	3341	8684	
5129	200-BP-4 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	7269	3054	
5130	200-BP-11 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	10930	2503	
5131	200-PO-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	2414	7704	
5132	200-PO-5 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	13113	
5133	200-TP-1 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	5948	
5134	200-BP-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	6439	
5135	200-TP-4 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5136	200-TP-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	
5137	200-ZP-2 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0	

Table 3-6. DOE-HQ Authorized Activity Data Sheets -
Validated Target Level. (sheet 3 of 4)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*						
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
VALIDATED TARGET LEVEL ER PRIORITY 2								
5138	200-PO-1 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0
5139	200-PO-4 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0
5140	200-SO-1 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0
5141	200-IU-3 CHARACTERIZATION AND ASSESSMENT	0	0	0	0	0	0	0
5175	SINGLE-SHELL TANK WASTE CHARACTERIZATION & ASSESSMENT SUPPOR	3144	2496	8292	7608	7879	7707	7458
5176	SINGLE-SHELL TANK (SST) WASTE CHARACTERIZATION	10820	11504	13708	16013	15830	16108	16810
5178	SINGLE-SHELL TANK ER-TD INTEGRATION	0	0	0	579	3228	4953	6128
5179	SINGLE-SHELL TANK ER TECHNICAL SUPPORT	0	0	0	0	0	0	0
5202	TECHNICAL SUPPORT TO REMEDIAL ACTION	677	0	1450	3100	4906	6789	7373
5204	GENERAL NEPA SUPPORT	1330	1385	2070	2336	914	277	277
5225	RAD AREA REMEDIAL ACTION DECON/STABILIZATION	830	1198	1263	1386	1806	2202	2647
5250	DRILLING UPGRADES	11000	7346	6831	5094	2272	2266	2368
5251	LABORATORY UPGRADES	7400	10554	14108	14550	16186	13744	13946
5275	100-HR-1 REMEDIAL ACTION	0	0	0	0	0	0	0
5277	100-DR-1 REMEDIAL ACTION	0	0	0	0	0	0	0
5278	100-BC-1 REMEDIAL ACTION	0	0	0	0	0	0	0
5280	100-KR-1 REMEDIAL ACTION	0	0	0	0	0	0	0
5282	100-NR-1 REMEDIAL ACTION	0	0	0	0	0	0	0
5284	100-NR-3 REMEDIAL ACTION	0	0	0	0	0	0	0
5300	300-FF-1 REMEDIAL ACTION	2000	500	0	0	0	0	0
5301	300-FF-5 REMEDIAL ACTION	0	0	0	0	0	0	0
5303	300-FF-2 REMEDIAL ACTION	5000	2000	0	0	0	0	0
5325	1100-EM-1 REMEDIAL ACTION	0	0	770	0	0	0	0
5375	200-BP-1 REMEDIAL ACTION	0	0	0	0	0	0	0
5378	200-ZP-1 REMEDIAL ACTION	3500	6500	0	0	0	0	0
5399	EXPEDITED RESPONSE ACTIONS	0	0	9630	9500	9043	8723	8493
5400	A-29 DITCH STABILIZATION AND CLOSURE PLAN	600	500	0	0	866	928	268
5402	NON-RADIOACTIVE DANGEROUS WASTE LANDFILL (NRDWL) CLOSURE	651	1100	1637	2600	3175	1485	2012
5403	B-POND BY-PASS	288	800	0	0	0	0	0
5404	B-POND STABILIZATION AND CLOSURE	957	1600	674	2900	673	928	715
5405	216-A-10 CRIB CLOSURE	0	0	0	0	0	0	0
5406	216-U-12 CRIB CLOSURE	0	0	626	400	577	464	447
5407	216-A-368 CRIB CLOSURE	0	0	0	0	0	0	0

Table 3-6. DOE-HQ Authorized Activity Data Sheets -
Validated Target Level. (sheet 4 of 4)

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
VALIDATED TARGET LEVEL ER PRIORITY 2									
5408	300 AREA EFFLUENT TREATMENT	0	0	289	400	231	520	402	
8182	324 SHIELDED MATERIAL FACILITY CLEAN-OUT	0	0	0	0	0	0	0	
8214	HANFORD INTEGRATED PLANNING (HIP)	0	0	3371	0	0	0	0	
8220	DOE-HQ ER PLANNING & TECHNICAL SUPPORT	851	0	0	0	0	0	0	
	SUBTOTAL ER PRIORITY 2	105149	124414	151564	149249	157148	164202	176879	
VALIDATED TARGET LEVEL ER PRIORITY 3									
5022	NEZ PERCE INDIAN NATION REVIEW	0	20	0	0	0	0	0	
5023	YAKIMA INDIAN NATION REVIEW	350	194	0	0	0	0	0	
5024	UMATILLA INDIAN NATION REVIEW	350	70	0	0	0	0	0	
6225	100 AREA ANCILLARY FACILITIES	0	0	0	0	0	0	0	
6275	224-B CONCENTRATION FACILITY	0	0	0	0	0	0	0	
6375	EFFLUENT FACILITIES	0	0	0	0	0	0	0	
	SUBTOTAL ER PRIORITY 3	700	284	0	0	0	0	0	
VALIDATED TARGET LEVEL ER PRIORITY 4									
6351	100/200/300 AREAS SITE CLEANUP OF EXCESS SUPPORT FACILITIES	0	0	0	0	0	0	0	
7020	209-E DECONTAMINATION & DECOMMISSIONING (PNL)	0	525	0	0	0	0	0	
	SUBTOTAL ER PRIORITY 4	0	525	0	0	0	0	0	
	TOTAL ER	130851	154900	169514	172907	181790	189877	200238	

Figure 3-5. Costs by Year and Priority for the Preliminary Unvalidated Case.

Figure 3-6. Costs by Year and Priority for Validated Target Level.

(1) high priority waste sites which will be addressed first and go through two remedial investigation phases, and (2) low priority waste sites which will only undergo one phase of remedial investigation.

3.7.3.3 Major Preliminary Unvalidated Case and Validated Target Level Comparisons. A line-by-line comparison between the work scope of two cases reveals the following: the Preliminary Unvalidated Case includes the aggregate area management strategy that is aimed at simplifying and reducing work effort by utilizing efficiencies, process learning, and minimizing redundancy by combining work scope. The major obstacle with this approach is that the work breakdown structure must be redefined to coincide with the aggregate area management verses the operable unit breakdown approach. The main objective of this case is to simplify work scope and to comply with the Tri-Party Agreement to the maximum extent possible.

The Validated Target Level also includes the aggregate area management strategy that is aimed at simplifying and reducing work effort by utilizing efficiencies, process learning, and minimizing redundancy by combining work scope. The Validated Target Level limits work scope that can be accomplished in any time period by placing a financial cap on FY 1992, and by placing a growth rate cap on succeeding years. Given the financially Validated Target Level, only the start and completion of from two to four operable units per year would be supported, falling two to four short of the six operable units per year goal set forth in the Tri-Party Agreement.

4.0 CORRECTIVE ACTIVITIES

4.1 OVERVIEW

Corrective activities consist of specific activities required by environmental statutory or regulatory requirements, or to fulfill compliance agreements with Federal, State, or local regulatory bodies, or both. These activities are required to ensure regulatory compliance for active facilities at the Hanford Site. Environmental corrective activities can be divided into three major categories: air, water, and solid waste. The ADSs, which provide details on each discrete activity, are presented in DOE/RL 89-17 (DOE-RL 1990b).

Corrective activities for the air category include assessments and upgrades of building exhaust air sampling systems to ensure compliance with DOE requirements for the gaseous effluent management program. Air emission permits are in place for all facilities for which a permit is required. Clean Air Act approvals are pending for several new projects and facility modifications.

No corrective activities are identified in the water category. This is because there are no known Clean Water Act violations.

Solid waste management activities are more extensive than those for air and water. Obtaining RCRA operating permits for TSD facilities is a major activity. The Hanford Site has one permit number under RCRA; it will have approximately 60 parts (one per TSD facility). The permit is not expected to be granted until 1995. The Hanford Site TSD facilities are presently under interim status. Other corrective activities include the following: (1) construction of mixed waste storage facilities, (2) PCB removal, (3) groundwater monitoring well installation and development, and (4) installation of a cathodic protection system to protect underground lines and tanks.

This is anticipated to be the last year for a separate corrective activities chapter in this plan. Most corrective activities transfer to the waste management category after FY 1991 and the remaining corrective activities will be incorporated into the waste management chapter.

4.2 ACCOMPLISHMENTS

In the corrective activities category, the following major activities have been accomplished since the previous issuance of this plan:

- Definitive design of cathodic protection systems for waste management facilities is complete. Construction was temporarily placed on hold in FY 1990 due to budget considerations, but has been restarted.
- Constructional Phase I of the mixed waste storage facilities was completed in FY 1990.

- Preliminary inventory of hot cell facilities having potential PCB-leaking ballasts has been completed. Chronic leakers have been controlled.
- A package was submitted to the EPA in November 1990 describing primary stack emission measurement and quality assurance systems for major stacks.
- Three Part B RCRA permits and three closure plans were submitted to Ecology in accordance with Tri-Party Agreement milestones in FY 1990.
- Interim status assessments for RCRA requirements have been submitted for all TSD units, per the Tri-Party Agreement.
- Twenty-two groundwater monitoring wells were installed in FY 1990.

4.3 MAJOR TASK DESCRIPTIONS

The following sections describe in more detail the corrective activities in the categories of air, water, and solid waste. All corrective activities are automatically assigned to Priority 1.

4.3.1 Air

Corrective activities for Clean Air Act compliance are described in this section.

The Hanford Site is out of compliance with 40 CFR 61 (54 CFR 51654), *National Emission Standards for Hazardous Air Pollutants: Radionuclides; Final Rule and Notice of Reconsideration* (EPA 1989). Subpart H of this regulation, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities," implemented technical and design requirements which far exceeded those previously imposed.

Because of the wide-ranging nature of the new requirements and potential major costs associated with the upgrade of existing systems, immediate action was not possible. Consequently, on May 14, 1990, DOE-RL requested a 2-year extension from EPA to comply with the monitoring requirements. The EPA has indicated verbal consent. Hundreds of emission sources at facilities across the Hanford Site have been assessed for compliance. Assessment and continuous sampling equipment for waste management air emission sources is required (ADSs 404, 423, 3013, 8100, and 9092).

Stack monitoring systems were identified as a concern by the Tiger Team, finding number A/CF-1. The response to A/CF-1 defines actions to be taken to establish compliance with the 40 CFR 61 (EPA 1989) as well as DOE Order 5400.1. The response indicates that the rough estimated cost of implementing the corrective actions is more than \$23 million and the estimated completion date is FY 1996.

Specific problems hindering 40 CFR 61 compliance include current probe configuration, procurement schedules, stack flow measurement methods, residual contamination and resultant occupational exposure, and the need to relocate some stack samplers.

Facility effluent monitoring plans are prepared specific to the various facilities across the site. When completed, the full set of plans will roll up into a sitewide environmental monitoring plan covering environmental surveillance (which PNL leads) and effluent monitoring (which Westinghouse Hanford leads). This process is a response to the 5400 series of DOE orders. The DOE will also use the facility effluent monitoring plans to demonstrate compliance with 40 CFR 61, relating to atmospheric emissions of hazardous pollutants and radionuclides.

The determination of whether a facility requires a facility effluent monitoring plan is based on the potential for any particular untreated discharge, either liquid or gaseous, to exceed one of the following:

- A reportable quantity of hazardous material as defined in the regulations
- A dose of 0.1 millirem per year to a maximally exposed member of the public.

If a facility requires a facility effluent monitoring plan, the plan must include program plans and complete documentation regarding the monitoring and characterizing of radioactive and nonradioactive hazardous discharges. This would include a discussion of source terms, characterization of the effluent streams and discharge points, monitoring system design criteria, historical effluent data and an assessment of compliance with the required standards. The DOE orders require that these documents be completed and approved by November 1991. Preparation is currently in progress (ADSs 404, 3013, and 9092).

In January 1991, Westinghouse Hanford submitted a letter to DOE-RL providing a summary of facility effluent monitoring plan determinations. The determination included evaluation of the registered sources of airborne radionuclide emissions for Westinghouse Hanford permitted stacks against the new 40 CFR 61. Six facility stacks exceeded the 0.1 millirem per year threshold and require evaluation for monitoring upgrades to meet criteria. They are the following:

1. PFP main stack, 291-Z-1
2. PUREX Plant main stack, 291-A-1
3. 340 Waste Handling Facility stack, 340-NT-EX
4. B Plant main stack, 296-B-1
5. 242-A Evaporator stack, 296-A-22
6. 241-AP Tank Farm stack, 296-A-40.

All Hanford Site contractors are involved in Clean Air Act activities. The PNL, in particular, has numerous stacks registered with regulatory agencies and is preparing four facility effluent monitoring plans.

4.3.2 Water

Corrective activities in the water category are regulated under the Clean Water Act. There are currently no known violations of the Clean Water Act; therefore, no such corrective activities exist at the Hanford Site. Solid waste regulations, by definition, govern many activities for liquid effluents, such as groundwater monitoring. These activities are covered in Section 4.3.3.2. The recent reauthorization of the Clean Water Act may cause corrective activities to be added in future revisions to this plan, although none have been defined to date.

One DOE National Pollutant Discharge Elimination System permit exists for the Hanford Site. Eight discharge points into the Columbia River are covered by this permit. Seven are assigned to Westinghouse Hanford and one to PNL. This permit is being renewed.

A permit renewal, according to DOE-HQ definition, is not considered a corrective activity. Each outfall has specific permit parameters. The EPA has not yet provided DOE-RL with its proposed permit renewal language. Should EPA change the terms of the existing permit, additional corrective activities may be required. As a result of the standby configuration of N Reactor, the flow ranges of effluents returned to the Columbia River via National Pollutant Discharge Elimination System outfalls have been significantly reduced.

4.3.3 Solid Waste

The DOE Order 5820.2A (DOE 1988a) establishes policies and guidelines by which DOE manages its radioactive wastes. The RCRA and implementing State regulations (WAC 173-303) govern dangerous wastes and mixed wastes.

The following subsections summarize environmental corrective activity projects and activities related to solid waste management.

4.3.3.1 RCRA Dangerous Waste Permits. Regulatory compliance with RCRA for dangerous waste treatment, storage for more than 90 days, or disposal facilities is implemented through acquisition of permits. These permits, which specify requirements for operation, closure, and postclosure monitoring are granted by EPA and Ecology. Permit applications are submitted by DOE to the regulatory agencies in two parts. Part A identifies the facility, provides its design parameters, and identifies the dangerous waste to be handled. Part B provides detailed facility descriptions, describes current and future operations, and identifies how the facility will be closed (ADSs 410, 411, 420, 421, 2000, 2001, 3000, 3013, 8002, 9112, and 9201).

For facilities that will not continue operating and that will be clean closed, only the Part A permit applications and closure plans are submitted. For facilities that will not continue to operate but will be closed with waste

remaining in place, Part A permit applications, closure plans, and postclosure permit applications will be submitted. Submission of a Part A application is required for any facility which continued to manage dangerous wastes after the wastes became subject to RCRA. An operating permit is issued after EPA and Ecology have reviewed the submitted application and supporting data, negotiated permit requirements, and obtained public comment on the draft permit. Closure plan approval follows a similar process.

Part A permit applications have been submitted to Ecology for all known facilities that have treated, stored for more than 90 days, or disposed of dangerous or mixed waste. Facilities that have handled dangerous waste or mixed waste and are intended to continue operation as TSD facilities will continue to operate under interim status pending issuance of an operating permit. Permit costs for these facilities are included in the cost summary for corrective actions for solid waste. See Table 4-1 for the current list of permits needed for Hanford Site facilities. Part B permit applications and closure plans are in various stages of preparation. A number of Part B permit applications have been submitted to Ecology and are currently under review.

Only permitting activities associated with existing facilities are categorized as corrective activities. Permit application preparation costs for new facilities are included as part of the project cost and are included in the same category as construction of the facilities (generally waste management operations).

Petitions to withdraw Part A permit applications will be submitted to Ecology for the 221-T Containment System Test Facility and the 324 Sodium Removal Pilot Plant. Petitions have been submitted and accepted for 332 Storage Facility and 2727-WA Sodium Storage Facility. These petitions have been submitted because further study of the missions of these facilities and the regulations has shown that the facilities are not TSD facilities and do not require permits. Petitions were submitted to Ecology to allow the 222-S Treatment Tank, PUREX Plant Treatment Tanks, 204-AR Waste Unloading Station, 241-Z Treatment Tank, and the T Plant Treatment Tank to be managed as 'treatment-by-generator' facilities. (If petitions are granted, closure plans and Part B permit applications are not required.) The petitions have been denied on the former four facilities. The petition for the T Plant treatment tank is on hold pending more information on the reason for denial of the other requests.

Petitions were submitted and accepted to change the Tri-Party Agreement Milestones for the 303-M Oxide Facility and 3718-F Alkali Metal Treatment Facility from Part B permit applications to closure plans. The missions of these two facilities have been determined to be unnecessary, therefore, closure of these facilities is appropriate.

Table 4-1. Dangerous Waste Regulations Permitting Requirements.
(sheet 1 of 2)

Facility	Applications required ^a	Operation ^b
1324-NA Percolation Pond	A/C	TD
183-H Solar Evaporation Basins	A/C	TS
1301-N Liquid Waste Disposal Facility	A/C	D
100-D Ponds	A/C	TD
1325-N Liquid Waste Disposal Facility	A/C	D
1706-KE Waste Treatment System	A/C	TS
105-DR Sodium Fire Facility	A/C	TS
1324-N Surface Impoundment	A/C	T
303-M Oxide Facility	A/C	T
3718-F Alkali Metal Treatment Facility	A/C	TS
Physical and Chemical Treatment Facilities	A/B	O
303-K Storage Facility	A/C	S
325 Waste Treatment Facility	A/B	T
300 Area Waste Acid Treatment	A/C	TS
305-B Storage Facility	A/B	TS
300 Area Process Trenches	A/PC	D
Thermal Treatment Test Facilities	A/B	O
304 Concretion Facility	A/C	TS
300 Area Solvent Evaporator	A/C	T
324 Sodium Removal Pilot Plant	A/B	T
Biological Treatment Test Facilities	A/B	O
4843 Alkali Metal Storage Facility	A/C	S
437 Maintenance and Storage Facility	A/B	T
Nonradioactive Dangerous Waste Landfill	A/C	D
Hanford Patrol Academy Demolition Site	A/B	T
616 Storage Facility	A/B	S
Simulated High-Level Waste Treatment Storage	A/C	TS
2101-M Pond	A/C	D
242-A Evaporator	A/B	T
Grout Treatment Facility	A/B	TD
216-A-36B Crib	A/C	D
216-A-10 Crib	A/C	D
216-B-63 Trench	A/C	TD
216-B-3 Pond	A/C	TD

Table 4-1. Dangerous Waste Regulations Permitting Requirements.
(sheet 2 of 2)

Facility	Applications required ^a	Operation ^b
216-A-29 Ditch	A/C	TD
B Plant	A/B ^c	TS
PUREX Plant	A/B	TS
PUREX Tunnels	A/B	S
Hanford Waste Vitrification Plant	A/B	TS
E-8 Borrow Pit	A/C	T
204-AR Waste Unloading Station	A/B	T
222-S Laboratories Tank and Storage Pad	A/B	TS
Hexone Storage and Treatment	A/C	TS
216-U-12 Crib	A/C	D
2727-S Storage Facility	A/C	S
241-Z Treatment Tank	A/B	T
221-T Containment System Test Facility	A/C	T
Transuranic Storage and Assay Facility	A/B	S
T Plant Treatment Tank	A/B	T
216-S-10 Pond and Ditch	A/C	D
Ashpit Site	A/C	T
Single-Shell Tanks	A/C	S
Hanford Central Waste Complex	A/B	TS
Double-Shell Tank Farms	A/B	TS
Low-Level Burial Grounds	A/C	D
207-A South Retention Basin	A/C	S
Liquid Effluent Retention Facility	A/B	S
216-A-37-1 Crib	A/C	D
Tank 241-CX-70	A/C	S
600 Area Purgewater Storage and Treatment Facility	A/B	TS

^a A - Part A permit application

B - Part B permit application

C - Closure plan

PC - Postclosure plan.

^bT - Treatment

D - Disposal

S - Storage

O - Other.

^cOperating permit should not be prepared, per Ecology, April 1991.

4.3.3.2 The RCRA Compliance. In addition to the permitting of TSD facilities, RCRA compliance is supported by the Hanford Environmental Compliance project. The three Hanford Environmental Compliance subprojects supporting corrective activities through FY 1997 are as follows.

- **Groundwater Monitoring Wells (W-017H)**--An estimated 165 wells with an average depth of approximately 91.44 meters (300 feet) will be installed in accordance with RCRA requirements. These wells provide long-term groundwater monitoring systems for areas of specific potential remedial concern. According to the Tri-Party Agreement, thirty wells will be installed in 1990; thereafter 50 wells will be installed each year until EPA and Ecology determine that the monitoring system is in compliance (ADSs 9062, 9065, and 9900).

A proposed 1993 line item is intended to support continued installation of 50 wells per year beyond the expiration of project W-017H.

- **Mixed-Waste Storage Facilities (W-016H)**--Four storage facilities will be constructed and permitted to store hazardous wastes before treatment or disposal. The facilities will be located at the Hanford Central Waste Complex and sized to store anticipated receipts of mixed waste for 7 years. Hanford is out of compliance with storage requirements in WAC 173-303 Sections 320 and 395 and these facilities provide RCRA-compliant storage to address the current building of waste in noncompliant storage (more than 8,000 drums). The facilities will comply with WAC 173-303 and 40 CFR 265 (EPA 1987) and 40 CFR 268 (EPA 1988). Activities are to be completed by FY 1993 (ADS 9207).
- **Cathodic Protection (W-020H)**--A cathodic protection system will be provided to protect waste transfer pipeline encasements, catch tanks, and associated underground facilities in the 200 East and West Areas. Activities are to be completed between FY 1990 and FY 1992 (ADSs 9111 and 9900).

Corrective activities also includes expense funding support to two Plutonium Finishing Plant projects: The Enclosed Material Handling Facility and 291-Z Closed Loop Cooling project (ADS 406). Capital funding is provided under Waste Management.

Potential RCRA deficiencies have been identified at the Hanford Site facilities through structured environmental assessments that were performed in 1987 and 1988. These deficiencies were incorporated in the Tri-Party Agreement Milestone M-23-00. This milestone requires that all identified interim status compliance actions (excluding groundwater monitoring and closure plans) be completed by September 1991. Funding for interim status corrective activities is funded through ADSs 406, 422, 8100, 9119, and 9307.

All interim status compliance actions that were identified in the assessments will be completed by September 1991, with the exception of the following categories.

- Actions associated with tank systems will be included in a new Tri-Party Agreement milestone designed to bring dangerous waste tank systems into compliance.
- Actions that cannot be performed because they represent potential RCRA/Atomic Energy Act inconsistencies.
- Actions that will be addressed at closure.

Table 4-2 indicates those facilities that have completed all the compliance actions and those that still require action. Many of these facilities are not specifically included in Tri-Party Agreement Milestone M-23-00 but are included here for completeness. In most cases, these actions fall into one of the three categories described above.

Table 4-2. Interim Status Compliance Action Status. (sheet 1 of 2)

Unit	Status ^a	Interim status compliance actions (referenced to applicable section of WAC 173-303)	Scheduled completion ^b
Maintenance and Storage Facility	A		
Solidified high-level waste treatment and storage	A		
305-B Storage Facility	A		
241-Z Plutonium Finishing Plant Treatment Tank	AR	Section 320 (Inspection) Section 640 (Tank Requirements)	(2) (1)
Low-level burial grounds	A		
Double-shell tanks	AR	Section 640 (Tank Requirements)	(1)
242-A Evaporator	AR	Section 320 (Inspection)	(2)
204-AR Unloading Station	AR	Section 640 (Tank Requirements)	(1)
224-T Transuranic Waste Storage and Assay Facility	A		
PUREX Tunnels	AR	Section 320 (Inspections) Section 630 (Container Management)	(2) (2)
216-A-36B	A		
1325-N	AR	Section 300 (Waste Analysis Plan)	(3)
1324-N	A		
1324-NA	AR	Section 300 (Waste Analysis Plan)	(3)
1301-N Crib	A		
216-B-3 Pond	AR	Section 300 (Waste Analysis Plan)	(3)
216-A-29 Ditch	AR	Section 300 (Waste Analysis Plan)	(3)
216-A-10	A		
216-B-63 Trench	AR	Section 300 (Waste Analysis Plan)	(3)
T Plant 15-1 Tank	AR	Section 320 (Inspection) Section 640 (Tank Requirements)	(2) (1)

Table 4-2. Interim Status Compliance Action Status. (sheet 2 of 2)

Unit	Status ^a	Interim status compliance actions (referenced to applicable section of WAC 173-303)	Scheduled completion ^b
T Plant 15-1 Tank	AR	Section 320 (Inspection) Section 640 (Tank Requirements)	(2) (1)
222-S Treatment Tank and Storage Pad	AR	Section 320 (Inspection) Section 640 (Tank Requirements)	(2) (1)
616 Hazardous Waste Storage	A		
PUREX Tanks	AR	Section 320 (Inspection) Section 640 (Tank Requirements)	(2) (1)
Central Waste Complex	A		
Nonradioactive Dangerous Waste Landfill	A		
300 Area Acid Treatment System	A		
311 Tanks	A		
303-K Storage Facility	A		
303-M Oxide Facility	A		
300 Area Process Trenches	AR	Section 300 (Waste Analysis Plan)	(3)
Hanford Patrol Academy Demolition Site	A		
4843 Alkali Metal Storage Facility	A		
3718-F Alkali Metal Storage Facility	AR	Section 300 (Waste Analysis Plan) Section 350 (Contingency Plan)	6/91 (4) 6/91 (4)
Single-Shell Tanks	AR	Section 640 (Tank Requirements)	(1)
Hexone Storage Tanks	A		
183-H Solar Evaporation Basins	A		
2727-S Storage Facility	A		
300 Area Solvent Evaporator	A		
105-DR Sodium Fire Facility	A		
E-8 Borrow Pit	A		
Ash Pit Site	A		
216-U-12 Crib	A		
2101-M Pond	AR	Section 300 (Waste Analysis Plan)	(3)
216-S-10 Pond and Ditch	AR	Section 300 (Waste Analysis Plan)	(3)
100-D Ponds	AR	Section 300 (Waste Analysis Plan)	(3)
304 Concretion Facility	A		
1706-KE Waste Treatment System	A		
B Plant Canyon Units	AR	Section 320 (Inspection) Section 640 (Tank Requirements)	5/91 (2) (1)

^a A = Adequate

AR = Action required.

^b (1) = Contingent upon ongoing tank negotiations with Ecology.

(2) = Petition for rule making change submitted 9/89 - potential RCRA/Atomic Energy Act inconsistency for physical inspection requires resolution.

(3) = Waste analysis of unit will be addressed at closure.

(4) = To be deleted due to a pending Tri-Party Agreement milestone change request. Unit no longer manages dangerous waste.

The Tri-Party Agreement action plan contains milestones associated with compliance with interim status requirements. These milestones are as follows:

- **Milestone M-21-00**--Submit RCRA interim status compliance assessments for all TSD units, April 1989 (complete)
- **Milestone M-22-00**--Establish enforceable action schedules for interim status assessment actions, December 1989 (complete)
- **Milestone M-23-00**--Achieve compliance with interim status requirements (excluding groundwater monitoring and closure plans), September 1991
- **Milestone M-24-00**--Install RCRA groundwater monitoring wells at specified rates until all RCRA land disposal facilities and SSTs are determined to have RCRA compliant monitoring systems, annually, beginning in CY 1989
- **Milestone M-25-00**--Provide annual reports of studies/efforts that are in progress to identify alternatives to land disposal of radioactive mixed wastes, annually, beginning March 1990
- **Milestone M-04-00**--Provide annual reports of DST and SST waste treatability studies. Although related to interim status, this activity is budgeted and scheduled under waste management operations, Chapter 2.0.

4.3.3.3 Polychlorinated Biphenyls. Specific activities for PCBs are (1) to continue with removal of PCBs from electrical, hydraulic, and other equipment; and (2) to identify and implement a disposal method for PCB-contaminated radioactive waste oil. Replacement of light ballasts for the hot cells at the 324 and 325 Buildings is needed to prevent creation of mixed wastes if the PCB-containing ballasts leak. They will be replaced with non-PCB ballasts as a corrective activity (ADS 8005). Other PCB-related activities are covered under Waste Management Operations (ADSs 2002 and 3008). A strategy and compliance plan for negotiation of a compliance agreement with EPA for storage of radioactively contaminated PCB waste will be prepared.

In 1989 the Department of the Navy identified the presence of PCBs in the Submarine Reactor Compartment Disposal packages. In accordance with an agreement with DOE and the EPA, the Department of the Navy removed all the PCBs from each compartment except for a few pounds dispersed in electrical insulating material and non-metallic items. The same practice will be followed for future compartments shipped for burial. All of the PCBs are inside the sealed disposal packages. The reactor compartments are regulated under the Toxic Substance Control Act because of the residual PCBs.

4.4 SCHEDULE AND BUDGETS

Figure 4-1 is a schedule of Hanford Site corrective activities for both Preliminary Unvalidated Case and Validated Target Level budgets. For corrective

Figure 4-1. Corrective Activities Schedule. (sheet 1 of 2)

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Figure 4-1. Corrective Activities Schedule. (sheet 2 of 2)

Notes:

(1) Most activities transfer to Waste Management Operations in FY 1992.

(2) Activity scheduled for 8/31/97 completion under the Validated Target Level budget.

(3) Transfers to Waste Management Operations in FY 1993. Fifty wells per year not supported by the Validated Target Level budget until FY 1995.

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activities, only groundwater monitoring well installation and RCRA permit application submission are delayed by the Validated Target Level. Table 4-3 contains additional detail on Tri-Party Agreement milestones for RCRA Part B permit applications and closure plans for TSD units.

Table 4-4 is a listing of Preliminary Unvalidated Case costs and Table 4-5 is a listing of Validated Target Level costs from individual ADS for corrective activities by ADS number and title (all corrective activities are Priority 1). Figures 4-2 and 4-3 are bar graphs of total corrective activity Preliminary Unvalidated Case and Validated Target Level costs by year.

Table 4-3. Milestones for the Permitting and Closures of Treatment, Storage, and/or Disposal Units. (sheet 1 of 4)

Tri-Party Agreement milestone number	Milestone	Due date
M-20-00	Submit Part B permit applications or closure plans for all RCRA TSD units. All Part B permit applications, closure plans, and postclosure permit applications will be submitted to Ecology and EPA by May 1996. Individual units will be submitted as shown below as interim milestones.	May 1996
M-20-01	Submit Hanford Waste Vitrification Plant Part B to Ecology and EPA.	July 1989 (Complete)
M-20-02	Submit 616 Storage Facility Part B to Ecology and EPA.	July 1989 (Complete)
M-20-03	Submit Single-Shell Tank System Closure/Corrective Action Work Plan to Ecology and EPA.	Sept. 1989 (Complete)
M-20-04	Submit 616 Storage Facility Part B to Ecology and EPA.	Sept. 1989 (Complete)
M-20-05	Submit Central Waste Complex-Radioactive Mixed Waste Storage Part B to Ecology and EPA.	Oct. 1991
M-20-06	Submit Low-Level Burial Grounds Part B to Ecology and EPA.	Dec. 1989 (Complete)
M-20-07	Submit Nonradioactive Dangerous Waste Landfill Closure/Postclosure Plan to Ecology and EPA.	Aug. 1990 (Complete)
M-20-08	Submit 305-B Storage Facility Part B to Ecology and EPA.	Jan. 1990 (Complete)
M-20-09	Submit 216-B-3 Pond Closure/Postclosure Plan to Ecology and EPA.	March 1990 (Complete)
M-20-10	Submit 300 Area Waste Acid System Closure Plan to Ecology and EPA (includes 311 tanks).	June 1990 (Complete)
M-20-11	Submit PUREX Tunnels Part B to Ecology and EPA.	Sept. 1990 (Complete)

Table 4-3. Milestones for the Permitting and Closures of Treatment, Storage, and/or Disposal Units. (sheet 2 of 4)

Tri-Party Agreement milestone number	Milestone	Due date
M-20-12	Submit Central Waste Complex-Waste Receiving and Packaging Facility Part B to Ecology and EPA	Oct. 1991
M-20-13	Submit 303-K Storage Area Closure Plan to Ecology and EPA.	April 1990 (Complete)
M-20-14	Submit 4843 Sodium Storage Facility Part B to Ecology and EPA.	June 1991
M-20-15	Submit 304 Concretion Facility Closure Plan to Ecology and EPA.	April 1990 (Complete)
M-20-16	Submit Double-Shell Tanks Part B to Ecology and EPA.	June 1991
M-20-17	Submit 242-A Evaporator Part B to Ecology and EPA.	June 1991
M-20-18	Submit 3718-F Alkali Metal Treatment and Storage Facility Part B to Ecology and EPA.	June 1991 ^a
M-20-19	Submit Simulated High-Level Slurry Treatment/Storage Closure Plan to Ecology and EPA.	Sept. 1989 (Complete)
M-20-20	Submit 325 Waste Treatment Facility Part B to Ecology and EPA.	Aug. 1991
M-20-21	Submit B Plant Part B to Ecology and EPA. (Milestone may be changed to closure plan, [date unknown] per Ecology, April 1991)	Oct. 1991 ^b
M-20-22	Submit 222-S Laboratory Part B to Ecology and EPA.	Dec. 1991
M-20-23	Submit Transuranic Waste Storage and Assay Facility Storage Part B to Ecology and EPA.	June 1992
M-20-24	Submit PUREX Plant Part B to Ecology and EPA.	Sept. 1992
M-20-25	Submit Hanford Patrol Academy Demolition Sites Part B to Ecology and EPA.	Nov. 1992
M-20-26	Submit Ashpit Demolition Site Closure Plan to Ecology and EPA.	Nov. 1992

Table 4-3. Milestones for the Permitting and Closures of Treatment, Storage, and/or Disposal Units. (sheet 3 of 4)

Tri-Party Agreement milestone number	Milestone	Due date
M-20-27	Submit Hexone Storage and Treatment Closure Plan to Ecology and EPA.	Nov. 1992
M-20-28	Submit E-8 Borrow Pit Demolition Site Closure Plan to Ecology and EPA.	Nov. 1992
M-20-29	Submit Maintenance and Storage Facility Part B to Ecology and EPA.	Nov. 1993
M-20-30	Submit 303-M Oxide Facility Part B to Ecology and EPA.	Oct. 1992 ^a
M-20-31	Submit 1301-N/1325-N Closure Plan/Postclosure Plan to Ecology and EPA.	May 1994
M-20-32	Submit 300 Area Process Trenches Closure/Postclosure Plan to Ecology and EPA.	Aug. 1994
M-20-33	Submit 216-A-10 Crib Closure/Postclosure Plan to Ecology and EPA.	March 1996
M-20-34	Submit 216-A-36B Crib Closure/Postclosure Plan to Ecology and EPA.	March 1996
M-20-35	Submit 1324-N/1324-NA Closure Plan to Ecology and EPA.	Sept. 1994
M-20-36	Submit 216-A-29 Ditch Closure/Postclosure Plan to Ecology and EPA.	May 1996
M-20-37	Submit 216-U-12 Crib Closure/Postclosure Plan to Ecology and EPA.	Nov. 1994
M-20-38	Submit 216-B-63 Trench Closure Plan to Ecology and EPA.	May 1996
M-20-39	Submit 216-S-10 Pond and Ditch Closure Plan to Ecology and EPA.	May 1996
M-20-40	Submit 100-D Ponds Closure Plan to Ecology and EPA.	Feb. 1993
M-20-41	Submit 105-DR Closure Plan to Ecology and EPA.	Sept. 1990 (Complete)

Table 4-3. Milestones for the Permitting and Closures of Treatment, Storage, and/or Disposal Units. (sheet 4 of 4)

Tri-Party Agreement milestone number	Milestone	Due date
M-20-42	Submit Thermal Treatment Part B to Ecology and EPA.	Dec. 1993
M-20-43	Submit Physical/Chemical Treatment Part B to Ecology and EPA.	Dec. 1994
M-20-44	Submit Biological Treatment Part B to Ecology and EPA.	Dec. 1995
M-20-45	Submit petitions to Ecology to withdraw Part A permit applications for 332 Storage Facility, 1706-KE Treatment Facility, 2727-WA Sodium Storage Facility, 221-T Containment System Test Facility, and 324 Sodium Removal Pilot Plant.	June 1989 ^c (Complete) Resubmitted June 1990
M-20-46	Submit petitions to Ecology to manage the following facilities as 'treatment-by-generator' facilities: T Plant Treatment Tank, 222-S Treatment Tank, PUREX Plant Treatment Tanks, 204-AR Waste Unloading Station, and 241-Z Treatment Tank.	June 1989 (Complete)

^aChange request will be submitted to change Tri-Party Agreement milestone from Part B permit application to closure plan.

^bChange request submitted to extend date to FY 1992.

^cThe 332 Storage Facility and 2727 Sodium Storage Facility have been accepted by Ecology and is out for public comment.

Table 4-4. Corrective Activity Costs by Activity Data Sheets - Preliminary Unvalidated Case.

ACTIVITY DATA SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
PRELIMINARY UNVALIDATED CASE CA PRIORITY 1									
404	AIR PERMITTING/COMPLIANCE CHEMICAL PROCESSING	831	0	0	0	0	0	0	
406	CORRECT ACTIONS FOR CHEM PROCESS PROD FAC (CP)	1604	0	0	0	0	0	0	
410	PART B PERMITTING - PUREX	1170	0	0	0	0	0	0	
411	NUCLEAR MTLs PROD PART B PERMITTING - PFP, T PLANT	610	0	0	0	0	0	0	
2001	NUCLEAR ENERGY RCRA PERMITS/CLOSURE	397	0	0	0	0	0	0	
3000	N REACTOR RCRA PERMITS/CLOSURES	2000	0	0	0	0	0	0	
8005	LIGHT BALLAST PCB CLEANUP AND REMOVAL (PNL)	320	150	0	0	0	0	0	
8100	AIR AND SEWAGE MONITORING MULTIPROGRAM BUILDINGS	0	3045	50	0	0	0	0	
9062	ENVIR MONITORING - RCRA GW MON WELL INSTALLATION & DEVL	6595	5527	0	0	0	0	0	
9092	AIR PERMITTING/COMPLIANCE (FEMPS)	315	1640	0	0	0	0	0	
9112	DST PERMITTING (TPA) (W1B)	1902	0	0	0	0	0	0	
9119	DST INTERIM STATUS COMPLIANCE (TPA)(W1B)	2997	1360	1950	0	0	0	0	
9201	SOLID WASTE MANAGEMENT PERMITTING	1940	1940	0	0	0	0	0	
9207	SOLID MIXED WASTE STORAGE FACILITIES (W-016)	1800	0	0	0	0	0	0	
9307	SST INTERIM STATUS COMPLIANCE (TPA) (W3B)	314	315	455	0	0	0	0	
SUBTOTAL CA PRIORITY 1		22795	13977	2455	0	0	0	0	
TOTAL CA		22795	13977	2455	0	0	0	0	

Table 4-5. Corrective Activity Costs by Activity Data Sheets - Validated Target Level.

ACTIVITY DAT SHEET NUMBER	ACTIVITY DATA SHEET TITLE	(Costs, \$,000)*							
		FY 1991	FY 1992 B	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	
VALIDATED TARGET LEVEL CA PRIORITY 1									
404	AIR PERMITTING/COMPLIANCE CHEMICAL PROCESSING	831	0	0	0	0	0	0	0
406	CORRECT ACTIONS FOR CHEM PROCESS PROD FAC (CP)	1604	0	0	0	0	0	0	0
410	PART B PERMITTING - PUREX	1170	0	0	0	0	0	0	0
411	NUCLEAR MTLs PROD PART B PERMITTING - PFP, T PLANT	610	0	0	0	0	0	0	0
2001	NUCLEAR ENERGY RCRA PERMITS/CLOSURE	397	0	0	0	0	0	6	0
3000	N REACTOR RCRA PERMITS/CLOSURES	2000	0	0	0	0	0	0	0
8005	LIGHT BALLAST PCB CLEANUP AND REMOVAL (PNL)	320	150	0	0	0	0	0	0
8100	AIR AND SEWAGE MONITORING MULTIPROGRAM BUILDINGS	0	3045	50	0	0	0	0	0
9062	ENVIR MONITORING - RCRA GW MON WELL INSTALLATION & DEVL	6595	5527	0	0	0	0	0	0
9092	AIR PERMITTING/COMPLIANCE (FEMPS)	315	1640	0	0	0	0	0	0
9112	DST PERMITTING (TPA) (W1B)	1902	0	0	0	0	0	0	0
9119	DST INTERIM STATUS COMPLIANCE (TPA)(W1B)	2997	1360	1950	0	0	0	0	0
9201	SOLID WASTE MANAGEMENT PERMITTING	1940	1940	0	0	0	0	0	0
9207	SOLID MIXED WASTE STORAGE FACILITIES (W-016)	1800	0	0	0	0	0	0	0
9307	SST INTERIM STATUS COMPLIANCE (TPA) (W3B)	314	315	455	0	0	0	0	0
SUBTOTAL CA PRIORITY 1		22795	13977	2455	0	0	0	0	0
TOTAL CA		22795	13977	2455	0	0	0	0	0

Figure 4-2. Corrective Activities Costs by Year and Priority - Preliminary Unvalidated Case.

Figure 4-3. Corrective Activities Costs by Year and Priority - Validated Target Level.

5.0 TECHNOLOGY DEVELOPMENT

5.1 OVERVIEW

To successfully achieve its 30-year cleanup goal and to do this with the lowest possible cost, DOE must adapt, develop, or create and rapidly implement new technologies that comply with all applicable regulations. The principal mission of DOE's Office of Technology Development is to consolidate and provide centralized management and oversight for research, development, demonstration, testing, and evaluation activities required to support the following DOE-HQ Offices: (1) Environmental Restoration and Waste Management, (2) Waste Operations, (3) Defense, (4) Nuclear Energy, and (5) Energy Research Programs. These activities are developed in response to the needs of the Environmental Restoration and Waste Management organizations. Their needs are presented to the Office of Technology Development in annually updated roadmaps, which identify and document technology needs and establish timeframes for technology development requirements. This mission will be accomplished by coordinating closely with the Waste Operations and Environmental Restoration offices to establish technology needs, and by using all available internal (government agencies) and external (private sector/international) resources.

The Office of Technology Development's programmatic implementation strategy is founded on the concept of integrated demonstrations, integrated programs, and supporting technology programs. (1) An integrated demonstration is a cost-effective mechanism that assembles a group of related and synergistic technologies to evaluate their performance both individually and as part of a complete system in correcting environmental restoration and waste management research, development, and/or demonstration tasks that relate to a single environmental restoration or waste management issue or function. (2) An integrated program is a set of activities dedicated to developing technology solutions for a single problem category (e.g., characterization, separations) common to EM activities across the complex. (3) Supporting technology programs, such as robotics and analytical laboratory management, are cross-cutting technical disciplines that support several integrated demonstrations and integrated programs. For each activity and program that is underway, a Technical Task Plan (TTP) is generated annually by the field. These TTPs (similar to ADSs for the Environmental Restoration and Waste Management programs) form the basis for the Hanford Site Five-Year Program Plans.

The technology development program is implemented at the Hanford Site through technical program managers at PNL, Westinghouse Hanford, and KEH. Currently, two integrated demonstrations are assigned to the Hanford Site for lead coordination as follows: (1) for underground storage tank stabilization and remediation, and closure of high-priority SST RCRA sites, and (2) for the expedited response action to remediate the carbon tetrachloride plume in the 200 West Area. Also, two integrated programs are being managed by Hanford, the In Situ Vitrification Program and the In Situ Remediation Program.

Technology development activities and the associated schedules are included in the HDW-EIS (DOE 1987b) and the Tri-Party Agreement, which drives

much of the Hanford Site environmental restoration and waste management planning activities, including technology development.

5.1.1 Hanford Site's Technology Development Organization

The Hanford Site has taken a team approach to managing its technology development activities. Consistent with the philosophy that both end-users and technologists must be involved with the technology development process, teams from Westinghouse Hanford, PNL, and Kaiser Engineers Hanford have been formed. Depending upon the scope of a given activity and its end use, projects may be managed by all three organizations.

The management of technology development activities at the Hanford Site is the responsibility of the Branch Chief for Technology Development in the Waste Management Division. The Branch Chief is the Technical Program Officer and is responsible for all technology development activities including transportation, education, program support, and technology integration.

Westinghouse Hanford's Office of Technology Integration, Kaiser Engineers Hanford's Systems and Process Engineering, and PNL's Office of Environmental Technology each manage its own technology tasks and programs.

The entire Hanford Site team maintains an extensive information network to ensure consideration of all good technology development ideas from other DOE sites, government agencies, nations, and private industry.

5.1.2 Program Development

At the Hanford Site, waste management and environmental restoration programs are managed as seven Hanford Site missions. These missions include the following: (1) DST, (2) SST, (3) capsules, (4) solid wastes, (5) liquid effluents, (6) past-practice units, and (7) D&D. Completion of these missions is vitally dependent on the development of new and/or modified technologies.

The Hanford Site has initiated a rigorous planning process for identifying environmental restoration and waste management technology development needs. Teams composed of operations staff and technologists identify and prioritize needs in the six key technology development areas: (1) characterization, (2) waste treatment, (3) waste minimization, (4) storage and disposal, (5) remediation, and (6) D&D. Each mission has a team consisting of representatives from Westinghouse Hanford, PNL, and Kaiser Engineers Hanford.

The top needs from each of the 6 teams are further evaluated against 10 criteria to develop a prioritized list of the Hanford Site needs. The criteria includes the following: (1) considerations for safe operations (e.g., minimizes spread of contamination; ensures that the public, workers and the environment are protected), (2) regulatory compliance, (3) cost savings, (4) schedule, and (5) support for continued operations. The 21 highest priority needs which resulted from this prioritization process, are shown in Table 5-1, along with their overall ranking.

Table 5-1. Top Technology Development Needs.

Category	Overall priority
Characterization	
• Improved laboratory analyses to support decisions	2
• In situ characterization	5
• Improved response of analytical information	10
• Improved sampling of heterogeneous materials	13
• Improved container integrity sensors	16
Waste Treatment	
• Safe and efficient retrieval methods	4
• Improved contaminant separation techniques	6
• Improved mixed waste treatment processes	11
• Technologies for extraction/destruction of organics	14
• Contamination control during processing	15
Waste Minimization	
• Substitutes for hazardous chemicals	17
• Process to recover/reuse nitric acid	20
Storage/Disposal	
• Evaluation of alternatives for permanent waste disposal	1
• Waste forms that comply with established requirements	9
• Extension of existing storage lifetime	21
Remediation	
• In situ stabilization of contaminants	3
• Improved groundwater treatment methods	7
• In situ treatment of wastes	8
• In-place treatment of residual wastes	12
Decontamination and Decommissioning	
• Reduced mixed waste generation during decontamination	18
• Improved size-reduction techniques	19

The relative ranking of these needs will be adjusted as more information regarding the urgency of these needs is developed. This planning process is the baseline from which new TTPs are proposed to the Office of Technology Development.

The next step in the process is to evaluate the current technologies available to satisfy these needs. This evaluation will include the following: (1) literature search and (2) contacts with other DOE sites, public and private organizations, universities, and international organizations. Based on results of this technology search and DOE-HQ funding guidance, proposals for the development of new technologies and testing of existing technologies are prepared. These are followed by technical task plans for those activities which are approved. The entire needs assessment process is shown schematically in Figure 5-1. In addition, efforts addressing other DOE sites' needs are developed, especially as they relate to integrated demonstrations.

Figure 5-1. Hanford Site Technology Needs Assessment Process.

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5.2 ACCOMPLISHMENTS AND STATUS

Sections 5.2.1 and 5.2.2 summarize the technology development accomplishments at the Hanford Site for FY 1991. Status of applicable 5-year vision goals is located in Section 5.2.3.

5.2.1 Environmental Restoration

Accomplishments in technology development for environmental restoration were primarily focused in remediation. However, significant progress was also made in characterization and TSD.

Characterization

- A workshop to prepare a characterization technology development plan is being scheduled. The workshop will include representatives from all DOE sites with tank problems. The plan will provide a prioritized listing of technology needs.
- Two test borings were completed as "cold" proof of the drill cuttings containment system and dual-wall percussion hammer method of drilling. A field test report has been issued.
- Field testing of pressure transducers and data loggers was completed, documenting the field readiness of the system for use in remedial investigations.
- The data acquisition system for ground-penetrating radar was improved. Among the improvements are the implementation of a real-time display capability for ground-penetrating radar site surveys. They also include the development of computer programs that permit the utilization of an efficient personal computer-based data processing system for all data analysis operations print outs. The data files produced by this system can now be directly transferred to the Hanford Environmental Information System database.

Waste Treatment

- A robotics technology demonstration is planned at the Hanford Site to demonstrate the remote retrieval of waste from SSTs. The demonstration will include the use of existing and emerging technologies.

Storage and Disposal

- Preliminary testing was completed for the Los Alamos National Laboratories small-scale explosion test task under the SST Storage Technology project.

Remediation

- A contract was signed by Bend Research, Inc. for FY 1991 fabrication and testing of a pilot plant that employs supported liquid membrane technology to remove uranium and chromium from groundwater.
- A report was submitted to DOE describing the long-term directions, deliverables, and decision points for the in situ vitrification limits project. The in situ vitrification melting model was designed and initial coding was completed. Work was completed for a report on in situ vitrification contaminant fate.
- Melt startup and control methods for selected barriers have been identified, screened, selected, and approved for engineering-scale experiments. Engineering-scale tests to determine feasibility of creating an underground "floor" for a containment system have been completed.
- The engineering-scale underground tank vitrification test report was published. The electrode feed system and support structure designs for the large-scale test were completed. Fabrication of the new containment shell for the offgas hood fabrication was completed and successfully tested at the Hanford Site before the Idaho National Engineering Laboratory tests. A pilot-scale test for underground tanks was conducted.
- Experiments confirmed that more than 99 percent of nitrate in contaminated groundwater can be destroyed using either organics or ammonia as the reductant in a supercritical reducing process.
- Under the soil washing demonstration project, a method was identified to count alpha and beta radiation rapidly to enable a preliminary judgement on the effectiveness of treatability tests without waiting for a full analytical workup.
- The large-scale in situ vitrification test was successfully completed. This is the first large-scale vitrification of mixed radioactive and hazardous wastes at an actual waste site.
- Assembly and operational testing of an upgraded laboratory-scale apparatus for further characterizing the process chemistry for in situ soil heating of organic contaminated soil was completed. Analytical procedures for identifying contaminate-degradation products and initialization of the "TOUGH" computer program were also completed. The code will be used to model the initial soil-drying step of the in situ soil heating process.
- Prototype protective barrier designs were developed and a site for the prototype barrier was selected. A workshop was held to gather input from other national labs and Federal agencies on the barrier design. The modeling test plan was published, in addition to the

barrier highlights document, the field lysimeter test facility status report, and the small tube lysimeter status report.

- Preliminary technical specifications on in situ stabilization technology for fluidized-bed pressure vessels and auxiliary piping and injection modules were completed. Also, technical specifications for a coaxial hydraulic homogenizer module used for mixing waste disposal tank sludges and residuals were completed.

5.2.2 Waste Management Operations

Accomplishments in technology development for waste management operations were primarily focused on waste treatment. However, significant progress was also made in three of the other four technology development areas: (1) characterization, (2) waste minimization, and (3) storage/disposal. In many cases, accomplishments from the environmental restoration technology development program can be directly useful to the waste operations technology development program.

Characterization

- Planning is complete for the first stage of alpha caisson characterization. A task was initiated to resolve safety issues related to contact-handled-TRU waste characterization.

Waste Minimization

- The pilot-scale system for a waste acid detoxification and recovery process was modified to improve operating flexibility; the pilot plant was prepared for testing a three-component acid waste system. Laboratory tests were performed to support the Plutonium Recovery Facility Waste Solidification Project.

Waste Treatment

- The plant-scale catalyzed electrochemical plutonium oxide dissolution flat plate dissolver was set up and cold functional testing was completed. Other activities that have taken place within this joint Idaho National Engineering Laboratory-Hanford Site project include assembling and calibrating the catalyzed electrochemical plutonium oxide dissolution spectrophotometer and completing laboratory work to evaluate additional plutonium recoveries from dissolution residues.
- Distillation of hexone from the underground storage tank to the railcars has been completed. Evaluation of disposal options for the hexone indicated incineration to be the preferred option.
- Methods for processing spent ion exchange resin into waste forms that are acceptable for WIPP and/or burial were evaluated, selected, and tested.

- The DOE-RL approved the functional design criteria, conceptual design report, and project authorization for the DST treatment retrieval system process tests project, completing the planned work for this project.

Storage and Disposal

- A report titled *Strategy for Identifying Natural Analogs of the Long-Term Performance of Low-Level Waste Disposal Sites* (PNL 1990b) was prepared by staff from the defense LLW technology support project.

5.2.3 Status

Along with the initial issuance of the site-specific plan (DOE-RL 1989a), a "Five-Year Vision for Hanford Cleanup" paper was issued (see Appendix D). This paper contained a list of goals for cleanup progress over the first 5 years. This list included two goals applicable to the technology development program. These goals and their status are listed below:

GOAL

Develop and test new cleanup technologies based on knowledge of wastes in the environment advanced by the Environmental and Molecular Science Laboratory. Evaluate cleanup costs using these new technologies and make the technologies available for general use if cost effective.

STATUS

This effort has received the highest technology development priority, and efforts are expected to be well under way by the end of this 5-year vision period. The scope of the original facility is currently being expanded to include applied, as well as basic, technology.

GOAL

Develop an organization that tracks all pertinent research and development, both inside and outside of the Hanford Site. Apply that information to Hanford Site cleanup.

STATUS

Refer to Section 5.1.1 for details of the Hanford Site team that responds to the technology needs of the Site.

5.3 TECHNOLOGY SUPPORT TO WASTE MANAGEMENT

Technology support to waste management at the Hanford Site is focused primarily in the key areas of characterization, minimization, and TSD for the DST, SST, and solid waste missions. The effluents and capsules missions can benefit from some of the technology being developed for the other three missions primarily in the characterization technology development area.

5.3.1 Double-Shell Tank Mission

Figure 5-2 is a simplified logic diagram of the baseline activities that must be completed to attain final cleanup of the DST waste. This figure illustrates the TTPs funded in FY 1991 that support this mission. There will be additional high-priority technology development tasks identified as part of the ongoing needs assessment process. Many of the technology needs are similar or shared with the SST, past-practice unit, and solid waste missions.

The technology development efforts funded in FY 1991 that support the DST mission are primarily focused on developing the following: (1) suitable treatment technologies for TRU liquid wastes (TTP 8058) (2) barrier technology for isolating subsurface sites from man, animals, plants, and wind erosion (TTP 8176), and (3) a technically credible model for predicting the environmental impact of various disposed waste forms (TTP 8138).

5.3.2 Single-Shell Tank Mission

Figure 5-3 is a simplified logic diagram of the baseline activities that must be completed to attain final closure of the SST sites. This figure illustrates the TTP funded in FY 1991 that support this mission. There will be additional high-priority technology development tasks identified as part of the ongoing needs assessment process. Many of the technology needs are similar or shared with the DST, past-practice unit, and solid waste missions.

Technologies are being developed to support retrieval, treatment, and packaging of the SST wastes (TTPs 9709 and 9710). Technologies for pretreatment of SST wastes include the following: (1) treatments for minimizing the amount of wastes requiring disposal, (2) treatments maximizing the fraction of waste that can be disposed of onsite as grouted LLW in near-surface vaults, and (3) treatments minimizing the amounts of TRU and/or HLW that must be disposed of as vitrified glass in a geological repository (TTPs 8058, 8055, and 9710). Planning began in FY 1991 for the Integrated Demonstration for Underground Storage Tanks (TTP 9711).

Performance assessment technologies are being developed to assess the effectiveness of remediation and disposal systems (TTP 8138). Performance assessment is an analysis that (1) identifies the natural and human-caused events and processes that might adversely affect a waste remediation or

Figure 5-2. Double-Shell Tank Mission.

Figure 5-3. Single-Shell Tank Mission.

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disposal system, (2) predicts the performance of the system in terms of the containment and isolation of radionuclides and hazardous chemicals, and (3) estimates the environmental consequences to determine if the system will comply with governmental regulations and to determine the degree of human and environmental risk if the system is used.

Final waste package technology development supports the overall objective of final closure of the SST system by 2018. Waste package technology includes in situ vitrification (TTPs 7005 and 8120) and waste stabilization technologies such as a fluidized-bed zeolite system (TTP 8178). These technologies will physically stabilize the tank structures and safely contain and isolate tank wastes from the environment.

5.3.3 Solid Waste Mission

Figure 5-4 is a simplified logic diagram of the baseline activities that must be completed to attain final disposal of solid waste. This figure illustrates the TTP funded in FY 1991 to support this mission. There will be additional high-priority technology development tasks identified as part of the ongoing needs assessment process. Many of the technology needs are similar or shared with the DST, SST, and past-practice unit missions.

The technology development efforts funded in FY 1991 that support the Solid Waste mission are primarily focused on characterization of TRU solid waste and developing suitable treatment technologies for contaminated soil.

Retrievably stored TRU solid wastes will be retrieved and characterized under ADS 9205, to support the design of waste receiving and processing treatment processes. Nonintrusive, in situ methods for subsurface characterization of buried wastes will be developed (TTP 8179).

In situ soil heating (TTP 8163) will develop and demonstrate the in situ soil heating process to destroy and remove organic wastes from contaminated soils. The soil washing project (TTP 8137), which has been used effectively in Europe, can be used to treat soils contaminated with radionuclides, heavy metals, organics, and inorganics. It is an alternative to capping or to excavation, repackaging, and transport to a landfill.

5.4 TECHNOLOGY SUPPORT TO ENVIRONMENTAL RESTORATION

Technology support to environmental restoration at the Hanford Site is focused primarily in the key areas of characterization, risk and performance assessment, and remediation for the past-practice units missions. The D&D mission can benefit from some of the technology being developed for the past-practice unit mission in the protective barriers technology development area.

Figure 5-4. Solid Waste Mission.

Notes:

* Indicates TTP supports more than one mission

TRU = Transuranic

TTP = Technology Task Plan

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Figure 5-5 is a simplified logic diagram of the baseline activities that must be completed to attain final closure of the past-practice units. This figure illustrates the TTP funded in FY 1991 that support this mission. There will be additional high-priority technology development tasks identified as part of the ongoing needs assessment process, especially in support of the arid site integrated demonstration (TTPs 8502 and 8503).

Past-practice units at the Hanford Site are defined as waste sites regulated under RCRA corrective actions or CERCLA remediation. They include contaminated groundwater and soil.

Testing and evaluation of in situ sensors and development and demonstration of geophysical survey methods, such as ground penetrating radar, acoustic imaging methods, and electromagnetic induction techniques will be accomplished under TTP 8179. The drilling containment project (TTP 9069) focuses on drilling and sampling techniques or equipment that will expedite drilling and sampling groundwater wells at the Hanford Site safely and cost-effectively.

Numerous remediation technologies are being developed to support environmental restoration of contaminated soil and groundwater at the Hanford Site. Many of the technologies that address cleanup of contaminated soils have been discussed in the previous sections. They include the following: (1) the protective barrier and warning marker system (TTP 8176), (2) the fluidized-bed zeolite system (TTP 8178), (3) in situ vitrification barriers for isolation and containment (TTPs 7005 and 8160), (4) in situ heating (TTP 8163), and (5) soil washing (TTP 8137).

The following remediation demonstration projects are underway at the Hanford Site to address groundwater cleanup. The U1/U2 groundwater biological treatment demonstration is intended to develop and demonstrate a biological process for simultaneous destruction of nitrates and specific organic contaminants in Hanford Site groundwater (TTP 8118). Because the groundwater also contains uranium, the supported liquid membrane technology (TTP 5201) will be used as a pretreatment step. The catalytic destruction of organics and nitrates in water project (TTP 8127) has the objective of developing and demonstrating a catalytic process for destroying hazardous organics and nitrates in groundwater. The biological treatment development project (TTP 8123) is intended to extend the Hanford Site biological treatment capability by developing technologies that can be used to destroy organic groundwater contaminants such as cyanide, and to extract inorganics such as chromium, uranium, and other radionuclides.

5.5 SUPPORT TO TECHNOLOGY PROGRAMS

Technology support activities that provide direct assistance to the Office of Technology Development, and cross-cut many Hanford Site programs, as well as those at other DOE sites. The Hanford Site will assist DOE-HQ in screening research, development, demonstration, testing, and evaluation projects (TTP 7016) and remediation technologies (TTP 7018), participating in internal technical peer reviews (TTP 8191), and the developing environmental restoration and waste management roadmaps (TTP 8186). The Hanford Site will

Figure 5-5. Past-Practice Units Mission.

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also continue support to the national robotics development planning effort (TTP 8188), international technology exchange program (TTP 8056), and education and outreach program (TTP 8169).

5.6 BUDGETS

Table 5-2 is a listing of required costs from individual TTPs for technology development by TTP number and title. The FY 1991 through FY 1996 information is directly from the February 1991 submission of the FY 1991 TTPs (less FY 1990 carryover of \$3.4 million). Program guidance received in January 1991 reflects a total of \$28.4 million "planning level" for FY 1991. The FY 1991 TTPs were not yet approved at completion of this revision. Information provided for FY 1997 is not complete, because FY 1991 TTPs only include funding requirements through FY 1996. Figure 5-6 is a bar graph of total technology development costs by year.

Funding increases present major challenges to accommodate growth. The growth is really a bow-wave created by the need to support safety issues, TPA issues, DOE commitments, etc. Also, all the work is not planned to be accomplished at Hanford; rather at many other DOE sites thereby leveling resources across the complex.

Table 5-2. Technology Development Estimates by Technical Task Plan. (sheet 1 of 2)

TECHNICAL TASK PLAN NUMBER	TECHNICAL TASK PLAN TITLE	(\$ IN 000's)						
		FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
RL-0566	FIBER OPTIC PROBE FOR TCE IN SOIL & GW	125	125					
RL-6500	HEXONE TANK WASTE TREATMENT	800	1,000					
RL-8016	LLW LYSIMETER & NATURAL ANALOGS	100	335	630	410	350	510	
RL-8056	INTERNATIONAL TECHNOLOGY EXCHANGE	1,000	1,612	1,774	2,018	2,198	2,520	2,890
RL-8058	CEPOD: TREATMENT OF TRU CONTAMINATED	500	3,150	3,600	2,900	2,900	2,900	
RL-8120	UST REMEDIATION BY IN SITU VITRIFICATION	2,950	8,975	9,850	10,105	9,700	9,225	6,150
RL-8127	CATALYTIC DESTRUCTION OF ORGANICS & NITR	465	400	400	400			
RL-8133	RISK MANAGEMENT	320	530	650				
RL-8137	SUPPORT TO SOIL WASHING DEMONSTRATIONS	100	100	100				
RL-8160	166-B-6A CRIB ISV DEMO PROJECT	415	195					
RL-8169	OUTREACH ACTIVITIES TO STIMULATE EDUC	223	375	425	600	600	600	850
RL-8176	PERMANENT ISOLATION BARRIER SYSTEM	600	3,581	3,705	2,880	2,372	2,652	
RL-8178	IN SITU FLUIDIZED-BED ZEOLITE SYSTEM	250	400	350	250	300	300	
RL-8500	R&D FOR VOC-ARID SITE INTEGRATED DEMO	1,300	3,200	4,200	5,000	5,200	5,500	
RL-8501	EMSL CONSTRUCTION PROJECT	11,200	29,100	78,800	69,300	27,900		
RL-8502	PLANNING & MGMT OF VOC-ARID SITE ID	650	1,475	1,610	1,560	1,560	1,560	
RL-8503	DT&E FOR VOC-ARID SITE INTEGRATED DEMO	1,210	4,455	6,200	7,000	7,500	7,500	
RL-8504	PNL BURIED WASTE IN SITU VITRIFICATION	2,550	4,680	4,150	2,740			
RL-8505	SUPPORT STAFF ASSIGNMENTS	1,164	1,400	1,200	1,000	700	400	
RL-8506	TPO/TPM MGMT OF RICHLAND TD PROGRAM	969	2,100	2,100	2,100	2,100	2,100	2,100
RL-8507	ANALYTICAL LAB MGMT-METHODS COMPENDIUM	350	850	1,000	450	450	450	
RL-8508	ROBOTICS UST (PNL)	200	460	600	700	700	400	
RL-8509	ROBOTICS BURIED WASTE (PNL)	50	450	790	750	450		
RL-8510	ROBOTICS LABORATORY AUTOMATION (PNL)	270	550	550	600	600	500	
RL-8511	ROBOTICS ADVANCED TECHNOLOGY (PNL)	200	600	500	450			
RL-8513	TECHNOLOGY INTEGRATION-INDUSTRIAL COLLAB	70						
RL-8514	PLANNING FOR INTEGRATED DEMONSTRATIONS	70	150	150	100	100	100	
RL-8515	TECH INTEGR-SITE SPECIFIC LESSONS LEARNED	100	154					
RL-8516	ISV LIMITS & TECHNOLOGY COORDINATION	500	2,800	3,900	1,200	850		
RL-9021	TRMT TECH FOR TRU SPENT ION EXCHNG RESINS	200	300	350	400	400	400	
RL-9205	TRANSURANIC WASTE CHARACTERIZATION	500						
RL-9303	SST STORAGE TECHNOLOGY	300	1,000	1,000	1,000	1,000	1,000	

Table 5-2. Technology Development Estimates by Technical Task Plan. (sheet 2 of 2)

TECHNICAL TASK PLAN NUMBER	TECHNICAL TASK PLAN TITLE	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
RL-9306	SST TREATMENT TECHNOLOGY	200	1,135	1,200	1,500	2,000	2,000	
RL-9709	ROBOTICS UST (WMC)	700	1,400	2,200	2,100	1,300	800	
RL-9710-RD	UST TECHNOLOGY DEVELOPMENT (R&D)	1,500	6,500	7,000	8,500	8,200	7,000	
RL-9710-DT	UST TECHNOLOGY DEVELOPMENT (DT&E)	1,098	2,500	2,000	2,000	2,000	2,000	
RL-9711	PLANNING FOR UST INTEGRATED DEMO	500	1,500	1,800	1,900	2,150		
RL-9712	ANALYTICAL LAB MGMT-METHODS COMPENDIUM	100	TBD	TBD	TBD	TBD		
RL-9713	TECHNOLOGY INTEGRATION-TECH TRANSFER PRGM	100	200					
	TOTAL TECHNOLOGY DEVELOPMENT TTP'S	33,899	87,737	142,784	129,913	83,580	50,417	TBD
	TECHNOLOGY DEVELOPMENT FIN PLAN/ESCALATION*	23,456	36,117	37,454				

* THESE TOTALS REPRESENT THE MAY, 1991 FINANCIAL PLAN AND ESCALATIONS IN FY 1992 AND FY 1993. INCLUDED ARE \$5,170 IN FY 1991, \$17,100 IN FY 1992, AND \$17,733 IN FY 1993 FOR THE ENVIRONMENTAL AND MOLECULAR SCIENCES LABORATORY (TTP RL-8501).

Figure 5-6. Technology Development Costs by Year.

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6.0 SPECIAL TOPICS

In this chapter are short discussions of topics that are outside the formal scope of the plan, or new to the plan, and/or of particular interest to the public. Most activities relating to these topics are incorporated into the plan elsewhere as part of the ADS planning process, although some of the topics, such as culture change, are too broad in nature to be covered in a specific ADS. The topics are discussed here for special emphasis and in some cases in response to comments received during the public review process.

6.1 CULTURE: GOALS AND STATUS

We recognize we need to improve the way we do business (our culture) if we are to succeed in managing wastes and restoring the environment. Improvements and refinements are necessary to support the overall cleanup effort as well as to improve public confidence that DOE and its contractors can carry out this mission.

Along with the initial issuance of the site-specific plan (DOE-RL 1989a), a paper entitled "Five-Year Vision for Hanford Cleanup" was issued (see Appendix D). This paper contained a list of goals for cleanup progress over the next 5 years (by September 1995). Progress on specific cleanup goals are contained in earlier chapters. In that vision, we established a series of goals and committed to improving the way the Hanford Site does business. These were aimed at having strong public and political support for cleanup and ensuring our organization's culture will be geared to cleanup and gaining public confidence. The status of these goals is presented below. In general, we must continue making progress in these areas.

GOAL

Develop productive relationships with our regulators. Force each other to do the best cleanup work. Work with them openly. Encourage them to have representatives on or near Hanford. Make available quick and direct access to us, our information, and the waste sites.

STATUS

Disclosure of information completely and promptly to regulators has been improved, but requires additional attention. Requested documents can now be provided, in most cases directly from the document center without a formal request, saving significant time. Another positive step is our action to identify categories of information that do not require formal clearance prior to offsite release. For example, when site staff met with Washington and Oregon officials about the hydrogen tank issues, they released the draft documents as soon as they could be photocopied. Timely release of documents to regulators and concerned citizens is an area where progress must continue.

A recent example in which communication with regulators could improve is the February submittal of the change package with major changes to the Tri-Party Agreement schedules. Regulators expressed concern that some of the changes had already been implemented and that some were not adequately justified.

However, relationships with our regulators are improving. Negotiations on the Tri-Party Agreement change requests resulted in a mutual agreement on new milestones and a course of action for several milestones that will be finalized when all information needed to make a final decisions is available.

The DOE funded the State of Washington \$2.8 million in FY 1990 for oversight activities. The FY 1991 funding level was increased to \$5.3 million. EPA has opened a local project office and virtually all EPA interactions with DOE are through this office. Ecology has also opened a local office but staffs the local office only with inspectors. The majority of the Ecology staff remains based in Lacey, Washington. Communication could be improved if a larger share of the Ecology staff were relocated to the Kennewick office.

The Tri-Party Agreement requires most key documents (work plans, effluent studies, etc.) to be sent to the State and EPA for review and comment. Certain computerized waste inventory data are now directly accessible by the State and EPA. Shortly, all sampling and characterization data will be directly available, via computer, to the State and EPA.

GOAL

Develop partnerships with the states of Washington and Oregon, and affected Northwest Indian nations on cleanup. Establish common goals. Respect the rights of the States and Indian nations. Perform cleanup work based on mutual guidelines and encourage extensive public involvement. Seek open support of cleanup activities by State and Indian officials.

STATUS

A State, Tribal, and EPA working group was established to assist in preparation of the site-specific plan by giving advice. Membership includes the States of Washington and Oregon, EPA Region 10, the Nez Perce Tribe, the Yakima Indian Nation, and the Confederated Tribes of the Umatilla Indian Reservation. Working group members, however, have expressed disappointment and frustration over the recent timing and extent of their involvement.

A similar group reviews and comments on the national plan. The States of Washington and Oregon, the Yakima Indian Nation, and the Confederated Tribes of the Umatilla Indian Reservation are on the national group. The DOE has invited the tribes to participate, in respect of treaty rights. The DOE negotiated grant agreements with the Yakima Indian Nation and the Confederated Tribes of the Umatilla Indian Reservation to fund the costs of this participation.

At the working group's recommendation, we held four public scoping meetings on the first site-specific plan in September 1989 to help us determine what should be included in the site-specific plan. After the site-specific plan was prepared, we conducted nine briefings and public meetings in May and June 1990.

Initial plans presented to the State and tribal working group called for two meetings in Oregon, and at the State of Oregon's request, we increased it to four meetings. The State moderated the meetings in Oregon, which included a presentation from the Oregon Department of Energy. A number of Oregon Department of Energy, Hanford Waste Board, and Advisory Committee officials attended and actively participated. There were five meetings held in Washington. About 350 people attended the nine meetings.

GOAL

Recognize the sovereignty and treaty rights of Indian nations.

STATUS

The DOE has recognized the role of the affected Indian nations in the cleanup of its defense sites. This recognition is in Section 1.3 of the June 1990 national plan (DOE 1990b) and in Section 1.8.4 of this site-specific plan. The Yakima Indian Nation and the Confederated Tribes of the Umatilla Indian Reservation have been identified as having key roles in the cleanup of the Hanford Site. These governments received briefings on the site-specific plan, and have been invited to attend national and local planning sessions. We have issued grants to allow these governments to participate meaningfully. We are working to understand better the concerns of the Nez Perce Tribe. The DOE is considering a grant to them also.

Some of our employees still have little understanding of Indian issues. However, our procedures require that a qualified archaeologist evaluate all sites before any work is done in the field. The archaeologists, on staff at PNL, are fully trained in State and Federal laws protecting Indian cultural sites and can require mitigating action if a site contains evidence of cultural significance.

We are working to be sure all employees who need it receive training that explicitly describes these laws. Violation of these laws can lead to disciplinary action. More work is needed in this area.

We have conducted tribal issue workshops for some of our managers. We are starting to reflect tribal perspectives in the *Hanford Reach* newspaper to Westinghouse Hanford employees.

GOAL

Take positive measures to assure that the Northwest Congressional delegation and other key members of Congress understand and support Hanford cleanup and work to obtain the funding needed. Encourage Congress to establish long-term funding for cleanup.

STATUS

It is DOE's goal to clean up the Hanford Site by the year 2018. This requires the support and understanding of Congress. We will continue to respond to information requests from congressional staff that will allow them to make informed decisions.

Congress approved additional funds for cleanup in FY 1991. The Senate Appropriations language said that DOE should fund the Tri-Party Agreement before other Hanford Site activities. Congress supported cleanup agreements but cut funds for PUREX Plant operations in the environmental and waste management budget. The region's congressional delegations concern that funds must be used efficiently and effectively is growing.

In 1990, Senator Adams introduced a bill to establish a trust fund for Hanford Site cleanup. The DOE opposes the bill. The State of Oregon, citizen groups, and many concerned citizens at the site-specific plan public meetings stated that this opposition shows DOE is not serious about changing its culture. The DOE, in turn, feels the existing system is working and gives it more flexibility in responding to new issues.

The Northwest's Congressional delegation is firmly committed to establishing an Environmental and Molecular Sciences Laboratory at the Hanford Site. Congress has included money in the budget to design the state-of-the-art facility. In October 1990, Congress appropriated an additional \$20 million to accelerate the laboratory's development. Because the Laboratory's mission is to help develop better and more cost-effective ways to contain and dispose of radioactive and chemical wastes, strong Congressional support indicates their understanding and support for Hanford Site cleanup.

Efforts are underway in Congress to increase cleanup funding in FY 1992. Congress is taking actions to specifically increase funding above the President's request for the Hanford Waste Vittrification Plant.

GOAL

Develop an active outreach program for the general public. Encourage participation by our managers, scientists, and engineers. Provide unbiased, factual information, seek the public's advice on issues, and respond to the public's concerns.

STATUS

In FY 1990 we improved in this area. The mailing list for the Tri-Party Agreement information totals approximately 2,800 and attendance at meetings has increased. The ratings by the public for both the site-specific plan meetings and the Tri-Party Agreement meetings continue to improve. Many members of the public indicated they would like to see greater involvement of scientists and engineers and less involvement of public relations personnel. We are doing this. The quarterly newsletter *Hanford Update* is published jointly with DOE, EPA, and Ecology to provide interested citizens with timely information about the Tri-Party Agreement and cleanup.

The Hanford Speakers Bureau delivered 339 presentations to a total audience of 19,752. Waste management and environmental restoration presentations made up a large share of this effort and included 123 presentations to audiences of approximately 6,417.

We conducted an aggressive public outreach program that carried the cleanup message to more than 46,000 Northwest citizens. Through the year-long "Hanford Visits Your Town" program, senior management helped inform five Washington communities about Hanford's new cleanup mission. Other targeted outreach programs convey our cleanup plans, problems, and opportunities to legislators and elected officials, business and labor groups, and agricultural, military, and medical audiences.

Approximately 3,000 Northwest citizens are regularly informed about Hanford's waste management and environmental activities through *Insight*, an issues-oriented Westinghouse Hanford newsletter introduced in March 1990.

We have produced additional fact sheets on timely waste management and environmental restoration issues. However, a number of improvements are still needed. There is still some concern voiced that the fact sheets are incomplete and biased. We will continue to strive to provide timely factual information.

We issued a separate comment response document and summary to respond to the public comments on last year's plan. We held four public meetings and two public workshops to solicit public comments on DOE's proposed changes to the Tri-Party Agreement. A listing of all comments was produced. The negotiations reflected public comments. In June, we will hold four more public meetings to explain how public comments were addressed in these negotiations. Also, we are offering another 45 days for public comment.

GOAL

Provide easy, open, and timely access to anyone on all old and new information about Hanford's wastes and cleanup. Seek to understand what information is desired and provide it freely. Strive to match the amount and complexity of the information with the needs of various people.

STATUS

Laws governing cleanup and permitting activities have provisions for public involvement. Most documents on those topics are available to the public for review, and comments and responses are addressed openly. The four information centers (Seattle, Spokane, Richland, and Portland) have been maintained, and information is available at these locations.

We recognize that existence of information centers does not solve many of the communication problems; nor is it always easy to find information at these locations. We try to quickly provide a copy of any public document requested by any individual. At times, we have learned key documents were missing, internal procedures delayed mailings to reading rooms, and the documents have been hard to find in the information centers. A major effort was recently undertaken to better organize and display material in the information centers. Library staffs were trained to maintain the displays properly. Periodic visits to all locations are planned to assure the information continues to be properly displayed and available.

We also recognize that making information publicly available sometimes is not enough. For example, information about the discharge of contaminated liquids, including SST waste, to the ground had been available to the public for some time. But it was scattered and hard to find. Efforts to address these issues are now underway.

In the past, there has been reluctance to release information. We are continuing to improve in this area. For example, tank safety information is made public soon after it is available. New information about past-practices will continue to come to light. Our challenge is to report events promptly today and to deal with the events and reporting practices of the past openly.

It is also important to release information in a timely manner. Our delay in releasing the 1989 Hanford Site environmental monitoring data is an example of our failure to institutionalize this aspect of culture change. This decision was made to assure quality and consistency. The delay is not consistent with the direction in which the DOE wishes to move.

We have made an effort to integrate information whenever possible. For example, when appropriate, information on the Five-Year Plan is made available at Tri-Party Agreement meetings. We've also included Five-Year Plan and other non-Tri-Party Agreement information in the *Hanford Update*.

We are trying to be more responsive to requests from citizen groups. Further improvements are still needed.

GOAL

Write all documents intended to be distributed to the general public to be easily understood. Place documents in the public reading rooms on major cleanup assessments, recommendations, or decisions that contain short summaries easily understood by the public.

STATUS

We continue to pursue this goal and can report some success. The summary and overview prepared for the site-specific plan was one of the first documents produced under the new culture that met this goal. Fact sheets on the issues of ferrocyanide and hydrogen in the HLW tanks were more understandable. Fact sheets and newsletters prepared to support the Tri-Party Agreement public involvement activities are written to be easily understood.

GOAL

Provide the news media with complete, factual, and timely information on issues of potential public interest.

STATUS

While we are still working on getting timely and concise information to the news media, we have some successes to report. Increased efforts were made in FY 1990 to assure the news media had adequate information on key, timely issues, such as the hydrogen buildup in the radioactive waste tanks. A few days before the site-specific plan public meetings were held, our technical and news media support staff visited news organizations to discuss the public meetings.

Because the release of information on past liquid waste discharges to the soil came after the news media had already reported it, our efforts were intended to ensure that the information released was complete and accurate and were a little slower than needed to support the public's desire for information. We must continue to show improvement in this area.

GOAL

Develop facts on potential health risks due to past radiation releases from Hanford and provide these facts to the public.

STATUS

The DOE is relying on the Hanford Environmental Dose Reconstruction project, which is covered in Section 6.4, to achieve this goal. This project is directed by the Technical Steering Panel, made up of independent experts. The Centers for Disease Control now manage the study. Preliminary dose estimates were released by the Technical Steering Panel in July 1990, completing the first phase of the multi-phase project. Releasing preliminary data is unusual at the Hanford Site and represents the direction the new culture is leading us.

Eight Indian reservations are located within 200 miles of the Hanford Site. Because their lifestyles are different from those of non-Indians, their uptake of radiation could be different, too. Thus, the researchers have set up contracts with experts and members of these eight tribes to gather information about their diets and lifestyles so doses can be estimated for them.

Staff at the PNL who are doing the technical work for the project are working closely with the Centers for Disease Control and the Fred Hutchinson Cancer Research Center on the Hanford Thyroid Disease study. Much of the information resulting from the dose reconstruction project will be shared with the thyroid disease study. The purpose of the thyroid disease study is to determine if the incidence of thyroid disease increased in the population near Hanford as a result of the Hanford Site radioactive releases. Public involvement and outreach is a significant component in both projects.

GOAL

Assure that all of our actions put protection of the environment, and human health and safety first. Reward people and organizations for protecting the environment, and human health and safety.

STATUS

Senior management in DOE and the contractors have made a strong commitment that the protection of the environment and human health and safety come first. The DOE and Westinghouse Hanford have reorganized to support the new mission of becoming DOE's flagship site for environmental cleanup.

Contractor management has communicated to employees that the Hanford Site's mission is to transform the Hanford Site into the nation's model for excellence in environmental management. Employees who have made advances in the environmental area or did something that improved occupational safety have received recognition.

Several contractors have appointed senior-level managers to address employee concerns, specifically, those related to safety and compliance with laws and regulations. Kaiser Engineers Hanford has created an employee hotline. The general manager reviews all hotline calls and assigns actions. At the conclusion of assigned actions, he signs all written responses to employees.

The DOE Tiger Team evaluation raised the concern that employees at Westinghouse Hanford were reluctant to use the Employee Concerns program. This program was developed to get safety and environmental concerns elevated to senior management if the concerns were not being resolved adequately at lower management levels. Westinghouse Hanford management recognized this reluctance and created the Clean Sweep program to encourage employees to raise any issues associated with health and safety, security, environment, or compliance. This activity is still underway.

There is still a concern that employees who raise concerns are not being heard and that some are being harassed. Several recent "whistleblower" incidents indicate that more intensive effort is still needed to assure that those who uncover weaknesses in management and operating systems receive positive reinforcement and rewards.

GOAL

Take positive measures to assure that changes are being driven within Hanford rather than by outside forces. Create a climate that fosters growth and changes. Keep the values that helped us succeed in the past. Develop new values to help us succeed in the future.

STATUS

Changes in priorities, in activities, and in the way we do business are occurring because of both internal and external forces. The key internal source of change has been our will to grow in strength, not merely in staff, budget, and levels of administration. A number of internally driven activities occurred in FY 1990. One of these internal activities was the review by the DOE Tiger Team. However, external forces still seem to drive many changes at the Hanford Site. There is a concerted effort to change this reactionary management style to one that takes the lead in setting the direction for the Hanford Site.

Many workers are unaware of the site values beyond placing first emphasis on safety. Several recently implemented sitewide programs focusing on environmental awareness are expected to redirect employee attention to the need to embrace the values consistent with our new mission. Our challenge is to uphold the strengths and correct the weaknesses, not to condemn every aspect of the old work force culture. One vehicle is the *Hanford Reach* newspaper which highlights cleanup successes.

We face a tremendous challenge in creating a climate that fosters growth and change. The regulatory environment in which Hanford now operates emphasizes compliance to regulations over innovation and change.

GOAL

Make every effort to do the right things right the first time.

STATUS

A Total Quality Program has been implemented site-wide. The stated objective of the program is "Doing the right things right the first time." Seminars on the subject of "Total Quality" have been extensively presented. Other specific examples may be found under other goals.

GOAL

Question how our current practices can be improved. Find new ways to solve problems. Encourage our people to be creative and to raise issues that need attention.

STATUS

The Tiger Team review is the best example of this activity. First, we conducted an intensive self-assessment. Then, a group of 91 outside experts reviewed all environmental, safety and management activities. A number of findings and observations were identified and an action plan to respond to them was prepared. See Section 6.3 for more details. This type of intense scrutiny will not stop with this one effort. The Hanford Site will continue to perform many internal audits (both within the contractor organizations and by DOE-RL and DOE-HQ staff). We will call in external experts when necessary.

A number of programs are in place to encourage employees to suggest ways to improve operations, reduce or avoid costs, to permit employees to raise any kind of concern through a number of channels, and to improve their skills, including communication skills, so that problems can be expressed to the proper management.

GOAL

Find new ways to reward and motivate Hanford workers.

STATUS

We are pursuing both new and old ways of motivating workers. "Team Hanford" was created to reward DOE and contractor employees for suggestions on ways to improve such concerns as safety, environmental responsibility, efficiency, at the site. Several of the contractors have also established awards programs for exemplary performance and ideas for improvement. The PNL established the "Director's Award for Excellence," an annual award to be given to the technical groups that have demonstrated sustained scientific and engineering excellence. In addition, Battelle Memorial Institute, which operates PNL for DOE, has instituted a program to reward inventors and innovators. Westinghouse Hanford has a program to reward employees for productivity improvement suggestions. An employee recognition program has been revised specifically to recognize environmentally related suggestions. Kaiser Engineers Hanford has created the Quality Productivity Improvement Award program. This program rewards employees for suggestions and implementation of improvements to process or programs within the company.

GOAL

Seek professional outside help when we do not have the expertise or solutions. Use technical peer review to ensure excellent work. Listen to others, including our critics. Learn from the successes and failures of others.

STATUS

The Hanford Research, Development, Demonstration, Testing, and Evaluation program has been implemented to assure the cost-effective development and application of environmental and waste management technology. A key role of the program is to collaborate with other DOE sites, other federal agencies, universities, and industry.

The intent of the collaborative effort is to ensure the appropriate and beneficial use of all technical resources in the country, and to avoid the "not-invented-here" syndrome.

In FY 1990 we both sought and received outside help with the tank safety issues. External reviews came from the Advisory Committee on Nuclear Facility Safety (Ahearne committee), the Defense Nuclear Facilities Safety Board, and a group with officials from Washington, Oregon, and EPA. This will be expanded in the future to cover other areas as well. The National Academy of Sciences plays a role in the peer review of the Hanford SST program. The academy routinely reviews program plans and proposed actions. We have received guidance from the 5-year plan working group. We will continue to seek additional advice.

GOAL

Recognize that we serve the public. Try to understand the public's concerns and desires. Strive to address those concerns and desires in our decisions and actions. Recognize that good technical solutions are a vital first step, but know that the public must have confidence in these solutions.

STATUS

We are improving in this area, with room for continued improvement. We have increased attempts to gain public input on cleanup activities at the Hanford Site. Nine public meetings were held in May and June 1990 on the site-specific plan (at the advice of the external working group). These were specifically held to gather additional public input into what needs to be done on the Hanford Site.

Quarterly public meetings on the Tri-Party Agreement are held in the Tri-Cities and at least one other city as a joint effort with DOE, EPA, and Ecology. This provides a valuable opportunity for Northwest citizens to get information on and give input to cleanup activities. People with alternative viewpoints are also given the opportunity to make presentations at these meetings. Periodically, workshops are held on specific subjects of interest (such as Tri-Party Agreement change request workshops held in March 1991). We will continue to hold workshops on special topics as needed.

GOAL

Take positive measures to assure that our organizations and people work together as a team with a "can do" approach to solving problems. Designate one person that is clearly and ultimately accountable for each program or problem. Delegate other persons with related or partial responsibility to work as a team under the leader's guidance.

STATUS

In the fall of 1990, DOE and its contractors formally announced the new cleanup mission for the Hanford Site. In order to better carry out this mission, reorganizations were implemented which were tailored to the elements of the mission. For example, both DOE and Westinghouse established dedicated organizations to deal with resolving tank safety issues.

The DOE is currently reevaluating their structure of contractors in support of the Hanford Site, along with other DOE facilities around the complex. Consideration is being given to bringing on a contractor to address environmental cleanup, separate from the site operating contractor.

GOAL

Be extremely self-critical. Find, face up to, and fix our problems. Get to the root causes of problems so that they do not recur. Anticipate potential problems and prevent them from happening.

STATUS

The Tiger Team review, mentioned earlier, is an example of self-criticism to improve the overall operation of the Hanford Site. The DOE purposely went out to find what the problems were and to identify those actions necessary to correct or improve operations. Once the tank safety issues were raised to top management, we have been self-critical in evaluating and addressing the issue. The Westinghouse Hanford employee focus group study looked at attitudes and actions needed to support Hanford's new mission, and implementation of the study's recommendations has begun.

Consistent with the Tiger Team mission of self-examination, Westinghouse Hanford has formed an internal Performance Assessment and Oversight group. It is chartered to assess the effectiveness of all elements of the company, including evaluating the companies effectiveness in proactively finding and correcting deficiencies and problems. This group reports directly to the Westinghouse Hanford President's office.

GOAL

Comply with the spirit, as well as the letter, of all laws and regulations designed to protect the environment, and human health and safety. Understand that complying with laws and regulations may not be enough. Look for reasonable ways to reduce risks further and address problems not covered by laws and regulations. Propose alternatives or changes to laws and regulations that prevent or hinder protection of the environment, and human health and safety or provide little or no benefit for the public funds expended.

STATUS

The Hanford Site continues to improve its compliance with all applicable laws and regulations. Our challenge lies in the fact that several applicable laws and regulations generate mixed interpretations of how to comply with their requirements. These require negotiations with Ecology or EPA to determine the appropriate application of the law. The Tri-Party Agreement defined the process and responsibilities for this. On a positive note, Westinghouse Hanford's office in Lacey provided substantial input to Ecology when it revised WAC 173-303, *Dangerous Waste Regulations* (Ecology 1987a). The Hanford Site is also represented on Ecology's Science Advisory Board, which provides technical review and recommendations on new or revised regulations for Ecology.

GOAL

Be a role model. Foster a climate of environmental, health, and safety awareness that influences people and organizations beyond Hanford.

STATUS

Though the Hanford Site has a long way to go, it has been a model for other Federal sites in terms of establishing comprehensive agreements, such as Tri-Party Agreement. The Hanford Site is also taking a very active role in the activities at the DOE-HQ level, by providing staff, expertise, and suggestions. A household hazardous waste pickup was sponsored in the Tri-Cities for Earth Day 1990 and 1991. Environmental awareness is increasing across the Hanford Site.

In 1988, Kaiser Engineers Hanford established a 5-year safety goal to reduce personnel injury rates by 20 percent per year. In the first 2 1/2 years, Kaiser Engineers Hanford reduced all injury incidence rates by at least 61 percent.

Many workers report that the emphasis on safety is greater at Hanford Site's than any other place they have worked. This goal will be achieved when every worker adopts these ethics.

6.2 HIGH-LEVEL WASTE TANK SAFETY ISSUES

6.2.1 Background

High-level radioactive liquid waste, a byproduct of the plutonium separation process at the Hanford Site, is stored in large underground waste storage tanks. The first generation of tanks, built between 1943 and the mid-1960's, were single-shell carbon steel tanks encased in concrete. Of the 149 SSTs constructed, the oldest have been in use for nearly 50 years. Sixty-six of the SSTs are either suspected, or known, to have leaked liquid radioactive waste to the ground, and the remaining tanks can be expected to start leaking in the future. The second generation of tanks was constructed using primary and secondary liners with an annulus between the two shells. Twenty-eight of these newer DSTs were built between 1968 and the mid-1980's; none have leaked.

Because several plutonium recovery processes have been used at the Hanford Site and because of past-process operations used in tank waste management, the chemical and radionuclides compositions of the waste in individual tanks are varied. Volumes and compositions were strongly dependent upon the chemistry of the separations process used in generating the waste.

Also, methods for treating the waste in the tanks have had major impacts on the composition of the tank contents. These treatment methods have included the recovery of uranium, the separation and removal of high-heat-generating radioactive isotopes, and the concentration of the radioactive waste by evaporation of the water to crystalize the waste as a saltcake. Mixing of the waste tank content resulted from transferring solutions and slurries between tanks and tank farms during waste processing operations.

The management and handling of the liquid radioactive waste at the Hanford Site over the last 40 years has resulted in nearly 226 million liters (60 million gallons) of radioactive liquid, sludge, and saltcake being stored in 177 underground waste storage tanks. The objective is to store this waste safely and without any further insult (release) to the environment until final disposal of the high-level radioactive waste can take place.

The drainable liquid that could leak to the environment is that liquid standing above the solids as well as that liquid contained within the sludge and saltcake that can be pumped out of the tank. With the drainable liquids removed from a tank, little liquid should remain to leak to the ground. For those SSTs that have been interim isolated (94 SSTs) most of the drainable liquid has been pumped out (saltwell pumping) and the liquids transferred to the DSTs. Current program calls for interim isolation of the remaining 55 SSTs by pumping the drainable liquids. Pumping of SSTs containing ferrocyanide is currently on hold, pending safety analysis to determine the best course of action.

6.2.2 Waste Tank Safety Issues and Priorities

Twenty-three safety issues have been identified at this time. Table 6-1 provides a summary listing of the 23 safety issues along with the affected tanks, expected completion dates and the corresponding ADS numbers for resolving and remediating each safety issue. Where action plans may not support milestones established by the Tri-Party Agreement, either work-around alternatives to meet the Tri-Party Agreement dates must be found or renegotiations with the EPA and Ecology must establish new Tri-Party Agreement milestones.

Identification and assignment of priorities to the high-level radioactive waste tank issue started with identification in 1989 of waste tanks containing potentially high amounts of ferrocyanide and, later that year, tanks potentially accumulating and periodically vent flammable concentration of certain gases. Subsequently, nine other issues were identified and added to the list by May 1990. Since that time other issues have been added as they have surfaced during many technical reviews. As of April 1991, from this list of issues, including environmental issues, 23 safety issues directly associated with high-level radioactive waste and operating tank farm facility safety have been identified for resolution.

Table 6-1. Hanford Site Waste Tank Safety Issues. (sheet 1 of 2)

Safety issues description	Number of tanks			Completion date
	DST	SST	Total	
Priority 1 ^a				
1. Flammable gas generation in Tank 101-SY and other tanks. (ADSs 9123, 9853, 9854, 9855, 9806, and 9808)	5	18	23	9/00
2. Potential explosive mixtures of ferro-cyanide in tanks. (ADSs 9850, 9853, 9854, 9855, and 9806)	--	24	24	3/02
3. Potential organic-nitrate reactions in tanks. (ADSs 9852, 9853, 9854, 9855, and 9806)	--	8	8	9/99
4. Continued cooling required for high-heat generation in Tank 106-C. (ADSs 9852, 9853, 9854, 9855, and 9807)	--	1	1	9/98
Priority 2				
1. Insufficient tank contents characterization to support evaluations. (ADS 9853)	A11	A11	177	9/98
2. Inadequate safety documentation. (ADS 9853)	A11	A11	177	3/99
3. Tank safe operating life. (ADS 9853)	A11	A11	177	9/96
4. DST space requirements. (ADSs 9851 and 9806)	A11	A11	177	9/00
5. Upgrading of operations, equipment, and facilities.				9/00
a. Improvement in conduct of operations. (ADS 9100)	A11	A11	177	9/93
b. Lack of plant-essential drawings. (ADS 9804)	A11	A11	177	9/00
c. Maintenance and upgrades of tank farm facilities and equipment. (ADSs 9803, 9805, and 9806)	A11	A11	177	9/98
d. Instrument upgrades in SSTs and DSTs. (ADSs 9805 and 9806)	A11	A11	177	9/00
e. Tank toxic vapor releases. (ADS 9108)	A11	A11	177	9/97

Table 6-1. Hanford Site Waste Tank Safety Issues. (sheet 2 of 2)

Safety issues description	Number of tanks			Completion date
	DST	SST	Total	
5. Upgrading of operations, equipment, and facilities. (continued)				
f. Leaking S-302-A catch tank. (ADS 9805)	3	83	86	9/91
g. Inadequate SST leak-detection systems ^b . (ADS 9108)	--	A11	149	9/99
h. SST emergency pumping. (ADS 9305)	--	17	17	9/94
i. Response to a leaking DST. (ADS 9108)	A11	--	28	12/94
Priority 3				
1. SST sealing to prevent intrusions ^b . (ADS 9305)	--	A11	149	9/06
2. DST safety upgrades.				6/02
a. Transfer line concrete encasement integrity and secondary containment compliance. (ADSs 9119 and 9806)	A11	A11	A11	6/02
b. AZ Tank Farm ventilation line. (ADSs 9810 and 9806)	2	--	2	9/97
c. Excessive hydroxide consumption in Tank 107-AN. (ADSs 9109 and 9851)	1	--	1	9/96
d. Improved leak detection in DSTs. (ADS 9108)	A11	--	28	9/99
e. Inter-tank ventilation connections. (ADS 9851)	A11	19	47	9/96

NOTE: Completion dates are based on DOE FY 1993 Activity Data Sheets, Preliminary Unvalidated Case.

^aSee Section 6.2.2 for descriptions of priority criteria.

^bIssues that could possibly be interpreted as environmental concerns.

DST = double-shell tank
SST = single-shell tank.

The list of safety issues was developed using the following priority criteria as specified by the High-Level Waste Tank Safety Task Force:

- Priority 1--Issues and/or situations that contain most of the necessary conditions that could lead to worker (onsite) or offsite radiation exposure through an uncontrolled release of radioactive waste; for example, Tank 241-SY-101 (referred to as Tank 101-SY).
- Priority 2--Issues and/or situations that present (or contain) some of the necessary conditions that could lead to an uncontrolled release of radioactive waste under extreme assumptions.
- Priority 3--Issues and/or situations that could lead to the future release of radioactive waste if the tanks are viewed as intermediate storage (5 to 30 years) of high-level radioactive waste; for example, corrosion and/or leakage, operating practices, and buried single-wall transfer lines.

At this time, particularly for the Priority 1 safety issues, there are insufficient data and analysis of the waste to understand the phenomena that are occurring and what remedial methods are appropriate. Also, criteria as to what constitutes acceptable risk and what constitutes closure of the issue cannot be completely defined until a better understanding of the problem is known. Therefore, alternatives and interim remedial actions for many of the safety issues are speculative at this point. However, the alternatives and the actions discussed are believed to be bounding for resolution of the issues.

Resolution of some waste tank safety issues could require out-of-tank treatment or pumping of liquids and dilution of waste. Because of the long lead time required to develop retrieval systems, or procure additional storage tanks and treatment facilities, DOE has asked Westinghouse Hanford to start conceptual design efforts in FY 1991 for possible treatment units and storage tanks to address the hydrogen and ferrocyanide issues. Pending results from on-going studies, which will be fully integrated with final disposal planning, the DOE might pursue expedited Congressional approval to build the necessary facilities to remediate these priority safety issues.

6.2.3 Priority 1 Safety Issues

The first four safety issues are Priority 1. (See Section 6.2.2 for descriptions of priority criteria).

6.2.3.1 Accumulation of Flammable Gases in Tank 101-SY and Other Tanks. Five DSTs and 18 SSTs have been identified as having a significant potential for flammable gas accumulation, entrapment below the crust layer, and periodic gas releases. The presence of a flammable gas mixture and an ignition source simultaneously pose the potential for a fire or explosion and could lead to an increased risk of the release of radioactive waste. Of lower potential risk is an unfiltered release of radioactivity to the environment from overpressurizing the ventilation system during a periodic gas venting. The waste tank that has been the most active, Tank 101-SY, has released, during

several of its venting periods, concentrations of hydrogen that for a short period of time exceeded the minimum amount necessary to support combustion. During these releases, overpressurizations have been measured without resulting in any contamination spread. The venting of gases is expected to reoccur periodically until some form of remediation is taken. Until then, operational restrictions have been imposed for the 23 waste tanks to reduce the potential for sparks and ignition sources.

The worst possible consequence is a hydrogen fire or explosion which could ignite the waste crust (if it is indeed flammable), leading to larger releases of radioactive waste. This is believed to have a low probability of occurring because there are no known ignition sources in the tanks and temperatures are well below those required to start chemical reaction.

Several options are being considered to remediate the flammable gas issue: (1) dilute and circulate the waste in situ, (2) transfer a portion of the waste to other DSTs and then dilute and circulate it in the affected tanks, (3) increase ventilation to remove gases faster, (4) stir and/or mix to release gas bubbles, and (5) heat or use ultrasonic devices to release trapped gas bubbles.

It is expected to take more than 4 years to develop and install new instrumentation, obtain and characterize in-tank core samples, and complete NEPA documentation to support the remedial actions. Remedial actions, to eliminate accumulation and/or generation of flammable gas mixtures, may require complete ventilation replacement, additional DST space for diluting the waste, or sophisticated waste treatment processes to be developed, engineered, constructed, and operated for remediation of all 23 high-level radioactive waste tanks that accumulate flammable gases. Meanwhile, near-term efforts will be directed towards emergency preparedness planning and eliminating the cyclic releases of flammable gas mixtures by ultrasonic nucleation, stirring, dilution, transferring or some other method so that the gases generated within the waste tank will be continuously released at concentrations within safe limits.

6.2.3.2 Potential Explosive Mixtures of Ferrocyanide in Tanks. Twenty-four SSTs may contain appreciable amounts of ferrocyanide precipitates (1,000 g-moles [465 pounds] or greater). Estimated ferrocyanide content of the 24 tanks ranges from 1,000 g-moles (465 pounds) to approximately 200,000 g-moles (93,000 pounds) in Tank 241-BY-104 (referred to as Tank 104-BY). During the early 1950's, to quickly obtain additional waste storage volume, a process was developed to reduce radionuclides concentration in the free-standing liquid tank wastes to levels low enough to permit disposal of the liquid to the soil. This process involved the addition of ferrocyanide to the tanks to precipitate radioactive cesium out of the liquid. Ferrocyanide salts in the presence of nitrate and/or nitrite constituents (which these tanks contain) can react and detonate under certain conditions, which include dryness, proper chemical concentration and mixture, and elevated temperatures or a high-energy spark. Reactions can occur at 285 °C (545 °F). Organic materials (which some of these tanks probably contain) can cause an exothermic reaction to begin in the temperature range of 180 to 200 °C (360 to 430 °F).

A recently completed General Accounting Office-sponsored study postulated dose consequences that were two orders of magnitude greater than stated in the HDW-EIS (DOE 1987b) for the "worst-case" accident. Such a release is believed to have a low probability of occurring even from a localized "hot-spot" because the maximum temperatures measured inside the ferrocyanide tanks at the Hanford Site are at or below 60 °C (140 °F), thus providing a significant margin of safety. Tank temperatures have also been declining at a little less than 2 °C per year as the tank fission products continue to decay.

Several options are being considered to remediate the ferrocyanide issue: (1) remove the waste and separate, deactivate, or remove the reactive waste constituents, such as the oxidizer material (nitrates and/or nitrites) or the ferrocyanide, (2) provide a new ventilation system that will ensure adequate flow rates, filtration, and exhaust monitoring for these tanks, and (3) demonstrate that the risk of an exothermic reaction is acceptably low and, consequently, no remediation is required.

It is expected to take 3 to 4 years to develop and install new instrumentation, obtain and characterize in-tank core samples, and complete a supplemental EIS to implement the remedial actions. Remedial action will require new ventilation systems and ultimately may include a new processing facility to separate and treat the potentially reactive constituents of the waste. Meanwhile, near-term efforts to determine if the tank constituents are stable, and will remain so for a long period of time, include accident modeling, risk analysis, issue closure criteria, safety evaluations, chemical reaction studies, enhanced tank monitoring and modeling, waste characterization, and emergency preparedness planning. Also, work is planned to ensure that temperatures measured at various points in the tank are representative of the entire tank contents. This will further ensure that the tank contents are maintained well below temperatures that can cause exothermic reactions.

6.2.3.3 Potential Organic-Nitrate Reactions in Tanks. Eight SSTs may contain unacceptable concentrations of organic chemicals (e.g., more than 10 dry weight percent sodium acetate equivalent). The chemical identity and accurate concentrations of organic materials in the listed SSTs materials is not known at present. However, very concentrated organic could support an exothermic reaction at temperatures greater than 180 °C (356 °F).

Under a worst-case scenario involving significant overheating (greater than 180 °C [356 °F]) of waste in the tanks, it may be postulated that a mixture of organic-nitrate/nitrite solids might react rapidly, possibly damaging the tank and leading to releases of radioactive materials to the environment. This is believed to have a very low probability of occurring, since the margin between minimum ignition temperature and measured tank temperatures is very large.

Three options are being considered to remediate the organic-nitrate issue: (1) demonstrate that the probability of an explosion is acceptably small and that no action is required, (2) remove the waste and separate, deactivate, or remove some of the waste constituents such as the oxidizer material nitrates and/or nitrites) or the organic constituents, and (3) provide a new ventilation system that will ensure adequate flow rates, filtration, and exhaust monitoring for these tanks.

It is expected to take up to 6 years to develop and install new instrumentation, obtain and characterize in-tank core samples, develop issue and closure criteria, and complete a NEPA document to support the remedial actions. The remedial actions will require a new ventilation system and may ultimately require a new processing facility to separate and treat the potentially reactive constituents of the waste in these eight tanks. Meanwhile, near-term efforts will be required for emergency preparedness planning and to determine if the tank constituents are stable, and will remain so for a long period of time, include determining both the conditions for ignition of organic-nitrate and/or organic-nitrite mixtures and the degree of potential for ignition of organic-nitrate and/or organic-nitrite mixtures from radiolytic or chemical heating of the saltcake mixture. Also, work is planned to map the temperature profiles of the entire tank contents. This will further ensure that the tank contents are maintained well below the minimum temperatures that cause exothermic reactions.

6.2.3.4 Continued Cooling Required for High-Heat Generation in Tank 106-C. Tank 241-C-106 (referred to as Tank 106-C) is a 2-million-liter- (530,000-gallon-) capacity SST. The tank has been used for high-level radioactive waste storage since mid-1947 and currently is approximately half full of waste. During the late 1960's, a program to recover heat-generating strontium and cesium from high-level radioactive waste in some of the SSTs inadvertently transferred some of the heat-generating sludge to Tank 106-C. Since mid-1971, water has been added periodically to Tank 106-C to keep the sludge wet and to promote heat removal by evaporative cooling to the vapor space. The cooling water is in addition to the other drainable liquids in the tank.

If Tank 106-C should leak, the addition of cooling water could increase the amount of leakage to the ground. If cooling water additions to the tank are stopped, the sludge will heat to temperatures greater than established limits and may cause tank structural damage, possibly leading to dome collapse and an unacceptable radioactive release to the environment. Also, a Tri-Party Agreement milestone has been established to remove all the drainable liquid (which would eliminate the use of cooling water) and interim isolate Tank 106-C by September 1996. Tank 106-C is currently considered to be sound and has not been declared to be leaking.

Two options are being considered to remediate this safety issue: (1) partially remove, to DSTs, enough of the tank contents to reduce heat generation in Tank 106-C to an acceptable limit, and (2) provide a mechanical means of cooling the radioactive waste. The first option is currently the preferred alternative; however, additional DST space would be required for dilution of the removed waste.

It is expected to take up to 5 years to develop and install additional instrumentation, obtain and characterize in-tank core samples, and complete a NEPA document to support the remedial actions. For the near-term emergency preparedness plans will developed. The remedial actions to control the heat generation in Tank 106-C may require significant tank ventilation upgrading, additional DST space for diluting the waste, and a waste tank retrieval

system, which has yet to be developed, prototyped, tested, produced, and operated. The remedial actions might, instead, require the development, testing, and production of a mechanical cooling system.

The Tank 106-C high-heat safety issue of interim remediation is expected to be completed by the end of FY 1998.

6.2.4 Priority 2 Safety Issues

There are 13 Priority 2 safety issues (see Section 6.2.2 for descriptions of priority criteria). The first four are standalone issues and are covered individually. The remaining nine safety issues have been combined since they are all part of the upgrading of operations, equipment, and facilities.

6.2.4.1 Insufficient Tank Contents Characterization to Support Evaluations.

Knowledge of the chemical contents of the SSTs and DSTs is necessary to ensure that appropriate safety precautions and preventive measures are taken while operating the tank farms. In the past, in-tank core sampling and characterization has focused on select chemicals and radionuclides necessary to support operations, without fully understanding the total chemistry and waste chemical stability of the tank contents. Characterization is required to assess the chemical and radiological hazards that may be present, to better understand the mechanisms in which the tank contents will interact with new wastes, to prepare interim remediation measures for the identified safety issues, and to prepare all the tanks for final disposal. Additional in-tank core sampling and studies of basic tank chemistry will be necessary.

An integrated (waste tank safety, Tri-Party Agreement, and final disposal requirements) in-tank core sampling plan to define sampling needs, priorities, and laboratory capabilities and limitations will be issued. It will present a proposed order to sample the tanks to resolve safety issues and other critical data needs in an optimal manner. The plan will call for resampling many of the tanks previously sampled, sampling previously unsampled tanks to adequately address information shortfalls associated with solving potential safety issues, for samples to support remediation and alternative disposal selection, and for samples to update and/or validate safety analyses and performance assessments results.

In-tank core sampling to determine remediation actions for Priority 1 safety issues will be completed first. It is expected that all of the DST in-tank core sampling will be completed within 4 years and that all of the SSTs will have had at least two core samples per tank completed within 8 years (a Tri-Party Agreement milestone).

6.2.4.2 Inadequate Safety Documentation.

Multiple safety analysis reports, operational safety requirements, and hazard identification and evaluation reports currently exist for the SSTs, DSTs, aging waste tank farm facilities, and the two waste evaporator facilities. These documents do not adequately define an envelope for the safe operation of the waste tanks. Additionally, these documents do not meet today's documentation standards as defined by current DOE orders and Westinghouse Hanford requirements. Significant changes have occurred in the requirements for the preparation, format and content, and

risk assessment methodologies associated with safety analysis reports since the preparation of the existing documentation (safety analysis reports issued before 1987). Conclusive evidence of safely designed facilities is not represented in the current safety analysis reports. Consolidation and revision of these documents are required to (1) establish a safe operations envelope as determined by hazard and accident analyses in The Safety Analysis Report (or its revision) and (2) ensure uniformity with ongoing safety issues and/or documents.

It is expected that the existing safety analysis reports can be consolidated and reissued as five upgraded safety analysis reports for SSTs, DSTs, aging waste facilities, and two waste evaporator facilities.

6.2.4.3 Tank Safe Operating Life. The Hanford Site SSTs have exceeded their original design life, and the early DSTs are fast approaching their technical specification operating life. Data on the long-term structural stability of the tanks is inadequate. Available information on the condition of the waste tank structures is limited. The final waste disposal of the SSTs is scheduled to be completed by the year 2018, putting the life of the oldest tanks at approximately 75 years of age. The primary liners of approximately half the SSTs have already leaked, and all SSTs should be considered potential leakers. All DSTs will be required to contain chemically and radioactively hazardous materials beyond their design lives (50 years) under present operational and disposal plans. No DST liner has leaked to date, but original corrosion studies indicate that a liner could start leaking before planned disposal operations are completed.

A performance review is required to determine the consequences of storing the waste for a longer period than was originally planned. Tank collapse scenarios, in particular as they relate to seismic events, could lead to significant onsite radiological releases and potentially significant offsite releases. A specific measurement regime will be developed and implemented to detect potential structural problems. A tank life expectancy analysis, which will include computer analysis as well as laboratory and field measurements, will be performed to provide reasonable lifetime estimates for the waste tanks. If the findings from these analysis do not support the current schedule for final waste disposal, then new replacement tanks or final disposal acceleration options will be investigated.

6.2.4.4 Double-Shell Tank Space Requirements. Inadequate DST space exists to meet waste management needs and to provide adequate contingency space. More space is required to keep different types of waste segregated, to continue to saltwell pump drainable liquids from SSTs to DSTs, for possible remediation of safety issues by waste transfers into DSTs (for example, as a result of the need to dilute waste), for new waste generation from site cleanup, and for dedicated (reserved) space to pump waste from a leaking tank. Additional tanks are also required to stage feed for final disposal.

Additional DST space is critical to the continued safe operation of high-level radioactive waste management at the Hanford Site. Because of the potential need for out-of tank treatment for waste remediation, additional storage to support new treatment facilities will be required. The need is pressing for support to the flammable gas and ferrocyanide safety issues, and

the construction of new tanks needs to be expedited to meet their corrective action needs. To remediate this situation, an integrated requirements study has been requested by DOE to be performed on an accelerated basis to identify all the tank capacity requirements for additional DSTs, both near-term and long-term. When the requirements are known, the necessary front-end engineering studies, including NEPA documentation, will have to be prepared, and approval obtained from Congress to expedite the construction. This will be followed by the design, construction, and startup of new tanks.

6.2.4.5 Upgrading of Operations, Equipment, and Facilities.

- a. Improvement in Conduct of Operation. As judged by several recent reviewers, tank farm performance in the conduct of operations is currently considered poor. Several improvements involving procedures and training are being implemented. Ultimately, the training will meet requirements for accreditation in accordance with DOE orders.
- b. Lack of Plant-Essential Drawings. The tank farm drawings have not been maintained to an as-built state in compliance with DOE orders. It is estimated that approximately 50 percent of the 8,000 drawings pertinent to tank farms require upgrading. Without the correct drawings, operations, SST pumping, facility and equipment upgrades, and the safety issue remediation efforts may be adversely impacted and delayed.
- c. Maintenance and Upgrades of Tank Farm Facilities and Equipment. Past maintenance practices have not adequately maintained the facilities and equipment. Many of the waste tank farm facilities and equipment are old (approaching 50 years of age), degraded, and unreliable. Many facilities do not meet current design requirements. A major upgrade (repair and/or replace) effort is required to place existing equipment in acceptable condition and bring all equipment and facilities into compliance with current regulatory requirements.
- d. Instrument Upgrades in Single- and Double-Shell Tanks. Instrumentation such as liquid-level gauges, leak detection systems in process pits, and radiation monitors require much maintenance and are often out of service or fail. Spare parts are unavailable. Tank monitoring instrumentation must be upgraded to meet today's safety and operating requirements and to produce early warnings of unacceptable behavior and to detect the onset of an out-of-specification tank. This instrumentation is required to be fully operational as soon as possible and be maintained operational until final disposal of the waste in the tanks has been completed. Enhancements are needed in the areas of temperature measurement, liquid-level monitoring, gas flow rates, in-tank gas analysis, surface-level measurements, tank pressure measurements, visual observation, tank integrity, crust topography, and specialized in situ chemical and radiological analysis.

- e. Tank Toxic Vapor Releases. Gases that pose health hazards may be present in the waste tank vapor spaces and, ultimately, the work spaces. Tank vapor sampling will be implemented to define the scope of the problem, and methods for mitigating the consequences of toxic releases will be implemented. The focus at the beginning will be the tanks identified by the Safety Measures Law.
- f. Leaking S-302-A Catch Tank. The S-302-A catch tank is leaking. This tank provides secondary containment to a diversion box that is at the common point for many onsite waste transfer routes in support of waste management, plant, and essential laboratory operations. The long-term solution is to replace the catch tank. Near-term remediation has been accomplished through development of a waste truck transfer capability to support the laboratory and the ongoing repair of the catch tank through the use of a unique grout material.
- g. Inadequate Single-Shell Tank Leak Detection System. For SSTs that do not have free-standing liquid above the solids, the current type of liquid-level conductivity probe is ineffective, making it nearly impossible to determine if a tank has begun to leak. Some tanks have had liquid observation wells installed through the tank solids to find the interstitial liquid level within the tank solids. Currently, 18 tanks are awaiting liquid observation well installation. The wells typically can detect a minimum liquid loss of 7,600 liters (2,000 gallons). Leak detection systems, consisting of dry wells external to the tanks, are routinely used, but they are only able to detect leaks typically in excess of 26,000 to 38,000 liters (7,000 to 10,000 gallons). Liquid leak detection improvement capabilities that will meet the RCRA requirements are being investigated. Meanwhile, the liquid observation well appears to be the best available leak detection system and will be installed within those SSTs that do not contain free-standing liquids above the solids.
- h. Single-Shell Tank Emergency Pumping. Currently, 17 SSTs contain drainable liquid waste that could not be pumped out in response to a leak because either the transfer lines do not exist or the transfer routes would be through nonapproved receiver tanks. For those cases where no transfer routes exist, equipment and procedures will be developed and demonstrated for overground transfers and a safety assessment performed for use in an emergency situation. Receiver tanks will be upgraded, tested, and approved for use.
- i. Response to a Leaking Double-Shell Tank. The emergency response to a leaking DST is marginal. A leaking DST could continue to leak into the annulus until the liquid waste can be removed. The tank must be emptied quickly. Studies are scheduled to determine methods to speed up the transfer of waste from one DST to another. Dedicated equipment will be established with approved procedures for immediate operation of emergency pumping.

6.2.5 Priority 3 Safety Issues

There are six Priority 3 safety issues (see Section 6.2.2 for descriptions of priority criteria). One of the safety issues is for upgrading SSTs only, to prevent liquid intrusions into the tanks while the remaining five are related primarily to DSTs and are generically safety upgrades for DSTs.

6.2.5.1 Single-Shell Tank Sealing to Prevent Intrusions. The sealing of SSTs (interim isolation) is a complex process that is designed to prevent intrusion of liquids such as rainwater from entering the tanks after drainable liquid has been removed. For reasons not yet fully understood, the interim isolation process has not been completely successful in preventing all intrusions into these tanks. Studies will be performed to determine why some liquid intrusions are still occurring in interim-isolated tanks, and then additional methods to eliminate intrusions will be evaluated for implementation.

6.2.5.2 Double-Shell Tank Safety Upgrades.

- a. Transfer Line Concrete Encasement Integrity and Secondary Containment Compliance. Deficiencies in meeting the secondary containment requirements exist for storage and transfer systems. Specific deficiencies exist relative to DST integrity assessments, transfer piping, diversion boxes, valve pits, ventilation systems, and pump pits. Integrity assessments will be performed on the DST systems to ensure that the tank systems are fit for use. Replacements of existing transfer facilities will be evaluated and recommendations for secondary containment will be implemented. Also, concrete encasements that were used for many years as a secondary containment for underground transfer lines will be replaced by pipe-in-pipe systems.
- b. AZ Tank Farm Ventilation Line. In the process of installing a sampling port (welding) in an underground ventilation line for the 241-AZ Tank Farm (referred to as AZ Tank Farm), cracking was observed in the stainless steel pipe. If the ventilation line fails, causing a ventilation failure, cooling of tank contents would be severely hampered, which could result in a structural failure and a release of radioactivity to the environment. In addition, cracks elsewhere in the ventilation line could be releasing contamination to the soil. The cause of the problem is not fully understood at this time. Potential solutions to be implemented range from patching or replacing a section of the ventilation line to a major line item for replacing the ventilation header.
- c. Excessive Hydroxide Consumption in Tank 107-AN. For the past several years Tank 241-AN-107 (referred to as Tank 107-AN) has been out of specification for hydroxide concentration. Compliance with the specification is necessary to limit corrosion so that the design life of the tank can be met without primary liner failure. Alternative techniques are being reviewed to determine how caustic can be added to the tank and ensure mixing.

- d. Improved Leak Detection in Double-Shell Tanks. Leak detection experience at the Savannah River Site has shown that some DSTs have developed incrustations indicating pinhole weeping of the inner liner, which was detectable only by annulus photographic inspection of the inner liner. Current Hanford Site DST practices do not include any routine visual inspection of the inner wall. In addition, unlike the Savannah River Site DSTs, only a portion of the Hanford Site DST inner walls can be visually inspected with the currently available equipment and annulus access. However, it is believed that leak detection systems for the Hanford Site DSTs, which include conductivity probes at various intervals in the annulus, liquid-level monitoring in the primary tank, radiation continuous air monitors in the annulus outlet ventilation system, and a leak detection pit outside the secondary containment, provide adequate leak detection. Nonetheless, a finite possibility exists for a small undetected leak in a Hanford Site DST to go unnoticed by current leak-detection equipment. Therefore, photographic coverage of the inner liners of the DSTs, from currently available access ports, will be made to determine if any leaking has taken place from any point that can be observed. The results of this investigation will determine if more risers should be put in place to obtain 100 percent coverage.
- e. Intertank Ventilation Connections. All of the DSTs (and some of the SSTs) are on active interconnected ventilation systems that do not have filtered inlets. Any event within one of the tanks that causes air expansion in excess of the ventilation system capacity results in pressurization of that tank and potentially of the interconnected tanks. Under such conditions, potentially contaminated radioactive effluents could be forced out through ventilation system inlets, process drains, and instrument penetration ports. Methods to add filters to the inlets and isolate the non-gas-generating tanks from the gas-generating tanks or eliminate the gas-generating mechanism in the tanks are being evaluated for implementation.

6.3 TIGER TEAM ASSESSMENT

On June 27, 1989, Secretary of Energy, James D. Watkins, announced a 10-point initiative to strengthen safety, environmental protection, and waste management activities at the DOE's production, research, and testing facilities. In support of the 10-point initiative, the Secretary established independent "Tiger Teams" to assess compliance at DOE facilities. The assessments are onsite, independent reviews of DOE environment, safety, and health programs to ensure compliance with applicable Federal, State, and local regulations; permit requirements; agreements, orders, and consent decrees; and DOE orders. In addition, the Tiger Teams assess DOE operations for conformance with applicable "best" and "accepted" industry practices and the adequacy of DOE and site contractor management programs.

A Tiger Team Assessment was conducted at the Hanford Site, including the DOE-RL and its contractors Westinghouse Hanford, PNL, Hanford Environmental Health Foundation, and Kaiser Engineers Hanford from May 21, 1990 to July 18,

1990. The Hanford Tiger Team consisted of three subteams: (1) Safety and Health, (2) Environmental, and (3) Management and Organization. The Safety and Health assessment included a comparison of worker safety conditions to Occupational Safety and Health Administration standards for industrial safety and health.

The Hanford Tiger Team presented its findings to DOE-RL on July 18, 1990, at which time the Hanford Site received a written report, *Tiger Team Assessment of the Hanford Site*, (DOE 1990f) documenting the findings and concerns made by the Tiger Team.

There were 21 Management and Organization findings, 84 Environmental findings, and 266 Health and Safety findings. None of these resulted in stopping work. The Hanford Tiger Team used established criteria to categorize its findings and concerns. There were no Category I concerns indicating a situation for which "a clear and present danger exists to workers or members of the public." There were nine Category II concerns indicating a situation of significance and urgency such that the necessary field response should not be delayed until the preparation of a final report or the routine development of an action plan. The team's draft report noted that all nine issues, which required immediate attention, have been addressed. The remainder of the concerns (Category III) address noncompliance with DOE orders or needs for improvement, where there is not sufficient urgency to require immediate attention.

With regard to the Hanford Site's environmental concerns in particular, the team chose six findings to summarize their nature and scope.

- Long-term storage of radioactive and mixed wastes at the Hanford Site tank farms and the low-level burial grounds presents a potential threat to the environment.
- Clear definition of roles and responsibilities for management and quality assurance of Tri-Party Agreement activities, and independent verification of Tri-Party Agreement cost projections are lacking.
- Current and past waste disposal practices at the Hanford Site have contaminated the groundwater onsite and potentially offsite, and Hanford has not adequately defined the vertical and horizontal groundwater flow regimes.
- Westinghouse Hanford and PNL sitewide radiological monitoring programs and radioactive air emissions monitoring programs lack formality.
- Radioactively-contaminated surface soil areas are expanding at a rate even greater than the stabilization and cleanup rates.
- Environmental quality assurance and quality control programs are inadequate.

The Hanford Site prepared the *Hanford Site Preliminary Action Plan* (DOE 1991a) responding to the *Tiger Team Assessment of the Hanford Site*

(DOE 1990f). The Action Plan, prepared by DOE-RL and its contractors, provides specific responses to the 371 Findings and Concerns of the assessment. Individually, the responses and planned actions are focused and integrated at the facility and operational level. Thorough site-wide programmatic integration is occurring. Planned actions are being tracked through completion by individual contractors and the DOE-RL.

The Hanford Site also carried out a root cause analysis of the assessment findings and concerns to identify common bases and contributing factors. The activities identified in the Action Plan should not only correct the specific concerns and findings identified by the Tiger Team assessment, but also correct root causes that may be impacting operations sitewide.

6.4 HANFORD ENVIRONMENTAL DOSE RECONSTRUCTION PROJECT

The purpose of the dose reconstruction project is to estimate the radiation doses that people may have received from release of radioactive materials from the Hanford Site. The project is directed by an independent, 18-member panel consisting of representatives of various scientific disciplines, Native Americans, members of the public, and the States of Washington and Oregon. The project is expected to be completed in 1994.

On July 12, 1990, the project released the Phase I reports. The purpose of Phase I was to determine the feasibility of reconstructing doses. Preliminary estimates of the radiation doses people residing in a 10-county area surrounding the Hanford Site from exposure to site emissions of iodine-131 to the atmosphere from 1944 to 1947, and for populations exposed to radioactive materials released to the Columbia River from 1964 to 1966. Among the preliminary results are the following:

- Some infants may have received a radiation dose to the thyroid as high as 2,900 rad. This radiation dose would have come from drinking milk with a radioactive form of iodine called iodine-131. Infants and children who drank milk from cows that ate pasture grass in areas generally downwind from the Hanford Site may have accumulated some of the highest doses. Milk was the most important route of exposure to iodine-131. The exposure was received gradually over the 3-year period.
- Only a small number of people could have been exposed to such high doses, and the probability that any of them actually received such a dose is low. The children who may have received high doses would be adults in their mid- to late-40's today.
- Five percent, or about 13,500 of the 270,000 people living in 10 counties around the Hanford Site in the mid-1940's, may have received more than 33 rad during 1944 to 1947.
- Most of the 270,000 population would have received much smaller doses. Fifty percent received doses below 1.7 rad.

- Dose from exposure to river water was much lower than from the iodine releases.

The rad measurement is not the same as the rem effective dose equivalent measurement. The rem effective dose equivalent puts different types of radiation doses to different organs on an equivalent basis in terms of the potential health risk. One rad of dose to the thyroid equals about 1/30 rem effective dose equivalent.

The study was designed only to estimate past doses and does not attempt to link specific health effects to dose levels. A separate, Congressionally funded epidemiology study by the Centers for Disease Control is underway to determine whether a link exists between airborne iodine-131 from the Hanford Site and the incidence of thyroid disease in local populations.

Researchers reconstructed several types of historical information to estimate doses: (1) amounts and types of radionuclides emitted from Hanford Site facilities, (2) transport patterns and amounts of radionuclides that travelled through the environment in air and water and concentrated in vegetation and fish, and (3) demographic, agricultural, and food consumption patterns that affected peoples' exposures to radionuclides. The most significant exposure pathway was to infants drinking milk from cows that ate pasture contaminated by airborne iodine-131.

The project, established in 1988, is managed by PNL under the direction of an independent Technical Steering Panel of national experts. The DOE has funded the project under the landlord program (ADS 1009) but provided no technical direction or oversight. Management of the program has been transferred to the Centers for Disease Control, which will be funded by DOE-HQ. The Technical Steering Panel will continue to direct the technical program conducted by PNL.

The Technical Steering Panel hosts periodic public meetings to conduct business, review and direct PNL work, and respond to public comments on the study.

Staff at PNL who are conducting the project are working closely with the Centers for Disease Control and the Fred Hutchinson Cancer Research Center on the Hanford Thyroid Disease Study. Much of the information resulting from the dose reconstruction project will be shared with the thyroid disease study. The purpose of the thyroid disease study is to determine if the incidence of thyroid disease increased in the population near the Hanford Site as a result of Hanford radioactive releases. Public involvement and outreach is a significant component in both projects.

Work in FY 1991 and FY 1992 is focused on enhancing the models and data and expanding the studies to include all significant radionuclide releases from 1944 to 1957.

Eight Indian reservations are located within 200 miles of the Hanford Site. Because their lifestyles are different from those of non-Indians, their uptake of radiation could be different, too. Thus, the researchers have set

up contracts with experts and members of these eight tribes to gather information about their diets and lifestyles so doses can be estimated for them.

6.5 FUTURE SITE USE/CLEANUP

Development of alternatives for future site uses and clean up strategies will play a key part in making decisions on "how clean is clean." A region-wide activity is being initiated to get substantial public input to alternatives that can be evaluated in the proposed Hanford Remedial Action Environmental Impact Statement.

An organizing committee consisting of representatives from Federal, State, tribal, and local government agencies have agreed to form a working group to help develop these alternatives. An independent facilitator is being hired to assist the working group in understanding the conditions at Hanford, the factors that affect potential future site uses and strategies for cleanup, and the needs and concerns of all who are interested in the future of the Hanford Site.

The working group is expected to be established in summer 1991. The proposed Hanford Remedial Action Environmental Impact Statement is planned to be started in 1992.

6.6 TRANSPORTATION AND PACKAGING OPERATIONS

6.6.1 Overview

The DOE-RL and its Hanford contractors package and transport material at the Hanford Site between onsite facilities and offsite destinations. These shipments include parts and equipment to support plant and laboratory operations and waste management activities; essential materials and supplies (including fuel and other bulk chemicals) are shipped to the site from offsite; and numerous products and waste generated by Hanford Site operations are shipped from the site. Nonradioactive wastes will continue to be shipped offsite for treatment and disposal, unless onsite treatment and disposal can be shown to be more cost effective. The DOE-RL transportation and packaging operations are conducted in a safe, cost effective manner, paying particular attention to safeguards and accounting of shipments including hazardous materials and hazardous waste. The DOE-RL transportation and packaging operations are performed in accordance with applicable Federal and State regulations and agreements and in compliance with DOE standards. This is to protect health and safety for site employees, the public, and the environment.

Offsite shipments meet all applicable State, tribal, and Federal regulations, including those of the U.S. Department of Transportation. When a shipment being moved onsite does not meet Department of Transportation standards, the road is blocked to traffic during the shipment.

Maintaining safe operations while packaging and transporting materials and waste is an important commitment at the Hanford Site. This commitment is satisfied using a comprehensive safety and compliance program made up of several important elements, including:

- Package design, testing, and analysis
- Personnel qualification and training
- Package maintenance and control
- Qualification of carriers that transport hazardous material
- Safety and Quality Assurance program oversight
- Safeguards and Security
- Management policies and procedures
- Documentation and transport data management.

Program elements unique to DOE-RL operations include:

- Technical support for field transportation and packaging operations
- Single point-of-contact for oversight and approval of shipments transported over public access roadways within the Hanford Site boundaries
- Single point-of-contact for oversight and approval of hazardous material shipments leaving the Hanford Site.

In addition to Hanford site operations, many elements of this program also support DOE-HQ Transportation Management Program operations, emergency preparedness, and information and institutional activities. In this capacity, DOE-RL and its management and operations contractor assist DOE-HQ in the development of transportation policy, packaging technology, and development of effective institutional outreach programs.

6.6.2 Accomplishments and Status

In FY 1991, an estimated 10,000 hazardous material and waste shipments, involving approximately 20,000 packages will have been transported between onsite Hanford facilities. Also in FY 1991 an estimated 400 hazardous material and waste shipments, involving approximately 2,500 packages, will have been shipped from the Hanford Site to offsite destinations. No hazard to the environment, health, and safety of Hanford Site employees or the public has occurred as a result of these shipments to date.

Along with the initial issuance of the site-specific plan (DOE-RL 1989a), a "Five-Year Vision for Hanford Cleanup" paper was issued (Appendix D). This paper contained a list of goals for cleanup progress over the first 5 years.

The list included one item applicable to transportation. This goal is restated and its status provided below.

GOAL

We have addressed the concerns of the States and Indian nations about transport of plutonium-contaminated wastes. We have begun the shipping campaign to the WIPP in New Mexico.

STATUS

For the progress toward meeting this goal, refer to Section 6.6.7.

6.6.3 Onsite Transportation and Packaging Operations

Onsite transportation and packaging operations are conducted by DOE-RL contractors within the Hanford Site boundaries. Equipment, materials, and goods are prepared, packaged, and transported by qualified personnel who have successfully completed appropriate training and qualification requirements. Onsite transportation and packaging of hazardous material and waste is conducted in accordance with U.S. Department of Transportation regulations or established DOE orders which prescribe packaging requirements and administrative and operational controls to achieve safety. For the most part, containers authorized for use offsite by the U.S. Department of Transportation and/or the U.S. Nuclear Regulatory Commission are used within authorized limitations for onsite transportation. However, in those cases where a U.S. Department of Transportation specification or U.S. Nuclear Regulatory Commission certificate of compliance is absent, packaging system applications and any limitations are documented in Safety Analysis Reports for Packaging, which are approved by contractor safety management and DOE-RL. The Safety Analysis Report for Packaging and other supporting certification documents are prepared in accordance with applicable the U.S. Department of Transportation and DOE requirements to confirm and document that required safety levels are achieved.

The DOE-RL and its contractors conduct a comprehensive oversight control program made up of audits, appraisals, and surveillances to ensure continued safe and cost-effective transportation and packaging operations. These audits and appraisals address a wide spectrum of activities associated with DOE-RL's transportation and packaging program, such as shipping and receiving operations, personnel training, facility procedures, package design and approval, package use, transport vehicle inspection, and maintenance activities.

6.6.4 Offsite Transportation and Packaging Operations

Offsite transportation and packaging operations are conducted by DOE-RL contractors to locations beyond the Hanford Site boundaries.

Equipment, material, and goods are transported to and from offsite destinations primarily by commercial carriers contracted by the DOE. However, there are some shipments made by either DOE employees using government-owned vehicles, DOE-RL contractor employees using government-owned vehicles, or commercial carriers contracted by the DOE. With DOE-RL direction, the Hanford management and operations contractor manages the overall implementation and control of the shipping and receiving program at Hanford.

Offsite transportation and packaging operations are executed in accordance with applicable DOE orders, the applicable safety regulations of the U.S. Department of Transportation, *Hazardous Material Regulation of the Department of Transportation* (DOT 1967), and the applicable packaging standards of the U.S. Nuclear Regulatory Commission (10 CFR 71) as well as any other applicable laws and regulations. The DOE-RL has delegated to its prime management and operations contractor approval authority and single point-of-contact for transportation of hazardous material and waste from the Hanford Site to offsite destinations. This function includes carrier selection, shipment inspections, review of shipping documentation, inspection of transportation equipment and tie-downs, and final certification that all hazardous materials and hazardous waste packages are in proper condition for transport from the Hanford Site.

In addition to offsite shipping and receiving activities, DOE-RL and its management and operations contractor support DOE-HQ transportation operations and packaging programs with transportation logistics expertise, technical packaging expertise, packaging testing and analysis services, commercial carrier evaluations, hazardous material training, and institutional outreach.

6.6.5 Safety and Quality Assurance

The DOE-RL and contractor Safety and Quality Assurance organizations provide independent overview of transportation and packaging operations conducted at the Hanford Site. The overview includes:

- Audits and appraisals
- Surveillance for compliance with applicable orders, codes, standards, regulations, contractor policies, and procedures
- Design and safety analysis review
- Health physics monitoring
- Package procurement, manufacture, maintenance, and control oversight.

This overview ensures that all transportation and packaging operations at Hanford are conducted using controls that prevent unnecessary exposure to potentially harmful effects of hazardous material and waste.

The safety organizations also provide field health physics support for transportation and packaging operations to ensure that radiological requirements are met. All equipment, material, and goods intended for shipment to offsite destinations must be released for shipment by health physics personnel to ensure compliance with U.S. Department of Transportation regulations.

Quality Assurance programs at the Hanford Site specifically focus on compliance with national quality standards such as NQA-1 and 10 CFR 71, Subpart H as they are applicable to transportation and packaging operations. Quality Assurance surveillances of transportation and packaging operations assess compliance with applicable codes, standards, and requirements.

6.6.6 Safeguards and Security Control

The DOE-RL and its contractors also maintain safeguards and security programs to ensure that radioactive material, special nuclear material, and sensitive material are protected, controlled, and accounted. Transportation and packaging operations involving special nuclear materials must strict security requirements that include shipper certification, shipper authorization, shipment documentation, and adherence to nuclear security and accountability procedures. To ensure employee and public safety, the Hanford security force also provides physical protection at the site and its facilities and controls road and rail routes when used for onsite shipments of certain hazardous materials and waste. The number of shipments of classified materials has diminished significantly as the mission of the Hanford Site has changed.

6.6.7 Institutional Interface

Despite DOE's excellent transportation safety record, safety and environmental issues and concerns over offsite hazardous and radioactive material shipments continue to be raised and continue to be a focus of DOE-RL actions. To better understand and address these issues and concerns, DOE-RL conducts outreach programs with interested parties. The DOE-RL recognizes that continued public support and cooperation will be needed for the transport of waste from the cleanup and disposal activities at the Hanford Site. The transportation outreach mission is to work cooperatively to resolve transportation-related institutional issues, provide opportunities for interaction, and provide information resources for those interested in or affected by DOE transportation. We will address concerns about campaigns shipment by shipment. The outreach program is built on the principles of risk communication: accept and involve the public as a legitimate partner; plan carefully and evaluate your efforts; listen and be sensitive to the public's specific concerns; be honest, frank, and open; coordinate and collaborate with credible sources; meet the needs of the media; and communicate effectively.

Many transportation issues and concerns are common among states and tribes along the routes of DOE shipments, and resolution of issues may require cooperative action among affected parties and DOE sites. The DOE-RL participates in regional meetings to provide opportunities for interaction and identify issues and try to find mutually agreeable solutions to these issues. These meetings include the Pacific States Committee, Oregon Hanford Waste Advisory Committee and Washington Nuclear Waste Advisory Council Transportation Committee meetings. To resolve these transportation issues DOE-RL works in a cooperative manner with DOE-HQ and other DOE field offices.

DOE-RL and Westinghouse Hanford helped DOE-HQ organize and conduct a national transportation workshop with State, tribal, and local government participation. It was a valuable tool to clearly articulate the concerns and make recommendations to DOE-HQ on how to resolve them.

7.0 QUALITY ASSURANCE

Quality assurance for environmental restoration, waste management operations, environmental restoration, technology development, and transportation on the Hanford Site is provided through implementation of documented quality assurance programs. Quality assurance programs establish the requirements for an effective management system that ensures risks and environmental impacts are minimized. Quality assurance programs and related procedures for use on the Hanford Site are responsive to DOE Order 5400.1, *General Environmental Protection Program* (DOE 1990c), DOE-RL Order 5700.1A, *Quality Assurance* (DOE-RL 1983), and the provisions of the Tri-Party Agreement.

Hanford Site contractors have developed quality assurance programs with subordinate plans and procedures for implementing these quality assurance requirements for environmental restoration and related waste management activities. The plans assure that quality assurance program requirements are addressed in implementing procedures which in turn, provide the bases for performing work in a controlled manner for consistent achievement of quality. Additionally, these procedures are appropriate authorities, and released for use to organizations responsible for performing the activities. Also, quality assurance project plans are developed for each major segment of work. As an example, each RCRA/CERCLA operable unit work plan contains a quality assurance project plan specific to that environmental activity.

The quality assurance organizational element within each Hanford Site contractor's organization has been delegated the responsibility for the oversight activities. The implementation of this oversight activity, by an organizational element independent of the "doing" organization provides the necessary assurance that environmental activities are being accomplished in accordance with applicable regulatory standards and guidance documents.

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8.0 TRI-PARTY AGREEMENT

The Tri-Party Agreement is an agreement among DOE, EPA, and Ecology. The primary objectives of the Tri-Party Agreement are to bring the Hanford Site into compliance with State and Federal hazardous waste laws and to clean up the Hanford Site. Other objectives include the following:

- Achieving compliance with RCRA interim and final status requirements for TSD operations
- Coordinating and integrating EPA and Ecology regulatory activities between RCRA and CERCLA to streamline regulatory involvement
- Ensuring adequate public involvement in cleanup decisions
- Ensuring that the work is properly prioritized.

The specific scope of the Tri-Party Agreement includes: (1) those actions necessary to achieve RCRA interim status requirements at TSD units; (2) permitting and/or closure of TSD units; (3) investigation and remediation of inactive waste units in accordance with CERCLA or Section 3004(u) of RCRA; and (4) any other action or new facility necessary to ensure that these items are accomplished. For example, new laboratories are included in the Tri-Party Agreement because they are required to meet the sampling load that will result from the remedial investigations and closures.

The Tri-Party Agreement includes three attachments.

- Attachment 1 is a letter from the U.S. Department of Justice that recognizes the enforceability of the agreement.
- Attachment 2 is the action plan for the Tri-Party Agreement. The action plan defines the processes and procedures to be followed and provides the enforceable milestones and schedules.
- Attachment 3 is a funding agreement between DOE and Ecology that commits DOE to providing Ecology with funding for oversight of activities carried out under the Tri-Party Agreement.

Another key document, which is not part of the Tri-Party Agreement, is the *Community Relations Plan for the Hanford Site, Benton County, Washington* (Ecology et al. 1989). The community relations plan:

- Meets the requirements for a community relations plan in support of CERCLA remedial actions
- Covers the remaining activities contained within the Tri-Party Agreement.
- Discusses how the public will be involved in the Tri-Party Agreement activities. (See Section 1.8.5.)

A significant accomplishment of the Tri-Party Agreement was the integration of the State's authorities under RCRA with EPA's authorities under both RCRA and CERCLA. This should help in minimizing duplication of effort and, more important, it should reduce redundant enforcement authorities.

The Tri-Party Agreement Action Plan, according to the Tri-Party Agreement, should be updated annually to incorporate changes and delineate activities for the upcoming year. An update was completed in March 1990. Because of the negotiations for changes to the agreement, the next update will be delayed until late in calendar year 1991.

8.1 RCRA INTERIM STATUS COMPLIANCE

With the exception of RCRA groundwater monitoring wells and closure plans, the Tri-Party Agreement calls for achieving RCRA interim status compliance by September 1991 at all existing TSD units on the Hanford Site. Compliance corrective actions were identified for each of the TSD units and milestones were established for completing those actions. The completion of compliance corrective actions is proceeding on schedule and all actions will be completed by the negotiated September 1991 date.

After the Tri-Party Agreement was signed, new regulations for hazardous waste tanks were promulgated. Negotiations are currently underway to incorporate waste tank integrity assessment milestones into the Tri-Party Agreement for those tanks that are subject to the hazardous waste tank regulations. The Tri-Party Agreement required that 30 RCRA groundwater monitoring wells be installed in calendar year 1990, with 50 RCRA groundwater monitoring wells to be installed each year thereafter. Technical issues associated with the installation of wells around SSTs delayed the completion of 8 of the 30 wells that were scheduled for 1990. The eight wells that were not installed in 1990 will be installed in 1991.

Individual closure plans were scheduled for completion beginning in September 1989 and ranging over the next 8 years. Closure plan preparation for inactive disposal units has been deferred so that it coincides with the remedial investigations conducted as part of the CERCLA and RCRA 3004(u) cleanup program, although Ecology has the ability to require closure in advance of remedial investigations. Refer to Chapter 4.0 for further detail on interim status compliance.

8.2 RCRA FINAL STATUS PERMIT

Part A permit applications have been submitted covering 62 groupings of TSD units on the Hanford Site, recognizing that only one RCRA permit will be issued. Discussions on the sitewide RCRA permit have been ongoing over the last year, and the permit is expected to be issued for public comment this fall.

A large percentage of the TSD groupings on the Hanford Site are required to be permitted for operation or postclosure care. Disposal units and other Part B permit applications of selected units have been submitted to Ecology for review. The remainder will be submitted over the next 6 years.

8.3 CLOSURE OF SINGLE-SHELL TANKS

A major element of the Tri-Party Agreement is the closure of the 149 SSTs located on the Hanford Site. The Tri-Party Agreement calls for complete closure by 2018. This is an aggressive schedule considering the technology that needs to be developed. The HDW-EIS (DOE 1987b) requires that a supplemental EIS be developed covering the final disposition of the tank wastes. Subsequent to the SST EIS, Ecology must approve the DOE-RL SST RCRA closure plan. Interim stabilization and isolation of the tanks will be completed by September 1996, per the Tri-Party Agreement, to minimize the potential of future leaks while awaiting final closure. (This information is expected to be impacted by recent tank safety issues. These issues will result in additional studies before the tanks can be pumped.)

Initial characterization of the SSTs will be completed by September 1998. To support this date, expanded laboratory capability will be constructed and operational by June 1994.

8.4 CLEANUP OF INACTIVE WASTE SITES

Approximately 1,100 waste units on the Hanford Site will be assessed for remediation. These waste sites include liquid and solid engineered waste units, unplanned release units (spills), septic tanks, etc. Approximately 60 percent of these units contain mixed wastes. The Tri-Party Agreement organizes these units into 74 operable units plus 4 groundwater operable units.

An operable unit is a grouping of waste units for the purpose of conducting a remedial investigation and subsequent remedial action. The Tri-Party Agreement calls for completing the investigations for all operable units by 2005 and completing all remedial actions by 2018. (See Tri-Party Agreement negotiation discussion in Section 8.8, M-12-00). To accomplish this, work plans for investigations will be developed at a rate of six per year. A key to the success of this effort is adequate laboratory capability. The Tri-Party Agreement requires a new operational low-level/mixed waste laboratory by January 1992.

8.5 CEASING DISPOSAL OF CONTAMINATED LIQUIDS TO THE SOIL COLUMN

In support of the Hanford Site cleanup, the Tri-Party Agreement includes actions necessary to cease disposal of contaminated liquids to the soil column. Nineteen wastestreams have been designated as Phase I (high priority) and will be treated or eliminated by June 1995. The 14 Phase II (lower priority) wastestreams will be addressed later. Either the streams will be eliminated or treatment systems will be installed. The treated effluent will then be disposed of into a new or existing site (e.g., pond) or possibly transported to the Columbia River. (See Tri-Party Agreement negotiations discussion in Section 8.8 under M-17-00).

8.6 HANFORD WASTE VITRIFICATION PLANT

The RCRA does not allow for the long-term storage of hazardous wastes, which are restricted from land disposal. The HWVP will be brought online by the end of 1999 to treat much of the waste stored in DSTs. The HWVP may be required to treat wastes that are retrieved from the SSTs. Per the Tri-Party Agreement, construction of the HWVP was to begin in July 1991. (See Tri-Party Agreement discussion in Section 8.8 under Milestone M-03-00).

8.7 WASTE RECEIVING AND PROCESSING FACILITY

The Tri-Party Agreement includes a milestone for a Waste Receiving and Processing Facility, which will be constructed in two phases. Phase I, which will be operational in September 1996, will provide the capability to receive, assay, and package wastes. Once operational, Phase I will allow for the removal of wastes from the current TRU waste storage pads for preparation for shipment to WIPP. Such action will allow for closure of the storage pads under RCRA. Phase I has encountered delays and may require changes to the associated Tri-Party Agreement Milestone M-18-00.

Phase II of Waste Receiving and Processing Plant will provide the treatment systems necessary for both TRU and mixed wastes before their final disposal. Phase II will be operational by September 1999. Low-level mixed wastes are currently being stored at the Hanford Site awaiting RCRA qualified treatment and disposal facilities.

8.8 TRI-PARTY AGREEMENT CHANGES

On February 6, 1991 a package of proposed changes to the Tri-Party Agreement were submitted to the EPA and Ecology. Since that time extensive negotiations have taken place to resolve the issues and arrive at positions acceptable to all parties. The negotiations have resulted in the following tentative changes. These changes are tentative pending the results of a 45-day public review held from May 22 through July 5, 1991 and public meetings held in June 1991.

Milestone: M-01-00, Completion of 14 Grout campaigns due in September 1994.

Change: Milestone M-01-00 has been delayed 27 months from September 1994 to December 1996.

Basis: This delay has tentatively been negotiated with the regulators to accommodate additional safety requirements, resolution of grout formulation issues, and verification of grout solidification.

Milestone: M-02-00, Initiation of B Plant operations for DST waste pretreatment due in October 1993.

Change: A new due date for Milestone M-02-00 is to be determined at a later date.

Basis: Because of the initial results of the risk assessment regarding the viability of B Plant for pretreatment of DST wastes, a series of studies have been undertaken which will be complete in FY 1991. A new date for Milestone M-02-00 will be proposed when these studies are completed. A replacement enforceable milestone (M-02-01 due December 1991) will be added for the completion of these studies. DOE has committed to propose additional enforceable pretreatment milestones upon completion of the studies.

Milestone: M-03-00, Initiate HWVP operations due in December 1999.

Change: Interim Milestone M-03-01 initiation of construction for the HWVP has been delayed nine months, while Milestone M-03-00 initiate HWVP operations has not been changed at this time.

Basis: A systematic assessment has been initiated by the DOE to determine if there are significant risks with the current vitrification/pretreatment program. The proposed 9-month delay in the start of HWVP construction allows time to evaluate the impacts of present technical concerns and to implement any necessary changes to the plant before commitment of resources for construction. The final date for Milestone M-03-00 may need to be reassessed at a later date depending on the systematic assessment.

Milestone: M-05-00, Complete SST interim stabilization due in September 1995.

Change: Adjustments to the number of tanks to be stabilized under the interim milestones supporting the major Milestone M-05-00 have been proposed (from 9 in FY 1991 to 4, no change in FY 1992, from 9 in FY 1993 to 11, from 9 in FY 1994 to 8, and from 5 in FY 1995 to 10). The major milestone date of September 1995 to complete the interim stabilization of all but the two high-heat tanks is not being proposed for change at this time.

Basis: Adjustments to the number of tanks to be stabilized have become necessary because of schedule slippage during FY 1990 caused by on-going safety concerns on ferrocyanide, flammable gas and high organic salts in the SSTs. Future milestones were also adjusted because of the time required to respond to new safety concerns and inefficiencies of pumping in more tank farms without pumping all tanks in each farm simultaneously.

Milestone: M-10-00, Complete analyses of at least two complete core samples from each SST.

Change: Adjustments are proposed to interim Milestones M-10-04 (extend due date from December 1990 to September 1991) and M-10-06 (reduction from 24 samples to 20 samples). Interim Milestone M-10-05 is proposed to be redefined to cover the preparation of an integrated waste sampling plan. No changes to the September 1998 major Milestone M-10-00 are proposed at this time. A new enforceable milestone is also proposed to be added to restore rotary mode sampling capability by September 1992.

Basis: The adjustments made to milestones under Milestone M-10-00 have become necessary because of high drill bit temperatures measured during testing of the sampling drill bit on synthetic hardcake in the rotational mode. The tanks to be sampled under Milestone M-10-04 are expected to be soft wastes that can be sampled without rotation of the sampling drill bit.

Milestone: M-12-00, Submit RI/FS or RFI/CMS work plans for 20 operable units due April 1992 and M-13-00. Submit six RI/FS or RFI/CMS work plans per year due beginning calendar year 1992.

Change: M-12-00 scope has been changed to 15 work plans and the due date for Milestone M-13-00 has been revised to due in calendar year 1993. Additionally, the interim milestones under Milestone M-12-00 have been revised to require rescoped work plans reflecting revised past-practices strategy. Four new major milestones have been added (M-27-00, M-28-00, M-29-00 and M-30-00) requiring the following: (1) aggregate area management study reports, (2) soils and groundwater background determinations, (3) Hanford Site risk assessment methodology and (4) integrated general investigations and studies for the 100 Areas. Under these new major milestones are 23 new supporting interim milestones.

Basis: These changes are being proposed to move towards a new method of addressing the past-practice site RI/FS activities in an effort to design a more efficient system tailored for the work to be done at the Hanford Site and to more effectively utilize funding for performing this work.

Milestone: M-17-00, Complete liquid effluent treatment facilities/upgrades for all Phase I streams due in June 1995.

Change: No change has been proposed for major Milestone M-17-00 although three new interim milestones have been added requiring the following: (1) the development of sampling and analysis plans, (2) implementation of interim operating restrictions on facility effluents, and (3) submittal of a methodology for assessing the impact of liquid discharges. Commitments have also been made to establish new milestones dealing with the 33 Phase I and II streams by September 1991. Commitments have also been made to negotiate a separate agreement by September 1991 to provide a schedule for obtaining state waste discharge permits.

Basis: The changes to Milestone M-17-00 address requirements for managing the discharge of liquid effluents to the soil as a result, in part, of EPA's and Ecology's reviews of the liquid effluent study that was submitted by the DOE in August 1990.

Milestone: M-20-21, Submit B Plant Part B to Ecology and EPA due in October 1991.

Change: M-20-21 due date is proposed as January 1992.

Basis: Milestone M-20-21 is proposed to be redefined due to the uncertainties regarding the future B Plant operating status. A new enforceable milestone is being proposed to be established by January 1992 for the submittal of either a closure plan or a permit application for B Plant.

Milestone: M-24-00, Install RCRA groundwater monitoring wells at the rate of 30 in calendar year 1990 due in December 1990.

Change: Interim Milestone M-24-07 and major Milestone M-24-00 (for 1990 only) are proposed to be extended 280 days to October 7, 1991.

Basis: The 280 day extension reflects the drilling delays which resulted when drilling was suspended in November 1989 at the request of Ecology.

Milestone: M-31-00, (new) Provide additional DST capacity due date to be determined.

Change: This is a newly established milestone for the construction of up to 4 new DSTs with interim milestones requiring the completion of conceptual design (M-31-01) and establishment of additional milestones (M-31-02) by September 1992.

Basis: A potential need has arisen for additional DST capacity to support waste disposal (vitrification) and interim waste treatment for safety issue resolution and waste storage prior to treatment and closure.

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9.0 ENVIRONMENTAL PROTECTION REQUIREMENTS

Federal and Washington State statutes, as well as DOE orders and other regulations, affect the environmental protection effort for the Hanford Site. Brief descriptions of the principal statutes and DOE orders are presented below. Tribal treaty rights also are covered in this section.

9.1 FEDERAL STATUTES

Several primary Federal environmental statutes, as enacted by the U.S. Congress, principally govern environmental protection activities at the Hanford Site. The following Federal statutes have major provisions for conduct of the Hanford Site's environmental protection program (see Table 9-1).

Table 9-1. Primary Federal Statutes Applicable to Hanford Sites's Environmental Protection Program. (sheet 1 of 2)

Primary Federal statutes	Provisions
<i>Resource Conservation and Recovery Act of 1976</i> (42 USC 6901 et seq.)/ <i>Hazardous and Solid Waste Amendments of 1984</i> (42 USC 6912 et seq.)	Establishes processes to protect public health and environment from activities associated with management and disposal of hazardous wastes. The Hanford Site is subject to a TSD facility and corrective action regulation in accordance with RCRA and has submitted Part A of a permit application designating itself as a TSD facility that handles hazardous waste.
<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i> (42 USC 9601 et seq.)/ <i>Superfund Amendments and Reauthorization Act of 1986</i> (42 USC 11001 et seq.)	Establishes process for undertaking remedial actions at inactive waste sites containing hazardous substances. Establishes reporting requirements for releases of hazardous substances. The CERCLA remedial action process has been initiated on the Hanford Site in response to being listed on the NPL.
<i>Emergency Planning and Community Right to Know Act of 1986</i> (42 USC 11001 et seq.)	Establishes framework for State and local emergency planning and provides mechanism for community awareness of hazardous chemicals present in a locality. The Hanford Site complies with these requirements.
<i>National Environmental Policy Act</i> (42 USC 4321 et seq.)	Establishes broad national policy for protection of environmental quality and provides the means for implementing that policy. All major construction and cleanup projects on the Hanford Site are subject to the NEPA review process.

Table 9-1. Primary Federal Statutes Applicable to Hanford Site's Environmental Protection Program. (sheet 2 of 2)

Primary Federal statutes	Provisions
<i>Safe Drinking Water Act</i> (42 USC 300 et seq.)	Provides for protection of public health by setting standards for water supplied for public consumption and by protecting public drinking water sources. The 15 drinking water systems on the Hanford Site comply with these standards.
<i>Toxic Substances Control Act</i> (15 USC 2601 et seq.)	Provides for protection of human health and environment from exposure to hazardous and toxic chemical substances and mixtures. The DOE-RL has implemented a program to clean up, treat, and dispose of all PCB-contaminated materials on the Hanford Site.
<i>Federal Insecticide, Fungicide, and Rodenticide Act</i> (7 USC 136 et seq.)	Regulates the manufacture and use of substances collectively called pesticides. One category of pesticides, herbicides, are used on the Hanford Site to inhibit growth of vegetation in contaminated areas.
<i>Atomic Energy Act of 1954</i> (42 USC 2011 et seq.)	Authorizes the DOE to conduct nuclear materials production, research and development, and associated activities. Such activities shall be conducted in a safe and environmentally sound manner.
<i>Clean Water Act of 1977</i> (33 USC 1251 et seq.)	Provides requirements to restore and maintain the chemical, physical, and biological integrity of the nation's water. Requires National Pollutant Discharge Elimination System permits to discharge to navigable waters. The Hanford Site currently has eight outfalls discharging to the Columbia River under its permit.
<i>Clean Air Act</i> (42 USC 7401 et seq.)	Provides for prevention and control of air pollution from stationary and mobile sources. Provides for the achievement and maintenance of air quality levels to protect public health and welfare through operations management, emissions control, and monitoring. The Hanford Site manages and monitors its radioactive and nonradioactive emissions in accordance with these provisions.

In addition to those primary Federal statutes having major application to the Hanford Site's environmental protection program, other statutes, laws, and regulations also apply (see Table 9-2).

Table 9-2. Other Federal Statutes Applicable to Hanford Site's Environmental Protection Program. (sheet 1 of 2)

Other Federal statutes	Provisions
<i>Hanford Reach Study Act</i> (Public Law 100-605)	Requires the Secretary of the Interior to prepare a study on the Hanford Reach to consider its addition to National Wild and Scenic Rivers System.
<i>Rivers and Harbors Act of 1899</i> (33 USC 401 et seq.)	Requires acquiring a U.S. Army Corps of Engineers permit before altering the course, location, conditions of channels, or discharging dredge or fill materials into any navigable waters. (Section 404 of the Clean Water Act is also applicable.)
<i>Noise Control Act</i> (42 USC 4901 et seq.)	Provides for coordinating Federal noise control research, establishing noise emissions standards, and disseminating information to the public.
<i>Migratory Bird Treaty Act</i> (16 USC 703 et seq.)	Prohibits acts such as killing, capturing, or transporting protected migratory birds, their nests, and eggs.
<i>Fish and Wildlife Coordination Act</i> (16 USC 661 et seq.)	Authorizes the Secretary of the Interior to assist and cooperate with public and private organizations to protect fish and wildlife.
<i>Hazardous Materials Transportation Act</i> (49 USC 1801 et seq.)	Gives additional regulatory and enforcement authority to the Secretary of Transportation to protect the nation from risks of transporting hazardous materials.
<i>Endangered Species Act</i> (16 USC 1531 et seq.)	Establishes a program for conserving endangered species and their ecosystems.
<i>Bald Eagle Protection Act</i> (16 USC 668)	Prohibits acts such as possessing, killing, transporting, or disturbing bald and golden eagles and their nests or eggs.
<i>Archaeological Resources Protection Act of 1979</i> (16 USC 470AA)	Provides for protection of archaeological resources located on public or Indian lands.
<i>National Monument Act</i> (16 USC 433)	Provides for protection of historic and prehistoric ruins, monuments, and objects of antiquity located on lands owned or controlled by the Federal government.

Table 9-2. Other Federal Statutes Applicable to Hanford Site's Environmental Protection Program. (sheet 2 of 2)

Other Federal statutes	Provisions
<i>American Indian Religious Freedom Act</i> (42 USC 1996)	Provides for protection of American Indian's rights to believe, express, and exercise their traditional religions, including the right to access religious sites.
<i>National Historic Preservation Act</i> (16 USC 469 et seq.)	Establishes national policy to preserve historic places, which includes sites, structures, and objects significant in American history, archaeology, or culture.
<i>Archaeological and Historic Preservation Act</i> (16 USC 469 et seq.)	Preserves significant historic or archaeological data, including relics and specimens, that might be destroyed by Federal construction projects, activities, or programs.
<i>Native American Graves Protection and Repatriation Act</i> (25 USC 3001 et seq.)	Protects Native American burial sites and prohibits the removal of human remains and funerary, sacred, or cultural patrimony objects.

9.2 INDIAN TREATIES

Indian treaties will impact Hanford Site cleanup and are listed in Table 9-3:

Table 9-3. Indian Treaties Provisions.

Treaty	Provisions
Treaty with the Yakima, June 9, 1855, 12 Stat 951	Treaties reserve to the tribes "...the right to fish at all usual accustomed places...and to hunt, gather roots and berries, and pasture horses and cattle on open and unclaimed lands."
Treaty with the Walla Walla, Cayuse, and Umatilla, June 9, 1855, 12 Stat 945	
Treaty with the Nez Perce, June 11, 1855, 12 Stat 957	

9.3 STATE OF WASHINGTON STATUTES

The DOE activities at the Hanford Site must be in compliance with Washington State statutes that have been authorized by Federal legislation. In addition, other Washington State statutes establish technical criteria that

are used by the DOE in designing environmental protection facilities or projects. The principal Washington State statutes affecting the environmental restoration and waste management effort for the Hanford Site are identified in Table 9-4.

Table 9-4. Washington State Statutes, Laws, and Regulations.

State of Washington Statutes	
RCW 15.28,	<i>Washington Pesticide Control Act</i>
RCW 18.104,	<i>Water Well Construction</i>
RCW 36.58,	<i>Solid Waste Disposal</i>
RCW 43.21A,	<i>Department of Ecology</i>
RCW 43.21B,	<i>Pollution Control Hearings Board of the State</i>
RCW 43.21C,	<i>State Environmental Policy Act</i>
RCW 43.200,	<i>Radioactive Waste Act</i>
RCW 70.94,	<i>Washington Clean Air Act</i>
RCW 70.95,	<i>Solid Waste Management--Recovery and Recycling</i>
RCW 70.95B,	<i>Domestic Waste Treatment Plants--Certification and Regulation of Operators</i>
RCW 70.95C,	<i>Waste Reduction</i>
RCW 70.98,	<i>Nuclear Energy and Radiation</i>
RCW 70.105,	<i>Hazardous Waste Disposal</i>
RCW 70.105A,	<i>Hazardous Waste Regulations (Fees)</i>
RCW 70.105D,	<i>Hazardous Waste Cleanup--Model Toxics Control Act</i>
RCW 90.44,	<i>Regulation of Public Ground Waters</i>
RCW 90.48,	<i>Water Pollution Control</i>
RCW 90.54,	<i>Water Resources Act of 1971</i>
RCW 90.76,	<i>Underground Storage Tanks</i>

9.4 U.S. DEPARTMENT OF ENERGY ORDERS

The DOE has developed and implemented an extensive set of directives, called orders, to provide mandatory guidance for its operations. A selection of those orders (i.e., 5400 and 5800 series) with major applications for the Hanford Site environmental protection program are outlined in Table 9-5.

Table 9-5. U.S. Department of Energy and U.S. Department of Energy-Richland Operations Orders and Their Application. (sheet 1 of 2)

DOE and DOE-RL Orders	Application
DOE Order 5400.1, <i>General Environmental Protection Program Requirements</i>	Establishes environmental protection program requirements, authorities, and responsibilities (more specific than requirements in DOE Order 5480.1B).
DOE Order 5400.2A, <i>Environmental Compliance Issue Coordination</i>	Sets forth policy, direction, and procedures for coordinating environmental issues of significance to DOE.
DOE Order 5400.3, <i>Hazardous and Radioactive Mixed Waste Program</i>	Provides direction for implementing a DOE hazardous waste management program.
DOE Order 5400.4, <i>Comprehensive Environmental Response, Compensation, and Liability Act Requirements</i>	Provides direction for implementing a DOE CERCLA program.
DOE Order 5400.5, <i>Radiation Protection of the Public and the Environment</i>	Establishes a program and standards for radiation protection.
DOE Order 5440.1D, <i>National Environmental Policy Act</i>	Establishes DOE policy for implementing the NEPA.
DOE Order 5480.1B, <i>Environment, Safety, and Health Program for Department of Energy Operations</i>	Establishes Environment, Safety, and Health Program for DOE operations.
DOE Order 5480.3, <i>Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes</i>	Establishes requirements for packaging and transporting hazardous materials, hazardous substances, and hazardous wastes.
DOE Order 5480.4, <i>Environmental Protection, Safety, and Health Protection Standards</i>	Establishes mandatory environmental, safety, and health standards, codes, and regulations to be evaluated in appraisals and surveillance.
DOE Order 5480.5, <i>Safety of Nuclear Facilities</i>	Sets forth policy and direction for safety in DOE nonreactor nuclear facilities.
DOE Order 5482.1B, <i>Environment, Safety and Health Appraisal Program</i>	Establishes Environment, Safety and Health appraisal program for DOE.
DOE 5484.1, <i>Environmental Protection, Safety, and Health Protection Information Reporting Requirements</i>	Establishes requirements and procedures for reporting and investigating matters of environmental protection, safety, and health protection significance.

Table 9-5. U.S. Department of Energy and U.S. Department of Energy-Richland Operations Orders and Their Application. (sheet 2 of 2)

DOE and DOE-RL Orders	Application
DOE Order 5820.2A, <i>Radioactive Waste Management</i>	Establishes policies and guidelines for management of radioactive waste and contaminated facilities.
DOE-RL Order 5480.1A, <i>Environmental Protection, Safety and Health Protection Program for Richland Operations</i>	Supplements DOE Order 5480.1B for DOE-RL. Includes safety requirements for packaging of radioactive materials.
DOE-RL Order 5480.4B, <i>Environmental Protection, Safety, and Health Protection Standards for DOE-RL</i>	Supplements DOE Order 5480.4, assigns responsibilities and authorities and establishes reporting requirements for DOE-RL.
DOE-RL Order 5480.5, <i>Safety of Nuclear Facilities</i>	Sets forth policy and direction for safety in DOE-RL nuclear facilities.
DOE-RL Order 5482.1B, <i>Environment, Safety, Health, and Quality Assurance Appraisal and Surveillance Program</i>	Supplements DOE Order 5482.1B, assigns responsibilities and authorities, and establishes reporting requirements for DOE-RL.
DOE-RL Order 5484.1, <i>Environmental Protection, Safety and Health Protection Information Reporting Requirements</i>	Supplements DOE Order 5484.1, establishes Environment, Safety, and Health reporting requirements for DOE-RL.
DOE-RL Order 5484.2A, <i>Unusual Occurrence Reporting System for Richland Operations</i>	Establishes authorities and responsibilities and assigns reporting requirements for DOE-RL.
DOE-RL Order 5800.2A, <i>Radioactive Waste Management</i>	Establishes policies and guidelines for management of radioactive waste and contaminated facilities.

9.5 LOCAL AND OTHER REGULATIONS

The Hanford Site also is subject to regulations imposed by local governments. The principal regulation impacting the environmental protection of the Hanford Site is in Table 9-6.

Table 9-6. Local Regulations and Application.

Local regulations	Application
General Regulation 80-7 of the Benton-Franklin-Walla Walla Counties Air Pollution Control Authority	Establishes regional requirements for air pollution prevention and control. Provides standards for visible emissions including oxides of nitrogen and particulates. Provides requirements for notice of construction of any source of Clean Air Act-regulated pollutants. Requires submittal of annual emissions inventories.

10.0 COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

10.1 HANFORD SITE ACTIONS

The NEPA documentation required for specific remedial actions will be prepared as appropriate, per 52 FR 47662 (DOE 1987a) on compliance with the following:

- NEPA
- Amendments to the DOE NEPA guidelines (DOE 1987a)
- SEN-15-90--NEPA initiative (SEN 1990)
- *Interim Procedural Guidance for Implementation of SEN-15-90* (DOE 1990d)
- DOE Order 5820.2A (DOE 1988a) and
- DOE Order 5440.1D (DOE 1991b).

A Hanford Site remedial action EIS has been proposed (June 13, 1990) to DOE-HQ to assess the cumulative impacts associated with the remedial actions. Before the execution of a record of decision for the Hanford Site remedial action EIS, specific projects and activities will be documented using categorical exclusions, environmental assessments, or supplements to the HDW-EIS (DOE 1987b), as appropriate. All RCRA closure activities are also within the purview of the Washington State Environmental Policy Act.

Overall NEPA documentation for Hanford Site environmental restoration and remedial activities programs will be provided through a three-tiered strategy which is composed of the following: (1) a DOE system-wide programmatic EIS, (2) the Hanford Site remedial action EIS, and (3) project-specific environmental assessments or categorical exclusions, as appropriate. This strategy will facilitate phased NEPA documentation from the most general to the most specific levels in the Environmental Restoration and Waste Management programs. Throughout the NEPA process, the public will be involved through formal NEPA scoping and comment processes, and informal public workshops and forums.

Figure 10-1 is a diagram of the process used to determine the appropriate levels of NEPA documentation for projects and activities.

10.2 ACTIONS SUPPORTING RCRA AND CERCLA

The NEPA documentation will be prepared for site characterization activities on an operable-unit-by-operable-unit basis or on a site-by-site basis, supporting CERCLA and RCRA, respectively. Remedial actions will be

Figure 10-1. National Environmental Policy Act Document Determination Process within U.S. Department of Energy (effective 10/1/90).

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documented using both the overall Hanford Site remedial action EIS, when completed, and operable unit specific reviews and documents to address the unit/site specific impacts. Scoping for the Hanford Site remedial action EIS is currently anticipated for the first quarter of FY 1992 with a record of decision planned for FY 1994.

The Hanford Site remedial action EIS will examine the effects of remedial action for 78 operable units which include radioactive, hazardous, and mixed wastes. The SST remedial action(s) will be documented through a supplement to the HDW-EIS. Further NEPA documentation associated with the Hanford Site environmental restoration and remedial action program is provided in the *Draft Environmental Impact Statement for Decommissioning of Eight Surplus Reactors at the Hanford Site, Richland, Washington* (DOE 1989c).

The DOE-HQ/Office of Environmental Restoration and Waste Management initiated the preparation of a programmatic EIS for DOE-wide Environmental Restoration and Waste Management activities in October 1990. The programmatic EIS will examine overall strategies for Environmental Restoration and Waste Management activities throughout the DOE sites and serve to envelop the overall impacts for the program. Another EIS in the early planning stage is the SST Closure Supplemental EIS. This EIS will be required to close the SST farms.

10.3 ACTIONS SUPPORTING WASTE MANAGEMENT

Additional NEPA reviews and documentation have been or will be prepared for the following: (1) the HWVP, (2) the Waste Receiving and Processing Facility, and (3) the Grout Treatment Facility. The Hanford Environmental Compliance Project environmental assessment was prepared by DOE-RL to document numerous subprojects associated with waste management activities (see Section 2.3.5.2). The latter document has been submitted to DOE-HQ for approval.

The DOE-HQ has mandated the preparation of supplemental documentation for the impacts associated with DST and SST waste operations, and for other high-level defense waste issues in a supplement to the HDW-EIS. The DOE-HQ has also decided to have an EIS prepared to evaluate the options for final disposition of irradiated fuels stored on the Hanford Site. Among other options, one of the choices likely to be evaluated will be processing the fuel through PUREX. Specific details for the scopes for these EISs will result from public interaction and the NEPA scoping process.

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11.0 DATA MANAGEMENT AND REPORTING

11.1 DATA MANAGEMENT

The long-term nature of the waste management and environmental programs requires that supporting information be kept for extended periods in a secure, controlled, and retrievable manner. The principal programs and methods for environmental information management are described in the *Environmental Information Management Plan* (Michael 1990). Hanford Site environmental information is defined as data related to the protection or improvement of the Hanford Site environment, including data required in order to satisfy environmental statutes, applicable DOE orders, or the Tri-Party Agreement.

The Westinghouse Hanford Environmental Division manages Hanford Site environmental information. This includes: (1) establishing standards for how data is validated and controlled, (2) developing and maintaining a supportive computer-based environment, and (3) sustaining a centralized file management system.

Westinghouse Hanford has established an overall records management and document control system that governs the methods by which all records, documents, and other materials are generated, maintained, and disposed of. The types of records management and document control systems currently available include the following:

- Generation of documents
- Change control
- Review and approval
- Control and distribution
- Identification of records
- Storage
- Retrieval
- Destruction of records.

Westinghouse Hanford has established the Environmental Data Management Center to receive, process, and maintain information related to waste management and environmental program activities. The Environmental Data Management Center compiles and maintains a reference file, coordinates administrative record activities, and distributes administrative record indexes and documents to EPA, DOE, and Ecology. The Environmental Data Management Center also provides publicly available documents related to the Hanford Site cleanup process to the four information repositories. The Environmental Data Management Center compiles and maintains the official

administrative record file on the Hanford Site in accordance with Tri-Party Agreement requirements. Unofficial files are located with DOE-RL, Ecology, and EPA.

The Tri-Party Agreement Action Plan defines the methods and processes by which hazardous waste permits will be obtained, and by which other RCRA and CERCLA compliance activities will be conducted on the Hanford Site. Administrative records comprise the assemblage of documents that are compiled and maintained pertaining to a project or administrative action or permit/permit modification, or that are candidates for inclusion once a record of decision is attained.

The administrative record is an accumulation of documents that were considered or were relied on when determining the response action or permit/permit modification for cleanup of a site. Also, the administrative record contains documents that provide proof of public participation in the remediation process.

The administrative record file is a judicial record that could be used in court to fulfill the requirements of the discovery process. It provides a means for showing how a cleanup decision is reached and eliminates irrelevant information that can encumber an ordinary record keeping system.

Four repositories whose responsibilities are identified in the Community Relations Plan (Ecology et al. 1989), maintain up-to-date information on the Hanford Site's cleanup efforts. The following is a current list of the repositories:

- DOE-RL Public Reading Room, Federal Building, Richland, Washington
- University of Washington Library, Seattle, Washington
- Crosby Library at Gonzaga University, Spokane, Washington
- Portland State University Library, Portland, Oregon.

The repositories receive copies of the following: (1) Tri-Party Agreement Action Plan quarterly progress reports, (2) reports of environmental restoration activities conducted under CERCLA/SARA and RCRA, (3) closure and postclosure plans, (4) RCRA permit applications, (5) meeting summaries, and (6) other documents identified in the community relations plan.

A considerable amount of waste management and environmental restoration data is collected or generated by computer and, therefore, exists in electronic form. Approximately 60 computer-based information systems, in addition to manual systems, are used to meet data management needs. To meet the long-term needs for management of electronic data, an environmental information management system called ENCORE has been defined. ENCORE is made up of a combination of administrative, hardware, and software subsystems. Scientific and technical data and the subsystems for their management are included within the ENCORE framework.

The Waste Information Data System and the Hanford Environmental Information System are two key computer-based information systems. The Waste Information Data System is a database on waste sites and contains identification and characterization data gathered from a number of sources. The Hanford Environmental Information System is being developed as a resource for the storage, analysis, and display of investigative data in support of remediation activities.

11.2 REPORTING

The DOE-RL is responsible for submitting numerous routine plans and reports to meet requirements of Federal, State, and local regulatory agencies, to comply with DOE orders, and to provide information to the public. Since the site-specific plan was last issued, there have been several changes to the list of plans and reports. Some plans or reports are no longer required or needed, or several plans or reports are now combined into a single report. New reports have been added. For example, the information contained in the Solid Waste Management Program Plan, issued in 1990, is now contained in this site-specific plan. Also, for 1990, a single report will detail all Hanford Site Effluent discharges and solid waste management activities information previously contained in three reports. An example of an added report is the Hanford Site Environmental Status Report, SEN-7A-90.

Copies of plans and reports required by or related to Tri-Party Agreement activities are placed in each of the four information repositories. Copies of other plans and reports deemed to be of public interest are placed in the DOE-RL Public Reading Room. Table 11-1 provides the current list of routinely prepared and issued plans and reports and includes the frequency and date of issuance.

Table 11-1. Routine Reports. (sheet 1 of 3)

Type of report/information	Frequency	Issue date
Tank Farm Surveillance and Waste Status Summary Report	Monthly	
National Pollutant Discharge Elimination System Effluent Monitoring Report	Monthly	
Water Bacteriological Analysis	Monthly	
Potable Water Quality Reports	Monthly	
Monthly Pesticide Application Report	Monthly	
Hanford Site Quarterly Environmental Status Report, SEN-7A-90	Quarterly	January, etc.
Defense Waste and Environmental Restoration FY 19XX Quarterly Status Report	Quarterly	January, etc.

Table 11-1. Routine Reports. (sheet 2 of 3)

Type of report/information	Frequency	Issue date
Hanford Federal Facility Agreement and Consent Order Quarterly Progress Report	Quarterly	February, etc.
Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Report for Hanford Facilities	Quarterly	March, etc.
Treatability Test Exclusion Notification	Quarterly	March, etc.
Circular A-106, Federal Agency Pollution Abatement Plan Project Report	Semiannually	April, December
Water Sample Information for Inorganic Chemical Analysis	Semiannually	May, November
Hanford Site Waste Management Units Report	Annually (if required)	January
Annual Notification of Continuous Releases of Ammonia and Ammonium Hydroxide that are above the CERCLA Reportable Quantity Values for CY 19XX	Annually	February
Tier Two Emergency and Hazardous Chemical Inventory	Annually	February
Generator Annual Dangerous Waste Report	Annually	February
TSD Facility Annual Dangerous Waste Report	Annually	February
Annual Report for Resource Conservation and Recovery Act Groundwater Monitoring Projects at Hanford Facilities	Annually	March
Alternatives to Land Disposal of Solid Radioactive Mixed Waste on the Hanford Site	Annually	March
Annual Waste Reduction Report	Annually	March
Radioactive Effluent and Onsite Discharge Data Reports	Annually	April
Hanford Site Environmental Report for CY 1991	Annually	June
Westinghouse Hanford Company Environmental Surveillance Report-200/600 Areas Calendar Year 19XX	Annually	June
Toxic Chemical Release Inventory Report	Annually	June
Westinghouse Hanford Company Environmental Surveillance Annual Report--100 Areas	Annually	July

Table 11-1. Routine Reports. (sheet 3 of 3)

Type of report/information	Frequency	Issue date
Tri-County Air Pollution Control Emission Summary	Annually	July
Annual PCB Report	Annually	July
Environmental Restoration Remedial Actions Program Field Office Management Plan	Annually	July
Environmental Restoration and Waste Management Site-Specific Plan for the Richland Operations Office	Annually	August
Westinghouse Hanford Company Effluent Discharges and Solid Waste Management Report for CY 19XX	Annually	August
Hanford Site Radioactive Solid Waste Acceptance Criteria	Annually	September
Hanford Site Environmental Permit Status Report	Annually	September
Hanford Site Surplus Facilities Program Plan	Annually	September
Tank Waste Treatability Studies	Annually	September
Superfund Amendment and Reauthorization Act (SARA) Report	Annually	November
U.S. Department of Energy-Richland Operations Office Environmental Protection Implementation Plan, November 9, 19XX to November 9, 19XX	Annually	November
Environmental Restoration Remedial Actions Program Field Office Management Plan	Annually	December
Operational Groundwater Monitoring for the Hanford Site	Annually	December
Inventory of Federal Agency Hazardous Waste Facilities	Biennially (even number years)	January
Biennial Waste Minimization Report	Biennially (even number years)	March

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12.0 LIST OF DEFINITIONS

This chapter defines key acronyms and initialisms used in this document, in the companion philosophy and overview document (DOE-RL 1989a), and in the ADSs found in DOE/RL 89-17 (DOE-RL 1990a). Also provided is a set of conversions to assist in converting metric units to English units or vice versa.

12.1 ACRONYMS

ADS	activity data sheet
CERCLA	<i>Comprehensive Environmental Response, Compensation and Liability Act of 1980</i>
CFR	Code of Federal Regulations
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy-Headquarters
DOE-RL	U.S. Department of Energy-Richland Operations Office
DST	double-shell tank
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FFTF	Fast Flux Test Facility
FY	fiscal year
HDW-EIS	<i>Hanford Defense Waste-Environmental Impact Statement</i>
HLW	high-level waste
HWVP	Hanford Waste Vitrification Plant
LLW	low-level waste
NEPA	<i>National Environmental Policy Act of 1976</i>
NPL	National Priorities List
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PNL	Pacific Northwest Laboratory
PUREX	Plutonium-Uranium Extraction
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RCW	Revised Code of Washington
RFI/CMS	RCRA facility investigation/corrective measures study
RI/FS	remedial investigation/feasibility study
SST	single-shell tank
TRU	transuranic
TRUEX	transuranic extraction
TSD	treatment, storage, and disposal
TTP	technical task plan
WAC	Washington Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company
WIPP	Waste Isolation Pilot Plant

12.2 METRIC CONVERSIONS

Metric/English Equivalents

1 cubic meter (1 m ³)	= 35.31 cubic feet
1 cubic meter (1 m ³)	= 264.2 gallons (=1,000 liters)
1 square meter (1 m ²)	= 10.76 square feet
1 liter	= 0.2642 gallons
1 foot	= 30.48 centimeters
1 meter	= 3.281 feet

12.3 GLOSSARY

100 Area--The section of the Hanford Site on the southern shore of the Columbia River in the northern part of the site, where the shutdown plutonium production reactors are located.

101-SY (formally known as 241-SY-101)--A DST, located in 200 West Area, that generates the largest amount of combustible hydrogen and nitrous oxide gases. The gases accumulate under a crust on top of the waste, then "burp" periodically to release the gases.

183-H Solar Evaporation Basins--Concrete basins in the 100-H Area, about 30 meters wide, 120 meters long, and 5 meters deep, used originally for the 100-H Reactor's water treatment system. They were used from 1973 to 1985 to evaporate liquid chemically hazardous and radioactive wastes from fuel fabrication. The basins contained 7,000 cubic meters of radioactive and hazardous sludge, recently removed as part of the basins' cleanup under RCRA.

200 Area--The section of the Hanford Site, near its center, used to reprocess irradiated nuclear fuel and store the resulting wastes. The 200 Area is further divided into two sections: 200 East Area and 200 West Area.

300 Area--The section in the southern part of the Hanford Site on the Columbia River used for laboratory work and fabrication of the nuclear fuel that the Hanford Site's reactors used.

1100 Area--The southern part of the Hanford Site used for administration and facilities. The 1100 Area has housed the Hanford Site's vehicle maintenance facilities, with its attendant hazardous chemical wastes, but has never been used for storage of radioactive wastes.

Activity Data Sheet--A concise (typically four- or five-page) summary of work funded by the DOE's Environmental Restoration and Waste Management budget. Each sheet describes a waste management or environmental need (e.g., can relate to a health or environmental concern, routine maintenance/surveillance, administration), regulatory requirements and agreements relating to the need, steps proposed to address the need, and the estimated cost and milestones to support the need.

Aggregate Areas--Groupings of waste sites to make their remediation simpler.

Aggregate Area Management Strategy--A way in which to clean up old waste sites faster if information indicates that this would reduce risks to the public and environment. Existing information would be gathered and studied. If the suggested early actions would help, interim actions would be taken to determine the source of the contamination and the groundwater unit at the same time and take care of the highest risks first.

Aging Waste Tanks--The DSTs especially designed to hold self-boiling wastes.

Ammonia Scrubber Distillate--A wastestream from a concentrator at the head end of the PUREX Plant. The feed to this concentrator is associated with fuel decladding and the neutralization and transfer of clad-removal waste to underground storage tanks.

Aquifer--A geologic formation or structure that can yield water in useable quantities.

As Low As Reasonably Achievable--A radiation protection principle applied to radiation exposures, with costs and benefits taken into account.

Atomic Energy Act--The Act (1954) which placed production and control of nuclear materials within a civilian agency, originally the Atomic Energy Commission.

B Plant--A Hanford Site facility built in 1943 to recover plutonium for nuclear weapons. It used first-penetration technology (bismuth-phosphate process). This mission ended in 1956. After modifications, B Plant restarted in 1967 for its second mission, which was to remove strontium and cesium from stored liquid wastes. The facility is now being considered for conversion to pretreat DST wastes so that they can be solidified in glass-like logs or cement-like grout. Recent events put this mission in doubt and it is likely that a new facility will be built instead.

Below Regulatory Concern--A level of radioactivity in waste which is considered to be safe for human exposure and, therefore, does not require monitoring or control.

Best Available Technology or Best Demonstrated Available Technology--Treatment technologies that have been shown through actual use to yield the greatest environmental benefit among competing technologies that are practically available.

Caisson--An underground structure used to store HLW; typical designs include corrugated metal or concrete cylinders about 2.5 meters in diameter, 55-gallon drums welded end-to-end, and vertical steel pipes below grade.

Canyon--At sites handling radioactive material, a heavily shielded, partially below-grade concrete structure used for remote chemical processing of fuels or wastes.

Carbon Tetrachloride--A chlorinated organic solvent used in the plutonium extraction process at the Plutonium Finishing Plant. Carbon tetrachloride is a known human liver carcinogen via inhalation and ingestion. Other toxic effects include damage to the central nervous system.

Certified TRU Waste--Since 1986, certain newly generated 55-gallon drums of solid TRU waste that have been certified to Hanford Site waste acceptance criteria and stored in the Transuranic Storage and Assay Facility.

Characterization--Facility or site sampling, monitoring, and analysis activities to determine the extent and nature of the waste problem at a site. Characterization provides the basis for getting the technical information required to develop, screen, analyze, and select appropriate cleanup techniques.

Chemical Sewer--The drain system for nonradioactive, chemically hazardous liquid wastes at Hanford Site facilities. For example, B Plant chemical sewage can include contributions from chemical makeup, floor drains in the operating parts of the plant, overflows from chemical tanks, cooling water and steam condensate, and rainfall.

Clean Air Act--Its purpose is to "protect and enhance the quality of the Nation's air resources." Its primary application is through Prevention of Significant Deterioration (PSD) permits to regulate new potentially polluting facilities. Of increasing importance are the National Emissions Standards for Hazardous Air Pollutants (NESHAPs). The CAA was passed in 1970 as amendments to 42 USC 7401.

Clean Close--A term used in the RCRA meaning to remedy, or close, a site with hazardous materials by removing the contaminated materials.

Clean Water Act of 1977--Amended the Federal Water Pollution Control Act first passed in 1956. Its objective is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Act's major enforcement tool is the National Pollutant Discharge Elimination Systems (NPDES) permit.

Closure Plan--Documentation prepared to guide the deactivation, stabilization, and surveillance of a waste management unit or facility under the RCRA.

Cold Standby--The condition of a facility that is not operating when the fuel and radioactive materials have been removed (cold). The facility is maintained so that it is possible to restart its operations (standby).

Complexant Concentrate--Waste material with a high concentration of complexants, or chemicals (usually organic) that help in chelating (a form of chemical bonding) metallic atoms. Chelating helps extract the nuclear materials from the dissolved nuclear fuel. Examples include citrates, EDTA, HEDTA.

Compliance Agreements--Legally binding agreements between regulators and regulated entities that set standards and schedules for compliance with

environmental statutes. Includes Consent Order and Compliance Agreements, Federal Facilities Agreements, and Federal Facilities Compliance Agreements.

Comprehensive Environmental Response, Compensation, and Liability Act--Also known as Superfund, this is the Federal law enacted in 1980 and reauthorized in 1986, which gives statutory authority for cleanup of hazardous substances at formerly used sites that could endanger public health or welfare or the environment.

Condensate--Liquid that is boiled off, then condensed back into a liquid, or that results from condensing a gas.

Contact-Handled--TRU waste, usually packaged in some form, which emits low enough radiation (a surface dose rate up to 200 mrem/hour) to permit close and unshielded manipulation by workers.

Contamination--Measured concentration of an undesirable chemical (radioactive or not) that is above the normal or background level.

Continuity of Operations--Each DOE site has activities that include developing strategic and long-range waste management plans, surveillance and maintenance of facilities and equipment, waste certification, proper training programs for personnel, and record/information administration.

Corrective Actions--Measures taken under RCRA or CERCLA to clean up a waste site. Corrective actions are also done to close issues relating to safety. Corrective actions should not be confused with corrective activities, a category of activity described in Chapter 4.0 of this plan.

Crib--An underground structure designed to receive liquid waste that can percolate into the soil directly or after traveling through a connected tile field. Similar in concept to a septic tank system.

Curie--A unit of measurement of radioactivity or of the quantity of a radionuclides, equal to 3.7×10^{10} disintegrations per second. In lay terms, a curie is enough radioactivity to handle remotely and with care.

Dangerous Waste--Solid wastes designated in certain Washington State statutes (WAC 173-303-070 through 173-303-103) as dangerous or extremely dangerous. In general, these are the wastes called "hazardous" in the Federal RCRA.

Decommissioning--The process of removing a facility from operation, followed by decontamination, entombment, dismantlement, or conversion to another use. Typically called decontamination and decommissioning (D&D).

Decontaminating and Decommissioning--The process of removing contamination from facilities or equipment by washing, chemical action, mechanical cleaning, or other techniques, then removing facility or equipment from operation, and entombing, dismantling and removing, or converting the facility for another use.

- Defense Waste**--Radioactive waste from any activity performed in whole or in part in support of DOE atomic energy defense activities; excludes waste under purview of the Nuclear Regulatory Commission or generated by the commercial nuclear power industry.
- Disposal**--Waste emplacement designed to ensure isolation of waste from the biosphere with no intention of retrieval for the foreseeable future and that requires deliberate action to regain access to the waste.
- Drain Header (B Plant Cell)**--The place in B Plant where pipes come together so the liquids from reprocessing are drained, then routed appropriately. (Processing in B Plant is conducted in enclosed areas called cells.)
- DOE Orders**--Internal requirements that establish DOE policy and procedures for compliance with applicable laws and regulations.
- Double-Shell Slurry**--Concentrated wastes in the DSTs that result from evaporating off liquids in the DST wastes and the liquids that are pumped from the SSTs.
- Double-Shell Tank**--A large reinforced concrete underground container with two inner steel liners to provide containment and backup containment of liquid wastes. The space between the liners has instruments to permit detection of leaks from the inner liner.
- Down-Gradient**--In hydrologic terms, downstream (the direction of underground water flow).
- Diffusion Barrier**--In the Grout Treatment Facility's design, a molecular-level physical barrier to prevent migration of contaminants from leaving the vault.
- Drywell**--A drainage receptacle constructed by digging a hole and refilling with coarse gravel. Also, a watertight well casing used for inserting monitoring equipment into the ground.
- Drinking Water Standard**--Concentration limits for certain elements and pollutants that may occur in drinking water; established by the Safe Drinking Water Act.
- Effluent**--A stream or flow of material discharged (e.g., into the environment, tanks, treatment systems).
- Environmental Restoration**--Cleanup and restoration of sites contaminated with hazardous substances during past production or disposal activities.
- Evaporator**--A Hanford Site facility to reduce the water content in tank waste to concentrate the waste and reduce storage space needs.
- Evaporation basins**--A basin in which liquids are discharged to allow them to evaporate naturally.

Expedited Response Action--A way under CERCLA to clean up old waste sites faster by bypassing some of the reviews and paperwork, if doing so will prevent harm to people and the environment.

Fast Flux Test Facility--A liquid metal test reactor that serves as a test tool for advanced reactor technology. Operations at the FFTF began in 1982 and have since expanded into other areas, such as fusion research, space power systems, and isotope production.

Feasibility Study--A step in the environmental restoration process specified by CERCLA. The objectives of the feasibility study are to identify the alternatives for remediation and to select and describe a remedial action that satisfies the applicable or relevant and appropriate requirements for mitigating confirmed environmental contamination. Successful completion of the feasibility study should result in unimpeded subsequent development of a remedial design for implementation of the selected remedial actions.

Ferrocyanide--A chemical formerly added to waste storage tanks to scavenge, or help settle out, other chemicals. It is currently a source of SST safety problems because of potential explosion problems.

Fission--The division of an atom's nucleus into two (or infrequently three) atoms of lower mass, usually accompanied by the expulsion of gamma rays, neutrons, beta particles, and/or alpha particles (all are types of radiation).

Five-Year Plan--The DOE-HQ plan that lays out the framework for the DOE's long-term strategy to clean up its waste sites safely and in compliance with applicable laws and regulations. The Hanford Five-Year Plan (this report) is formally known as the *Environmental Restoration and Waste Management Five-Year Plan*, and it describes the environmental restoration and waste management activities for the Hanford Site.

Fractionization--The process of separating a wastestream into different portions.

French Drain--A rock-filled encasement with an open bottom to allow seepage of liquid waste into the ground.

Frit--Chemical additives mixed with waste which create a glass upon heating; examples include fusible ceramic oxides and silicates (also see vitrification).

Functional Design Criteria--A report engineers prepare to describe the requirements and performance specifications a proposed facility or machine must meet. These criteria form the basis for engineers to design the facility or machine.

Gable Mountain Pond--A pond between 200 East Area and Gable Mountain that received cooling water from facilities in 200 East Area, including the PUREX Plant, B Plant, a tank farm's support facilities, and the 242-A Evaporator from 1957 to 1987. It was decommissioned in 1988.

Geological Repository--A mined facility for disposal of radioactive wastes that uses natural geologic barriers to provide waste containment over geological time scales.

Geophysical--Relating to the physical earth sciences, including hydrology, seismology, volcanology, magnetism, and radioactivity.

Offgas--Gases that are vented from processes.

Glovebox--An enclosed area that is sealed and shielded for work with radioactive materials. Workers outside the area handle the material inside through gloves attached to openings.

Groundwater--Liquid water occurring beneath the earth's surface, in the interstices between soil grains in fractures or in porous formations.

Groundwater Remediation--Treatment of groundwater to remove pollutants.

Grout--As the term is used at the Hanford Site, a fluid mixture of cementitious materials and liquid waste that sets up as a solid mass and is used to fix and immobilize waste. This is the treatment of choice of the EPA to immobilize certain chemical wastes. The Hanford Grout Treatment Facility will be regulated under the RCRA program.

Half-Life--The amount of time it takes for a half of the atoms of a radioactive substance to disintegrate, that is, for a half the radioactivity of a material to decay to nonradioactive forms.

Hanford Waste Vitrification Plant--A facility to be built for treatment of high-level liquid radioactive waste at Hanford Site. Liquids are vitrified, or solidified in a glass-like form, to reduce the potential for radioactive and hazardous contamination from getting into the environment. This plant will be regulated under RCRA.

Hardcake--The hard material in SSTs after liquids are pumped out.

Hazardous Wastes--Those wastes included in the definitions of RCRA 1004(5) and RCW 70.105.010(15).

Hazard Ranking System--The system used by EPA to determine where a site should be placed on the National Priorities List--the higher the hazard, the higher the site is placed on the list. The system determines the priority in which the sites will be funded by the EPA and remediated.

Heavy Metals--A metal of atomic weight greater than sodium (22.9) which forms soaps on reaction with fatty acids.

High-Efficiency Particulate Air Filter--Material, usually a paper or fiber sheet pleated to increase surface area, which captures entrained particles from an air stream, usually with efficiencies of 99.95 percent or higher.

High-Level Waste--The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of TRU waste and fission products in concentrations requiring permanent isolation.

Hot Cell--An enclosed area that is sealed and shielded for work with radioactive materials. Workers outside the area handle the material inside through the use of remote manipulators.

In Situ Vitrification--A process that turns soil (and whatever is in it) into glass by inserting electrodes into the soil and heating it until it melts. The soil then solidifies in a glass-like material resembling obsidian. The process destroys organic materials and immobilizes inorganic materials to isolate wastes safely.

Inactive Waste Site--Sites formerly used for the treatment, storage, or disposal of wastes.

Interim Isolation--The removal of unnecessary pipelines, capping or plugging remaining lines, and sealing openings to prevent liquids (mainly rainwater or snowmelt) from entering the SSTs. Leaves in place only the lines needed to monitor the tank.

Interim Stabilization--The transferring to the DSTs of the liquids that can be removed from SST wastes.

Interstices--The spaces in the waste matrices in DSTs and SSTs.

Interstitial Liquor--The liquid within the pores of saltcake and sludge in the DSTs and SSTs, like the moisture a sponge can hold.

Ion-Exchange--Process for selectively removing a constituent from a waste stream by reversibly transferring ions between an insoluble solid and the wastestream; the exchange medium (usually a column of resin or soil) can then be washed to collect the waste or taken directly to disposal; for example, a water softener operates by ion exchange.

Jet Pumping--A technique for removing interstitial liquid from SSTs.

Jumper Pit--(for the Grout Treatment Facility). A pit that contains the valves, pipes, and other equipment to connect processing equipment that may contain highly radioactive materials.

K Basins--Water-filled storage basins in the 100-K Area in which irradiated fuel from N Reactor are stored. The two basins are 100-K East and 100-K West.

Land Disposal Restrictions--Provisions of the Hazardous and Solid Waste Amendments to RCRA that require hazardous wastes to be treated before they are disposed of in the ground.

Leachate--Liquid that percolates out of a solution.

Liquid Effluent Retention Facility--A Hanford Site facility being built to store 242-A Evaporator process condensate suspected of containing certain regulated chemicals (ammonia) classified as "listed waste." This effluent can no longer be discharged to the ground via a crib because of this potential.

Listed Waste--Waste that has been identified by regulations as unacceptable for disposal in the ground. These chemicals are listed in tables in State and Federal hazardous waste laws. Examples include acetone, ammonia, and other commercial chemicals.

Logging--As used in this report, techniques to understand changes in underground soils and rocks, such as measuring electrical resistance, porosity, or natural radiation. Also means recording the characteristics of soil and rock that drillers encounter.

Low-Level Waste--Radioactive waste not classified as HLW, TRU waste, spent nuclear fuel, or by-product material.

Major System Acquisition--A classification for large federal projects that changes the way they are managed and funded.

Mixed Waste--Waste with both radioactive and hazardous components, as defined by the Atomic Energy Act and the RCRA. Mixed wastes are regulated under both laws.

Module I--The first phase of the Waste Receiving and Packaging Facility. It will include nondestructive testing services, examination, certification, and shipping of boxes and drums of contact-handled TRU waste, opening and repackaging of TRU drums, and decontamination of drum overpacks and items that could fit inside drums.

Module II--The second phase of the Waste Receiving and Packaging Facility. It will treat and handle low-level mixed wastes, remote-handled wastes, and decontamination of larger items. It also will process retrieved and newly generated, remote-handled TRU waste and all low-level mixed waste and secondary solids.

mrem--Abbreviation for millirem, or one-thousandth of a rem. This is a unit of measurement of radiation dose.

N Reactor--The last plutonium production reactor built at the Hanford Site. It operated from 1964 to 1987. It is shut down and no restart is planned.

National Emission Standards for Hazardous Air Polluting Substances--Clean Air Act limits for release of hazardous pollutants for which no ambient air quality standard is applicable.

National Environmental Policy Act--A law that established the requirement for conducting environmental reviews of Federal actions that have the potential for significant impact on the human environment.

National Pollutant Discharge Elimination System--Section 402 of the Federal Water Pollution Control Act (a.k.a. Clean Water Act) that establishes a permit for discharges to water and provides standards by which such permits may be granted.

National Priorities List--The EPA's list of priority waste sites containing hazardous substances that will be investigated and cleaned up under the Superfund program.

Neutralized Cladding Removal Waste--Waste that results from dissolving and removing the zirconium cladding from irradiated N Reactor fuel in the PUREX Plant. This wastestream has TRU contamination.

Neutralized Current Acid Waste--The highly radioactive liquid waste after plutonium is removed from dissolved irradiated fuel during reprocessing. It is the most radioactive wastestream from reprocessing operations.

Non-Contact Cooling Water--Cooling water that has never come into direct contact with radioactive materials and, therefore, would only be contaminated if there was a leak in a pipe or vessel. That means that it is usually nonradioactive and uncontaminated. This should not be confused with non-contact waste, which has a high enough level of radioactivity that it is not safe for workers to be directly exposed to it. Workers can only handle non-contact waste remotely.

Offgas--Gases that are vented from processes.

Outfall Structure--A drain or pipe that discharges liquids.

Operable Unit--A discrete portion of a site consisting of one or more release sites considered together for assessment and cleanup activities. The major reasons to place release sites together in an operable unit include geographic proximity, similarity of waste characteristics and site type, and the possibilities for economy of scale.

Organics--At the Hanford Site, compounds that contain carbon.

Past-Practice Units--Areas within the Hanford Site where solid wastes were buried or liquid wastes were discharged to the ground in the past, but no longer.

Performance Assessment--A term used to denote all activities (qualitative and quantitative) carried out to (1) determine the long-term ability of a site/facility to effectively isolate the waste and ensure the long-term health and safety of the public and (2) provide the basis for demonstrating regulatory compliance. Performance assessment serves as a focal point for site characterization, model development, and uncertainty analysis research activities.

Plume--Distribution of contaminants a distance away from a point source in a medium like groundwater, soil, or air; a defined area contamination.

Plutonium Finishing Plant--A complex in Hanford's 200 West Area where plutonium from scrap material is stabilized and recycled for reuse. Until 1989, the plant processed plutonium nitrate from the PUREX Plant to make plutonium metal for shipment elsewhere for use in weapons.

Plutonium-Uranium Extraction--Third generation technology to separate plutonium from irradiated fuel. At the PUREX Plant irradiated fuel was chemically dissolved to recover plutonium and uranium from 1956 to 1972 and 1983 to 1989.

Pre-1970, Suspect TRU-Contaminated Waste--Solid wastes that have TRU material and are buried near the surface in unlined trenches. Before 1970, the concept of TRU waste did not exist, and TRU wastes were not distinguished from other low-level wastes.

Pretreatment--As the term is used at the Hanford Site, the treatment of double-shell tank wastes before they are solidified--as grout or by vitrification. Present plans call for the wastes to be pretreated to separate the high volume of low-level waste (to be grouted) from the low volume of high-level waste (to be vitrified).

Process Condensate--Liquid that is boiled off in processes, then condensed back into a liquid, for example to concentrate the radioactive wastes from the PUREX Plant and other facilities.

Purgewater--Water pumped from groundwater monitoring wells, whether from well drilling or sampling.

rad--A special unit of measure for the absorbed dose of radiation; one rad equals 100 ergs absorbed per gram of material.

Radiation--Energy in the form of waves or particles from parts of atoms. **Radioactive Waste**. A solid, liquid, or gaseous material of negligible economic value that contains radionuclides in excess of threshold quantities. Does not include material contaminated by radionuclides from nuclear weapons testing.

Radiolytic Decomposition--The breaking up of a compound by radiation.

Radionuclides--Nuclides that are radioactive. A nuclide is a species of atom with a specific mass, atomic number, and nuclear energy state.

RCRA Facility Assessment--The initial Resource Conservation and Recovery Act (RCRA) process to determine whether corrective action for a RCRA past-practice unit is warranted or to define what additional data must be gathered to make this determination; analogous to a Comprehensive Environmental Response, Compensation, and Liability Act Preliminary Assessment and Site Inspection.

RCRA Facility Investigation--The RCRA process of determining extent of hazardous waste contamination; analogous to the Comprehensive Environmental Response, Compensation, and Liability Act Remedial Investigation.

RCRA Facility Investigation/Corrective Measures Study--The process under RCRA to study the site needing cleanup, and identify, evaluate, and select a cleanup option that meets the law's requirements.

RCRA Part A Permit--The first part of a Resource Conservation and Recovery Act permit application that identifies treatment, storage, and disposal units within a to-be-permitted facility.

RCRA Part B Permit--The detailed second part of a Resource Conservation and Recovery Act permit application that describes wastes managed, quantities, and facilities.

Recharge--To restore or return water to an aquifer.

Record of Decision--The NEPA or CERCLA document used to select the method of remedial action to be implemented at a site after the EIS (NEPA) or feasibility study and proposed plan process (CERCLA) are completed.

REDOX--A facility and/or second generation technology for separating plutonium from irradiated fuels by using successive steps of chemical REDuction/OXidation together with solvent extraction. The REDOX Plant at the Hanford Site was the world's first nuclear solvent extraction plant. It is in the 200 West Area and operated from 1952 to 1967. The plant was placed on the list for decommissioning in the mid-1970's.

Remedial Investigation--The Comprehensive Environmental Response, Compensation, and Liability Act process of determining the extent of hazardous substance contamination and, as appropriate, conducting treatability investigations. The RI provides the site specific information for the Feasibility Study.

Remedial Investigation/Feasibility Study--The process under CERCLA to study the site needing cleanup, and identify, evaluate, and select a cleanup option that meets the law's requirements.

Remediation--Removing or correcting a condition, such as by removing or isolating contaminated material.

Remote-Handled--TRU waste with a surface dose rate greater than 200 mrem/hour and requiring shielding from and distance between it and human manipulators

Repository--As the term applies to the Hanford Site, a place for the permanent disposal of radioactive wastes in an engineered facility in an underground geologic formation.

Reprocessing--The dissolution of spent reactor fuel and separation of uranium, TRU elements, and fission products.

Resource Conservation and Recovery Act--A Federal law enacted in 1976 that regulates generation, transportation, treatment, storage, and disposal of hazardous wastes and remediation of waste sites currently in use (contrast with CERCLA).

Retention Basin--An excavated and lined areas used to hold fluids until radioactive decay reduces activities to levels permissible for release or until sampling verifies that the fluid is at a level permissible for release

Retrievably Stored TRU Waste--Solid waste with TRU contamination, segregated from LLW and stored for future retrieval in unlined trenches near the surface or in buildings above ground.

Reverse Well--A well, sometimes drilled into the water table, into which liquid contaminated wastes were pumped to discharge them.

Roughing Filter--A prefilter to remove the majority of the larger particles in an air exhaust stream, after which high-efficiency particulate airfilters then remove the small particles.

S. 1140--This was a bill introduced in the Senate in 1990 to require Federal facilities to comply with the same environmental laws and regulations as do private companies. In the 1991 session, it is designated as S. 596.

S. 1462--This was a bill introduced in the Senate in 1990 to establish a trust fund to pay for waste cleanup at DOE facilities.

Safe Drinking Water Act--The maximum contaminant levels developed under this Act are used in groundwater monitoring programs.

Safety Envelope--A period of time in which an activity can be conducted safely.

Saltcake--Crystallized nitrate and other salts deposited in waste tanks, usually after active measures are taken to remove moisture

Salt well--A hole drilled or sluiced into a saltcake and lined with a cylindrical screen to permit drainage and jet pumping of interstitial liquor

Sanitary Waste--Wastes, such as garbage, that are generated by normal housekeeping activities and that are not hazardous or radioactive.

Single-Shell Tanks--At the Hanford Site, underground reinforced concrete containers with one carbon steel liner, which is covered with 2 to 3 meters of earth. Capacity ranges from 55,000 to 1 million gallons. The tanks have been used to store high-level radioactive wastes.

Site-Specific Plan--The common name of the plan describing environmental restoration and waste management activities at a DOE site such as the Hanford Site. It covers the year in which the plan is written, the next year, and the following five-year planning period. The national plan, covering all of DOE's nuclear weapons facilities, is called the "DOE-Headquarters Five-Year Plan."

Soil Column--A three-dimensional section of the ground.

Spent Fuel--Nuclear fuel (metallic rods or elements) that has been irradiated. Contains uranium, fission products and TRU.

Steam Condensate--Liquid that is boiled off as steam, then condensed back into a liquid. It is typically nearly pure water, but impurities with boiling points near or below that of water can be included.

Storage--Retention and monitoring of waste in a retrievable manner pending final disposal.

Strontium Semiworks--A plant in 200 East Area used for the PUREX and REDOX processes from 1952 to 1956, and for recovering and purifying strontium from 1960 to 1967. It has significant contamination and is undergoing decommissioning, which began in 1984.

Subsidence--Gradual or sudden sinking of the ground surface below natural grade level resulting from slow decay and compression of material or collapse of a large void space.

Superfund Amendments and Reauthorization Act--The 1986 Act amending and reauthorizing the Comprehensive Environmental Response, Compensation, and Liability Act.

Supernatant--The liquid that floats on the surface of heavier material deposited by settling, precipitation, or centrifugation.

Surplus Facility--Any facility or site (including equipment) that has no identified programmatic use and may or may not be radioactively contaminated to levels that require controlled access.

T Plant--One of the original processing plants built in 1943 to separate plutonium for use in bombs. Now the facility is used to decontaminate and decommission equipment.

Thermocouple--a device for measuring temperature

Toxic Substances Control Act--TSCA was enacted in 1976 to protect human health and the environment from unreasonable risk resulting from exposure to, manufacture, distribution, use or disposal of substances containing toxic chemicals. Under TSCA, any hazardous wastes that contain more than 50 parts per million of polychlorinated biphenyls are subject to regulation under this Act.

Transuranic--Having radionuclides with an atomic number greater than that of uranium, with a half-life of more than 20 years, and in concentrations greater than 100 nanocuries per gram of waste. That's the official definition. In lay terms, TRU wastes are usually those contaminated with plutonium. Most do not have much penetrating radiation--a piece of paper or 2 inches of air is all the shielding one would need--but they need to be isolated because they typically remain radioactive for very long periods of time.

Treatment--Any activity that alters the chemical or physical nature of a hazardous waste to reduce its toxicity, volume, mobility, or render it amenable for transport, storage or disposal.

Trench--A large structure usually filled with solid radioactive wastes and buried

Tri-Party Agreement--An agreement signed by U.S. Department of Energy, U.S. Environmental Protection Agency, and States that identifies milestones for key waste management actions.

Tritium--A radioactive (unstable) form of hydrogen with two neutrons (nonradioactive hydrogen has none.) It behaves chemically exactly like nonradioactive hydrogen and becomes part of water molecules.

Unplanned Release Sites--Places where contaminated liquids or particulates were discharged to the ground but were not planned to be so used.

U.S. Testing--The company that performed analytical testing of samples for the Hanford Site contractors until June 1990. The basis for terminating the contract was that U.S. Testing performed analytical tests in its Hoboken, N.J. laboratory knowing it was in violation of contractual quality assurance requirements. The contract termination did not result from any analytical work done at the Richland laboratory.

UO₃ Plant--Uranium Oxide Plant, a processing facility that converted liquid uranyl (uranium) nitrate hexahydrate from the PUREX Plant into a uranium trioxide powder which was recycled into reactor fuel. The plant was built in 1943-44 and operated from 1951 to 1972 and from 1984 to 1989.

Vadose Zone--The unsaturated region of soil between the ground surface and the water table.

Vitrification--Forming a glass-like material by heat and melting.

Waste Isolation Pilot Plant--A research and development facility near Carlsbad, N.M., to demonstrate the safe disposal of military TRU wastes in a repository in salt layer 2,150 feet underground.

Waste Minimization--The reduction, to the extent feasible, of hazardous waste that is generated before treatment, storage or disposal of the waste. Waste minimization includes any source reduction or recycling activity that results in either (1) reduction of total volume of hazardous waste, (2) reduction of toxicity of hazardous waste, or (3) both.

Waste Receiving and Processing Facility--A plant to be built at the Hanford Site that will receive, repackage, certify, sort, treat, and reduce volume for low-level, TRU, low-level mixed, and TRU mixed wastes (not all functions for all waste types). From this facility TRU wastes will be shipped offsite for disposal.

Wastestream--The waste that leaves a facility or operation similar to "effluent."

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APPENDIX A

PRIORITIZED LISTING OF OPERABLE UNITS

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Table A-1. Prioritized Listing of Operable Units. (sheet 1 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
1	1100-EM-1	1100-1	Acid pit	CPP
		1100-2	Solvent pit	CPP
		1100-3	Antifreeze pit	CPP
		1100-4	Storage tank	
		Horn Rapids Disposal	Landfill	CPP
		UN-1100-5	Spill	CPP
		UN-1100-6	Spill	
2	300-FF-1	300 Area Ash Pits	Ash pit	CPP
		300 Area Filter Backwash Pond	Pond	CPP
		300 Area Retired Filter Backwash Pond	Pond	CPP
		300 Area Retired Radioactive Liquid Waste System	Sewer	CPP
		300 Area Radioactive Liquid Waste System and 340 Complex	Sewer	CPP
		300 Area Sanitary Sewer System	Sewer	CPP
		307 Retention Basin	Retention basin	CPP
		316-1	Pond	CPP
		316-2	Pond	CPP
		316-3	Trench	CPP
		316-5 (300 Area Process Trenches)	Trench	TSD (D-3-1)
		618-12	Burial ground	CPP
		618-4	Burial ground	CPP
		618-5	Burial ground	CPP
		UN-300-1	Spill	CPP
		UN-300-11	Spill	CPP
		UN-300-14	Spill	CPP
		UN-300-2	Spill	CPP
		UN-300-31	Spill	CPP
		UN-300-41	Spill	CPP

Table A-1. Prioritized Listing of Operable Units. (sheet 2 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
3	200-BP-1	216-B-43	Crib	CPP
		216-B-44	Crib	CPP
		216-B-45	Crib	CPP
		216-B-46	Crib	CPP
		216-B-47	Crib	CPP
		216-B-48	Crib	CPP
		216-B-49	Crib	CPP
		216-B-50	Crib	CPP
		216-B-57	Crib	CPP
		216-B-61	Crib	CPP
		UN-200-E-110	Spill	CPP
		UN-200-E-63	Spill	CPP
		UN-200-E-9	Spill	CPP
4	100-HR-1	116-H-1 (107-H Liquid Waste Disposal Trench)	Trench	RPP
		116-H-2 (1608-H Liquid Waste Disposal Trench)	Trench	RPP
		116-H-3 (105-H Dummy Decontamination French Drain)	French drain	RPP
		116-H-4 (105-H Plutonium Crib)	Crib	RPP
		116-H-5	Outfall structure	RPP
		116-H-6 (183-H Solar Evaporation Basin)	Retention basin	TSD (T-1-4)
		116-H-7 (107-H Retention Basin)	Retention basin	RPP
		116-H-9 (117-H Crib)	Crib	RPP
		132-H-1	Stack	
		132-H-3 (1608 Waste Water Pumping Station)	Pump station	
		1607-H2 (124-H-2)	Septic tank	RPP
		1607-H4 (124-H-4)	Septic tank	RPP
5	100-DR-1	116-D-1A	Trench	RPP
		116-D-1B (105-D Storage Basin Trench Number 2)	Trench	RPP
		116-D-2 (105-D Plutonium Crib)	Crib	RPP

Table A-1. Prioritized Listing of Operable Units. (sheet 3 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
5	100-DR-1	116-D-3 (108-D Crib Number 1)	French drain	RPP
		116-D-4 (108-D Crib Number 2)	French drain	RPP
		116-D-5 (1904-D Outfall Structure)	Outfall structure	RPP
		116-D-6 (105-D Cushion Corridor French Drain)	French drain	RPP
		116-D-7 (107-D Retention Basin)	Retention basin	RPP
		116-D-9 (117-D Crib)	Crib	RPP
		116-DR-1 (107-DR Liquid Waste Disposal Trench Number 1)	Trench	RPP
		116-DR-2 (107-DR Liquid Waste Disposal Trench Number 2)	Trench	RPP
		116-DR-5 (1904-DR Outfall Structure)	Outfall structure	RPP
		116-DR-9 (107-DR Retention Basin)	Retention basin	RPP
		120-D-1 (100-D Ponds)	Ponds	TSD (D-1-1)
		126-D-1 (184-D Powerhouse Ash Pit)	Ash pit	RPP
		130-D-1 (1716-D Gasoline Storage Tank)	Storage tank	RPP
		132-D-3 (1608-D Waste Water Pumping Station)	Pump station	
		1607-D2 (124-D-2)	Septic tank	RPP
6	100-BC-1	116-B-1	Trench	CPP
		116-B-10	French drain	CPP
		116-B-11	Trench*	CPP
		116-B-12	Retention basin	CPP
		116-B-13	Trench	CPP
		116-B-14	Trench	CPP
		116-B-2	Trench	CPP
		116-B-3	Crib	CPP
		116-B-4	French drain	CPP

Table A-1. Prioritized Listing of Operable Units. (sheet 4 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
6	100-BC-1	116-B-5	Crib	CPP
		116-B-6A	Crib	CPP
		116-B-6B	Crib	CPP
		116-B-7	Outfall structure	CPP
		116-B-8	Outfall structure	CPP
		116-B-9	French drain	CPP
		116-C-1	Trench	CPP
		116-C-5	Retention basin	CPP
		118-B-10	Pit	CPP
		118-B-5	Burial ground	CPP
		118-B-7	Burial ground	CPP
		120-B-1	Sump	CPP
		126-B-1	Ash pit	CPP
		126-B-2	Demolition and inert landfill	CPP
		126-B-3	Demolition and inert landfill	CPP
		128-B-1	Burning pit	CPP
		128-B-3	Burning pit	CPP
		128-C-1	Burning pit	CPP
		132-B-5	Building	
		132-C-2	Outfall structure	
		1607-B1	Septic tank	CPP
		1607-B2	Septic tank	CPP
		1607-B3	Septic tank	CPP
		1607-B4	Septic tank	CPP
		1607-B5	Septic tank	CPP
		1607-B6	Septic tank	CPP
		1607-B7	Septic tank	CPP
7	100-KR-1	116-K-1	Crib	CPP
		116-K-2	Trench	CPP

Table A-1. Prioritized Listing of Operable Units. (sheet 5 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
7	100-KR-1	116-KE-4	Retention basin	CPP
		116-KW-3	Retention basin	CPP
8	100-NR-1	116-N-1 (1301-N)	Crib	TSD (D-1-2)
		116-N-2	Storage tank	RPP
		116-N-3 (1325-N)	Crib	TSD (D-1-2)
		124-N-4	Septic tank	RPP
		128-N-1	Burning pit	RPP
		UN-100-N-13	Spill	RPP
		UN-100-N-14	Spill	RPP
		UN-100-N-17	Spill	RPP
		UN-100-N-20	Spill	RPP
		UN-100-N-24	Spill	RPP
		UN-100-N-25	Spill	RPP
		UN-100-N-26	Spill	RPP
		UN-100-N-31	Spill	RPP
		UN-100-N-4	Spill	RPP
		UN-100-N-5	Spill	RPP
		UN-100-N-8	Spill	RPP
		UN-100-N-9	Spill	RPP
9	100-FR-1	116-F-1	Trench	CPP
		116-F-10	French drain	CPP
		116-F-11	French drain	CPP
		116-F-12	French drain	CPP
		116-F-13	French drain	CPP
		116-F-14	Retention basin	CPP
		116-F-2	Trench	CPP
		116-F-3	Trench	CPP
		116-F-4	Crib	CPP
		116-F-5	Crib	CPP
		116-F-6	Trench	CPP
		116-F-7	French drain	CPP

Table A-1. Prioritized Listing of Operable Units. (sheet 6 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
9	100-FR-1	116-F-8	Outfall structure	CPP
		116-F-9	Trench	CPP
		132-F-4	Stack	
		132-F-6	Pump station	
		1607-F2	Septic tank	CPP
		1607-F3	Septic tank	CPP
		1607-F4	Septic tank	CPP
		1607-F5	Septic tank	CPP
		1607-F6	Septic tank	CPP
		UN-100-F-1	Spill	CPP
10	100-NR-3	120-N-1 (1324-N)	Pond	TSD (T-1-2)
		120-N-2	Neutralization unit	TSD (T-1-2)
		120-N-3	French drain	RPP
		120-N-5	Neutralization unit	RPP
		120-N-6	French drain	RPP
		120-N-7	French drain	RPP
		120-N-8	French drain	RPP
		124-N-1	Septic tank	RPP
		124-N-10	Sewer	RPP
		124-N-2	Septic tank	RPP
		124-N-5	Septic tank	RPP
		124-N-6	Septic tank	RPP
		124-N-7	Septic tank	RPP
		124-N-8	Septic tank	RPP
		124-N-9	Septic tank	RPP
		130-N-1	Pond	RPP
		UN-100-N-11	Spill	RPP
		UN-100-N-15	Spill	RPP
		UN-100-N-18	Spill	RPP
		UN-100-N-19	Spill	RPP

Table A-1. Prioritized Listing of Operable Units. (sheet 7 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
10	100-NR-3	UN-100-N-21	Spill	RPP
		UN-100-N-22	Spill	RPP
		UN-100-N-23	Spill	RPP
		UN-100-N-33	Spill	RPP
		UN-100-N-34	Spill	RPP
		UN-100-N-6	Spill	RPP
		UN-600-17	Spill	RPP
11	200-UP-2	200-W Construction Surface Laydown Area	Burial ground	CPP
		207-U Retention Basin*	Retention basin	CPP
		216-U-1 and 2	Crib	CPP
		216-U-12	Crib	TSD (D-2-8)
		216-U-14	Ditch	CPP
		216-U-15	Trench	CPP
		216-U-16	Crib	CPP
		216-U-17	Crib	CPP
		216-U-3	French drain	CPP
		216-U-4	Reverse well	CPP
		216-U-4A	French drain	CPP
		216-U-4B	French drain	CPP
		216-U-5	Trench	CPP
		216-U-6	Trench	CPP
		216-U-7	French drain	CPP
		216-U-8	Crib	CPP
		241-U-151	Diversion box	CPP
		241-U-152	Diversion box	CPP
		241-U-302	Catch tank	CPP
		241-U-361	Settling tank	CPP
		241-UX-154	Diversion box	CPP
		241-UX-302	Catch tank	CPP
		241-WR Vault	Receiving vault	CPP
		2607-W5	Septic tank	CPP
		2607-W7	Septic tank	CPP

Table A-1. Prioritized Listing of Operable Units. (sheet 8 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
11	200-UP-2	UN-200-W-101	Spill	CPP
		UN-200-W-117	Spill	CPP
		UN-200-W-118	Spill	CPP
		UN-200-W-19	Spill	CPP
		UN-200-W-33	Spill	CPP
		UN-200-W-39	Spill	CPP
		UN-200-W-46	Spill	CPP
		UN-200-W-48	Spill	CPP
		UN-200-W-55	Spill	CPP
		UN-200-W-6	Spill	CPP
		UN-200-W-60	Spill	CPP
		UN-200-W-78	Spill	CPP
		UN-200-W-86	Spill	CPP
12	100-BC-2	116-C-2A	Crib	CPP
		116-C-2B	Pump station*	
		116-C-2C	Crib	CPP
		116-C-3	Storage tank	CPP
		118-C-2	Storage tank	CPP
		132-C-1	Stack	
		1607-B8	Septic tank	CPP
13	200-BP-5	216-B-5	Reverse well	CPP
		216-B-56	Crib	CPP
		216-B-59	Retention basin	CPP
		216-B-9TF	Crib	CPP
		241-B-154	Diversion box	CPP
		241-B-302-B	Catch tank	CPP
		241-B-361	Settling tank	CPP
		UN-200-E-45	Spill	CPP
		UN-200-E-7	Spill	CPP
14	100-DR-2	116-DR-3 (105-DR Storage Basin Trench)	Trench	RPP
		116-DR-4 (105-DR Plutonium Crib)	Crib	RPP
		116-DR-6 (1608-DR Liquid Disposal Trench)	Trench	RPP

Table A-1. Prioritized Listing of Operable Units. (sheet 9 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
14	100-DR-2	116-DR-7 (105-DR Inkwell Crib) 116-DR-8 (117-DR Crib) 118-D-5 (Ball 3X Burial Ground) 132-DR-1 (1608-DR Waste Water Pumping Station) 1607-D3	Crib Crib Burial ground Pump station Septic tank	RPP RPP RPP RPP
15	200-ZP-1	216-Z-1 and 2TF 216-Z-12 216-Z-13 216-Z-14 216-Z-15 216-Z-18 216-Z-1A 216-Z-3 241-Z-361 2607-Z UN-200-W-103 UN-200-W-11 UN-200-W-159 UN-200-W-23 UN-200-W-74 UN-200-W-75 UN-200-W-89 UN-200-W-90 UN-200-W-91	Crib Crib French drain French drain French drain Crib Drain field Crib Settling tank Septic tank Spill Spill Spill Spill Spill Spill Spill Spill	CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP
16	100-KR-2	116-KE-1 116-KE-2 116-KE-3 116-KW-1 116-KW-2 118-K-1 120-KE-8	Crib Crib Reverse well Crib Reverse well Burial ground Brine pit	CPP CPP CPP CPP CPP CPP CPP

Table A-1. Prioritized Listing of Operable Units. (sheet 10 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
16	100-KR-2	120-KW-6 130-K-1 130-K-2 130-KE-1 130-KE-2 130-KW-1 130-KW-2 1607-K4 1607-K6 UN-100-K-1	Brine pit Storage tank Storage tank Storage tank Storage tank Storage tank Storage tank Septic tank Septic tank Spill	CPP CPP CPP CPP CPP CPP CPP CPP CPP CPP
17	200-BP-4	216-B-11A and B 216-B-51 216-B-7A and B 216-B-8TF	Reverse well French drain Crib Crib	
18	200-BP-11	216-B-3 (B Pond) 216-B-3-1 216-B-3-2 216-B-3-3 216-B-3A 216-B-3B 216-B-3C 216-E-25 UN-200-E-14 UN-200-E-92	Pond Ditch Ditch Ditch Pond Pond Pond Pond Spill Spill	TSD (D-2-5) RPP RPP TSD (D-2-5) TSD (D-2-5) TSD (D-2-5) TSD (D-2-5) RPP RPP RPP
19	200-PO-2	216-A-10 216-A-15 216-A-2 216-A-21 216-A-27	Crib French drain Crib Crib Crib	TSD (D-2-2)

Table A-1. Prioritized Listing of Operable Units. (sheet 11 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
19	200-PO-2	216-A-31 216-A-36A 216-A-36B 216-A-38-1 216-A-4 216-A-45 216-A-5 UN-200-E-117 UN-200-E-13 UN-200-E-22 UN-200-E-25 UN-200-E-39 UN-200-E-40 UN-200-E-97	Crib Crib Crib Crib Crib Crib Crib Spill Spill Spill Spill Spill Spill	TSD (D-2-4)
20	200-PO-5	207-A Retention Basin* 216-A-1 216-A-16 216-A-17 216-A-18 216-A-19 216-A-20 216-A-23A 216-A-23B 216-A-24 216-A-29 216-A-34 216-A-524 216-A-7 216-A-8 241-A-302B 2607-EC	Retention basin Crib French drain French drain Trench Trench Trench French drain French drain Crib Ditch Ditch Control structure Crib Crib Catch tank Septic tank	TSD (D-2-3)

Table A-1. Prioritized Listing of Operable Units. (sheet 12 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
20	200-PO-5	UN-200-E-56 UN-200-E-67	Spill Spill	
B	100-BC-3	118-B-2 118-B-3 118-B-4 118-B-6	Burial ground Burial ground Burial ground Burial ground	CPP CPP CPP CPP
B	100-BC-4	118-B-1 118-C-1 1607-B9	Burial ground Burial ground Septic tank	CPP CPP CPP
B	100-DR-3	118-D-1 (100-D Burial Ground Number 1) 118-D-2 (100-D Burial Ground Number 2) 118-D-3 (100-D Burial Ground Number 3) 118-D-4 (Construction Burial Ground) 118-DR-1 (105-DR Gas Loop Burial Ground) 128-D-1 (100-D/DR Burning Pit) 1607-D1 (124-DR-1)	Burial ground Burial ground Burial ground Burial ground Burial ground Burning pit Septic tank	RPP RPP RPP RPP RPP RPP RPP
B	100-FR-2	118-F-1 118-F-2 118-F-3 118-F-4 118-F-5 118-F-6 118-F-7 126-F-1 128-F-1 1607-F1	Burial ground Burial ground Burial ground Burial ground Burial ground Burial ground Burial ground Ash pit Burning pit Septic tank	

Table A-1. Prioritized Listing of Operable Units. (sheet 13 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
B	100-HR-2	118-H-1 (100-H Burial Ground Number 1)	Burial ground	RPP
		118-H-1 (100-H Burial Ground Number 1)	Burial ground	RPP
		118-H-2 (H-1 Loop Burial Ground)	Burial ground	RPP
		118-H-3 (Construction Burial Ground)	Burial ground	RPP
		118-H-4 (Ball 3X Burial Ground)	Burial ground	RPP
		118-H-5 (100-H Thimble Pit)	Burial ground	RPP
		126-H-1 (184-H Powerhouse Ash Pit)	Ash pit	RPP
		128-H-1 (100-H Burning Pit)	Burning pit	RPP
		128-H-2	Burning pit	RPP
		128-H-3	Burning pit	RPP
		1607-H1 (124-H-1)	Septic tank	RPP
		1607-H3 (124-H-3)	Septic tank	RPP
B	100-IU-1	600 Area Army Munitions Burial Site	Burial ground	
		Riverland Railroad Car Wash Pit	Pit	
B	100-KR-3	120-KE-1	French drain	CPP
		120-KE-2	French drain	CPP
		120-KE-3	Trench	CPP
		120-KE-6	Storage tank	CPP
		120-KE-9	Brine pit	CPP
		120-KW-1	French drain	CPP
		120-KW-2	French drain	CPP
		120-KW-5	Storage tank	CPP
		120-KW-7	Brine pit	CPP
		128-K-1	Burning pit	CPP
		128-K-2	Burning pit	CPP
		130-K-3	Storage tank	CPP
		1607-K1	Septic tank	CPP
		1607-K2	Septic tank	CPP
		1607-K3	Septic tank	CPP
		1607-K5	Septic tank	CPP

Table A-1. Prioritized Listing of Operable Units. (sheet 14 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
B	100-NR-2	118-N-1	Silos	
		124-N-3	Septic tank	
		UN-100-N-1	Spill	
		UN-100-N-10	Spill	
		UN-100-N-12	Spill	
		UN-100-N-2	Spill	
		UN-100-N-29	Spill	
		UN-100-N-3	Spill	
		UN-100-N-30	Spill	
		UN-100-N-32	Spill	
		UN-100-N-35	Spill	
		UN-100-N-7	Spill	
B	200-BP-2	216-B-14	Crib	
		216-B-15	Crib	
		216-B-16	Crib	
		216-B-17	Crib	
		216-B-18	Crib	
		216-B-19	Crib	
		216-B-20	Trench	
		216-B-21	Trench	
		216-B-22	Trench	
		216-B-23	Trench	
		216-B-24	Trench	
		216-B-25	Trench	
		216-B-26	Trench	
		216-B-27	Trench	
		216-B-28	Trench	
		216-B-29	Trench	
		216-B-30	Trench	
		216-B-31	Trench	
		216-B-32	Trench	
		216-B-33	Trench	
		216-B-34	Trench	

Table A-1. Prioritized Listing of Operable Units. (sheet 15 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
B	200-BP-2	216-B-52 216-B-53A 216-B-53B 216-B-54 216-B-58 UN-200-E-83	Trench Trench Trench Trench Trench Spill	
B	200-IU-3	600 Area Central Landfill 600 Area Nonradioactive Dangerous Waste Landfill 600 Area Original Central Landfill 6607-1 6607-2 UN-600-12	Landfill Landfill Landfill Septic tank Septic tank Spill	TSD (D-6-1)
B	200-PO-1	216-A-11 216-A-12 216-A-13 216-A-14 216-A-22 216-A-26 216-A-26A 216-A-28 216-A-3 216-A-32 216-A-33 216-A-35 216-A-40 216-A-41 216-A-9 218-E-1 218-E-13 241-A-151 241-A-302A 2607-E6	French drain French drain French drain French drain French drain French drain French drain French drain Crib Crib French drain French drain Trench Crib Crib Burial ground Burial ground Diversion box Catch tank Septic tank	

Table A-1. Prioritized Listing of Operable Units. (sheet 16 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
B	200-PO-1	2607-EA	Septic tank	
		UN-200-E-10	Spill	
		UN-200-E-11	Spill	
		UN-200-E-114	Spill	
		UN-200-E-12	Spill	
		UN-200-E-142	Spill	
		UN-200-E-15	Spill	
		UN-200-E-19	Spill	
		UN-200-E-20	Spill	
		UN-200-E-26	Spill	
		UN-200-E-28	Spill	
		UN-200-E-31	Spill	
		UN-200-E-33	Spill	
		UN-200-E-42	Spill	
		UN-200-E-49	Spill	
		UN-200-E-58	Spill	
		UN-200-E-60	Spill	
B	200-PO-1	UN-200-E-65	Spill	
		UN-200-E-88	Spill	
		UN-200-E-96	Spill	
B	200-PO-4	216-A-30	Crib	
		216-A-37-1	Crib	
		216-A-37-2	Crib	
		216-A-42	Retention basin	
		216-A-6	Crib	
		2607-EL	Septic tank	
B	200-SO-1	200-E Powerhouse Ditch	Ditch	
		216-C-1	Crib	
		216-C-10	Crib	
		216-C-2	Reverse well	
		216-C-3	Crib	
		216-C-4	Crib	
		216-C-5	Crib	

Table A-1. Prioritized Listing of Operable Units. (sheet 17 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
B	200-SO-1	216-C-6 216-C-7 216-C-9 218-C-9 241-CX-70 241-CX-71 241-CX-72 2607-E5 2607-E7A Hot Semi-Works Valve Pit UN-200-E-141 UN-200-E-36 UN-200-E-37 UN-200-E-98	Crib Crib Pond Burial ground Storage tank Neutralization unit Storage tank Septic tank Septic tank Valve pit Spill Spill Spill Spill	
B	200-TP-1	216-T-21 216-T-22 216-T-23 216-T-24 216-T-25 216-T-32 216-T-36 216-T-5 216-T-7TF	Trench Trench Trench Trench Trench Crib Crib Trench Crib	
B	200-TP-2	200-W Powerhouse Pond 216-T-13 216-T-18 216-T-19TF 216-T-20 216-T-26 216-T-27 216-T-28 216-T-31	Pond Trench Crib Crib Trench Crib Crib Crib French drain	

Table A-1. Prioritized Listing of Operable Units. (sheet 18 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
B	200-TP-2	241-TX-152 241-TX-155 241-TX-302B UN-200-W-113 UN-200-W-135 UN-200-W-14 UN-200-W-99 216-T-1	Diversion box Diversion box Catch tank Spill Spill Spill Spill Ditch	
B	200-TP-4	216-T-10 216-T-11 216-T-2 216-T-29 216-T-3 216-T-33 216-T-34 216-T-35 216-T-8	Trench Trench Reverse well Crib Reverse well Crib Crib Crib Crib	
B	200-TP-4	216-T-9 218-W-8 241-T-361 241-TX-154 241-TX-302C 2607-W3 2607-W4 UN-200-W-102 UN-200-W-2 UN-200-W-27 UN-200-W-3 UN-200-W-38 UN-200-W-4 UN-200-W-58 UN-200-W-65 UN-200-W-67	Trench Burial ground Settling tank Diversion box Catch tank Septic tank Septic tank Spill Spill Spill Spill Spill Spill Spill Spill Spill	

Table A-1. Prioritized Listing of Operable Units. (sheet 19 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
B	200-TP-4	UN-200-W-73 UN-200-W-77 UN-200-W-8 UN-200-W-85 UN-200-W-98	Spill Spill Spill Spill Spill	
B	200-ZP-2	207-Z Retention Basin 216-Z-10 216-Z-16 216-Z-17 216-Z-4 216-Z-5 216-Z-6 216-Z-7 216-Z-8 216-Z-9 2607-W8 2607-WA 2607-Z8 UN-200-W-130 UN-200-W-79	Retention basin Reverse well Crib Trench Trench Crib Crib Crib French drain Trench Septic tank Septic tank Septic tank Spill Spill	
B	300-FF-2	300 Area Vitrification Test Site 618-1 618-13 618-2 618-3 618-7 618-8 618-9	Test treatment and storage facility Burial ground Burial ground Burial ground Burial ground Burial ground Burial ground Burial ground	
B	300-FF-3	300 Area Interim Filter Backwash Disposal 309-TW-1 309-TW-2	Neutralization unit Storage tank Storage tank	

Table A-1. Prioritized Listing of Operable Units. (sheet 20 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
B	300-FF-3	309-TW-3 315 Retired Sanitary Drain Field 331 LSL Drain Field 331 LSL Trench 1 331 LSL Trench 2 335 and 336 Retired Sanitary Drain Field 618-6 UN-300-10 UN-300-12 UN-300-13 UN-300-17 UN-300-18 UN-300-39 UN-300-4 UN-300-40 UN-300-42 UN-300-43 UN-300-44 UN-300-45 UN-300-5 UN-300-7	Storage tank Drain field Drain field Trench Trench Drain field Burial ground Spill Spill Spill Spill Spill Spill Spill Spill Spill Spill Spill Spill Spill	
C	100-IU-2	East White Bluffs Landfill J. A. Jones, Number 2 White Bluffs Landfill	Landfill Burial ground Landfill	
C	100-IU-3	USBR 2,4-D Burial Site Wahulke Slope Nike Missile Base	Landfill Test treatment and storage facility (missile base)	
C	1100-EM-2	1100 Area Bus Shop Underground Hoist Rams* 1100 Area Underground Steam Pad Tank Number 2*	Storage tank Storage tank	

Table A-1. Prioritized Listing of Operable Units. (sheet 21 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
C	1100-EM-2	1100 Area Underground Steam Pad Tank Number 3* 1100 Area Used Oil Tank Number 4* 1100 Area Used Oil Tank Number 5* 1100 Area Used Oil Tank Number 6* 1100 HWSA 700 Area Waste Solvent Tank	Storage tank Storage tank Storage tank Storage tank Storage tank Storage tank	
C	1100-EM-3	3000 Area 1208 HWSA 3000 Area 1226 HWSA 3000 Area 1234 Storage Yard 3000 Area 1240 HWSA 3000 Area Jones Yard HWSA 3000 Area Underground Used Oil Tank UN-3000-1	Staging area Staging area Staging area Staging area Staging area Storage tank Spill	
C	1100-IU-1	6652-C SSL Active Septic Tank 6652-C SSL Inactive Septic Tank 6652-G Air Land Ecology Field Storage Building Septic Tank* 6652-I Air Land Ecology Headquarters Septic Tank* Rattlesnake Mountain Nike Missile Base	Septic tank Septic tank Septic tank Septic tank Test treatment and storage facility (missile base)*	
C	200-BP-10	218-E-2 218-E-2A 218-E-4 218-E-5 218-E-5A 218-E-9 UN-200-E-112	Burial ground Burial ground Burial ground Burial ground Burial ground Burial ground Spill	

Table A-1. Prioritized Listing of Operable Units. (sheet 22 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
C	200-BP-10	UN-200-E-61 UN-200-E-95	Spill Spill	
C	200-BP-3	216-B-35 216-B-36 216-B-37 216-B-38 216-B-39 216-B-40 216-B-41 216-B-42	Trench Trench Trench Trench Trench Trench Trench Trench	
C	200-BP-6	216-B-10A 216-B-10B 216-B-13 216-B-4 216-B-6 216-B-60 218-E-6 218-E-7 241-BX-154 241-BX-155 241-BX-302B 241-BX-302C 241-ER-152 2607-E3 2607-E4 270-E Condensate Neutralization Tank Tile Field South of 218-E-4 UN-200-E-1 UN-200-E-103 UN-200-E-140 UN-200-E-2	Crib Crib French drain Reverse well Reverse well Crib Burial ground Burial ground Diversion box Diversion box Catch tank Catch tank Diversion box Septic tank Septic tank Neutralization tank Drain field Spill Spill Spill Spill	

Table A-1. Prioritized Listing of Operable Units. (sheet 23 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
C	200-BP-6	UN-200-E-3 UN-200-E-41 UN-200-E-44 UN-200-E-52 UN-200-E-54 UN-200-E-55 UN-200-E-69 UN-200-E-80 UN-200-E-85 UN-200-E-87 UN-200-E-90	Spill Spill Spill Spill Spill Spill Spill Spill Spill Spill Spill	
C	200-BP-8	207-S Retention Basin* 216-B-2-1 216-B-2-2 216-B-2-3 216-B-63 2607-E9	Retention basin Ditch Ditch Ditch Ditch Septic tank	TSD (D-2-6)
C	200-BP-9	200 Area Construction Pit 216-B-12 216-B-55 216-B-62 216-B-64 241-ER-151 241-ER-311 UN-200-E-64	Pit Crib Crib Crib Retention basin Diversion box Catch tank Spill	
C	200-IU-4	213 J and K 213 J and K Storage Facility Hanford Townsite Landfill Hanford Trailer Camp Landfill P-11 UN-600-16 UN-600-18	Crib Storage facility Landfill Landfill Crib Spill Spill	

Table A-1. Prioritized Listing of Operable Units. (sheet 24 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
C	200-NO-1	216-N-1 216-N-2 216-N-3 216-N-4 216-N-5 216-N-6 216-N-7	Pond Trench Trench Pond Trench Pond Trench	
C	200-PO-6	200-E Burning Pit 218-E-12A 218-E-8 UN-200-E-62	Burning pit Burial ground Burial ground Spill	
C	200-RO-1	216-S-10D 216-S-10P 216-S-11 216-S-16D 216-S-16P 216-S-17 216-S-172 216-S-19 216-S-25 216-S-5 216-S-6 216-U-9 2607-WZ 2904-S-160 2904-S-170 2904-S-171	Ditch Pond Pond Ditch Pond Pond Control structure Pond Crib Crib Crib Ditch Septic tank Control structure Control structure Control structure	TSD (D-2-7) TSD (D-2-7)
C	200-RO-2	207-B Retention Basin* 216-S-1 and 2	Retention basin Crib	

Table A-1. Prioritized Listing of Operable Units. (sheet 25 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
C	200-R0-2	216-S-13	Crib	
		216-S-15	Pond	
		216-S-18	Trench	
		216-S-23	Crib	
		216-S-3	French drain	
		216-S-7	Crib	
		216-S-8	Trench	
		216-S-9	Crib	
		218-W-9	Burial ground	
		241-S-151	Diversion box	
		241-S-302A	Catch tank	
		241-SX-302	Catch tank	
		UN-200-W-108	Spill	
		UN-200-W-109	Spill	
		UN-200-W-114	Spill	
		UN-200-W-123	Spill	
		UN-200-W-127	Spill	
		UN-200-W-32	Spill	
		UN-200-W-34	Spill	
		UN-200-W-41	Spill	
		UN-200-W-42	Spill	
		UN-200-W-49	Spill	
		UN-200-W-50	Spill	
		UN-200-W-52	Spill	
		UN-200-W-69	Spill	
		UN-200-W-82	Spill	
		UN-200-W-83	Spill	
C	200-R0-3	207-SL Retention Basin*	Retention basin	
		216-S-12	Trench	
		216-S-14	Trench	
		216-S-20	Crib	
		216-S-22	Crib	
		216-S-26	Crib	

Table A-1. Prioritized Listing of Operable Units. (sheet 26 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
C	200-RO-3	218-W-7 240-S-151 240-S-152 240-S-302 2607-W6 622-1 UN-200-W-116 UN-200-W-35 UN-200-W-43 UN-200-W-56 UN-200-W-61	Burial ground Diversion box Diversion box Catch tank Septic tank Dumping area Spill Spill Spill Spill Spill	
C	200-TP-3	207-T Retention Basin* 216-T-12 216-T-14 216-T-15 216-T-16 216-T-17 216-T-4-1D 216-T-4-2 216-T-4A 216-T-4B 216-T-6 UN-200-W-63 UN-200-W-7	Retention basin Trench Trench Trench Trench Trench Ditch Ditch Pond Pond Crib Spill Spill	
C	200-UP-1	216-S-21 216-S-4 216-U-10 216-U-11 216-U-13 216-Z-11 216-Z-19 216-Z-1D 216-Z-20	Crib French drain Pond Ditch Trench Ditch Ditch Ditch Crib	

Table A-1. Prioritized Listing of Operable Units. (sheet 27 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
C	200-UP-1	2607-W9 UN-200-W-68	Septic tank Spill	
C	200-ZP-3	218-W-1 218-W-11 218-W-1A 218-W-2 218-W-2A 218-W-3 218-W-4A 2607-WWA UN-200-W-132 UN-200-W-44 Z-Plant Burning Pit	Burial ground Burial ground Burial ground Burial ground Burial ground Burial ground Burial ground Septic tank Spill Spill Burning pit	
C	300-FF-4	400 Area French Drain Number 10 400 Area French Drain Number 10A 400 Area French Drain Number 1A 400 Area French Drain Number 1B 400 Area French Drain Number 2 400 Area French Drain Number 3 400 Area French Drain Number 4 400 Area French Drain Number 5 400 Area French Drain Number 6 400 Area French Drain Number 7 400 Area French Drain Number 8 400 Area French Drain Number 9 400 Area Process Pond and Sewer 400 Area Retired French Drain 400 Area Retired Sanitary Pond 400 Area Retired Septic Tanks 400 Area Sand Bottom Trench 400 Area Sanitary Sewer 400 Area Sanitary Tile Field 403 French Drain	French drain French drain French drain French drain French drain French drain French drain French drain French drain French drain French drain French drain Pond French drain Pond Septic tank Trench Drain field Drain field French drain	

Table A-1. Prioritized Listing of Operable Units. (sheet 28 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
C	300-FF-4	4713-B French Drain 4721 French Drain 4722-B French Drain 4722-C French Drain 4831 Laydown HWSA UN-400-1	French drain French drain French drain French drain Staging area Spill	
C	300-IU-1	316-4 618-10 618-11 J. A. Jones Number 1	Crib Burial ground Burial ground Landfill	
D	100-IU-4	Sodium Dichromate Barrel Disposal	Landfill	
D	100-IU-5	White Bluffs Pickling Acid Crib	Crib	
D	200-IU-1	600 Area Exploratory Shaft HWSA 600 Area Exploratory Shaft Septic Tank 6607-3	Staging area Septic tank Septic tank	
D	200-IU-2	1607-FSM 600 Area Near-Surface Test Facility Septic Tank 600 Area Near-Surface Test Facility Underground Tank	Septic tank Septic tank Storage tank	
D	200-IU-5	2607-FSN 600 Area Batch Plant HWSA 622-R Septic Tank* Old Central Shop Area	Septic tank Staging area Septic tank Test treatment and storage facility	
D	200-IU-6	216-A-25 216-N-8	Pond Pond	
D	200-SS-1	200-E Powerhouse Ash Pit 218-E-3 2607-E1 2607-E7B 2607-E8	Ash pit Burial ground Septic tank Septic tank Septic tank	

Table A-1. Prioritized Listing of Operable Units. (sheet 29 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
D	200-SS-1	2607-EH 2607-EK 2607-EM 2607-EP 2607-EQ 2607-ER 2607-GF Chemical Tile Field North of 2703-E	Septic tank Septic tank Septic tank Septic tank Septic tank Septic tank Septic tank Drain field	
D	200-SS-2	200-W Ash Disposal Basin* 200-W Burning Pit 200-W Powerhouse Ash Pit 216-W-LWC* 2607-W1 2607-W2 UN-200-W-88	Ash pit Burning pit Ash pit Crib Septic tank Septic tank Spill	
*	200-BP-7	241-B-101 241-B-102 241-B-103 241-B-104 241-B-105 241-B-106 241-B-107 241-B-108 241-B-109 241-B-110	Single-shell tank Single-shell tank Single-shell tank Single-shell tank Single-shell tank Single-shell tank Single-shell tank Single-shell tank Single-shell tank Single-shell tank	TSD (S-2-4) TSD (S-2-4) TSD (S-2-4) TSD (S-2-4) TSD (S-2-4) TSD (S-2-4) TSD (S-2-4) TSD (S-2-4) TSD (S-2-4) TSD (S-2-4)

Table A-1. Prioritized Listing of Operable Units. (sheet 30 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-BP-7	241-B-111	Single-shell tank	TSD (S-2-4)
		241-B-112	Single-shell tank	TSD (S-2-4)
		241-B-151	Diversion box	RPP
		241-B-152	Diversion box	RPP
		241-B-153	Diversion box	RPP
		241-B-201	Single-shell tank	TSD (S-2-4)
		241-B-202	Single-shell tank	TSD (S-2-4)
		241-B-203	Single-shell tank	TSD (S-2-4)
		241-B-204	Single-shell tank	TSD (S-2-4)
		241-B-252	Diversion box	RPP
		241-B-301B	Catch tank	RPP
		241-BR-152	Diversion box	RPP
		241-BX-101	Single-shell tank	TSD (S-2-4)
		241-BX-102	Single-shell tank	TSD (S-2-4)
		241-BX-103	Single-shell tank	TSD (S-2-4)
		241-BX-104	Single-shell tank	TSD (S-2-4)
		241-BX-105	Single-shell tank	TSD (S-2-4)
		241-BX-106	Single-shell tank	TSD (S-2-4)
		241-BX-107	Single-shell tank	TSD (S-2-4)
		241-BX-108	Single-shell tank	TSD (S-2-4)
		241-BX-109	Single-shell tank	TSD (S-2-4)
		241-BX-110	Single-shell tank	TSD (S-2-4)

Table A-1. Prioritized Listing of Operable Units. (sheet 31 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-BP-7	241-BX-111	Single-shell tank	TSD (S-2-4)
		241-BX-112	Single-shell tank	TSD (S-2-4)
		241-BX-153	Diversion box	RPP
		241-BX-302A	Catch tank	RPP
		241-BXR-151	Diversion box	RPP
		241-BXR-152	Diversion box	RPP
		241-BXR-153	Diversion box	RPP
		241-BY-101	Single-shell tank	TSD (S-2-4)
		241-BY-102	Single-shell tank	TSD (S-2-4)
		241-BY-103	Single-shell tank	TSD (S-2-4)
		241-BY-104	Single-shell tank	TSD (S-2-4)
		241-BY-105	Single-shell tank	TSD (S-2-4)
		241-BY-106	Single-shell tank	TSD (S-2-4)
		241-BY-107	Single-shell tank	TSD (S-2-4)
		241-BY-108	Single-shell tank	TSD (S-2-4)
		241-BY-109	Single-shell tank	TSD (S-2-4)
		241-BY-110	Single-shell tank	TSD (S-2-4)
		241-BY-111	Single-shell tank	TSD (S-2-4)
		241-BY-112	Single-shell tank	TSD (S-2-4)
		241-BYR-152	Diversion box	RPP
		241-BYR-153	Diversion box	RPP
		241-BYR-154	Diversion box	RPP

Table A-1. Prioritized Listing of Operable Units. (sheet 32 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-BP-7	242-B-151	Diversion box	RPP
		244-BXR Vault*	Receiving vault	RPP
		2607-EB	Septic tank	RPP
		UN-200-E-101	Spill	RPP
		UN-200-E-105	Spill	RPP
		UN-200-E-109	Spill	RPP
		UN-200-E-43	Spill	RPP
		UN-200-E-76	Spill	RPP
		UN-200-E-79	Spill	RPP
		UN-200-E-89	Spill	RPP
*	200-PO-3	216-A-39	Crib	RPP
		216-C-8	French drain	RPP
		241-A-101	Single-shell tank	TSD (S-2-4)
		241-A-102	Single-shell tank	TSD (S-2-4)
		241-A-103	Single-shell tank	TSD (S-2-4)
		241-A-104	Single-shell tank	TSD (S-2-4)
		241-A-105	Single-shell tank	TSD (S-2-4)
		241-A-106	Single-shell tank	TSD (S-2-4)
		241-A-152	Diversion box	RPP
		241-A-153	Diversion box	RPP
		241-A-350	Catch tank	RPP
		241-A-417	Catch tank	RPP
		241-A-A	Diversion box	RPP
		241-A-B	Diversion box	RPP
		241-AR-151	Diversion box	RPP
		241-AX-101	Single-shell tank	TSD (S-2-4)

Table A-1. Prioritized Listing of Operable Units. (sheet 33 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-PO-3	241-AX-102	Single-shell tank	TSD (S-2-4)
		241-AX-103	Single-shell tank	TSD (S-2-4)
		241-AX-104	Single-shell tank	TSD (S-2-4)
		241-AX-151	Diversion box	RPP
		241-AX-152-DS	Diversion box	RPP
		241-AX-155	Diversion box	RPP
		241-AX-501	Valve pit	RPP
		241-AX-A	Diversion box	RPP
		241-AX-B	Diversion box	RPP
		241-C-101	Single-shell tank	TSD (S-2-4)
		241-C-102	Single-shell tank	TSD (S-2-4)
		241-C-103	Single-shell tank	TSD (S-2-4)
		241-C-104	Single-shell tank	TSD (S-2-4)
		241-C-105	Single-shell tank	TSD (S-2-4)
		241-C-106	Single-shell tank	TSD (S-2-4)
		241-C-107	Single-shell tank	TSD (S-2-4)
		241-C-108	Single-shell tank	TSD (S-2-4)
		241-C-109	Single-shell tank	TSD (S-2-4)
		241-C-110	Single-shell tank	TSD (S-2-4)
		241-C-111	Single-shell tank	TSD (S-2-4)
		241-C-112	Single-shell tank	TSD (S-2-4)
		241-C-151	Diversion box	RPP
		241-C-152	Diversion box	RPP

Table A-1. Prioritized Listing of Operable Units. (sheet 34 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-P0-3	241-C-153	Diversion box	RPP
		241-C-201	Single-shell tank	TSD (S-2-4)
		241-C-202	Single-shell tank	TSD (S-2-4)
		241-C-203	Single-shell tank	TSD (S-2-4)
		241-C-204	Single-shell tank	TSD (S-2-4)
		241-C-252	Diversion box	RPP
		241-C-301C	Catch tank	RPP
		241-CR-151	Diversion box	RPP
		241-CR-152	Diversion box	RPP
		241-CR-153	Diversion box	RPP
		241-ER-153	Diversion box	RPP
		2607-ED	Septic tank	RPP
		2607-EG	Septic tank	RPP
		2607-EJ	Septic tank	RPP
		UN-200-E-100	Spill	RPP
		UN-200-E-107	Spill	RPP
		UN-200-E-118	Spill	RPP
		UN-200-E-16	Spill	RPP
		UN-200-E-18	Spill	RPP
		UN-200-E-27	Spill	RPP
		UN-200-E-47	Spill	RPP
		UN-200-E-48	Spill	RPP
		UN-200-E-68	Spill	RPP
		UN-200-E-72	Spill	RPP
		UN-200-E-81	Spill	RPP
		UN-200-E-82	Spill	RPP
		UN-200-E-86	Spill	RPP
		UN-200-E-91	Spill	RPP
		UN-200-E-94	Spill	RPP
		UN-200-E-99	Spill	RPP

Table A-1. Prioritized Listing of Operable Units. (sheet 35 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-R0-4	241-S-101	Single-shell tank	TSD (S-2-4)
		241-S-102	Single-shell tank	TSD (S-2-4)
		241-S-103	Single-shell tank	TSD (S-2-4)
		241-S-104	Single-shell tank	TSD (S-2-4)
		241-S-105	Single-shell tank	TSD (S-2-4)
		241-S-106	Single-shell tank	TSD (S-2-4)
		241-S-107	Single-shell tank	TSD (S-2-4)
		241-S-108	Single-shell tank	TSD (S-2-4)
		241-S-109	Single-shell tank	TSD (S-2-4)
		241-S-110	Single-shell tank	TSD (S-2-4)
		241-S-111	Single-shell tank	TSD (S-2-4)
		241-S-112	Single-shell tank	TSD (S-2-4)
		241-S-152	Diversion box	RPP
		241-S-302B	Catch tank	RPP
		241-S-A	Valve pit	RPP
		241-S-B	Valve pit	RPP
		241-S-C	Valve pit	RPP
		241-S-D	Valve pit	RPP
		241-SX-101	Single-shell tank	TSD (S-2-4)
		241-SX-102	Single-shell tank	TSD (S-2-4)
		241-SX-103	Single-shell tank	TSD (S-2-4)
		241-SX-104	Single-shell tank	TSD (S-2-4)

Table A-1. Prioritized Listing of Operable Units. (sheet 36 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-R0-4	241-SX-105	Single-shell tank	TSD (S-2-4)
		241-SX-106	Single-shell tank	TSD (S-2-4)
		241-SX-107	Single-shell tank	TSD (S-2-4)
		241-SX-108	Single-shell tank	TSD (S-2-4)
		241-SX-109	Single-shell tank	TSD (S-2-4)
		241-SX-110	Single-shell tank	TSD (S-2-4)
		241-SX-111	Single-shell tank	TSD (S-2-4)
		241-SX-112	Single-shell tank	TSD (S-2-4)
		241-SX-113	Single-shell tank	TSD (S-2-4)
		241-SX-114	Single-shell tank	TSD (S-2-4)
		241-SX-115	Single-shell tank	TSD (S-2-4)
		241-SX-151	Diversion box	RPP
		241-SX-152	Diversion box	RPP
		UN-200-W-10	Spill	RPP
		UN-200-W-80	Spill	RPP
		UN-200-W-81	Spill	RPP
*	200-TP-5	241-TX-101	Single-shell tank	TSD (S-2-4)
		241-TX-102	Single-shell tank	TSD (S-2-4)
		241-TX-103	Single-shell tank	TSD (S-2-4)
		241-TX-104	Single-shell tank	TSD (S-2-4)
		241-TX-105	Single-shell tank	TSD (S-2-4)

Table A-1. Prioritized Listing of Operable Units. (sheet 37 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-TP-5	241-TX-106	Single-shell tank	TSD (S-2-4)
		241-TX-107	Single-shell tank	TSD (S-2-4)
		241-TX-108	Single-shell tank	TSD (S-2-4)
		241-TX-109	Single-shell tank	TSD (S-2-4)
		241-TX-110	Single-shell tank	TSD (S-2-4)
		241-TX-111	Single-shell tank	TSD (S-2-4)
		241-TX-112	Single-shell tank	TSD (S-2-4)
		241-TX-113	Single-shell tank	TSD (S-2-4)
		241-TX-114	Single-shell tank	TSD (S-2-4)
		241-TX-115	Single-shell tank	TSD (S-2-4)
		241-TX-116	Single-shell tank	TSD (S-2-4)
		241-TX-117	Single-shell tank	TSD (S-2-4)
		241-TX-118	Single-shell tank	TSD (S-2-4)
		241-TX-153	Diversion box	RPP
		241-TX-302A	Catch tank	RPP
		241-TXR-152	Diversion box	RPP
		241-TXR-153	Diversion box	RPP
		241-TY-101	Single-shell tank	TSD (S-2-4)
		241-TY-102	Single-shell tank	TSD (S-2-4)
		241-TY-103	Single-shell tank	TSD (S-2-4)
		241-TY-104	Single-shell tank	TSD (S-2-4)

Table A-1. Prioritized Listing of Operable Units. (sheet 38 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-TP-5	241-TY-105	Single-shell tank	TSD (S-2-4)
		241-TY-106	Single-shell tank	TSD (S-2-4)
		241-TY-153	Diversion box	RPP
		241-TY-302A	Catch tank	RPP
		241-TY-302B	Catch tank	RPP
		242-T-151	Diversion box	RPP
		2607-WT	Septic tank	RPP
		2607-WTX	Septic tank	RPP
		UN-200-W-100	Spill	RPP
		UN-200-W-17	Spill	RPP
		UN-200-W-76	Spill	RPP
*	200-TP-6	241-T-101	Single-shell tank	TSD (S-2-4)
		241-T-102	Single-shell tank	TSD (S-2-4)
		241-T-103	Single-shell tank	TSD (S-2-4)
		241-T-104	Single-shell tank	TSD (S-2-4)
		241-T-105	Single-shell tank	TSD (S-2-4)
		241-T-106	Single-shell tank	TSD (S-2-4)
		241-T-107	Single-shell tank	TSD (S-2-4)
		241-T-108	Single-shell tank	TSD (S-2-4)
		241-T-109	Single-shell tank	TSD (S-2-4)
		241-T-110	Single-shell tank	TSD (S-2-4)
		241-T-111	Single-shell tank	TSD (S-2-4)
		241-T-112	Single-shell tank	TSD (S-2-4)

Table A-1. Prioritized Listing of Operable Units. (sheet 39 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-TP-6	241-T-151	Diversion box	RPP
		241-T-152	Diversion box	RPP
		241-T-153	Diversion box	RPP
		241-T-201	Single-shell tank	TSD (S-2-4)
		241-T-202	Single-shell tank	TSD (S-2-4)
		241-T-203	Single-shell tank	TSD (S-2-4)
		241-T-204	Single-shell tank	TSD (S-2-4)
		241-T-252	Diversion box	RPP
		241-T-301	Catch tank	RPP
		241-T-302	Catch tank	RPP
		241-TR-152	Diversion box	RPP
		241-TR-153	Diversion box	RPP
		UN-200-W-29	Spill	RPP
		UN-200-W-62	Spill	RPP
		UN-200-W-64	Spill	RPP
		UN-200-W-97	Spill	RPP
*	200-UP-3	241-U-101	Single-shell tank	TSD (S-2-4)
		241-U-102	Single-shell tank	TSD (S-2-4)
		241-U-103	Single-shell tank	TSD (S-2-4)
		241-U-104	Single-shell tank	TSD (S-2-4)
		241-U-105	Single-shell tank	TSD (S-2-4)
		241-U-106	Single-shell tank	TSD (S-2-4)
		241-U-107	Single-shell tank	TSD (S-2-4)
		241-U-108	Single-shell tank	TSD (S-2-4)

Table A-1. Prioritized Listing of Operable Units. (sheet 40 of 40)

Working order	Operable unit	Site name	Unit type	Unit type
*	200-UP-3	241-U-109	Single-shell tank	TSD (S-2-4)
		241-U-110	Single-shell tank	TSD (S-2-4)
		241-U-111	Single-shell tank	TSD (S-2-4)
		241-U-112	Single-shell tank	TSD (S-2-4)
		241-U-153	Diversion box	RPP
		241-U-201	Single-shell tank	TSD (S-2-4)
		241-U-202	Single-shell tank	TSD (S-2-4)
		241-U-203	Single-shell tank	TSD (S-2-4)
		241-U-204	Single-shell tank	TSD (S-2-4)
		241-U-252	Diversion box	RPP
		241-U-301	Catch tank	RPP
		241-U-A	Diversion box	RPP
		241-U-B	Diversion box	RPP
		241-U-C	Diversion box	RPP
		241-U-D	Diversion box	RPP
		241-UR-151	Diversion box	RPP
		241-UR-152	Diversion box	RPP
		241-UR-153	Diversion box	RPP
*	200-UP-3	241-UR-154	Diversion box	RPP
		244-UR Vault	Receiving vault	RPP
		2607-WUT	Septic tank	RPP
		UN-200-W-71	Spill	RPP

CCP = Comprehensive Environmental Response, Compensation and Liability Act past-practices.

RPP = Resource Conservation and Recovery Act past-practices.

TSD = Treatment, storage and disposal.

* = Single-shell tank operable unit which has not been prioritized.

APPENDIX B
STORED AND BURIED WASTES

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APPENDIX B

STORED AND BURIED WASTES

This appendix presents a table that shows the quantities of low-level waste and mixed waste stored and buried at the Hanford Site and a table showing 1988 and 1989 generation rates of hazardous, mixed, and radioactive wastes.

Table B-1. Historical Volumes and Nondecayed Radioactivity Levels
of Low-Level Waste and Low-Level Mixed Waste at
the Hanford Site. (sheet 1 of 2)

Status	Year	Low-level waste				Low-level mixed waste			
		Volume (cubic meters)		Radioactivity (curies)		Volume (cubic meters)		Radioactivity (curies)	
		Annual Rate	Accumu- lation	Annual rate	Accumu- lation	Annual rate	Accumu- lation	Annual rate	Accumu- lation
Buried	1944	12,459	12,459	2,975	2,975	0	0	0	0
Buried	1945	4,454	16,914	1,550	4,525	0	0	0	0
Buried	1946	1,339	18,253	2,025	6,550	0	0	0	0
Buried	1947	2,614	20,867	4,150	10,700	0	0	0	0
Buried	1948	2,614	23,480	6,200	16,900	0	0	0	0
Buried	1949	13,093	36,574	11,626	28,526	0	0	0	0
Buried	1950	3,163	39,737	9,250	37,776	0	0	0	0
Buried	1951	2,982	42,719	10,250	48,026	0	0	0	0
Buried	1952	3,239	45,958	14,320	62,346	0	0	0	0
Buried	1953	17,337	63,295	22,970	85,316	0	0	0	0
Buried	1954	20,725	84,021	50,905	136,221	0	0	0	0
Buried	1955	25,494	109,515	60,075	196,296	0	0	0	0
Buried	1956	14,224	123,738	34,150	230,446	0	0	0	0
Buried	1957	2,775	126,513	21,055	251,501	0	0	0	0
Buried	1958	3,230	129,743	19,015	270,516	0	0	0	0
Buried	1959	3,256	132,999	18,965	289,481	0	0	0	0
Buried	1960	4,157	137,156	13,300	302,781	0	0	0	0
Buried	1961	2,350	139,507	7,060	309,841	0	0	0	0
Buried	1962	2,602	142,109	4,220	314,061	0	0	0	0
Buried	1963	2,995	145,104	6,805	320,866	0	0	0	0
Buried	1964	3,176	148,279	10,355	331,221	0	0	0	0
Buried	1965	7,813	156,092	29,055	360,276	0	0	0	0
Buried	1966	3,422	159,514	9,485	369,761	0	0	0	0
Buried	1967	4,416	163,930	13,700	383,461	0	0	0	0
Buried	1968	835	164,765	71,202	454,663	0	0	0	0
Buried	1969	159,518	324,283	75,549	530,212	0	0	0	0
Buried	1970	3,402	327,685	39,480	569,692	0	0	0	0
Buried	1971	3,965	331,650	7,425	577,117	0	0	0	0
Buried	1972	4,533	336,182	187,835	764,952	0	0	0	0
Buried	1973	7,384	343,566	288,938	1,053,890	0	0	0	0
Buried	1974	7,053	350,619	6,274	1,060,163	0	0	0	0
Buried	1975	8,197	358,816	239,768	1,299,932	0	0	0	0
Buried	1976	5,326	364,142	418,735	1,718,667	0	0	0	0
Buried	1977	11,287	375,430	905,318	2,623,985	0	0	0	0
Buried	1978	10,406	385,836	1,035,443	3,659,427	0	0	0	0
Buried	1979	17,884	403,720	880,357	4,539,785	0	0	0	0

Table B-1. Historical Volumes and Nondecayed Radioactivity Levels of Low-Level Waste and Low-Level Mixed Waste at the Hanford Site. (sheet 2 of 2)

Status	Year	Low-level waste				Low-level mixed waste			
		Volume (cubic meters)		Radioactivity (curies)		Volume (cubic meters)		Radioactivity (curies)	
		Annual Rate	Accumulation	Annual rate	Accumulation	Annual rate	Accumulation	Annual rate	Accumulation
Buried	1980	11,253	414,974	140,212	4,679,997	0	0	0	0
Buried	1981	13,513	428,487	767,822	5,447,819	0	0	0	0
Buried	1982	12,211	440,698	710,610	6,158,429	0	0	0	0
Buried	1983	18,324	459,022	861,847	7,020,277	0	0	0	0
Buried	1984	19,057	478,078	260,197	7,280,473	0	0	0	0
Buried	1985	17,491	495,569	275,173	7,555,646	0	0	0	0
Buried	1986	21,196	516,765	204,547	7,760,193	0	0	0	0
Buried	1987	20,406	537,171	70,394	7,830,587	621	621	63,602	3,602
Buried	1988	16,838	554,009	145,275	7,975,861	9	631	1,250	64,852
Buried	1989	11,858	565,867	104,855	8,080,717	2,113	2,744	85,711	150,563
Buried	1990	7,920	573,787	46,460	8,127,176 ^a	5,395	8,138	196,837	347,400 ^a
Stored	1980	8	8	39,200	39,200	0	0	0	0
Stored	1981	15	23	30,000	69,200	0	0	0	0
Stored	1982	12	36	0	69,200	0	0	0	0
Stored	1983	8	44	165,700	234,900	0	0	0	0
Stored	1984	11	55	4	234,904	0	0	0	0
Stored	1985	1	56	0	234,904	0	0	0	0
Stored	1986	8	64	0	234,904	0	0	0	0
Stored	1987	0	64	0	234,904	716	716	400	400
Stored	1988	29	92	0	234,904	459	1,175	11	411
Stored	1989	39	131	0	234,905	534	1,709	12	423
Stored	1990	33	164	0	234,905	982	2,691	12	435 ^b

^aFor input to the Integrated Data Base, accumulative mass quantities of uranium and thorium are converted to curies and then added to the accumulative non-decayed activity. The accumulative activities of buried low-level waste and buried low-level mixed waste (through December 31, 1990) reported for the 1991 Integrated Data Base Report are 8,951,289 curies and 347,403 curies, respectively.

^bFor input to the Integrated Data Base, accumulative mass quantities of uranium and thorium are converted to curies and then added to the accumulative non-decayed activity. The accumulative activity of stored low-level mixed waste (through December 31, 1990) reported for the 1991 Integrated Data Base Report is 469 curies.

Table B-2. Hazardous and Radioactive Waste Generated on the Hanford Site in 1988 through 1990.^a

Calendar year	Waste type				
	Hazardous waste	Radioactive mixed waste	Radioactive		
			Low-level waste	Transuranic waste	High-level waste
1990	658,200	11,917,000	3,800,000	21,900	0
1989	66,600,000	6,960,000	8,300,000	27,200	0
1988	80,100,000	25,100,000	3,600,000	24,500	0
			UF = 18,100 ^b		

NOTE: All figures are in kilograms.

^aData is total for all Hanford Site generation sources and includes both liquid and solid wastes.

^bUF = Combined low-level waste and transuranic waste.

APPENDIX C

**U.S. DEPARTMENT OF ENERGY ORDER 5820.2A
IMPLEMENTATION SUMMARY TABLE**

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APPENDIX C

**U.S. DEPARTMENT OF ENERGY ORDER 5820.2A
IMPLEMENTATION SUMMARY TABLE**

The DOE Order 5820.2A (DOE-HQ 1988a) requires that the status of compliance with DOE Order 5820.2A be updated in the annual *Hanford Site Waste Management Plan* issued each December. Guidance for presenting the status of compliance is found in Attachment II of the Implementation Guidance for DOE Order 5820.2A, issued by DOE-HQ in October 1988.

Subsequent DOE guidance consolidated the *Hanford Site Waste Management Plan* into the site-specific plan. Therefore, the implementation summary is now included with this document.

The DOE guidance for presenting the status of compliance requested a table format with the focus on activities to attain compliance with the requirements of DOE Order 5820.2A. Accordingly, the DOE Order 5820.2A Implementation Summary Table is presented as Table C-1.

Table C-1. Implementation Summary. (sheet 1 of 7)

DOE 5820.2A requirement	Activity	Actual practice	Current plans	Costs ^a (\$ millions)	Scheduled completion date (FY)	Enforceable agreements ^b
Chapter I 3.a.(2)	Design reviews	SARs prepared for new facilities; others 3-4 years old	Update 5 HLW facility SARs	8	1999	
			Update 19 non-HLW management facility SARs and SADs	28	1998	
			Update research facility SARs (ADS 1012)	2	1996	
Chapter I 3.b.(1)	HLW characterization	Limited samples taken from tanks	Expand hot cell (ADS 9900) ^c	14.6	1994 ^d	M-11-02 M-11-00
		Limited hazardous chemical analysis	Upgrade analytical capability for LLW/mixed waste and hazardous components (ADS 9446)	61	1995	M-11-00 M-14-00 M-20-22
Chapter I 3.b.(2)(g)	Cathodic protection	Part of system upgraded since FY 1980	Upgrade remaining system (ADS 9111)	7.1	1992	
Chapter I 3.b.(5)	Training	Training meets part of the requirements	14 major upgrades will be achieved by obtaining new staff and materials	3.5	1992	
			Construct training facility	1.1	1992	
Chapter I 3.b.(6)	QA	NQA-1 elements implemented. Audits detect deficiencies which are corrected as part of routine operations ^d	Continue audits of NQA-1 implementation ^e	Routine expense	Ongoing	
		QA records in non-NQA-1 storage	Build NQA-1 Records Storage Facility	2 ^f	TBD	
Chapter I 3.b.(7)	Treatment of wastes in DSTs	HLW is stored for future processing and disposal	Retrieval and pre-treatment of DST waste	1,600-2,500	2,006	
Chapter I 3.c.(1)	Characterization of wastes in SSTs	Limited sampling; limited analysis of hazardous components	Upgrade sample equipment; take additional samples	Funded by ER program	1998 Phase I 2001 Phase II	M-10-00 M-10-01 M-10-02 M-10-03 M-10-04 M-10-05 M-10-06 M-10-07 M-10-08 M-10-09 M-10-10 M-10-11 M-10-12
			Sampling and analysis of mixed waste per SST Characterization Plan.			
			Expand hot cell	See 3.b.(1) above	1994	
			Upgrade analytical capability for both radioactive and chemical components	See 3.b.(1) above	1992-1995	

Table C-1. Implementation Summary. (sheet 2 of 7)

DOE 5820.2A requirement	Activity	Actual practice	Current plans	Costs ^a (\$ millions)	Scheduled completion date (FY)	Enforceable agreements ^b
Chapter I 3.c.(2)(d)	Singly contained pipelines	SAR prepared in 1981	Update SAR	See 3.a.(2) above		
Chapter I 3.c.(3)(c)	SST backup power for monitoring and leak detection ^d	Leak detection provided by self-powered trucks that monitor dry wells Portable generators are used as necessary during power outages	Continue to provide operability with backup power sources as needed	--	--	
Chapter I 13.c.(3)(d)	Monitoring wells	Ground water monitoring system at SSTs not in compliance with RCRA.	Complete rest of 33 SST wells in CY 1991 and CY 1992	5	1992	M-24-07 M-24-15
Chapter I 3.c.(6)	QA	NQA-1 requirements implemented	Continue audits of NQA-1 implementation	See 3.b.(6) above		
Chapter I 3.d.(1)	HLW disposal	HLW is stored	Construct and operate HWVP (ADS 4000)	1,200	2000	M-03-00 M-03-01 M-02-02
			Complete interim stabilization and isolation of SSTs (ADS 9304, ADS 9305, ADS 9306)	65	1996	M-05-00 M-05-02 M-05-03 M-05-04 M-05-05 M-05-06 M-05-07 M-05-08 M-05-09
			Integration/implementation of technology for demonstration of SST waste retrieval and tank farm closure developed by TD	Funded by ER program	Initiate 1997 Initiate 2004	M-08-00 M-07-00
Chapter II 3.a.(1)	Avoid TRU commingling	TRU is kept separate from mixed waste and LLW in most process activities. Segregation of TRU and LLW is also documented in facility specific TRU and LLW Waste Certification Plans	Document segregation activities as part of waste minimization plans	See Chapter II, 3.b.(1) below	Complete	

Table C-1. Implementation Summary. (sheet 3 of 7)

DOE 5820.2A requirement	Activity	Actual practice	Current plans	Costs ^a (\$ millions)	Scheduled completion date (FY)	Enforceable agreements ^b
Chapter II 3.a.(3)	TRU/LLW segregation at 100 nCi/g	55-gal drums are assayed	Adapt 55-gal design to (0.3 m ³ 83-gal) drum overpack (ADSs 9216, 9205, and 9206)	1	1991	
			Develop box waste assay (ADS 9206)	8	1995	
Chapter II 3.b.(1)-(4)	TRU waste generation and treatment	Technical and administrative controls reduce gross volume of waste generated.	Complete facility-specific waste minimization plans	Routine operations expense	Complete	
	TRU waste generation and treatment	Retrieval of 138 drums in FY 1991 for characterization.	Retrieve and characterize 200 drums of TRU waste stored in trenches (ADS 9205)	8.1	1993	
	Remove retrievably stored TRU waste from trenches. Repackage for shipment to WIPP	No full scale retrieval before FY 1999	Construct and operate WRAP Facility (ADS 9208, ADS 9218)	87 (through 1997); Out-year costs	Construct Module I 1996	M-18-00
			Construct and operate WRAP Facility Module II (ADS 9218)	337.5 through 1997	Construct and operate Module II TBD (Dependant on pending change request to TPA)	M-19-00
Chapter II 3.c.(1)	TRU waste certification	Only waste from large-volume generators is certified	Retrieve stored TRU waste from trenches and caissons (ADSs 9206 and 9223)	150 through 1997, out-year costs TBD	2012	
			Obtain approval for small stream generators' certification plans for CH TRU waste (ADS 9216)	0.01	1991	
Chapter II 3.f	Shipment to WIPP	No early shipments	Obtain approval for RH TRU waste certification plan	0.5	1993	
			Prepare early shipment to WIPP (ADS 9211)	N/A Task Cancelled		
Chapter II 3.f	Shipment to WIPP	Normal shipments	Complete shipping to WIPP (ADS 9208)	21	2013	

Table C-1. Implementation Summary. (sheet 4 of 7)

DOE 5820.2A requirement	Activity	Actual practice	Current plans	Costs ^a (\$ millions)	Scheduled completion date (FY)	Enforceable agreements ^b
Chapter II 3.g.(1)(d)	Interim storage	Certified waste stored in TRUSAF. Noncertified waste accumulating at generator sites	Build storage facility for non-certified waste (ADSs 9203 and 9207)	112	1998	
Chapter II 3.g.(2)-(8)	Interim storage requirements ^d	In compliance	Maintain compliance	See 3.g.(1) above	--	
Chapter II 3.i	Buried TRU waste	Routine surveillance of buried TRU waste	Prepare site characterization, site closure strategy, and site closure plans	To be funded by ER program; cost TBD	To be scheduled by ER program	
Chapter II c.j	QA ^d	Routine audits to evaluate compliance with NQA-1	Continue audits	Routine operations expense	--	
Chapter III 3.a	Performance objectives	Monitoring demonstrates compliance	Perform performance assessment to determine future compliance	See 3.b.(1)	See 3.b.(1)	
Chapter III 3.b.(1)	Site-specific radiological performance assessment	Performance assessment completed for HDW-EIS. Grout and LLW burial grounds PA in preparation				
			Predict time-dependent contamination and dose from grout disposal facilities.	1-2	1990-1993	
			Prepare site-specific radiological performance assessment for burial grounds	0.5-2	1992-1995	
Chapter III 3.b.(2)	Systems performance assessment	Systems performance assessment planning has been initiated	Prepare systems performance assessment	1.0	1992-1995	
Chapter III 3.b.(3)	Monitor performance	Environmental analyses and monitoring is performed	Continue monitoring and verify performance assessment models	3-6	Ongoing	
Chapter III 3.c.(1)	Administrative controls to reduce waste	Controls established in most facilities	Implement controls in all facilities	See Chapter III 3.e.(3) below	Complete	

Table C-1. Implementation Summary. (sheet 5 of 7)

DOE 5820.2A requirement	Activity	Actual practice	Current plans	Costs ^a (\$ millions)	Scheduled completion date (FY)	Enforceable agreements ^b
Chapter III 3.c.(2)	Auditable program to minimize waste generation	Auditable programs do not exist in most facilities	Auditable programs will be in place by end of FY 1990	See Chapter III 3.e.(3) below	1990	
Chapter III 3.c.(3)	Waste segregation	LLW is sorted from nonradioactive waste (in one facility only)	Demonstrate sorting and scanning system (ADS 9210) Purchase and install sorting and scanning systems	0.2 1.0	1991 1995	
Chapter III 3.d.(1)	Waste characterization	Characterized by general types of trash	Construct an LLW sampling and characterization facility (ADS 9900)	16.6	1993	M-14-00
Chapter III 3.f.(1)	Treatment to meet performance objectives	LLW buried in near-surface trenches and ground vaults	Conduct performance assessment to document compliance	See Chapter III 3.b.(1) above	See Chapter III 3.b.(1) above	
Chapter III 3.f.(2)	Implement treatment	Compactors exist in some facilities	WRAP Facility, Module II, operation (ADSs 9217 and 9218)	See Chapter II 3.b.(1)	Module II 1999	
Chapter III 3.f.(3)	NEPA/SEPA and other documentation for large treatment facility	One solid waste treatment facility being developed	NEPA/SEPA documentation will be prepared as part of WRAP Facility Project, Central Waste complex and LLW Burial Grounds	See Chapter II 3.b	1996	M-20-05 M-20-06 M-20-12
Chapter III 3.f.(4)	Documentation for operations	WRAP Module 1 Facility in design. Compactor facility has required documentation	Documentation will be prepared for WRAP Facility before operations (ADS 9208)	See Chapter II 3.b	1996	
Chapter III 3.h.(1)	Long-term storage	Waste stored under conditions expected to meet performance objectives	Construct new storage facilities (ADSs 9203 and 9207)	See Chapter II 3.g(1)(d)	1998	
Chapter III 3.i.(1)&(2)	Disposal to meet performance objectives	Waste disposed in safe manner.	Prepare a performance assessment to demonstrate compliance to performance objective Construct and operate a LLW disposal demonstration facility (ADS 9212)	See 3.b.(1) 9	 1995	

Table C-1. Implementation Summary. (sheet 6 of 7)

DOE 5820.2A requirement	Activity	Actual practice	Current plans	Costs ^a (\$ millions)	Scheduled completion date (FY)	Enforceable agreements ^b
Chapter III 3.j.(1)	Disposal site closure	RCRA closure plans are written as part of Part B applications	Submit RCRA Part B permit application (ADS 9201) Develop closure technology (ADS 9204) Initiate closure of 218-E-10 burial ground (ADS 9204)	1.9 22.9 (through FY 1997) TBD	1992 1996 1996 (initiated)	M-20-05 M-20-12
Chapter III 3.j.(5)	Field office approval ^d	Field office approval is obtained for closure plans	Field office approval will be obtained for future closure plans	Routine operations expense	As required	
Chapter III 3.j.(6)	Termination of monitoring ^d	Monitoring and maintenance performed	Monitoring will be terminated based on an analysis of site performance	Routine operations expense	As required	
Chapter III 3.k.(2)	Environmental monitoring	Environmental monitoring performed on all solid LLW burial sites	Define the monitoring required to determine migration and parameter changes after the LLW performance assessment is complete	See Chapter III 3.b.(3) above		
Chapter III 3.k.(4)	Trend analysis	Trend analysis is performed on environmental monitoring data	Apply trend analysis to evaluation of performance assessment models	See Chapter III 3.b.(3) above		
Chapter III 3.l	QA ^d	Routine audits to evaluate compliance with NQA-1	Continue audits	Routine operations expense		
Chapter III 3.m.(1)	Record-keeping system	Records are kept according to previous requirements	The Richland Solid Waste Information Tracking System is being developed (ADS 9210)	Routine operations expense	1991	
Chapter IV 3.a.(3)	Management of NARM	NARM disposed in LLW burial grounds	Compliance with RCRA will be achieved	Routine Operations Expense		

Table C-1. Implementation Summary. (sheet 7 of 7)

DOE 5820.2A requirement	Activity	Actual practice	Current plans	Costs ^a (\$ millions)	Scheduled completion date (FY)	Enforceable agreements ^b
Chapter V 3.e.	QA	Records are stored in non-NQA-1 facilities	Build NQA-1 Records Storage Facility	See Chapter I 3.b.(6) above		

^aCosts are for achieving compliance to DOE Order 5820.2A. Costs for maintaining compliance are included in operational budgets as part of safety and continuity of operations.

^bTri-Party Agreement milestones are indicated by milestone number (e.g., M-11-02).

^cNumber in parenthesis refers to FY 1992 to FY 1996 Activity Data Sheets.

^dCompletion dates are documented in the Tri-Party Agreement (EPA et al. 1989).

^eIn compliance. Will be removed from table when next updated.

^fConstruction Line Item Projects are subject to Congressional funding approvals; DOE-RL does not have authorization authority for these projects.

Legend:

CH = contact-handled
DST = double-shell tank
ER = environmental restoration
FY = fiscal year
HLW = high-level waste
HWVP = Hanford Waste Vitrification Plant
LLW = low-level waste
NARM = naturally occurring and accelerator-produced radioactive material
NDE = nondestructive examination
NDT = nondestructive testing
NEPA = National Environmental Policy Act
RH = remote-handled
SAD = safety analysis document
SAR = safety analysis report
SST = single-shell tank
TBD = to be determined
TPA = Tri-Party Agreement
TRU = transuranic
TRUSAF = Transuranic Waste Storage and Assay facility
QA = quality assurance
WRAP = Waste Receiving and Processing facility.

APPENDIX D
FIVE-YEAR VISION FOR HANFORD CLEANUP

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Five-Year Vision for Hanford Cleanup

Introduction

The U.S. Department of Energy is committed to cleaning up all of Hanford's inactive facilities and waste sites within 30 years (by 2018 since some cleanup started in 1988). These wastes will be disposed of safely and permanently. Some of Hanford's facilities and waste sites will still be used in 2018. Cleanup of these will occur when they are no longer used.

This is our vision of what should happen in the next five years (by September 1995) to achieve this commitment. It describes the progress we must achieve to gear up for and begin full-scale cleanup. It describes how we intend to strengthen public confidence and political support for cleanup. Finally, it describes how we will do cleanup business at Hanford (our organization's culture).

We recognize that the nation has entered a new era. The public demands more environmental protection. And, the public expects more understandable information and involvement in waste cleanup. We will fulfill this mandate.

This vision is the basis for the Hanford Cleanup Five-Year Plan. The plan begins to describe how we intend to achieve the vision. This vision contains goals and guiding principles. To be achieved, this vision must shine through our programs, policies, and procedures. Our people must see and believe in this vision. And, they must know what they have to do to help achieve it.

We asked the states of Washington and Oregon; the Yakima, Umatilla, and Nez Perce Indian nations; the U.S. Environmental Protection Agency; and the public to comment on the draft of this vision. We have changed the vision based on these comments. This vision will be reviewed yearly in public. We will assess our progress. We will examine our funding and legal limits. Then, we will make any changes needed in the direction that we are headed.

Cleanup Progress

In Five Years, we will be achieving our commitment to complete cleanup of inactive facilities and waste sites by 2018. Hanford will be the flagship for the department's national cleanup program.

This Will Be So If:

- We have a clear and complete understanding of where all the wastes are. All of them have been prioritized for cleanup.
- We have taken actions to prevent immediate risks and to reduce the spread of contamination.
- We have met or surpassed all milestones due in the Tri-Party Agreement with Washington and the U.S. Environmental Protection Agency.
- For the radioactive wastes in large underground tanks:
 - Liquid low-level wastes from the double-shell tanks are being solidified in grout. This grout is disposed of in underground concrete vaults. About forty percent of the grout vaults needed for this waste are built and filled;
 - We are building the Hanford Waste Vitrification Plant that will solidify liquid high-level wastes in glass logs for disposal in the national high-level waste repository;
 - The liquids that can be pumped have been removed from nearly all of the old single-shell tanks. Openings in these tanks have been sealed until decisions are made on permanent disposal;
 - We have developed and are testing methods to remove highly radioactive salts, sludges, and remaining liquids from the old single-shell tanks;

- The nature of the salts and sludges in about fifty percent of the single-shell tanks has been determined; and
- We are developing the means to address the wastes that have leaked or been discharged from the single-shell tanks.
- For old waste sites, including contaminated soil and groundwater:
 - About fifty percent of the plans to investigate the waste sites are done;
 - About twenty percent of the studies to determine the hazards and propose cleanup actions are done; and
 - Detailed design or cleanup has started on about fifteen percent of the sites.
- For recent and current waste facilities:
 - All facilities meet interim regulations to ensure near-term protection of human health and safety and the environment; and
 - We have applied for about seventy-five percent of the permits needed to continue to use, cleanup, or close recent and current waste facilities.
- We are building the Waste Receiving and Processing Plant to inspect, treat, and repackage solid plutonium-contaminated wastes for transport.
- Nearly all of the liquid contaminants discharged to the soil have been treated or stopped.
- We have the needed resources and commitment to meet the future milestones in the Tri-Party Agreement. We are on schedule to meet these milestones.
- About 30 percent of the old contaminated buildings and facilities have been removed and the sites have been cleaned up.
- Decisions have been made on decommissioning the old plutonium production reactors. These decisions are reasonable, cost-effective, and have broad public support.
- The Environmental and Molecular Science Laboratories have advanced our knowledge of wastes in the environment. We have developed and tested several new cleanup technologies. These technologies are reducing the cost of cleanup. And, they are available when we need them.
- We have an organization that tracks all pertinent research and development, both inside and outside of Hanford. That information is being applied to Hanford cleanup.
- We have addressed the concerns of the states and Indian nations about transport of plutonium-contaminated wastes. We have begun the shipping campaign to the Waste Isolation Pilot Plant in New Mexico.
- We have developed and committed to a comprehensive plan, schedule, and set of priorities to complete cleanup of inactive facilities and waste sites by 2018.
- We are working with the regulators and the public to clearly define what cleanup means. We are developing overall goals and standards for the long-term risks that will remain after cleanup is done. We are addressing future land uses. This work is being done in public. It is melding regulatory requirements with technical assessments of risks and capabilities, social concerns and values, and fiscal realities.
- We have contingency plans in place to safely treat and store Hanford's wastes if onsite or offsite disposal facilities are delayed or not available:
- We have a clear understanding of what wastes will be shipped into Hanford from other locations. We agree that these shipments make sense. We have the means to safely treat, store, and dispose of these wastes before they arrive.
- We are preventing future waste cleanup problems. We understand the wastes that will be produced by future operations. We are reducing the amount and hazards of new wastes. New wastes are treated, and either safely stored or disposed. All stored waste is being prepared for disposal as soon as possible. The funds needed for disposal are available.

Public Confidence and Political Support

In Five Years, we will have strong public confidence and political support for cleanup.

This Will Be So If:

- We have productive relationships with our regulators. We are forcing each other to do the best cleanup work. We work with them openly. They have representatives on or near Hanford. They have quick and direct access to us, our information, and the waste sites.
- We have developed partnerships with Washington, Oregon, and affected Northwest Indian nations on cleanup. We have common goals. We respect the rights of the states and Indian nations. Together, we are guiding cleanup work with extensive public involvement. State and Indian officials are openly supportive of cleanup activities.
- We recognize the sovereignty and treaty rights of Indian nations.
- The Northwest Congressional delegation and other key members of Congress understand and support Hanford cleanup and work to obtain the funding needed. Congress has established long-term funding for cleanup.
- We have an active outreach program for the general public. Many of our managers, scientists, and engineers participate. We are providing unbiased, factual information; seeking the public's advice on issues; and responding to the public's concerns.
- We provide easy, open, and timely access to anyone on all old and new information about Hanford's wastes and cleanup. We seek to understand what information is desired and provide it freely. We strive to match the amount and complexity of the information with the needs of various people.

- All documents intended to be distributed to the general public are written to be easily understood. Documents placed in the public reading rooms on major cleanup assessments, recommendations, or decisions contain short summaries that can be easily understood by the public.
- We provide the news media with complete, factual, and timely information on issues of potential public interest.
- Facts on potential health risks due to past radiation releases from Hanford have been developed and provided to the public.

Hanford's Organizational Culture

In Five Years, our way of doing business (our organization's culture) will be geared to cleanup and gaining public confidence.

This Will Be So If:

- All of our actions put protection of the environment, and human health and safety first. And, we reward people and organizations for protecting the environment, and human health and safety.
- Changes are being driven from within Hanford rather than by outside forces. We have created a climate that fosters growth and changes. We are keeping the values that helped us succeed in the past. We are developing new values to help us succeed in the future.
- We do the right things right the first time.
- We question how our current practices can be improved. We find new ways to solve problems. We encourage our people to be creative and to raise issues that need attention.

- We are finding new ways to reward and motivate Hanford workers.
- We seek professional outside help when we do not have the expertise or solutions. We use technical peer review to ensure excellent work. We listen to others, including our critics. We learn from the successes and failures of others.
- We recognize that we serve the public. We try to understand the public's concerns and desires. We strive to address those concerns and desires in our decisions and actions. We recognize that good technical solutions are a vital first step. But, we know that the public must have confidence in these solutions.
- Our organizations and people work together as a team with a "can do" approach to solve problems. One person is clearly and ultimately accountable for each program or problem. Other persons with related or partial responsibility work as a team under the leader's guidance.
- We are extremely self-critical. We find, face up to, and fix our problems. We get to the root causes of problems so that they do not recur. We anticipate potential problems and prevent them from happening.
- We comply with the spirit, as well as the letter, of all laws and regulations designed to protect the environment, and human health and safety. But, we understand that complying with laws and regulations may not be enough. We look for reasonable ways to reduce risks further and address problems not covered by laws and regulations. We propose alternatives or changes to laws and regulations that prevent or hinder protection of the environment, and human health and safety or provide little or no benefit for the public funds expended.
- We are a role model. We foster a climate of environmental, health, and safety awareness that influences people and organizations beyond Hanford.

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