DOE/RL-97-57
Revision 0

Accelerating Cleanup

Paths to Closure
Hanford Site

United States
Department of Energy
Richland, Washington

Approved for Public Release

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Revision 0

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U.S. DEPARTMENT OF ENERGY
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A Message From the Manager:

Hanford's Cleanup Strategy

Hanford's environmental management mission is to safely cleanup and manage the site's legacy wastes. As stated in the Hanford Strategic Plan the key mission indicators which must be achieved for successful cleanup are:

- Reduced risks to the worker, the public, and the environment
- Increased amount of land and other resources recovered for other uses
- Reduced/eliminated total amount of inventory and materials remaining to be cleaned up
- Reduced/eliminated costly mortgages

The Hanford Strategic Plan also identifies the critical success factors to achieve the mission. These provide a sound basis for ongoing operations and effeciencies for the Hanford Site.

The Hanford Site, Accelerating Cleanup: Paths to Closure document identifies the activities and projects required to accomplish the environmental management mission and to achieve the key mission indicators. This document provides discussion on current planning assumptions including land use, end states, and material and waste disposition. Also discussed are life cycle cost estimates, strategies and prioritization, and the anticipated critical closure path for completion of cleanup activities at the Hanford Site.

I have been encouraged by the dialogue that the previous drafts of this document has stimulated with representatives of the Tribal Nations, Regulatory Agencies, Hanford Advisory Board, and concerned citizens of the Pacific Northwest. I look forward to continuing to work with you to accomplish our cleanup mission at Hanford.

John D. Wagoner

John D. Wagoner, Manager
DOE-Richland Operations Office

EXECUTIVE SUMMARY

This document, *Accelerating Cleanup: Paths to Closure* (hereinafter referred to as *Paths to Closure*), was previously referred to as the *Draft 2006 Plan*. As part of the DOE's national strategy, the Richland Operations Office's *Paths to Closure* summarizes an integrated path forward for environmental cleanup at the Hanford Site. The Hanford Site underwent a concerted effort between 1994 and 1996 to accelerate the cleanup of the Site. These efforts are reflected in the current Site Baseline. This document describes the current Site Baseline and suggests strategies for further improvements in scope, schedule and cost. The Environmental Management program decided to change the name of the draft "strategy" and the document describing it in response to a series of stakeholder concerns, including the practicality of achieving widespread cleanup by 2006. Also, EM was concerned that calling the document a "plan" could be misconstrued to be a proposal by DOE or a decision-making document. The change in name, however, does not diminish the 2006 vision. To that end, *Paths to Closure* retains a focus on 2006, which serves as a point in time around which objectives and goals are established.

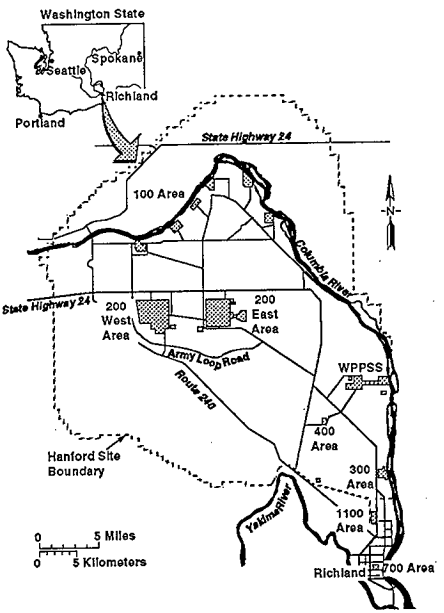


Figure 1-1. The Hanford Site in Southeastern Washington State.

OVERVIEW OF THE HANFORD SITE

The 1,450-square kilometer (560-square mile) Hanford Site, located in southeastern Washington State, was acquired by the Federal Government in 1943 for the construction and operation of facilities to produce plutonium for national defense (Figure 1-1). The Site, which is managed by the U.S. Department of Energy (DOE), has been used for a variety of purposes, including plutonium production, chemical processing, waste management, and research and development activities.

THE ENVIRONMENTAL MANAGEMENT CLEANUP MISSION

The Hanford Site's environmental management, or cleanup, mission is to protect the health and safety of the public, workers, and the environment; control hazardous materials; and utilize the assets (people, infrastructure, site) for other missions.

The major Hanford Site cleanup mission area projects are:

- **Tank Waste Remediation System**
- **Waste Management (includes Spent Nuclear Fuel Project)**
- **Facility Transition**
- **Environmental Restoration**
- **Science and Technology**
- **Other Supporting Projects**

WHAT COMPLETION OF THE CLEANUP MISSION MEANS

For the purpose of this *Paths to Closure* document and associated life cycle costs, the Hanford Site Environmental Management Cleanup Mission is finished upon completion of the last defined mission endpoint target. At that time, the Federal Government will continue in a stewardship role due to disposed waste remaining onsite. Other missions are also expected to continue at the Hanford Site beyond the completion of the Environmental Management Cleanup Mission, primarily in the areas of science and technology.

The Cleanup Mission is completed upon completion of the last defined final Endpoint target. At that time, the Federal Government will continue in a stewardship role due to disposed waste remaining onsite. Stewardship activities may include continued groundwater management.

HANFORD VISION 2006

The *Paths to Closure* approach builds on an already accelerated pace of activities and numerous efficiencies implemented at the Hanford Site during the last few years. It commits to significant cleanup progress on the Site by 2006, while recognizing that much cleanup effort will remain beyond 2006.

By 2006, urgent risks at the Hanford Site will be mitigated, almost all of the costly mortgages will be reduced, tank wastes will be in the process of being immobilized, and high-priority waste sites in the 100 and 300 Areas along the Columbia River will be remediated.

The baseline budgets reflected herein necessary to meet compliance requirements exceed the assumed level annual funding of $993 million for the Hanford Site through 2006. The DOE Richland Operations Office (RL) has agreed to vigorously pursue a targeted goal of $2.5 billion of savings for performance enhancements through 2006. A total of approximately $1.1 billion of

the targeted savings goal has been incorporated into the January 1998 baseline. Additional savings of approximately $88 million identified as of February 1, 1998, are planned to be incorporated in the baseline. The remaining approximate $1.3 billion of performance enhancements needed to reach the $2.5 billion goal will be pursued through stretch goals, breakthroughs, technology development, and expanded use of competitive subcontracting and other forms of fixed-priced contracting. Lower funding levels would preclude realization of savings to enhance performance.

Significant cleanup activities will remain on the Hanford Site after fiscal year (FY) 2006, with or without performance enhancements. They include groundwater remediation, completion of tank waste immobilization and shipment, disposition of transuranic wastes, closure of waste sites on the 200 Area Plateau and disposition of facilities not required for follow-on Site missions (e.g., stewardship mission).

The baseline completion date for the cleanup mission of FY 2046 potentially could be accelerated through technology breakthroughs and early shipment of wastes offsite.

COMMITMENT TO MEETING LEGAL AND REGULATORY REQUIREMENTS

The Office of Environmental Management (EM) is committed to maintaining full compliance with applicable environmental and other requirements. This includes working closely with regulators, Tribal Nations and stakeholders to address compliance requirements, conduct other activities, and determine appropriate priorities and related funding levels.

ENSURING SAFETY AND HEALTH

The mission of EM involves the cleanup and management of large amounts of radioactive and hazardous waste and materials. Accordingly, EM is committed to a policy that can be summarized as "do work safely or don't do it." EM will not compromise safety and health to accelerate site closures and will continue to implement its safety management policy and the recommendations of the Defense Nuclear Facilities Safety Board (DNFSB).

REDUCING RISK

Risk management is an integral element of EM's approach to setting priorities, sequencing project work, and measuring performance. Initiatives set forth in this *Paths to Closure* document place priority on projects that eliminate urgent risks. Specifically, sequencing of projects will consider an evaluation of risks to workers, the public, and the environment, as well as other factors.

FOSTERING INVOLVEMENT OF TRIBAL NATIONS AND STAKEHOLDERS

Because the strategies chosen by EM affect a diverse group of Tribal Nations and stakeholders, and must be approved by regulators, EM places a high priority on soliciting and incorporating the suggestions of all those parties at both local and national levels early in its planning process.

EASING THE TRANSITION OF WORKERS

Workforce restructuring plans for Hanford will address adjustments in the workforce that may occur from time to time as the *Paths to Closure* approach is implemented. Potential strategies for offering benefits to workers affected by workforce adjustments may include preference in hiring and for severance pay and incentive programs for both voluntary and involuntary separation and outplacement assistance services, such as job search workshops, access to job listings, resume preparation, career and educational counseling, and educational assistance.

To reduce workforce turnover, to the extent possible, it is planned that the existing workforce will receive occupational training, designed to ensure that the skills necessary for each phase of the schedule will be available within the existing workforce. As the need for a specific skill declines, the intent is for workers having those skills, to be trained in new skills which will be needed by an upcoming prioject. This will reduce the number of new employees that will require Hanford startup or fundamental training, and give added control over the skill-mix available to the projects.

PLANNING ASSUMPTIONS

Key technical assumptions which apply through completion of the Hanford Site cleanup mission are:

- Access to DOE land used for disposal of radioactive waste will remain restricted as long as necessary to ensure adequate protection of human health and the environment.
- A final decision on the Comprehensive Land Use Plan will be made in the *National Environmental Policy Act of 1969* (NEPA) process through the *Hanford Remedial Action Environmental Impact Statement* (HRA-EIS). Final decisions on the level of cleanup to be performed on individual waste sites will be made in the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) response action or *Resource Conservation and Recovery Act of 1976* (RCRA) permit processes.
- Nuclear materials, spent nuclear fuel, and high-level waste eventually will be sent offsite. Onsite interim, safe, stable storage will be required.
- Groundwater use will remain restricted for a yet-to-be-determined period. Final cleanup levels will be established in individual CERCLA records of decision or in RCRA permit modifications.

Other planning assumptions as of the January 1998 baseline include:

- Throughout the cleanup mission, Hanford workers will receive the mandatory and needed training to perform their jobs in a safe, legally-compliant, and efficient manner.
- The Hanford Site Baseline is based on obtaining sufficient funding to maintain compliance.

- The Fast Flux Test Facility standby after FY 1998 and, if necessary, future deactivation funding requirements are considered to be in addition to the current Site funding target.
- Tank waste remediation privatization operations funding requirements through 2006 and national program activities included in the baseline are considered to be in addition to the current Site funding target.

LIFE CYCLE COST

The current Hanford cleanup life cycle cost profile is estimated to be $85.3 billion as of the January 1998 baseline (Figure 1-2). The life cycle cost is fully escalated to year of expenditure (escalation rate of 2.7% per year) and represents a summation of the Section A cost baselines in the Project Baseline Summaries (PBSs). Assumption for carryover funds, including those anticipated for construction and other multi-year activities are not included. These baseline estimates are developed assuming optimum funding scenarios. These optimum funding levels exceed the $5.75 billion target level funding that the Department of Energy's Office of Environmental Management has assumed for planning.

In constant FY 1998 (i.e., un-escalated) dollars, the life-cycle cost reflected in the January 1998 PBSs is approximately $50.8 billion. It is estimated that the $5.75 billion target level annual funding for the EM complex will add approximately $1.8 billion to Hanford's Life Cycle Cost estimates due to delays in mortgage reducing activities. When the $1.8 billion is added to the $2.2 billion of efficiencies already built into the PBSs, the total is approximately $54.8 billion. This compares to the $54.3 billion reflected at the $6.0 billion target level in the June Discussion Draft. The difference is attributed to some cost growth since publication of the Discussion Draft (e.g., Spent Nuclear Fuel Project).

CLOSURE DATES

Closure dates for selected projects, and associated critical milestones, are portrayed on the Critical Closure Path (Figure 3-2). The Hanford Cleanup Mission is currently planned to be complete in the year 2046. Stewardship activities, which may include groundwater management, will continue beyond 2046 along with other Site missions.

END STATE

A NEPA process for the *Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan* (DOE/EIS-222D) is being completed for formal public review and comment. Sitewide land-use planning issues, assumptions, and end states are being discussed in this forum. A formal decision will be made through the NEPA EIS Record of Decision (ROD). A final HRA-EIS is scheduled for October 1998, and the EIS ROD is expected by December 1998. The ROD provides a baseline decision on the Comprehensive Land Use Plan to define future land uses for the Hanford Site while DOE manages the property. Final decisions on the level of remediation to be performed on individual waste sites will be made in the CERCLA or RCRA decision processes. As CERCLA and RCRA decisions are made, revisions to the Comprehensive Land Use Plan will be made if required.

Overview of Cleanup Approach

The Site baseline reflected in this *Paths to Closure* document is not fully compliant with current regulatory agreements. There are some near-term compliance issues. In addition, the cost estimates in the current baselines (Part A of the Project Baseline Summaries) exceed the target funding levels. Therefore, to achieve the cleanup mission end states within targeted funding levels and continue to maintain compliance with regulatory agreements, it is critical to continue to reduce baseline costs through efficiencies, new technology, alternate approaches and deactivation/stabilization of facilities. At the same time we must continue to maintain safe operations and address the Site's urgent risks.

Cleanup Mission planning priorities are
(1) Essential Safety Activities
(2) Essential Services and Activities
(3) Urgent Risks
(4) Mortgage and Risk Reduction
(5) Viable Environmental Restoration Program
(6) Complete Existing Priority Projects and Minimize New Starts
(7) No Major Swings in Base Projects Workforce Year-to-Year.

Cleanup Mission Planning Priorities:

Essential Safety Activities are base operating requirements to maintain safety for workers, the public and environmental protection and to enable accomplishment of interim and final mission endpoint targets.

Essential Services and Activities are required to support budgeted cleanup progress and regulatory environmental compliance. These can include community mandates such as the Hanford Advisory Board.

Urgent Risks which are present at the Hanford Site include high-level waste tanks, corroded spent nuclear fuel, and unstabilized plutonium. Mitigating urgent risks means putting **Safety First** including:

- Moving spent nuclear fuel into safe, stable storage away from the Columbia River
- Mitigating tank waste urgent risks
- Cleaning out the 324 Facility B Cell
- Stabilizing plutonium in the Plutonium Finishing Plant
- Protecting the Columbia River through Vadose Zone and Groundwater Management

Mortgage and Risk Reduction addresses projects such as Spent Nuclear Fuel and B Plant where costly Surveillance and Maintenance activities are required to maintain minimum levels of safety and containment of hazards.

Viable Environmental Restoration Program activities include cleanup along the Columbia River, groundwater management, a 200 Area strategy and reactor interim safe storage.

Complete Existing Priority Projects and Minimize New Starts addresses phasing of activities.

No Major Swings in Base Projects Workforce Year-to-Year addresses stabilization of project workforce requirements.

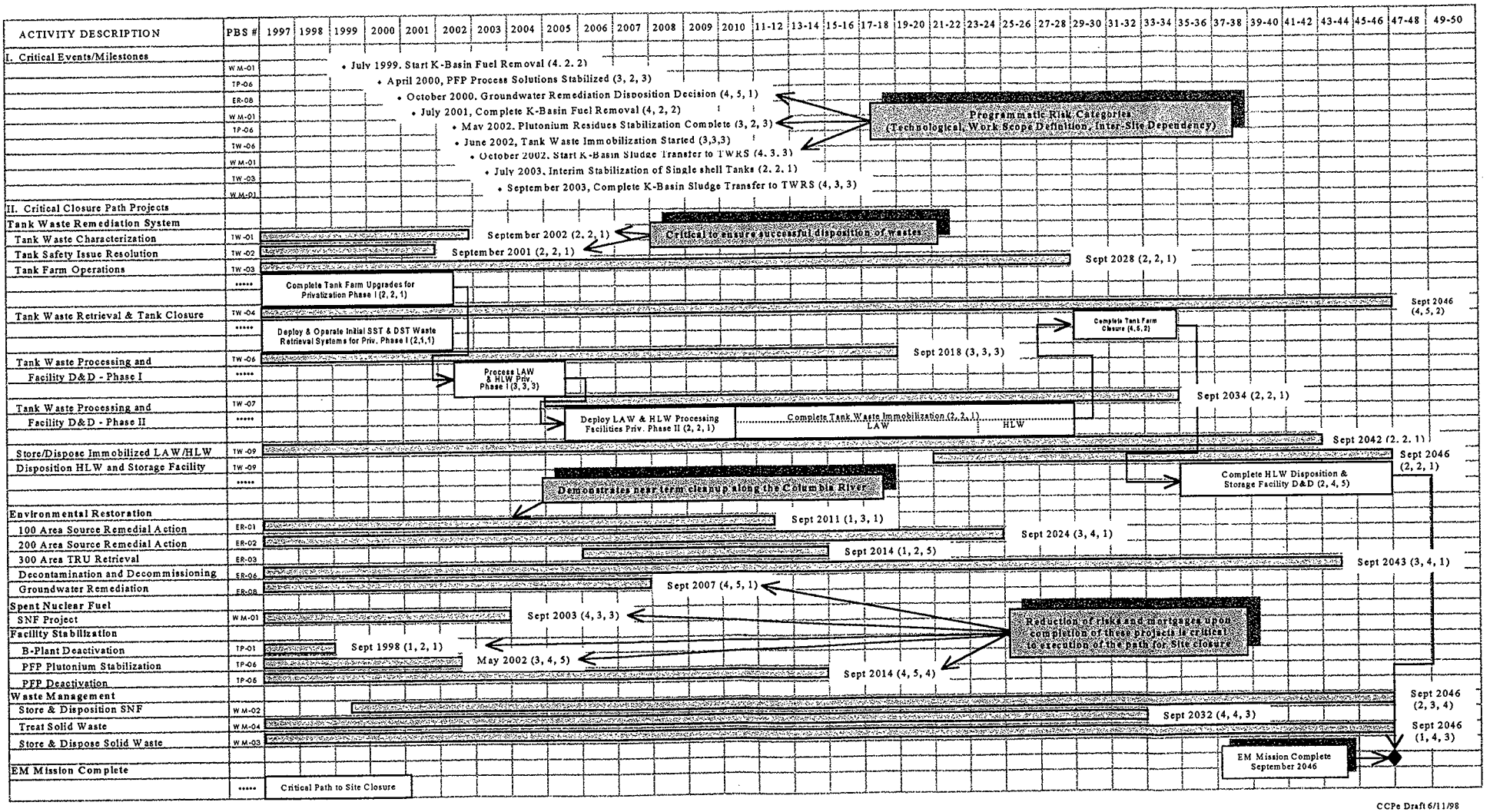
Five urgent risks have already been reduced: (1) significant quantities of highly radioactive waste have been relocated from the 300 Area to more protective storage on the remote 200 Area Plateau; (2) hydraulic containment capabilities of the spent nuclear fuel storage basins along the Columbia River have been improved awaiting transfer of the fuel to the 200 Area Plateau; (3) substantial quantities of nuclear material contained in the Plutonium Finishing Plant have been stabilized; (4) significant progress has been made on Waste Tank Safety issues, with all but 38 tanks removed from the Watch List; and (5) 100 Area groundwater remediation actions have protected the Columbia River.

CRITICAL CLOSURE PATH

The critical closure path is a steamlined schedule of high-level activities, events, and/or decisions that warrant DOE management attention and must occur "on schedule" to achieve the planned Site closure. Figure 3-2 depicts the critical closure path for the Hanford Site cleanup mission. As shown, the critical path proceeds through the preparation, immobilization, and final disposition of the tank wastes. To succeed along this critical path, many other activities are also critical:

- Urgent risks must have top priority. It is not acceptable to ignore such conditions and put resources into longer term risks.
- The fixed costs for maintaining the Site in a safe manner need to be reduced through facility stabilization and deactivation to make additional funds available for cleanup.
- The Environmental Restoration Project is critical because it results in visible near-term cleanup progress, which is critical for continued support of any project of such length. In addition, the magnitude of waste site cleanup on the Hanford Site (e.g., over 1,400 waste sites) dictates a long-term effort that cannot be deferred.
- The practice of storing wastes awaiting treatment and deferring the retrieval and processing of the transuranic retrievable wastes eventually will increase costs for additional storage facilities. It will also cost much more to retrieve the transuranic wastes because of deterioration of the containers over time. At fixed funding levels, other cleanup activities would be impacted.

Figure 3-2. Critical Closure Path for Hanford Site Cleanup.



The critical closure path identifies programmatic risks associated with each activity and event. Three numbers in parentheses, e.g., "(2,2,1)" represent technology, work scope definition, and inter-site dependency risks, respectively, on a scale of 1 to 5, where "5 " represents high programmatic risk. For example, the Environmental Restoration area reflects a "5 " for 300 Area transuranic waste due to the lack of a defined facility to handle the waste and lack of a disposal location within waste management.

SCIENCE AND TECHNOLOGY DEVELOPMENT

Much of the success in achieving *Paths to Closure* goals depends on the ability of innovative technologies to reduce cost and risk and to do what cannot be done with existing methods. Currently, 79 technology needs and 53 science needs have been identified by the projects through the Hanford Site Technology Coordination Group. These needs coincide with project goals and objectives described herein. In total, there are 119 technology and science activities at Hanford focused on performing cleanup better, cheaper, faster, or safer. While definitive cost savings or avoidance information is not available for all innovative technologies, cost savings/avoidance potential of at least $400 million has been identified to date.

Key baseline technology activities for the Hanford cleanup mission include (1) Hanford Tanks Initiative-sponsored deployment of tank waste retrieval and characterization technologies; (2) macroencapsulation of the Site's low-level mixed waste inventory; and (3) enhanced sludge washing, a process for minimizing the volume of immobilized low-level waste to be disposed on Site. In addition, key breakthrough technology activities for Hanford cleanup include (1) other technologies for low-level waste volume minimization, such as salt-removal technologies (e.g., "clean salt"); (2) carbon dioxide (CO_2) pellet decontamination to allow free release of wastes; (3) remote laser cutting; (4) the C-Reactor Interim Safe Storage Large-Scale Technology Demonstration; and (5) in situ reduction/oxidation (REDOX) manipulation to prevent chromium migration in groundwater.

EM CLEANUP PROJECTS

The Project Hanford Breakdown Structure, Figure 4-1, portrays the relational structure of site projects and ties those projects to project baseline summaries. The PBSs describe in detail the workscope related to each of the projects included in the Project Hanford Breakdown Structure.

ENHANCED PERFORMANCE STRATEGIES

RL is committed to vigorously pursue cleanup work scope efficiency savings of $2.5 billion from the October 1996 baseline through 2006. Realized work scope efficiency savings beyond that needed to meet baseline commitments will be reapplied to accomplish additional Site cleanup. The additional cleanup would likely include 100/200/300 Areas remediation; deactivation, decontamination, and decommissioning of additional facilities; and treatment and final disposition of additional legacy waste. Application of realized efficiencies to enhance cleanup will not be included in the baseline until a specific plan has been developed and a formal baseline change approved.

Several ways to achieve enhanced performance are being used. One way is indirect cost reductions. Indirect costs include, among others, Safeguards and Security, the Fire Department, and General and Administrative costs.

Another approach to enhance performance is through stretch and breakthrough opportunities. Stretch goals are basically getting the job done faster, thereby saving resources. Breakthroughs can take many forms such as alternative plans; application of new, cost-effective technology; or different contracting approaches.

The efficiency savings will include indirect cost reductions; stretch, breakthrough, and subcontracting opportunities; other project efficiencies (new reengineering and technology applications and management streamlining); and scope changes agreed to by regulatory authorities. Savings will be documented either by work scope deletion on approved baseline change request, or achievement of a positive earned value cost variance from the performance management system.

REGULATORY COMPLIANCE

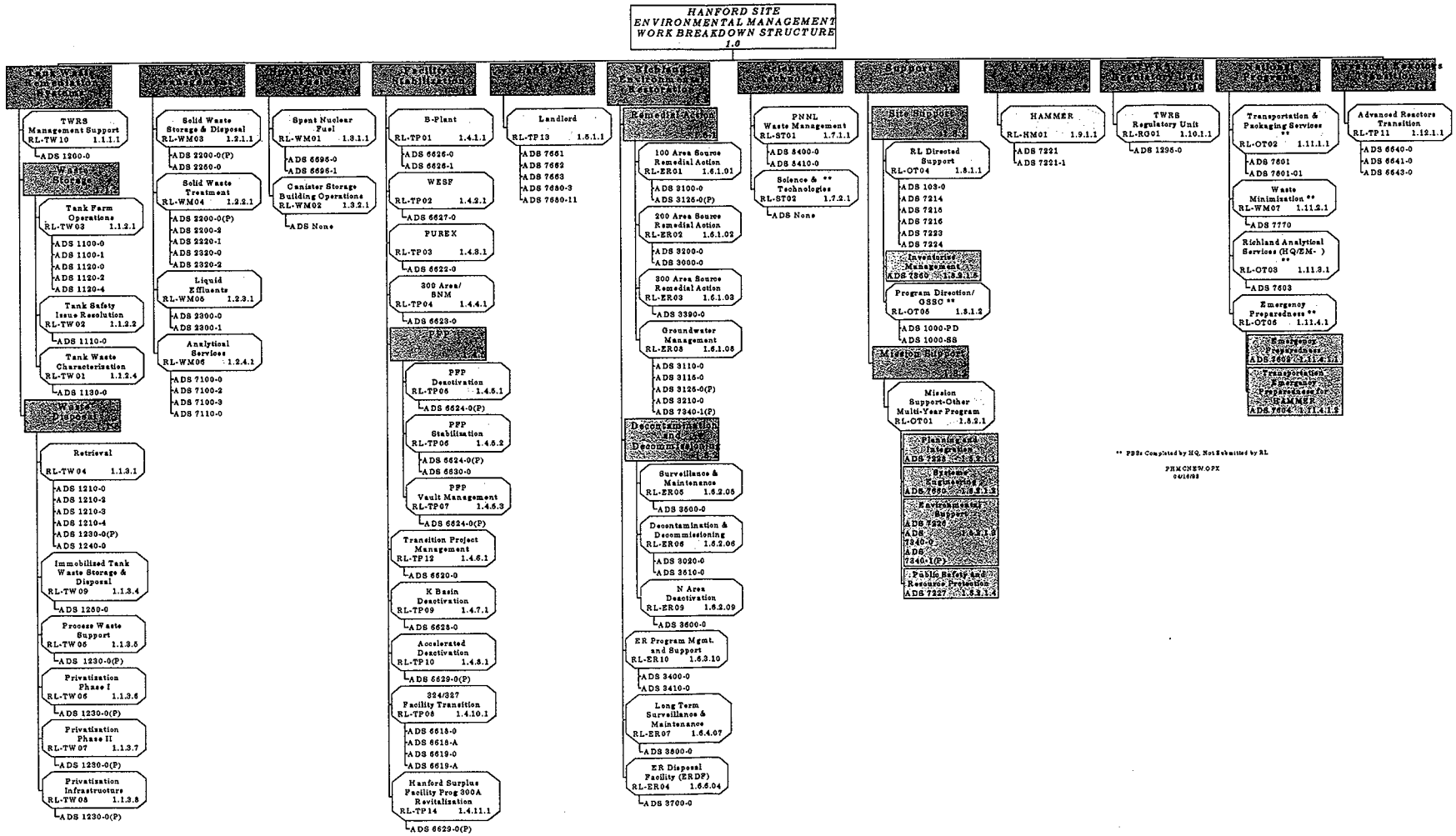
The planning assumptions and associated future decisions reflected in this document have been made to support development of the Site cleanup baseline. These assumptions and discussions are contingent on future decisions made under the NEPA, CERCLA, and RCRA decision-making processes.

The *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) is the basis for the path forward for the environmental management mission. The agreement, originally signed in 1989, is between the DOE, the U.S. Environmental Protection Agency, and the Washington State Department of Ecology. It is the legal document that binds the DOE to actions that comply with CERCLA; RCRA; Executive Order 12088; and the Washington State Hazardous Waste Management Act. Many pathways and decisions depicted in *Paths to Closure* depend on the NEPA, CERCLA, RCRA, and their decision-making processes. Substantial progress has been made in managing the cleanup program and meeting enforceable Tri-Party Agreement milestones. The agreement identifies a required process for modifications/addendum and has widespread public support in the Northwest and a commitment to public involvement.

DOE's objective is for the Site to be in full compliance with applicable regulatory requirements for ongoing operations, current requirements of the Tri-Party Agreement, and DOE commitments to the DNFSB. Working with the Site contractors, the regulatory authorities, and the DNFSB, RL seeks real cost efficiencies, alternate technical approaches to achieve the desired results, resolution of regulatory issues within the current legal and regulatory framework, and potential

The majority of the Site's budget is driven by regulatory compliance to cleanup agreements. "Compliance" is cleanup progress. Adequate funding is necessary to fulfill Tri-Party Agreement milestone commitments.

Figure 4-1. EM PROJECT HANFORD BREAKDOWN STRUCTURE



improvements in laws and regulations to allow more results with less cost in seeking to achieve full compliance. Realization of the $2.5 billion workscope acceleration efficiency goal through FY 2006 will help attainment of the full compliance objective.

ATTAINABILITY

Priority is maintained on continued safe operations and elimination of urgent risks. As a result, without performance enhancements, significant delays in other projects are incurred at the target funding level. Whereas operating compliance is maintained with respect to regulations, numerous Tri-Party Agreement/DNFSB milestones are impacted and would result in the potential for major fines, penalties or sanctions.

In addition to delay of noncritical projects, some of the more significant potential results of not achieving enhancements are:

- Inability to retrieve the wastes from the 177 underground storage tanks.
- Delay in a DNFSB 94-1 major commitment to restabilize and package plutonium currently stored at Hanford.
- Two to 10 years of increased risk to workers and the environment because of deferred disposition of stored mixed waste and transuranic waste. This deferral will increase stored waste inventories and delay shipments of waste to the Waste Isolation Pilot Plant. This impacts Tri-Party Agreement milestones M-19 and M-91, placing RL at risk for enforcement action by regulators.
- An increase in risk to workers and the environment and $150 million in additional costs for a 6-year extension of surveillance and maintenance of 300 Area contaminated facilities. This added expense diverts funds from cleanup activities to accommodate recent additions of critical near-term activities. The extension also delays revitalization of the 300 Area for alternative economic use.
- An increase in risk to workers and the environment and $34 million in additional costs for a 2-year extension of surveillance and maintenance of contaminated facilities with no currently identified mission and of facilities not expected to have a viable mission after FY 2000—potentially there are 34 facilities in this group. This extension is also caused by diversion of funds from cleanup activities to accommodate recent additions of critical near-term activities.
- Delay in completing waste site assessment and remediation of the 200 Area. This delay impacts Tri-Party Agreement milestones M-13, M-15, and M-16, plus 20 or more interim milestones, placing RL at risk for enforcement action by regulators.

STAKEHOLDER AND TRIBAL NATIONS PARTICIPATION

The signing of the Tri-Party Agreement and several key stakeholder, Tribal Nation, and regulator activities have strengthened the decision-making processes. These significant activities include the work of the Future Site Uses Working Group in 1992 and the Tank Waste Task Force in 1993, and the formation of the Hanford Natural Resources Trustee Council in 1993 and the Hanford Advisory Board in 1994. In each case a wide range of regional stakeholder and Tribal Nations' interests are represented. The first two groups met for several months before issuing final reports that identified stakeholder values and principles.

The Hanford Advisory Board and the Hanford Natural Resources Trustee Council have become key elements in the stakeholder involvement process. Members of the Hanford Advisory Board and Tribal Nations individually and collectively have participated in planning discussions and briefings regarding a vision for 2006 since July 1996. The DOE has held monthly updates with the Washington State Department of Ecology and the U.S. Environmental Protection Agency on the status of the budget and planning processes. The Hanford Natural Resources Trustee Council meets regularly with DOE and regulators to address natural resource restoration requirements for final closure of impacted sites.

An Integrated Priority List of Hanford Site work has proven to be a successful tool for developing annual budget submittals. The development process has included stakeholder participation and support. Stakeholders and Tribal representatives have participated in workshops to evaluate risk, develop the Integrated Priority List, and provide advice on how to better represent stakeholder values and principles.

DISPOSITION OF STAKEHOLDER AND TRIBAL NATIONS COMMENTS

All public comments are being considered for incorporation into the National and Site *Accelerating Cleanup: Paths to Closure* documents. DOE Headquarters staff has compiled and categorized, by subject area, responses received from Tribal Nations, States, regulators, local government officials, and other stakeholders. Major issues of concern include budget and cost estimates, end states and other key assumptions, stakeholder participation, opportunities to enhance project performance, and prioritization of Site activities. A Preliminary Comment Response Document was issued by DOE Headquarters in December 1997. The comment response document is intended to convey how EM plans to respond to comments received during the National Discussion Draft comment period, which ended on September 9, 1997. Comments were also received by Hanford in early 1998 during the public involvement process discussing the formulation of the FY 2000 Site budget submittal to DOE-HQ.

The comment disposition process is ongoing. Meetings have been held with commentors to discuss major comments. Written responses will be provided to commentors. This document incudes resolution of comments that can be incorporated at this time.

COPIES OF *PATHS TO CLOSURE* DOCUMENTS

Requests for copies of this *Paths to Closure* document or for additional information should be submitted directly to DOE-RL at the following address:

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Richland Operations Office
Mr. Jim Daily A5-58
825 Jadwin Avenue
Richland, WA 99352
(509-376-7721)

Requests for copies of the National *Paths to Closure* report should be directed to the Center for Environmental Management Information (CEMI) at 1-800-736-3282.

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Reader's Guide to the Accelerating Cleanup: Paths to Closure Document

This document complies with DOE-Headquarters specifications for Site-specific ***Paths to Closure*** *documents. The following 'cross-walk' illustrates how questions raised by the Hanford planning process are addressed in this document and by related Hanford planning documents.*

Hanford's Planning Process	Draft Paths to Closure Document	Related Hanford Planning Documents
What is the policy?	1.2 EM Policies 5.0 Regulatory Compliance	Tri-Party Agreement
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CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DNFSB	Defense Nuclear Facility Safety Board
EIS	Environmental Impact Statement
EM	(Office of) Environmental Management
ENCO	enterprise company
FDH	Fluor Daniel Hanford, Inc.
FFTF	Fast Flux Test Facility
FY	fiscal year
HRA	Hanford Remedial Action
MLLW	mixed low-level waste
NEPA	*National Environmental Policy Act of 1969*
PBS	project baseline summary
PFP	Plutonium Finishing Plant
PUREX	Plutonium Uranium Extraction Facility
RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	reduction oxidation
RL	U.S. Department of Energy, Richland Operations Office
ROD	Record of Decision
RU	Office of Radiological, Nuclear, and Process Safety Regulation of TWRS Privatization Contractors
TBD	to be determined
TRU	transuranic waste
TWRS	Tank Waste Remediation System
S&M	surveillance and maintenance
WESF	Waste Encapsulation and Storage Facility
WIPP	Waste Isolation Pilot Project

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1. INTRODUCTION/OVERVIEW OF *PATHS TO CLOSURE*

This document, *Accelerating Cleanup: Paths to Closure* (hereinafter referred to as *Paths to Closure*), was previously referred to as the *Draft 2006 Plan*. As part of the DOE's national strategy, the Richland Operations Office's *Paths to Closure* summarizes an integrated path forward for environmental cleanup at the Hanford Site. The Hanford Site underwent a concerted effort between 1994 and 1996 to accelerate the cleanup of the Site. These efforts are reflected in the current Site Baseline. This document describes the current Site Baseline and suggests strategies for further improvements in scope, schedule and cost. The Environmental Management program decided to change the name of the draft "strategy" and the document describing it in response to a series of stakeholder concerns, including the practicality of achieving widespread cleanup by 2006. Also, EM was concerned that calling the document a "plan" could be misconstrued to be a proposal by DOE or a decision-making document. The change in name, however, does not diminish the 2006 vision. To that end, *Paths to Closure* retains a focus on 2006, which serves as a point in time around which objectives and goals are established.

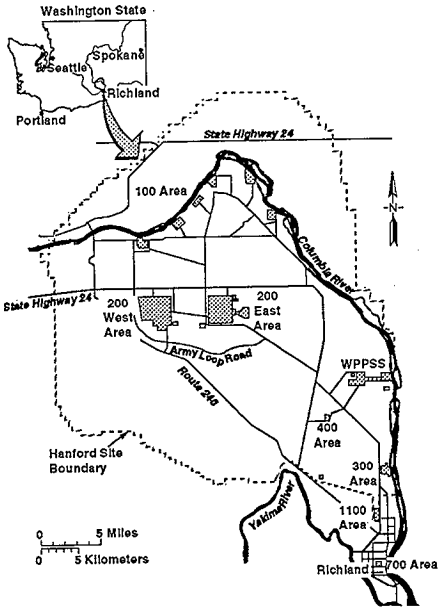


Figure 1-1. The Hanford Site in Southeastern Washington State.

1.1 OVERVIEW OF THE HANFORD SITE

The 1,450-square kilometer (560-square mile) Hanford Site, located in southeastern Washington State, was acquired by the Federal Government in 1943 for the construction and operation of facilities to produce plutonium for national defense (Figure 1-1). The Site, which is managed by the U.S. Department of Energy (DOE), has been used for a variety of purposes, including plutonium production, chemical processing, waste management, and research and development activities.

1.1.1 The Hanford Site's Environmental Management Mission

The Hanford Site's environmental management, or cleanup, mission is to protect the health and safety of the public, workers, and the environment; control hazardous materials; and utilize the assets (people, infrastructure, site) for other missions. The Hanford Site's science and

technology mission is to develop and deploy science and technology in the service of the nation, including stewardship of the Hanford Site. A secondary focus of the Site's missions is to transfer a positive legacy to the community through economic diversification activities. This *Paths to Closure* document specifically addresses the environmental management cleanup mission for the Site.

1.1.2 Major Projects

The following sections describe the major Hanford Site environmental management cleanup mission areas containing the approximately 50 projects. The major site mission area descriptions are aligned with the Hanford Strategic Plan goals.

Tank Waste Remediation System Project. The Tank Waste Remediation System (TWRS) Project provides for the safe, continued storage of waste in the existing single- and double-shell tanks and includes stabilization of tanks and mitigation of tank safety issues. In addition, projects provide for the characterization, removal, treatment, and ultimate onsite disposal of immobilized low-level waste and the onsite storage and subsequent offsite disposal of immobilized high-level waste. In the interim, the operation and maintenance of tanks continue to ensure the safety of the public and onsite workers and protection of the environment, pending final disposition of the tank waste, the tanks, and the tank farm areas.

Waste Management Project. The Waste Management Project provides for the safe storage, treatment, and disposal of solid and liquid waste, both legacy and newly generated, in accordance with applicable federal and state laws and regulations. Some solid wastes are directly disposed without treatment; whereas, other solid waste (e.g., transuranic (TRU) waste) is stored and treated before onsite or offsite disposal. Handling and treatment facilities are being built for the interim management and preparation of solid waste for final disposal. Waste management provides for the interim storage of spent nuclear fuel pending offsite disposal in a national repository and radiological decontamination of equipment for reuse, storage, and disposal. A major ongoing project is removal of spent fuel from water storage basins along the Columbia River to interim dry storage on the 200 Area Plateau. Analytical services to the site are also provided. Services are provided through a combination of onsite laboratories and commercial services.

Facility Transition Project. The Facility Transition Project transitions facilities from risky and costly maintenance conditions to a surveillance and maintenance (S&M) state that is safe and cost effective ("cheap to keep") while awaiting final disposition. This includes safe and secure management of nuclear materials awaiting final disposition. Specific ongoing projects include cleaning and deactivating facilities that are no longer operating and no longer have a mission. Completion of these projects, commonly referred to as "mortgage reduction," results in significant reduction of risks to Site workers, the public and the environment and makes future funds available for additional site cleanup efforts.

Environmental Restoration Project. The Environmental Restoration Project provides for interim and final cleanup of waste sites and contaminated groundwater and for final

decontamination and decommissioning (D&D) of surplus facilities. In addition, the project provides S&M of facilities and waste sites before and after remediation.

The waste site and facility remediation activities are regulated under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) and the *Resource Conservation and Recovery Act of 1976* (RCRA) permit processes. It is through these regulatory processes that the cleanup standards and subsequent end states will be established.

Science and Technology Project. The Science and Technology Project provides for the safe and compliant operation of research facilities that support the Hanford Site technology requirements, much of which focuses on the cleanup missions of the DOE complex. Specific environmental management and technology development projects, under the direction of the DOE, address future cleanup needs with the emphasis on reducing the cost and schedule of cleanup. In addition, the Science and Technology Project manages the national Tank Focus Area technology development activities.

Other Supporting Projects. Other projects support overall management and mission activities and maintenance of the Hanford Site infrastructure. These projects ensure adequate involvement of stakeholders, and integrate environmental, safety, and health activities. Stakeholder involvement includes the continued participation of the Hanford Advisory Board, whose members represent the local community, some Tribal Nations, regulators, special interest groups, Oregon State, and Hanford Site employees. This involvement is critical for successful cleanup of the Site.

1.1.3 Definition of Completion

For the purpose of this *Paths to Closure document* and associated life cycle costs, the Hanford Site Environmental Management Cleanup Mission is finished upon completion of the last defined mission endpoint target. It is recognized that Site stewardship activities, to include long-term maintenance and monitoring, will continue well beyond this point. For endpoint targets achieved before the end of the Environmental Management Cleanup Mission (e.g., tank closure), the follow-on stewardship activities will continue as part of the Environmental Management Cleanup Mission until the last mission endpoint target is achieved. At that time, the Federal Government will continue in a stewardship role due to disposed waste remaining onsite. Other missions are also expected to continue at the Hanford Site beyond the completion of the Environmental Management Cleanup Mission, primarily in the areas of science and technology. The currently defined final mission endpoint target for the Hanford Site Environmental Management Cleanup Mission is "remove non-essential, surplus buildings and facilities that don't have identified post-cleanup uses."

The Cleanup Mission is completed upon completion of the last defined final Endpoint Target. At that time, the Federal Government will continue in a stewardship role due to disposed waste remaining onsite. Stewardship activities may include continued groundwater management.

1.1.4 Hanford Vision 2006

The *Paths to Closure* approach builds on an already accelerated pace of activities and numerous efficiencies implemented at the Hanford Site during the last few years. It commits to significant cleanup progress on the Site by 2006, while recognizing that much cleanup effort will remain beyond 2006.

By 2006, urgent risks at the Hanford Site will be mitigated, almost all of the costly mortgages will be reduced, tank wastes will be in the process of being immobilized, and high-priority waste sites in the 100 and 300 Areas along the Columbia River will be remediated.

1.2 ENVIRONMENTAL MANAGEMENT POLICIES

This section summarizes legal requirements and policies that affect the Hanford Environmental Management Program. The requirements and policies are considered essential to the effective accomplishment of the cleanup mission.

1.2.1 Meeting Legal and Regulatory Requirements

The Office of Environmental Management (EM) is committed to maintaining full compliance with applicable environmental and other requirements. This includes working closely with regulators, Tribal Nations and stakeholders to address compliance requirements, conduct other activities, and determine appropriate priorities and related funding levels.

1.2.2 Policies

EM's policies include ensuring the safety and health of workers; reducing risks to the public and the environment; fostering involvement of Tribal Nations and stakeholders; and easing the transition of workers.

1.2.2.1 Ensuring Safety and Health. The mission of EM involves the cleanup and management of large amounts of radioactive and hazardous waste and materials. Accordingly, EM is committed to a policy that can be summarized as "do work safely or don't do it." EM will not compromise safety and health to accelerate site closures and will continue to implement its safety management policy and the recommendations of the DNFSB.

The EM Safety Management System provides the framework for safety and health management. Integral to the system is up-front involvement of workers in defining the work and evaluating hazards. The system provides the basis for identifying the appropriate mix of skills and other resources required for planning, budgeting, and conducting the safe and effective completion of project work. EM is identifying methods of improving safety and health performance, establishing benchmarks by which to measure such performance, and holding managers accountable for performance. The Secretary of Energy has directed the Assistant Secretary for Environmental Management to work closely with the Assistant Secretary for

Environment, Health, and Safety to ensure that *Paths to Closure* includes appropriate provisions for the protection of health and safety.

1.2.2.2 Reducing Risk. Risk management is an integral element of EM's approach to setting priorities, sequencing project work, and measuring performance. Initiatives set forth in *Paths to Closure* place priority on projects that eliminate urgent risks. Specifically, sequencing of projects will be subject to an evaluation of risks to workers, the public, and the environment, as well as other factors. Evaluations of risk for projects also will include metrics that show incremental reduction of risk. EM will continue its efforts to identify opportunities to reduce risk more quickly than in the past. Those opportunities will be explored thoroughly with Tribal Nations and stakeholders before they are included in the *Paths to Closure* strategy.

1.2.2.3 Fostering Involvement of Tribal Nations and Stakeholders. Because the strategies chosen by EM affect a diverse group of Tribal Nations and stakeholders, and must be approved by regulators, EM places a high priority on soliciting and incorporating the suggestions of all those parties at both local and national levels early in its planning process.

In November 1996, Assistant Secretary for Environmental Management, Al Alm, committed to Tribal Nations and stakeholders that the various draft site ten-year plans will incorporate *only* those initiatives that EM is confident could proceed, certain that the initiatives are consistent with legal requirements and have been developed in collaboration with stakeholders and regulators. Mr. Alm stated further that iterations of the Hanford Draft 2006 Plan would identify issues that remain to be addressed with regulators or other stakeholders and that require resolution.

Assumptions were based in part on preliminary discussions with stakeholders and regulators. Discussion will continue. The parties to those ongoing discussions will conform to the decision-making process prescribed under federal, state, and local environmental laws before making any final decisions. The EM recognizes that, to date, involvement of Tribal Nations and stakeholders has not been consistent. Therefore, EM is committed to the establishment of a more disciplined and inclusive system.

The Environmental Management Program planning process also includes an approach to issue resolution that involves the development of action plans for some issues. Action plans are required for selected issues that are controversial, that change the Environmental Management Program's previous planning baseline, that have not yet been addressed with Tribal Nations and stakeholders, that affect a number of sites, that require that an explicit decision or policy to be made, or that affect the path toward closure of a site. Resolution of issues and opportunities for decision-making are expected to continue, and it is expected that modifications and updates of the *Paths to Closure* document will be necessary.

1.2.2.4 Easing the Transition of Workers. Workforce restructuring plans for Hanford will address adjustments in the workforce that may occur from time to time as *Paths to Closure* is implemented. Potential strategies for offering benefits to workers affected by workforce adjustments are being reviewed. These strategies may include incentive programs for both voluntary and involuntary separation and out placement assistance services, such as job search

workshops, access to job listings, resume preparation, career and educational counseling, and educational assistance. Certain involuntarily separated workers will be eligible for preference in hiring and for severance pay, in accordance with the Hanford Site Workforce Restructuring Plan.

As projects conducted under *Paths to Closure* come to a close and Hanford Site cleanup approaches closure, DOE also intends to provide, in accordance with the requirements of Section 3161 of the National Defense Authorization Act for FY 1993, assistance to communities that are affected by the reconfiguring, downsizing, and closing of defense nuclear facilities. DOE realizes that attaining the *Paths to Closure* goals may affect the economies of nearby communities where a significant number of displaced workers live. DOE will cooperate with the Community Reuse Organization and execute economic development initiatives to help minimize those effects. The Office of Worker and Community Transition, which is responsible for the overall management of DOE's community transition program, will authorize specific actions, within approved funding levels, selected through application of the evaluation criteria set forth in the guidance.

1.3 PLANNING ASSUMPTIONS

1.3.1 Technical Planning Assumptions

Several assumptions are factored into life cycle planning for the Hanford Site cleanup mission. Key technical assumptions used in the development of *Paths to Closure* include:

- Access to DOE land used for disposal of radioactive waste will remain restricted as long as necessary to ensure adequate protection of human health and the environment.

- A final decision on the *Comprehensive Land Use Plan* will be made in the *National Environmental Policy Act of 1969* (NEPA) process on the *Hanford Remedial Action Environmental Impact Statement*. Final decisions on the level of cleanup to be performed on individual waste sites will be made in the CERCLA response action or RCRA permit processes.

- Special nuclear materials, spent nuclear fuel, transuranic and high-level waste eventually will be sent offsite. Onsite interim, safe, stable storage will be required.

- Groundwater use will remain restricted for a yet-to-be-determined period. Final cleanup levels will be established in individual CERCLA records of decision or in RCRA permit modifications.

1.3.2 Other Planning Assumptions

Development of *Paths to Closure* is guided by the following DOE directed planning assumptions:

- EM funding is level through 2006, to include escalation.
- Cleanup at most sites is complete by 2006 or earlier.
- Strong stakeholder/Tribal Nations values are recognized.
- Maintaining compliance is critical.
- Innovative technologies are used to reduce costs.
- Cost-effective privatization is maximized.
- Integration across programs and sites is optimized.

Other planning assumptions as of the January 1998 baseline include:

- Throughout the cleanup mission, Hanford workers will receive the mandatory and needed training to perform their jobs in a safe, legally-compliant, and efficient manner.
- The Hanford Site Baseline is based on obtaining sufficient funding to maintain compliance.
- Funding requirements for standby of the Fast Flux Test Facility (FFTF) after FY 1998 and, if necessary, future deactivation, are considered to be in addition to the current Site funding target.
- Tank waste remediation privatization operations funding requirements through 2006 included in the baseline are considered to be in addition to the current Site funding target.

The Site strategies and prioritization discussed in Section 3.0 are integral with these planning assumptions. Prioritization of cleanup work is discussed in Section 3.1 and reflected in the Critical Closure Path and Disposition Maps discussed in Section 3.2. The dependence of this strategy on development and deployment of innovative technologies is discussed in Section 3.5.

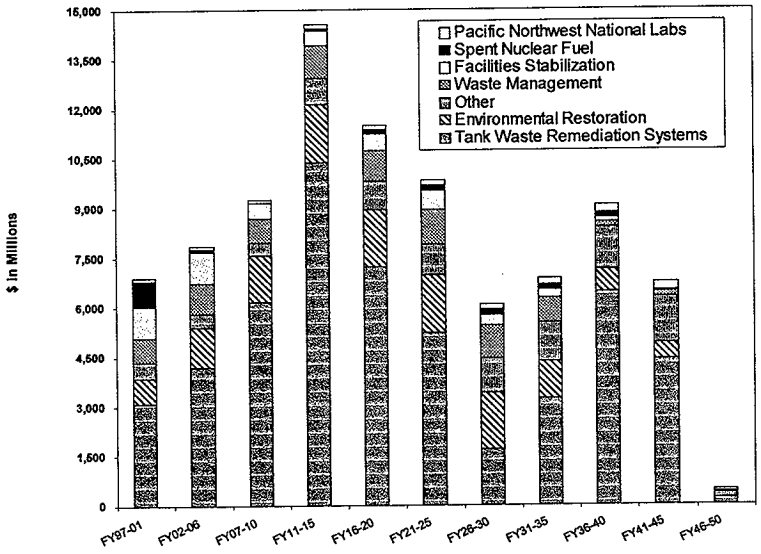
1.4 CHANGES

This *Paths to Closure* document has been changed from earlier drafts to reflect changes in major project baselines and inclusion of a "Critical Closure Path" and waste and material "Disposition Maps" to better display the underlying logic and basis. These changes should provide for better discussions among RL, Tribal Nations and stakeholders to further improve the approach and plan for cleanup of Hanford.

1.5 LIFE CYCLE COST

The current Hanford cleanup life cycle cost profile is estimated to be $85.3 billion as of the January 1998 baseline (Figure 1-2). The life cycle cost is fully escalated to year of expenditure (escalation rate of 2.7% per year) and represents a summation of the Section A cost baselines in

Figure 1-2. Life Cycle Cost Profile.



Pacific Northwest National Labs	85	92	83	117	134	153	175	200	228	260	56	1,583
Spent Nuclear Fuel	787	101	12	76	148	143	148	156	163	20	4	1,758
Facilities Stabilization	954	911	488	448	488	594	311	245	145			4,584
Waste Management	731	933	724	986	934	1,028	994	734	144	156	32	7,396
Other	483	421	390	802	447	491	555	627	672	740	162	5,421
Environmental Restoration	755	1,208	1,400	1,750	1,738	1,754	1,705	1,117	674	461		12,562
Tank Waste Remediation Systems	3,032	4,089	6,155	10,368	7,209	5,208	1,693	3,230	6,443	4,414	193	52,036
Total	6,827	7,755	9,251	14,177	11,099	9,371	5,582	6,309	8,470	6,051	447	85,340

the PBSs. Assumptions for carryover funds, including those anticipated for construction and other multi-year activities are not included. These baseline estimates are developed assuming optimum funding scenarios. These optimum funding levels exceed the $5.75 billion target level funding that the Department of Energy's Office of Environmental Management has assumed for planning.

In constant FY 1998 (i.e., un-escalated) dollars, the life-cycle cost reflected in the January 1998 PBSs is approximately $50.8 billion. It is estimated that the $5.75 billion target level funding will add approximately $1.8 billion to Hanford's Life Cycle Cost estimates due to delays in mortgage reducing activities. When the $1.8 billion is added to the $2.2 billion of efficiencies already built into the PBS baselines, the total is approximately $54.8 billion. This compares to

already built into the PBS baselines, the total is approximately $54.8 billion. This compares to the $54.3 billion reflected at the $6.0 billion target level in the June Discussion Draft. The difference is attributed to some cost growths since publication of the Discussion Draft (e.g., Spent Nuclear Fuel Project).

1.6 CLOSURE DATES

Closure dates for selected projects, and associated critical milestones, are portrayed on the Critical Closure Path (Figure 3-2). The Hanford Cleanup Mission is currently planned to be complete in the year 2046. Stewardship activities, which may include groundwater management, will continue beyond 2046 along with other Site missions.

1.7 PLANNING PROCESS

Life cycle cost baselines at the Hanford Site have been developed to be compliant with regulatory and DNFSB agreed-to commitments and milestones. Section A of the PBSs contain this baseline. It will only be changed with approved change control packages, which also update the technical and schedule portions of the Integrated Site Baseline. To the extent possible, cost savings initiatives will be used to bridge the gap between compliance needs and funding. If a gap still remains, prioritization criteria will be used. Planning documents, including the PBSs, multi-year work plans, and project priority lists are to be consistent regarding their depiction of the Integrated Site Baseline.

2. END STATE, FUTURE USE, AND STEWARDSHIP

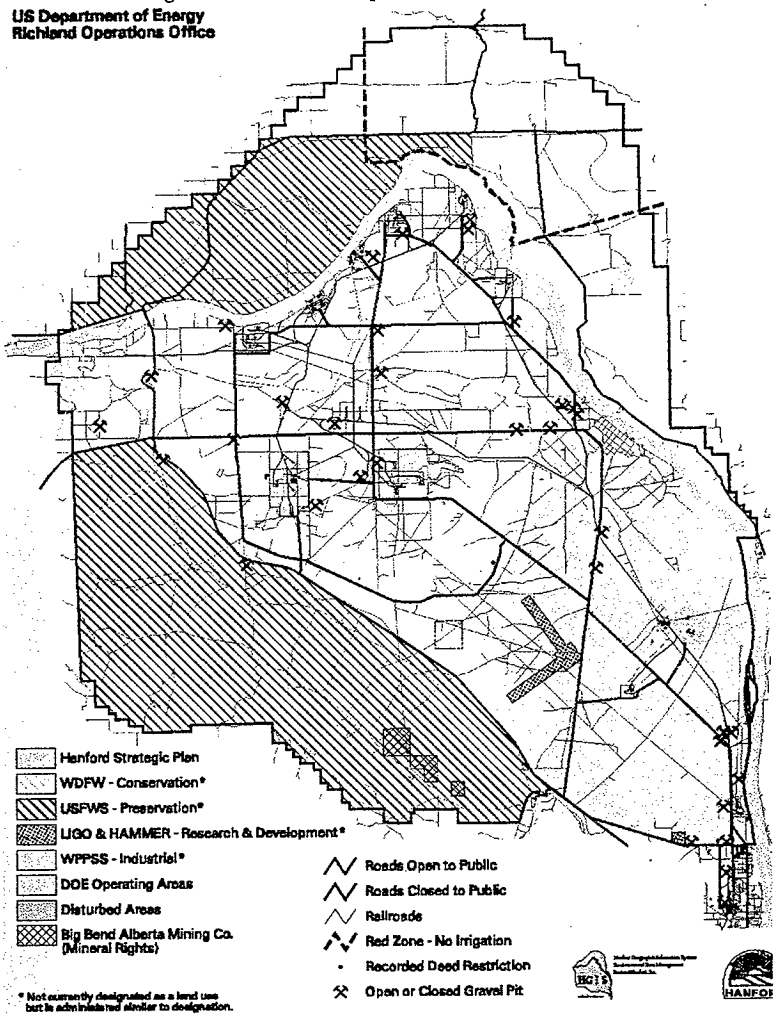
2.1 MAPS

Several land use alternatives are being identified for the future through the *Hanford Remedial Action (HRA) EIS/Comprehensive Land Use Plan National Environmental Policy Act* (NEPA) ROD. Figure 2-1 portrays the baseline map that will be changed once the process is completed.

2.2 END STATE

A NEPA process for the *Hanford Remedial Environmental Impact Statement and Comprehensive Land Use Plan* (DOE/EIS-222D) is being completed for formal public review and comment. Sitewide land-use planning issues, assumptions, and end states are being discussed in this forum. A formal decision will be made through the NEPA EIS ROD. A final

Figure 2-1. Baseline Map for Land Use Alternative.



HRA-EIS is scheduled for October 1998, and the NEPA EIS ROD is expected by December 1998. The ROD provides a baseline decision on the *Comprehensive Land Use Plan* to define future land uses for the Hanford Site. As mandated by Public Law 104-201, Section 3153, the land use plan will address a 50-year or greater planning period. Once established, this land use plan would provide a framework for making land use and facility use decisions while DOE manages the land. Final decisions on the level of remediation to be performed on individual waste sites will be made in the CERCLA response action or RCRA permit processes. As CERCLA and RCRA decisions are made, revisions to the *Comprehensive Land Use Plan* will be made if required.

2.3 FUTURE USE PLANS

Alternatives for potential future use of the Hanford Site lands were developed through a cooperative effort. Those participating in alternatives development included the DOE; the Confederated Tribes of the Umatilla Indian Reservation; the Nez Perce Tribe; the U.S. Department of Interior (Bureau of Land Management, Bureau of Reclamation and U.S. Fish and Wildlife Service); the City of Richland; and Benton, Franklin, and Grant counties. These alternatives are being analyzed in the HRA-EIS for the potential environmental impacts resulting from the proposed future land uses associated with each alternative. The selection of the appropriate land uses for the Hanford Site will be made through the NEPA EIS ROD.

The draft land use designations and their definitions shown in Table 2-1 were developed by the cooperating agencies and were determined to be suitable for the Hanford Site lands so alternative land use plans could be developed and compared.

2.4 LONG-TERM STEWARDSHIP ISSUES

Access to DOE land required for disposal of radioactive waste, including appropriate buffer zones, will remain restricted and under DOE control as long as necessary to ensure adequate protection of human health and the environment. Release of land from DOE control will be considered when the land is no longer needed for the mission at the Hanford Site. When land is released from DOE control, land that was acquired would be released through the General Service Administration or as provided for by Congress. Control of land that was withdrawn from the Bureau of Land Management and lands obtained from the Bureau of Reclamation through a memorandum of agreement would be transferred back to those agencies. When sites are certified as complete, any CERCLA and RCRA requirements for long-term surveillance, monitoring, and maintenance will be identified, along with the appropriate institutional controls to protect human health and the environment.

Table 2-1. Hanford Site Land Use Designations (Draft).

Land Use Designation	Definition
Industrial-Exclusive	An area suitable and desirable for treatment, storage, and disposal of hazardous, dangerous, radioactive, and non-radioactive wastes. Includes related activities consistent with "industrial exclusive" uses.
Industrial	An area suitable and desirable for activities, such as reactor operations, rail, barge transport facilities, mining, manufacturing, food processing, assembly, warehouse, and distribution operations. Includes related activities consistent with "industrial" uses.
Agricultural	An area designated for the tilling of soil, raising of crops and livestock, and horticulture for commercial purposes along with all those activities normally and routinely involved in horticulture and the production of crops and livestock. Includes related activities consistent with "agricultural" uses.
Research and Development	An area designated for conducting basic or applied research that requires the use of a large-scale or isolated facility. Includes scientific, engineering, technology development, technology transfer, economic diversification, and deployment activities to meet regional and national needs. Includes related activities consistent with "research and development."
High-Intensity Recreation	An area allocated for high-intensity, visitor-serving activities and facilities (commercial and governmental): golf courses, recreational vehicle parks, boat launching facilities, Tribal fishing facilities, destination resorts, cultural centers, and museums. Includes related activities consistent with "high-intensity recreation."
Low-Intensity Recreation	An area allocated for low-intensity visitor serving facilities: improved recreational trails, primitive boat launching facilities, and permitted campgrounds. Includes related activities consistent with "low-intensity recreation."
Conservation (Mining and Grazing)	An area reserved for the management and protection of archeological, cultural, ecological, and natural resources. Limited and managed mining and grazing could occur as a conditional use (e.g., a permit or permission would be required) within appropriate areas. Limited public access would be consistent with resource conservation. Includes related activities consistent with "conservation" ("mining and grazing") uses.
Conservation (Mining)	An area reserved for the management and protection of archeological, cultural, ecological, and natural resources. Limited and managed mining could occur as a conditional use (e.g., a permit or permission would be required) within appropriate areas. Limited public access would be consistent with resource conservation. Includes related activities consistent with "conservation" ("mining") uses.
Preservation	An area managed for the preservation of archeological, cultural, ecological, and natural resources. No new consumptive uses (e.g., mining) would be allowed within this area. Public access limitations would be consistent with resource preservation requirements. Includes related activities (e.g.; low-impact recreational activities and traditional uses by Tribal members) consistent with "preservation" uses.

3. STRATEGIES AND PRIORITIZATION

This section discusses the Hanford Site cleanup strategies and resultant prioritization of work that set the context for developing the *Paths to Closure* approach. The strategies and associated priorities have been developed by senior RL officials using the Hanford Strategic Planning Process. The priorities guide decisions concerning the work scope to be completed by 2006. The planning process includes input from regulators, stakeholders, and Tribal Nations.

3.1 OVERVIEW OF CLEANUP APPROACH

The Site baseline reflected in this *Paths to Closure* document is not fully compliant with current regulatory agreements. There are some near-term compliance issues. In addition, the cost estimates in the current baselines (Part A of the Project Baseline Summaries) exceed the target funding levels. Therefore, to achieve the cleanup mission end states within targeted funding levels and continue to maintain compliance with regulatory agreements, it is critical to continue to reduce baseline costs through efficiencies, new technology, alternate approaches and deactivation/ stabilization of facilities. At the same time we must continue to maintain safe operations and address the Site's urgent risks.

Cleanup Mission planning priorities are (1) Essential Safety Activities, (2) Essential Services and Activities, (3) Urgent Risks, (4) Mortgage and Risk Reduction, (5) Viable Environmental Restoration Program, (6) Complete Existing Priority Projects and Minimize New Starts, and (7) No Major Swings in Base Projects Workforce Year-to-Year.

Summarized below are the priorities and goals that set the context for developing the *Paths to Closure* approach. These priorities guide decisions concerning the work scope to be completed by the end of FY 2006. The process includes input from regulators, stakeholders, and Tribal Nations.

Essential Safety Activities are base operating requirements to maintain safety for workers, the public and environmental protection and to enable accomplishment of interim and final mission endpoint targets.

Essential Services and Activities are required to support budgeted cleanup progress and regulatory environmental compliance. These can include community mandates such as the Hanford Advisory Board.

Urgent Risks which are present at the Hanford Site include high-level waste tanks, corroded spent nuclear fuel, and unstabilized plutonium. Mitigating urgent risks means putting **Safety First** including:

- Moving spent nuclear fuel into safe, stable storage away from the Columbia River
- Resolving tank waste urgent storage risks and waste treatment for risk reduction
- Cleaning out the 324 Facility B Cell
- Stabilizing plutonium in the Plutonium Finishing Plant
- Protecting the Columbia River through Vadose Zone and Groundwater Management

Mortgage and Risk Reduction addresses projects such as Spent Nuclear Fuel and B Plant where costly Surveillance and Maintenance activities are required to maintain minimum levels of safety and containment of hazards.

Viable Environmental Restoration Program activities include cleanup along the Columbia River, groundwater management, a 200 Area strategy and reactor interim safe storage.

Complete Existing Priority Projects and Minimize New Starts addresses phasing of activities.

No Major Swings in Base Projects Workforce Year-to-Year addresses stabilization of project workforce requirements.

The cleanup mission of the Hanford Site is expected to last at least 50 years. This timeframe is driven by the complexity associated with the removal, processing, and subsequent disposition of the waste contained within the 177 storage tanks and the multitude of waste sites and facilities requiring cleanup and disposition. In addition, the surplus reactors along the Columbia River are being interim stabilized, allowing for radioactive decay before final disposition.

Five urgent risks have already been reduced: (1) significant quantities of highly radioactive waste have been relocated from the 300 Area to more protective storage on the remote 200 Area Plateau; (2) hydraulic containment capabilities of the spent nuclear fuel storage basins along the Columbia River have been improved awaiting transfer of the fuel to the 200 Area Plateau; (3) substantial quantities of nuclear material contained in the Plutonium Finishing Plant have been stabilized; (4) significant progress has been made on Waste Tank Safety issues, with all but 38 tanks removed from the Watch List; and (5) 100 Area groundwater remediation actions have protected the Columbia River.

Table 3-1 reflects the projected Site status as of the end of FY 2006 based on the above priorities, and the *Paths to Closure* baseline scenario. By the end of FY 2006, risks to human health and the environment and associated

costs will be greatly reduced or eliminated, fixed mortgage costs will be significantly reduced, and efforts to clean up legacy wastes will be increased. The "minimum safe operating" portion of the Site's fixed costs will be reduced by more than half by the end of FY 2006. With level funding, this will result in a higher percentage of the total budget being applied to cleanup efforts. As noted in Table 3-1:

- Urgent risks will have been mitigated
- Other risks and costly mortgages will have been significantly reduced
- Tank wastes will be in the process of being retrieved and immobilized
- Cleanup along the river will be in latter stages of completion.

As noted on the table, a significant portion of our remaining performance enhancement target is required to achieve these baseline accomplishments. The overall target of performance enhancements (total of $2.5 billion through FY 2006) assumes funding of $993 million per year for the Hanford Site. Lower funding would not result in such enhancements. The table also reflects stretch goals and breakthroughs that must be achieved by FY 2006 if all or part of the remaining performance enhancement target is realized. Of significance would be completion of cleanup activities along the Columbia River by 2006.

Significant cleanup activities remaining on the Hanford Site after FY 2006, will include:

- Completion of tank waste immobilization and shipment of the high-level waste canisters to the high-level waste repository, and subsequent closure of the tank farms
- Completion of TRU waste retrieval and shipment to Waste Isolation Pilot Project (WIPP)
- Closure of waste sites on the 200 Area Plateau
- Disposition of facilities not required for follow-on site missions (e. g., stewardship mission).
- Groundwater management.

All of these activities will continue beyond FY 2006, with or without performance enhancements, and through the current baseline completion date of 2046 for the Hanford Site cleanup mission. At that time, immobilized high-level waste will have been sent offsite, and the facilities decommissioned. Through technology breakthroughs and early shipment of wastes offsite, a best-case enhanced scenario could result in completion of the Hanford Site cleanup mission as early as 2033. This could only be realized at a high funding scenario that would allow resources to be applied to such technology breakthroughs.

Table 3-1. Projected Site Status - Vision 2006 (Baseline[a] Scenario)

Urgent risks mitigated	• PFP material stabilized (2002) • All high priority tank safety issues resolved (2001) • All single-shell tanks interim stabilized (2003) • All tanks characterized (1999) • K Basin fuel removed and in dry storage (2001) • K Basin sludge removed (2003)
Other risks and costly mortgages reduced	• Deactivated and turned over to Environmental Restoration: - PUREX (Deactivation-1997; turnover to ER-1998) - B Plant (1998) - 324 and 327 (2004) - Accelerate deactivation to 2003[b] - K Basin (2006) - 309 Building (2002) - Accelerate deactivation of 12 of 48 misc. nuclear/hazardous facilities • Nuclear Energy Legacy Sodium Disposition complete (2003) • 34 vacant landlord facilities demolished • 8 surplus facilities decontaminated and decommissioned • Plutonium Finishing Plant deactivation complete (2014) - *Breakthrough: The PFP is now working to develop a new PFP Strategic Vision 2006 Project Plan. The 2006 Vision is "as an interim endpoint, the PFP Facility will be dismantled to a clean slab on grade by 09/30/06."*[c] • 300 Area Revitalization - 24 of 34 contaminated buildings deactivated • 73 clean 300 Area buildings decommissioned or converted to alternate use
Reactors along the Columbia River and waste sites dispositioned	• 3 of 9 reactors in interim safe storage - *Breakthrough: 8 of 9 reactors in interim safe storage*[d] • 2.5 million cubic meters of soil disposed of in the Environmental Restoration Disposal Facility - Breakthrough: 3.5 million cubic meters[d] • 450 waste sites complete (100-200-300-1100 Areas) - *Breakthrough: 603 waste sites*[d]
Tank waste disposal underway	• Waste removal initiated on 10 single-shell tanks (2006) • Approximately 6% to 13% of tank waste treated by privatized contractors (2006) • Immobilized low-activity waste storage facilities operational; immobilized high-level waste in interim storage
Stored solid waste reduced	• 25% of life cycle transuranic waste shipped to the Waste Isolation Pilot Plant or disposed onsite (2006) • 25% mixed waste treated/disposed (2006) - *Breakthrough: 30% treated and disposed*[d] • Spent nuclear fuel removed from T Plant Canyon (2001) • Operations in T Plant at hot standby (1999) • Continue operation of 222-S and WSCF analytical laboratories and manage contracted commercial services.

PFP = Plutonium Finishing Plant
PUREX = Plutonium Uranium Extraction Facility
[a] Baseline includes over $700 million of realized performance enhancements and requires ≈ $600 million of additional performance enhancements to be achieved through 2006 at the $993 million per year funding level for the Hanford Site.
[b] Assumes profile as identified in the 324/327 draft PMP.
[c] Conceptually, implementation of this Vision would cost approximately $200 million over current PFP planned costs for FYs 1999 through 2006, but would save more than $1 billion from the overall life cycle costs for the PFP.
[d] Candidates for applying remainder of $2.5 billion (i.e., $1.3 billion) targeted performance enhancements through 2006.

Figure 3-1 summarizes the projected progress toward final disposition of Hanford Site legacy materials and facilities. The figure shows the extent to which these problems have been resolved.

3.2 CRITICAL CLOSURE PATH

The critical closure path is a steamlined schedule of high-level activities, events, and/or decisions that warrant DOE management attention and must occur "on schedule" to achieve the planned Site closure. Figure 3-2 depicts the critical closure path for the Hanford Site cleanup mission. As shown, the critical path proceeds through the preparation, immobilization, and final disposition of the tank wastes. To succeed along this critical path, many other activities are also considered as critical:

- Urgent risks must have top priority. It is not acceptable to ignore such conditions and put resources into longer term risks.

- The fixed costs for maintaining the Site in a safe manner need to be reduced through facility stabilization and deactivation to make additional funds available for cleanup.

- The Environmental Restoration Project is critical because it results in visible near-term cleanup progress, which is critical for continued support of any project of such length. In addition, the magnitude of waste site cleanup on the Hanford Site (e.g., over 1,400 waste sites) dictates a long-term effort that cannot be deferred to the future.

- The practice of storing wastes awaiting treatment and deferring the retrieval and processing of the TRU retrievable wastes eventually will increase costs for additional storage facilities. It will also cost much more to retrieve the TRU wastes because of deterioration of the containers over time. At fixed funding levels, other cleanup activities would be impacted.

The critical closure path identifies programmatic risks associated with each activity and event. Three numbers in parentheses, e.g., "(2,2,1)". represent technology, work scope definition, and inter-site dependency risks, respectively, on a scale of 1 to 5, where "5" represents high programmatic risk. For example, the Environmental Restoration area reflects a "5" for 300 Area transuranic waste due to the lack of a defined facility to handle the waste and lack of a disposal location within waste management.

The Disposition Maps (Attachment B) define the volumes of waste and materials that require disposition, the process for disposition, and movement of waste and material onsite and offsite. The volumes correlate directly to the site performance metric data contained in the Project Baseline Summaries. If ultimate disposition pathways are not known, they are designated "to be determined" (TBD). Resolution of these TBDs will be worked between the sites with stakeholder participation, and resulting formal decisions would then be incorporated into this document.

Figure 3-1. Projected Disposition of Legacy Materials, Wastes, and Facilities by 2006.

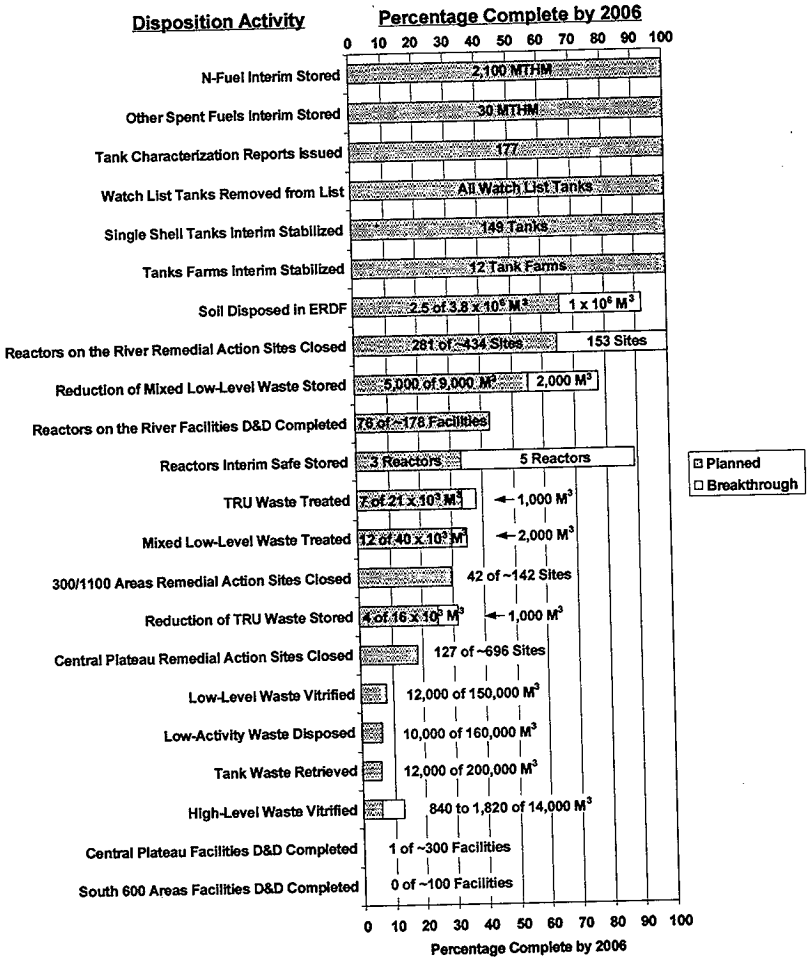
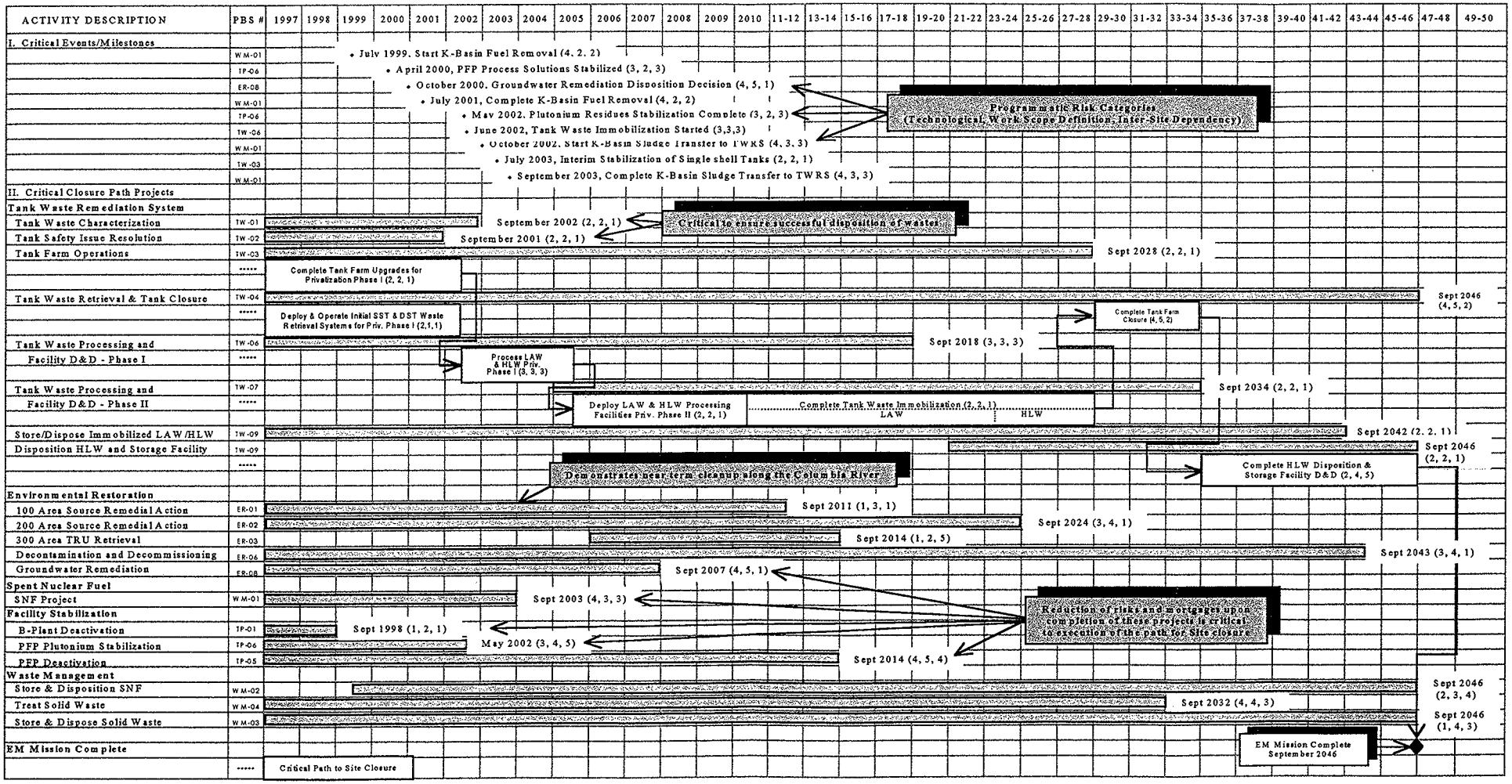


Figure 3-2. Critical Closure Path for Hanford Site Cleanup.



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3.3 OTHER OPPORTUNITIES

The following represent some additional opportunities that are being evaluated with the intent of enhancing the Hanford Site baseline. These opportunities are at different stages of consideration and could result in additional cost savings, although some attempts would require additional funding earlier in the cleanup process.

- New PFP Vision. Process and ship special nuclear material offsite much earlier than currently planned. Disposition the total PFP complex resulting in a significant cost savings.
- Accelerate reactor interim safe storage.
- Initiate K Basin deactivation before completion of the Spent Nuclear Fuel Project.

Other breakthrough opportunities are outlined in Table 3-1 and in Figure 3-1.

3.4 CONTRACTING APPROACH

Beginning in 1998, all of the Project Hanford Management Contractor (PHMC) major subcontractors and the enterprise company (ENCO) subcontractors will be required to submit a compete/exercise of option plan for FY 1999 to the RL Procurement Contractor Officer. The plan will be reviewed to determine whether exercise of subcontract options or issuance of competitive subcontract solicitations are appropriate. This annual analysis process will be the catalyst for establishing a tailored contract strategy for each subcontractor.

In those situations where exercising the option is not considered in the best interest of the government, alternative sources will be developed and a competitive solicitation, if appropriate, will be prepared for that block of work. Where work can be fixed priced because the nature of the work is well defined and historical cost information is available, the PHMC will use either a firm fixed-price contract or will apply a cost-based incentive under a cost plus incentive fee arrangement or a fixed price incentive type contract.

In those situations where exercising the option is considered appropriate, the PHMC will take the leveraging opportunity to renegotiate the terms and conditions of the subcontract if necessary for better application to projected conditions. These extended subcontracts will be renegotiated to include a subjective performance assessment component and a set of performance-based incentive goals, which are independent from the performance agreements negotiated with RL to optimally control subcontractor priorities and assignments.

The PHMC will analyze the health and vitality of the ENCOs and will recommend if the ENCO's exclusivity protection can be removed even if its option is exercised. Removing exclusivity is an option only for task order type ENCOs such as Fluor Daniel Northwest, Inc.; Waste Management Federal Services, Inc., Northwest Ops.; SGN Eurisys Services Corporation; and Lockheed Martin Services, Inc. Safeguards and Security and the Quality Assurance ENCOs

must remain as a single source because having multiple performers would be expensive and disruptive.

Subcontracting to commercial, non-profit, or other agencies or enterprises is another contracting approach designed to save taxpayer dollars. Several Hanford Site projects have already been subcontracted in this manner as summarized in Table 3-2, and there are many more candidates. By contracting work to private companies, work is being performed for less money.

3.5 SCIENCE AND TECHNOLOGY DEVELOPMENT

Much of the success in achieving *Paths to Closure* goals depends on the ability of innovative technologies to reduce cost and risk and to do what cannot be done with existing methods. In FY 1998, 79 technology needs and 53 science needs were identified by the programs through the Hanford Site Technology Coordination Group (STCG). These needs coincide with project goals and objectives described herein. There are 119 technology and science activities at the Hanford Site focused on performing cleanup better, cheaper, faster, or safer. Although definitive cost savings or avoidance information is not available for all innovative technologies, cost savings or avoidance potential of at least $400 million have been identified to date.

Key baseline technology activities for the Hanford Site cleanup mission include (1) Hanford Tanks Initiative-sponsored deployments of tank waste retrieval and characterization technologies; (2) macroencapsulation of the site's low-level mixed waste inventory; and (3) enhanced sludge washing, a process for minimizing the volume of immobilized high-level waste to be disposed offsite. In addition, key breakthrough technology activities (ones that provide significant improvements over current technologies) for Hanford Site cleanup include (1) other technologies for low-level waste volume minimization, such as salt-removal technologies; (2) carbon dioxide (CO_2) pellet decontamination to allow free release of wastes; (3) remote laser cutting; (4) the C-Reactor Interim Safe Storage Large-Scale Technology Demonstration; and (5) in situ reduction/oxidation (REDOX) manipulation to prevent chromium migration in groundwater. Table 3-3 contains more details about these technologies.

Table 3-2. Hanford Projects Under Alternative Contracting Strategies

Project	Description
Tank Waste Remediation System	The highest cost activities anticipated at the Hanford Site are the retrieval and treatment of the waste in the high-level waste tanks to produce high-level waste canisters of glass and immobilized low-level waste. This activity is now being privatized in a two-phase approach. The first phase is underway, the second-phase contracts will be let in 2006, and completion of the waste processing activities is expected in 2028.
Solid Sanitary Waste Disposal	The functions of the Hanford Site landfill, which has been operated for the life of the Site, have been transferred to other entities in agreement with the Washington State Department of Ecology. The City of Richland landfill is receiving the majority of the sanitary wastes. Asbestos, medical, and drummed waste are being sent to other locations for disposal.
Hanford Fossil Fuel Services	Refueling services to the U.S. Department of Energy (DOE) fleet are now being provided by automated service stations. A General Services Administration credit card is used by drivers to access gasoline. This has eliminated the need for attendants and provides for automated entry of vehicle mileage for improved driver reporting and monitoring. It also reduces the need for DOE monitoring of the fueling inventory and accounting. The fuel provider is paid based on the amount of gasoline used. Conoco is the company currently providing the service to the Hanford Site.
Hanford Laundry	The cleaning of all Site radioactive and nonradioactive laundry, and the cleaning and decontamination of respirators is provided by Interstate Nuclear Services (INS). In addition to providing services to the Hanford Site, INS also provides laundry services to Washington Public Power Supply System and to Rocky Flats. The contract avoided the construction of a new $24 million DOE facility and resulted in cost savings of about $4 million per year in operations.
Columbia River Exhibition of History, Science, and Technology (CREHST)	DOE previously operated the Hanford Science Museum from overhead funds. During the need to reduce budgets in 1995, the museum was to be eliminated. However, with much effort by many in the Tri-Cities, the museum was privatized with the formation of the Environmental Science and Technology Foundation. The scope of the effort was increased to include agriculture, geology, river management, and history of the region. The funding for the construction and operation of a new center is being provided by the community, supporting businesses, and corporations. CREHST still works to support DOE through the storage of historical artifacts and provides information on the technology developed at the Site.
Hanford Mail Services	The Site mail services are now provided by a private contractor, Jantec Inc. Jantec provides sitewide delivery and pickup service, including interplant and U.S. mail. They handle about 17,400,000 units per year to about 800 mail stops onsite. They also perform mail list addressing of large distributions and prepare and meter outgoing U.S. Postal mail.
Mixed Waste Thermal Treatment	Future thermal treatment of some contact-handled low-level mixed waste (waste that contains both radioactive and hazardous components) is planned to be provided by the Allied Technology Group (ATG) Thermal Treatment Facility in Richland. ATG is developing a gasification/vitrification treatment system that may be used for Hanford wastes and, potentially, other mixed wastes in the DOE complex. Depending on the outcome of a NEPA environmental assessment, the service is expected to start in November 2000 and will treat up to 717 cubic meters of Hanford Site waste per year. The termination liability for DOE is $2.5 million over the 5-year startup period (1995-2000).
Mixed Waste Non-thermal Treatment	Depending on the outcome of a NEPA environmental assessment, this contract will treat up to 1860 m^3 of contact-handled low-level mixed waste beginning in FY 1999. Treatment will be by means of non-thermal technologies. The treatment contract was awarded to Allied Technologies Group (ATG) in Richland, Washington.

Table 3-3. Key Technology Activities for Hanford Cleanup

Project	Technology Activity	Impact
RL-ER06, D&D	C-Reactor Interim Safe Storage Large-Scale Technology Demonstration	Demonstration of 20 innovative technologies that will enable D&D of eight reactors at the Hanford Site
RL-ER06, D&D	Canyon Disposition Initiative	Accurate determination of the structural integrity, type, quantity, and location of contamination in fuel processing to support a Record of Decision.
RL-ER08, Groundwater Management	In Situ Redox Manipulation	In situ treatment for chromium migration into the Columbia River
RL-TP05, PFP Deactivation	CO_2 Pellet Decontamination	Free release of contaminated materials (vs. onsite burial)
RL-TP08, 324/327 Facility Transition Project	Remote Laser Cutting	Faster and safer method for cutting materials in hot cells and other remote areas
RL-TW04, Retrieval Project	Hanford Tanks Initiative	Retrieval performance objectives to support tank closure by demonstrating and evaluating innovative tank waste retrieval and characterization methods
RL-TW04, Retrieval Project	Cone Penetrometer	Vadose zone characterization to support tank farm closure performance criteria
RL-TW05, Process Waste Support	Salt Removal Technologies	Immobilized low-level waste volume minimization and cost savings.
RL-TW06, Process Waste Privatization: Phase I	Enhanced Sludge Washing: Caustic Leaching	Immobilized high-level waste volume minimization and cost savings.
RL-WM04, Solid Waste Treatment	Macroencapsulation of Mixed Low-Level Waste	RCRA-compliant treatment of mixed low-level waste with improved worker safety

RCRA = *Resource conservation and Recovery Act of 1976*

As more breakthrough technologies are deployed, the cost savings/avoidance potential may increase by a factor of ten. Other sites, industries, national laboratories, and universities will be consulted to find better technology. Such recent projects as the Hanford Technology Deployment Center and the Advanced Process Engineering Laboratory will be instrumental in attracting the

non-Hanford technologies. These projects are factored into the benefit calculations, increasing the savings by a similar amount for a total potential savings approaching $8 billion.

4. SCOPE, SCHEDULE AND COST

4.1 SCOPE OF WORK

The Project Hanford Breakdown Structure (Figure 4-1) portrays the relational structure of Site projects and ties those projects to PBSs. The PBSs describe in detail the workscope related to each of the projects included in the Project Hanford Breakdown Structure.

4.1.1 Individual Project PBS Description

The projects represented in the boxes of Figure 4-1 are defined in the following paragraphs.

RL-TW01 Tank Waste Characterization Project - characterizes waste in 177 Hanford Site waste tanks and issues tank characterization reports to satisfy the Hanford Federal Facility Agreement and Consent Order program needs, (Tri-Party Agreement; Ecology et al. 1996) milestone M-44-00, and the DNFSB Recommendation 93-5 commitment.

RL-TW02 Tank Safety Issue Resolution Project - identifies hazards associated with storage of radioactive mixed waste in large underground waste storage double-shell and single-shell tanks at the Hanford Site. The project provides the technical basis for closure of unreviewed safety questions and resolution of safety issues (and removal from the Watch List).

RL-TW03 Tank Farm Operations Project - operates, maintains, and upgrades tank farm facilities to assure safe storage of the waste until it is retrieved. The project includes maintenance of tank farm facilities, receipt and transfer of radioactive liquid waste from other Hanford Site facilities, pumping interstitial liquid from the single-shell tanks (interim stabilization), disconnecting piping to prevent further liquid intrusion (isolation), and reducing surface contamination above the tanks.

RL-TW04 Retrieval Project - removes and transfers wastes from double-shell and single-shell tanks to resolve safety issues and provide feed for privatized waste treatment and immobilization facilities. The project will also close the tanks and tank farm operable units.

RL-TW05 Process Waste Support - supports pretreatment and immobilization of the radioactive waste stored in 177 underground single- and double-shell tanks at the Hanford Site. This project administers and integrates the contract(s); defines the systems necessary to support privatization; ensures that acceptable waste feed is delivered to the contractor(s) (Phase I only); provides for D&D of the contractor's facilities (Phase I only); develops requests for proposals; and awards, administers, and integrates the contract(s) for retrieving, pretreating, and processing both low- and high-level wastes.

RL-TW06 Privatization Phase I - acquires privatized facilities that will provide waste treatment and immobilization services on a fixed-unit-price basis. Three low-activity waste envelopes and one high-level waste envelope (about 13 percent of total tank waste) will be processed during a nine-year period (2002-2011), followed by deactivation of the contractor's plants. Immobilized low-activity waste and high-level waste products will be returned for storage and disposal.

RL-TW07 Privatization Phase II - involves full-scale production facilities for the retrieval, treatment, and immobilization of all remaining tank waste and D&D of facilities. One or more private contractors will design, construct, operate, decontaminate, and decommission contractor-owned facilities and produce immobilized low-activity and high-level waste products. The contractor(s) will recover costs through payments for waste products. Waste retrieval operations will also be privatized.

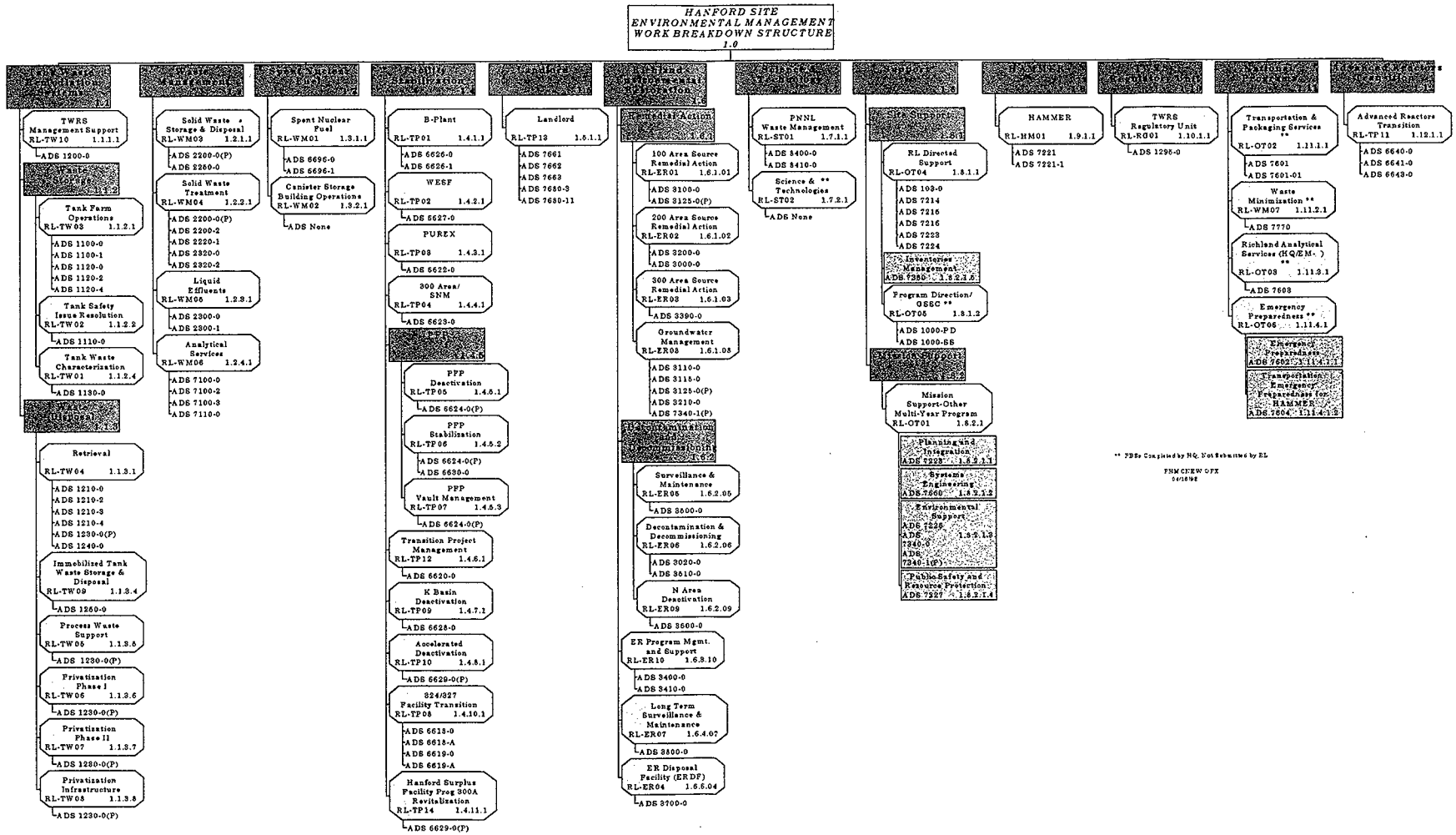
RL-TW08 Privatization Infrastructure - provides the required facilities, physical interfaces, and systems that will ensure that the privatization contractor is integrated into the Hanford Site infrastructure for both Phase I and II.

RL-TW09 Immobilized Tank Waste Storage and Disposal Project - provides safe interim storage and final near-surface disposal on the Hanford Site for immobilized low-activity tank waste, interim storage for immobilized High-level waste, and the final disposition of cesium/strontium capsules produced on the Hanford Site.

RL-TW10 TWRS Management Support - provides overall program management for TWRS; establishes and maintains the technical, cost, and schedule baselines for TWRS; and provides program integration, policy, oversight, and other required program/project services (e.g., Quality Assurance-Environmental Safety and Health Oversight and System Engineering).

RL-WM01 Spent Nuclear Fuel - addresses the urgent need to move metallic spent nuclear fuel from the present degraded storage conditions in the 105 K East and 105 K West Basins in the 100 K Area along the banks of the Columbia River to safe interim storage in the 200 Area on the Central Plateau. Major objectives include: removing and repackaging K-Basins spent nuclear fuel into multicanister overpacks suitable for downstream fuel handling and interim storage; drying the fuel to remove free water to enable safe transport to and staging in the 200 Area; conditioning fuel to remove bound water for safe stable interim storage; removing sludge and debris collected in the K-Basins for disposition as low-level liquid waste or solid waste in accordance with disposition plans being developed; treating water contained in the basins to maintain water quality, maintain safe conditions within the K-Basins, and reduce tritium levels; and consolidating non-defense production reactor spent nuclear fuel in the 200 Area pending final disposition.

Figure 4-1. EM PROJECT HANFORD BREAKDOWN STRUCTURE



RL-WM02 Canister Storage Building Operations - provides long-term (40 years), interim storage, operations, maintenance, and surveillance of:

- 2,100 metric tons of irradiated metallic uranium fuel until the fuel is sent to a repository or otherwise dispositioned

- Spent nuclear fuel from FFTF, the 324/325/327 buildings, Neutron Radiography Facility, Test Reactor and Isotope Production General Atomics, light water reactor fuel, and pressurized water reactor Core 2 Fuel currently located across the Site. This long-term storage will include inventory accountability, material safeguards, facility surveillance, equipment maintenance, and other necessary operational activities.

RL-WM03 Solid Waste Storage and Disposal - provides centralized facilities for the storage of solid radioactive mixed low-level and TRU wastes and the disposal of solid radioactive low-level waste (excluding tank waste and sanitary wastes) for onsite and offsite generators. This includes the management, operations, surveillance, monitoring, and maintenance of facility buildings, burial grounds, and current waste inventories. The program manages the receipt and storage or disposal of newly generated wastes from onsite and offsite generators.

RL-WM04 Solid Waste Treatment - provides onsite and commercial mixed waste treatment, waste verification and repackaging, and decontamination services to customers throughout the Hanford Site. The work supports agreements with Tri-Party Agreement stakeholders and addresses specific milestones for initiating and completing treatment for a variety of low-level, low-level mixed, TRU, and TRU mixed wastes. Wastes are treated for disposal purposes under varying criteria. The work is accomplished through existing facilities on the Hanford Site (T-Plant complex and the Waste Receiving and Processing Facility) and through offsite treatment contracts.

RL-WM05 Liquid Effluent Project - provides an integrated system for managing liquid effluents and for reducing tank waste volumes using a combination of local and central treatment. Implementation of local treatment will remain with the generators; central treatment capabilities will be provided by the Liquid Effluent Project. The project includes overall management of the Liquid Effluent Project and operation, maintenance, technical support, and management/ administration of the following facilities: 242-A Evaporator, Liquid Effluent Retention Facility, 200 Area Effluent Treatment Facility, 200 Area Treated Effluent Disposal Facility, 300 Area Treated Effluent Disposal Facility, and 340 Waste Handling Facility. The project is responsible for operation and maintenance of the process server system; retention process sewer system, including the 307 Retention Basins; and Radioactive Liquid Waste System. The project is also responsible for commitments identified in the Miscellaneous Streams Plan and Schedule, shutdown planning and integration for the 340 Handling Facility, and preparation of a biennial tritium treatment technology report as required by the Tri-Party Agreement.

RL-WM06 Analytical Services - provides analytical services to Site programs. Services include waste and environmental sample analysis, process control support, field and sampling

services, development services, and Site expertise in chemistry and data quality. The project operates onsite analytical laboratories, contracts commercial services, establishes Hanford Site laboratory quality standards, and integrates all Hanford Site analytical services.

RL-WM07 Waste Minimization - reduces generation and release of DOE multi-medial wastes and pollutants by implementing cost-effective waste minimization and pollution prevention technologies, practices, and policies with partners in government and industry while conducting operations in compliance with applicable environmental requirements. This PBS is prepared at the DOE Headquarters level.

RL-TP01 B Plant Subproject - transitions B Plant to a deactivated facility and places it in a configuration suitable for long-term surveillance. This includes deactivation of the 800-foot B Plant canyon building and adjoining support facilities to an environmentally acceptable state and turning the facility over to the Environmental Restoration Project for final disposition.

RL-TP02 Waste Encapsulation and Storage Facility Subproject - maintains encapsulated cesium and strontium capsules containing 146 million curies of cesium-137 and strontium-90 and their daughter products in safe, environmentally sound, and cost-effective storage. The project plans for and initiates activities needed to ensure that the systems and structures of the Waste Encapsulation and Storage Facility are maintained in a condition that allows for safe storage of the cesium and strontium capsules. The project develops and implements an updated safety analysis report and an interim safety basis document that evaluates all interim safety requirements pending completion of the safety analysis report. The project develops an effective capsule inspection, leak detection, and recovery system. The project also reencapsulates failed and suspect cesium capsules into a configuration acceptable for pool cell storage at the Waste Encapsulation and Storage Facility. Cesium and strontium capsules from the Pacific Northwest National Laboratory are returned to the Waste Encapsulation and Storage Facility, including those shipped to the 324 Facility for reencapsulation.

RL-TP03 PUREX Subproject -completes turnover of PUREX to EM-40 in FY 1998.

RL-TP04 300 Area/Special Nuclear Material Subproject - maintains facilities in a regulatory compliant state until turnover to EM-40 is completed. Completes the isolation of the 313 South Building to reduce the safety risks of an unsafe roof. Completes closure of two remaining RCRA-permitted treatment, storage, and disposal systems. Completes deactivation/stabilization activities as described in WHC-SD-FL-SSP-002, *Shutdown Plan for the 300 Area Fuel Supply Facilities*. The project relocates/disposes 1200 metric tons of low enriched uranium.

RL-TP05 PFP Deactivation - provides for the safe and orderly terminal cleanout and deactivation of seven of the nine major facilities and their associated support structures at the PFP Complex. Two major facilities (2736ZB, Product Shipping and Receiving Facility, and 2736Z, Plutonium Storage Facility) will not be deactivated at this time because of their mission of safe and secure storage of nuclear materials until at least 2025. The vaults are scheduled to be deactivated at that time.

RL-TP06 PFP Stabilization - implements DNFSB Recommendation 94-01 and corrects related plutonium vulnerabilities by stabilizing, repackaging, immobilizing, and/or properly dispositioning all remaining plutonium-bearing materials in storage or holdup (leftover residues of varying quantities) at the PFP. One candidate line item is required to support the stabilization, packaging, and storage of plutonium-bearing materials at PFP in accordance with the schedule and requirements of DNFSB Recommendation 94-01. This line item consists of (1) an automated Plutonium Stabilization and Packaging System and (2) 2736-Z Vault upgrades and 2736-ZB facility modifications, as necessary, to support the Stabilization and Packaging System.

RL-TP07 PFP Vault Management - provides for the safe and secure storage for special nuclear materials at the PFP Complex and provides the basic infrastructure with which the PFP stabilization and deactivation projects are dependent. The project includes the plant systems, facilities, and processes that provide the minimum safe configuration for PFP, the plant infrastructure systems and projects, the support for International Atomic Energy Agency custodianship of vault #3, and safeguards and security systems replacement projects.

RL-TP08 324/327 Facility Transition Project - includes the planning, deactivation, and minimum safe activities within the 324 and 327 Facilities. The 324 and 327 Facilities are performing selected stabilization activities in response to Tri-Party Agreement milestones (B-Cell cleanout and the high-level vault tank closures) and to the vulnerability assessments (cesium capsule removal and legacy fuel removal). This project will remove and/or reduce human health and environmental hazards associated with the 324 and 327 Facilities. This project will place the facilities in the lowest radiological classification possible for S&M pending reuse or final D&D.

RL-TP09 K-Basin Deactivation - encompasses the activities for planning, end point determination, and physical deactivation of the K-Basins and associated ancillary facilities after the fuel and sludge are removed.

RL-TP10 Accelerated Deactivation Project - deactivates all contaminated facilities at the Hanford Site not currently being deactivated or scheduled for deactivation under another PBS.

RL-TP11 Advanced Reactors Transition - includes the FFTF, the Fuels and Materials Examination Facility, and the Plutonium Recycle Test Reactor/309 Building and Nuclear Energy legacies (several other facilities that were involved in developing and testing components for use in sodium). FFTF is currently in a "standby" condition while any future role it may play in the DOE's dual-track tritium production strategy is evaluated. During "standby," deactivation activities are limited to washing and storing spent nuclear fuel assemblies and components, along with nonfueled reactor components that have reached the end of their useful life. Deactivation of the PRTR/309 Building and Nuclear Energy Legacy, sodium test facilities will continue, unabated by the FFTF "standby."

RL-TP12 Transition Project Management - provides centralized program, project, technical integration, and business management to plan, execute, and control the Facility Stabilization Project. The project provides for common safeguard and security support;

centralized coordination of environmental, safety, health, radiological control, and quality assurance; systems engineering; new technology development and implementation support; policies and procedure development; excess facility and material planning; Facility Stabilization Project strategic planning; procurement support; communications support; management of special nuclear materials; human resources; and operations integration support. The project provides support for technical development of 200 Area Canyon Entombment and FDH project management direction.

RL-TP13 Landlord Project - preserves, upgrades, maintains, and forecasts cost-effective general infrastructure activities. Specific functions and services include utilities (i.e., steam, water, sanitary sewer, solid waste disposal, electrical, and telecommunication distribution), transportation, general purpose facilities (i.e., general support shops and laboratories), services, and energy and land use management.

RL-TP14 Hanford Surplus Facility Program 300 Area Revitalization Project - deactivates 300 Area contaminated facilities not currently managed under another PBS. Activities include monitoring and maintenance of facilities and grounds as required to assure containment of the radioactive and hazardous material; stabilization and deactivation of contaminated facilities; and alternative cleanup of facilities by removing the legacy and liabilities of DOE operations only to the extent necessary for facility and area alternative use.

RL-ER01 - 100 Areas Environmental Restoration Remedial Action - provides for the assessment, remedial design, and remedial action of past practices waste sites in the 100 Areas.

RL-ER02 - 200 Areas Environmental Restoration Remedial Action - provides for the assessment, remedial design, and remedial action of past practices waste sites in the 200 Areas.

RL-ER03 - 300 Area Environmental Restoration Remedial Action - provides for the assessment, remedial design, and remedial action of past practices waste sites in the 300 and 400 Areas.

RL-ER04 - Environmental Restoration Disposal Facility - provides for the transportation of waste from the waste sites to the disposal facility and construction, operation, and closure of the disposal facility. The Environmental Restoration Disposal Facility will accept only those wastes generated by the Environmental Restoration Project at the Hanford Site.

RL-ER05 - Surveillance and Maintenance - includes the S&M of surplus facilities and past practices waste sites that have been assigned or transitioned to the Environmental Restoration Project. This includes the S&M for the facilities (*Baseline Environmental Management Report*) that will be transitioned to the Environmental Restoration Project in the future and support for the coordination of the transition activities with EM-60. The S&M activities are divided into two major areas: Radiation Area Remedial Action, which is S&M of the waste sites, and Surveillance and Maintenance, which is S&M of the surplus facilities.

RL-ER06 -D&D - provides for the D&D of surplus facilities that have been assigned or transitioned to the Environmental Restoration Project. This includes the interim safe storage and final disposition of the nine surplus reactors. This includes the D&D of facilities (*Baseline Environmental Management Report* estimates) that will be transitioned to the Environmental Restoration Project in the future.

RL-ER07 - Environmental Restoration Long-term Surveillance and Maintenance - provides for the S&M after the remediation and D&D of the waste sites and facilities. This includes the revegetation of the remediated surface areas.

RL-ER08 - Groundwater Management Project - includes the groundwater remediation, monitoring and characterization, well maintenance, and decommissioning activities. The Groundwater Management Project is divided into three major areas: 100 Area Groundwater, 200 Area Groundwater, and Hanford Site Groundwater Management.

Additionally, in order to obtain a thorough understanding of the potential impacts on the vadose zone, groundwater and Columbia River, discharges and leaks from the high-level radioactive waste tanks must be considered, along with all other relevant contaminant discharges to the vadose zone. To meet this goal, RL has formed the Groundwater/Vadose Zone Integration Project that is responsible for integration and management of the Hanford Site groundwater and vadose zone activities.

RL-ER09 - Environmental Restoration N Area Deactivation - provides for the deactivation of N Reactor and the ancillary facilities and transition of the deactivated facilities to S&M.

RL-ER10 - Environmental Restoration Program Management and Support - provides support to Quality, Environmental Safety and Health, Planning and Controls, Project Technical Support, and both RL and Environmental Restoration Contractor Project and Program Support.

RL-ST01 Pacific Northwest National Laboratory Waste Management Project - provides waste management services and compliant operations in support of science and technology development for the Hanford Site cleanup activity. The project ensures that the research laboratory facilities needed for science and technology development are maintained in a minimum safe condition and that the facilities are monitored as required. Operational compliance services are provided in these facilities to meet regulatory requirements, including environmental, safety, and health regulations. The project provides the required waste management infrastructure to manage the packaging and disposal of currently generated wastes.

RL-OT01 Mission Support Project - includes five unique activities that support cross-cutting mission areas and contractors across the Hanford Site. Most of the activities will be required at some level throughout the life of the Hanford Site, which for planning purposes is assumed to be the year 2046. The following five programs conduct activities under the Mission Support Project: (1) Site Planning and Integration, (2) Hanford Environmental Management Program, (3) Effluent and Environmental Monitoring Program, (4) Site Systems Engineering, and (5) Pacific Northwest National Laboratory Public Safety and Resource Program.

RL-OT02 Transportation and Packaging Services Headquarters. This PBS is prepared at the DOE Headquarters level.

RL-OT03 Richland Analytical Services. This PBS is prepared at the DOE Headquarters level.

RL-OT04 RL Directed Support - provides funding for various RL-directed activities that are considered to be "RL Must Do's."

RL-HM01 HAMMER - brokers and hosts training in six specific product lines: emergency operations, fire operations, environmental restoration and waste management, occupational safety and health, associated technologies, and law enforcement. A seventh product line, technology supported learning, is being added.

RL-RG01 TWRS Regulatory Unit (RU) - the responsibility of the Office of Radiological, Nuclear, and Process Safety Regulation of TWRS Privatization Contractors (RU) is to provide safety regulation of the design, construction, operation, and deactivation of privatized facilities to remediate Hanford Site tank wastes. The basic concept of this approach is that the contractor(s) are responsible for (1) achieving adequate safety, (2) compliance with applicable laws and legal requirements, and (3) conformance with DOE-stipulated top-level safety standards and principles. Consistent with these requirements, the Contractor(s) are required to tailor the exercise of this responsibility to the specific hazards associated with their activities. The RU will develop a regulatory environment that permits privatization to occur in a timely, predictable, and stable manner consistent with the concepts and principles of the U.S. Nuclear Regulatory Commission; and one that embraces the fundamental regulatory principles of independence, openness, efficiency, clarity, and reliability. Authority for establishing the RU is found in DOE/RL-96-25, *Policy for Radiological Nuclear, and Process Safety Regulation of TWRS Privatization Contractors.*

4.1.2 Hanford Cleanup Mission Endpoint Targets

Endpoint targets represent interim or final milestones which define measureable progress along the path to completing Hanford cleanup. The endpoint targets defined by the Hanford Strategic Plan for the cleanup mission are displayed in Table 4-1. The Spent Nuclear Fuel and most Facilities Transition projects have endpoint targets within the 10-year window; TWRS, Solid Waste, and Environmental Restoration endpoint targets extend beyond FY 2006. Some are planning assumptions not supported by formal NEPA, CERCLA or RCRA decisions.

Table 4-1. Interim and Final Endpoint Targets. (4 sheets)

Geographical Area	PBS	Title
	Radioactive Tank Waste	
Central Plateau	**Final Endpoint Targets**	
	Immobilized Tank Waste Storage	The immobilized low-activity fraction will be disposed onsite in a 200 Area disposal system.
	Immobilized Tank Waste Storage	The high-level immobilized fraction will be interim stored until it can be shipped offsite for disposal in a high-level waste geologic repository.
	Immobilized Tank Waste Storage	For Cs/Sr capsules declared waste disposed in a high-level waste geologic repository.
	Retrieval	After the waste has been retrieved from the tanks, the tank farms - including the tanks - will be closed.
	Interim Endpoint Target	
	Process Waste	*Retrieve tank wastes to the extent needed for tank closure, divide into high-level and low-activity fractions, and immobilize.*
	Solid Waste	
Central Plateau	**Final Endpoint Targets**	
	Solid Waste	Retrievably stored transuranic waste retrieved, processed, shipped offsite to the Waste Isolation Pilot Project.
	Solid Waste	Low-level and low-level mixed waste from onsite and offsite sources will continue to be disposed of in the 200 Area.
	Spent Nuclear Fuel	
Reactors on the River	**Final Endpoint Target**	
	Spent Nuclear Fuel	Spent fuel removed and K-Basins cleaned sufficient to transition to D&D.
Central Plateau	**Final Endpoint Target**	
		Spent fuels removed offsite for final disposition
	Interim Endpoint Targets	
	Spent Nuclear Fuel	*Spent fuels consolidated in the 200 Area in safe, stable, cost-effective storage pending national decisions on their ultimate disposition.*
South 600 Area	**Final Endpoint Targets**	
	Advanced Reactor Transitions	Spent fuels (TRIGA and light water reactor) and applicable FFTF fuels removed from 400 Area interim storage to 200 Area.
		Spent fuels (sodium-bonded EBR-II test assemblies) removed offsite for final disposition.
	Interim Endpoint Targets	
	300 Area Fuel Supply	*Spent fuels (light water reactor) removed to interim storage in 400 Area pending availability of 200 Area interim storage.*

Table 4-1. Interim and Final Endpoint Targets. (4 sheets)

Geographical Area	PBS	Title
	Facility Transition	
Reactors on the River	*Interim Endpoint Targets (Final Endpoint Targets with Decontamination and Decommissioning (D&D) at the end of this table)*	
	K-Basins	*Drain, decontaminate, and stabilize K-Basin Facility.*
Central Plateau	*Interim Endpoint Targets (Final Endpoint Targets with Decontamination and Decommissioning (D&D) at the end of this table)*	
	Accelerated Deactivation	*Transition high-cost surplus facilities to a low-cost, stable deactivated condition.*
	PFP	*Provide safe, stable, interim storage for nuclear materials in the 200 Area pending decision on their ultimate disposition.*
	WESF	*Continue to provide safe storage for Cs/Sr capsules in WESF until removed. WESF exists as a decoupled and standalone facility (formerly tied to B-Plant systems).*
	PUREX/B-Plant	*Transition the PUREX facility and B-Plant in low-cost, stable deactivated condition.*
	PFP	*Complete stabilization of plutonium in PFP (DNFSB 94-1 implementation).*
	PFP	*Transition production areas of PFP to a low-cost, stable, deactivated condition; continue safe, stable, interim storage of plutonium.*
South 600 Area	*Interim Endpoint Targets (Final Endpoint Targets with Decontamination and Decommissioning (D&D) at the end of this table)*	
	300 Area Revitalization	*Transition high-cost surplus facilities to a low-cost, stable deactivated condition.*
	Advanced Reactor Transition (ART)	*Maintain the FFTF in "standby."*
	324/327 Buildings	*Transition the 324/327 Buildings to a low-cost, stable deactivated condition and disposition their nuclear materials (including 324 Building radioactive tank wastes).*
	ART	*Complete deactivation of the Nuclear Energy Legacy facilities.*
	300 Area Fuel	*Complete final disposition of remaining unirradiated uranium inventories by disposition offsite or disposal as low-level waste in 200 Area.*
	300 Area Fuel	*Complete transition of the 300 Area fuels supply.*
	Environmental Contaminated Groundwater	
Reactors on the River	**Final Endpoint Targets**	
	100 Area Source Remedial Action	Final cleanup levels will be established within individual RODs or Permit Modifications.
	Interim Endpoint Targets	
	Groundwater Management Project	*Groundwater use remains restricted for a yet to be determined period: groundwater intercepted or contained to protect the Columbia River and the environment.*

Table 4-1. Interim and Final Endpoint Targets. (4 sheets)

Geographical Area	PBS	Title
Central Plateau	**Final Endpoint Targets**	
	200 Area Source Remedial Action	Final cleanup levels will be established within individual RODs or Permit Modifications.
	Interim Endpoint Targets	
		Groundwater use remains restricted for a yet to be determined period; groundwater intercepted or contained to within designated boundaries.
South 600 Area	**Final Endpoint Targets**	
	300 Area Source Remedial Action	Final cleanup levels will be established within individual RODs or Permit Modifications.
	Interim Endpoint Targets	
		Groundwater use remains restricted for a yet to be determined period; existing Site plumes will continue to be monitored.
Central Core	**Final Endpoint Targets**	
	Groundwater Management Project	Groundwater use remains restricted for a yet to be determined period.
	Interim Endpoint Targets	
	Groundwater Management Project	Monitor existing groundwater sites plumes; intercept or contain as necessary to protect the Columbia River.
	Environmental Contaminated Soil Sites	
Reactors on the River	**Final Endpoint Targets**	
	100 Area Source Remedial Action	Soil sites remediated consistent with ROD cleanup standards.
	100 Area Source Remedial Action	Final cleanup levels will be established within individual RODs or Permit Modifications.
Central Plateau	**Final Endpoint Targets**	
	200 Area Source Remedial Action	Soil sites will be closed in place with surface barriers, or retrieval alternatives will be established within individual RODs or Permit Modifications.
	200 Area Source Remedial Action	Operate the ERDF to accept waste from remediation of CERCLA units across the Hanford Site.
South 600 Area	**Final Endpoint Targets**	
	300 Area Source Remedial Action	Soil sites remediated consistent with ROD cleanup standards. Contaminated media will be consolidated and moved to the 200 Area for disposal.
	300 Area Source Remedial Action	Final cleanup levels will be established within individual RODs or Permit Modifications.
Central Core	**Final Endpoint Targets**	
	200 Area Source Remedial Action	Final cleanup levels will be established within individual RODs or Permit Modifications.

Table 4-1. Interim and Final Endpoint Targets. (4 sheets)

Geographical Area	PBS	Title
	Decontamination and Decommissioning (D&D)	
Reactors on the River	**Final Endpoint Targets**	
	D&D	Reactor Blocks transported to Central Plateau following ~ 50 year waiting period to allow natural decay of existing radiation levels.
	D&D	Remove non-essential, surplus buildings and facilities that don't have identified post-cleanup uses.
	Interim Endpoint Targets	
	D&D	*Reactors placed in interim safe storage pending future removal.*
Central Plateau	**Final Endpoint Targets**	
	D&D	Dismantle, or close through entombment, D&D facilities currently assigned to the Environmental Restoration Program.
	D&D	Remove non-essential, surplus buildings and facilities that don't have identified post cleanup uses.
South 600 Area	**Final Endpoint Targets**	
	D&D	Reuse facilities for economic diversification where feasible.
	D&D	Remove non-essential, surplus buildings and facilities that don't have identified post-cleanup uses.
Central Core	**Final Endpoint Targets**	
	D&D	Remove non-essential, surplus buildings and facilities that don't have identified post-cleanup uses.

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
D&D = decontamination and decommissioning
DNFSB = Defense Nuclear Facility Safety Board
EBR II = Experimental Breeder Reactor II
ERDF = Environmental Restoration Disposal Facility
FFTF = Fast Flux Test Facility
PFP = Plutonium Finishing Plant
PUREX = Plutonium Uranium Extraction Facility
ROD = Record of Decision
TRIGA = Training Reactor, Isotopes, General Atomic
WESF = Waste Encapsulation and Storage Facility

4.2 SCHEDULE AND COST

Hanford's milestones are listed in Table 4-2. Due to limited funding, the current strategy places near-term focus on reducing the Site's urgent risks and mortgages and complying with enforceable agreements. This approach is critical toward making funds available in the near future to better support Site environmental restoration activities and disposition of stored wastes and materials.

The lifecycle cost for the EM Cleanup mission at the Hanford Site is based on completion of all mission endpoint targets, which is currently planned for FY 2046. Upon completion of an endpoint target, post cleanup costs such as S&M or monitoring would continue under the EM Cleanup mission up until the last endpoint target is realized. Follow-on Site caretaker costs would then continue and are not included in this lifecycle estimate. The life-cycle cost includes repository fees for both HLW canisters and SNF. It also includes funding received at Hanford for Defense Program activities of $20.5 million each year.

The current Hanford cleanup life cycle cost profile is estimated to be $85.3 billion as of the January 1998 baseline (Figure 1-2). The life cycle cost is fully escalated to year of expenditure (escalation rate of 2.7% per year) and represents a summation of the Section A cost baselines in the PBSs. Assumption for carryover funds, including those anticipated for construction and other multi-year activities are not included. These baseline estimates are developed assuming optimum funding scenarios. These optimum funding levels exceed the $5.75 billion target level funding that the Department of Energy's Office of Environmental Management has assumed for planning.

In constant FY 1998 (i.e., un-escalated) dollars, the life-cycle cost reflected in the January 1998 PBSs is approximately $50.8 billion. It is estimated that the $5.75 billion target level funding will add approximately $1.8 billion to Hanford's Life Cycle Cost estimates due to delays in mortgage reducing activities. When the $1.8 billion is added to the $2.2 billion of efficiencies already built into the PBS baselines, the total is approximately $54.8 billion. This compares to the $54.3 billion reflected at the $6.0 billion target level in the June Discussion Draft. The difference is attributed to some cost growths since publication of the Discussion Draft (e.g., Spent Nuclear Fuel Project).

The baseline includes $2.2 billion of life cycle performance enhancements achieved to date. Assuming a life-cycle performance enhancement target of $17.1 billion (per the June Discussion Draft), this leaves $14.9 billion to be potentially realized. Of this, approximately $0.6 billion is required to support the baseline through FY 2006, as the baseline currently exceeds target level funding. The $14.9 billion could be realized through efforts such as technology breakthroughs, acceleration of mortgage reductions and early shipment of wastes and materials offsite. A key example being pursued today is the "New Vision" for the Plutonium Finishing Plant (PFP). Instead of continued operation to support storage of nuclear materials through FY 2025, an alternative pathway is being assessed to ship the material offsite and decommission the PFP complex as early as FY 2006. Through these efforts, the goal is to accelerate the completion of the EM Cleanup mission from FY 2046 to FY 2033. If totally successful, the life-cycle costs would be reduced from approximately $54.8 billion to $37.7 billion.

Such performance enhancements can only be realized at adequate funding levels. At reduced levels, needed technologies cannot be pursued. Reducing the sites operating costs would also be deferred, thereby compounding the funding problem.

4.3 METHODOLOGY

Activity-based cost estimates have been prepared for a significant portion of the direct-funded Hanford Site Cleanup activities. Independent reviews including critical analysis, Independent Cost Estimates and check estimates have been performed on 80 percent of the baseline costs.

An escalation factor of 2.7% is built into all baselines as well as contingencies required for line item projects. No other contingencies are built into the baseline.

The life cycle baseline includes only those efficiencies achieved to-date. Efficiency targets are not incorporated into the baseline, although Hanford Site projects are actively working to achieve these goals.

Table 4-2. Milestones

Milestone	PBS #	Date
TANK WASTE REMEDIATION SYSTEM		
All 177 tanks initial waste characterization complete	TW-01	09/28/01
Mitigate/resolve tank safety issues	TW-02	09/30/01
Initiate hot operations of the HLW Vitrification Facility	TW-06	06/30/02
Complete single-shell tank interim stabilization	TW-03	07/31/03
Complete closure of all single-shell tank farms	TW-04	09/30/24
Complete vitrification of Hanford Site low-level waste	TW-07	12/31/24
Complete pretreatment processing of Hanford tank waste	TW-07	12/31/24
Complete vitrification of Hanford Site high-level tank waste	TW-07	09/30/28
All tank waste immobilized	TW-07	12/31/28
SOLID WASTE		
Initiate thermal treatment of contact-handled low-level mixed waste	WM-04	12/31/00
Complete treatment W-113 for post 1970 contact-handled transuranic/transuranic mixed retrieval	WM-04	09/30/04
Complete WRAP operations	WM-04	09/30/31
Complete waste shipments to Waste Isolation Pilot Project	WM-04	09/30/31
Complete Canister Storage Building operations	WM-02	09/30/39
LIQUID WASTE		
340 Facility to transition	WM-05	03/29/02
All treated effluent facility operations complete	WM-05	09/30/30

Table 4-2. Milestones

Milestone	PBS #	Date
SPENT NUCLEAR FUEL		
Start Basin fuel removal	WM-01	07/30/99
Complete Basin fuel removal	WM-01	07/31/01
Complete Basin debris removal	WM-01	10/02/02
Complete Basin sludge removal	WM-01	09/23/03
ENVIRONMENTAL RESTORATION		
Complete 105-C Reactor interim safe storage large-scale demo project	ER-01	09/30/98
Complete the RI/FS (RFI/CMS) process for all operable units	ER-10	12/31/08
Complete all 100 Area remedial actions	ER-01	09/30/11
FACILITY TRANSITION		
Complete B Plant facility transition phase and initiate S&M phase	TP-01	09/30/98
Remove B-Cell equipment and 100% dispersibles	TP-08	05/31/99
Ship balance of SNM for burial	TP-04	09/30/00
Transition Building 309 to shutdown status	TP-11	06/30/01
Complete 324/327 facility cleanup	TP-08	09/30/04
Complete deactivation of 100-K Area Basin facilities	TP-09	03/31/07
PFP cleanup and Transition to S&M completed	TP-05	09/30/14
Complete deactivation of remaining 16 facilities	TP-10	09/30/37

PFP = Plutonium Finishing Plant
PUREX = Plutonium Uranium Extraction Facility
SNM = Special nuclear material
S&M = Surveillance and maintenance
WRAP I = Waste Receiving and Processing Facility Module I

4.4 ENHANCED PERFORMANCE STRATEGIES

4.4.1 Goals and Policy

As previously stated, RL is committed to vigorously pursue cleanup work scope efficiency savings of $2.5 billion through 2006. Realized work scope efficiency savings beyond that needed to meet baseline commitments will be reapplied to accomplish additional Site cleanup. The additional cleanup would likely include 100/200/300 Areas remediation; deactivation, decontamination, and decommissioning of additional facilities; and treatment and final disposition of additional legacy waste. Application of realized efficiencies to enhance cleanup will not be included in the baseline until a specific plan has been developed and a formal baseline change approved.

4.4.2 Strategies

Several ways to achieve enhanced performance are being used. One way is indirect cost reductions. Indirect costs include, among others, Safeguards and Security, the Fire Department, and General and Administrative costs.

The efficiency savings will include indirect cost reductions; stretch, breakthrough, and alternative contracting strategies; other project efficiencies (new reengineering and technology applications and management streamlining); and scope changes agreed to by regulatory authorities. Savings will be documented either by work scope deletion on approved baseline change request, or achievement of a positive earned value cost variance from the performance management system.

Another approach to enhance performance is through stretch and breakthrough opportunities. Stretch goals are basically getting the job done faster, thereby saving resources. Breakthroughs can take many forms such as alternative plans; application of new, cost-effective technology; or different contracting approaches. Stretch and breakthrough opportunities will be pursued as summarized in Table 4-3. Except as noted above, the opportunities summarized in the table are currently not included in the PBS drafts. These opportunities include further schedule accelerations, incorporation of cost-effective technologies, additional mortgage reductions, and emphasis on competitive fixed-price contracts where feasible.

Alternative contracting strategies are further discussed in Section 3.3. Contracts placed for the first phase of tank waste disposal are, by far, the largest such venture to date in the DOE complex.

Table 4-3. Summary of Potential Stretch or Breakthrough Opportunities and their Benefits (Currently NOT in Baseline)

Project	Stretch/Breakthrough Opportunities	Benefit		
		Baseline completion	Stretch/ Breakthrough Completion	Potential Cost Savings (10 Years)
Facility Transition	Implement PFP 2006 Vision	9/14	2006	TBD (10 year) $1 billion (life cycle)
	Accelerate 324/327 Buildings deactivation by restoring original draft funding profile. (Additional funding of $4.6 million in FY 98, $17.7 million in FY 99 and $3.6 million in FY00 is required to avoid $49.3 million between FY 01 and FY 04 for a net savings of $23.4 million).	9/04	9/03	$20 million
	Accelerate K-Basin deactivation schedule (Stretch goal)	6/07	TBD	TBD
	Accelerate 300 Area revitalization	TBD	TBD	$6.4 million/yr of acceleration
Environmental Restoration	Limit services provided that are beyond those required in commercial industry	Ongoing	N/A	$150 million (life cycle)
	Perform additional work on cost estimates in the Project baseline	Ongoing	N/A	$30 million
	Reduce cost of labor through improved productivity	Ongoing	N/A	$25 million
	Implement Federal Acquisition Streamline Act and Federal Acquisition Reform Act	Ongoing	N/A	TBD
	Finalize and implement burial ground strategy and apply emerging characterization technologies for waste sorting and segregation	Ongoing	N/A	$200 million (life cycle)
	Optimize approach to interim safe storage of reactors and apply emerging D&D technologies	2014	2006	$35 million (life cycle)
	Partner with the DOE Office of Science and Technology	Ongoing	N/A	TBD

Table 4-3. Summary of Potential Stretch or Breakthrough Opportunities and their Benefits (Currently NOT in Baseline)

Project	Stretch/Breakthrough Opportunities	Benefit		
		Baseline completion	Stretch/ Breakthrough Completion	Potential Cost Savings (10 Years)
Waste Management	Reduce CH-TRU Inventory	2006 (25%)	2006 (30%)	$10 million
	Reduce CH-LLMW Inventory	2006 (55%)	2006 (80%)	$10 million
	Consolidate Analytical Services (Breakthrough)	TBD	2006	>$10 million
Tank Waste Remediation	Reduce volume of vitrified HLW (pretreatment breakthroughs)	TBD	TBD	TBD
	Review waste retrieval plans when risks are better understood*	TBD	2006	TBD
	Package Cs and Sr capsules for near surface disposal (INEL's Bin 7)	TBD	TBD	TBD
	Reduce requirements for HLW canister storage capacity	TBD	TBD	TBD
	Review tank closure criteria*	TBD	2006	TBD
Science & Technology	DC arc melter glassify LLMW	TBD	TBD	$100 million $250 million (life cycle)
	Eliminate 300 Area dependency on 340 Facility and the Radioactive Liquid Waste System (Stretch goal)	1999	1998	TBD
	Develop and Implement a Waste Generator Cost Recovery System (Breakthrough)	TBD	TBD	TBD
Other	Outsourcing, Spin-offs, Privatization	TBD	TBD	$100 million $200 million (life cycle)
	Enterprise Company Cost Efficiencies	TBD	TBD	$200 million $600 million (life cycle)

*The *Tank Waste Remediation System Final Environmental Impact Statement* (DOE/EIS-0189) Record of Decision committed to formal program re-evaluations in response to National Research Council recommendations.

CH = Contact-handled
D&D = decontamination and decommissioning
DOE = U.S. Department of Energy
ETF = Effluent Treatment Facility
HAW = High Activity Waste
INEL = Idaho National Engineering Laboratory
LAW = Low Activity Waste
LLMW = Low-level mixed waste
R&D = Research and development
S&M = Surveillance and maintenance
TRU = Transuranic (waste)
WSCF = Waste Sampling and Characterization Facility

4.4.3 History and Progress to Date

Cost savings initiatives have been an integral part of Hanford Site operations since FY 1994 when RL began tracking and reporting cost savings following renegotiation of the Tri-Party Agreement. Continuing Congressional actions towards establishing a balanced budget have resulted in funding reductions for all federal agencies, including the DOE environmental management cleanup mission. In FY 1995, RL initiated an aggressive cost savings program to address the gap between planned work and available funds by identifying and deleting unnecessary work scope and performing the remaining work scope more efficiently. Baseline planning and changes in FY 1997 resulted in additional savings for FY 1997-1999. These cost savings were already reflected in February 1997 PBS.

A total of approximately $1.1 billion of the $2.5 billion targeted savings goal through 2006 has been incorporated into the January 1998 baseline. Additional savings of approximately $88 million identified as of February 1, 1998, are planned to be incorporated in the baseline. The remaining approximate $1.3 billion of performance enhancements needed to reach the $2.5 billion goal will be pursued through stretch goals, breakthroughs, technology development, and expanded use of competitive subcontracting and other types of fixed-priced contracting.

5. REGULATORY COMPLIANCE

5.1 COMPLIANCE

The planning assumptions and associated future decisions reflected in this document have been made to support development of the Site cleanup baseline. These assumptions and discussions are contingent on future decisions made under the NEPA, CERCLA, and RCRA decision-making processes.

The Hanford Site complies with numerous federal and state requirements and many agreements and orders. Major environmental laws that apply to the program include CERCLA, RCRA, the *Federal Water Pollution Control Act*, the *Clean Air Act*, and NEPA. The RL will comply with NEPA through adherence to DOE Order 451.1A, and the DOE NEPA Implementing Procedures (10 CFR 1021). The NEPA documents prepared by RL tier from DOE-wide programmatic environmental impact statements or previous Hanford Site environmental impact statements. For example, RL is preparing the Hanford Solid Waste Management Program EIS to evaluate the environmental impacts of proposed future waste management actions at the Hanford Site, including local implementation of decisions made in the *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*. Planned NEPA documentation for the next two years is discussed in the RL Annual National Environmental Policy Act Planning Summary. The CERCLA documentation (making decisions for cleanup activities) incorporates NEPA values.

Historic resources and cultural values present at the Hanford Site are subject to a number of federal laws and Executive Orders and are considered in DOE planning activities. Among these are the National Historic Preservation Act, Archaeological Resources Protection Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, and Sacred Sites Executive Order 13007.

The Tri-Party Agreement is the basis for the path forward for the environmental management mission. The agreement, originally signed in 1989, is between the DOE, the U.S. Environmental Protection Agency, and the Washington State Department of Ecology. It is the legal document that binds the DOE to actions that comply with CERCLA; RCRA; Executive Order 12088; and Washington State Hazardous Waste Management Act. Many pathways and decisions depicted in this document depend on the NEPA, CERCLA, RCRA, and their decision-making processes. Substantial progress has been made in managing the cleanup program and meeting enforceable Tri-Party Agreement milestones. The agreement identifies a required process for modifications/addendum and has widespread public support in the Northwest and a commitment to public involvement.

The majority of the Site's budget is driven by regulatory compliance to cleanup agreements. "Compliance" is cleanup progress. Adequate funding is necessary to fulfill Tri-Party Agreement milestone commitments.

DOE's objective is for the Site to be in full compliance with applicable regulatory requirements for ongoing operations, current requirements of the Tri-Party Agreement, and DOE commitments to the DNFSB. Working with the Site contractors, the regulatory authorities, and the DNFSB, RL seeks real cost efficiencies, alternate technical approaches to achieve the desired results, resolution of regulatory issues within the current legal and regulatory framework, and potential improvements in laws and regulations to allow more results with less cost in seeking to achieve full compliance. Realization of the $2.5 billion workscope acceleration efficiency goal through FY 2006 will help attainment of the full compliance objective.

5.2 ATTAINABILITY

Priority is maintained on continued safe operations and elimination of urgent risks. As a result, without performance enhancements, significant delays in other projects are incurred at the target funding level. Of primary concern is the impact to the site's "Critical Closure Path" activities. In addition to mitigating the urgent risks, the critical closure path recognizes the need to (1) maintain progress on the tank waste disposal program, which is the critical path to completion of cleanup, and (2) the need to reduce the operating costs for the Site so that sufficient resources are available to effectively disposition waste sites, stored legacy wastes and materials, and facilities. If this is not achieved, the life cycle costs will increase significantly because of the additional time to complete cleanup, additional facility upgrades and replacements, and increased cleanup costs due to deteriorating conditions of the waste and materials being addressed. Whereas operating compliance is maintained with respect to

regulations, numerous Tri-Party Agreement/DNFSB milestones are impacted and would result in the potential for major fines, penalties, or sanctions.

In addition to delay of noncritical projects, some of the more significant potential results of not achieving enhancements are:

- Inability to retrieve the wastes from the 177 underground storage tanks.
- Delay in a DNFSB 94-1 major commitment to restabilize and package plutonium currently stored at Hanford.
- Two to 10 years of increased risk to workers and the environment because of deferred disposition of stored mixed waste and transuranic waste. This deferral will increase stored waste inventories and delay shipments of waste to the Waste Isolation Pilot Plant. This impacts Tri-Party Agreement milestones M-19 and M-91, placing RL at risk for enforcement action by regulators.
- An increase in risk to workers and the environment and $150 million in additional costs for a 6-year extension of surveillance and maintenance of 300 Area contaminated facilities. This added expense diverts funds from cleanup activities to accommodate recent additions of critical near-term activities. The extension also delays revitalization of the 300 Area for alternative economic use.
- An increase in risk to workers and the environment and $34 million in additional costs for a 2-year extension of surveillance and maintenance of contaminated facilities with no currently identified mission and of facilities not expected to have a viable mission after FY 2000—potentially there are 34 facilities in this group. This extension is also caused by diversion of funds from cleanup activities to accommodate recent additions of critical near-term activities.
- Delay in completing waste site assessment and remediation of the 200 Area. This delay impacts Tri-Party Agreement milestones M-13, M-15, and M-16, plus 20 or more interim milestones, placing RL at risk for enforcement action by regulators.

6. STAKEHOLDER AND TRIBAL NATIONS INVOLVEMENT

6.1 PARTICIPATION TO DATE

The signing of the Tri-Party Agreement and several key stakeholder, Tribal Nation, and regulator activities have strengthened the decision-making processes. These significant events include meetings of the Future Site Uses Working Group in 1992 and the Tank Waste Task Force in 1993, and the formation of the Hanford Natural Resources Trustee Council in 1993 and the Hanford Advisory Board in 1994. In each case a wide range of regional stakeholder and Tribal Nations' interests are represented. The first two groups met for several months before issuing final reports that identified stakeholder values and principles.

The Hanford Advisory Board and the Hanford Natural Resources Trustee Council have become key elements in the stakeholder involvement process. Members of the Hanford Advisory Board and Tribal Nations individually and collectively have participated in planning discussions and briefings regarding a vision for 2006 since July 1996. The DOE has held monthly updates with the Washington State Department of Ecology and the U.S. Environmental Protection Agency on the status of the FY budget and planning processes. The Hanford Natural Resources Trustee Council meets regularly with DOE and regulators to address natural resource restoration requirements for final closure of impacted sites.

An Integrated Priority List of Hanford Site work proved to be a successful tool for discussion in developing and submitting the FY 1998 and FY 1999 budgets. The development process included stakeholder participation and support. Stakeholders and Tribal representatives participated in workshops to evaluate risk, develop the Integrated Priority List, and provide advice on how to better represent stakeholder values and principles. A similar process has been used in 1998 for FY 2000 budget preparation. Workshops were held with regulators, Tribal representatives, and stakeholders to develop the first draft FY 2000 Integrated Priority List prior to the initial public meeting in Richland on February 26 to discuss the FY 2000 proposed budget. The Richland workshop was followed by public meetings in Portland, Oregon on March 9, in Seattle, Washington on March 10, and again in Richland on March 12.

Expanded Involvement

- **1992 – Future Site Uses Working Group and the HRA-EIS**
- **1993 – Tank Waste Task Force and Hanford Natural Resources Trustee Council**
- **1994 – Hanford Advisory Board (to present)**
- **1996 – Hanford Strategic Plan and 1998 Integrated Priority List**
- **1997 – FY 1999 Integrated Priority List, 2006 Vision and Discussion Draft.**
- **1998 – FY 2000 Integrated Priority List, Draft *Paths to Closure***

In June 1997, EM issued National and Site 2006 Plan Discussion Drafts as the basis for continuing dialogue with stakeholders and Tribal Nations. In July 1997, EM held a national feedback session to discuss the EM

national FY 1999 budget. In February 1998, EM issued National and Site *Accelerating Cleanup, Paths to Closure* drafts for public comment through May 1, 1998. The options and alternatives described in this and future iterations of *Paths to Closure* will impact budget formulation and execution activities. This planning process will allow EM to develop annual budgets in the context of long-term objectives.

6.2 DISPOSITION OF STAKEHOLDER AND TRIBAL NATIONS COMMENTS

6.2.1 COMMENTS RECEIVED

All public comments are being considered for incorporation into the National and Site *Accelerating Cleanup: Paths to Closure* documents. Headquarters staff has compiled and categorized, by subject area, responses received from Tribal Nations, states, regulators, local government officials, and other stakeholders. Major issues of concern include budget and cost estimates, key assumptions, stakeholder participation, opportunities to enhance project performance, and prioritization of Site activities. A Preliminary Comment Response Document was issued by DOE Headquarters in December 1997. The comment response document is intended to convey how EM plans to respond to comments received during the National Discussion Draft comment period which ended on September 9, 1997.Comments were also received by Hanford in early 1998 during the public involvement process discussing the formulation of the FY 2000 Site budget submittal to DOE-HQ.

6.2.2 DISPOSITION PROCESS

The comment disposition process is an ongoing one. Meetings have been held with commentors to discuss major comments. Commentors will be responded to in writing. This *Paths to Closure* document includes resolution of comments that can be incorporated at this time.

7. COPIES OF *PATHS TO CLOSURE* DOCUMENTS

Copies of this *Paths to Closure* document or requests for additional information should be submitted directly to DOE-RL at the following address:

U.S. Department of Energy
Richland Operations Office
Mr. Jim Daily A5-58
825 Jadwin Avenue
Richland, WA 99352
(509-376-7721)

Requests for copies of the National *Paths to Closure* report should be directed to the Center for Environmental Management Information (CEMI) at 1-800-736-3282.

8. REFERENCES

10 CFR 1021, "National Environmental Policy Act Implementing Procedures," *Code of Federal Regulations*, Washington, D.C.

American Indian Religious Freedom Act, 42 U.S.C. 1996-1996a.

Archaeological Resources Protection Act, 16 U.S.C. 47099, et. seq.

Clean Air Act, 42 U.S.C. 7401, et seq.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9601, et seq.

DNFSB Recommendation 93-5.

DNFSB Recommendation 94-01.

DOE-EIS-0189, *Tank Waste Remediation System Final Environmental Impact Statement Record of Decision,* U.S. Department of Energy, Washington, D.C.

DOE/EIS-200F, 1997, *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste,* U.S. Department of Energy, Washington, D.C.

DOE/EIS-0222D, 1996, *Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan*, U.S. Department of Energy, Washington, D.C.

DOE/EM-0290, *The 1996 Baseline Environmental Management Report.*

DOE Order 430.1, *Life Cycle Asset Management.*

DOE Order 451.1A, *National Environmental Policy Act Compliance Program*

DOE/RL-96-25, Rev. 0, 1996, *Policy for Radiological, Nuclear, and Process Safety Regulations of TWRS Privatization Contractors.*

Ecology, EPA, and DOE, 1996, *Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

Executive Order 12088.

Federal Acquisition Reform Act.

Federal Acquisition Streamline Act.

Federal Water Pollution Control Act
Indian Sacred Sites, Executive Order 13007, 61 FR 26771.

Memorandum of Agreement for the Execution of Radiological, Nuclear, and Process Safety Regulation of the TWRS Privatization Contractors.

Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001, et. seq.

National Defense Authorization Act for FY 1993.

National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321, et seq.

National Historic Preservation Act, 16 U.S.C. 470, et. seq..

Public Law 104-201, *National Defense Authorization Act for Fiscal Year 1997,* Section 3155, "Requirement for Annual Five-Year Budget for the National Security Programs of the Department of Energy."

Resource Conservation and Recovery Act of 1976 (RCRA), 42 U.S.C. 6901, et seq.

RL Annual National Environmental Policy Act Planning Summary, January 1998.

Washington State Hazardous Waste Management Act.

WHC-SD-FL-SSP-002, *Shutdown Plan for the 300 Area Fuel Supply Facilities,* Westinghouse Hanford Company, Richland, Washington.

ATTACHMENT A

TECHNOLOGY DEPLOYMENT MANAGEMENT PLAN ANNOTATED OUTLINE

Technology Deployment Management Plan Annotated Outline

1.0 Objective and Scope

The objective of this management plan is to adopt methods and management practices to effectively incorporate necessary and appropriate technologies that reduce Environmental Management cleanup costs. Further, this plan will address changes needed to remove institutional barriers that limit the use of commercial practices and incentives.

This plan will address technical, administrative, and institutional improvements that will be needed to implement an effective change and maximize the return on investment through the deployment of alternative technologies. Technical issues will include adopting methods to interrogate and challenge the technical baselines for vulnerability and opportunity, standardizing methods to assess technology maturity, systematic evaluations of risk, and other evaluations needed to support investments in new technologies.

Administrative plans will be included to establish meaningful goals, measure and report performance, and communicate the significance of the problems being solved and the success in reducing Hanford Site cleanup costs.

This plan addresses institutional practices, including authorization procedures, incentives, and liability that will be addressed at the contractor, field office, and U.S. Department of Energy (DOE) Headquarters levels to identify required changes to address and remove barriers, streamline and accelerate decision-making, and promote commonly held goals among organizations making cleanup decisions.

2.0 Overview of Opportunities for the Deployment of New Technologies

The Hanford Site has a very robust program in place for the identification of Site technology and science needs. The current Science and Technology Needs document clearly states the needs and opportunities for the deployment of alternative technologies at the Hanford Site and these needs have been reviewed by the regulators and stakeholders through the Site Technology Coordination Group. Additionally, the Hanford Site has recently developed an integrated sitewide baseline that will serve as the basis for identification of additional opportunities to reduce cost or risk through strategic investments in science and technology. Systems engineering type processes, integrated sitewide baseline, and project organizations will help identify where science and technology-based information can reduce programmatic risk and to identify opportunities for the deployment of alternative technologies that reduce cost, improve safety, or improve current baseline schedules. Implementation opportunities will be time phased to ensure that key decision or insertion points are identified and agreed to by regulators and stakeholders as appropriate. Metrics for the Hanford Site technology project will be based on cost savings and avoidance, as well as improved safety and accelerated project schedules, not on the number of technologies deployed.

3.0 Management Strategy

The Project Hanford established a needs-driven approach for the deployment of alternative technologies. Industrial solutions are actively sought to improve current baselines, and the Hanford Site has aligned with the Focus Areas to satisfy the technology development needs. DOE's management approach is to incentivize the contractors to improve current baselines and to accomplish the work ahead of schedule and more cost effectively. Once opportunities for improvement of the baseline are identified and have been matched with alternative technologies, deployment will be tracked and reported at the project level.

4.0 Overall Site Approach to Enhance Technology Deployment

The Hanford Site is focused on being user driven and implementing a "market pull" rather than "technology push" approach to technology deployment. The Hanford Site, in conjunction with regulators and stakeholders, initiated efforts through the Hanford Technology Deployment Center to identify the key elements of the technology deployment equation and developing results-oriented action plans to overcome existing barriers and to streamline processes. Key elements being addressed include: the needs identification process; improvements in identifying and advertising successes; developing technology use incentives; developing supplier incentives; working within the Federal budgeting processes; and addressing risk aversion. The future or desired state for each of these critical elements is being identified by assessing current status relative to the desired state and developing specific actions that will be implemented at the DOE Richland Operation Office level. This process is positioning the Hanford Site for success. The timing of these efforts fits with the phase 2 submittal of the Technology Deployment Management Plan as outlined in the guidance.

5.0 Barrier Reduction Efforts

The ongoing management evaluation process described in section 4 above is aimed at making technology development and deployment a clear success at Hanford. Through these efforts we are identifying barriers and defining specific and measurable actions that will be implemented to remove barriers and streamline the technology deployment process. Barrier reduction efforts will focus on the identification of non-baseline funding to help buy down individual project risks, establishing technology use incentives, development of standardized approaches to life cycle costing.

We will continue our proactive interactions with the regulators and stakeholders through our Site Technology Coordination Group. One example of this positive interaction with the regulators is the ongoing pilot program for the certification of radioactive and mixed waste technologies. Under Washington State Department of Ecology leadership, this Washington State certification program has the potential to expedite the deployment of technologies at the Hanford Site and throughout the DOE complex. Other barrier reduction programs and collaborative programs will be expanded during the phase 2 planning effort.

6.0 Opportunities for Deployment:

Potential technologies will be listed in a table attached to the Hanford Deployment Management Plan. In addition, Hanford will be focusing on our Science and Technology Needs Statements which include schedules for potential technology opportunities.

ATTACHMENT B

HANFORD DISPOSITION MAPS

- Richland Operations Office Conceptual Summary Disposition Map
- Hanford ER Baseline Disposition Map
- Hanford HLW Baseline Disposition Map
- Hanford LLW Baseline Disposition Map
- Hanford MLLW Baseline Disposition Map
- Hanford Nuclear Materials Baseline Disposition Map
- Hanford SNF Baseline Disposition Map (2 Pages)
- Hanford TRU Baseline Disposition Map

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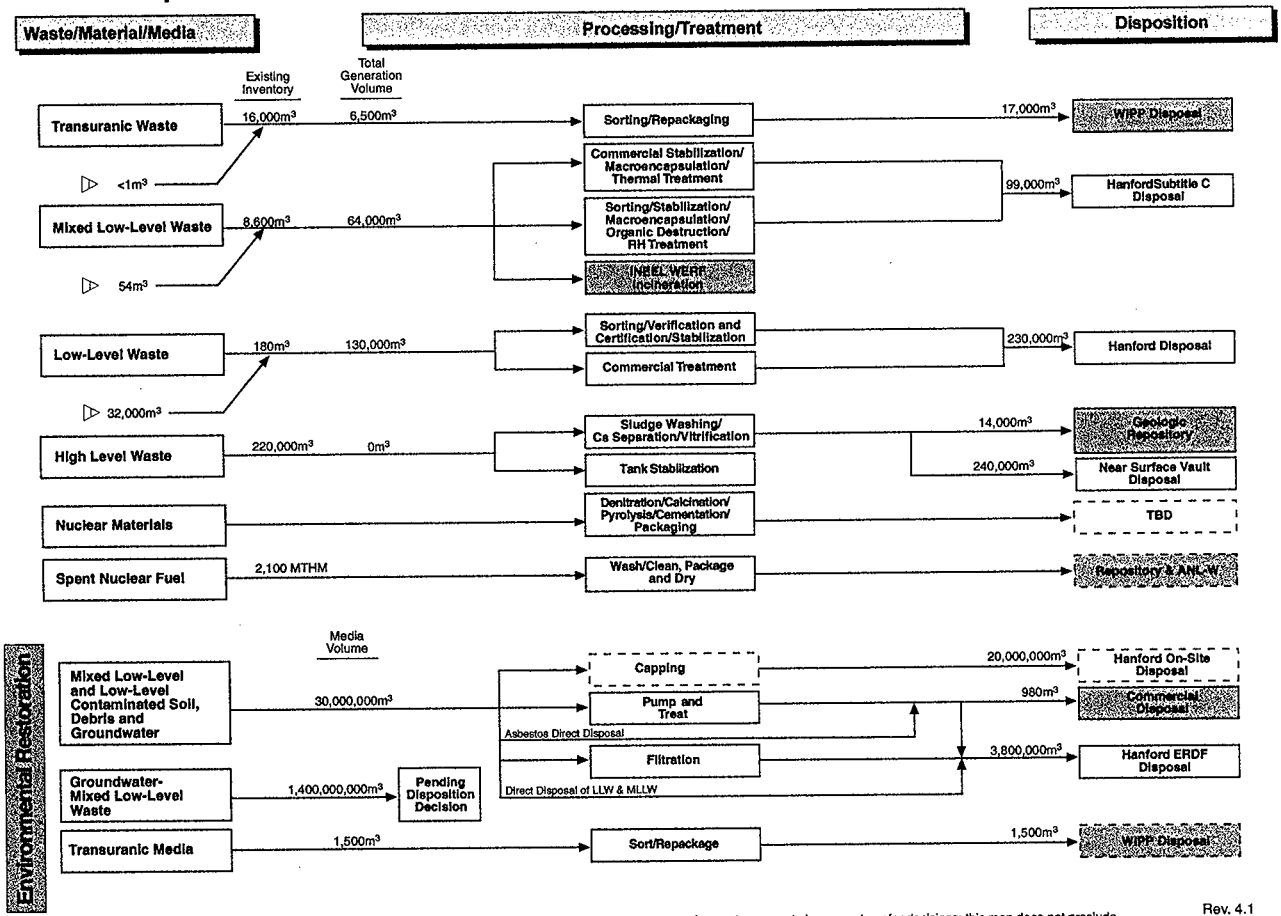
Richland Operations Office Conceptual Summary Disposition Map

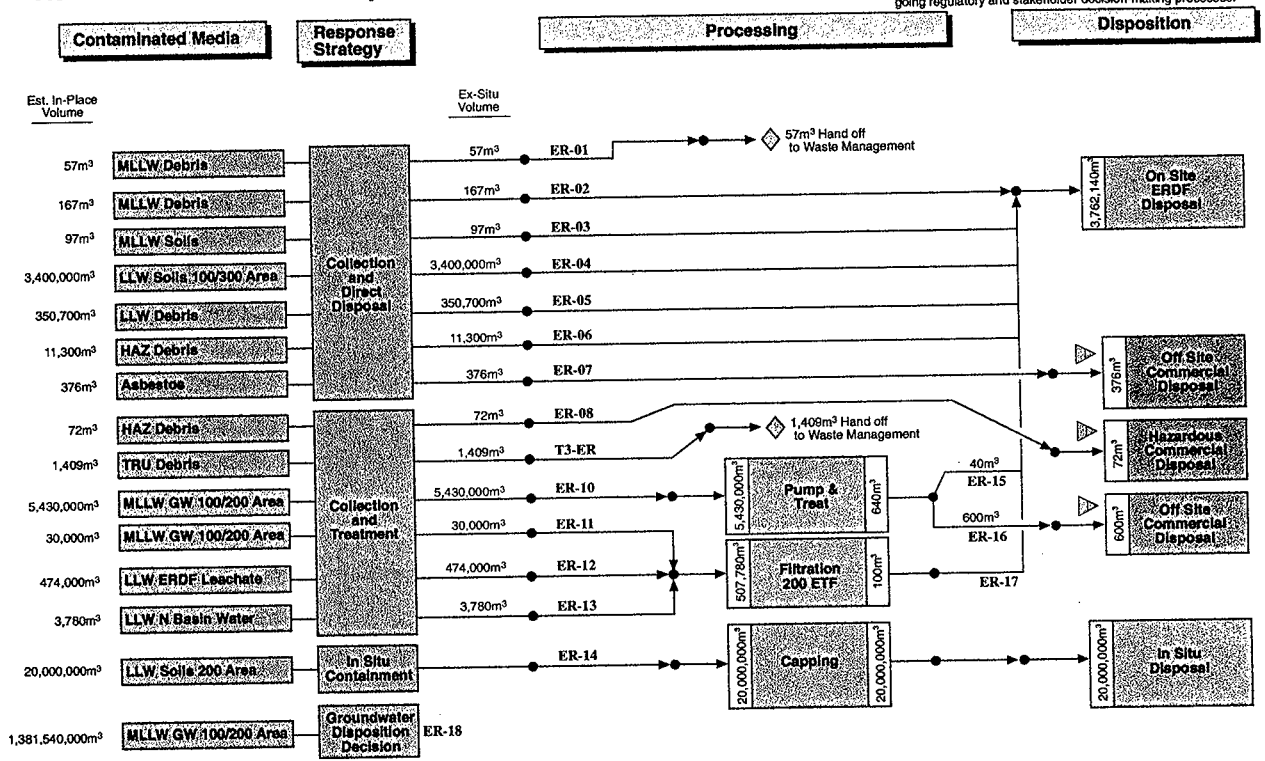


This map is conceptual and in many cases does not represent cleanup or transfer decisions; this map does not preclude nor preempt the on-going regulatory and stakeholder decision-making processes. This summary map includes data from all sites reporting to this operations office. Volumes are approximate and have been rounded to two significant figures. For specific details, please refer to the site-specific and waste-specific disposition maps.

Rev. 4.1
6/18/98

Hanford ER Baseline Disposition Map

PREDECISIONAL DRAFT
This map is conceptual and in many cases does not represent cleanup or transfer decisions; this map does not preclude the on-going regulatory and stakeholder decision-making processes.



1,387,477,780m³ :Aqueous Subtotal
23,764,178m³ :Non-Aqueous Subtotal
1,411,241,958m³ :Media Total

Aqueous Subtotal: 5,937,780m³
Non-Aqueous Subtotal: 3,764,178m³

KEY: INEEL | OR | Fernald | RFETS | SNL | SRS | NTS | Hanford | WIPP | Offsite Comm. | Onsite Comm. | LANL | West Valley | SQS | Unknown | Intersite Interface: ▷ | On site Interface: ◇

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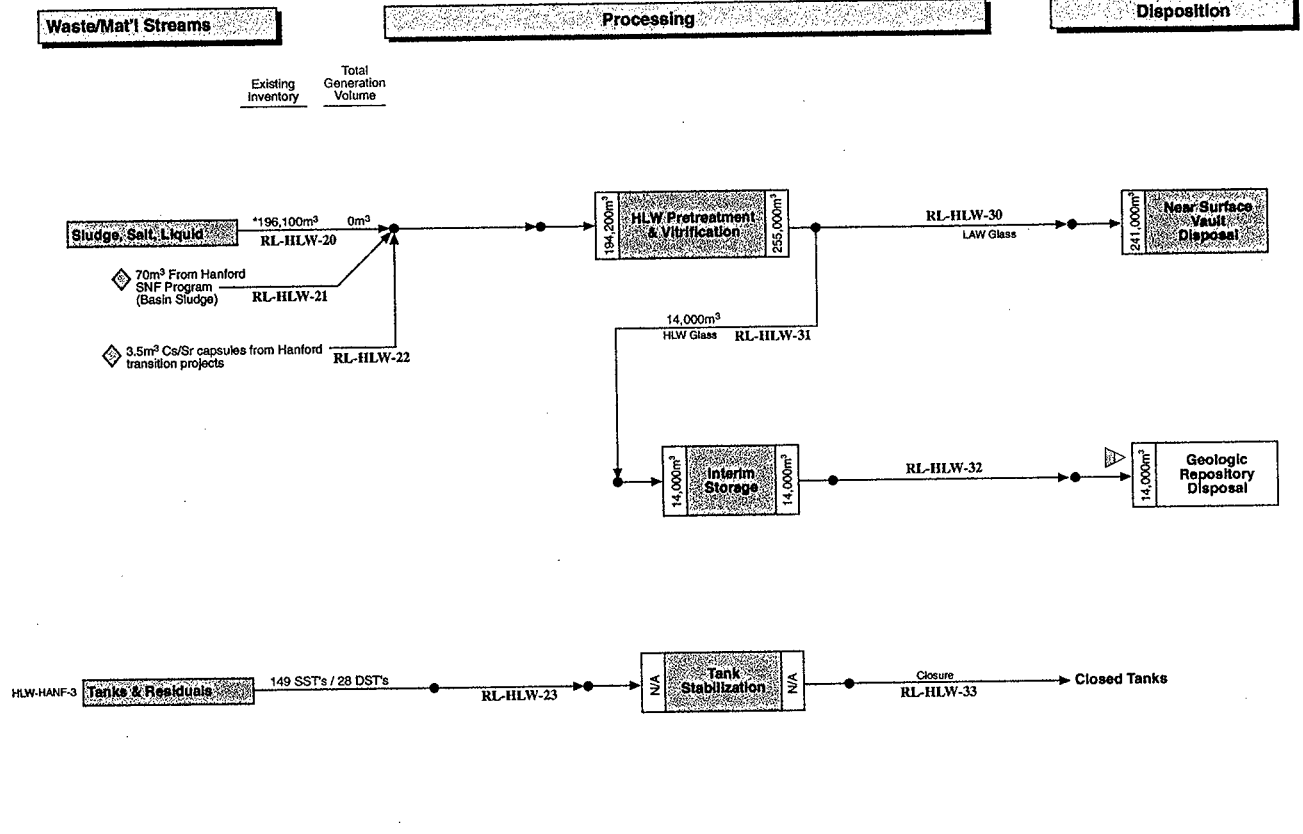
15-1

Rev. 3.1
3/31/98

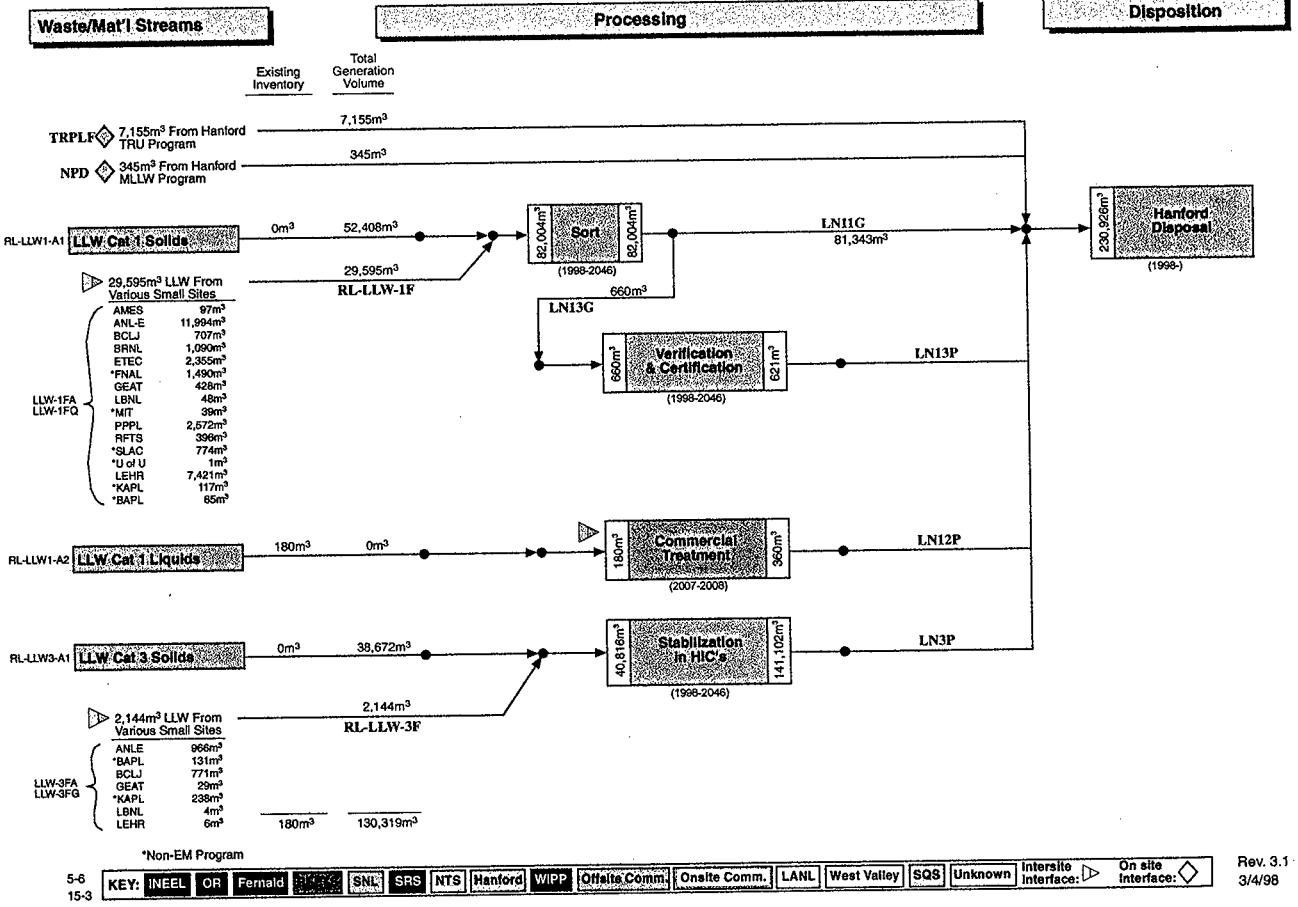
Hanford HLW Baseline Disposition Map

PREDECISIONAL DRAFT
This map is conceptual and in many cases does not represent cleanup or transfer decisions; this map does not preclude the on-going regulatory and stakeholder decision-making processes.



Hanford LLW Baseline Disposition Map

PREDECISIONAL DRAFT
This map is conceptual and in many cases does not represent cleanup or transfer decisions; this map does not preclude the on-going regulatory and stakeholder decision-making processes.



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15-3

Rev. 3.1
3/4/98

Hanford MLLW Baseline Disposition Map

PREDECISIONAL DRAFT
This map is conceptual and in many cases does not represent cleanup or transfer decisions; this map does not preclude the ongoing regulatory and stakeholder decision-making processes.