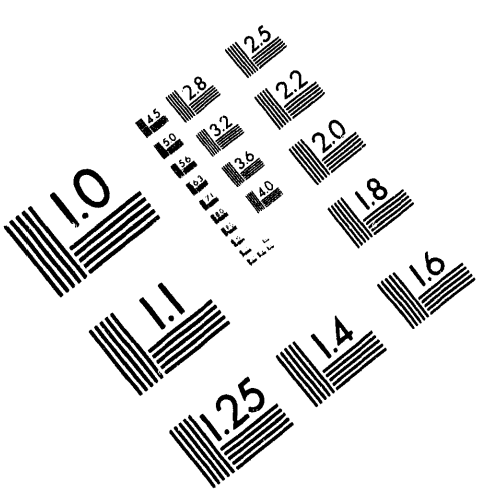

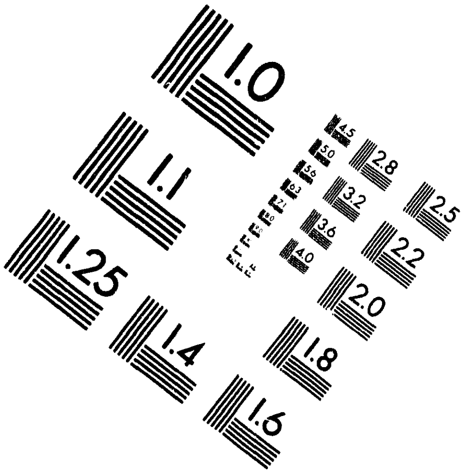

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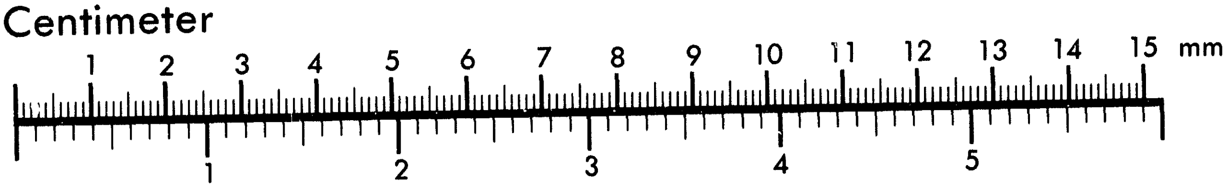

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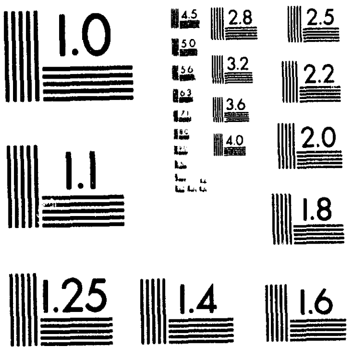

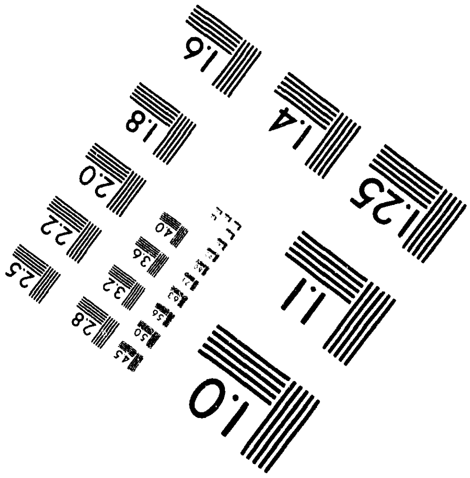

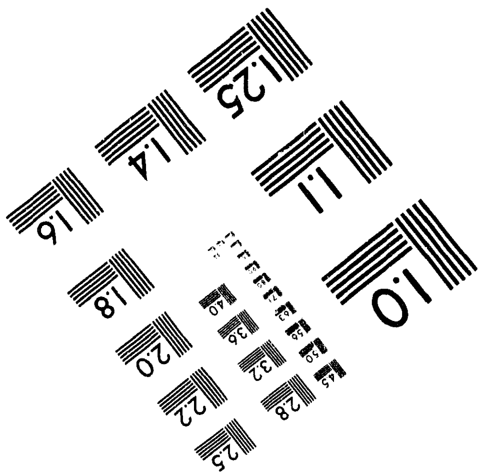

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PUREX/UO_3 Deactivation Project Management Plan

Date Published
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PUREX/UO3	17400		DOE
Editor	**Phone**	**MSIN**	**DOE/HQ Program (DP, EH, EM, NE, etc.)**
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Additional Information Apparently DOE-HQ has elected to open all levels of documentation to the public. Previously there have been classifications of documents according to intended audience. Levels of documents and types of documents were reviewed by editors or publication services to assure particular DOE Order formats were correctly followed. This document is apparently a hybrid of original classifications. While I agree the public may be interested in the information concerning the deactivation of PUREX & UO_3 Plant - I don't believe the Project Management Plan, a low level document, is the media by which the information should be provided. Public comments, on federal Projects are normally sought through NEPA documentation and/or

BD-7600-062 (08/91) WEF074

EXECUTIVE SUMMARY

From 1955 through 1990, the Plutonium-Uranium Extraction Plant (PUREX) provided the United States Department of Energy Hanford Site with nuclear fuel reprocessing capability. It operated in sequence with the Uranium Trioxide (UO_3) Plant, which converted the PUREX liquid uranium nitrate product to solid UO_3 powder. Final UO_3 Plant operation ended in 1993.

In December 1992, planning was initiated for the deactivation of PUREX and UO_3 Plant. The objective of deactivation planning was to identify the activities needed to establish a passively safe, environmentally secure configuration at both plants, and ensure that the configuration could be retained during the post-deactivation period.

The PUREX/UO_3 Deactivation Project management plan represents completion of the planning efforts. It presents the deactivation approach to be used for the two plants, and the supporting technical, cost, and schedule baselines.

Deactivation activities concentrate on removal, reduction, and stabilization of the radioactive and chemical materials remaining at the plants, and the shutdown of the utilities and effluents. When deactivation is completed, the two plants will be left unoccupied and locked, pending eventual decontamination and decommissioning.

Deactivation is expected to cost \$233.8 million, require 5 years to complete, and yield \$36 million in annual surveillance and maintenance cost savings.

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CONTENTS

CONTENTS (cont)

APPENDIXES

LIST OF FIGURES

LIST OF FIGURES (cont)

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LIST OF TERMS

ALARA	as low as reasonably achievable
AMU	aqueous makeup
BCWS	budgeted cost of work scheduled
CAA	*Clean Air Act of 1977*
CENRTC	capital equipment not related to construction
CERCLA	*Comprehensive Environmental Response Compensation and Liability Act of 1980*
CFR	control feature requirement
CPR	cost performance report
CWBS	Contract Work Breakdown Structure
D&D	decontamination and decommissioning
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy-Headquarters
DOE-RL	U.S. Department of Energy, Richland Operations Office
EA	environmental assessment
EIS	Environmental Impact Statement
EM	Office of Environmental Restoration and Waste Management
EMAC	Environmental and Waste Management Advisory Committee
EPA	U.S. Environmental Protection Agency
ES&H	Environmental, Safety and Health
FY	fiscal year
HSFP	Hanford Surplus Facilities Program
HVAC	heating, ventilation, and air conditioning
ITE	Independent Technical Experts
KEH	Kaiser Engineers Hanford
LCO	Limiting Conditions for Operation
LCS	Limiting Control Setting
LLW	low-level waste
LLW-MW	low-level mixed waste
M&E	material and equipment
M&O	Management and Operating
MCS	Management Control System
MP	major project
MSA	major system acquisition
MSSR	Milestone Schedule Status Report
NDA	nondestructive analysis
NEPA	*National Environmental Policy Act of 1969*
OSHA	Occupational Safety and Health Administration
OSR	operational safety requirement
P&O	pipe and operating
PCM	Process Control Manual
PDS	PUREX/UO_3 Deactivation Standards
PMP	Project Management Plan
PR	product removal
PSWBS	Project Summary Work Breakdown Structure
PUREX	Plutonium-Uranium Extraction (Plant)

LIST OF TERMS (cont)

PUREX/UO_3 Deactivation Project	Project
QAPP	Quality Assurance Program Plan
RCRA	*Resource Conservation and Recovery Act of 1976*
RID	Requirements Identification Document
SAR	Safety Analysis Report
SARP	Safety Analysis Report for Packaging
SEPA	*State Environmental Policy Act of 1983*
SMS	Site Management System
SNM	special nuclear material
SPR	single-pass reactor
STWG	State and Tribal Working Group
TAT	Transition Advisory Team
TPC	total project cost
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage and disposal
TRU	transuranic
TRU-MW	transuranic mixed waste
UNH	uranyl nitrate hexahydrate
UO_3	Uranium Trioxide
USQ	Unreviewed Safety Question
WAC	*Washington State Administrative Code*
WBS	Work Breakdown Structure
WHC	Westinghouse Hanford Company
WPP	Worker Protection Program

1.0 INTRODUCTION

1.1 INTRODUCTION

The Project Management Plan (PMP) for the Plutonium-Uranium Extraction (Plant) (PUREX)/Uranium Trioxide (Plant) (UO_3) Deactivation Project (Project) sets forth the plans, organizations, and control systems for management of the Project. The Project includes the deactivation of both the PUREX Plant in the 200 East Area and the UO_3 Plant in the 200 West Area of the Hanford Site.

1.1.1 Project Management Plan Description

This PMP has been prepared in accordance with the guidelines provided in DOE Order 4700.1, *Project Management System*, dated June 2, 1992; the *Independent Technical Review of the Hanford PUREX Plant Transition to Deactivation*, dated October 1992 (Thullen 1992); applicable experience from commercial nuclear plant deactivation and decontamination and decommissioning (D&D) activities; and Project-specific workshops that occurred beginning in February 1993. In compliance with the guidelines contained in this PMP, Westinghouse Hanford Company (WHC) will develop and maintain the detailed plans and procedures which will be reviewed periodically and, as specified herein, approved by the U.S. Department of Energy (DOE).

This PMP will be kept current as the Project progresses. Portions of the PMP addressing workscope, cost, and schedule will be updated as the detailed supporting documentation is developed.

This PMP includes the following sections.

- Section 1.0, Introduction. The introduction provides a summary of the PMP and the Project in terms of history, mission needs, scope, and the roles of the Project management team.
- Section 2.0, Project Objectives. This section provides the objectives established to support the mission needs and to develop the Project baselines. The objectives are in the following forms:
  - Measurable technical and economic objectives in terms of end point condition or performance capability
  - Schedule objectives for major activities showing their relationship to the Project Summary Work Breakdown Structure (WBS)
  - Cost objectives for WBS level one, two, and three elements, and their relationship to the total project cost.

- Section 3.0, Management Organization and Responsibilities. This section depicts the Project organization and functional relationships and roles and responsibilities that have been established to achieve the objectives set forth in Section 2.0 of this PMP.
- Section 4.0, Project Baseline. This section describes the Project WBS, and cost and schedule baselines.
- Section 5.0, Project Management and Control System. This section describes the development and control of Project baselines and Project performance measurement techniques.
- Section 6.0, Information and Reporting. This section describes information and reports to be generated as part of assessing Project performance, reviews, and meetings to convey Project status and to identify corrective actions.
- Section 7.0, Supporting Plans. This section describes the environmental, safety and health, quality assurance, waste management, and safeguards and security requirements for the Project.
- Appendixes. The Appendixes describe the detailed Project-specific regulation compliance strategies, including the *Resource Conservation and Recovery Act of 1976* (RCRA), the *National Environmental Policy Act of 1969 (NEPA)*, and the application of codes and standards to Project activities. Also included are Project risk and uncertainty management, public involvement, the Surveillance and Maintenance Plan, and the Project's planning bases.

1.1.2 Project Background

PUREX is a standby nuclear fuel reprocessing plant which was used to chemically separate plutonium and uranium from Hanford Site nuclear reactor fuel elements. The plant was constructed between 1953 and 1955 and was operated until 1990. The UO_3 Plant converted the liquid uranium nitrate product received from PUREX into a solid, oxide form. Processing was determined by PUREX uranium product inventory buildup. The final UO_3 Plant campaign occurred during June 1993. The Project includes both Plants, which are located approximately six miles apart. The locations of the two plants are shown in Figures 1.1-1, 1.1-2 and 1.1-3.

In October 1990, DOE-Richland Operations Office (DOE-RL) directed WHC to initiate transition-to-standby activities for PUREX and UO_3 Plant. The standby condition was achieved in September 1992. In December 1992, the DOE Assistant Secretary for Environmental Restoration and Waste Management authorized the termination of PUREX and UO_3 Plant and directed DOE-RL to proceed with shutdown planning and terminal cleanout activities.

A major factor in the December 1992 decision was the completion of the *Independent Technical Review of the Hanford PUREX Plant Transition to Deactivation* ("Red Team" Report), conducted in July and August 1992 and

Figure 1.1-1. Map of the Hanford Reservation.

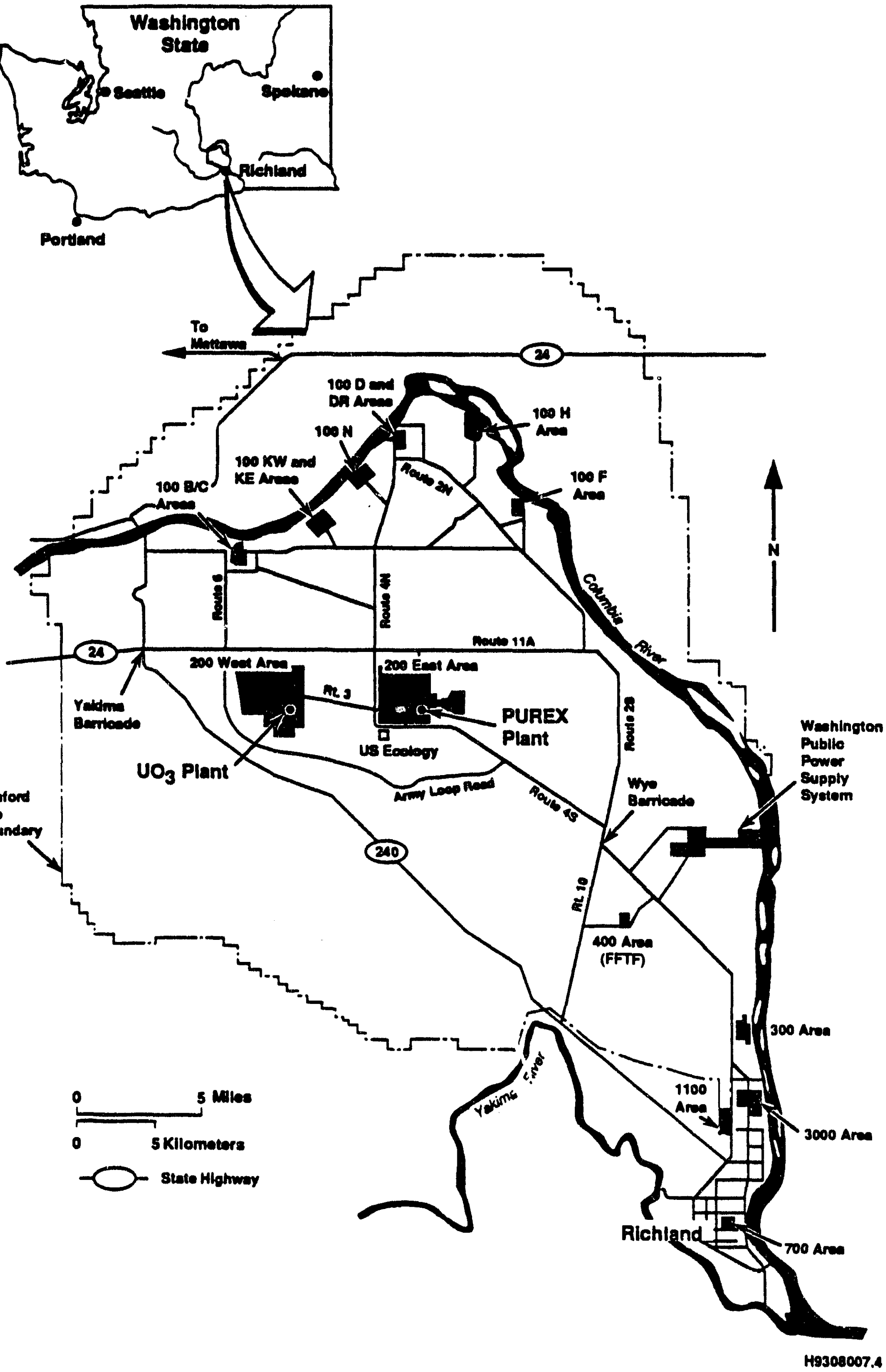


Figure 1.1-2. Map of the 200 East Area.

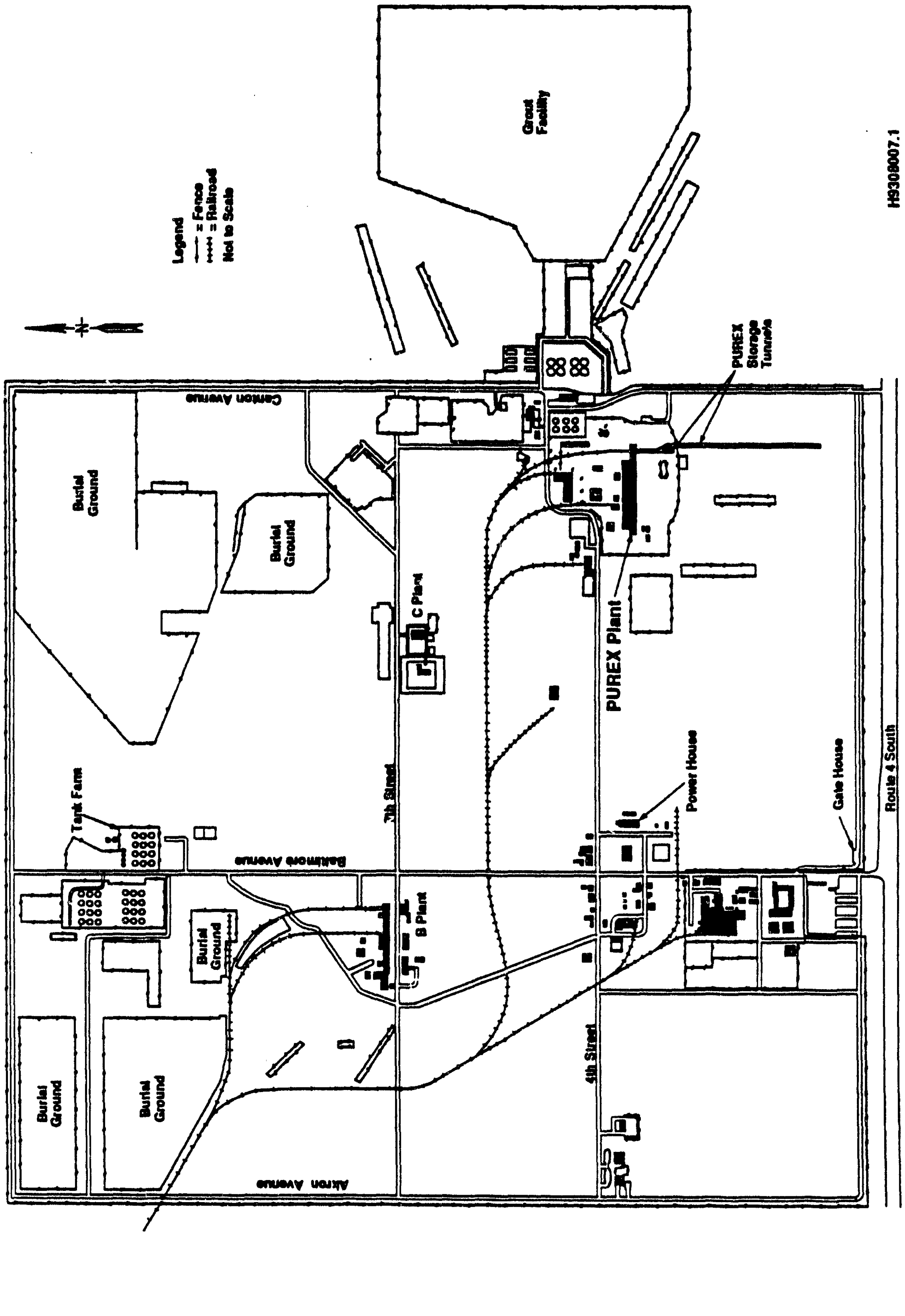
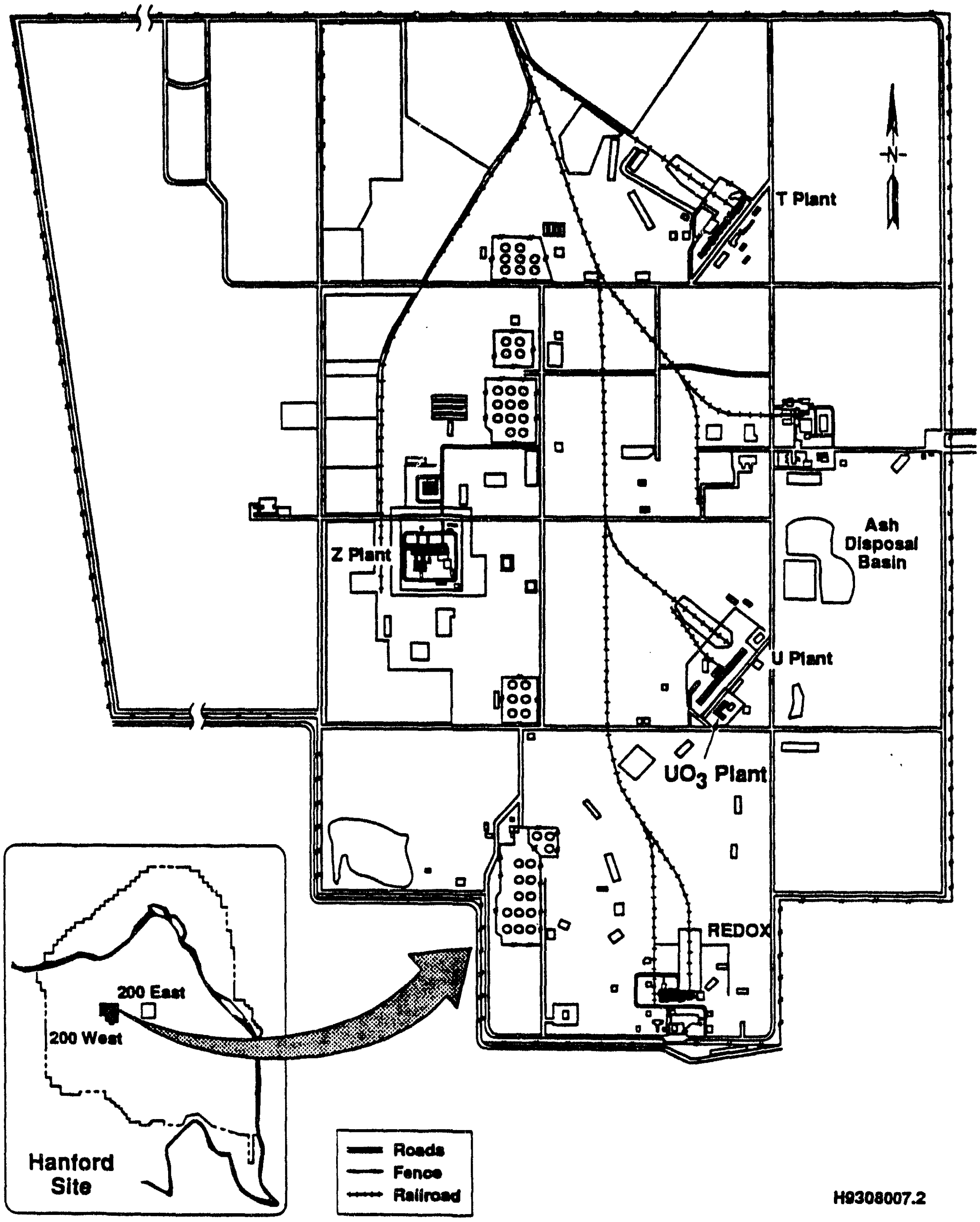


Figure 1.1-3. Map of the 200 West Area.



reported in October 1992. The Red Team charter was to "perform a review of the planning, technical basis, and issues related to the transition of PUREX status from standby to safe deactivation, with a minimum surveillance. In addition, this review would provide recommendations, methods, activities, criteria and potential changes to requirements that would be applicable to PUREX and other Department of Energy Facilities and sites to achieve minimum costs in the transition to *safe deactivation* while personnel familiar with the plant operation are still available."

In summary, the report stated, "PUREX is in a safe, stable standby condition with no technical barriers to a timely transition to safe deactivation; institutional management and regulatory barriers exist and obstruct change but they can be surmounted; a change in methods of doing business is required to eliminate these barriers; timely, cost effective PUREX transition to safe deactivation requires the active cooperation of many organizations, including DOE at all levels, Washington State regulators, the M&O Contractor and numerous stakeholders." The report contained a conceptual plan for the transition of PUREX to safe deactivation.

1.2 PURPOSE

The purpose of the PUREX/UO_3 Deactivation Project is to establish a passively safe and environmentally secure configuration of the PUREX and UO_3 Plant at the Hanford Site, and to preserve that configuration for a 10-year horizon. The 10-year horizon is used to predict future maintenance requirements and represents the typical time duration expended to define, authorize, and initiate the follow-on D&D activities.

At the completion of the Stabilization Campaign in 1990, the feedstock left in PUREX from the 1988 shutdown had been processed and removed from the plant. Bulk chemicals, solutions used to test the processing equipment, the PUREX process solvent, recovered nitric acid, and a small quantity of pre-1972 reactor fuel were left in the plant. During the subsequent transition-to-standby phase, these materials were left untouched.

The Project removes, reduces, and/or stabilizes the major remaining radioactive sources within the PUREX and UO_3 Plant process buildings and the hazardous chemicals at PUREX. Completing these activities reduces the plant risk to workers and the public and allows for a reduced level of surveillance during the extended surveillance period following deactivation. During the period after deactivation, the plants will be surveilled routinely, the operating equipment and confinement barriers will be maintained, and final D&D will be planned.

Focusing on near-term solutions that prevent or minimize the further spread of contamination while long-term D&D remedies are being pursued is consistent with the intent of the U.S. Environmental Protection Agency (EPA)/530-SW-90-069, the *RCRA Implementation Study* released by the EPA in 1990. The study recommended that greater emphasis be placed on interim actions that achieve near-term environmental results.

When fully deactivated, the plants will be left unoccupied, empty, and locked. With the exception of the PUREX heating, ventilation, and air conditioning (HVAC) system required to maintain the final confinement barrier, there will be no active systems or utilities within the process buildings. The PUREX HVAC confinement system will be operated from outside the process building.

Plant status will be monitored routinely from outside the process buildings. Approximately once a quarter the plants will be entered and inspected. Standard industrial security measures will protect the plants from unauthorized entry at other times.

PUREX is similar to several DOE canyon facilities that will enter the deactivation phase in the future. The Project is expected to be the reference model for these subsequent projects.

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1.3 SCOPE

The PUREX/UO_3 Deactivation Project consists of the following:

- Continuation and eventual phase-out of most existing standby activities, including shift surveillance readings, instrument calibrations, and preventative maintenance. The standby activities are described and updated annually in the WHC Facility Operations Multi-Year Program Plan (WHC 1993b) and Facility Operations Fiscal Year Work Plan (WHC 1993a). The effort includes planning and executing all activities needed to maintain PUREX and UO_3 Plant in a safe standby condition and completing the requirements that support environmental, worker health and safety, and *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1992) activities needed for the standby configuration. These activities will continue to diminish as the deactivation work progresses; resources released from discontinued standby activities will be applied to the deactivation work.

- Deactivation activities are newly defined and prepare PUREX and UO_3 Plant for transfer to the Hanford Surplus Facilities Program. Key activities include removing or stabilizing the major radioactive and chemical source terms and making the modifications needed to maintain and safely surveil the plants for the 10-year surveillance planning horizon. The interdependence between existing standby activities and the deactivation activities is shown in Section 4.2.

- At completion, the plants will be unoccupied, locked, and maintained with minimum entry requirements. Chemical and radioactive inventories will be reduced and stabilized to minimize plant risks and allow for reduced monitoring and surveillance.

The Project combines the existing standby activities with the new deactivation activities in one project, which is dedicated to transitioning PUREX and UO_3 Plant to a fully deactivated state. The existing standby activities have been adequately defined in the fiscal year work plans and are not being addressed in detail in this PMP. This PMP concentrates on the new work needed to complete the transition to the fully deactivated end state.

The Project scope includes deactivation of the PUREX and UO_3 Plant process buildings, the ancillary support structures, PUREX and UO_3 Plant mobile offices, Kaiser Engineers Hanford (KEH) mobile offices within the PUREX fence, plant utilities, and underground radioactive waste and effluent lines. The Project's physical boundaries are roughly defined by the existing fenceline surrounding PUREX and UO_3 Plant, (refer to Figures 1.3-1 and 1.3-2). The only significant ancillary support structures beyond the fencelines are the PUREX 216-A-42 retention basin and the UO_3 Plant 207-U retention basin. The PUREX storage tunnels are not included in the Project scope.

Figure 1.3-1. PUREX Yard Plan.

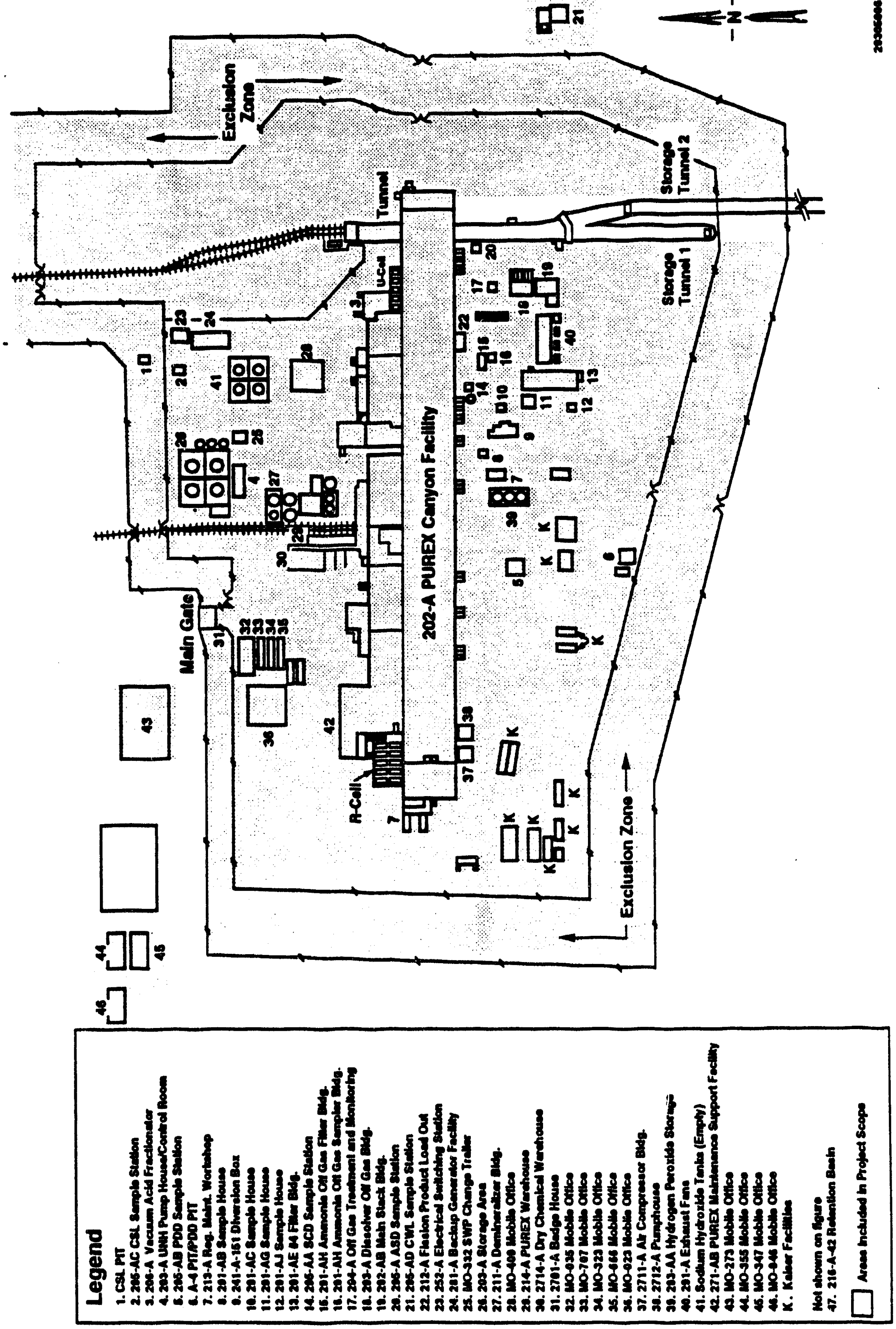
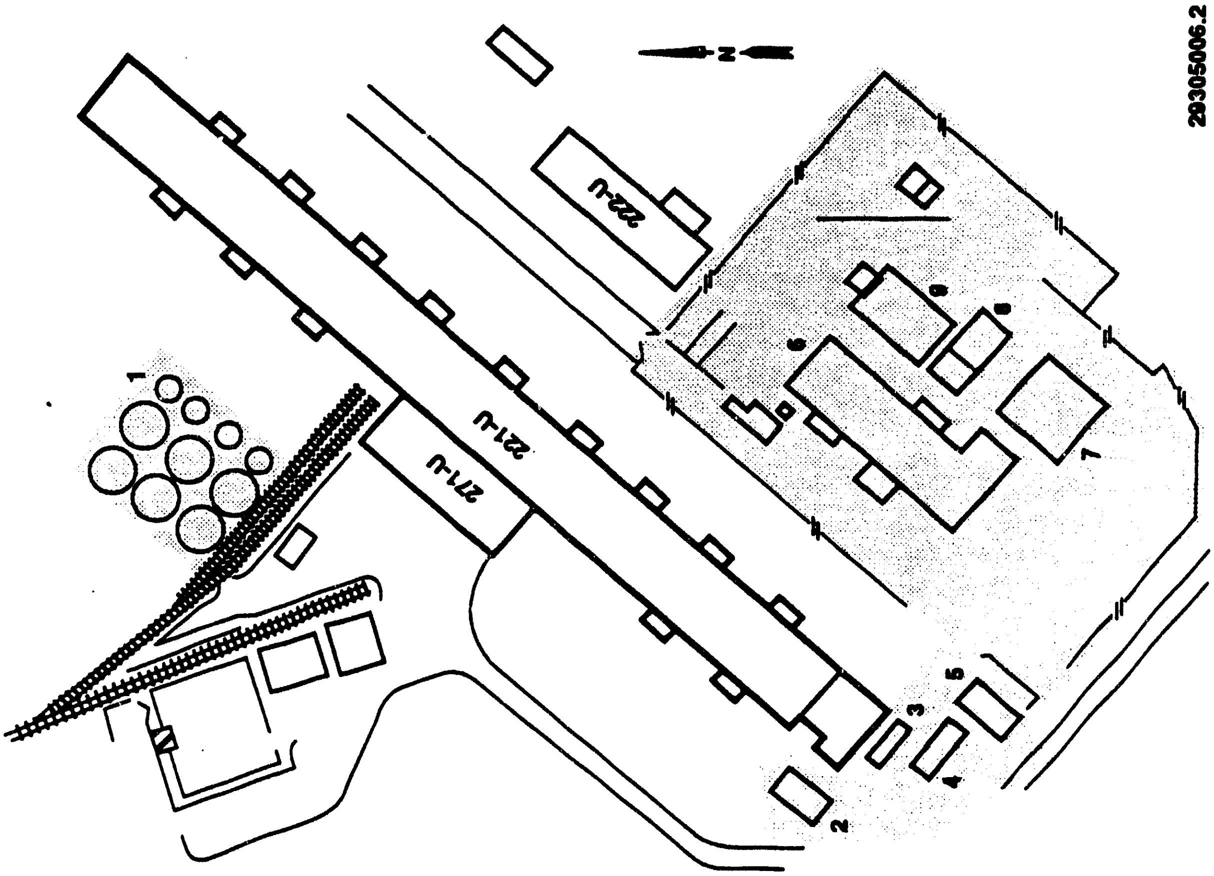


Figure 1.3-2. UO_3 Plant Yard Plan.



Legend

1. 211-U Storage Tank Farm
2. MO-722 Mobile Office
3. MO-351 Mobile Office
4. MO-419 Mobile Office
5. MO-107 Mobile Office
6. 224-U Main Process Building
7. 224-UA Calciner Building
8. 272-U Maintenance Facility
9. 203-U UNH Storage

Not shown on figure

10. 207-U Retention Basin

Areas Included in Project Scope

The intent of the Project is to comply with all applicable DOE requirements and the Tri-Party Agreement. These requirements address worker and public health and safety, work conduct and reporting, environmental compliance, configuration control, quality assurance, and record generation and preservation, and will be applied using an approach which factors in the magnitude of the activity risks, and the plants' life cycle status. While compliance issues exist in the 40-year-old plants, many will be resolved through deactivation of plant systems.

Deactivation activities will be conducted in accordance with these requirements using the existing WHC and PUREX and UO_3 Plant administrative systems wherever applicable. The Project activities will be evaluated by authorized WHC, DOE, and regulatory oversight agencies to ensure that the appropriate level of compliance is maintained.

The Project requires the support of other Hanford Site facilities, particularly the tank farms' double-shell waste tanks for storage of PUREX-generated liquid waste. The relationships are shown in Figures 1.3-3 and 1.3-4.

Preparation for the surveillance phase that follows completion of the Project, record generation and archiving, and the final characterization required for eventual D&D are part of the Project. Successful deactivation applications and the Project's "Lessons Learned" that are applicable to other canyon facilities will be documented and transferred to appropriate facility organizations.

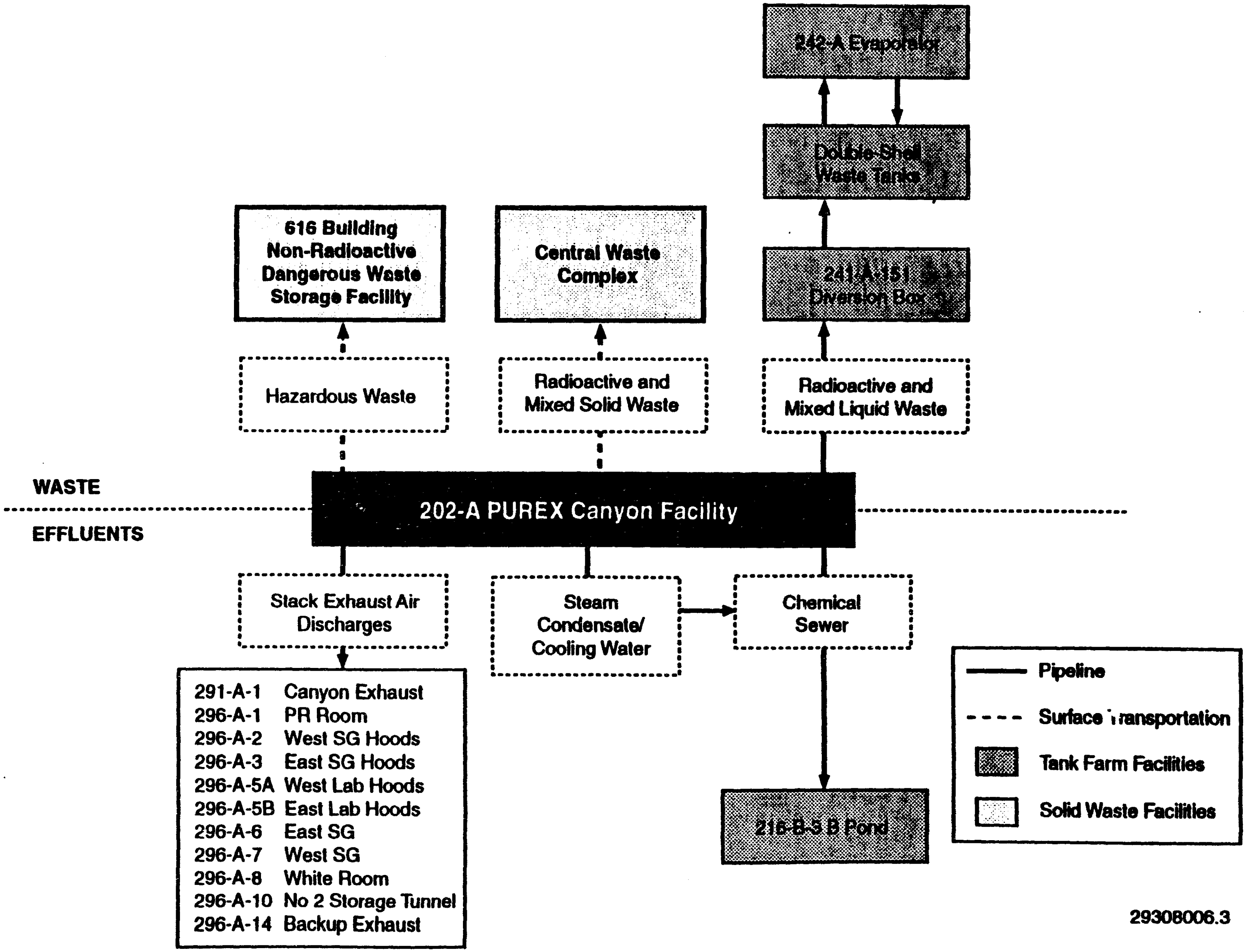


Figure 1.3-3. PUREX Site Relationship.

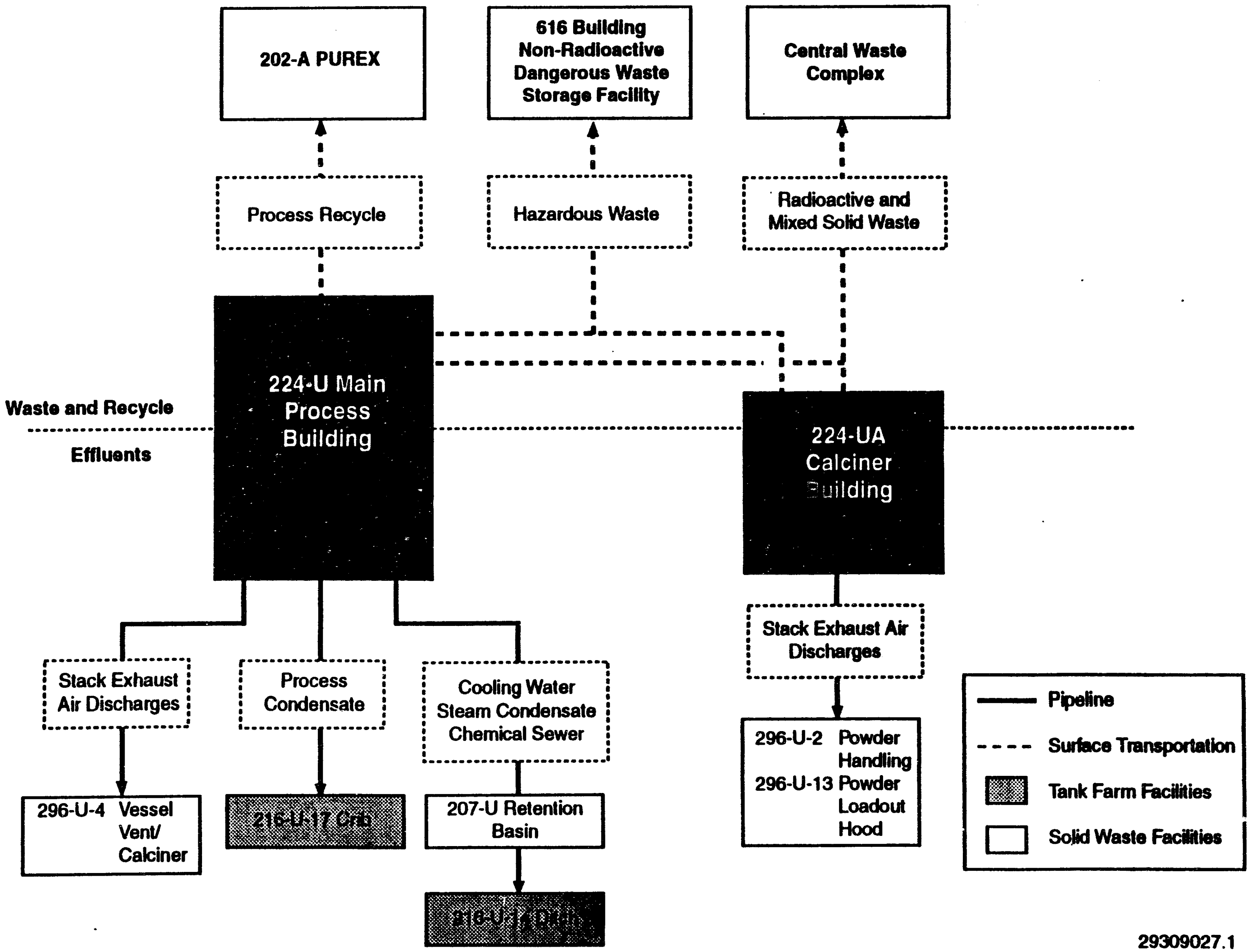


Figure 1.3-4. UO_3 Plant Site Relationship.

2.0 PROJECT OBJECTIVES

2.1 PROJECT OBJECTIVES

The PUREX/UO_3 Deactivation Project objectives support the DOE Office of Facility Transition and Management overall goal of developing swift, uniform methods for deactivating similar facilities. The Project objectives are as follows.

1. Establish a passively safe and environmentally secure configuration of the plant (no active internal functions or equipment within confinement), and retain that configuration for a 10-year horizon.

2. Achieve a total yearly cost target of $2 to $5 million/year at turnover.

3. Implement cost-effective, innovative approaches to ensure the required safety envelope is defined and maintained during deactivation.

4. Achieve compliance with Environmental, Safety, and Health codes and standards during deactivation.

5. Involve stakeholders in the development and execution of the PUREX/UO_3 Deactivation project management plan.

6. Transition the workforce out of PUREX and UO_3 Plant through redeployment or outplacement.

7. Apply lessons learned from commercial deactivation experience.

8. Establish the PUREX/UO_3 Deactivation Project as a model for canyon facilities.

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2.2 TECHNICAL CRITERIA

The mission of the PUREX/UO_3 Deactivation Project is to demonstrate a safe, cost-effective model for facility deactivation by deactivating PUREX and UO_3 Plant and completing turnover to the Hanford Surplus Facilities Program (HSFP). Technical criteria define project completion and the acceptable conditions for turnover to the HSFP.

2.2.1 General Technical Requirements

General technical requirements define the Project's overall approach to fulfilling the end-state condition required for turnover to the HSFP. Applicable requirements set forth in draft DOE Order 58XX.XX, *Transition of Facilities to the Office of Environmental Restoration and Waste Management*, will be met.

The Project shall ensure that imminent hazards to personnel or the environment are controlled through partial closure, removal, isolation, mitigation, or stabilization. The Project shall also ensure that structures can be maintained in a safe condition, with immediate threats to human health and safety removed or appropriate compensatory measures (barriers, access controls, administrative controls, etc.) implemented.

The Project end state shall result in the classification of PUREX and UO_3 Plant as non-occupied facilities. As such, compliance with DOE Order 6430.1A, *General Design Criteria*, is not required. Project activities shall ensure that access during the surveillance phase is not required at a greater frequency than necessary to maintain the non-occupied facility status. Conservatively, the access that should be allowed for a non-occupied facility status is not more frequent than once each quarter.

The Project will end with PUREX and UO_3 Plant turnover to the HSFP for post-deactivation surveillance and eventual D&D. Existing WHC Site systems shall be used for Project execution, except as provided in this PMP.

2.2.2 Configuration Requirements

The PUREX and UO_3 Plant configuration shall be modified and controlled sufficiently to enable safety and regulatory compliance during Project performance and post-project D&D activities. The minimum configuration control requirements are as follows.

- Records shall be established and archived for reactivating D&D essential systems and providing meaningful D&D characterization. As a minimum, the following records should be established and maintained:
  - Location, identification, and qualification of hazardous materials that are attached/contained and cannot be removed without going into a D&D mode
  - Final radiological status surveys

- Certified vendor information files, equipment operating procedures, records, drawings, photographs, etc., that reflect "As-Left" configuration

- Information required to reactivate elevator systems

- Zero energy check records for electrical circuits that were de-energized

- Installed piping system and equipment blank records

- Documentation that locations where irradiated fuel elements and/or other source and special materials were handled and/or stored were examined and material accounted for

- Radiological posting in compliance with applicable requirements set forth in WHC-CM-1-6, *Radiological Control Manual*

- Pending radiation occurrence reports, event fact sheets, unusual occurrence reports and/or any other out-of-standard condition reports finalized and closed out

- The PUREX and UO_3 Plant Safety Basis revised for the post-deactivation surveillance period in accordance with the Project-specific requirements of Appendix F

- Documentation demonstrating compliance with worker safety and health prepared in accordance with the Project-specific requirements of Appendix F

- Any required permits relating to the facility's current or anticipated use obtained. Activities shall not preclude subsequent closure options until permitting dictates final closure.

- Deactivation check sheets completed and approved by the responsible personnel performing the actual work, the overview organizations, and plant management.

2.2.3 Workforce Restructure Requirements

Project activities shall include provisions for redeployment or retraining of the PUREX and UO_3 Plant workforce to enable transition into other Site activities including the potential deactivation of other Hanford canyon buildings (i.e., B Plant, U Plant, and the Reduction-Oxidation (REDOX) (Plant). Retraining activities should be initiated early in the Project to maximize education/skill enhancement and be integrated with existing Hanford Site retraining programs.

2.2.4 Hazardous and Radioactive Materials Removal/Stabilization Requirements

Hazardous and radioactive materials shall be removed from the plants or stabilized sufficiently to ensure long-term PUREX and UO_3 Plant safety and regulatory compliance, enable plant classification as a non-occupied facility, and enable subsequent successful D&D.

Materials shall be removed and/or stabilized sufficiently to ensure that the plant complies with WHC-CM-1-6, *Radiological Control Manual*, as applicable to a non-occupied facility after completion of deactivation. As a general guide, "as-left" contamination and radiation levels in plant areas should be no greater than the levels encountered during normal operation and occupancy of the plant.

To ensure long-term safety and regulatory compliance, the following requirements apply.

- Permanent radiation zones to be entered for surveillance shall be decontaminated and released or the surface contamination levels reduced or stabilized to minimize re-suspension and/or migration of loose contamination. Temporary radiation zones inside and outside of buildings shall be eliminated.
- Packaged radioactive and mixed waste with identified final disposition shall be removed and disposed of. Wastes that are not removed shall be identified and characterized, and documented.
- Accessible interior glovebox surfaces shall be decontaminated or the surface contamination stabilized. Openings to gloveboxes shall be sealed in a manner that ensures confinement of remaining contamination.
- Loose or damaged (friable) asbestos in areas expected to be entered during surveillance shall be removed or stabilized.
- Fissile materials shall be removed sufficiently to eliminate the potential for a nuclear criticality excursion and the need for a criticality alarm system.
- Tanks, vessels, and drums shall be drained using installed equipment and features. Heels shall not contain material classified as hazardous waste.
- Hazardous materials used for deactivation and cleanup work shall be collected and disposed of.
- Emergency lighting and associated batteries from the facilities shall be removed and disposed of.

To ensure minimum life-cycle cost, the following requirements apply.

- The remaining surplus materials, equipment, supplies, and spare parts should be inventoried, labeled, segregated, and evaluated for use at other sites or sold.
- Disposal of waste materials will be maximized during deactivation.
- Existing system and equipment capabilities will be used for material removal/stabilization to the maximum extent possible.
- Conditions that require implementation of operational safety requirements (OSRs) during the surveillance period will be eliminated.

2.2.5 Surveillance Requirements

Facility configuration shall ensure D&D options are not foreclosed, and facility safety and environmental protection can be maintained until D&D.

To ensure safety and environmental protection during surveillance, the following requirements apply.

- Consistent with the PUREX and UO_3 Plant Safety Basis, the operation of safety and utility systems shall be reduced to the extent possible, while maintaining ventilation, alarms and other capabilities necessary for a deactivated facility. Required vital safety systems and utility systems shall be fully functional and have operating procedures in place.
- To minimize points of ingress, doors to the plants shall be locked from the inside except those required for entrance by surveillance crews.
- Security systems and procedures shall be adequate to prevent unauthorized entry to plant structures.
- Liquid effluent sources from PUREX and UO_3 Plant shall be eliminated prior to the surveillance phase. Flow routes to disposal sites should be isolated. Isolation should be achieved by sealing or valving off at the facilities and screening off accessible outlets of the discharge pipes for varmint control.
- Facility penetrations (louvers, pipe openings, etc.) will be closed off to prevent bird and other animal intrusions.
- Elevator systems shall be deactivated in a manner that enables future reactivation.
- Systems that were opened to facilitate deactivation and could present a radiological and/or an industrial safety problem if left open shall be adequately closed off.

- Known facility roof leaks and/or deteriorated roof panels shall be repaired.

- Radiation space monitoring and continuous air monitoring systems shall be reduced to a level commensurate with the surveillance requirements. As a general guide, "as-left" contamination and radiation levels in the plants should be low enough that only portable monitoring equipment is required during surveillance entries.

To achieve a non-occupied facility status, the following requirements apply.

- Ventilation and monitoring equipment shall be consolidated, relocated, housed, operated, and/or maintained such that facility entry frequency does not compromise the non-occupancy status.

- Fire protection systems shall be modified or eliminated to both achieve and reflect the non-occupied status and to minimize system testing and maintenance.

- Electrical and water supply services to the process buildings shall be isolated; electrical and water supply services in the surrounding yard areas shall be reduced to meet minimum surveillance support requirements. Centralized electrical services for surveillance purposes should be considered.

- The building steam system shall be deactivated. Building steam requirements shall be eliminated to enable steam system deactivation.

2.2.5.1 Deactivated PUREX Condition. Table 2.2-1 describes the expected PUREX condition, by plant area, when the technical requirements stated above have been satisfied.

2.2.5.2 Deactivated UO_3 Plant Condition. Table 2.2-2 describes the expected UO_3 Plant condition, by plant area, when the technical requirements stated above have been satisfied.

Table 2.2-1. PUREX Status After Deactivation. (2 sheets)

Facility area	Area status description
Canyon	- Mobile quantities of Special Nuclear Materials (SNM) removed - Fuels removed - Process vessels emptied and flushed - Some process equipment disassembled to remove inventory - SNM Material inventory reconciled - Process cells flushed - Failed equipment/jumpers removed from canyon deck as appropriate - Canyon piping to external facility interfaces (Tank Farms, 216-B-3/Pond, out of service cribs, etc.) isolated
Storage Gallery	- Supplies removed - Shop equipment de-energized - Fire foam system deactivated - High-radiation areas mitigated
Sample Gallery	- Samplers, including D5 Cave, flushed - Sample Gallery area flushed - Hoods containing significant SNM decontaminated - Hood exhaust ductwork removed - Floor drains plugged
Pipe and Operating Gallery	- Gallery flushed - Mobile equipment removed - White room repainted - White room floor resurfaced - Headers drained and flushed - Floor drains plugged.
Cranes	- Cranes parked on maintenance platforms and shut down as is.
Aqueous Make-up	- Chemical inventory removed - Tanks and supply headers flushed
Analytical Laboratory	- All Chemical inventory removed - Hoods decontaminated - Equipment de-energized
Shop Areas	- Supplies removed - Equipment de-energized
Control Rooms	- All instrument and equipment controls de-energized, except control of canyon exhaust. These functions will be consolidated at a single remote monitoring location
Office/Change Rooms, Mobile offices	- Personnel relocated - Furniture and files removed
211-A Area	- Chemical inventory removed - Demineralizers isolated with resin disposed - Vessels flushed - Utilities isolated - Surfaces decontaminated of hazardous materials and resurfaced as necessary
203-A Area	- Tanks emptied and flushed - Utilities isolated - Acid solutions removed - Surfaces decontaminated and resurfaced as necessary
U-Cell/ Fractionator	- Recovered acid removed - Vessels flushed - Coverblocks sealed

Table 2.2-1. PUREX Status After Deactivation. (2 sheets)

Facility area	Area status description
Heating, ventilation and air conditioning (HVAC)/Services	- HVAC systems consolidated to limit gaseous effluent discharge and monitoring points to 291-A-1 Canyon exhaust stack - Steam, water and compressed air service eliminated - Electrical systems consolidated - Emergency loads minimized or eliminated - Electrical service provided for selected lighting panels - Alternative source of backup power to canyon fans - Monitoring functions consolidated at a single monitoring location
Effluents	- Liquid and gaseous effluent streams eliminated, except 291-A-1 stack discharge - Buildings decontaminated and locked - Effluent piping isolated
N-Cell, PR Room and Q-Cell	- Gloveboxes decontaminated and residual contamination fixed
R-Cell Vault	- Organic solvent removed - Vessels and vault flushed - Coverblocks sealed
Ancillary Buildings	- Portable and/or mobile equipment and materials removed - Piping with external interfaces isolated - Utilities and HVAC isolated - Surfaces and piping and vessels flushed - Asbestos stabilized

Table 2.2-2. UO_3 Plant Status After Deactivation.

Facility area	Area status description
Cells A, B, C, and D in 224-U	- All process vessels emptied and flushed - Material accountability reconciled - Process cells flushed - Piping to external facility interfaces (effluents, etc.) isolated.
224-U Pipe and Operating Gallery	- Mobile equipment removed - Headers drained and flushed - Floor drains plugged
224-UA Processing Areas	- UO_3 powder removed from calciners, powder handling equipment, and vacuum cleaning system - Bag filters left in place after air blow of system - Material accountability reconciled - Piping to external facility isolated - Process areas decontaminated
Lucky Pot Room, Cells E and F, Abandoned powder handing equipment	- Abandoned equipment left as is - Piping to external facilities isolated
2714-U & T-Hopper storage pad	- Full T-hoppers shipped to purchaser - Drums of depleted UO_3 removed - Surfaces decontaminated and resurfaced as necessary
Shop Areas	- Supplies removed - Equipment de-energized
Control Rooms	- All instrument and equipment controls deactivated
Office/Change Rooms/Mobile offices	- Personnel relocated - Furniture and files removed
211-U Area	- Acid inventory removed - Vessels flushed - Utilities isolated - Asbestos stabilized
203-U Area	- Storage tanks emptied and flushed - Utilities isolated - Surfaces decontaminated and resurfaced as necessary
Heating, ventilation and air conditioning (HVAC)/Services	- HVAC systems shutdown - Steam, water and compressed air service eliminated - Electrical service provided for selected lighting panels
Effluents	- Liquids and gaseous effluent streams eliminated - Effluent piping isolated
Ancillary Buildings	- Portable/mobile equipment and materials removed - Piping with external interfaces isolated - Utilities and HVAC isolated - Surfaces and piping flushed and decontaminated

2.3 SCHEDULE OBJECTIVES

The schedule objective is to complete deactivation by July 31, 1998. The major schedule milestones, which are identified in the Baseline Project Schedule (Figure 2.3-1), are shown in Table 2.3-1.

The Master Project Schedule is included in Section 4 of this PMP.

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MANAGEMENT

W. W. BIXBY
Deputy Assistant Secretary for
Facility Transition and Management

R. MARTINEZ
Project Manager
Office of Site and Facility Transfer

G. J. BRACKEN
Project Manager
Purex/U03 Deactivation Project

BASELINE
PUREX/U03
Faci

ACTIVITY MILESTONES	FISCAL YEAR	1994 Oct	Jan	Apr	Jul	199 Oct	Jan
PUREX SURVEILLANCE PHASE I							
PUREX SURVEILLANCE PHASE II							
PUREX SURVEILLANCE PHASE III							
PUREX SURVEILLANCE PHASE IV							
U03 SURVEILLANCE PHASE I							
U03 SURVEILLANCE PHASE II							
******DEACTIVATION AND COMPLIANCE******							
******CRITERIA & PLANS******							
PUREX CLOSURE PLAN COMPLETED							
******PUREX TRANSITION******							
E-F11 CONCENTRATOR DEMONSTRATION COMPLETED							
TANK FARM WASTE LINES ISOLATED							
ANCILLARY BUILDINGS DEACTIVATED							
PR ROOM DEACTIVATION COMPLETED							
N CELL STABILIZATION COMPLETED							
SAMPLE GALLERY DEACTIVATED							
PIPE & OPERATING GALLERY DEACTIVATED							
**ALUMINUM CLAD FUEL							
SINGLE-PASS FUEL RETURNED							
**DISSOLVER CELL FUELS (ZIRCONIUM CLAD FUEL)							
N REACTOR FUEL RETURNED							
ZIRCONIUM HEEL STABILIZATION COMPLETED							
**TANK D5 & E6 METAL SOLUTION							
TANK D5-E6 ENGINEERING STUDY COMPLETED							
PU-U SOLUTION DISPOSAL COMPLETED							
**CANYON CELL FLUSHES							
PUREX CANYON FLUSHING COMPLETED							
**RECOVERED ACID DISPOSITION							
NITRIC ACID DISPOSAL COMPLETED							
**UTILITY/SUPPORT SYSTEMS							
HVAC SYSTEM CONSOLIDATION COMPLETED							
PUREX LIQUID EFFLUENT DISCHARGE DISCONTINUED							
*******U03 TRANSITION*******							
U03 PLANT PHASE I DEACTIVATION COMPLETED							
U03 PROCESS CONDENSATE DISCHARGE DISCONTINUED							
U03 COOLING WATER DISCHARGE DISCONTINUED							
U03 SNM FINAL ACCOUNTABILITY RECONCILED							
U03 PLANT DEACTIVATION COMPLETED							
*******PROJECT MANAGEMENT*********							
PUREX SNM FINAL ACCOUNTABILITY RECONCILED							
PUREX PLANT SURVEILLANCE & MAINTENANCE PLAN COMP							
PUREX DEACTIVATION COMPLETED							
PROJECT SAFETY BASIS PACKAGE SUBMITTED							
DEACTIVATION COST ESTIMATE SUBMITTED							

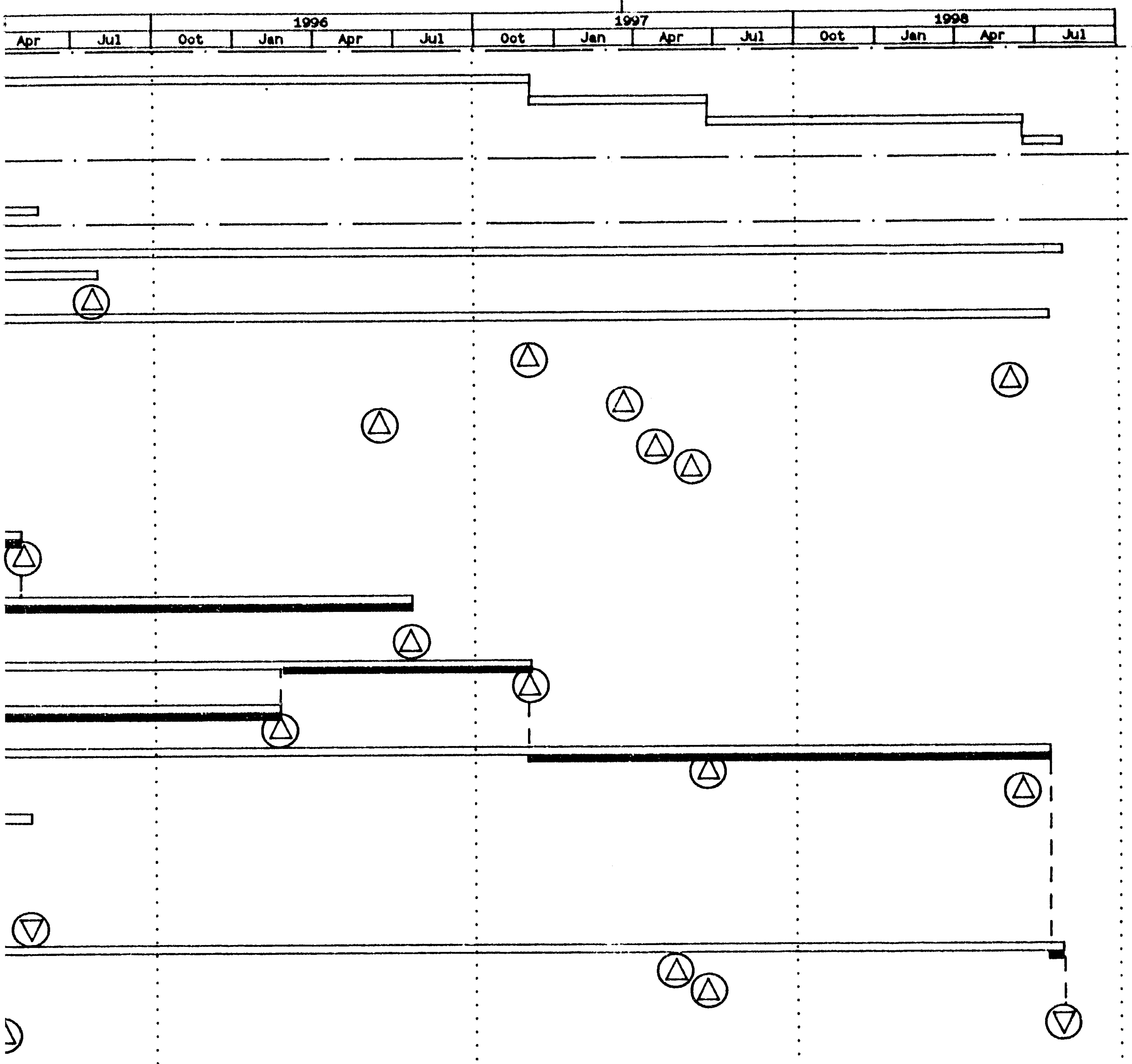
(▽) DOE-HQ CONTROLLED MILESTONE (△) DOE-RL CONTROLLED MILESTO

PROJECT SCHEDULE

DEACTIVATION PROJECT

Office of
ity Transition
and
anagement

ORIG. PLAN APPR.	Sept. 93 (Date)
LAST PLAN CHG.	(Date)
STATUS AS OF	(Date)



E

CRITICAL PATH

Table 2.3-1 Major Schedule Milestones

Milestone Description	Milestone Date
Deactivation cost estimate submitted	10/31/93
UO_3 Plant Phase I Deactivation completed	03/15/94
E-F11 Concentrator Demonstration completed	03/16/94
Tank D5/E6 Engineering Study completed	04/08/94
UO_3 Process Condensate Discharge discontinued	09/26/94
Single-pass Fuel returned	10/17/94
Zirconium Heel Stabilization completed	10/19/94
UO_3 SNM Final Accountability reconciled	10/19/94
UO_3 Cooling Water Discharge discontinued	12/21/94
Project Safety Basis Package submitted	04/11/95
N Reactor Fuel returned	05/03/95
UO_3 Plant Deactivation completed	05/16/95
PUREX Closure Plan completed	07/31/95
Nitric Acid Disposal completed	02/24/96
N-Cell Stabilization completed	06/17/96
Pu-U Solution Disposal completed	07/22/96
PUREX Canyon Flushing completed	12/04/96
Tank Farm Waste Lines isolated	12/04/96
PR Room Deactivation completed	03/19/97
Sample Gallery deactivated	04/22/97
PUREX SNM Final Accountability reconciled	05/16/97
Pipe & Operating Gallery deactivated	06/02/97
PUREX/UO_3 Plant Surveillance & Maintenance Plan completed	06/24/97
HVAC System consolidation completed	06/25/97
Ancillary buildings deactivated	06/01/98
PUREX Liquid Effluent discharge discontinued	06/17/98
PUREX Deactivation completed	07/31/98

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2.4 COST OBJECTIVES

The cost objective is to complete deactivation for a total project cost (TPC) of $233.8 million. The TPC is comprised of the following:

- PUREX Surveillance and Maintenance budget of $160.0 million
- UO_3 Plant Surveillance and Maintenance budget of $5.0 million
- PUREX and UO_3 Plant Deactivation budget of $68.8 million.

Cost information is presented in Section 4 of this PMP.

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3.0 MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

3.1 MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

The Project is organized in a traditional project structure, which is used to communicate project guidance and complete routine project activities. The structure is readily identified within the bold outline in Figure 3.1-1.

3.1.1 Principal Project Team Organizations and Responsibilities

3.1.1.1 U.S. Department of Energy - Headquarters. The Deputy Assistant Secretary for Facility Transition and Management (EM-60) has responsibility for approval of key Project decisions. The Director, Office of Site and Facility Transfer (EM-64), has delegated program management authority to the Project Manager for EM-60.

During the Project's planning phase, the EM-60 line management and EM-64 management assist Project formation by (1) establishing the PUREX/UO_3 Deactivation Project structures; (2) promoting the DOE-Headquarters (DOE-HQ) project manager as the Project's single point of contact at DOE-HQ; and (3) opening lines of communication with matrixed support, oversight and approval organizations, and external stakeholders. Summary responsibilities of EM-60 are as follows.

- Provide facility transition and deactivation guidance to the Project management team.
- Establish a direct link to the DOE-HQ project manager; promote the DOE-HQ project manager as the point of contact for matrixed support organizations and external stakeholders; provide sufficient funding and Office of Site and Facility Transfer organization/matrix support.
- Act as the final decision authority when Project management team decision-making deadlocks occur.
- Approve the Project Management Plan.
- Participate in quarterly progress reviews.

The DOE-HQ project manager is the single point of contact for Project activities and actions within DOE-HQ and is the DOE-HQ Project interface for DOE-RL and WHC. Responsibilities of the DOE-HQ project manager include (1) mobilizing DOE-HQ activities to support the Project, (2) ensuring successful Project execution, and (3) exercising appropriate management decisions for the Project. Summary responsibilities include the following.

- Represent DOE-HQ on the Project management team.
- Review and recommend approval of Project scope, Project cost, overall schedule objectives, and DOE-HQ milestones to EM-60.

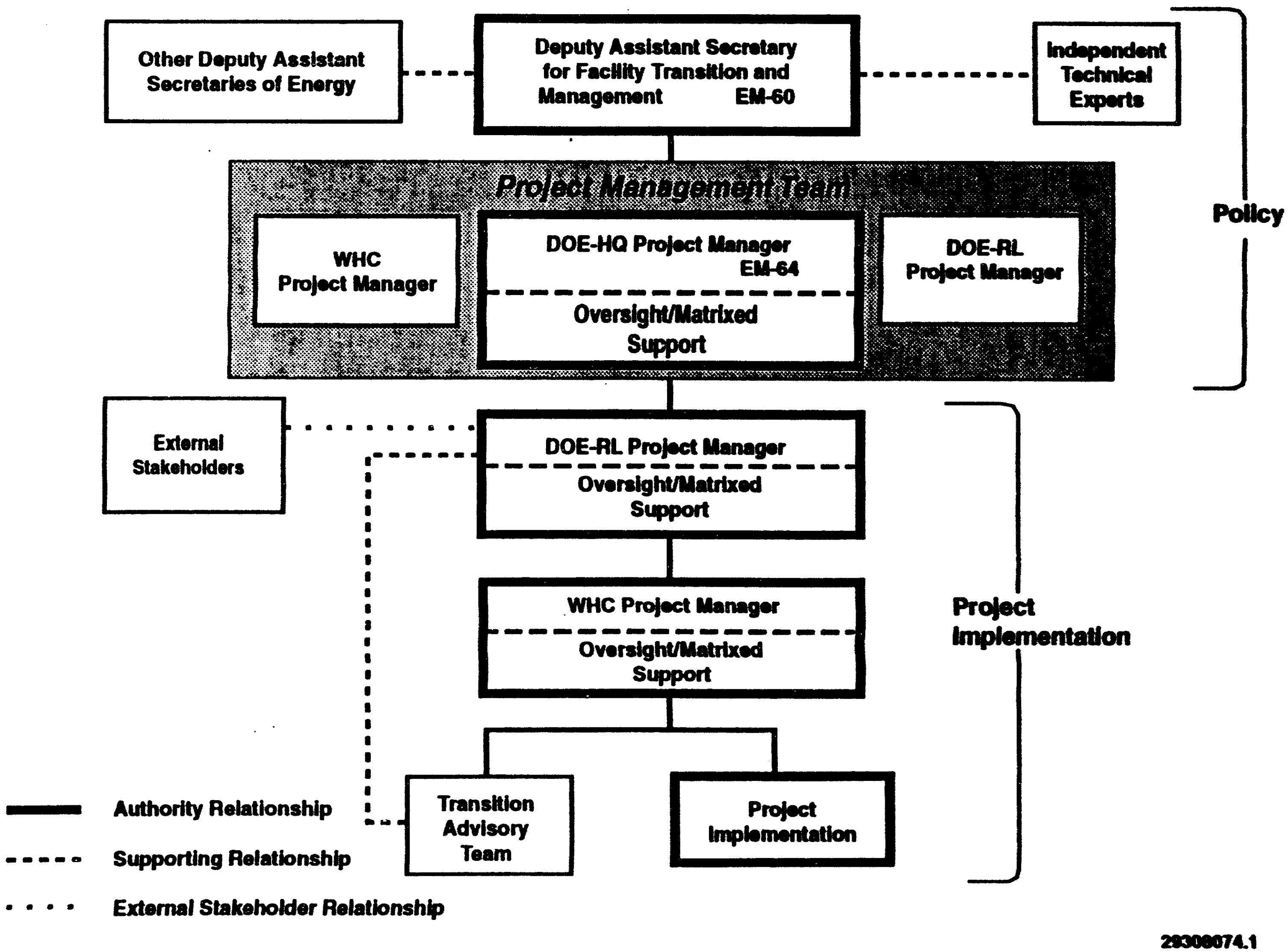

Figure 3.1-1. Project Management Relationships.

- Identify and secure Project resources.
- Provide a program budget and funding guidance.
- Monitor the overall Project progress.
- Provide DOE-HQ Project policy guidance to DOE-RL and WHC.
- Act as the liaison for DOE-HQ organizations and external stakeholders; establish proactive communication paths to enhance timely decisions.
- Keep DOE-HQ management informed of Project status and obtain direction as necessary.

Additional description of DOE-HQ roles and responsibilities, including supporting organizations, is contained in DOE Order 4700.1, *Project Management System*, Chapter I, Part C, "Management Roles, Responsibilities, and Authority."

3.1.1.2 U.S. Department of Energy-Richland Operations Office. Field responsibility lies with the PUREX/UO_3 Deactivation Project office within the Operations and Transition Division, DOE-RL. The project office consists of a small dedicated staff reporting to the project manager.

The DOE-RL project manager serves as the primary interface between DOE and WHC. The DOE-RL project manager is the Project interface at the Richland Operations Office for DOE-HQ and WHC, DOE-RL matrixed support organizations, and external stakeholders. The DOE-RL project manager is responsible for Project performance with respect to established technical, schedule, and cost baselines. The DOE-RL project manager continuously monitors established baselines, informs DOE-RL management of existing or potential problems that could result in significant deviations from established baselines, and directs corrective action to maintain Project baselines.

The DOE-RL project manager's primary role is oversight rather than daily management of the Project. Day-to-day project management responsibilities are assigned to WHC. In this oversight capacity, the DOE-RL project manager's interests focus on higher level management issues, such as overall Project performance with respect to established baselines, management and control, and the effectiveness of WHC's project control system in providing useful information. The DOE-RL project manager's other primary role is to obtain DOE-RL agreement with the concepts recommended in the PMP.

Matrixed support is provided to the DOE-RL project manager from the DOE-RL organization. Summary responsibilities of the DOE-RL project manager are as follows.

- Coordinate and approve overall Project documentation and control baselines.
- Monitor and review Project activities.

- Ensure compliance with applicable DOE orders and regulatory requirements.
- Provide management guidance and direction to WHC.
- Maintain a proactive, single point of contact for the Project for matrix support organizations, State and Federal regulatory agencies, and other external stakeholders.
- Coordinate approval of Project documentation in DOE-RL.

3.1.1.3 Westinghouse Hanford Company. WHC is responsible for supporting the DOE-RL project office with day-to-day technical management, coordination, control, and reporting of Project activities identified in the PMP. The Project organization is shown in Figure 3.1-2.

The WHC project manager plans, coordinates, and directs Project execution, including technical direction, development and administration of Project criteria and baselines, system analysis, scheduling, budgeting, configuration management, and reporting. The WHC project manager receives policy guidance and project instructions from the DOE-RL project manager.

The WHC project manager is responsible for the following.

- Define and administer the technical, cost, and schedule requirements for the Project.
- Develop the PMP for DOE approval.
- Prepare safety analysis reports, environmental analyses, and regulatory analyses and permits needed for Project implementation.
- Manage and control Project baselines, as well as the timely identification and communication of real and potential problems to the DOE-RL project manager.
- Develop proposed corrective actions.
- Implement corrective actions, as required and directed by the DOE-RL and DOE-HQ project managers.
- Provide the DOE-RL project office a clear and concise narrative report of Project status with respect to established Project baselines.

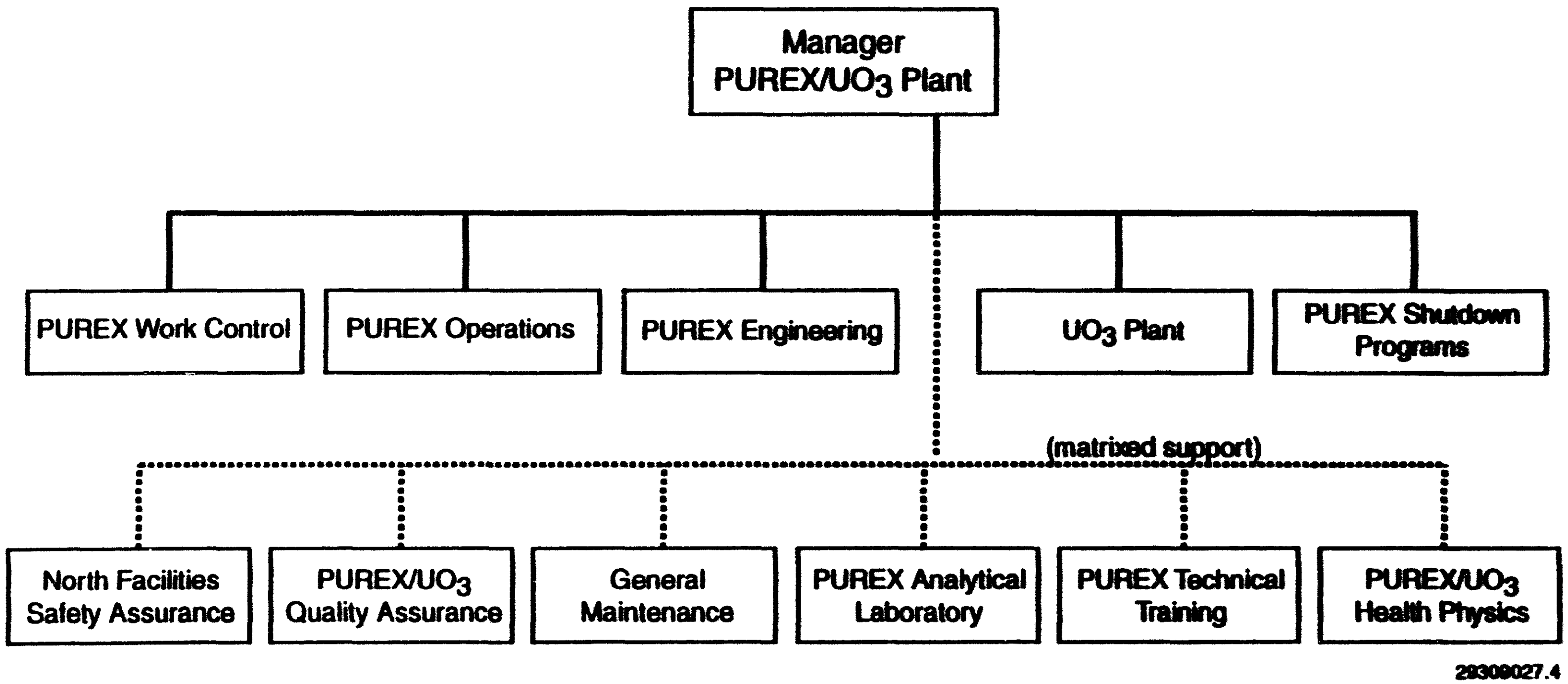

Figure 3.1-2. WHC Project Organization.

3.1.2 Other Project Organizations

The traditional structure has been supplemented with the following features, which are intended to broaden Project involvement, accelerate Project definition, and streamline the deactivation process.

- Independent Technical Experts
- Project Management Team
- Transition Advisory Team
- External Stakeholders.

The relationships and responsibilities of these Project members are expanded in the following sections.

3.1.2.1 Independent Technical Experts. The Independent Technical Experts (ITE) provide technical and management feedback on the Project as directed by the Deputy Assistant Secretary, EM-60, and the Project management team. The Deputy Assistant Secretary, EM-60, will be the focal point for any recommendations or input given by the ITE, and, if appropriate, will direct DOE-HQ, DOE-RL, and WHC project managers to implement the ITE recommendations. The ITE will be available to the Deputy Assistant Secretary to lend their technical and management expertise on an as-needed basis. Their focus will be to provide independent assessment of the strategic and tactical approaches for PUREX and UO_3 Plant deactivation to ensure that DOE proceeds in a safe, timely, and cost-effective manner. The ITE will accomplish this through reviews and analyses as needed. Initially, it is anticipated that the ITE will conduct reviews on a quarterly basis. Given the expertise of the ITE, they will provide additional credibility to the Project for the stakeholders.

The ITE will be individuals who are senior level members of government and private sector organizations with experience in the following:

- Deactivation and D&D of nuclear facilities
- Analyzing the implications of regulations
- Identifying and dealing with stakeholder concerns
- Resolving technical issues associated with managing a project of this scope.

3.1.2.2 Project Management Team. The Project management team is the Project policy-making and decision-making board. The Project management team defines the project strategy.

The Project management team is composed of the three project managers: the DOE-HQ project manager; the DOE-RL project manager; and the WHC project manager.

The Project management team meets on an ad hoc basis when policy decisions or significant project issue resolution is needed. Decision-making is facilitated by the DOE-HQ project manager. Decisions are communicated through normal project channels. If the Project management team cannot reach consensus, the Deputy Assistant Secretary, EM-60, makes the decision.

Following completion of this activity, the members of the Project management team return to their traditional project roles.

Project management team members are responsible for ensuring that effective Project working relationships are developed with their oversight and approval organizations and external stakeholders and that the Project receives timely guidance, reviews, and approvals from the organizations. This is accomplished by working within their respective oversight and matrixed support organizations. When it is necessary to secure timely resolution of issues that are stalemated within these organizations, the Project management team members will raise the issue through their own institutional authority structure for immediate resolution.

3.1.2.3 Transition Advisory Team. The Transition Advisory Team (TAT) provides project definition and technical support to the WHC project manager. The TAT's chief responsibility is rapid completion of the PMP.

The TAT places special emphasis on defining practical, low-cost compliance methods in key policy areas, and adapting commercial D&D experience to the deactivation activities.

The TAT is composed of practical-minded, results-oriented senior scientists and engineers, selected from outside the Project. Membership will change to match development needs of the PMP. Once the PMP is complete, the TAT dissolves.

3.1.2.4 External Stakeholders. The external stakeholders are groups and individuals who are affected by the Project or who can affect the future of the Project. Major external stakeholders include PUREX and UO_3 Plant workers, the Native American Nations, Washington State Departments of Ecology and Health, the Washington State Office of Historic Preservation, EPA Region 10, and the Defense Nuclear Facilities Safety Board.

Stakeholders will support the Project by (1) identifying the information the stakeholders need to know, and (2) providing the DOE-RL project manager with the information necessary to make publicly acceptable Project decisions and to lead the Project to a successful outcome in the public forum. Refer to Appendix D, "Stakeholder Involvement Plan," for details of the involvement process. Most involvement is expected to occur through the Tri-Party Agreement process.

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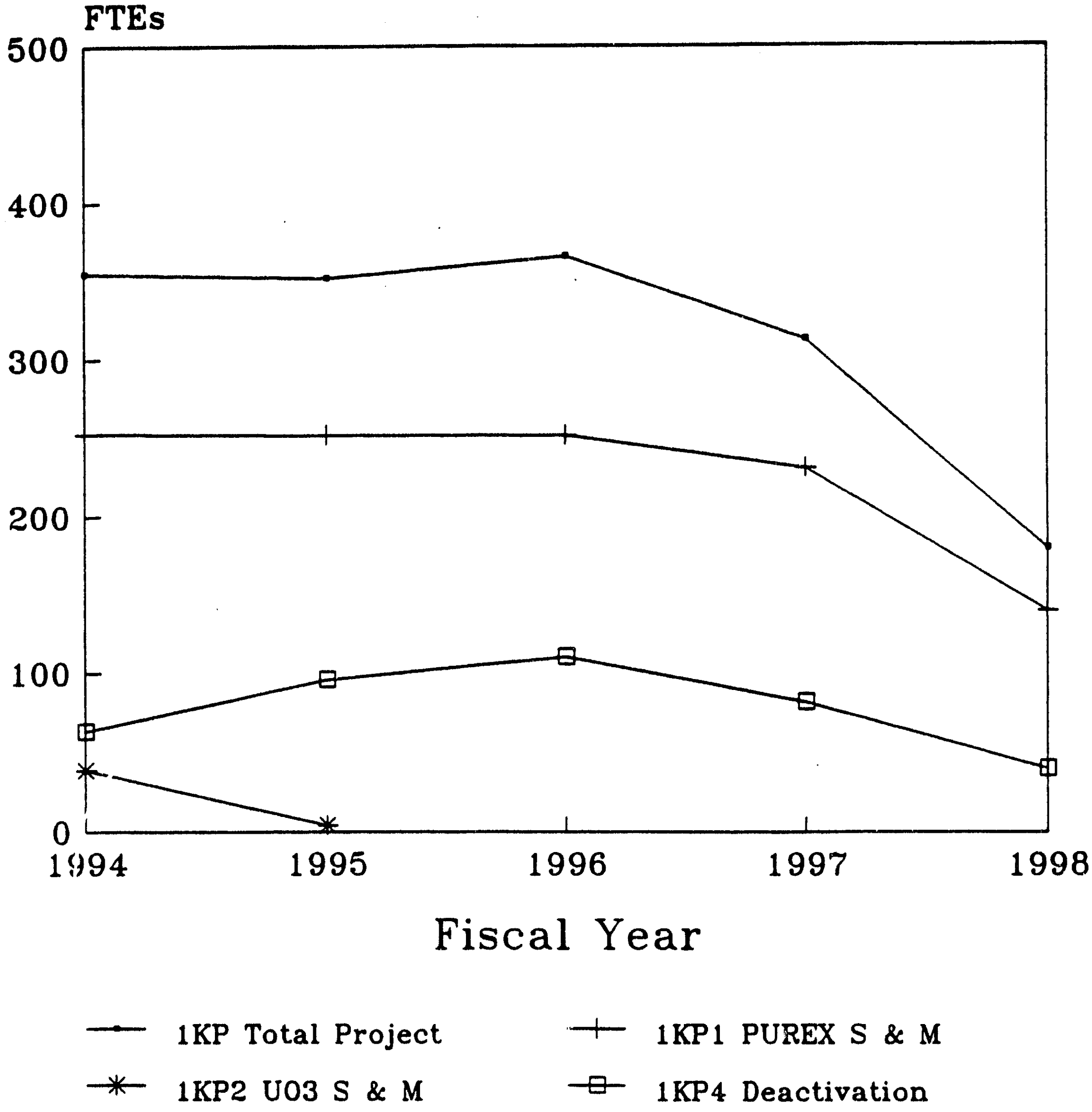
3.2 PROJECT STAFFING

Project staffing is shown in Figure 3.2-1, reflecting the number of staff required by fiscal year.

Figure 3.2-1 Project Staffing



S & M = Surveillance and Maintenance

3.3 METHOD OF PERFORMANCE

Planning and design will be performed by PUREX Engineering, with support by WHC Engineering and KEH as required.

Because of the nature of the work, cleanout and stabilization activities will be performed by the WHC workforce. Activities defined as *Davis-Bacon Act* work will be performed by KEH, which will use either onsite forces or subcontractors.

Significant subcontract activities are not anticipated because of the hazard classification of the work. If contracting is possible for some portion of the work, contracts will be based on competitive bid.

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4.0 PROJECT BASELINE

4.1 WORK BREAKDOWN STRUCTURE

The WBS is the structure for defining and controlling project work and is the basis for work planning, authorization, reporting, and monitoring of performance. The Project work efforts are organized by the Project Summary WBS (PSWBS) and the Contract WBS (CWBS). The approved PSWBS and CWBS are shown in Table 4.1-1 and Figure 4.1-1.

All elements of the Project effort are defined in terms of the WBS, including the following:

- Workscope
- Schedule
- Cost estimate
- Budget.

DOE-RL reviews and approves the PSWBS when it is submitted as part of the Project baseline. DOE-HQ will review and concur with DOE-RL approval of the PSWBS. WHC is responsible for the coordination, review, and approval of the CWBS. Changes to the PSWBS or CWBS will be processed as part of the Project change control process.

4.1.1 Project Summary Work Breakdown Structure

Although the Project is expected to be an expense-funded activity, the PSWBS incorporates the five major expense and plant and capital equipment work categories that may be required for the Project. At this time, only the "1KP Expense" PSWBS definition has been completely developed. If required, other PSWBS elements and changes to the PSWBS will be developed through the change control process.

4.1.1.1 "1KP" Elements, "Expense." The 1KP elements are the expense-funded elements of the Project and include PUREX Surveillance and Maintenance; UO_3 Plant Surveillance and Maintenance; and PUREX and UO_3 Plant Deactivation/Compliance activities.

4.1.1.1.1 "1KP1, PUREX Surveillance and Maintenance." The 1KP1 activity incorporates all tasks required to support minimum PUREX surveillance and maintenance of critical utility and safety systems while the plant is in standby condition. These tasks include the following.

- Ensure minimum compliance with applicable State and Federal regulations and DOE orders.
- Complete the OSRs and normal plant standby surveillances.
- Maintain the OSR equipment, and complete instrument calibrations and equipment preventive maintenance activities.

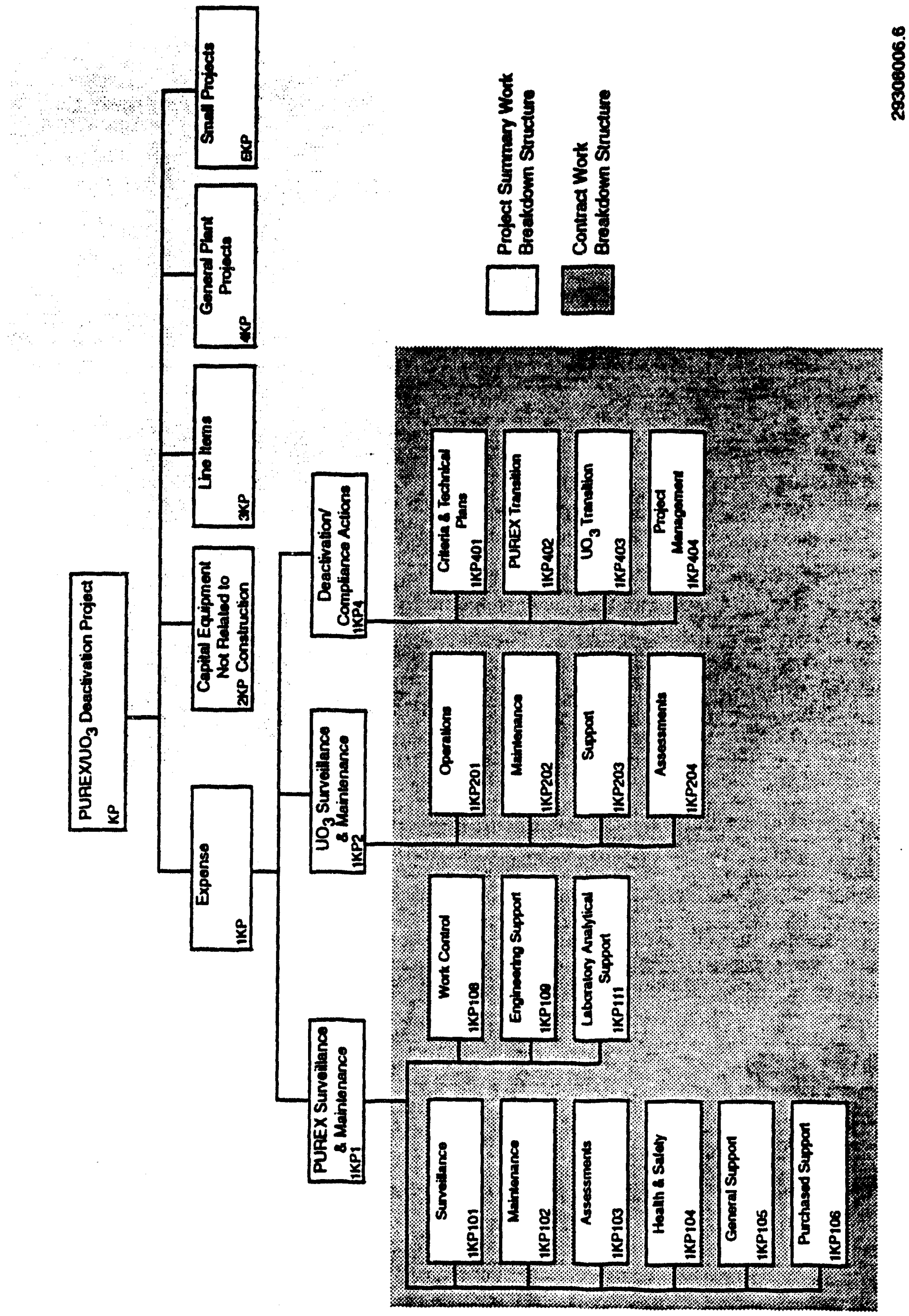
Table 4.1-1. Work Breakdown Structure Responsibility Assignment Matrix. (2 sheets)

Program	Activity	Cost Account	Title	Responsible Organization
KP			PUREX/UO_3 Deactivation Project	PUREX/UO_3 Plant
1KP			Expense	
	1KP1		PUREX Surveillance and Maintenance	Facility Operations Programs
		1KP101	PUREX Surveillance	PUREX Operations
		1KP102	PUREX Maintenance	PUREX/UO_3 Maintenance
		1KP103	PUREX Assessments	Facility Operations Programs
		1KP104	PUREX Health & Safety	PUREX/UO_3 Health & Safety
		1KP105	PUREX General Support	PUREX/UO_3 Plant
		1KP106	Purchased Support	Outage Planning & Material Control
		1KP108	Work Control	PUREX Work Control
		1KP109	Engineering Support	PUREX Engineering
		1KP111	Laboratory Analytical Support	PUREX Analytical Laboratory
		1KP112	200 Areas Support Services	PUREX/UO_3 Maintenance

Table 4.1-1. Work Breakdown Structure Responsibility Assignment Matrix. (2 sheets)

Program	Activity	Cost Account	Title	Responsible Organization
	1KP2		UO_3 Surveillance and Maintenance	Facility Operations Programs
		1KP201	UO_3 Operations	UO_3 Plant Operations
		1KP202	UO_3 Maintenance	PUREX/UO_3 Maintenance
		1KP203	UO_3 Support	UO_3 Plant Operations
		1KP204	UO_3 Assessments	Facility Operations Programs
	1KP4		Deactivation/ Compliance Actions	Facility Operations Programs
		1KP401	Criteria & Technical Plans	PUREX Shutdown Programs
		1KP402	PUREX Transition	PUREX Operations
		1KP403	UO_3 Transition	UO_3 Plant Operations
		1KP404	Project Management	PUREX Shutdown Programs

Figure 4.1-1. Work Breakdown Structure.



- Maintain a comprehensive scheduled radiological survey program for both dose rate and contamination levels throughout PUREX.

4.1.1.1.2 "1KP2, UO_3 Surveillance and Maintenance." The 1KP2 activity incorporates all tasks required to support UO_3 Plant surveillance and maintenance of critical utility and safety systems and the transition-to-standby condition following completion of the final stabilization campaign. The principal transition-to-standby activities include the following:

- Pipe and vessel flushing
- Removal of the residual UO_3 powder heels from the calciners and air cleaning system
- Transfer of the recovered nitric acid to PUREX.

The content of the surveillance and maintenance work is similar to PUREX.

4.1.1.1.3 "1KP4, PUREX/UO_3 Deactivation/Compliance Actions." The 1KP4 activity includes all expense-funded tasks necessary to convert PUREX and UO_3 Plant to a fully deactivated state. Key tasks include the following.

- Chemical Disposition. Dispose of the remaining PUREX bulk process chemicals and clean the PUREX 211-A area chemical storage tanks.
- Single-Pass Reactor Fuel Disposition. Transfer approximately 2.87 metric tons of single-pass reactor fuel from the PUREX slug storage basin to the 100-K East fuel storage basin.
- Slug Storage Basin Deactivation. Remove water and decontaminate the PUREX slug storage basin.
- N Reactor Fuel Disposition. Retrieve approximately 260 kg of N Reactor fuel from PUREX A, B, and C Cells, and transfer to the 100-K East fuel storage basin.
- Zirconium Heel Stabilization. Passivate the zirconium cladding pieces remaining in the PUREX dissolvers.
- Metal Solution Disposition. Dispose of approximately 22,700 L (6,000 gal) of rework quality plutonium-uranium solution stored in PUREX tanks D5 and E6.
- Canyon Flushing. Flush the PUREX canyon walls, floors, vessels, and piping to minimize the potential for resuspension and migration of radioactive material and to remove hazardous materials.
- In-Plant Waste Concentration. Operate the PUREX E-F11 process evaporator to reduce the volume of liquid waste sent from PUREX to the tank farms' double-shell waste tanks.
- Contaminated Solvent Disposal. Dispose of about 79,000 L (21,000 gal) of slightly contaminated PUREX solvent stored in PUREX tanks G5 and R7.

- Support and Ancillary Systems. Deactivate ancillary PUREX buildings including vessel and piping flushes, equipment de-energization, utilities isolation, and decontamination.

- Product Removal Room Deactivation. Remove glovebox equipment; decontaminate gloveboxes and isolate at PUREX.

- N Cell Cleanout. Remove remaining plutonium dioxide and equipment from the gloveboxes; decontaminate gloveboxes and isolate at PUREX.

- Q Cell Cleanout. Remove glovebox equipment; decontaminate glovebox and isolate at PUREX.

- Sample Gallery Deactivation. Decontaminate and remove sample hoods and ventilation ductwork in the PUREX Sample Gallery.

- Pipe and Operating Gallery and White Room Deactivation. Flush and drain piping and tanks, and fix contamination in the White Room at PUREX.

- Ventilation Systems Consolidation. Consolidate PUREX ventilation systems into a single system with a single stack discharge.

- Utilities and Service Systems. Isolate unneeded services to the PUREX 202-A Building, consolidate electrical distribution at one location in PUREX, and install a monitoring system for use during the surveillance period.

- Laboratory. Remove chemical reagents; salvage equipment; decontaminate and stabilize contaminated areas.

- Contaminated Acid Disposal. Dispose of approximately 787,000 L (208,000 gal) of concentrated (~10 molar) nitric acid currently being held in the PUREX 203-A area and in tanks U1 and U2 in the U Cell vault area.

- UO_3 Plant Deactivation. Decontaminate and remove residual uranium oxide powder; transfer concentrated nitric acid to PUREX for disposal; flush piping and vessels; eliminate waste water processing.

4.1.1.2 "2KP" Elements, "Capital Equipment Not Related to Construction." The 2KP elements include equipment with an acquisition cost of $5,000 or more and a service life of two years or longer, and equipment that is recognized as an individual property unit. Capital equipment not related to construction (CENRTC) candidates include equipment required to support PUREX during the surveillance period: reconfiguration of the PUREX HVAC, consolidation of plant electrical utilities, and incorporation of the remote monitoring system.

4.1.1.3 "3KP" Elements, "Line Items." The 3KP elements include capital-funded modifications required to complete the deactivation activities of PUREX and UO_3 Plant, with a total estimated cost of $1.2 million or greater. No line item requirements for deactivation have been identified.

4.1.1.4 "4KP" Elements, "General Plant Projects." The 4KP elements include capital-funded modifications required to complete the deactivation activities, with a total estimated cost between $0.3 and $1.2 million. No general plant project requirements for the deactivation have been identified.

4.1.1.5 "5KP" Element, "Small Projects." The 5KP elements include tasks funded from the general plant project budget, with a total estimated cost of less than $0.3 million. No Small Project requirements have been identified.

4.1.2 Contract Work Breakdown Structure

The 1KP expense element is expected to be the major funding source for deactivation activities. The "1KP Expense" PSWBS definition has been extended to the CWBS level, and the CWBS has been fully developed.

4.1.2.1 "1KP1" Elements, "PUREX Surveillance and Maintenance." The following cost elements are included in the 1KP1 activity. Some PUREX elements incorporate small UO_3 Plant tasks of the same scope and content.

- 1KP101, PUREX Surveillance. This includes shift surveillance, OSR maintenance support, solid waste packaging and handling, occurrence reporting, canyon operations, and training and relief shift.
- 1KP102, PUREX Maintenance. This includes OSR, plant utility, environmental monitoring maintenance, and training.
- 1KP103, PUREX Assessments. This includes apportioned support for common site services, including steam, raw and sanitary water, contaminated clothing, laundry and mask cleaning, electricity, power grid maintenance, fire system inspection and maintenance, and work control system support; solid waste disposal; and computer network.
- 1KP104, PUREX Health and Safety. This includes a radiological survey program for dose rate and contamination levels throughout PUREX and adjacent outdoor areas, operations and maintenance health physics support, and radiological engineering.
- 1KP105, PUREX General Support. This includes Quality Assurance plant assessment reviews, plant operations and maintenance work performance verification, and quality documentation review; nuclear material accountability, material balance area transfer records, and annual inventory support; and asset changes in PUREX and UO_3 Plant spare parts inventory.
- 1KP106, Purchased Support. This includes PUREX and UO_3 Plant maintenance material purchases and services from miscellaneous support groups, including tank farms crane crew, solid waste burial box fabrication, diesel generator repair, rail maintenance, solid waste transportation, and maintenance engineering.
- 1KP108, Work Control. This includes PUREX and UO_3 Plant maintenance work packages, work scheduling and tracking, material procurement and receiving, and scheduling.

- 1KP109, Engineering Support. This includes PUREX and UO_3 Plant surveillance and maintenance, effluents, solid and hazardous waste engineering, plant engineering, design and drafting, and engineering configuration management.

- 1KP111, Laboratory Analytical Support. This includes effluents, liquid waste, and nuclear material accountability and inventory analyses.

- 1KP112, 200 Areas Support Services. This includes PUREX and UO_3 Plant HVAC filter, stack testing, and pressure/flow balancing; lifting device inspection and testing; scaffolding; carpentry; grounds maintenance; and janitorial services; maintenance engineering; and shop fabrication work.

4.1.2.2 "1KP2" Elements, "UO_3 Surveillance and Maintenance." The following cost elements are included in the 1KP2 activity. Some small UO_3 Plant elements are included in the larger PUREX elements of the same scope and content.

- 1KP201, UO_3 Operations. This includes shift surveillance, maintenance support, post-stabilization campaign transition-to-standby activities, solid waste packaging and handling, occurrence reporting, and training and shift relief.

- 1KP202, UO_3 Maintenance. This includes plant utility, environmental monitoring maintenance, and training.

- 1KP203, UO_3 Support. This includes Health and Safety, Quality Assurance, and laboratory services.

- 1KP204, UO_3 Assessments. This includes apportioned support for common site services, including steam, raw and sanitary water, contaminated clothing, laundry and mask cleaning, electricity, power grid maintenance, and work control system support; and computer network.

4.1.2.3 "1KP4" Elements, "Deactivation/Compliance Actions." The cost elements in the 1KP4 activity incorporate all expense-funded tasks necessary to convert PUREX and UO_3 Plant to a fully deactivated state. Key tasks include removing or stabilizing the major radioactive source terms and making the modifications needed to maintain and safely surveil the plants for the 10-year surveillance planning horizon.

- 1KP401, Criteria and Technical Plans. This includes Project baseline development, Project management plan preparation and approval, systems engineering, and technical criteria development; and regulatory permits.

- 1KP402, PUREX Transition. This includes removal or stabilization of major radioactive source terms and contamination within PUREX and adjacent outdoor areas; removal of hazardous materials; stabilization of ancillary support buildings; consolidation of HVAC and electrical service; plant equipment deactivation; spare parts and spare equipment adjustments; PUREX analytical laboratory deactivation; isolation of PUREX from utilities and waste lines; incorporation of remote monitoring capability; and preparation of PUREX transfer documentation.

- 1KP403, UO_3 Transition. This includes the removal of remaining UO_3 powder within the plant; removal or stabilization of contamination in the plant and adjacent outdoor areas; removal of hazardous materials; stabilization of ancillary support buildings; elimination of rainwater collection and evaporation; plant equipment deactivation; spare parts and spare equipment adjustments; isolation of UO_3 Plant from utilities and waste lines; shutdown of 216-U-14 ditch and 216-U-17 crib; and preparation of plant transfer documentation.

- 1KP404, Project Management. This includes Project coordination; technical, cost, and schedule Project administration; Project performance and evaluation; and codes and standards.

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4.2 SCHEDULE BASELINE

As part of planning, activities schedules incorporating DOE-HQ/DOE-RL Controlled Milestones were developed for the scope identified in the PSWBS. This schedule information constitutes the schedule baseline and is documented in the following:

- Level 1 - Master Project Schedule (refer to Figure 4.2-1)
- Controlled Milestones (refer to Table 4.2-1).

WHC is responsible for the preparation and management of these schedules, the Milestone Log, and the Milestone Dictionary in accordance with the Management Control System (MCS). The Level 1 schedule is supported by lower level schedules. The schedules make up the schedule baseline utilized by WHC for schedule performance, measurement, and control. The DOE-RL Project manager is provided copies of all schedules necessary for evaluating project status.

The schedule and schedule control process include the following.

- Schedules have been constructed using the PSWBS/CWBS levels and reflect tasks required to complete a single WBS element. Also, in accordance with the WBS, lower-level schedules are directly integrated and traceable to higher level schedules.
- An integrated network capable of producing a critical path logic for the entire Project has been implemented for analysis and reporting.
- Schedule objectives identified in Section 2.3 of this plan have been incorporated into major milestones. These milestones provide points for control and reporting within the Master Project Schedule and lower-level schedules. Changes in schedule dates for these major milestones must be approved in accordance with the project change control in Section 5.3. In addition, as part of the WHC MCS, a Milestone Control Log and Dictionary will be maintained to provide definition, control, and tracking on each DOE-HQ and DOE-RL controlled milestone.
- On a monthly basis, WHC tracks actual progress against the Level 0 and Level 1 schedules. Schedule status is reported by each project team member, and the status is reviewed by DOE-RL/WHC project management. Appropriate corrective actions are initiated to rectify schedule variances as they are identified.
- The DOE-RL project office conducts periodic analysis of project schedules to ensure the accuracy of the monthly data.

The Level 1 Master Project Schedule presented in this section is the working schedule used to plan, status, and report on the Project. This document integrates all facets of the Project.

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MANAGEMENT

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Office of Site and Facility Transfer

G. J. BRACKEN
Project Manager
Purex/UO3 Deactivation Project

MASTER PRO

PUREX/UO3 DEA

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ACTIVITY MILESTONE		FISCAL YEAR 1994: Oct	Jan	Apr	Jul	Oc
1						
1.01.200.999YZ	PUREX CLOSURE PLAN COMPLETED					
2						
2.01	**203-A FACILITY DEACTIVATION					
2.01.E1Z.850	203-A UNH AREA DEACTIVATED					
2.02	**211-A DEACTIVATION					
2.02.7ZZ.850	211-A CHEMICAL STORAGE AREA DEACTIVATED					
2.03	****CANYON					
2.03.18Z.850	SLUG STORAGE BASIN DEACTIVATED					
2.03.1ZZ.850	SINGLE-PASS FUEL RETURNED					
2.03.29Z.850	N REACTOR FUEL RETURNED					
2.03.3ZZ.850	ZIRCONIUM HEEL STABILIZATION COMPLETED					
2.03.420.850Z	TANK D5-E6 ENGINEERING STUDY COMPLETED					
2.03.4ZZ.850	PU-U SOLUTION DISPOSAL COMPLETED					
2.03.5ZZ.850	PUREX CANYON FLUSHING COMPLETED					
2.03.658.850	E-F11 CONCENTRATOR DEMONSTRATION COMPLETED					
2.03.6ZZ.850	E-F11 CONCENTRATOR OPERATION COMPLETED					
2.03.7CZ.800	TANK FARM WASTE LINES ISOLATED					
2.03.85Z.800	CANYON CRANES DEACTIVATED					
2.05	**PUREX ANCILLARY BUILDINGS DEACTIVATION					
2.05.42Z.850	GROUP 1 DEACTIVATION					
2.05.43Z.850	GROUP 2 DEACTIVATION					
2.05.44Z.850	GROUP 3 DEACTIVATION					
2.05.45Z.850	GROUP 4 DEACTIVATION					
2.05.46Z.850	GROUP 5 DEACTIVATION					
2.05.47Z.850	GROUP 6 DEACTIVATION					
2.05.4ZZ.850	ANCILLARY BUILDINGS DEACTIVATED					
2.06	**N CELL / Q CELL / PR ROOM					
2.06.1ZZ.850	PR ROOM DEACTIVATION COMPLETED					
2.06.2ZZ.850	HOT SHOP/M CELL CLEANOUT COMPLETED					
2.06.3ZZ.850	N CELL STABILIZATION COMPLETED					
2.06.47Z.850	Q CELL CLEANOUT COMPLETED					
2.07	**STORAGE GALLERY					
2.07.ZZZ.850	STORAGE GALLERY DEACTIVATED					
2.08	**SAMPLE GALLERY					
2.08.CZZ.850	SAMPLE GALLERY DEACTIVATED					
2.09	**P&O GALLERY/WHITE ROOM DEACTIVATION					
2.09.2ZZ.850	PIPE & OPERATING GALLERY DEACTIVATED					
2.10	**AMU SCHEDULE					
2.10.5ZZ.850	AMU DEACTIVATED					

▽ DOE-HQ CONTROLLED MILESTONE

△ DOE-RL CONTROLLED MILESTONE

△ WHC CONTROLLED MILESTONE

JECT SCHEDULE

CTIVATION PROJECT

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Transition
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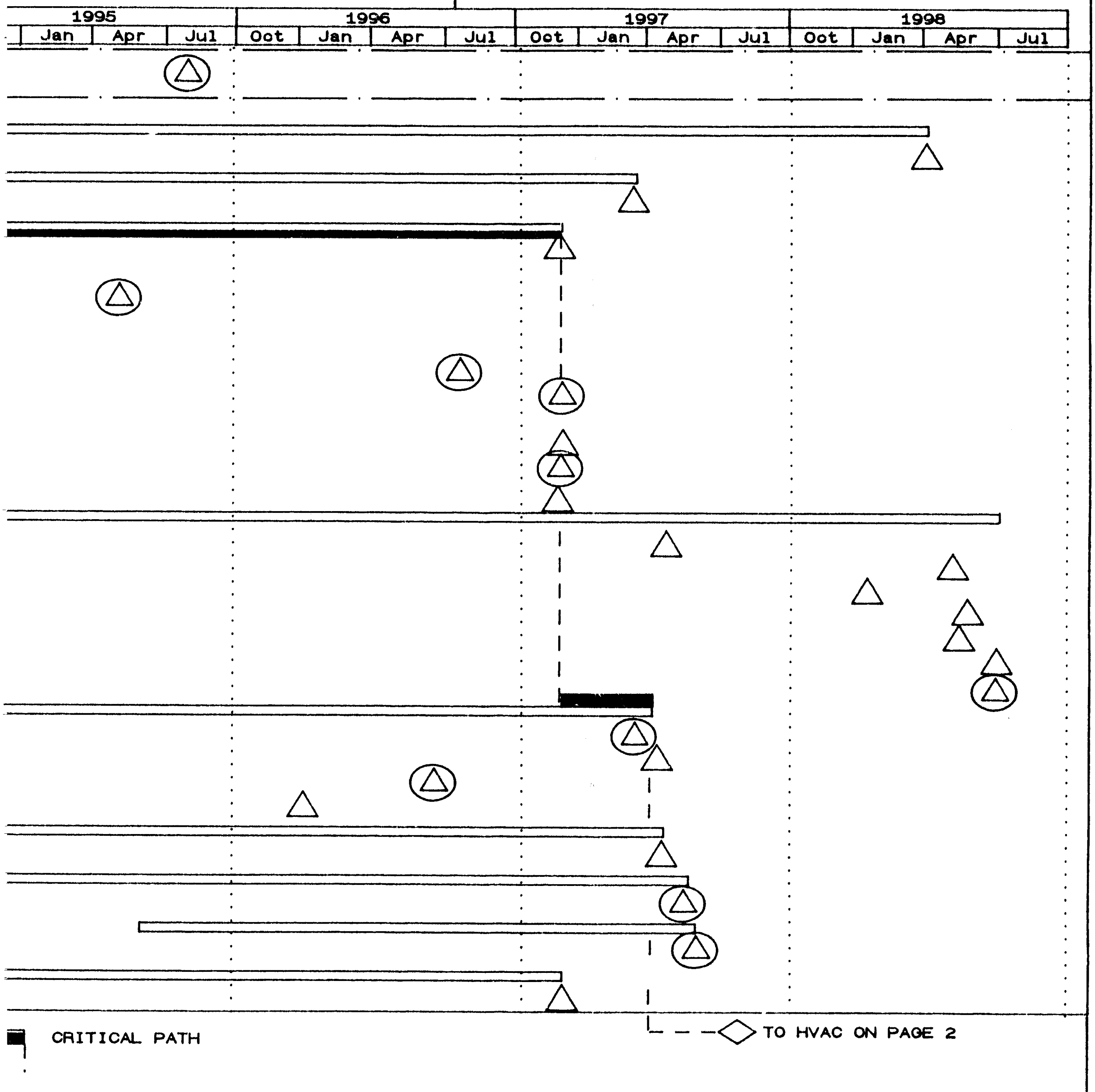
agement

ORIG. PLAN APPR. Sept. 93 (Date)

LAST PLAN CHG. ________ (Date)

STATUS AS OF ________ (Date)



MASTER PROJ

PUREX/U03 DEAC

ACTIVITY	MILESTONE
2	
2.12	**UTILITY/SUPPORT SYSTEMS
2.12.153.314Z	CRITICALITY ALARM SYSTEM DEACTIVATED
2.12.2ZZ.850	ELECTRICAL POWER CONSOLIDATION COMPLETED
2.12.3ZZ.800	HVAC SYSTEM CONSOLIDATION COMPLETED
2.12.425.899Z	FIRE SUPPRESSION SYSTEMS DEACTIVATION
2.12.515.850	RAW WATER SYSTEM ISOLATED
2.12.53Z.850	SANITARY WATER SYSTEM ISOLATED
2.12.55Z.850	MAIN STEAM HEADER ISOLATED
2.12.590.850	COMPRESSED AIR SYSTEMS DEACTIVATED
2.12.635.850Z	ELECTRONIC MONITORING SYSTEM OPERATIONAL
2.12.942.850	PUREX LIQUID EFFLUENT DISCHARGE DISCONTINUED
2.12.A21.850	EAST/WEST LABORATORY HOOD EXHAUST DEACTIVATED
2.12.A23.850	EAST SAMPLE GALLERY EXHAUST DEACTIVATED
2.12.A25.850	WHITE ROOM EXHAUST DEACTIVATED
2.12.A27.850	EAST SAMPLE GALLERY HOOD EXHAUST DEACTIVATED
2.12.A27.855	WEST SAMPLE GALLERY EXHAUST DEACTIVATED
2.12.A28.850	WEST SAMPLE GALLERY HOOD EXHAUST DEACTIVATED
2.14	LABORATORY DEACTIVATION ISOLATION
2.14.17C.850	ANALYTICAL LABORATORY DEACTIVATED
2.15	**RECOVERED ACID DISPOSITION
2.15.ZZZ.850	NITRIC ACID DISPOSAL COMPLETED
3	
3.	*******U03 TRANSITION*******
3.03.YYZ.850	POWDER HANDLING EXHAUST DEACTIVATED
3.03.YZZ.850	POWDER HANDLING LOADOUT HOOD EXHAUST DEACTIVATED
3.04.YYZ.850	U03 PLANT PHASE I DEACTIVATION COMPLETED
3.05.19Z.850	U03 STORMWATER DIVERSION COMPLETED
3.06.24Z.850	VESSEL VENT/CALCINER EXHAUST DEACTIVATED
3.06.24Z.851	U03 PROCESS CONDSENATE DISCHARGE DISCONTINUED
3.06.25Z.850	U03 COOLING WATER DISCHARGE DISCONTINUED
3.06.333.850	U03 SNM FINAL ACCOUNTABILITY RECONCILED
3.06.YZZ.850	U03 PLANT DEACTIVATION COMPLETED
3.08.122.850	U03 PLANT SURVEILLANCE PROCEDURES COMPLETED
4	
4	*******PROJECT MANAGEMENT*********
4.02.820.850	PUREX SNM FINAL ACCOUNTABILITY RECONCILED
4.03.701.850	PUREX PLANT SURVEILLANCE & MAINTENANCE PLAN COMP
4.03.702.850	PUREX SURVEILLANCE PROCEDURES COMPLETED
4.03.YZZ.850	PUREX DEACTIVATION COMPLETED
4.05.130.850	PROJECT SAFETY BASIS PACKAGE SUBMITTED
4.07.10Z	DEACTIVATION COST ESTIMATE SUBMITTED

FISCAL YEAR: 1994 — Oct | Jan | Apr | Jul

▽ DOE-HQ CONTROLLED MILESTONE

△ WHC CONTROLLED MILESTONE

△ DOE-RL CONTROLLED MILESTONE

ECT SCHEDULE

TIVATION PROJECT

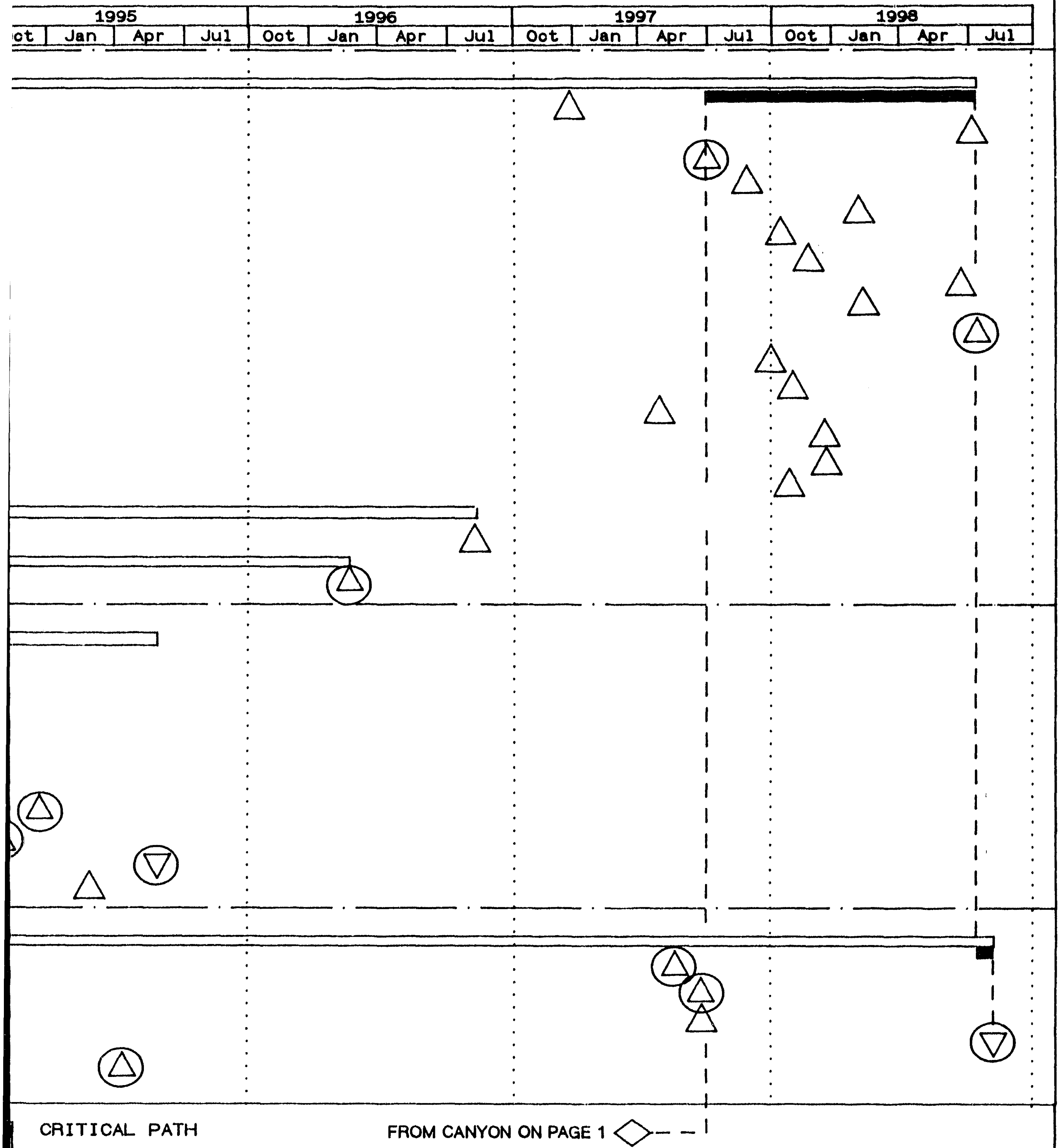


Table 4.2-1. Controlled Milestones (2 sheets).

MS. NO.	DESCRIPTION	MS LEVEL 0 HQ	1 RL	2 WHC	PLANNED COMPLETION DATE
4.07.10Z	Deactivation cost estimate submitted		X		10/31/93
3.03.YYZ.850	Powder Handling Exhaust deactivated			X	03/15/94
3.03.YZZ.850	Powder Handling Loadout Hood Exhaust deactivated			X	03/15/94
3.04.YYZ.850	UO_3 Plant Phase I Deactivation completed		X		03/15/94
2.02.658.850	E-F11 Concentrator Demonstration Completed		X		03/16/94
2.03.420.850Z	Tank D5/E6 Engineering Study completed		X		04/08/94
3.06.24Z.850	Vessel Vent/Calciner Exhaust deactivated			X	08/24/94
3.05.19Z.850	UO_3 Stormwater Diversion completed			X	09/19/94
3.06.24Z.851	UO_3 Process Condensate Discharge discontinued		X		09/26/94
2.03.1ZZ.850	Single-Pass Fuel returned		X		10/17/94
3.06.333.850	UO_3 SNM Final Accountability reconciled		X		10/19/94
2.03.3ZZ.850	Zirconium Heel Stabilization completed		X		10/19/94
3.06.25Z.850	UO_3 Cooling Water Discharge discontinued		X		12/21/94
3.08.122.850	UO_3 Plant Surveillance procedures completed			X	02/17/95
4.05.130.850	Project Safety Basis Package submitted		X		04/11/95
2.03.29Z.850	N Reactor Fuel returned		X		05/03/95
3.06.YZZ.850	UO_3 Plant Deactivation completed	X			05/16/95
1.01.200.999YZ	PUREX Closure Plan completed		X		07/31/95
2.06.47Z.850	Q Cell Cleanout completed			X	01/09/96
2.15.ZZZ.850	Nitric Acid Disposal completed		X		02/24/96
2.06.3ZZ.850	N Cell Stabilization completed		X		06/17/96
2.03.4ZZ.850	Pu-U Solution Disposal completed		X		07/22/96
2.14.17C.850	Analytical Laboratory deactivated			X	07/22/96
2.03.18Z.850	Slug Storage Basin deactivated			X	12/04/96
2.03.5ZZ.850	PUREX Canyon Flushing completed		X		12/04/96
2.03.6ZZ.850	E-F11 Concentrator Operation completed			X	12/04/96
2.10.5ZZ.850	AMU deactivated			X	12/04/96
2.12.153.314Z	Criticality Alarm System deactivated			X	12/20/96
2.03.85Z.800	Canyon Cranes deactivated			X	12/04/96
2.03.7CZ.800	Tank Farm Waste Lines isolated		X		12/04/96
2.06.1ZZ.850	PR Room Deactivation completed		X		03/19/97
2.02.7ZZ.850	211-A Chemical Storage Area deactivated			X	03/19/97
2.06.2ZZ.850	Hot Shop/M Cell Cleanout completed			X	04/14/97

Table 4.2-1. Controlled Milestones (2 sheets).

MS. NO.	DESCRIPTION	MS LEVEL 0 HQ	1 RL	2 WHC	PLANNED COMPLETION DATE
2.08.CZZ.850	Sample Gallery deactivated		X		04/22/97
2.07.ZZZ.850	Storage Gallery deactivated			X	04/22/97
2.05.42Z.850	Group 1 deactivated			X	04/25/97
2.12.A25.850	White Room Exhaust deactivated			X	04/29/97
4.02.820.850	PUREX SNM Final Accountability reconciled		X		05/16/97
2.09.2ZZ.850	Pipe & Operating Gallery deactivated		X		06/02/97
4.03.701.850	PUREX/UO_3 Plant Surveillance & Maintenance Plan completed		X		06/24/97
4.03.702.850	PUREX Surveillance Procedures completed			X	06/24/97
2.12.3ZZ.800	HVAC System Consolidation completed		X		06/25/97
2.12.425.899Z	Fire Suppression Systems deactivated			X	08/28/97
2.12.A21.850	East/West Laboratory Hood Exhaust deactivated			X	09/29/97
2.12.53Z.850	Sanitary Water System isolated			X	10/13/97
2.12.A28.850	West Sample Gallery Hood Exhaust deactivated			X	10/24/97
2.12.A23.850	East Sample Gallery Exhaust deactivated			X	10/27/97
2.12.55Z.850	Main Steam Header isolated			X	11/14/97
2.12.A27.855	West Sample Gallery Exhaust deactivated			X	12/12/97
2.12.A27.850	East Sample Gallery Hood Exhaust deactivated			X	12/12/97
2.05.44Z.850	Group 3 deactivated			X	01/22/98
2.12.515.850	Raw Water System isolated			X	02/06/98
2.12.635.850Z	Electronic Monitoring System operational			X	02/14/98
2.01.E1Z.850	203-A UNH Area deactivated			X	04/06/98
2.05.43Z.850	Group 2 deactivated			X	05/08/98
2.05.46Z.850	Group 5 deactivated			X	05/14/98
2.05.45Z.850	Group 4 deactivated			X	05/22/98
2.05.47Z.850	Group 6 deactivated			X	06/01/98
2.05.4ZZ.850	Ancillary Buildings deactivated		X		06/01/98
2.12.2ZZ.850	Electrical Power Consolidation completed			X	06/15/98
2.12.942.850	PUREX Liquid Effluent discharge discontinued		X		06/17/98
2.12.590.850	Compressed Air Systems deactivated			X	06/22/98
4.03.YZZ.850	PUREX Deactivation completed	X			07/31/98

4.3 COST BASELINE

The cost baseline for the Project is the time-phased cost estimate to complete the deactivation activities and turn the plants over to the Hanford Surplus Facilities Program. The following were used to develop the cost estimate:

- Defining the Project's technical and endpoint requirements
- Identifying and scheduling the individual work elements required to meet the requirements
- Systematically organizing the work elements in a WBS
- Estimating the resources needed to complete the work elements in the WBS using a uniform set of estimating assumptions
- Integrating the resource requirements at the PSWBS level.

The Project cost estimate is referred to as a baseline because it is integrated with the technical and schedule baselines and is subject to formal change control. The cost estimate for the PUREX/UO_3 Deactivation Project is shown in Table 4.3-1.

The cost baseline is contained in the WHC Facility Operations Fiscal Year Work Plan (WHC 1993a). The Fiscal Year Work Plan details the scope of work to be performed each fiscal year and defines the baseline cost estimate for the year. Annual approval of the Fiscal Year Work Plan accommodates changes due to revised programmatic requirements, budget constraints, or unplanned conditions or changes that may arise. Project workscope information in the Fiscal Year Work Plan is extracted from the Project management plan.

Table 4.3-1. Project Cost Estimate ($ Millions).

Activity	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	TOTAL
1KP1 PUREX Surveillance and Maintenance	34.0	34.0	34.0	32.0	24.0	2.0	160.0
1KP2 UO_3 Surveillance and Maintenance	4.5	0.5	*0.0	0.0	0.0	0.0	5.0
1KP4 Deactivation/ Compliance Actions	10.3	17.5	16.0	16.0	9.0	0.0	68.8
Total	48.8	52.0	50.0	48.0	33.0	2.0	**233.8

Assumptions built into Required Scope

- Reduction in OSR requirements completed by 03/31/94 $1 Million
- Productivity improvement initiated 10/01/94 $2 Million

*Assumes UO_3 Plant transfer to HSFP in FY 95
**Includes $2 Million in FY 99 for HSFP surveillance budget

FY 94 Funding

FY 94 ADS Funding	46.8
FY 93 PUREX Carryover	2.0
Total	48.8

4.3.1 Basis for Cost Estimate

The Project Cost Estimate is based on existing work rules and historical productivity, and therefore represents conditions expected during the deactivation activities. The level of confidence in the estimate is similar to that expected at the end of the conceptual design phase of a major project, if the work is performed and controlled as described in the project management plan.

The following are key planning assumptions used to prepare the cost estimate.

- D&D activities will not be performed for at least 10 years beyond the completion of deactivation activities.

- The deactivation activities are all covered by existing PUREX NEPA documentation, *Operation of PUREX and Uranium Oxide Plant Facilities* (DOE/EIS 0089) (DOE 1983). Any additional NEPA documentation will be completed in parallel with other Project activities with additional resources.

- Partial closure of the RCRA waste treatment, storage, and disposal (TSD) systems will be adequate for deactivation. The partial closure activities and compliance requirements for deactivation will be addressed by modifying the existing RCRA Part A interim status permit and/or the Tri-Party Agreement.

- Air and water permitting activities will be completed in parallel with other Project activities and will be completed within six months of Project start. The safety documentation and the codes and standards strategies outlined in the project management plan will be pursued concurrent with other deactivation tasks. These strategies are considered enhancements and are not prerequisites to the initiation of work activities.

- Tank Farms' double-shell waste tanks and the 242-A Evaporator will be available to support deactivation activities at the planned liquid waste discharge rate of not less than 87,000 L/month (23,000 gal/month) and a total waste volume of 5.7 million L (1.5 million gal).

- Use of the existing 216-B-3 pond for liquid effluent discharges will be limited and ultimately terminated by June 1995, in response to the Tri-Party Agreement commitments. The 200 Area Treated Effluent Facility will be available on schedule to compensate for loss of 216-B-3 pond access.

- Trained and qualified personnel are available to perform deactivation activities, eliminating the need to train new workers.

- Work inefficiencies are expected for radiation work involving respirators or supplied air, for the holiday months of November, December, and July, and for outdoor work from mid-November through mid-February.

- Pre-activity reviews will be conducted by the Plant staff or Plant Review Committee. No other operational readiness reviews will be required.

- Third party reviews, such as the Surplus Materials Peer Review and the Defense Nuclear Facilities Safety Board, will be conducted in parallel with deactivation tasks.

- Technical planning bases for the Project will be implemented as described. There is no Project contingency for deviations.

- Deactivation will begin October 1, 1993, using the project management plan baselines.

- Budget will be provided as planned in the funding profile.

Appendix C, "Risk and Uncertainties Evaluation and Management," provides a subjective evaluation of project risk and examines areas of traditional project cost growth.

4.3.2 Cost Estimate Method

The cost estimate was prepared by Project Time & Cost, Inc., under contract with the U.S. Army Corps of Engineers, Walla Walla District. The estimating methodologies and practices conformed to the Cost Engineer Code of Ethics as published by AACE International (formerly the American Association of Cost Engineers). The estimate is an activity based cost estimate.

The resource data used to prepare the cost estimate are derived from current cost data and staffing requirements for existing work elements that continue for the duration of the Project and from technical work descriptions and schedules prepared for each deactivation activity.

The estimate for each work element was reviewed by knowledgeable plant staff for uniformity and reasonableness prior to acceptance into the cost estimate.

The resources were priced using labor rates developed from the existing financial system. The indirect costs, including steam and water use assessments, organization overheads, material procurement, and general and administrative burdens, were similarly developed.

Comparisons of the deactivation resource mix with the existing resource mix were made, and the changes reconciled with work content differences. Where necessary, cost allowances were made based on historic usage rates, including materials and KEH construction forces. No contingency has been provided in the estimate.

5.0 PROJECT MANAGEMENT CONTROL SYSTEM

5.1 PROJECT MANAGEMENT CONTROL SYSTEM

The Management Control System (MCS) implemented on the PUREX/UO_3 Deactivation Project uses the WHC MCS, documented in WHC-CM-2-5, *Management Control System*.

The Project MCS provides a uniform approach to be used throughout the Project. The primary goal of this management system is to ensure planning and execution of this Project in a manner that is technically sound, timely, and cost-effective. All planning is identified and correlated to the Project Summary WBS.

The system focuses on establishing and controlling baselines at the overall project level and at the principal functional organization level. The summary project level baselines are managed by DOE-RL.

WHC has developed the Contract WBS to identify and manage the associated technical, cost, schedule, and funding documentation. This information constitutes the detailed technical cost and schedule baselines.

In addition, the system is designed to have an upward flow of integrated, summarized information from WHC to DOE-RL and then to DOE-HQ, ensuring timely management decision-making by the Project team. This is accomplished by the following.

- Provide a WBS that is integrated with the function organization structure and that defines the Project in a disciplined manner from the total project level to the detailed, manageable packages of work for which a technical scope of effort and associated schedule and budget are established and responsibility for performance of work is assigned.

- Ensure that the Project's MCS is interfaced and capable of organizing, planning, scheduling, budgeting, accounting, and reporting work in a timely, consistent manner.

- Obtain technical, schedule, cost, and funding information in the format and level of detail necessary to meet management and reporting needs.

- Integrate the submitted data to derive the Project status and progress against planned accomplishments.

- Evaluate and analyze the information to identify key problems that require management decision and corrective actions be taken.

- Correlate the Project funding profile with planned commitments, expenditures, and work accomplished to date.
- Process the information for exception reporting.
- Prepare and control changes that impact established workscope, budgets, and schedules.

5.2 COST AND SCHEDULE PERFORMANCE MEASUREMENT

Detailed cost, schedule, and funding baselines have been established for the Project in accordance with the WHC MCS documented in WHC-CM-2-5, *Management Control System*. The major steps in performance measurement are shown in Figure 5.2-1.

Employing these systems, the following will be accomplished.

- Use and maintain internal cost and schedule performance measurement information that provides responsible managers with timely, objective performance data.

- Track actual Project progress against baseline budget estimates and schedule milestones on a monthly basis. Cost and schedule status will be monitored using earned value techniques to determine work progress. Reports that describe the Project cost and schedule status and identify undesirable variances will be reviewed by management. Appropriate corrective action will be initiated to rectify cost and schedule variances as they are identified.

- Monitor cost and schedule trends to promptly identify potential favorable or unfavorable trends for management review and action.

- Provide a cost performance report (CPR) that integrates all elements of the project for submittal monthly. The CPR will be part of the Facility Operations Site Management System (SMS) report. Earned value progress and any changes in estimate-at-completion will be included in the CPR.

- Provide a variance analysis by WBS element corresponding to the CPR, highlighting situations that exceed the established reporting thresholds. The analysis will be for incremental and cumulative data and will include a statement of the problem and the action taken or recommended for correction.

  The variance thresholds assigned for all variances are based on the Budgeted Cost of Work Scheduled (BCWS) as follows:

  - BCWS < \$500,000 = ±10% and ±\$10,000

  - BCWS ≥ \$500,000 = ±\$50,000.

With these systems, analyses and trends are developed to (1) analyze significant deviations from planned work, (2) develop any necessary work-around plans so that unfavorable deviations can be minimized, (3) develop revised estimates at completion when the deviations cannot be minimized, and (4) provide the data necessary for both WHC and DOE reports.

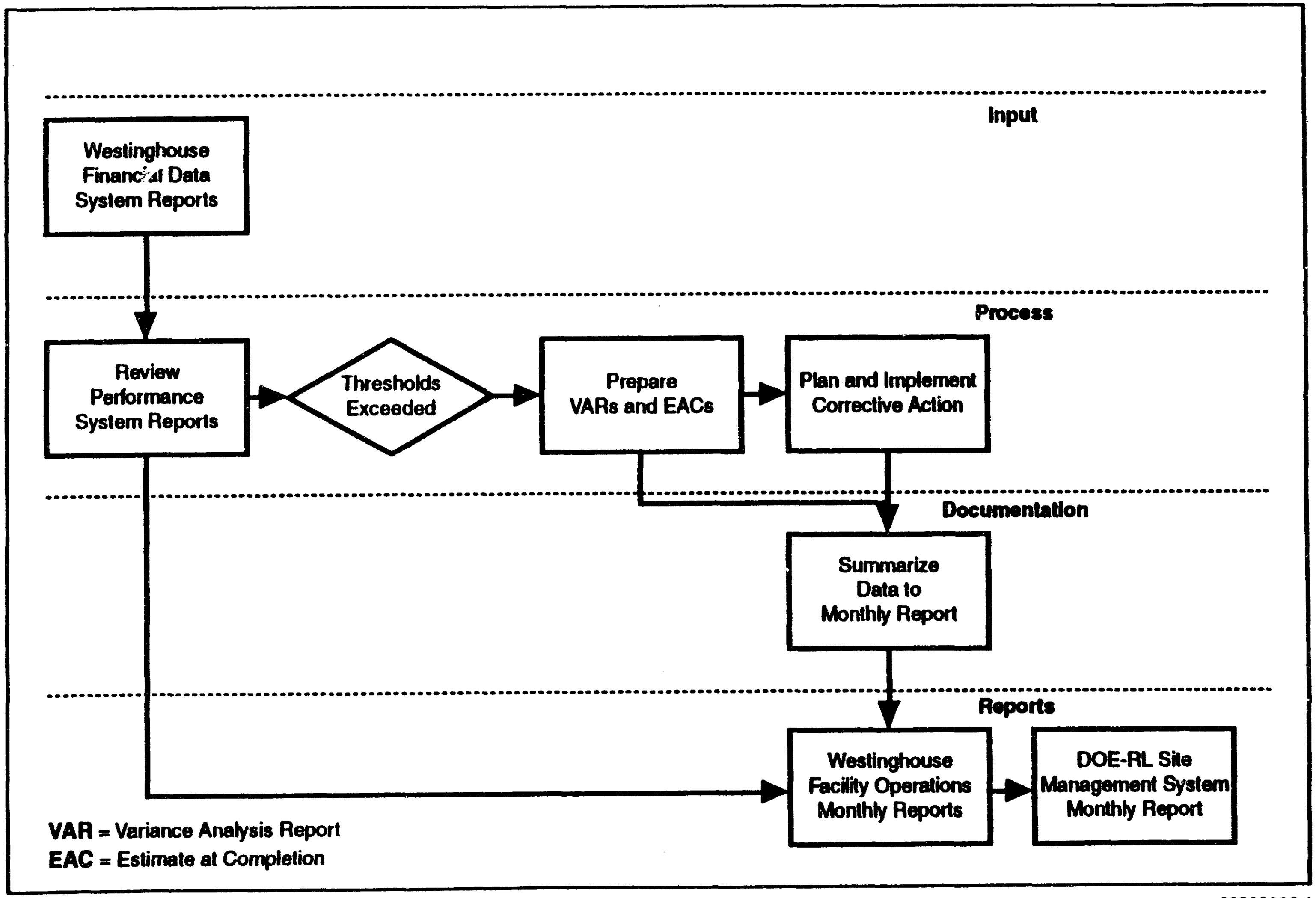


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Figure 5.2-1. Performance Analysis and Report Development Process.

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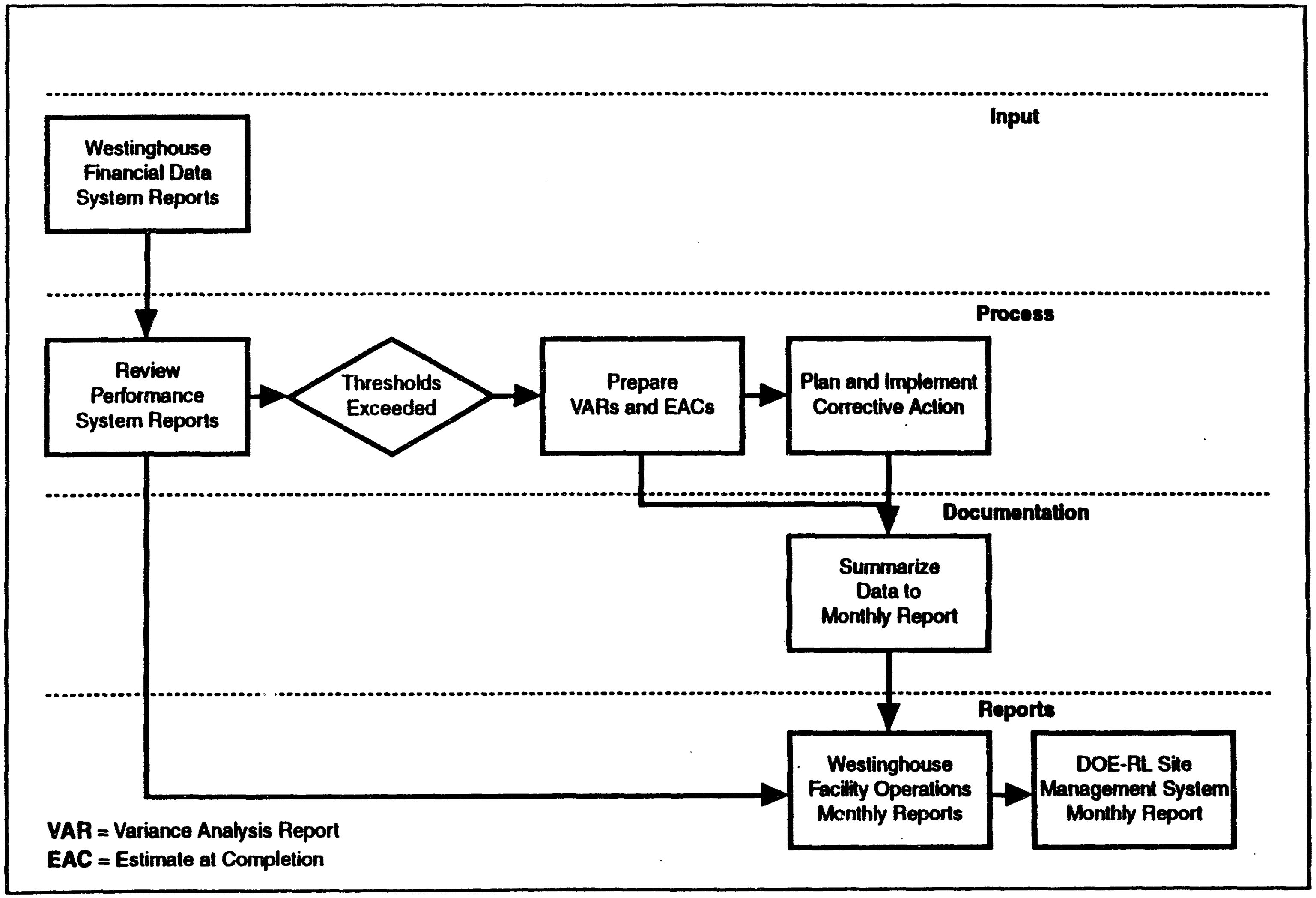

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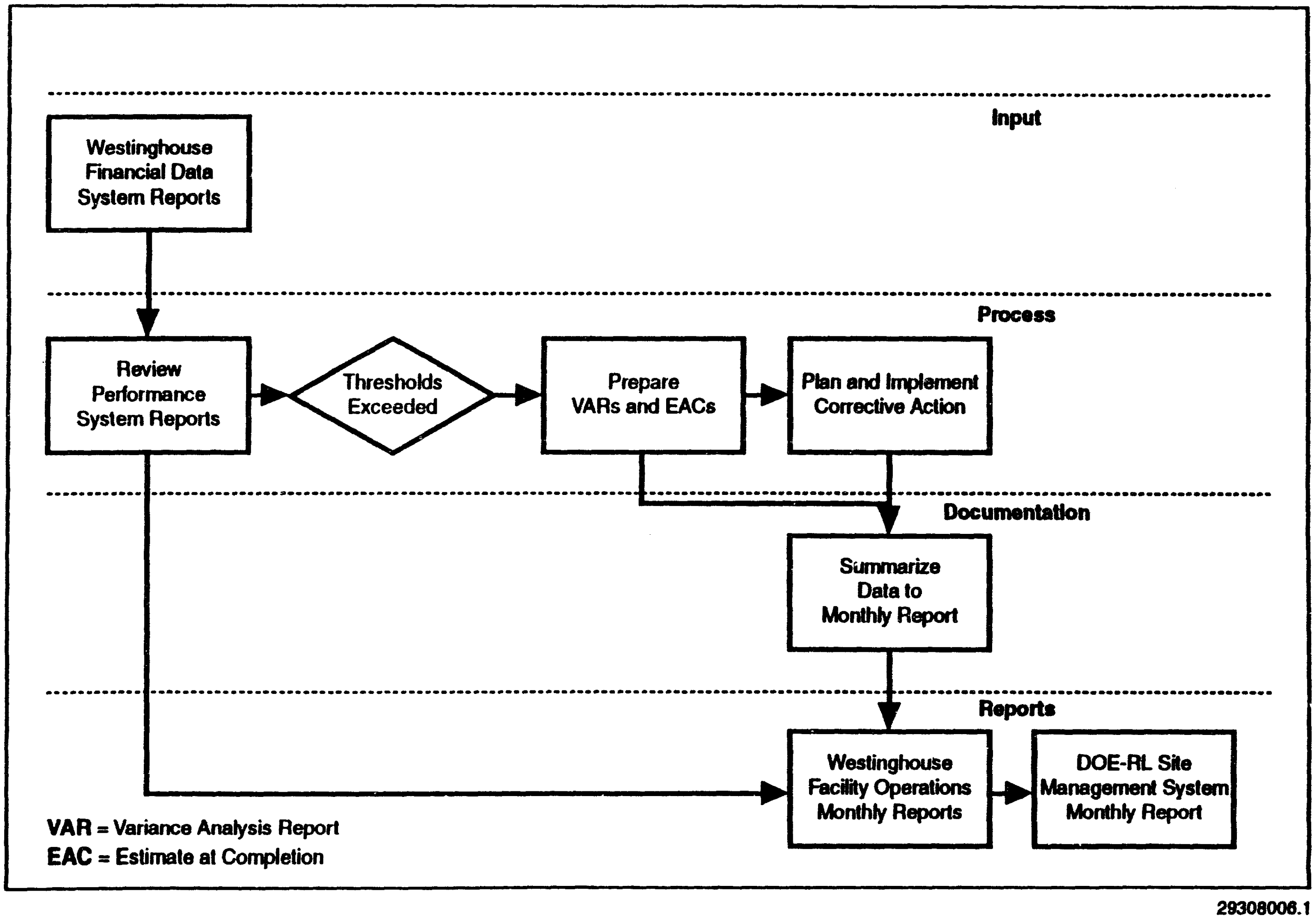

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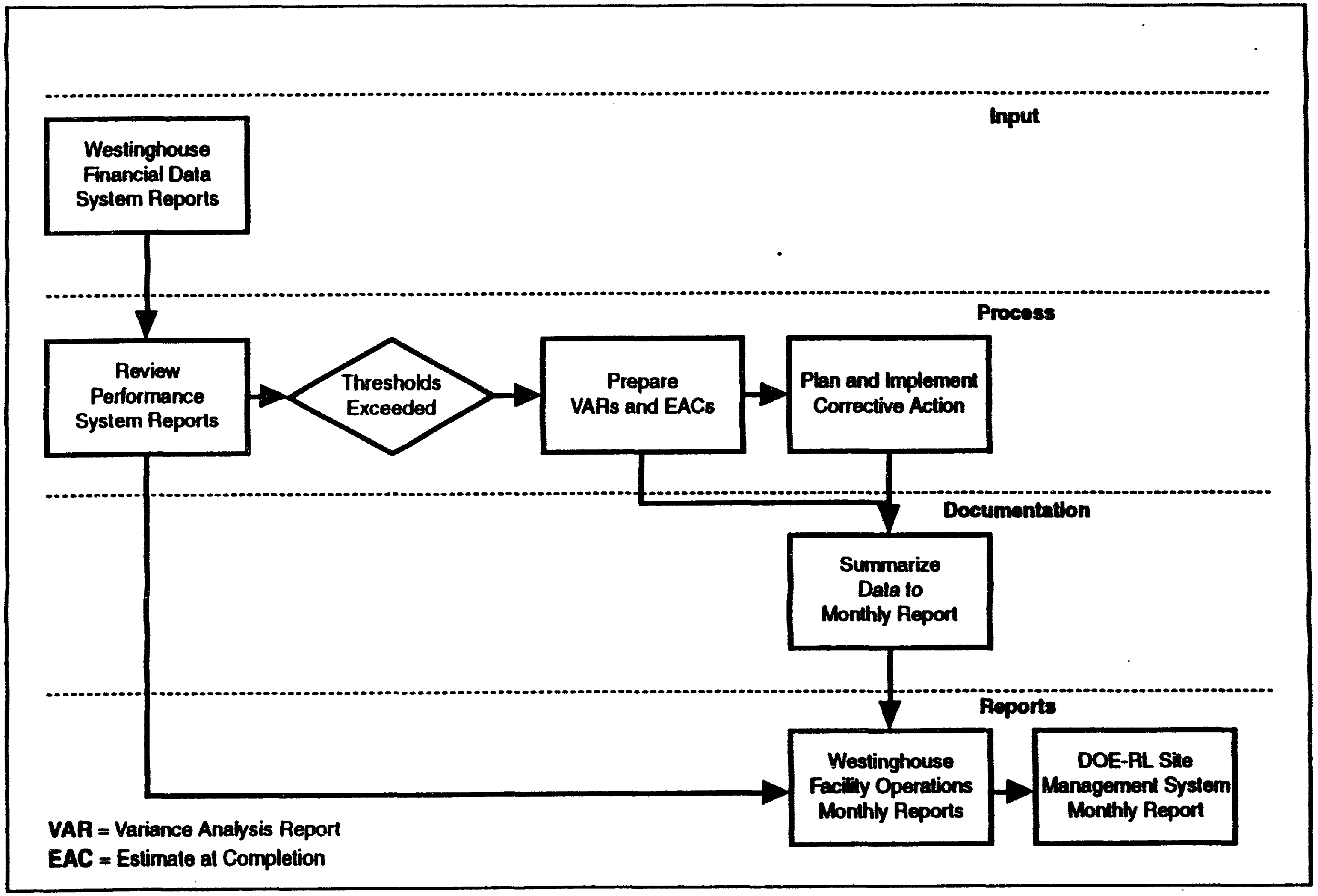

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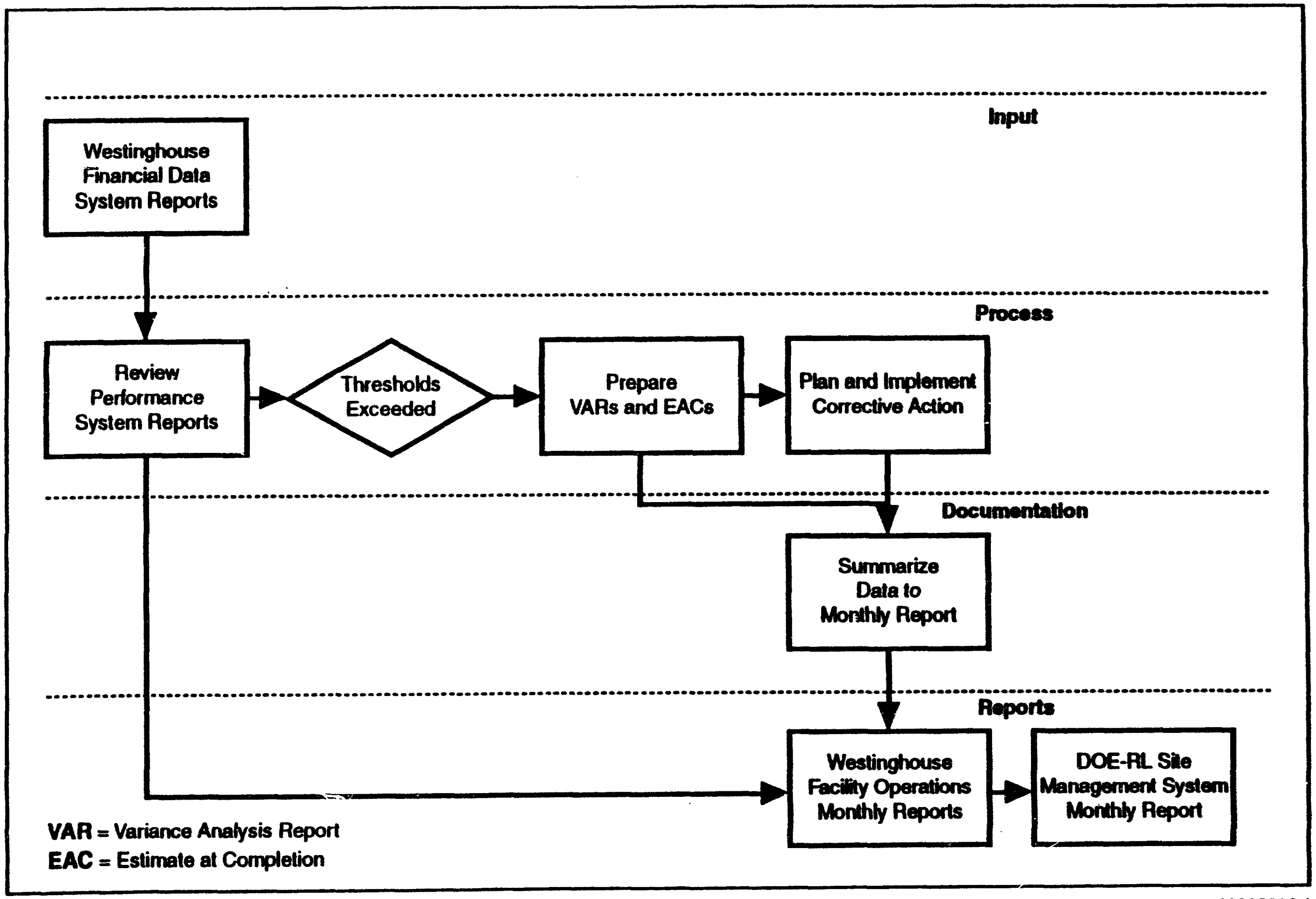

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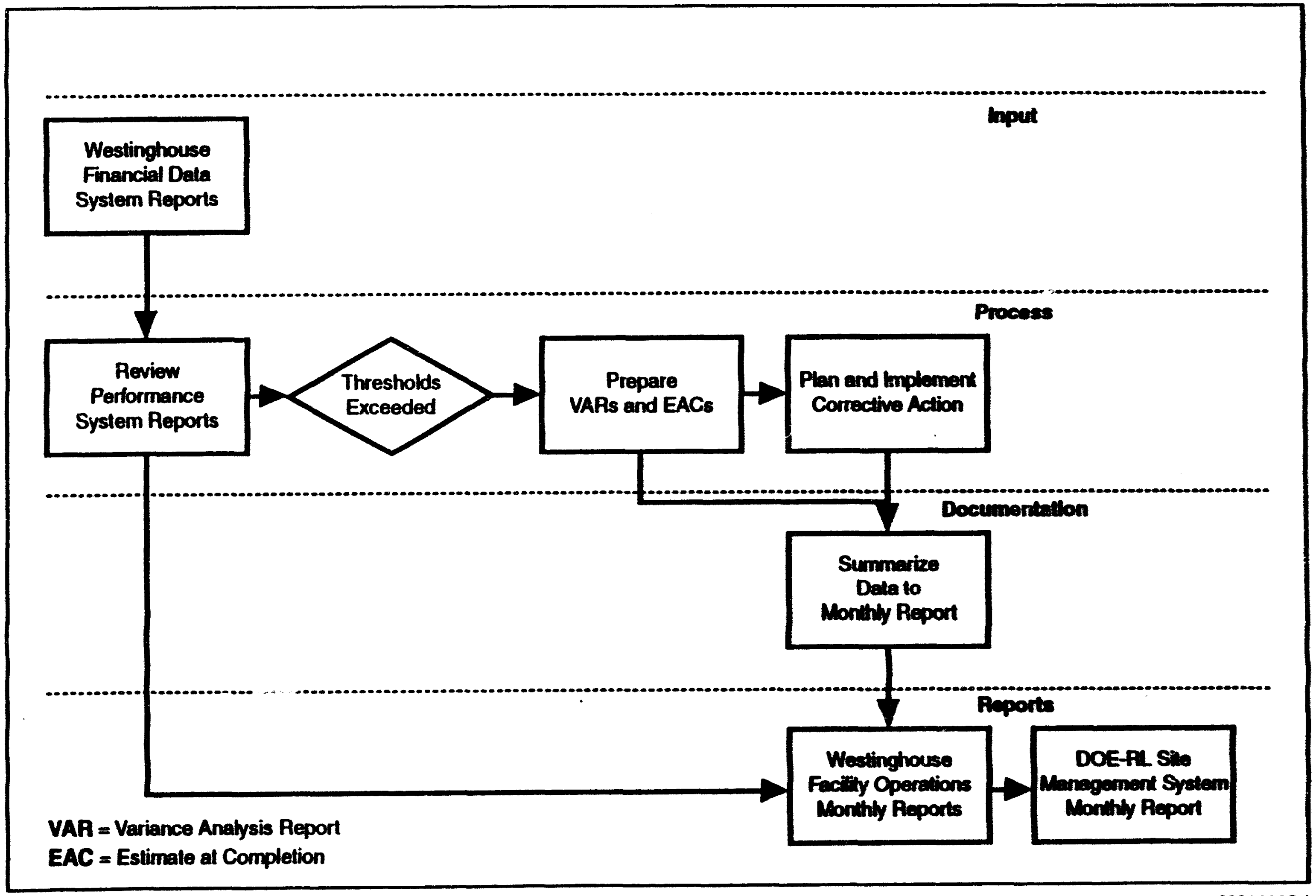

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5.3 BASELINE CHANGE CONTROL

Changes to the Project cost, schedule, and technical baselines are classified as Class 0, Class I, Class II, or Class III, according to the magnitude of impact. The change classifications are used to identify the approval authority. Types of baseline changes and the associated change classes are identified in Table 5.3-1.

Class 0 changes require DOE-HQ approval; Class I changes require DOE-RL approval; Class II and III changes require WHC approval. Although current DOE-HQ guidance refers to level 0 and level I as DOE-HQ approval levels, the Project intends to use the SMS terminology, which designates all DOE-HQ changes as level 0.

Project changes are processed by WHC in accordance with WHC-CM-2-5, *Management Control Systems*, Section 4.1, "Change Control."

Table 5.3-1. Change Classifications.

Baseline	Change Classifications			
	0 DOE-HQ	I DOE-RL	II WHC	III WHC
Schedule Baseline				
DOE-HQ major milestone dates and descriptions	X			
DOE-RL major and *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) milestones dates and descriptions		X		
WHC Project Office controlled key milestone dates and descriptions			X	
Significant "other" WHC milestone dates defined in Cost Account Authorizations (CAA) and lower level schedules				X
Cost Baseline				
Changes ± to Total Project Cost (TPC) in Activity Data Sheets	X			
Changes to project Financial Summary at End Function - "KP" level		X		
Changes to project Financial Summary at Activity - "KPX" - and cost account - "KPXX" level			X	
WHC CAA replanning that doesn't affect TPC at the cost account level				X
Technical Baseline				
Project management plan changes affecting controlled milestones, milestone descriptions, or cost baseline	Change classification determined by related cost and/or schedule baseline			
Change to approved project summary work breakdown structure dictionary		X		
Change to approved contract work breakdown structure dictionary			X	
Changes to approved project safety analysis reports and Operational Safety Requirements	Approval Authority determined using WHC-CM-1-3, *Management Requirements and Procedures*, MRP 5.43, "Impact Levels"			
Changes to approved project environmental documentation	X			

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6.0 INFORMATION AND REPORTING

6.1 MANAGEMENT REPORTING

Management reporting provides timely, accurate, exception data to apprise WHC and DOE management of current and projected Project conditions. Information contained in these reports is obtained from the same database that supports day-to-day management by WHC.

The Project uses the Facility Operations SMS Report to provide Project status.

6.1.1 Facility Operations Site Management System Report

Reporting for the PUREX/UO_3 Deactivation Project is incorporated in the consolidated monthly Facility Operations SMS Report, which is prepared by the WHC Facility Operations Division for DOE-RL. The SMS Report summarizes performance and compares it with the technical, schedule, and cost baselines contained in the Facility Operations Fiscal Year Work Plan. The report provides the data required by the DOE-HQ Progress Tracking System.

6.1.2 PUREX/UO_3 Deactivation Project Manager's Progress Report

The Facility Operations SMS report is the PUREX/UO_3 Deactivation Project Manager's Progress Report. The report consists of two parts: the Cost Performance Report (CPR) and the Milestone Schedule Status Report (MSSR).

6.1.2.1 Cost Performance Report. The CPR is submitted monthly. The report includes the following:

- Cost performance by WBS
- Problem/Variance Analysis.

The CPR is summarized at the PSWBS (Level 3 WBS) activity. Variance analyses are prepared for those accounts that fall outside of the Project +/- threshold.

6.1.2.2 Milestone Schedule Status Report. The MSSR is submitted monthly with the CPR. The report includes the following items:

- A statused baseline Project schedule
- A statused DOE milestone list
- A brief narrative of current schedule position.

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6.2 MANAGEMENT REVIEWS

6.2.1 DOE-HQ Project Management Reviews

Throughout the life of the Project, DOE-HQ Project Management Review meetings will be scheduled by DOE-RL with the appropriate personnel from DOE-HQ, DOE-RL, and WHC. DOE-HQ Project Management Review meetings will occur on a regular basis, typically once a quarter.

WHC will be responsible for preparing and issuing the agenda and recording action items, agreements, and commitments that result from the meeting. Quarterly reviews focus on significant accomplishments since the previous meeting, expected accomplishment for the next quarter, and major problems and issues facing the Project, as well as current cost, schedule, and technical status.

6.2.2 DOE-RL Project Status Review

A less formal, monthly Project Status Review meeting is conducted by DOE-RL and WHC. The review of PUREX/UO_3 Deactivation Project status is included in the consolidated monthly Facility Operations SMS Program Manager's review meeting. The review is conducted by the DOE-RL Operations and Transition Division Director and the WHC Facility Operations Vice President.

6.2.3 Special Reviews

As required, DOE and WHC hold special topic Project meetings to review progress, issues and action items requiring management decisions, change actions, and other items as necessary.

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7.0 SUPPORTING PLANS

7.1 ENVIRONMENTAL, SAFETY AND HEALTH

The intent of the Project is to comply with all applicable DOE requirements and the Tri-Party Agreement. These requirements protect workers, the public, and the environment, and will be applied using an approach that considers risk and the plants' life cycle status. The Project's Environmental, Safety and Health Program includes the following functions: environmental protection, occupational safety, fire protection, industrial hygiene, health physics, process and facilities safety, nuclear safety, emergency preparedness, and radioactive and hazardous waste management.

Most Project activities are the same as, or are similar to, activities that occurred during prior operations or during the standby period subsequent to the final plant operation in 1990. Therefore, it is expected that the WHC policies and procedures that are now in effect at PUREX and UO_3 Plant will be the same during deactivation. This premise is being validated by the processes described in Appendix A and F of this PMP. If procedures are determined to be inadequate, the inadequacies will be corrected before the impacted work is started.

During deactivation, the WHC Environmental Protection, Safety and Health, and Quality Assurance independent oversight organizations will monitor compliance with the requirements. These organizations, as well as all workers in the plant workforce, are authorized to stop work if an imminent safety, health, or environmental hazard is observed.

7.1.1 Environmental Management

The Environmental Management Program ensures the following.

- Chemical and radiological effluents released from the plant are controlled and maintained within the permit limits.
- All releases are monitored to verify that there are no significant radiological impacts.
- Samples are representative of the concentrations expected, and contaminants released to the environment do not pose a significant risk to the general public.

The program is conducted in accordance with WHC requirements stated in WHC-CM-1-3, *Management Requirements and Procedures*, Section 5.5, "Environmental and Safety Activities," WHC-CM-7-5, *Environmental Compliance*, and WHC-CM-7-6, *Environmental Compliance Verification Program Manual*.

The Project's Regulatory Compliance Plan (refer to Appendix A) specifies the applicable requirements of the regulations, and DOE orders for the Project; deactivation will be carried out in close cooperation with regulatory agencies. All required permits, approvals, and notifications will be completed as part of the Project:

- Phased closure of RCRA-permitted components
- Continued storage of certain mixed and dangerous wastes pending availability of treatment and disposal capability in accordance with the PUREX RCRA Part A permit application
- Air emissions from operations required to deactivate
- Control of liquid effluents in accordance with existing agreements
- Appropriate documentation in compliance with *NEPA* and the *State Environmental Policy Act* (SEPA).

7.1.1.1 NEPA and SEPA Documentation. Deactivation activities will be evaluated to determine if they fall within the scope of the 1983 Environmental Impact Statement (EIS), entitled *Operation of PUREX and Uranium Oxide Plant Facilities* (DOE/EIS 0089). Most of the activities have many elements of previous operations because they use the same processes and equipment. Any deactivation activities determined to fall outside the bounds of the existing EIS will be subjected to separate NEPA review.

A SEPA environmental checklist will be submitted to the Washington State Department of Ecology.

7.1.1.2 RCRA Documentation. Several PUREX tanks are regulated as RCRA TSD systems through Washington State Dangerous Waste Regulations (WAC 173-303). A phased approach to closing the PUREX RCRA unit will be used so deactivation and removal of process solutions can be accomplished in a timely and cost-effective manner. Phase I closure consists of activities such as excessing chemicals; removing process solutions; flushing to remove contamination; sampling the rinsate to ensure there are no dangerous waste constituents; and closing the tank systems, except for the associated secondary containment. The Phase I closure plan will be submitted to the Washington State Department of Ecology for approval. Phase II closure (i.e., D&D activities) will address all other aspects not included in Phase I closure.

7.1.1.3 Environmental Monitoring. The principal function of the Project's environmental monitoring program is to detect, quantify, evaluate, and where possible, predict impacts associated with routine as well as accidental or unintended releases of radioactive materials to the environment.

Releases will be governed by Section 5.0, "Records, Reporting and Response Activities", of WHC-CM-7-5, *Environmental Compliance*. Management of waste streams will be in accordance with Section 7.0, "Solid Waste Management," and 8.0, "Water Quality." No additional mitigation or detection features are expected to be required for the Project activities.

After removal and/or stabilization of the plants' radioactive and nonradioactive hazardous materials, WHC-EP-0468-1, *Facility Effluent Monitoring Plan for the Plutonium-Uranium Extraction Facility* (Nickels and Geiger 1992), and WHC-EP-0470, *Facility Effluent Monitoring Plan for the Uranium Trioxide Facility* (Thompson and Sontag 1991), will be revised to reflect those activities that will be required during the surveillance phase. At Project completion, there will be no liquid effluent streams; PUREX gaseous effluents will be consolidated into a single stack discharge; UO_3 Plant gaseous effluents will be eliminated; and solid waste streams will be limited to the waste accumulated from the quarterly plant inspection entries.

7.1.2 Radiological Protection

The following are the principal objectives of the Project's Radiological Protection Program.

- Ensure the radiological safety of onsite and plant personnel.
- Identify and separate contaminated from noncontaminated structures, surfaces, systems, and components.
- Properly and safely dispose of contaminated and noncontaminated components.
- Ensure that the plants meet all radiological requirements.

Radiological protection is addressed in the PUREX and UO_3 Plant Safety Analysis Reports (SARs)(Roemer 1990, Walser 1993) and in WHC-CM-5-9, *PUREX/UO_3 Administration Manual*. Specific details and procedures are provided in WHC-CM-1-6, *WHC Radiological Control Manual*. The WHC-CM-1-6 manual establishes radiation protection practices consistent with DOE-approved radiation protection standards. The WHC-CM-4-11, *ALARA Program Manual*, promulgates WHC procedures for maintaining radiation exposure as low as reasonably achievable (ALARA), well within Federal exposure limits.

The PUREX and UO_3 Plant deactivation activities will use the existing features of the PUREX and UO_3 Plant Radiation Protection Program. The features of the program were evaluated for adequacy as part of the DOE Order 5480.23, *Nuclear Safety Analysis Reports*, crosswalk described in Appendix F, and were found to be adequate.

The Project's Health Physics Organization will provide the practical working instructions and field assessments needed to ensure that the radiological protection program is fully implemented at the working level. The organization is responsible for the following activities.

- Perform a thorough radiological hazards evaluation of work involving personnel radiation exposure or the handling of radioactive materials.
- Provide appropriate surveillance to verify a radiologically safe working environment.

- Control the movement and storage of radioactive materials that are used or produced during deactivation activities.
- Thoroughly evaluate occurrences related to radiation protection, and formulate methods to preclude their recurrence.
- Develop radiation maps of the facility.
- Institute and implement access controls to avoid contamination of clean areas and to prevent access by personnel to controlled areas unless necessary.

WHC-CM-4-11, *ALARA Program Manual*, provides the guidance necessary to ensure that radiation exposures to workers and the public are maintained at ALARA levels.

The Project radiation workers receive formal ALARA training as part of the WHC company-wide program. The program includes the completion of a plant specific checklist for further on-the-job training for personnel who are involved in deactivation activities. The course content reflects the requirements specified in DOE Order 5480.11, *Radiation Protection for Occupational Workers*, and is intended to accomplish the following.

- Ensure that all involved personnel are instructed about radiation, its source and types, and radiation exposure and its effects.
- Provide instruction in the fundamentals of radiation protection that will enable individuals to keep their own exposure and collective exposure ALARA.
- Provide information on the radiation protection devices, instruments and equipment available, and how to use them.
- Provide instruction on proper dressing and undressing procedures.

The Project's Health Physics Organization reviews all deactivation work procedures that affect radiation safety, and observes deactivation work to ensure ALARA has been evaluated and implemented by the issuance of administrative procedures or by a formal revision to an existing procedure.

WHC also maintains an ALARA suggestion program and a PUREX and UO_3 Plant ALARA committee. Employees are encouraged to forward their suggestions relating to radiation protection. These suggestions are reviewed, and validated suggestions are acted upon by the Health Physics Organization.

7.1.3 Safety and Health

The Project's occupational safety and health program implements the procedures in WHC-CM-4-3, *Industrial Safety Manual*, and WHC-CM-4-40, *Industrial Hygiene Manual*. These manuals provide the necessary programs and guidance for routine work and conform to the requirements of DOE Order 5483.1A, *Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities* and DOE Order 5480.4, *Environmental Protection, Safety, and Health Protection Standards*.

An informal review by the DOE-HQ Office of Safety and Quality Assurance (EH-33) compared the WHC and PUREX and UO_3 Plant procedures with the requirements of Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response," and found that all major elements appear to be addressed. Compliance with this OSHA regulation and all OSHA regulations will be required by draft DOE Order 5483.XX, which supersedes DOE Order 5483.1A and DOE Order 5480.4.

The WHC program provides instructions and training in the control of physical hazards; hazards identification, surveillance, and communication; asbestos removal operation; hazardous materials handling and emergency response; posting of danger signs and tags or safety instructional materials; storage of pressurized gases; lockout and tagout activities; and explosive or combustible materials handling, processing, storage, transportation, and shipping.

As part of the Project evaluation of safety documentation adequacy, a detailed crosswalk review will be made between the worker health and safety-related standards and requirements supplied by EH-33, WHC, and the Project's safety and health procedures. This process is described in Appendix F.

7.1.3.1 Emergency Preparedness. The WHC-CM-4-43, *Emergency Management Procedures Manual*, provides the Hanford Site and 200 Area specific procedures for dealing with PUREX and UO_3 Plant emergencies. WHC maintains WHC-IP-0263-202A, *Westinghouse Hanford Company Emergency Plan for PUREX Facility* (Nankani 1992), and WHC-IP-0263-UO_3, *Westinghouse Hanford Company Emergency Plan for the UO_3 Facility* (Durban 1993), to provide plant-specific instructions for emergencies. The manuals identify lines of authority and the responsibilities of emergency response personnel and organizations.

7.1.3.2 Industrial Safety and Hygiene. Industrial safety and hygiene is in accordance with WHC-CM-4-3, *Industrial Safety Manual*, Volume I, "Safety Standards," and WHC-CM-4-40, *Industrial Hygiene Manual*. These manuals provide the instructions for routine deactivation work. The requirements in the manuals and the plant-specific instructions in WHC-CM-5-9, *PUREX/UO_3 Plant Administration*, comply with 29 CFR Part 1910, "General Industry Safety and Health Standards Application to Construction," and with 29 CFR Part 1926, "Occupational Safety and Health Standards for the Construction Industry."

7.1.3.3 Fire Protection. The required Project fire protection features are specified in WHC-CM-4-41, *Fire Protection Program Manual*. The intent of protection is to be sufficient to fulfill the requirements for the best protected class of industrial risks, as required in DOE Order 5480.7A, *Fire Protection*, and by the National Fire Protection Association Standard 101, "Life Safety Code," (NFPA 1991) for worker and public protection from the effects of a fire at the plants. The degree of fire protection is commensurate with the loss risk and risk to human health. As the project activities proceed, a measured reduction in protection is expected to result from the following:

- Systematic reduction in fire loading through removal of flammable bulk process solvent and other combustibles
- Reduction in occupational loading as the workforce is phased out of the plants, leaving them unoccupied
- Deactivation of plant systems that require fire protection, such as electrical switch gear rooms and the canyon crane cabs
- Elimination of raw and sanitary water utilities and winter heating from the plants
- Eventual declaration of "no-property value" for the plants.

At completion of deactivation, the remaining active fire protection system is expected to be the alarm system, which will summon a response crew from the 200 Area Fire Station.

7.1.3.4 Nuclear Safety. The Project's bases for nuclear safety are the SARs and the other safety-related documentation, demonstrating that the major radiologic accidents affecting the public have been defined and that the imposed mitigations intended to limit the public risk limit the consequences to the guidelines. The safety documentation strategy for the Project ensures adequate protection for the public and the onsite worker. The primary activities involved in the process are the following:

- Demonstrating the adequacy of "Safety Basis" and "Worker Health and Safety" documentation
- Reducing the number of OSRs that are applicable during deactivation
- Using the Safety Basis and the WHC unreviewed safety question process to evaluate deactivation task safety.

The adequacy of the Safety Basis documentation has been demonstrated by linking the 20 DOE Order 5480.23, *Nuclear Safety Analysis Reports*, topic issue guidance requirements to the existing safety-related documents. The crosswalk process used in making this determination is described in Appendix F.

The provisions of DOE Order 5480.21, *Unreviewed Safety Questions*, apply to deactivation activities to demonstrate that the proposed activity is within the facility safety envelope. Activities demonstrated to involve an unreviewed safety question or that require a change to OSRs require approval by DOE before implementation.

7.1.3.5 Criticality Safety. Manual WHC-CM-4-29, *Nuclear Criticality Safety Manual*, establishes the Nuclear Criticality Safety Program. Deactivation activities with criticality implications will be reviewed by the plant criticality safety representative and overviewed by the WHC North Facilities Safety Assurance organization to ensure that the proposed work is within the existing criticality prevention specifications. Work outside the previously analyzed and approved criticality prevention envelope will require a new criticality safety evaluation and/or a change to the existing criticality prevention specifications.

Deactivation activities include the removal of all recoverable special nuclear material from the facility to the extent practical. The recovery objective is to reduce the special nuclear material inventory to a condition in which the facility is reclassified as a Limited Control Facility, in which the form or distribution of the remaining material ensures that a safe mass cannot be exceeded. A criticality alarm system is not required for a Limited Control Facility.

Completion of the criticality safety evaluation report is the basis for downgrading the facility criticality status and for identifying controls and conditions that must be maintained during the post-deactivation surveillance period.

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7.2 QUALITY ASSURANCE

Project activities will be conducted in accordance with WHC-CM-5-9, *PUREX/UO_3 Plant Administration*, Section 2.23 "PUREX/UO_3 Plant Quality Assurance Program Plan." The Quality Assurance Program Plan (QAPP) specifies the organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality.

The QAPP cross references the plan's 18 quality criteria to the applicable WHC procedures that are required for plan implementation. The WHC Quality Assurance Program is based on ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities," 1989 edition (ASME 1989), without addenda.

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7.3 WASTE MANAGEMENT

Waste generated during the PUREX/UO_3 Deactivation Project will be managed in accordance with DOE Orders 5400.1, *General Environmental Protection Program*, 5400.3, *Hazardous and Radioactive Waste Program*, and 5820.2A, *Radioactive Waste Management*; RCRA, as amended; and the *Washington State Administrative Code* (WAC) for Dangerous Wastes, 173-303. Waste minimization programs to control waste generation have been established for PUREX and UO_3 Plant.

This section describes the handling, treatment, and disposal of Project waste and summarizes the techniques that are planned for waste minimization during the Project. Figures 7.3-1 and 7.3-2 show the generation and disposition of each Project waste stream.

7.3.1 Effluents

Currently, there are 3 liquid and 14 gaseous effluent discharges from PUREX and UO_3 Plant. By Project completion, the liquid effluent discharges to the soil column and the three UO_3 Plant gaseous effluent discharges will have been eliminated. The 11 PUREX gaseous effluents will be consolidated into a single stream and significantly reduced in flow.

7.3.1.1 Liquid Effluents. PUREX and UO_3 Plant liquid effluents have very low levels of contaminants and are discharged to the soil column. None of the liquid effluent streams contain constituents regulated as dangerous waste according to WAC 173-303.

The PUREX chemical sewer stream will be the only active stream at PUREX during the Project. Major stream sources are floor drains, the sanitary water high tank overflow, raw water quench stream, cooling water, and steam condensate. The stream is monitored for radioactivity and pH and is diverted to the 216-A-42 retention basin for rework if the preset action levels are exceeded. The stream discharges into the 216-B-3 pond and is disposed of in the soil column through seepage and to the atmosphere via evaporation. If the stream is required to support deactivation activities after June 1995, it will be rerouted to the Treated Effluent Disposal Facility and discharged to a state-approved site as required by the Tri-Party Agreement (M-17-00).

During deactivation, the flow rate of the chemical sewer stream will range between 1,000 and 2,300 liters per minute, depending on the operating status of the E-F11 concentrator.

Process condensate and cooling water effluent streams will be generated during the Project at the UO_3 Plant. The sources are condensate from the tank C-2 waste evaporator and steam condensate from the building ventilation system. The tank C-2 waste evaporator collects and evaporates flush and drain solutions from process vessels and water from potentially contaminated and contaminated areas of the plant, including decontamination sinks, equipment washdown, radiation zone floor drains, the uranyl nitrate hexahydrate (UNH) unloading station, and rainwater. The process condensate is discharged to the soil column through the 216-U-17 crib.

Figure 7.3-1. Disposition of PUREX Wastes.

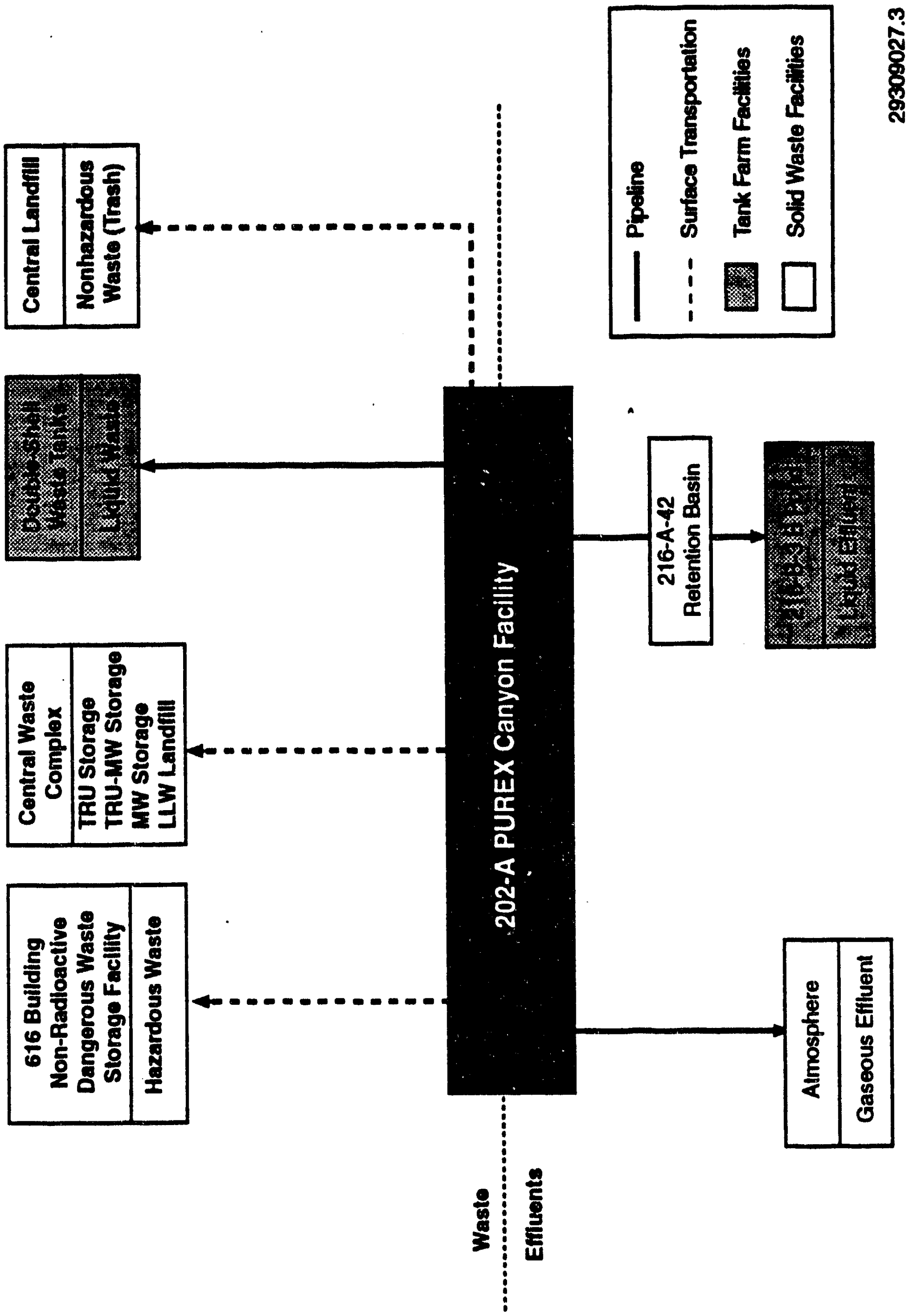
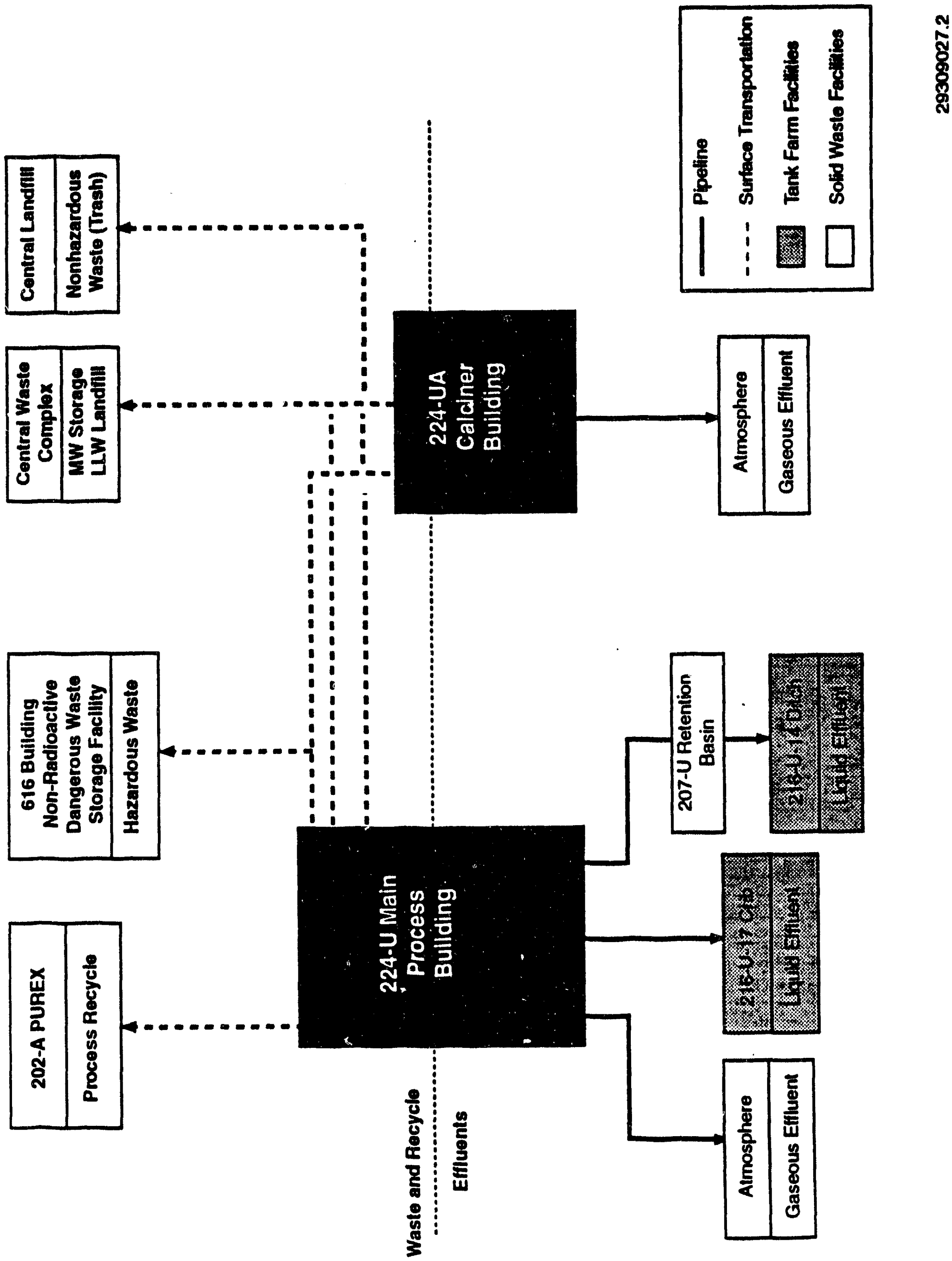


Figure 7.3-2. Disposition of UO_3 Plant Wastes.



The UO_3 Plant cooling water stream sources are cooling water from the air compressors, steam condensate, and washdown water from nonradiation area floor drains. The stream is discharged to the 216-U-14 ditch for disposal to the soil column.

7.3.1.2 Gaseous Effluents. PUREX and UO_3 Plant gaseous effluents consist of HVAC system discharges with very low levels of contaminants.

PUREX has 11 major gaseous effluent streams. The stream sources are listed in Table 7.3-1.

Table 7.3-1. PUREX Exhaust Stacks.

PUREX Exhaust Stacks	Source
Canyon Exhaust (291-A-1)	- Vessel vent system - Building HVAC system
Product Removal Room Exhaust (296-A-1)	- PR Room and hoods - N-Cell Hoods - Q-Cell
West Sample Gallery Hood Exhaust (296-A-2)	West Sample Gallery hoods
East Sample Gallery Hood Exhaust (296-A-3)	East Sample Gallery hoods
West Laboratory Hood Exhaust (296-A-5A)	Laboratory hoods
East Laboratory Hood Exhaust (296-A-5B)	Laboratory hoods
East Sample Gallery Room Exhaust (296-A-6)	East Sample Gallery and U Cell
West Sample Gallery Room Exhaust (296-A-7)	West Sample Gallery and R Cell
White Room Exhaust (296-A-8)	White Room
No. 2 Storage Tunnel (296-A-10)	No. 2 Storage Tunnel
Backup Facility Exhaust (296-A-14)	Building 293-A

During deactivation, the individual PUREX HVAC systems will be converted to a cascade system with discharge of all air through the Canyon Exhaust stack.

The UO_3 Plant has three gaseous effluent streams. The stream sources are listed in Table 7.3-2.

Table 7.3-2. UO_3 Plant Exhaust Stacks.

UO_3 Plant Exhaust Stacks	Source
Powder Handling System (296-U-2)	UO_3 powder transfer exhaust
Vessel Vent/Calciner System (296-U-4)	Process offgas
Powder Loadout Hood (296-U-13)	UO_3 Loadout room

Project activities will deactivate UO_3 Plant stacks.

7.3.2 Liquid Waste

Liquid wastes (radioactive and radioactive mixed waste liquids) that have been generated in PUREX are treated to meet tank farms storage specifications and transferred to tank farms' double-shell tanks for treatment and storage.

PUREX will have two active liquid waste streams during deactivation:

- Sump waste--generated in the sump waste receiver tank, TK-F18
- Miscellaneous and laboratory waste--generated in the miscellaneous and laboratory waste receiver tanks, TK-U3 and TK-U4.

The three tanks have RCRA Part A Interim Status for dangerous waste treatment and storage.

During transition, wastes from the following sources will collect as sump waste in TK-F18:

- Flush and decontamination solution from canyon process cells and vessels and sample gallery floor drains
- Vessel vent system condensate
- Sampler header and condenser vent header drainage
- Rainwater intrusion into the 241-A-151 diversion box collected in the 302-A catch tank
- Pipe and operating (P&O) gallery and sample gallery floor drains
- Steam condensate and rainwater collected in the 203 area sumps.

Wastes from the following sources are collected as miscellaneous and laboratory waste in TK-U3 and TK-U4:

- PUREX analytical laboratory waste
- Laboratory vacuum pump seal water
- Rainwater intrusion into the U cell sumps
- PUREX 291-A-1 canyon exhaust stack condensate and flush water
- Acid fractionator building sumps
- Storage Tunnel sumps.

During deactivation, PUREX will generate liquid wastes from the process equipment, process cell, and canyon flushes, and from disposal of contaminated nitric acid and remaining process solutions.

No similar liquid waste stream will be generated from the UO_3 Plant. UO_3 Plant flush solutions will be concentrated in the tank C-2 waste evaporator and transferred to PUREX for disposal to tank farms.

Since completion of the stabilization campaign in March 1990, liquid waste generation has continued to decrease, reflecting the completion of transition-to-standby activities in October 1992, emphasis on waste minimization, and the tank farms' limited capacity to accept new waste. Following completion of Project activities, no further liquid waste generation is expected.

The volume of waste transferred to tank farms during the Project will depend on the extent of the E-F11 concentrator operation and its capability to evaporate the dilute flushing wastes to a concentrated heel for transfer. The expected upper bound volume is 4.9 million L (1.3 million gal) of dilute waste without E-F11 operation. With E-F11 operation and optimal waste minimization, the volume could be reduced as low as 1.1 million L (300,000 gal) over the life of the Project.

Current operational waste volume projections prepared by tank farms' technical staff show that sufficient double-shell tank space is available to receive the PUREX waste, provided that the tank farms' 242-A Evaporator can be restarted and can concentrate the dilute waste now held in the double-shell tank inventory. The projections also show a waste shipping rate limit will have to be placed on PUREX to allow time to distribute waste among the double-shell tanks where space is available. The rate limit is 87,000 L (23,000 gal) per month. To stay within this limit, the E-F11 concentrator will be used to concentrate dilute PUREX waste before transfer to the double-shell tanks.

The PUREX process solvent, which is a characteristic mixed waste, cannot be stored in the double-shell tanks. It will be transferred to the Idaho National Engineering Laboratory for use at the New Waste Calcining Facility as a "product", or to a private incinerator for disposal.

7.3.3 Solid Waste

PUREX and UO_3 Plant generate two types of nonradioactive wastes: non-dangerous waste, such as office and packing trash, and dangerous waste. Four types of radioactive waste generated are transuranic (TRU) waste, TRU mixed waste (TRU-MW), low-level waste (LLW), and low-level mixed waste (LLW-MW).

7.3.3.1 Nonradioactive, Non-dangerous Solid Waste. This waste consists mainly of trash, non-recyclable waste paper and other throwaway materials. This waste is transported from PUREX and UO_3 Plant to the Hanford Site central landfill for disposal.

7.3.3.2 Nonradioactive Dangerous Solid Waste. PUREX and UO_3 Plant nonradioactive dangerous waste typically consists of fluorescent lamp ballasts, expired chemicals, solvent-wetted rags, batteries, aerosol cans, waste oil, residual paint, and chemically contaminated equipment.

Dangerous waste is accumulated and packaged at PUREX and UO_3 Plant and is stored at the 616 Dangerous Waste Storage Building pending transfer to a commercial firm for offsite treatment and disposal.

7.3.3.3 Radioactive Solid Waste. Radioactive solid wastes generated at PUREX and UO_3 Plant are categorized according to the definitions in WHC-EP-0063, *Hanford Site Solid Waste Acceptance Criteria* (Willis and Triner 1991), as TRU, TRU-MW, LLW, or LLW-MW. Sources of radioactive solid wastes are routine plant operations and deactivation activities.

All radioactive solid waste is packaged and transferred to the Hanford Site 200 West Area Central Waste Complex or the TRU waste storage facility for storage. After completion of the Project, solid radioactive waste will be generated only during the periodic surveillance entries into the plant and from repairs made to portions of the plant and equipment located in radiation zones.

7.3.3.3.1 Transuranic Waste. The major sources of PUREX TRU waste are N cell, the product removal (PR) room, L cell, samplers in the west end of the sample gallery, and the PUREX analytical laboratory. Typical TRU waste includes glass, paper, cloth, plastic, leather gloves, glovebox gloves, piping, ducting, conduit, glass and metal portions of gloveboxes, failed equipment, and air cleaning filters. PUREX generates about 3.5 m^3/year; however, with deactivation activities in N cell and the PR room and the planned co-precipitation of the plutonium-uranium solution in tanks D5 and E6 into 208-L (55-gal) drums, the TRU waste volume is predicted to peak at about 69 m^3/year.

The UO_3 Plant does not generate TRU waste.

7.3.3.3.2 Transuranic Mixed Waste. The TRU-MW stream is PUREX waste that either contains characteristic hazardous constituents or is inherently hazardous. The TRU-MW is generated in areas where TRU waste is generated. Typical TRU-MW consists of the same kinds of items as TRU waste with the addition of equipment contaminated with nitric acid and lead-lined glovebox gloves. PUREX generates about 1.4 m^3/year. The volume is predicted to peak at 13 m^3/year during deactivation.

The UO_3 Plant does not generate TRU-MW waste.

7.3.3.3.3 Low-Level Waste. The LLW stream is the major radioactive solid waste stream at PUREX and UO_3 Plant. Typically, LLW consists of non-TRU contaminated waste paper, plastic, rubber, and maintenance materials. Generation rates are about 1,100 m^3/year at PUREX and about 60 to 140 m^3/year at the UO_3 Plant.

The LLW volume will rise during deactivation, peaking at about 2,000 m^3/year, before gradually declining to very small volumes expected during the surveillance period following deactivation. The installation of a waste compactor at PUREX is predicted to reduce the PUREX LLW volume about ten-fold during deactivation activities and the peak volume to about 20 percent of the current generated volume.

7.3.3.3.4 Low-Level Mixed Waste. The LLW-MW stream is LLW that contains characteristic hazardous materials or is inherently hazardous. Typically, LLW-MW consists of expended laboratory chemicals, waste oils, aerosol cans, and solvent-wetted rags used for equipment decontamination. Generation rates at PUREX and UO_3 Plant are about 5.4 and 3.3 m^3/year, respectively.

7.3.4 Waste Minimization

Waste minimization programs have been implemented at PUREX and UO_3 Plant.

The following are waste minimization objectives for deactivation.

- Avoid generating waste.
- Minimize what is generated.
- Recycle what is minimized.
- Treat what cannot be recycled.

These objectives are applied sequentially to the work.

Practical waste minimization efforts include eliminating characteristic hazardous waste, segregating wastes into compatible categories, compacting solid waste, and concentrating dilute liquid waste. Key project waste minimization activities are described in the following sections.

7.3.4.1 Liquid Effluent Minimization. During deactivation, the PUREX chemical sewer flow to 216-B-3 pond, the UO_3 Plant process condensate flow to 216-U-17 crib, and the UO_3 Plant cooling water flow to 216-U-14 ditch will be eliminated. To do this, plant water and steam services must be isolated and the building HVAC steam heaters that contribute the steam condensate portion of the stream flows must be permanently shut off.

Electric heaters will be installed where seasonal heating is required for freeze protection or to prevent condensate formation on PUREX interior surfaces from unheated cascade air flow.

7.3.4.2 Gaseous Effluent Minimization. The PUREX HVAC systems will be joined in a single cascade system that transfers air from the areas of lowest radioactive contamination to highest contamination. The cascade minimizes the volume of air discharged and eliminates all discharge points except the canyon exhaust. The air discharge at PUREX will decrease to about 1.7 x 10^6 liters/minute from its current flow of 4.8 x 10^6 liters/minute.

Gaseous effluents are expected to be completely eliminated at the UO_3 Plant.

7.3.4.3 Liquid Waste Minimization. The long-term value from PUREX liquid waste minimization is the preservation of scarce tank farms' double-shell waste tank storage space for other uses.

About 4.9 million L (1.3 million gal) of dilute waste will be handled during the PUREX deactivation. The volume transferred to tank farms will be reduced to about one-fourth of the original volume. The cornerstone of this waste minimization activity is the use of the E-F11 concentrator to concentrate dilute waste. The waste transfer rate to tank farms will be limited to 87,000 L (23,000 gal) per month to meet waste distribution restrictions in the double-shell tanks. The transfer rate is consistent with the predicted rate for E-F11 concentrated bottoms generation.

New PUREX liquid waste will be generated from process vessel, process cell, and canyon flushes, and recovered nitric acid treatment. The recovered nitric acid sugar denitration will reduce the volume sent to tank farms by one-third, compared to the traditional method of directly neutralizing waste. Co-precipitation of the tanks D5 and E6 plutonium-uranium solution into 208-L (55-gal) drums, instead of batch transferring the solution to tank farms based on critical mass limits, will reduce the transfer volume to one-fortieth of the mass-limited volume.

Flush solutions at the UO_3 Plant will be recycled and concentrated in the tank C-2 waste evaporator. The concentrated evaporator bottoms will be transferred by truck to PUREX for handling. Collection and evaporation of rainwater accumulating in outdoor radiation zones will be eliminated after the radiation zones are decontaminated and released. Approximately 388,000 L (102,500 gal) of process condensate held in inventory will be neutralized directly and sent to the 216-U-17 crib without further processing.

7.3.4.4 Solid Waste Minimization. Deactivation activities will generate increased volumes of solid wastes.

7.3.4.4.1 Nonradioactive Hazardous Waste Minimization. The most successful waste minimization effort to date has been the sale of the remaining PUREX bulk process chemicals to the private sector. About 924,000 kg (2.04 million lb) of chemicals have been recycled to private industry. Of the original 1.04-million kg (2.3-million lb) inventory, 105,000 kg (232,000 lb) remain unsold. About 136,000 kg (300,000 lb) of ammonium fluoride-ammonium nitrate, a specialty chemical, have been disposed of as waste.

Most of the remaining PUREX bulk process chemicals are expected to be sold. During deactivation, the chemicals will continue to be offered for sale until it is determined that no market demand exists. At that time the leftover chemicals will be disposed of as waste.

7.3.4.4.2 Radioactive Waste Minimization. Solid waste volumes will be minimized by incorporating the waste minimization objectives in the planning phase; by segregating waste by type to prevent category crossover; and by using waste compaction and size reduction to reduce void space in the waste packages.

The generation of solid waste at PUREX and UO_3 Plant will be eliminated after completion of the Project, except for the small amounts created by surveillance entries and maintenance inside radiation zones.

7.4 SAFEGUARDS AND SECURITY

The controls provided by Safeguards and Security provide assurance that the plant will remain in a secure condition and that the remaining special nuclear material and vital government equipment will be protected. PUREX is currently defined as a Category IV facility according to DOE Order 5633.3A, *Control and Accountability of Nuclear Materials*. It is expected to remain a Category IV facility - one having reportable quantities of special nuclear materials until completion of D&D.

7.4.1 Deactivation Safeguards and Security

Deactivation will remove recoverable special nuclear material. A final inventory will be performed at the completion of the deactivation activities. Upon completion of the final inventory, any inventory differences or discrepancies will be reconciled, and the inventory records closed and archived.

In addition, the project will verify that all classified records have been removed from the plant per records disposition requirements. The deactivated facility will meet the conditions in DOE Order 5632.2A, *Physical Protection of Special Nuclear Material and Vital Equipment*, for reduced level of physical protection. Physical protection will be limited to those controls necessary to preclude unauthorized access.

7.4.2 Surveillance Safeguards and Security

At the completion of deactivation, PUREX will qualify for "Low-Level Protection" per DOE RLID 5632.1A, *Asset Protection Requirements*. The classification requires a minimum level of protection.

RLID 5632.1A also provides for documentation of the security requirements. The RLID 5632.1A security documentation will supersede the existing safeguards and security plan for PUREX, WHC-SP-0730, *202-A Building Special Protection Agreement* (Hanson 1992). The post-deactivation security plan will include these items:

- Access Control
  - The deactivated facility will be unoccupied. All doors to the facility should be locked from the inside except those required for entrance by surveillance personnel. To the maximum extent possible, unsurveilled areas of the facility should be sealed to prevent unauthorized access.
  - An access control procedure will be developed similar to WHC-CM-6-8, *Hanford Restoration Training Manual*, Section 1.3, "Surplus Facility Access Control," to facilitate the requirements for facility access. Keys for access doors should remain under administrative control.
  - Authorized personnel who access the facility will be logged in and out, and records will be maintained.
- Physical Barriers
  - Fences, gates, or other barriers should be maintained as an access barrier to the building area.
- Lighting
  - Lighting above ground level external access doors should be maintained.

7.5 PROGRAM MATERIAL MANAGEMENT

WHC is responsible to take all reasonable precautions and to use sound industrial practice to safeguard and protect U.S. Government property. This responsibility is delineated in WHC-CM-1-3, *Management Requirements and Procedures*, MRP 2.11, "Property Management." WHC-CM-2-3, *Property Management Manual*, implements the material management policy. Section 7, "Disposition," identifies the procedures involved with the disposition of property. These guidelines require controlling and maintaining detailed inventory records. The planning and control for disposition of government property, essential materials, and supplies during the PUREX and UO_3 Plant deactivation will be accomplished in agreement with the guidelines.

These guidelines provide for the administration and control of physical assets, except special nuclear material, which is controlled per WHC-CM-4-34, *Nuclear Material Control and Accountability Manual*.

The objective of property management during deactivation activities is to perform the functions of maintenance, protection, storage, movement, and disposition in a manner that will result in effectively disposing of all PUREX and UO_3 Plant non-nuclear materials and equipment with maximum asset use and least cost.

The PUREX and UO_3 Plant contain significant inventories of Real Property, Related Personal Property, and Personal Property. Real Property includes building structures, roads, transmission lines, and equipment or fixtures that are permanently installed in a building (e.g., piping, electrical systems, HVAC systems, and elevators). Related Personal Property includes personal property that is an integral part of the real property or specifically adapted for use in the real property (e.g., process equipment, communication systems, and fire alarm systems). Personal property includes equipment that can be removed from real property without significantly damaging or diminishing the functional value of either the real property or the equipment itself, such as office furniture. Personal property will be removed from the plants during deactivation. Real Property and Related Personal Property will be left intact.

7.5.1 Property Inventory and Control

A detailed inventory of property within PUREX and UO_3 Plant is maintained in the Richland Location Property System. The inventory listing provides the location, quantity, and custodian for fixed and movable equipment. These inventories will be maintained current for transfer to the Hanford Surplus Facilities Program.

7.5.2 Asset Disposition

Asset disposition constitutes coordination, documentation, and services for implementing an orderly disposition of equipment and facilities associated with PUREX and UO_3 Plant deactivation. Disposition includes the identification and removal of nonhazardous, nonradioactive salvageable material and equipment.

Disposition activities will take account of the value of property versus the cost of removal and transfer. As a minimum, the asset disposition will meet the requirements of WHC-CM-2-3, Section 5.1, "Retention of Property Not in Use," and the following guidelines.

- Personal Property shall be dispositioned per guidelines identified in WHC-CM-1-3, MRP 2.14, "Completed Plant and Equipment," which defines usable equipment.
- Mobile usable equipment shall be dispositioned per WHC-CM-2-3, Section 7.1, "Disposition of Equipment or Material."
- Mobile equipment that is no longer in a usable condition shall be disposed of per WHC-CM-2-3, Section 7.2, "Disposal and/or Write-Off of Property."
- Mobile contaminated equipment shall be dispositioned per procedures in WHC-CM-2-3, Section 7.7, "Disposition of Non-Capital Equipment Used in Radiation Zones."

All movable nonhazardous and controlled storage material and equipment (M&E) not required for the post-deactivation surveillance period will be excessed. The M&E is comprised of tens of thousands of components, parts, materials, and equipment (e.g., tools, compressors, welding machines, area monitors, drill presses, and other miscellaneous equipment).

All excess office equipment, including mobile offices not required for the post-deactivation surveillance period or the D&D activity, will be dispositioned.

7.6 CRITICAL SKILLS AND WORKFORCE REDEPLOYMENT

The retention of a skilled, trained workforce at PUREX and UO_3 Plant during deactivation has been identified as fundamental to overall Project success. The productive redeployment or outplacement of plant staff as the deactivation work phases out is a key Project objective.

This section describes how the Project will identify the critical skills needed in the workforce to ensure Project success and how the applicable workforce redeployment planning requirements of Section 3161 of the *National Defense Authorization Act for Fiscal Year 1993* will be met.

7.6.1 Critical Skills

Critical skills are the critical path workforce skills necessary for successful, on-time execution of Project activities. These skills have been identified from the deactivation schedules and cost estimate. The skills have been compiled by job category (e.g., millwright, pipefitter, or process engineer) and time-phased. The result is a series of resource curves showing critical skill requirements for the duration of the Project.

The resource curves are used to plan for changes in the critical skills mix needed to match new phases of the work. The resource curves also predict when specific skills can be phased out of the workforce. Therefore, these resource curves are an effective redeployment or outplacement planning tool.

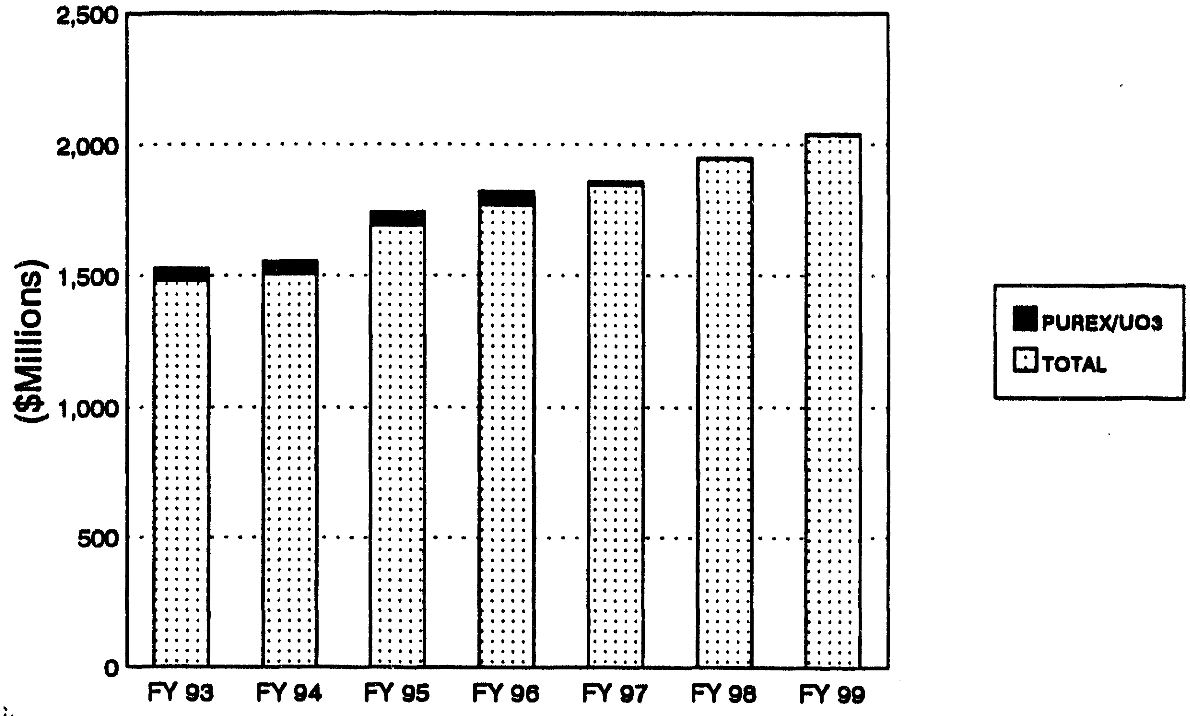
7.6.2 Workforce Redeployment

Completion of the Project is not expected to result in large workforce impacts. As Figure 7.6-1 shows, the peak project budget is only about three percent of the total Site budget, based on the FY 1995 Activity Data Sheet submittals. This figure closely matches the current Site attrition rate, suggesting that other Site work may be available for plant staff with transferrable skills as the deactivation work phases out.

For a workforce the size of PUREX, the existing Westinghouse reassignment and outplacement policies and infrastructure can adequately accommodate the changes identified by the planning. In the past, these have included:

- Company Support
  - Reviewing out-year staffing and fiscal year work plans for reassignment coordination along with hiring and attrition needs;
  - Evaluating public laws, DOE and other agency directives for retraining, and relocation options for displaced activities;
  - Developing utilization plans for excess employees, involving in-house as well as community options;
  - Establishing reassignment plans on an individualized basis for other facilities within the affected division, and outside the division;
  - Providing job search resources for displaced employees.

Figure 7.6-1. PUREX/UO_3 Deactivation Project Comparison to Total Hanford Site Expense Budget.



(Source: FY 95 ADS Submittal)

- Employee Support
    - Early intervention by Westinghouse to provide employee support network in potential job search;
    - Providing orientation in career decision making, resume preparation, interviewing techniques, and the job search processes and their use;
    - Assisting in both in-house and external job placement.

In addition, several other Hanford Site plants - B Plant, U Plant, and the Reduction-Oxidation (Plant) (REDOX) - are future deactivation candidates. These plants have not operated for many years, and no longer have an experienced operating staff. Deactivation will rely on the existing standby crews, supplemented with workers who have deactivation experience. The logical source for the additional workers is provided by the phase out of the PUREX/UO_3 Deactivation Project.

The predictive capability of the skills curves ensures that a long range strategy for effectively employing a mobile deactivation workforce can be developed. Combining future deactivation requirements, site attrition, and the existing WHC reassignment and outplacement policies is expected to accommodate worker impacts as the PUREX/UO_3 Deactivation Project completes.

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7.7 RECORDS MANAGEMENT

Records management describes the control of records and plant data generated during the Project; these records and data will form the documentation package of deactivation activities. The package will be turned over to the Hanford Surplus Facilities Program at the completion of the Project.

It is not expected that deactivation will create a need for new or different kinds of records from those being generated during cold standby. Records management will continue to be conducted in accordance with WHC-CM-3-5, *Document Control and Records Management Manual*, and WHC-CM-5-9, *PUREX/UO_3 Plant Administration*, Section 2.25, "PUREX/UO_3 Records Management." The PUREX and UO_3 Plant records management system is based on DOE Order 1324.2A, *Records Disposition*.

The following are objectives of records management.

- Preserve the evidence of end-state criteria achievement, project completion, and regulatory compliance.
- Provide the plant status basis for the initiation of surveillance activity.
- Ensure recall of plant information needed for D&D.

The Project records are important in planning the D&D phase, where regulatory requirements dictate the specific records and content to be submitted with the decommissioning plan. In addition, records are required to do the following.

- Document the "As-Left" configuration of the facility. "As-Left" is the condition of the facility at the end of the Project, reflecting changes made during the deactivation activities.
- Document compliance with regulations and quality requirements in accordance with WHC-CM-3-5, *Document Control and Records Management Manual*.
- Determine and track the inventory of hazardous and nonhazardous material.

7.7.1 Records Preparation

It is the responsibility of the Project to identify, generate, and/or preserve the records that will be used during the surveillance period and in the D&D planning. Records generated at the plant during deactivation are comprised of the following:

- Engineering documents
- Operating documents
- Daily plant records
- Work plans
- Historical records.

The PUREX and UO_3 Plant Records Center will maintain a tracking system of all record and non-record PUREX and UO_3 Plant files generated from day-to-day operation. This tracking system, and any records that have not been transferred to the Records Holding Area at the end of the Project, will be turned over to the Hanford Surplus Facilities Program at the time custody of the PUREX and UO_3 Plant is transferred to that program.

7.7.2 "As-Left" Condition

Plant configuration changes resulting from deactivation activities will be recorded on the engineering drawings or attached to the drawings as engineering change notices to provide a record of the "As-Left" plant condition. The drawings will be changed in accordance with WHC-CM-6-1, *Standard Engineering Practices*, Sections EP-1.3, " Preparation of Engineering Drawings," and EP-2.2, "Engineering Document Change Control."

Configuration changes are completed as a Modification Work Package. Post-review verification by the cognizant plant engineer verifies the "As-Left" condition, as specified in WHC-CM-5-9, Section 5.11, "Job Control System." This established methodology will accurately describe the "As-Left" facility configuration and preclude discovery problems during surveillance and D&D.

7.7.3 Facility Characterization Records

Planning for the D&D phase will require detailed historical information concerning the radiological conditions of the plant. Searches for early reports of spills or leaks involving the spread of contamination and hazardous chemicals in and around the plant and equipment, which preceded formal reporting requirements, will be made with special emphasis on the following:

- Description of the spill or leak, cleanup activities, and location of the remaining contamination

- Description of inaccessible areas, including areas beyond those normally entered (e.g., cracks in concrete; seepage into wood or tile; seepage into equipment and components or areas behind, below, or obstructed by equipment or structures)

- Site characterization data, including information on radiological and hazardous chemical spills, residual soil contamination levels, and principal radionuclides

7.7.4 Generic Records for Facility Turnover

The detailed list of specific PUREX and UO_3 Plant records required for the facility turnover to the Hanford Surplus Facilities Program is expected to emerge during Project execution. The following list of core records has been provided to the Project as a planning basis:

- Deactivation check sheets

- Deactivation log books and reports that record deactivation activities
- Appropriate safety analyses documents and Plant Emergency Procedures that reflect the deactivated status
- Identification of all hazardous material that cannot be removed and remains in the plant
- Documents to show that reactor fuel elements and/or other source and special materials have been removed from the facility
- Final radiological status surveys
- A record of the blanks installed during plant systems deactivation
- Records for plant equipment that is required to be left operational during surveillance
- Facility permits applicable to surveillance
- Records of elevator systems deactivation, load certification tests, and preventative maintenance
- Records of zero energy checks on electrical circuits that were de-energized.

7.7.5 Records Maintenance

Deactivation records require the same record protection system afforded to the general facility records. Original documents shall be transferred to and stored at the Records Holding Area.

7.7.6 Record Document Disposal

Record document disposal refers to the authorized destruction of all PUREX and UO_3 Plant documentation currently retained at the plant for which there is no further intended use for minimum compliance operations or Hanford Surplus Facilities Program. Record material will be identified for disposal in accordance with WHC-CM-3-5, *Document Control and Records Management Manual*, Section 5, Records Storage, Retrieval, and Destruction."

APPENDIX A

REGULATORY COMPLIANCE PLAN

A1.0 INTRODUCTION

The Plutonium-Uranium Extraction (Plant) (PUREX) was constructed and has been operated intermittently since 1957 to produce plutonium for use in production of weapons for the United States Department of Defense. In 1990, PUREX ceased operations and has been in standby since that time. In December 1992, the U.S. Department of Energy (DOE)-Headquarters notified Westinghouse Hanford Company (WHC) that PUREX would no longer operate and directed WHC to deactivate the plant.

The deactivation of PUREX and the Uranium Trioxide (UO_3) Plant is a pilot demonstration of both institutional and physical actions. The objective is to cost effectively prepare the plants for a safe, deactivated state, pending eventual completion of decommissioning. A major element of the pilot demonstration is to ensure compliance with applicable requirements of regulations and DOE orders. The plan presented in this section is intended to serve as a statement of approach for achieving compliance with dangerous waste, air quality, water quality, and *National Environmental Policy Act of 1969* (NEPA) requirements.

The following topics are important in achieving a compliant deactivation of PUREX:

- Closure of *Resource Conservation and Recovery Act of 1976* (RCRA)-permitted components of the plant
- Continued storage of certain mixed and dangerous wastes pending availability of treatment and disposal capability
- Air emissions from operations required to deactivate
- Control of liquid effluents
- Appropriate documentation in compliance with NEPA and the *State Environmental Policy Act of 1983* (SEPA)
- Compliance with DOE orders.

This document defines a regulatory compliance plan for deactivation of PUREX and UO_3 Plant. Closure of the plants will be accomplished in two phases: deactivation activities (phase I closure), followed by decontamination and decommissioning (D&D) activities (phase II closure).

Deactivation will be carried out in close cooperation with regulatory agencies and in accordance with all required permits. Any approvals and notifications that are required will be done as part of the Project. The unique aspect of the Project is that deactivation represents phase I closure, and decommissioning represents phase II, or final closure. Accordingly, an RCRA closure plan describing the deactivation of interim status systems will be developed for near-term submittal to the regulatory agencies. This plan will be modified in the long term to include final closure activities at interim status units at the time of D&D (phase II closure).

As the air emissions are defined, appropriate notifications will be made of expected air emissions from deactivation activities to the Washington State Department of Health, Washington State Department of Ecology (Ecology), and the U.S. Environmental Protection Agency. The notifications will be made and approvals obtained before the activity is carried out. A report of closure will be filed with the Washington State Department of Health when operations are permanently ceased at any emission unit registered with the agency.

Liquid effluents will be managed in accordance with Consent Order No. DE 91NM-177 (DOE-RL 1992).

Deactivation activities will be screened to determine if they fall within the scope of the 1983 Environmental Impact Statement (EIS) entitled *Operation of PUREX and Uranium Oxide Plant Facilities* (DOE 1983). Activities determined to fall outside the bounds of the existing EIS will undergo separate NEPA review.

A2.0 REGULATORY COMPLIANCE PLAN

This plan presents the approach of integrating compliance activities into the planning and conduct of deactivation.

A2.1 RCRA COMPLIANCE

Several components of PUREX are regulated under the treatment or storage requirements of RCRA, as implemented through Washington State Dangerous Waste regulations, WAC 173-303.

The following components and the use of each is shown in the unit-specific PUREX Part A Permit Application (Part A) (DOE-RL 1988):

Unit	Process Code	Description
Tank E5	T01	Treatment
Concentrator E-F11	T01	Treatment
Tank F15	T01	Treatment
Tank F16	T01	Treatment
Tank F18	S02/T01	Storage/Treatment
Tank G7	T01	Treatment
Tank U3	S02/T01	Storage/Treatment
Tank U4	S02/T01	Storage/Treatment
Containment	S05	Storage

The dangerous waste components consist of the waste tank (or concentrator), ancillary equipment, and secondary containment. Treatment to meet tank farm corrosion criteria consists of adjusting the pH to greater than 12 and adding sodium nitrite to greater than 0.011M.

The following are types of regulated dangerous waste that were stored and/or treated at PUREX during prior operations.

- Cladding Removal Waste. Corrosive mixed waste, generated by removing the zirconium cladding from the fuel prior to fuel dissolution, was treated in tank E5 to meet the tank farm corrosion criteria before its transfer to tank farms.

- Ammonia Scrubber Waste. Mixed waste from the Headend Ammonia Scrubber System (tanks A3-4, B3-4, C3-4, E3-2, F12, and concentrator E-F11) was treated in tank G7 to meet tank farm corrosion criteria before its transfer to tank farms.

- Miscellaneous Headend Waste. Mixed waste from throughout the PUREX headend, including drains from the PUREX analytical laboratory, is stored and treated in tanks U3 and U4 to meet tank farm corrosion criteria before its transfer to tank farms.

- Neutralized Zirflex Acid Waste. The highly radioactive, high heat generating, mixed waste containing the bulk of the fission products separated from the reactor fuel by the PUREX liquid-liquid extraction process was treated in tanks F15 and F16. The waste was sugar denitrated to destroy the nitric acid and then treated to meet tank farm corrosion criteria for storage in select tanks within tank farms.

- Miscellaneous Mixed Waste. Miscellaneous mixed waste that collects in 22 process cell sumps throughout the canyon area plus the bottoms from the E-F11 concentrator are stored and treated in tank F18 to meet tank farm corrosion criteria for storage in tank farms.

- Lead and Cadmium Waste. Lead was placed on jumpers used in the PUREX canyon as counterweights so the jumpers would hang properly from a crane hook. This allowed the jumpers to be installed remotely by the crane. Lead was also used as shielding for sensitive equipment and as weights in the canyon. Cadmium, a neutron absorber, was also used to protect sensitive equipment in the canyon. Lead and cadmium are removed from the jumper or piece of equipment and maintained in the containment (canyon) over D cell.

A separate unit-specific Part A was prepared for storing failed vessels and equipment in the PUREX storage tunnels. Subsequently, a unit-specific Part B Permit Application (Part B) (DOE-RL 1991) was prepared to fulfill *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1992) milestone M-20-11 and was submitted in September 1990. The Part A permit application for this treatment, storage, and disposal (TSD) unit covered the following.

- Storage Tunnel Waste. Failed vessels and equipment are placed in railroad tunnels adjacent to PUREX for storage. Lead, silver, or mercury contained on or in some of the failed vessels or equipment is placed in the tunnels along with the associated failed vessel or piece of equipment.

Final closure of the PUREX storage tunnels, will occur at the same time as, and in a manner consistent with PUREX Canyon TSD units.

A phased approach to closure will be used so deactivation and removal of process solutions from PUREX can be accomplished in a timely and cost-effective manner. Phase I closure associated with deactivation will consist of the following:

- Removing process and other solutions from the plant so waste treatment systems can be flushed

- Flushing both the internal and external surfaces, as appropriate, of each permitted tank system

- Sampling and documenting the analytical results of the final internal rinse

- Emptying tanks as much as possible with the existing jets or pumps, and leaving the tank unsealed so that the liquid heel will evaporate

- Isolating the tanks and cells from all liquid sources

- Flushing cell walls and floors

- Emptying the cell sumps to the normal heel using the existing jets.

The flush criteria will be the reduction of dangerous waste constituent concentrations in the rinsate such that these solutions do not exhibit dangerous waste characteristics. Flushing will reduce the total quantity of dangerous waste constituents, thus stabilizing or eliminating health and environmental risks during the surveillance period and follow-on activities.

The PUREX Phase I closure/deactivation calls for the storage and/or treatment of dangerous waste in a manner inconsistent with the current PUREX Part A permit. Some of the plant's process vessels currently are storing material that was considered to be a product (not a waste) when the December 1992 shutdown order was received. This has resulted in a noncompliant storage situation. Ongoing negotiations with the regulatory agencies will result in resolution of these issues. Options being considered include minor modification of Part A process descriptions; expansion of PUREX Plant interim status treatment/storage capacity and significant revisions to the Part A; and/or development of new Tri-Party Agreement milestones addressing the noncompliant situation.

In-place equipment, systems and materials, and solid materials containing dangerous waste constituents for which there is no existing treatment or storage capability will be left in their current location until the time of D&D, including vessels, piping, silver reactors, dissolvers with the mercury in their thermowells, cadmium moderators, lead counterweights, shielding, equipment in the tunnels, concrete debris in the canyon, etc. No substantial upgrades (i.e., secondary containment or sampling systems for waste currently sent to tank farms) are planned.

A RCRA closure plan describing the deactivation of interim status systems will be developed for near-term submittal to the regulatory agencies. This plan will be modified to include final closure activities (i.e., D&D of interim status systems) after the following actions have been completed:

- Adoption of the Hanford Remedial Action Environmental Impact Statement (or other future sitewide EIS) and final selection of land usage for Hanford Site areas

- Development of a uniform and coordinated program for closure of TSD units in the 200 Areas and sitewide cleanup standards

- Development of necessary plans, documents (including appropriate NEPA documents), and funding for D&D and final closure.

The RCRA closure plan will include deactivation and (eventually) D&D of only interim status units. Deactivation of all other systems will be conducted in compliance with agreements reached with the regulatory agencies.

D&D will include closure of secondary containment; the end-state of equipment, systems, and materials left in place, including material in the "containment building;" final disposition of the vessels and equipment in the tunnels; and closure of the tunnels.

The two-phased approach allows for immediate full deactivation, reduction of risk to human health and the environment, and reduction of surveillance and maintenance costs so resources can be directed to other cleanup activities while pursuing long-term plans to accomplish final closure of the 200 East Area and the Hanford Site.

A2.2 AIR EMISSIONS COMPLIANCE

Various activities for deactivation described in this project management plan (e.g., sugar denitration, evaporation of solutions using the E-F11 concentrator, co-precipitation of uranium and plutonium, transfer of irradiated fuel from PUREX to the 100-KE Area, transfer of contaminated organics, modification of heating, ventilation, and air conditioning systems) may result in emissions of radionuclides and/or regulated pollutants to the air. These activities will be evaluated as a group and if the potential to increase emissions of regulated pollutants is identified, the appropriate regulatory authority will be notified and approvals will be obtained before initiating these activities.

A report of closure will be filed with the Washington State Department of Health when operations are permanently ceased at any emission unit registered with the agency.

A2.3 LIQUID EFFLUENT COMPLIANCE

Liquid effluents during deactivation will consist of water discharges to the soil column. The waste to be transferred to tank farms from PUREX deactivation activities will be minimized by using a concentrator. The E-F11 concentrator will be used to (1) minimize waste by allowing liquids already in PUREX to be recycled for flushing, and (2) reduce the volume of PUREX process and flush solutions sent to tank farms. To operate the E-F11 concentrator, discharges of steam condensate and cooling water will be made through the chemical sewer system to the 216-B-3 pond system. Waste volumes transferred to tank farms will be further reduced by reducing concentrated nitric acid stored in the plant through sugar denitration. Some steam condensate and cooling water discharges will result from sugar denitration.

Consent Order No. DE 91NM-177 (DOE-RL 1992) requires that the PUREX Plant Chemical Sewer effluent discharge to the 216-B-3 pond system be limited to less than or equal to 2,300 L (600 gal) per minute, averaged over the calendar month, by June 1992, provided continued discharge is consistent with the closure schedule and strategy within any Ecology-approved 216-B-3 Pond System Closure Plan. This discharge limit will not be exceeded when the E-F11 concentrator is operated and sugar denitration is conducted to minimize waste.

The water discharged through the chemical sewer to 216-B-3 pond system is monitored for the presence of radioactivity. If radionuclides in the stream exceed preset limits, the monitor will initiate the automatic diversion of the streams to the 216-A-42 diversion basin. In the diversion basins, the streams will be retained until disposition has been determined.

The approved Sampling and Analysis Plan for the chemical sewer (Hobart 1992) (including the steam condensate and cooling water) is available for deactivation activities. In addition to the normal composite samples taken for annual discharge reporting, samples of the stream are collected according to the Sampling and Analysis Plan to demonstrate that no dangerous waste is being released.

DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, prohibits discharges of radionuclides to the soil in excess of two percent of the maximum annual radionuclide inventory, except as provided by an interim control strategy in compliance with Chapter II.3.e(1). Because no operating type activities have been conducted during the previous year, the radionuclides may increase and may exceed the two percent increase limit. DOE-Headquarters will be notified prior to commencement of deactivation activities that the two percent increase limit in the discharges to 216-B-3 pond system will be exceeded.

A2.4 NEPA COMPLIANCE

To ensure adequate NEPA coverage, a conservative review of individual deactivation activities is planned. The deactivation activities will be reviewed against the 1983 EIS entitled, *Operation of PUREX and Uranium Oxide Plant Facilities* (DOE/EIS 0089) by a combined WHC/DOE-Richland Operations Office (DOE-RL) screening panel to determine whether the activities are covered. A standard set of screening criteria will be applied to ensure a consistent approach. The results of the screening will be forwarded to DOE-RL with any recommendations from the screening panel on their evaluation. DOE-RL, in consolidation with DOE-Headquarters, will provide guidance relative to the appropriate level of NEPA documentation.

A2.5 SEPA COMPLIANCE

State and local government agencies are required to comply with SEPA before any permit is issued. Compliance is initiated by submission of a completed SEPA environmental checklist.

A2.6 NATIONAL HISTORIC PRESERVATION ACT COMPLIANCE

PUREX is considered an "exceptionally historic place" according to the criteria of the *National Historic Preservation Act of 1966*. Therefore, mitigation against substantial alteration of the historic character of this structure is required. This requirement will be met by preparing an historic preservation data package as part of the Project.

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APPENDIX B

PUREX/UO_3 DEACTIVATION STANDARDS PROGRAM

B1.0 INTRODUCTION

In March 1990, the Defense Nuclear Facilities Safety Board (DNFSB) issued recommendation 90-2 to the Secretary of Energy. The recommendation called for (1) identifying the standards that apply to the design, construction, operation, and decommissioning of defense nuclear facilities; (2) determining the adequacy of the standards for protecting public health and safety; and (3) determining the extent the standards have been implemented.

The U.S. Department of Energy (DOE) has implemented its program to document the applicable codes and standards in accordance with *Department of Energy Implementation Plan in response to Recommendation 90-2 of the Defense Nuclear Facilities Safety Board*, Revision 4, July 1993. The Implementation Plan describes how standards, which are sufficient to ensure safe and controlled accomplishment of activities, are incorporated in the management process for all defense nuclear facilities under the DNFSB's jurisdiction. The DOE Office of Environmental Restoration and Waste Management (EM) has attached guidelines to the implementation plan for EM facilities. These guidelines will be used for the Plutonium-Uranium Extraction (PUREX)/Uranium Trioxide (Plant) (UO_3) Deactivation Project.

B2.0 PUREX/UO_3 DEACTIVATION STANDARDS PROCESS OVERVIEW

The PUREX/UO_3 Deactivation Standards (PDS) Program is designed to support the transition of PUREX and UO_3 Plant from the current standby status to that of a safe and cost effective deactivated status. The more traditional management approach to work authorization (i.e., for a plant under construction or for the restart of a facility with a 10-year operating life) was considered to be ineffective for PUREX and UO_3 Plant deactivation and required substantial re-engineering. The decision to re-engineer the approach was driven by the need to provide a high confidence process for development of an Environmental, Safety and Health (ES&H) envelope for individual deactivation activities while maintaining cost effectiveness of the overall deactivation effort.

Current approaches to safe conduct of operations mandate a conservative set of industry standards and corresponding procedures for production operations. These standards are selected based upon safeguarding the public and employees against worst case scenarios postulating multiple and diverse operational events. The standards determined to be applicable for these scenarios and the resultant procedures which implement them may be overly conservative. This is especially true when compared with limited or single activities associated with the PUREX/UO_3 Deactivation Project.

To avoid such "built-in" conservatism, the PDS Program employs an activity-specific analysis/characterization with the primary objective of determining the level of safety/hazard significance associated with execution of the activity. The safety/hazard significance determination provides the basis for development of the ES&H envelope, which specifies the management and technical controls needed for safe, prudent, and environmentally sound execution of the activity and identifies the standards on which they are based.

The management and technical controls and specific standards identified in the ES&H envelope are then correlated to Westinghouse Hanford Company (WHC) implementing policies and procedures and validated for effective implementation. This activity-specific approach eliminates the burden of compliance with redundant and/or extraneous standards, which add substantial cost for incremental gains in the level of protection for ES&H.

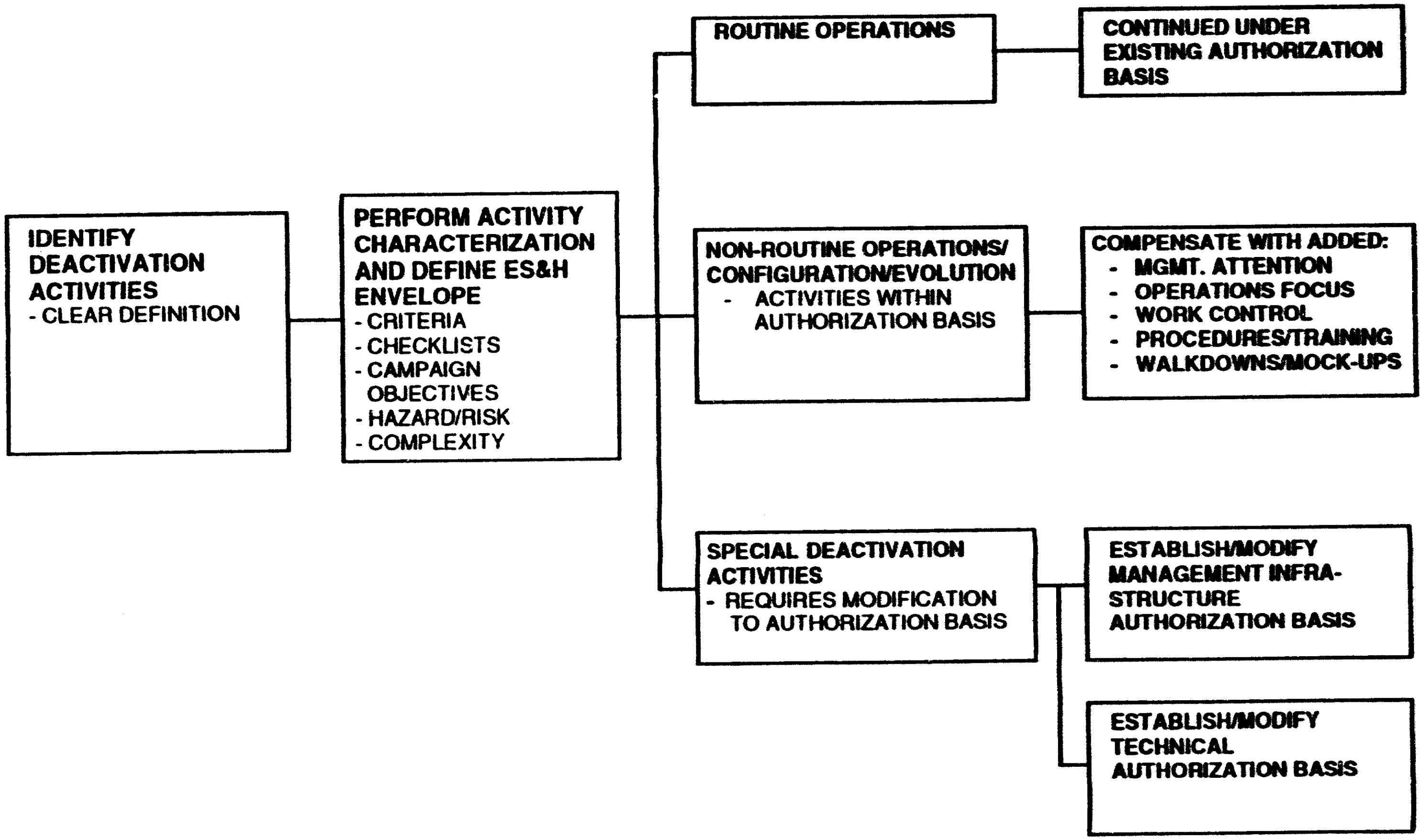
The PDS process is reflected at various levels of detail in Figures B-1, B-2, B-3, B-4, and B-5. The primary steps include the following:

- Expert analysis/characterization, including development of an ES&H envelope
- Activity categorization
- Validation of programs, policies, procedures, and instructions which implement the activity ES&H envelope
- Activity execution
- Activity closeout.

The first two steps of the process are shown in Figure B-1. An expanded level of detail for steps 3, 4, and 5 is shown in Figures B-2, B-3 and B-4 for each of the three categories in which a specific deactivation activity may be placed, depending upon results of expert analysis/characterization. Figure B-5 provides an expanded diagram for the Special Deactivation Activities category.

The analysis/characterization step of the PDS process focuses on the overall safety significance of the individual activity and the ES&H envelope needed for successful accomplishment. The information obtained from activity analysis/characterization and from development of the ES&H envelope allows placement or "binning" of each activity into one of three predefined categories. Two of the three activity categories, Routine Activities and Non-Routine Activities, define activities that fall within the existing PUREX/UO_3 Deactivation Project authorization basis. The third category of activities, Special Deactivation Activities, includes those activities considered to be of a scope and level of complexity that require special consideration by PUREX/UO_3 Deactivation Project management prior to execution.

Figure B-1. Process Overview



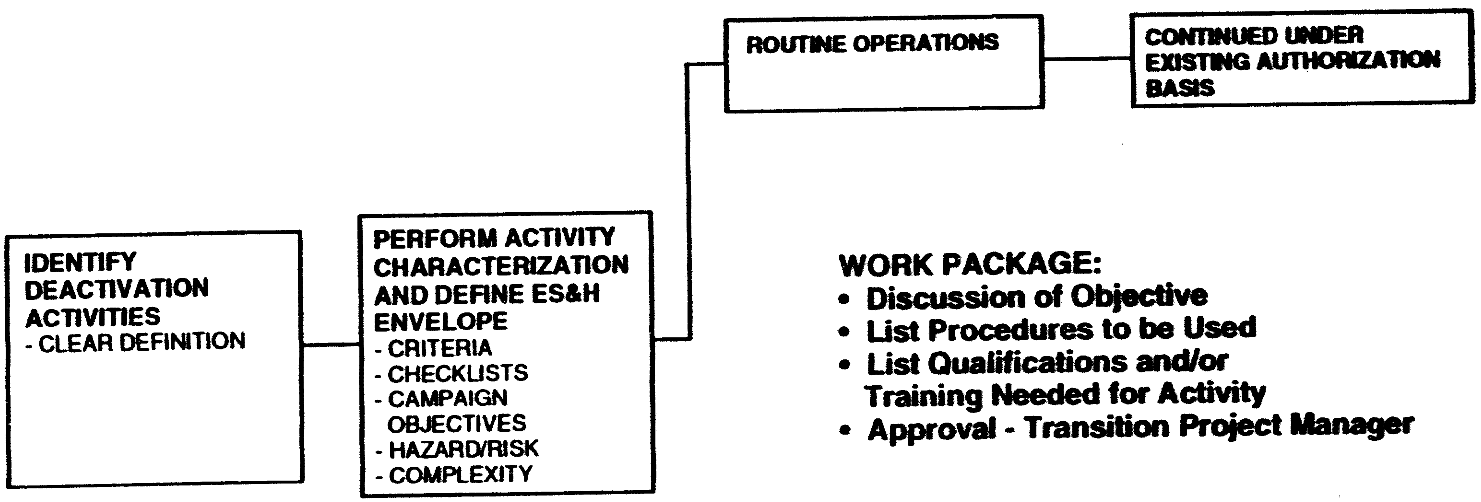
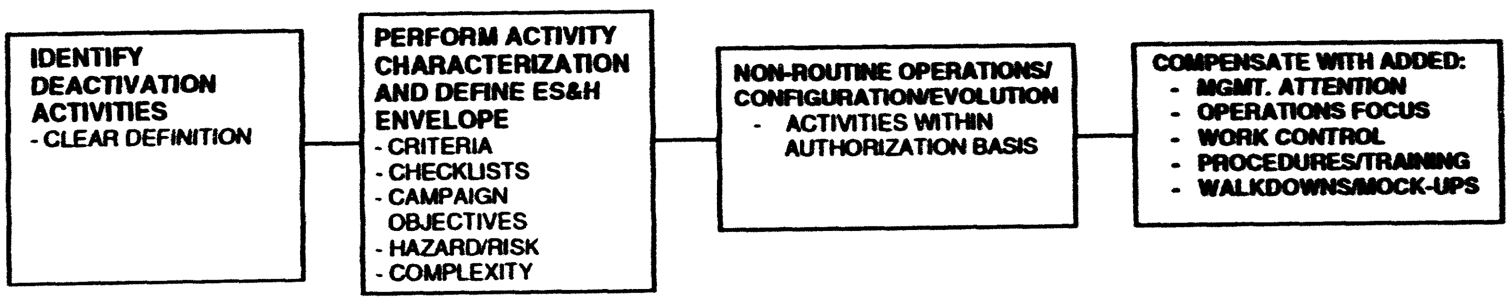


Figure B-2. Routine Operations



WORK PACKAGE:

- Includes Detail Work Instructions
- Includes Procedures Necessary to Perform Activity
- Includes Documentation of any Qualifications or Training Needed to Perform the Activity
- Approval - Plant Manager

Figure B-3. Non-Routine Operations

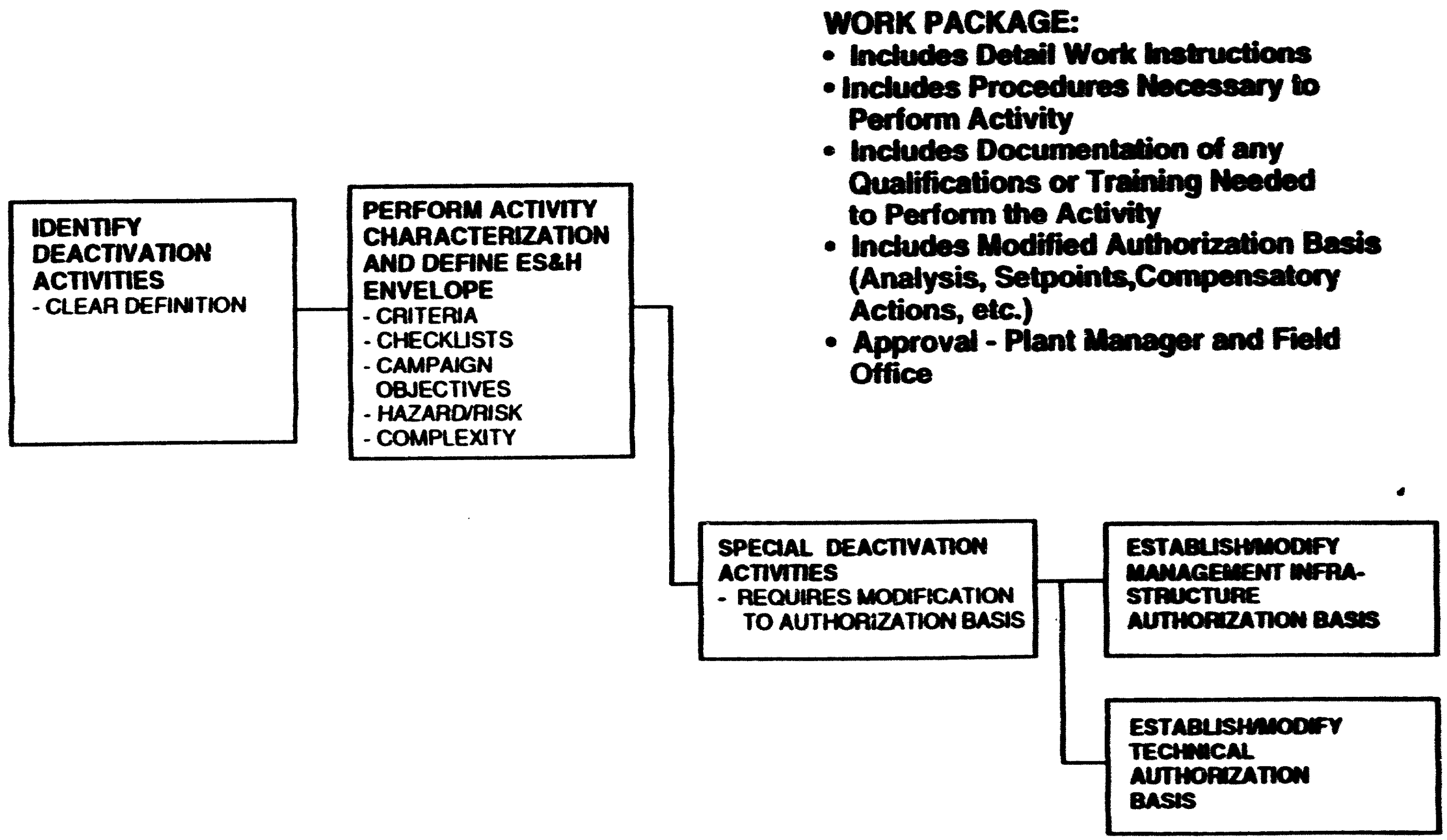
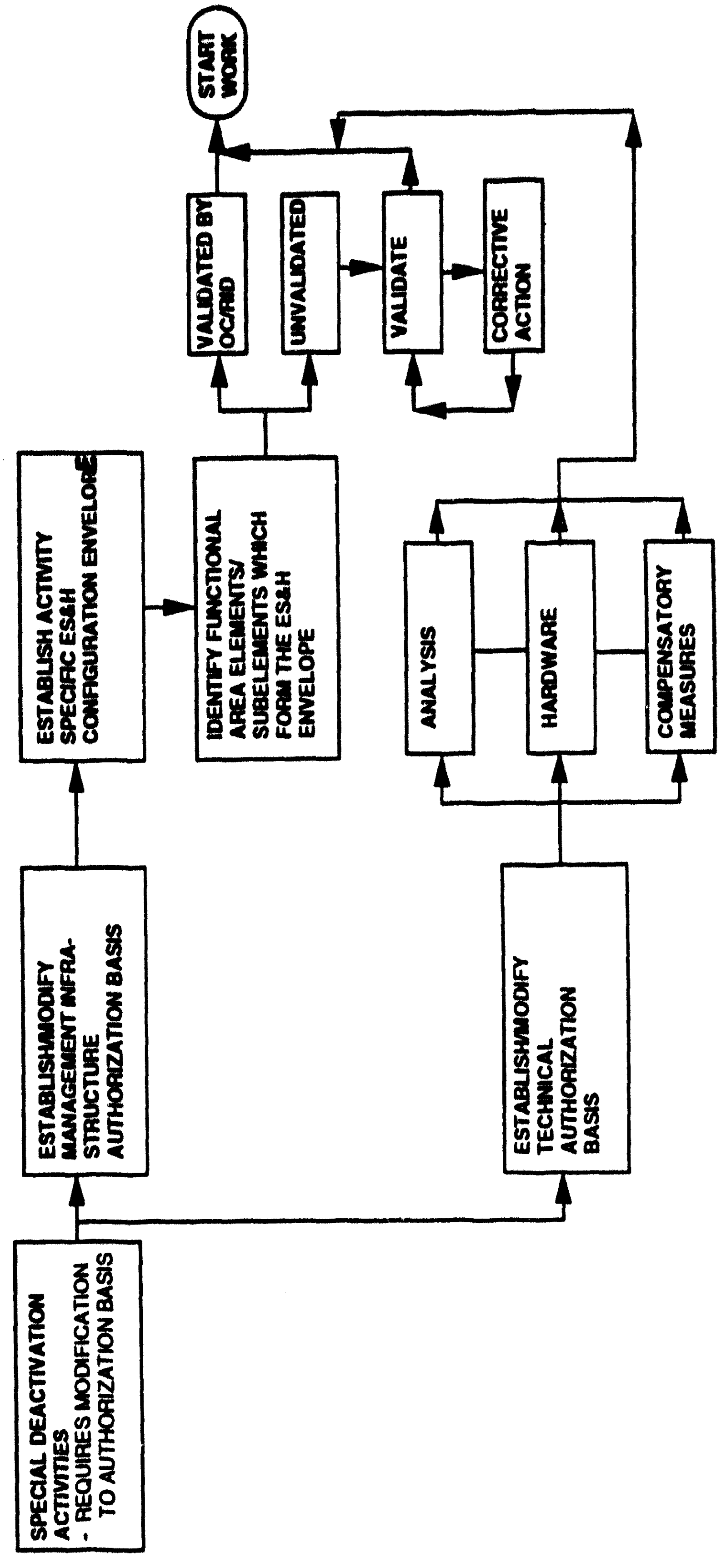


Figure B-4. Special Deactivation Activities

Figure B-5. Special Deactivation Activities (Expanded)



A critical step is validating the existence of programs, policies, procedures, and instructions that adequately implement the standards identified in the ES&H envelope. This step of the PDS process will be closely linked with ongoing Defense Programs (DP) and EM initiatives for implementing DNFSB Recommendation 90-2, including development of Requirements Identification Documents (RIDs). The PUREX/UO_3 Deactivation Project RIDs will be relied upon heavily as a tool during development of the activity-specific ES&H envelopes and for verification that site-level, plant-level, and activity-specific controls effectively implement the standards identified in the ES&H envelope.

Figure B-6 provides a list of the functional areas that collectively form a conservative ES&H envelope and for which PUREX/UO_3 Deactivation Project RIDs will be developed. Figure B-6 also provides a more detailed look at the Engineering Design functional area as an example of the basic structure employed for RID development. Figure B-7 provides a diagram of the RIDs development process. Several Hanford Site facilities are scheduled to complete a significant portion of RID development by December 1993. These approved RIDs will be used to expedite development of the PUREX/UO_3 Deactivation Project RIDs needed for validation of the standards specified by each deactivation activity ES&H envelope.

B3.0 DETAILED DISCUSSION OF ACTIVITY CATEGORIES

Deactivation activities that fall within the Routine Activity category require identification of an ES&H Control Envelope that lists the applicable management controls, but will be executed using the same levels of formality, control, and management attention as similar non-deactivation activities that are currently being performed in PUREX and UO_3 Plant. These activities will be executed using existing procedures for which PUREX and UO_3 Plant operators and technical personnel are trained and qualified. Approval to execute Routine category activities will reside with the WHC project manager.

Deactivation activities assigned to the Non-Routine Activity category will require identification of an activity-specific ES&H control envelope that includes detailed instructions for successful execution of the activity, and the identification of existing PUREX/UO_3 management controls (e.g., procedure number[s], title[s], and revision[s] needed to ensure safe and controlled execution of the activity; a description of any additional controls/requirements including increased management attention, reduced span of control, reduction in the level of concurrent activities; special training; new or revised procedures; compensatory measures; etc.). This category of deactivation activities will require validation that the management controls identified with the authorization basis have been effectively implemented in the plant or that special controls or compensatory measures specified have been developed and implemented. Activities falling into this category are

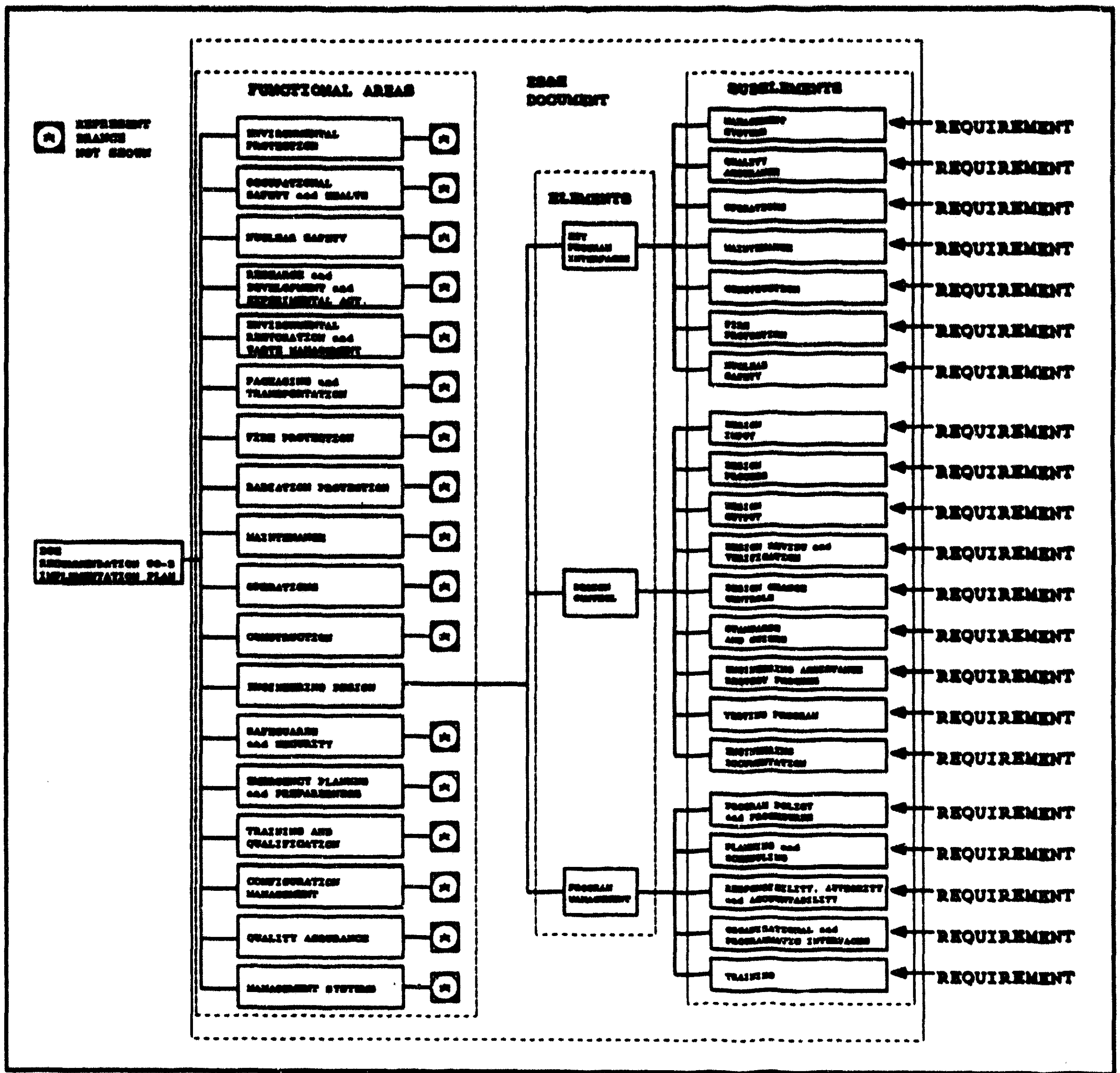


Figure B-6 RID STRUCTURE

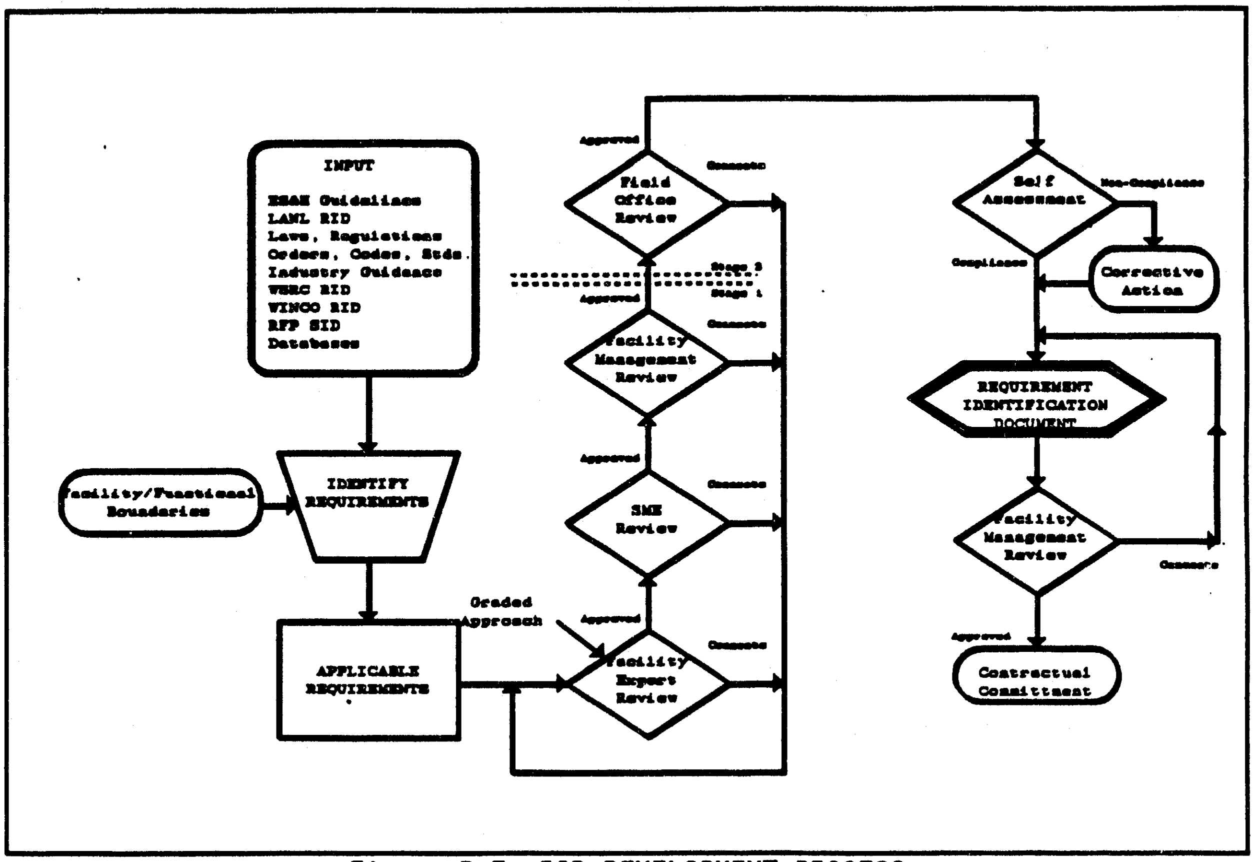


Figure B-7 RID DEVELOPMENT PROCESS

considered to be within the existing PUREX and UO_3 Plant authorization basis, but may not have been performed for some period of time or may require an off-normal configuration or unusual sequencing of tasks. Approval required to execute Non-Routine category activities will reside with the PUREX/UO_3 manager.

The third activity category, Special Deactivation Activities, requires full development of an activity-specific ES&H envelope, that identifies the list of standards considered necessary and sufficient to (1) ensure successful accomplishment of the deactivation activity; and (2) maintain employee/public health and safety, and protection of the environment at a level consistent with the safety significance of the activity. The ES&H envelope will serve as the template for development of detailed work instructions including management "hold points" and independent verifications, for correlation of selected standards with the site level, plant level, and activity-specific controls (programs, policies, procedures, instructions, etc.) that implement the requirements, and for documenting validation of effective implementation prior to activity execution. Activities falling within this category are considered to be of a scope and level of complexity that require special considerations by PUREX and UO_3 Plant management prior to execution. Authorization for activity execution will reside with the PUREX/UO_3 Manager and DOE-Richland Operations Office (DOE-RL).

B4.0 DOCUMENTATION OF THE PDS PROCESS

The existing WHC Policy addressing standards identification and application will be modified as needed to describe the PDS process and will be issued as a new procedure by the WHC Codes and Standards Compliance group. The new procedure will be approved by the manager of Codes and Standards Compliance, the PUREX/UO_3 manager and by DOE-RL as a part of the overall PUREX/UO3 Deactivation Project.

Documentation of execution of the PDS process, as well as execution of the individual deactivation activity, will be contained in a work package document. A work package will be generated for each deactivation activity and the content/format will be specified for each of the three activity categories. The work package will contain relevant documentation generated during execution of each major step in the PDS process. The collective package will serve to document the ES&H envelope and for activity closeout. The work package will supplement the existing PUREX/UO_3 Deactivation Project work control process.

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APPENDIX C

PROJECT RISK AND UNCERTAINTIES

C1.0 INTRODUCTION

The term "Risk" as used in the context of the Plutonium-Uranium Extraction (Plant) (PUREX)/Uranium Trioxide (Plant) (UO_3) Deactivation Project (Project) denotes any potential impacts on Project baselines during Project execution. Risks introduce the possibility of baseline impacts (e.g., not meeting the intended end-state, not meeting schedule milestone commitments, or not meeting cost expectations). Project risks do not include environmental, health, or safety risks.

The approach to identifying and controlling project risk is analogous to the method for environmental and safety risks.

- Identifying the project risk factors. An unfavorable outcome of a risk will normally affect one or more of the Project baselines.
- Grading the magnitude of project risk. The degree of Project risk involves assessing qualitatively the possibility of an unfavorable outcome and the potential impact.
- Implementing project management controls to mitigate or eliminate the risk.

This appendix provides the PUREX/UO_3 Deactivation Project planning assumptions that are the basis for determining Project risk; presents the results of the risk identification and grading; and identifies the mitigating actions that are expected to reduce the risk to a level commensurate with the complexity and importance of the Project.

C2.0 PLANNING ASSUMPTIONS

The risks and uncertainties associated with the PUREX/UO_3 Deactivation Project are based on the following planning assumptions.

- Decontamination and decommissioning (D&D) activities will not be performed for at least 10 years beyond the completion of deactivation activities. There is no significant schedule or budget risk associated with this assumption.
- The deactivation priorities from highest to lowest are as follows:
  - Regulatory Compliance. Complete the agreements that provide regulatory authorization for the deactivation activities starting with the current plant condition.

- High Hazards Reduction. Eliminate the major source terms; return single pass fuel, remove plutonium from tanks D5 and E6, remove the remaining N Cell plutonium powder, and eliminate the remaining nitric acid inventory. These activities decrease public risk during surveillance.

- Surveillance and Maintenance Cost Reduction. Eliminate plant workforce requirements and reduce the cost of the post-deactivation surveillance period.

- Facility transfer requirements. Facilitate the eventual D&D of the plants; DOE requirements for operating facilities should no longer apply to plants anticipating deactivation.

- Best Management Practices.

- The deactivation activities are covered by existing PUREX and UO_3 Plant *National Environmental Policy Act of 1969* (NEPA) documentation, *Operation of PUREX and Uranium Oxide Plant Facilities* (DOE/EIS 0089) (DOE 1983). If the Project requires additional NEPA documentation, including a possible environmental assessment (EA), it is likely one or more deactivation activities will be significantly delayed.

- Phase I closure of the *Resource Conservation and Recovery Act of 1976* (RCRA) waste treatment, storage, and disposal (TSD) systems will be adequate for deactivation. The RCRA deactivation requirements will be met by modifying the RCRA Part A Interim status permit and the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1992). No *Comprehensive Environmental Response Compensation and Liability Act of 1980* (CERCLA) requirements will be imposed.

- Waste tanks and the 242-A Evaporator will be available to support deactivation activities. If further restrictions are placed on liquid waste transfers to the underground waste tanks, there is a significant risk of delaying some deactivation activities.

- Use of the existing 216-B-3 pond for liquid effluent discharges will be limited and ultimately terminated by June 1995, in response to the Tri-Party Agreement commitments. There is no significant schedule or budget risk associated with this assumption, provided the 200 Area Treated Effluent Facility is available on schedule.

- Trained and qualified personnel are available to perform deactivation activities eliminating the need to train new workers. If knowledgeable PUREX and UO_3 Plant personnel are not available, there is a significant risk that deactivation schedules and costs will be adversely impacted.

- Pre-activity reviews will be conducted by the plant staff or Plant Review Committee. If independent Operational Readiness Reviews are required, deactivation activities will be significantly delayed.

- Continued operation of PUREX TSD tank systems will be allowed by the regulators without additional compliance with interim status requirements imposed by *Washington Administrative Code* (WAC) 173-303. Should additional compliance with interim status requirements be enforced for continued operation of active tank systems, additional upgrades (secondary containment, tank integrity assessment, waste analysis, etc.) that will significantly delay Project completion will be required.

- The safety documentation upgrade and the codes and standards strategies outlined in the project management plan will be pursued concurrent with other deactivation tasks. These strategies are considered enhancements and are not prerequisites to the initiation of work activities.

- Budget will be provided as planned in the funding profile. Because resources available for deactivation are from the existing minimum surveillance staff, any budget decrement will first be applied to deactivation to preserve minimum safe operation plant activities.

- Third party reviews, such as the Surplus Materials Peer Review and the Defense Nuclear Facilities Safety Board, will be conducted in parallel with deactivation tasks. If third party approval is required as a deactivation prerequisite, Project completion will be significantly delayed.

- Technical planning bases for the Project will be implemented as described. If the planning bases are changed or regulatory agreement is delayed, Project completion may be significantly delayed.

C3.0 PROJECT RISK ASSESSMENT

The following 14 risk factors are identified as the dominant contributors to risk for the PUREX/UO_3 Deactivation Project:

- High hazard category material disposition
- Time
- Interfaces
- Number of key participants
- Contractor capabilities
- Regulatory involvement
- NEPA/environmental permits
- Site issues
- Human resources
- Quality improvements
- Funding/Budget
- Institutional visibility
- Public involvement
- Overall complexity.

These factors are ranked in three categories: low risk, moderate risk, and high risk. The completed matrix of these factors and their associated rankings are presented in Table C-1. The risk ranking is based on the qualitative evaluation of risk, relying on experience, shared knowledge, similar projects and sub-projects, trends, and judgement. The ranking also reflects the extent of workscope definition available at the time of preparation, the predicted extent of institutional cooperation required to successfully complete the deactivation activities as now scoped, and the extent of development of technical definition. The higher Project risks require implementation of more Project controls, and lower risks justify less controls.

C4.0 RISK MITIGATION ACTIONS

The expected mitigating actions for high and moderate Project risks are identified on Table C-2.

Table C-1. Assessment of PUREX/UO_3 Deactivation Project Risk. (3 sheets)

Risk factor	Low risk	Moderate risk	High risk
Technology	Existing processes and equipment		
High hazard category material disposition (Appendix G work plans describe activity)		Single pass fuel return N-Cell cleanout	Nitric acid sugar denitration Plutonium-uranium solution disposal
Time		Reasonable time to perform work (tight but possible)	
Interfaces		Tank farm storage capacity Analytical Laboratory throughout capacity EM-40 end-state criteria	Safety Analysis changes
Number of key participants	One M&O Contractor		
Contractor capabilities		Limited deactivation experience	
Magnitude and type of environmental contamination		"Clean Release" criteria	
Regulatory involvement		EPA, Washington State Departments of Ecology and Health	

Table C-1. Assessment of PUREX/UO_3 Deactivation Project Risk. (3 sheets)

Risk factor	Low risk	Moderate risk	High risk
NEPA			Potential EA
Environmental permits (RCRA, CAA)		Pioneer agreements	
Number of locations		Two-PUREX and UO_3 Plant	
Site ownership	DOE property		
Improvements/ Accessibility	None required		
Labor skills		Moderate skilled labor	
Availability	Readily available		
Staff buildup	Gradual		
Productivity		Average productivity assumed and moderate schedule risk	
Quality improvements	Existing quality tolerance and low productivity risk		
Funding/Budget			Three or more year duration
			MP, MSA size
			Expense-Funded program

Table C-1. Assessment of PUREX/UO_3 Deactivation Project Risk. (3 sheets)

Risk factor	Low risk	Moderate risk	High risk
Institutional visibility			Pioneer Project Interest to DOE, Westinghouse Hanford Company, other contractors
Public involvement		Advisory groups, public meetings	
Overall complexity		Low technology risk Moderate schedule risk 1 Contractor 2 Locations Few site dependencies Moderate regulatory involvement Some public involvement	

Table C-2. Risk Mitigation Actions. (3 sheets)

Element/concern	Mitigation/actions
High hazard category material disposition	
Nitric acid denitration (high risk)	- Idaho Falls may receive approximately 227,000 L (60,000 gal) over a one-year period. - Limited consumption for process equipment dilute acid flushes. - Early permit discussions with regulators to confirm permit status or new requirements for NO_x destruction via existing sugar denitration process. U.S. Environmental Protection Agency has indicated that the governing permit for NO_x stack release is still valid.
Plutonium-uranium solution disposal (high risk)	- Detailed engineering alternatives study underway. - Low radiation dose rate allows operating and handling flexibility. - Alternative disposal to waste tanks is prevented by administrative hold, which potentially could be lifted.
Single pass fuel return (moderate risk)	- Start 100-K storage basins EA and shipping package SARP modifications as soon as possible. - Start PUREX B cell disassembly as soon as possible. - Grout A, B, C cell spilled N Reactor fuel in place as backup option.
N-Cell cleanout (moderate risk)	- Activities are familiar to plant personnel. - Limit special nuclear material recovery sufficient to shut down criticality alarm system.
Time	
Reasonable time to perform work (moderate risk)	- Resource-loaded schedules developed. - Identification of critical resources. - Schedule/resources review by plant staff.
Interfaces	
Tank farm storage capacity (moderate risk)	- Limit waste volumes sent to tank farms. Waste minimization processes have been identified and are being developed. - The key waste minimization process, E-F11 concentrator operation, discharging overheads to the atmosphere will be demonstrated. The E-F11 would be used for denitrated nitric acid and flush solution waste volume reduction. - Volume transferred to tank farms is reduced from 4.9 million L (1.3 million gal) to about 1.1 million L (300,000 gal) if all identified waste minimization activities can be used.
Analytical Laboratory capacity (moderate risk)	- Tank farms waste transfer samples require only confirmation of safety parameters for criticality mass limit, pH, corrosion inhibition. Other analyses follow. - Early process vessel flush evaluation will identify most effective sampling regime to track decontamination progress and limit unneeded samples. - Process flow sheet knowledge will be used to extrapolate level of other constituents from selected indicators rather than performing individual analyses. - Additional technical workforce can be assigned from other laboratories.

Table C-2. Risk Mitigation Actions. (3 sheets)

Element/concern	Mitigation/actions
Interfaces (Continued)	
EM-40 end-state criteria (moderate risk)	• Baseline end-state criteria in the project management plan before committing significant Project resources. • Use change control process to alter criteria affecting workscope so Project impacts are defined, visible, and agreed to.
Safety analysis changes (high risk)	• Workshops have been conducted with DOE-HQ oversight/support groups to gain concurrence on safety analysis approach. • Validation of existing safety basis documentation as USQ screening basis completed and accepted. • Similar worker safety and health evaluation will be conducted per draft DOE Order 5483.XX, Occupational Safety and Health Program, for DOE contractor employees and additional DOE safety and health requirements.
Contractor Capabilities	
Limited deactivation experience (moderate risk)	• Independent Technical Review (Red Team, October 1992) report verified Project feasibility. • Independent Technical Experts available.
Magnitude and Type of Environmental Contamination	
"Clean release" criteria (moderate risk)	• Determine extent of required cleanup by evaluating post-deactivation work health risk reduction (for example, inaccessible areas could have higher risk than areas subject to surveillance entries.)
Regulatory Involvement	
EPA, Washington State Departments of Ecology and Health (moderate risk)	• Regulatory Compliance Plan, identifying air, water, RCRA requirements and describing closure approach, is completed. Regulator discussions indicate willingness to develop agreements to facilitate work progress. • Reach agreement with regulators before significant Project resource commitment.
NEPA, environmental permits (RCRA, CAA)	
Pioneer agreements (moderate risk)	• Approach covered in Regulatory Involvement (above).
NEPA, potential EA (high risk)	• Detailed screening conducted on deactivation activities as basis for NEPA judgement. • EA limited to 100-K fuel receipt which would not impact plant deactivation activities.
Number of Locations	
Two (moderate risk)	• Common resources and personnel. • Activities in both locations included in integrated plan.
Labor Skills	
Moderate skilled labor (moderate risk)	• Schedules identify needed time-phased critical skill requirements.
Average productivity assumed and moderate schedule risk (moderate risk)	• Productivity based on historical rates for PUREX and UO_3 Plant workers. • Activities prioritized in event descoping is required.

Table C-2. Risk Mitigation Actions. (3 sheets)

Element/concern	Mitigation/actions
Funding	
Three or more year duration (high risk) Expense-funded program (high risk)	• "Critical Path Method" scheduling reduces chance of delay. • Funding needs identified in 5 Year Activity Data Sheets. • Deactivation treated as a Project for focus on performance objectives and milestones. • Project management concept to facilitate speedy resolution of issues.
Institutional Visibility	
Pioneer Project Interest to DOE, Westinghouse Hanford Company, and other contractors (high risk)	• Maintain effective communication. • Regular workshops and informal communication to limit over commitment of key Project team workers.
Public Involvement	
Advisory group, public meetings (moderate risk)	• Formal Project stakeholders involvement plan (refer to Appendix D). • Site active with public meetings.

APPENDIX D

STAKEHOLDER INVOLVEMENT PLAN

D1.0 INTRODUCTION

The Plutonium/Uranium Extraction (Plant) (PUREX)/Uranium Trioxide (Plant) (UO_3) Deactivation Project (Project) has been selected as a model for testing aggressive new methods to quickly convert existing U.S. Department of Energy (DOE) facilities from standby operation to a low cost, stable surveillance mode pending a final decision on plant disposition. To meet expectations, the adoption of new business concepts was mandated. The use of the partnership concept, as embodied in the Project Management Team and the Independent Technical Experts, is an example of a new concept integrated with the traditional project authority structure.

The success of the PUREX/UO_3 Deactivation Project and its new concepts depends on the degree of acceptance by the organizations and groups who can influence the PUREX/UO_3 Deactivation Project including:

- Existing DOE and Westinghouse Hanford Company (WHC) organizational structure (e.g., the matrixed and support groups who have project concurrence or approval authority)
- Legislated authority structure (e.g., the Washington State Department of Ecology or the Defense Nuclear Facilities Safety Board)
- Public advocates, advisory groups, or public opinion.

Groups who are affected by or who can affect the PUREX/UO_3 Deactivation Project are the Project's stakeholders.

A fundamental expectation of the Project is to involve stakeholders early in the concept-formation phase and throughout the project execution phase. Stakeholder involvement is necessary for and will lead to Project success.

This Stakeholder Involvement Plan identifies the stakeholders for the PUREX/UO_3 Deactivation Project and the methods that will be used to invoke their constructive interaction. However, it is important to note that many of the basic decisions, such as the decision to deactivate and to reach a point at which the plants can be left unoccupied and in a safe condition, already have been made.

D2.0 PURPOSE

The purpose of the activities outlined in the Stakeholder Involvement Plan is to accomplish the following.

- Establish a common information base from which interested parties can learn about PUREX and UO_3 Plant, their current status, and other pertinent facts related to these plants and their condition.
- Inform stakeholders about deactivation alternatives; end point objectives; and the constraints, costs, and timetable associated with each of these.
- Define stakeholder values for the Project and assure the values are incorporated in the work.
- Facilitate the transfer of information, feedback, and verification as deactivation alternatives are evaluated, selected, and implemented.
- Keep stakeholders apprised of the progress of the Project.

D3.0 STAKEHOLDERS

Stakeholders can be separated into three broad groups.

- Traditional stakeholders are those with concurrence or approval authority for Project activities from within existing DOE-Headquarters (DOE-HQ), DOE-Richland Operations Office (DOE-RL), and WHC organizations (e.g., the independent safety and quality assurance organizations). These stakeholders include PUREX/UO_3 Deactivation Project participants and the internal stakeholders whose active participation is necessary for the Project to succeed.
- Legislated stakeholders are those who have collateral or enforcement authority for Project activities invoked through the legislative process, such as the Washington State Department of Ecology or the Defense Nuclear Facilities Safety Board. These stakeholders are partners who are external to the Project. Legislated stakeholders' active participation is necessary for success of the PUREX/UO_3 Deactivation Project.
- Public stakeholders are those who influence DOE policy toward the Project through public advocacy or public opinion. Public stakeholders include WHC employees, the general public, and advisory groups. Public stakeholders' participation is voluntary and may generally depend on the PUREX/UO_3 Deactivation Project's perceived impact on their lives and interests.

These latter two groups are external stakeholders. Constituents of the three PUREX/UO_3 Deactivation Project stakeholder groups are summarized in Table D-1. Stakeholders can be members of more than one group.

D4.0 INVOLVEMENT PROCESS

Stakeholders support the Project by (1) identifying the information the stakeholders need to know, and (2) providing the DOE-RL Project manager with their values and the information necessary to make publicly acceptable Project decisions and to lead the Project to a successful outcome in the public forum. Most involvement is expected to occur through the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1992) process.

The following sections describe the forums available for stakeholder involvement. Wherever possible, several communication avenues are provided for each stakeholder group to make participation as convenient as possible. The multiple forums are shown in Figure D-1. The forums predate the PUREX/UO_3 Deactivation Project and have a proven stakeholder following. Wherever possible, information will be provided and exchanged using these channels.

D4.1 TRADITIONAL STAKEHOLDERS

WHC and DOE oversight and matrixed support organizations will be involved through review, comment, and approval of the PUREX/UO_3 Deactivation Project management plan.

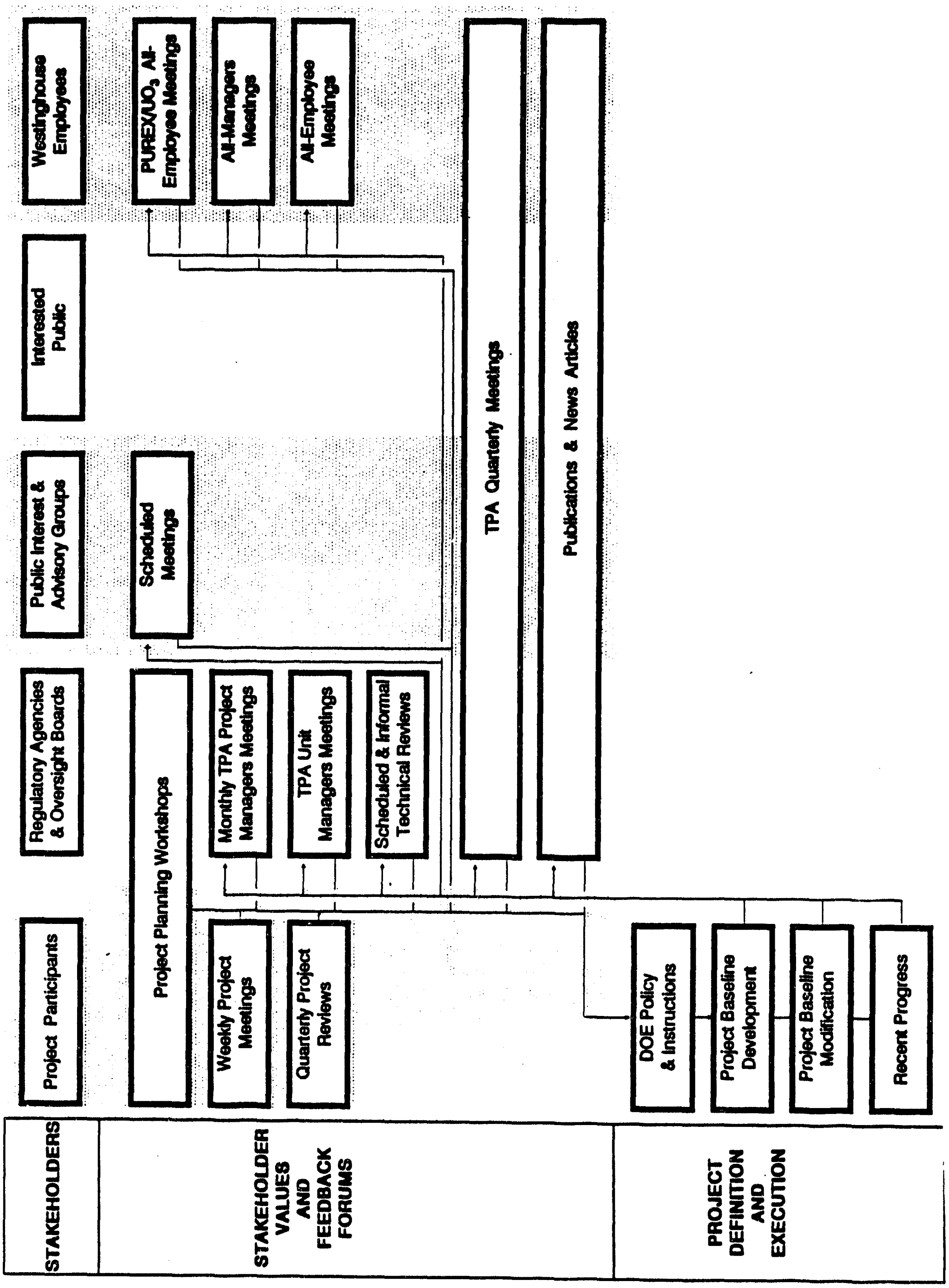
The Transition Advisory Team and the Independent Technical Experts are two stakeholder groups specifically constituted to advise the Project. These groups consist of independent subject-matter experts and senior representatives from private industry. They meet as requested to receive status reports and to provide feedback concerning the Project.

The Project management team is responsible for encouraging active involvement of these groups and for making access to the Project available and convenient. Where traditional organization roles come in conflict with Project objectives, it will be the Project management team's responsibility to act to resolve the conflict.

Table D-1. Major Project Stakeholders.

Organization or Affiliation	Stakeholder Groups
Project Participants	U.S. Department of Energy - Headquarters (DOE-HQ) Office of Facility Transition and Management Independent Technical Experts PUREX/UO_3 Deactivation Project Office U.S. Department of Energy - Richland Operations Office (DOE-RL) Operations and Transition Division PUREX/UO_3 Deactivation Project Office Westinghouse Hanford Company (WHC) PUREX/UO_3 Deactivation Project Office Transition Advisory Team DOE-HQ, DOE-RL, and WHC project oversight and matrixed support groups
Regulatory agencies	Oregon State Department of Energy U.S. Environmental Protection Agency Washington State Department of Ecology Washington State Department of Health Washington State Historic Preservation Office
Oversight boards	Defense Nuclear Facilities Safety Board
Public interest groups	Columbia River United Government Accountability Project Hanford Education League Heart of America Northwest Northwest Environmental Advocates and Hanford Watch
Advisory groups	Native American Nations Site-Specific Advisory Board State and Tribal Working Group U.S. Department of Energy Environmental Restoration and Waste Management Advisory Committee
Interested public	Individuals and groups
WHC employees	PUREX and UO_3 Plant employees Other employees

Figure D-1. PUREX/UO_3 Deactivation Project Stakeholder Involvement Process.



D4.2 LEGISLATED STAKEHOLDERS

Stakeholders with legislated regulatory, permitting, or oversight authority include the Defense Nuclear Facilities Safety Board and the following agencies: the U.S. Environmental Protection Agency, the Washington State Departments of Ecology and Health, the Washington State Historic Preservation Office, and local regulatory bodies.

The Defense Nuclear Facilities Safety Board will be involved through special meetings that focus on their oversight responsibilities. The DOE-HQ Project manager is responsible for their involvement.

The DOE-RL Project manager is the interface with the other agencies and is responsible for their Project involvement. As a result of implementing the Tri-Party Agreement, several standing forums are available and will be used for Project business. The following are standing forums.

- Tri-Party Agreement Project Managers' Meetings. The Tri-Party Agreement project managers consist of representatives of all Tri-Party Agreement signatories and are at a higher level of management than the unit managers, who are assigned to specific milestones.

  The Tri-Party Agreement project managers meet monthly. These meetings can be used to provide briefings and to receive feedback on the PUREX/UO_3 Deactivation Project. Briefings are not expected to be necessary every month, but the opportunity is available if one is desired by either PUREX and UO_3 Plant management or Tri-Party Agreement project managers.

- Tri-Party Agreement Unit Managers' Meetings. The unit managers consist of representatives of all Tri-Party Agreement signatories who have been assigned to monitor the cleanup specifically associated with certain facilities and waste storage and/or disposal units. The unit managers that address the closure plans for PUREX and the PUREX tunnels will begin meeting monthly as the July 1995 planned completion date draws nearer. These meetings will be used to brief the unit managers on the PUREX/UO_3 Deactivation Project and to receive feedback from them. Briefings are not expected to occur each month unless requested by the unit managers.

- Washington State Historic Preservation Office Meetings. These meetings are conducted through representatives of the Hanford Cultural Resource Laboratory at Battelle-Pacific Northwest Laboratories and the DOE-RL Site Infrastructure Division. A briefing on the PUREX/UO_3 Deactivation Project, along with the historic preservation plan for affected facilities, will be scheduled with representatives of these offices. Their feedback and concurrence with the PUREX/UO_3 Deactivation Project's approach to preservation will be solicited at that time.

- Special PUREX/UO_3 Deactivation Project workshops and special topic meetings. The Tri-Party Agreement agencies, as well as the Washington State Department of Health, are invited and actively encouraged to attend the special Project workshops held in Richland, Washington. The purpose of these workshops is to define Project policy. Special meetings on topics that the Tri-Party Agreement agencies and Washington State Department of Health have authority over are convened as required.

- State and Tribal Working Group Meetings. The regional constituent of this national set of groups has been brought together by DOE to provide advice and feedback to DOE programs and sites. Currently, the regional group meets twice a year, but it may adopt quarterly meetings in 1994. A status presentation on the PUREX/UO_3 Deactivation Project will be given to this group, at which time the group's feedback will be sought.

Although the Oregon Department of Energy has no regulatory authority for the PUREX/UO_3 Deactivation Project, it is treated as a stakeholder as a matter of courtesy. The Oregon Department of Energy is invited to participate in the policy workshops and regularly attends public stakeholder meetings.

D4.3 PUBLIC STAKEHOLDERS

Public stakeholders, the largest Project stakeholder group, are comprised of public advocacy groups, DOE and regulatory citizens' advisory panels, WHC employees, and individual members of the general public. The WHC Project manager is the interface with WHC employees. The Project interface with the other stakeholders is the DOE-RL Project manager.

Although these groups lack project decision-making authority, they exercise policy-making influence through public opinion and their value sets for deactivation work at the Hanford site.

The extent of the PUREX/UO_3 Deactivation Project involvement with public stakeholders is expected to be proportionate to its involvement in the overall Hanford Site cleanup process. The following existing public forums will be used.

- Special PUREX/UO_3 Deactivation Project workshops to identify the information the public needs to know, to share that information with the public, and to obtain input on the pubic values needed to make publicly acceptable Project decisions. The special workshops will occur early in the Project on a schedule determined by the level of public interest.

- Tri-Party Agreement Quarterly Public Meetings. Meetings with the general public are mandated in the Tri-Party Agreement to keep the public informed of developments and to receive feedback from the public. Topics that may be of interest only to some members of the public often are addressed in "break-out" sessions held in separate rooms near the main meetings. Such "break-out" sessions will be used for the Project on a schedule determined by the level of public interest.

- News Articles. The Hanford Reach is the newspaper of WHC/Boeing Computer Services of Richland. It reaches and informs employees of PUREX and UO_3 Plant and all other WHC employees on a weekly basis.

  The Hanford Update, a newsletter funded by the Tri-Party Agreement, is designed to inform all interested persons of developments in the Hanford Site cleanup. It is mailed on a quarterly basis to all persons and groups who have indicated an interest by signing their names at Tri-Party Agreement meetings or by calling the Tri-Party Agreement information number. It reaches and informs the wider interested public and general stakeholder groups.

  PUREX/UO_3 Deactivation Project news articles will be included in both the Hanford Reach and the Hanford Update on a regular basis.

- PUREX and UO_3 Plant All-Employee Meetings. All-Employee meetings occur on a quarterly or monthly basis or as often as requested by the employees or management. The meetings give PUREX and UO_3 Plant employees an opportunity to learn about the progress of the deactivation activities and to offer their feedback.

- Site-Specific Advisory Board Meetings. This group currently is being brought together by DOE-RL to serve as a sounding board and advisory panel on a broad range of issues involving the Hanford Site. The group's first meeting is expected to take place during late 1993.

- Environmental Restoration and Waste Management Advisory Committee Meetings. The Environmental and Waste Management Advisory Committee (EMAC) was formed by DOE-HQ in 1992 specifically to provide advice and counsel to the Secretary of Energy on Environmental Restoration and Waste Management projects that affect cleanup and land use issues. The EMAC is comprised of members of citizen groups, environmental groups, labor unions, Native American nations, consulting firms, government agencies, and academic institutions. The members from Washington State represent the Washington State Department of Ecology and the Yakima Indian Nation. The EMAC meets on a quarterly basis in Washington, D.C.

D5.0 COMMON INFORMATION BASE

Active public involvement requires that stakeholders be provided with enough basic information that they feel comfortable and qualified to comment and participate in an informed manner. The basic information provided to the stakeholders in the initial articles and presentations listed in Section D4.0 will include the following:

- Physical descriptions of PUREX and UO_3 Plant and processes
- Plant histories and background
- Facts on the current costs and surveillance and maintenance requirements for the plants
- Information on the DOE-HQ EM-60 project initiatives
- History of the PUREX and UO_3 Plant DOE deactivation order and the deactivation timetable, including information on the risks and costs of not completing the deactivation activities
- Description of the deactivation activities (e.g., removal of remaining special nuclear material, removal of hazardous chemicals, and isolation of utilities)
- Information on worker and public safety during deactivation activities, and on worker outplacement and community economic impacts following deactivation
- Introduction to some of the technical and regulatory questions and issues raised by the PUREX/UO_3 Deactivation Project.
- A list of pertinent documents concerning PUREX and UO_3 Plant will be maintained and updated on a continuing basis. This list will be available to the public by request. All documents listed are sent through the public availability clearance process.

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APPENDIX E

SURVEILLANCE AND MAINTENANCE PLAN

E1.0 INTRODUCTION

The Plutonium-Uranium Extraction (Plant) (PUREX)/Uranium Trioxide (Plant) (UO_3) Deactivation Project (Project) places the plant in a safe, environmentally sound, and economical condition. The surveillance and maintenance plan will ensure that the plant is maintained in a safe condition during the post-deactivation surveillance period while awaiting the start of decontamination and decommissioning activities. U.S. Department of Energy (DOE) Order 5820.2A, *Radioactive Waste Management*, Chapter V, "Decommissioning of Radioactively Contaminated Facilities," requires that a surveillance and maintenance program be developed and implemented with documented evidence that the checks and inspections are being conducted and that the required maintenance is being performed to keep the facility in a safe condition pending the final disposition.

The Surplus Facilities Management Acceptance Criteria specified in SFM-85-4, *Surplus Facilities Program Plan Fiscal Year 1993*, Appendix A, "Facility Acceptance and Transfer," (Winship and Hughes 1992) requires that PUREX and UO_3 Plant be in a radiologically safe condition following deactivation. The following is the basis for the surveillance and maintenance plan.

- The plants shall be in a physical condition adequate to contain and monitor any radioactive contamination. An "As-Left" radiation contamination survey of the plant and surrounding areas will be included in the deactivation records.

- Security systems and procedures shall be adequate to prevent unauthorized entry.

- Special nuclear materials, reactor fuels, and solid and liquid radioactive, hazardous, and mixed waste shall be removed from the facility or the location, and controls shall be documented and approved for those materials for which an end condition cannot be determined. Any exceptions of nuclear and hazardous material remaining in the facility shall be identified and characterized by location, type, and quantity.

To meet the surveillance and maintenance requirements, the PUREX and UO_3 Plant plan must ensure provisions are made to:

- Sustain systems required for monitoring and emission control

- Sustain operation of systems required for protection of surveillance personnel, the general public and environment, and vital equipment

- Sustain systems to respond to emergency conditions expected in the plant's deactivated state
- Sustain systems required to prevent structural degradation.

This appendix presents a summary-level description of the expected contents of the plan. The plan will be expanded and detailed as the Project proceeds.

E2.0 DEACTIVATED PLANT STATUS

The plant status expected at the end of the Project is described in Table 2.2-1. The area status listed in the table is the assumed condition to be used in preparing the surveillance and maintenance plan.

E3.0 SURVEILLANCE AND MAINTENANCE PLAN

Based on prior deactivation experience, the surveillance and maintenance plan will require the following functions.

E3.1 RADIATION AND ENVIRONMENTAL MONITORING

Monitoring during the surveillance period includes the following:

- Environmental surveillance will be in accordance with the following (the 291-A-1 canyon exhaust monitoring system will be operated):
  - WHC-CM-1-1, *Management Policies*, Section 5.1, "Environmental Assurance"
  - WHC-EP-0468-1, *Facility Effluent Monitoring Plan for the Plutonium-Uranium Extraction Facility* (Nickels and Geiger 1992)
  - WHC-CM-7-5, *Environmental Compliance*.
- Radiation protection, to the extent required for worker protection during plant surveillance entries, will be in agreement with the following:
  - DOE Order 5480.11, *Radiation Protection for Occupational Workers*
  - DOE N5480.6, *Radiological Control Manual*
  - WHC-CM-1-6, *Hanford Site Radiological Control Manual*.
- Periodic radiation surveys to confirm the baseline surveys and to detect any unexpected changes.

E3.2 RADIOLOGICAL CONTROL

Surveillance and maintenance of remaining plant systems that provide radiological control are limited to the operation of the cascaded heating, ventilation, and air conditioning (HVAC) system at PUREX. Surveillance of system performance will provide assurance of proper confinement function.

E3.3 MONITORS AND ALARMS

Continuous monitoring will be provided for the following:

- The 291-A-1 canyon exhaust stack effluent sampling and monitoring equipment, including stack gas flow rates and high radiation alarm
- Electrical power distribution status
- Cascade HVAC equipment status, including fans (parameters will be motor current, bearing temperatures, and an alert for fan transfer)
- Cascade HVAC monitoring of zone differential pressures, exhaust filter differential pressures, air dew point, and temperature.

The monitoring system will have the capability to communicate with monitoring stations outside the PUREX boundary.

E3.4 FACILITY AND ACCESS CONTROL

Surveillance and maintenance of the plant and access control during the surveillance period include surveillance of the following:

- Fences and doors for security and access protection
- External housekeeping to avoid accumulation of combustibles near the plant
- The exterior structure, roof, and access doors to verify no indication of potential or ongoing degradation of the structure or accesses
- The interior to ensure deactivated plant conditions are retained, and to reduce the risk of contamination spread due to intrusion by small animals or birds
- Signs and restricted area posting/barriers to ensure that proper warnings and exposure controls remain in place for worker protection.

E3.5 EMERGENCY PREPAREDNESS

Surveillance and maintenance of remaining active plant systems that provide emergency services include the following:

- Fire alarm system
- Backup power for the unmanned monitoring systems.

E4.0 SURVEILLANCE FREQUENCY

The surveillance and maintenance plan will be developed during the Project. The frequencies specified here are based on experience at similar Hanford Site facilities during extended outages and commercial nuclear experience. To the greatest practical extent, all surveillances will be conducted without entering the confinement structure. When entries are required, workers will follow a predetermined path and use checklists to ensure that a single entry fulfills the internal inspection requirements.

E4.1 WEEKLY SURVEILLANCES

Surveillance will be performed weekly on the following:

- Canyon exhaust fans, filters, and ventilation system differential pressure
- 291-A-1 canyon exhaust stack effluent monitoring system.

E4.2 MONTHLY SURVEILLANCES

Surveillances will be performed monthly on the following:

- Grounds housekeeping
- Exterior signs and restricted area posting/barriers
- HVAC intakes
- Personnel access control.

E4.3 QUARTERLY SURVEILLANCES

Surveillances will be performed quarterly on the following:

- Backup power supply
- Fire alarm system
- Internal plant inspection
- External plant inspection.

E5.0 REPORTING

Notification and reporting of events will be in accordance with DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*, as implemented by Hanford Surplus Facilities Program facility-specific procedures.

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APPENDIX F

SAFETY DOCUMENTATION PLAN

F1.0 INTRODUCTION

This appendix provides the process that the Plutonium-Uranium Extraction (Plant) (PUREX)/Uranium Trioxide (Plant) (UO_3) Deactivation Project (Project) will use to ensure that worker and public safety is adequately addressed during plant deactivation. The primary activities involved in the process include the following.

- Demonstrate the adequacy of "Safety Basis" and "Worker Health and Safety" documentation.
- Reduce the number of operational safety requirements (OSRs) that are applicable during deactivation.
- Use the Safety Basis and the Westinghouse Hanford Company (WHC) Unreviewed Safety Question (USQ) process to evaluate deactivation task safety.
- Provide the required safety documentation for the surveillance period.

F2.0 SAFETY DOCUMENTATION ACTIVITIES

F2.1 SAFETY BASIS DOCUMENTATION ADEQUACY

The adequacy of the Safety Basis documentation has been demonstrated by linking the 20 U.S. Department of Energy (DOE) Order 5480.23, *Nuclear Safety Analysis Reports*, topic issue guidance requirements to the existing safety-related documents. The crosswalk process used in making this determination is illustrated in Figure F-1.

Implementation of the process occurred through a series of mini-workshops covering related topics and using experienced subject matter experts from PUREX Operations, PUREX Engineering, PUREX Training, PUREX Independent Safety Oversight, and Safety Analysis. The subject matter experts performed a subjective evaluation and reached a consensus that the documents were adequate.

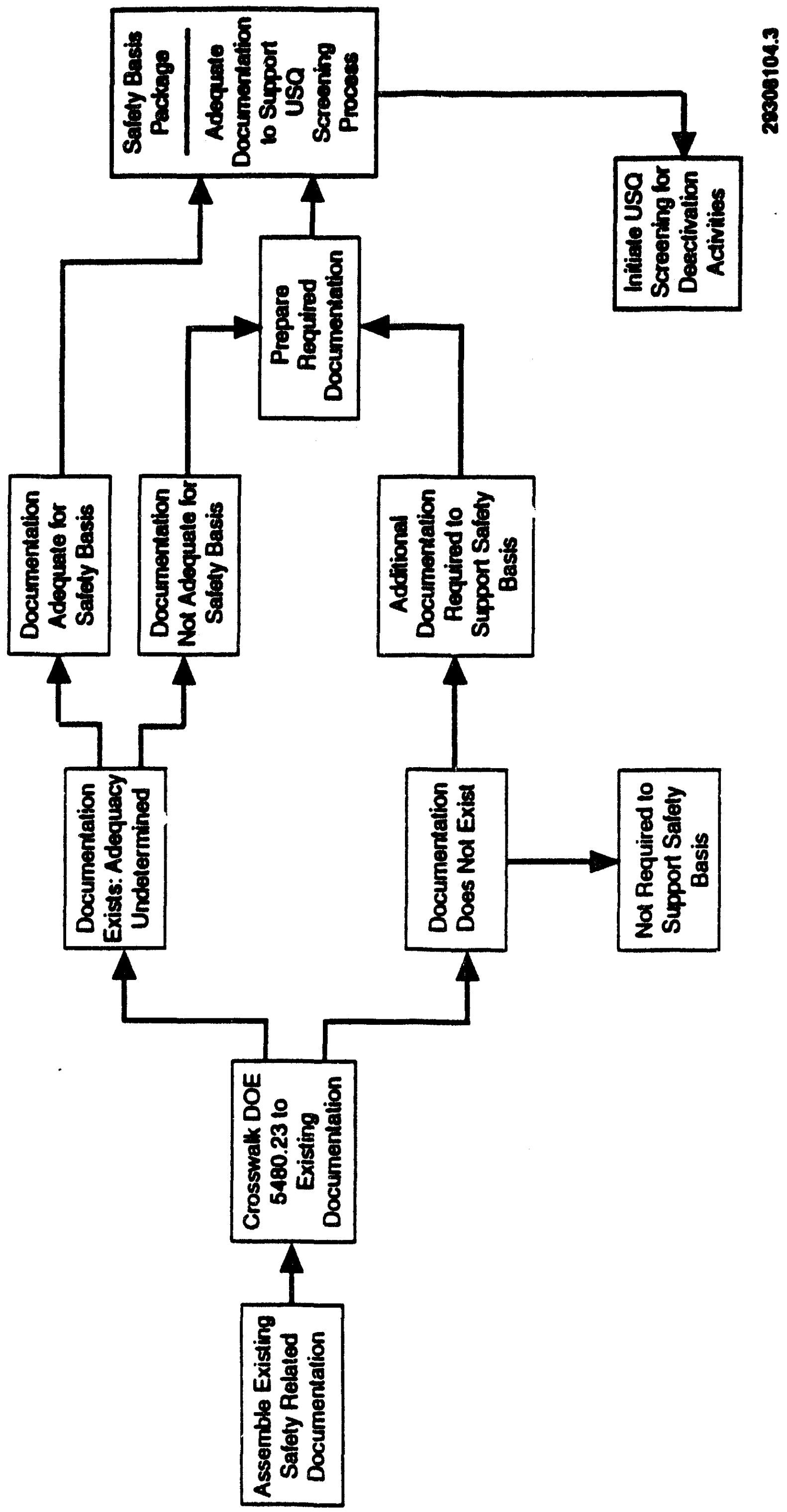


Figure F-1. Safety Basis Evaluation Process.

F2.2 WORKER HEALTH AND SAFETY DOCUMENTATION ADEQUACY

The crosswalk effort will be expanded to include the appropriate suite of worker health and safety-related standards and requirements that will be supplied by the DOE-Headquarters Office of Safety and Quality Assurance (EH-33). Compliance with Occupational Safety Health Act requirements is indicated in the (draft) WHC Worker Protection Program (WPP). Upon approval, the WPP will be included in WHC-CM-4-3, *Industrial Safety Manual*.

F2.3 INSTITUTIONAL CONTROLS

Institutional controls are used to implement and maintain compliance with DOE requirements. WHC implements many of the safety-related requirements by use of policies, management practices, and procedures. The institutional controls will be published as part of the WHC Generic Interim Safety Basis Matrix in fiscal year 1993. Implementation of these controls within the PUREX and UO_3 Plant will then be demonstrated by a checksheet or matrix.

F3.0 OPERATIONAL SAFETY REQUIREMENTS APPLICABILITY DURING DEACTIVATION

Operational safety requirement information is now contained in the following documents:

- WHC-SD-HS-SAR-001, Rev. 5, *PUREX Plant Final Safety Analysis Report* (Roemer 1990). Chapter 11 of the Safety Analysis Report (SAR) was written for an operating plant and contains 132 OSRs in the form of 23 safety boundaries/ conditions and 109 control features. Safety boundaries provide specific values and technical requirements; safety conditions define requirements but are not directly measurable; and control features state what is controlled but do not list specific values or limits.

- WHC-CM-5-24 Add. I, *PUREX Process Control Manual Addendum I* (PCM). This document implements Chapter 11 Safety Boundaries/Conditions and Control Features through a total of 186 control feature requirements (CFRs) as Limiting Conditions for Operation (LCOs), Limiting Control Settings (LCSs), administrative requirements, and surveillance requirements.

- WHC-SD-CP-OSR-006, Rev. 2, *Applicability of PUREX Operational Safety Requirements During Shutdown/Standby* (Applicability Document) (Parker 1992). This document evaluated the PCM requirements to determine which CFRs are applicable when PUREX is in a shutdown/standby condition. The purpose of the evaluation was to make it possible to better use the plant resources by eliminating unneeded instrument calibrations while maintaining the plant within the constraints of the current safety envelope.

- WHC-SD-CP-RD-020, Rev. 0, *Application of Standardized Operational Safety Requirement Criteria to PUREX Operational Safety Requirements* (Split Report) (Walser 1993). Applicability of existing OSRs to standby conditions was evaluated using Draft DOE Order 5480.23, *Nuclear Safety Analysis Reports*.

The OSRs, as indicated in the section applicability statements, were written to apply to an operating plant. The applicability statements in the PCM will be enhanced/expanded to cover the current plant status, thus reducing the number of OSRs requiring surveillance during deactivation. This action will release plant resources that can then be applied directly to completing defined tasks. Examples demonstrating how the approach shown in Figure F-2 will be implemented are presented in Figures F-3, F-4, and F-5. The proposed changes are highlighted by change bars in the left margin. Note that the OSRs will not be changed or deleted.

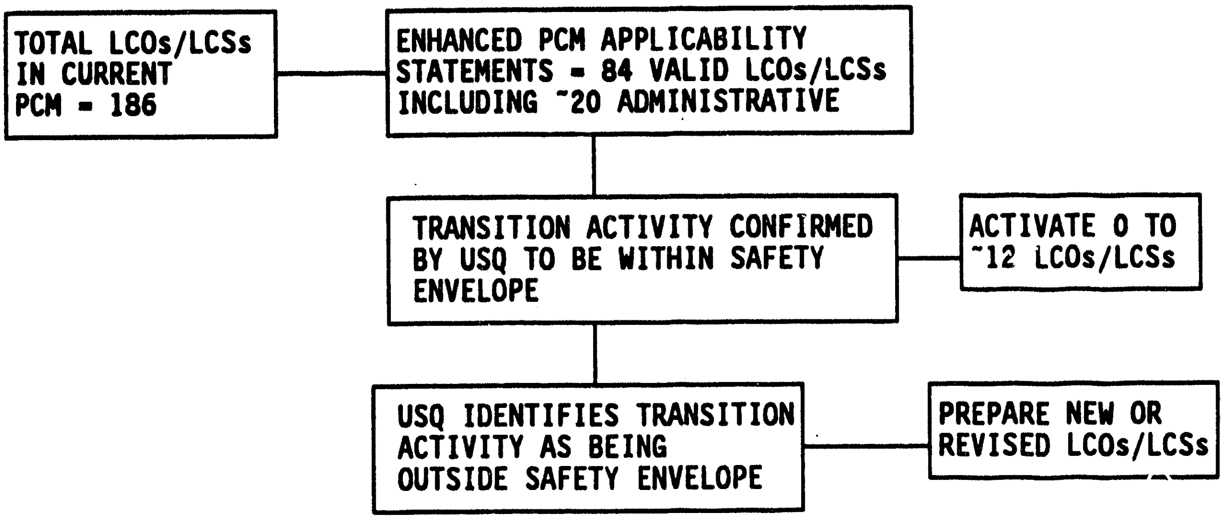
The PCM will be reissued as a supporting document that includes the tables that are in the current Applicability Document. The reissued PCM will be maintained current to provide clear direction for implementation in facility procedures and tracking systems. The Split Report will be used as a reference document that supplies the bases for the revised applicability statements. Applicable OSRs will be identified by exception and flagged as necessary.

F4.0 SAFETY EVALUATION

In accordance with DOE Order 5480.21, *Unreviewed Safety Questions*, a USQ screening form will be prepared to cover all identified deactivation tasks. The USQ will provide early identification of tasks that may require extensive safety evaluation and analysis.

The USQ process as illustrated in Figure F-6 will be used to review each task as the detailed work plan and procedures become available. Any task that receives "No" answers to all screening criteria questions will be considered within the existing safety envelope without further analysis. A "Safety Evaluation" will be completed and documented for tasks with screening criteria questions that are answered "Yes" or "Maybe." Tasks identified as non-USQ will be closed. Worker health and safety issues will be addressed in this review and in the pre-job hazard analysis/safety review conducted immediately before performing the task.

Figure F-2. OSR Reduction Using Enhanced Applicability Statements in PCM.



LCO = Limiting Condition for Operation
LCS = Limiting Control Setting
OSR = Operational Safety Requirement.
PCM = *PUREX Process Control Manual Addendum 1*.
USQ = Unreviewed Safety Question.

Figure F-3. Example of OSR Applicability Statement Incorporation for 1.0 Iodine-131 Content of Fuel (11.2.1, Ref. 1).

1.1 APPLICABILITY

This safety boundary applies to any nuclear fuel that may be dissolved for reprocessing at the PUREX Plant. The OSR and its associated LCO's and LCS's apply only when fuel is being received or dissolved or when there is AFAN in the dissolvers (1.6.5). Therefore, instrument calibrations and OSR surveillance relative to this OSR do not apply when there is no fuel in the plant for processing and AFAN has been isolated from the plant. The aluminum clad fuel in the storage pool lacks sufficient Iodine-131 to exceed the safety boundary due to its age (greater than 20 years).

1.2 OBJECTIVE

The objective is to define the maximum ^{131}I contained in one dissolver charge of irradiated fuel.

1.3 SAFETY BOUNDARY

The amount of ^{131}I contained in one dissolver charge is limited to 1.3 x 105 Ci.

1.4 BASES

The ^{131}I quantity stated is that analyzed in the short-cooled fuel accident in Chapter 9.0 of Reference 1. The actual quantity normally processed will be much lower, as described in Section 11.3.2.4 of Reference 1 (see Section 11.4 of this addendum).

1.5 CONTROL FEATURES

Processing of only authorized material will assure low levels of ^{131}I in the PUREX Plant. The green fuel monitor will permit detection of short-cooled fuel prior to charging in the event administrative controls break down. Temperature limits on the dissolver off-gas, silver reactor regeneration, and acid absorber operation assure that the minimum decontamination factor assumed in the accident analysis is maintained. The radiation devices in the off-gas system are to detect abnormal ^{131}I releases and to permit prompt corrective action. The testing/calibration program assures the mitigating conditions assumed in the accident analysis are available and functioning. Specific control features follow.

Figure F-4. Example of OSR Applicability Statement Incorporation for 5.0 Flammable Solvent Vapors and Aerosols (11.2.5, Ref.1).

5.1 APPLICABILITY

This safety boundary applies to the prevention of solvent fires in all process vessels in the solvent extraction (including concentrators/ condensers) and solvent waste treatment systems (F, G, H, J, K, L, and R Cells). The OSR and its associated LCO's and LCS's apply only to tanks containing organic or having the potential to contain organic and a functional steam supply to their coils or a functional agitator. The process organic is contained in G and R Cells. Therefore, instrument calibrations and OSR surveillance relative to this OSR apply only to tanks TK-G5 and TK-R7.

5.2 OBJECTIVE

The objective is to prevent the occurrence of an organic solvent fire or explosion in a process vessel.

5.3 SAFETY BOUNDARY

The concentration of organic in vapors and/or aerosols containing <33 vol% water vapor shall not exceed 46 mg/L.

5.4 BASES

The PUREX process solvent consists of materials with predictable vapor pressure--temperature relationships. The safety boundary organic concentration in vapors and/or aerosols in dry air of 46 mg/L is the established lower flammability limit for hydrocarbons of chain length C_8 or greater (Ref. 6). This limit therefore applies to NPH. The similar limit for pure TBP is 88 mg/L and is not reached until the temperature in an unagitated vessel reaches 146 °C (Ref. 5).

The 46 mg/L concentration due to the vapor pressure contribution of NPH is reached at a minimum temperature of 80 °C. Calculations based on conservative assumptions for available vapor space, agitator aerosol generation rates, and aerosol settling rates are made to determine the maximum aerosol contribution towards the vapor phase organic concentration (Ref. 7, 9, 10). A temperature limiting control setting based on the worst case tank is then selected to assure the 46 mg/L value is not exceeded in any tank.

Very fine aerosols or "mists" with particles in the size range of 10 to 60 microns may be flammable at organic concentrations of <46 mg/L and at temperatures from well below the flash point (80 °C minimum for NPH) to 90 °C. At 90 °C, mist flammability is limited by lack of sufficient oxygen in the mixture. Engineering calculations have shown that NPH particles in aerosols which may be formed as a result of agitation in PUREX vessels would have a mean diameter of >300 microns (Ref. 7). Thus, the 46 mg/L limit is applicable when both vapors and aerosols are present.

Figure F-5. Example of OSR Applicability Statement Incorporation for 7.0 Waste Treatment--Sugar Denitration.

7.1 APPLICABILITY

These safety boundaries apply to the sugar denitration of high-level waste. The OSR and its associated LCO's and LCS's only apply to the addition of sugar to the high-level waste for the suppression of ruthenium in the E-F6 concentrator or the denitration of waste/recovered acid solutions in Tanks F15 and F16. Therefore, instrument calibrations and OSR surveillance relative to this OSR do not apply when the solvent extraction High-Level Waste handling vessels have been emptied of high-level waste/recovered acid solutions and the sugar makeup tank (TK-204) has been emptied and flushed or the sugar addition route to Tk-F7 has been blanked. However, LCO's/LCS's 7.6.1, 7.6.4, 7.6.5, 7.6.6, 7.6.7, 7.6.8, 7.6.10, 7.6.11, and 7.6.12 will apply during the planned transition activity of sugar denitrating recovered acid.

7.2 OBJECTIVE

The objective is to prevent entry of radioactive solution into the pipe and operating P&O Gallery lines which may result in excessive radiation exposure to personnel and/or contamination spread.

7.3 SAFETY BOUNDARY

The maximum pressure shall not exceed 6.5 lb/in2 gage in E-F6 and 8.2 lb/in2 gage in TK-F15 and TK-F16.

7.4 BASES

Sugar is added to the 1WF solution in the concentrator feed tank (TK-F7) to form nitrite ion in the concentrator and suppress ruthenium oxidation and volatilization. The primary safety concern with this operation is the possibility of uncontrolled pressurization as a result of pumping an excessive quantity of unreacted sugar-nitric acid into a cold concentrator, then heating to boiling temperature. Similar reactions could occur in TK-F15 and TK-F16 where sugar is added to denitrate the waste solution. The approximate pressure that will force solution with a 1.0 specific gravity from these vessels into the P&O Gallery is given as the safety boundary. The actual solution specific gravity is considerably higher and the vessels are controlled at much lower pressures to avoid plugging of the vent line and/or ejecting solution to the canyon floor. The TK-F15, TK-F16, and E-F6 vessels are equipped with seal pots to limit pressurization to <25 in. of water (<0.9 lb/in2 gage).

7.5 CONTROL FEATURES

The control features are designed to prevent over pressurizing a vessel as the result of a rapid sugar-nitric acid reaction. Use of sugar is restricted to only three canyon vessels. There the reaction temperature, addition rates, and reaction times are limited to maintain a vigorous, but complete and controlled reaction.

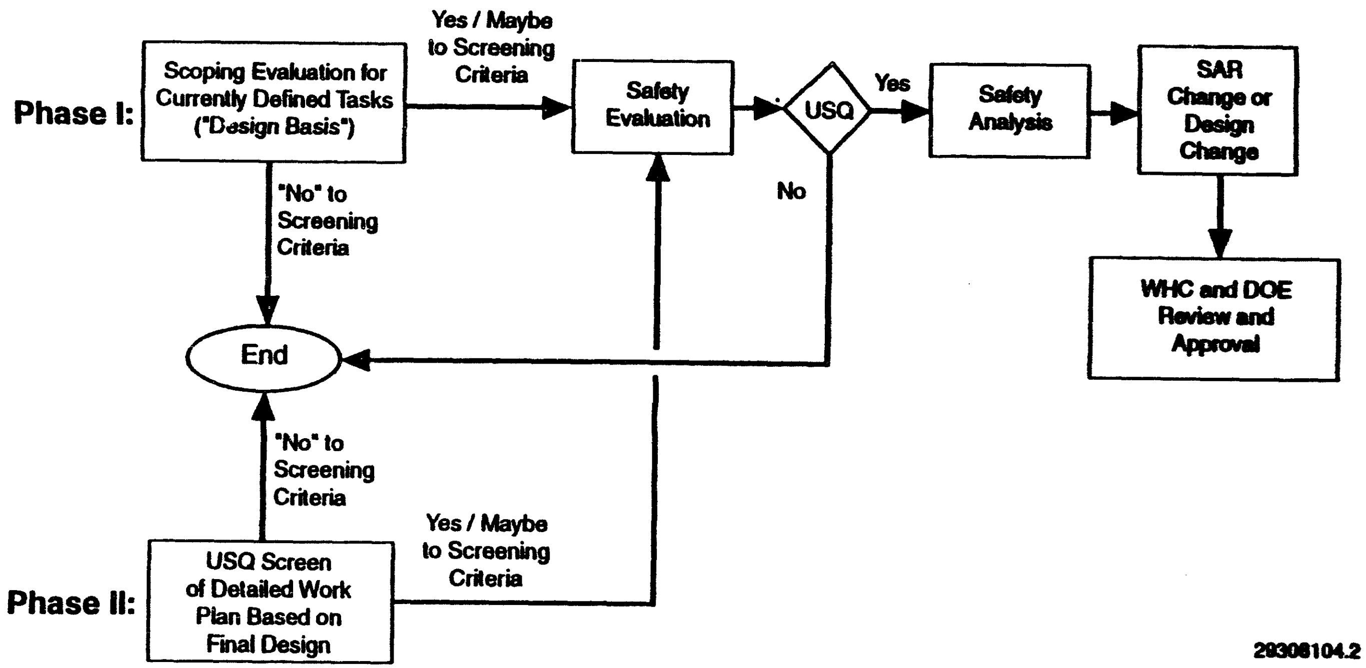


Figure F-6. PUREX/UO_3 Deactivation Project USQ Process.

Tasks identified as USQs will undergo extensive safety analysis and evaluation before initiating work. This action will ensure that appropriate work plan/procedure/equipment modifications are made to mitigate the risk/consequences of potential accidents to acceptable levels. This approach will clearly demonstrate that the activity can be conducted without undue risk to the public or plant worker. A "Preliminary Evaluation of PUREX Deactivation Activities," based on engineering judgment, is presented in Table F-1. Draft example USQ forms for three tasks that fall in the "No," "Possible/Maybe," and "Yes" categories, respectively, are shown in Figures F-7, F-8, and F-9.

F5.0 POST-DEACTIVATION SAFETY DOCUMENTATION

As one of the conditions for transfer to the Hanford Surplus Facilities Program, the SARs will be reviewed and updated for deactivation status in accordance with applicable WHC management requirements and procedures. Since both plants will be low-hazard (category 3) facilities at that time, the effort will be directed primarily at updating the description of the physical plant (probably in an appendix to the existing SAR). Available documents (see examples given below) will be referenced to provide needed information. The goal is to develop a safety document package for shutdown using a graded approach based on cost and safety benefit.

- WHC-SD-CP-HC-003 — *Hazard Classification of the PUREX Facility in Standby* (Domnoski 1993)
- WHC-SD-HS-SAR-001 — *PUREX Plant Final Safety Analysis Report* (Roemer 1990)
- WHC-SD-CP-PHA-001 — *PUREX Standby Preliminary Hazards Analysis* (Miska 1992)
- WHC-SD-WM-SAR-023 — *242-A Evaporator/Crystallizer Safety Analysis Report* (Bergmann 1991)
- WHC-SD-WM-SAR-027 — *Hazards Identification and Evaluation Report for the Operation of the Grout Facilities and Near-Surface Disposal of Grouted Phosphate/Sulfate Low Level Waste* (Gilbert 1993)
- WHC-SD-HS-SAR-XXX — Generic Interim Safety Basis (to be issued in fiscal year 1993)

Work on defining the elements required in the safety documentation package will start when the Project scope has been finalized and approved by DOE.

Table F-1. Preliminary USQ Screening of PUREX Deactivation Activities. (3 sheets)

Deactivation activity	Potential USQ	
	No	Yes/ Maybe
1. Tk-D5/E6 Pu solution disposal (co-precipitation option)		x
2. Aluminum clad fuel removal	x	
3. Fuel storage basin layup	x	
4. Removal of fuel elements from A-, B-, C-Cells	x	
5. Disposal of dilute acid solution currently in plant	x	
6. Tk-G5/R7 organic disposal	x	
7. Recovered/UO_3 contaminated acid disposal (sugar denitration)	x	
8. N-Cell plutonium removal	x	
9. Criticality alarm system	x	
10. UO_3 Plant process tank heels	x	
11. UO_3 Plant calciner heels	x	
12. UO_3 Plant 211-U tank heels	x	
13. UO_3 Plant 211-U tank 301 process condensate	x	
14. HNO_3 rail tankers	x	
15. UNH truck tankers	x	
16. E-F11 operation - demonstration	x	
17. Tunnel part B closure plan	x	
18. E-Cell floor debris	x	
19. Silver reactors A, B, C, and F -Cell	x	
20. Canyon lead waste pile	x	
21. Miscellaneous Radioactive Mixed Waste	x	
22. Miscellaneous hazardous waste	x	
23. HVAC consolidation/air flow reduction	x	
24. Electrical	x	
25. UO_3 Rainwater Diversion	x	
26. 211-A chemical removal	x	
27. 211-A tank heels	x	
28. 211-A neutralization system	x	
29. Demineralizer shutdown/resin removal	x	
30. U-Cell layup	x	
31. R-Cell layup	x	
32. AMU layup	x	
33. 211-U layup	x	
34. 224-U acid recovery layup	x	
35. 224-U process layup	x	
36. 224-UA calciner layup	x	

Table F-1. Preliminary USQ Screening of PUREX Deactivation Activities. (3 sheets)

37. 224-U miscellaneous layup	x	
38. Auxiliary process building layup	x	
39. Trap pit layup	x	
40. Outdoor radiation zone stabilization	x	
41. Loose asbestos stabilization	x	
42. Process vessel flushes	x	
43. Process cell flush	x	
44. Process cell sealant	x	
45. Pipe trench flush	x	
46. Air tunnel flush	x	
47. Air tunnel sealant	x	
48. Crane Maintenance Platform layup	x	
49. P&O Gallery layup	x	
50. Tank farm route isolation	x	
51. Liquid effluent systems shutdown/cleanout/isolation	x	
52. U-17/U-14 route isolation	x	
53. Canyon interface system flushes (Tk-216-A-1, -2, -302)	x	
54. Stabilize Zr heels	x	
55. Flush/decon or strip Sample Gallery hood duct work	x	
56. Layup N-Cell/PR Room	x[a]	
57. Deactivate storage gallery sumps	x	
58. Stabilize contamination migration storage gallery hood duct work	x	
59. Cleanout hot shop	x	
60. Q-Cell layup	x	
61. Process instrument deactivation	x	
62. Process equipment deactivation	x	
63. Surveillance monitoring provided	x	
64. Pneumatic instrument conversion	x	
65. Steam layup	x	
66. Raw water layup	x	
67. Sanitary water layup	x	
68. Process air layup	x	
69. Instrument air layup	x	
70. HVAC systems, associated stacks and monitoring layup	x	
71. Crane activities	x	
72. Deactivate and state source term characterization	x	
73. Fire protection system reduction	x	
74. Radiation space monitoring reduction	x	
75. Continuous air monitoring reduction	x	
76. Emergency lighting system removal	x	

Table F-1. Preliminary USQ Screening of PUREX Deactivation Activities. (3 sheets)

77. Building penetrations sealed	x	
78. Wooden structures razed	x	
79. Roof inspected/repaired	x	
80. Office furniture removed	x	
81. Spare parts removed	x	
82. Tools, portable equipment removed	x	
83. Janitorial supplies removed	x	
84. Barriers, access controls, administrative controls	x	
85. Isolation notifications	x	
86. Elevators deactivated	x	
87. Removable hazardous waste removed	x	
88. All removable radioactive and radioactive mixed waste removed	x	
89. All temporary radiation zones removed	x	
90. Filled T hopper disposition	x	
91. Office and support facilities disposition	x	
92. Railroad tunnel structural integrity	x	
93. P & O Gallery /sample gallery floor drains sealed	x	
94. Exterior cover blocks sealed against water intrusion	x	
95. Removable combustibles eliminated	x	
96. Canyon crane layup	x	
97. Designated surveillance pathway in plant	x	
98. Electrical systems shutdown/consolidation		x
99. Final radiation survey	x	
100. Relocate personnel	x	

[a]Depends on extent of equipment removal from N-Cell

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Centimeter

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 mm

1 2 3 4 5

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Figure F-7. "No" Category USQ Screening Form Example.

UNREVIEWED SAFETY QUESTION (USQ)
SCREENING AND SAFETY EVALUATION

1. Identification Number: USQ-P-93-01 | Completion of page one of this form satisfies the Screening Evaluation | Page 1 of 1

2. Title: Disposal of Dilute Nitric Acid Solutions in PUREX

3. Qualified USQ Evaluator: R. L. Walser | Date: 06/29/93

4. Peer Reviewer:

5. Is the matter being evaluated a CHANGE or a DISCOVERY? (Circle One) CHANGE

6. USQ Screening (Answer the appropriate set of questions.)

Does the proposed change:

A. Make changes in the facility as described in approved safety analyses?	[X] No	[ ] Yes/Maybe
B. Make changes in procedures as described in approved safety analyses?	[X] No	[ ] Yes/Maybe
C. Involve tests or experiments not described in approved safety analyses?	[X] No	[ ] Yes/Maybe

Will response to the discovery:

A. Require changes to the facility as described in the approved safety analyses?	[ ] No	[ ] Yes/Maybe
B. Require changes in procedures described in the approved safety analyses?	[ ] No	[ ] Yes/Maybe
C. Require tests or experiments not described in the approved safety analyses?	[ ] No	[ ] Yes/Maybe
D. Require revision or addition to SAR beyond annual update?	[ ] No	[ ] Yes/Maybe

BASIS (supporting information is required for each question, attach additional pages as necessary; specifically note SAR section reviewed to come to conclusion):

6A/6B/6C The dilute nitric acid solution will be transferred to Tk-F18 for pH adjustment and transfer to tank farms. Existing routes and procedures will be used for these operations which have been conducted in PUREX for more than 37 years. No changes to the facility nor tests/experiments are involved. Also, the radionuclide concentration in the solution is orders of magnitude lower than that considered in the SAR.

7. Safety Analyses

A. Will the proposed change or response to the discovery require a change to the existing Technical Specifications or Operational Safety Requirements?	[X] No	[ ] Yes/Maybe
B. Will the proposed change or discovery require additional Technical Specification or Operational Safety Requirements?	[X] No	[ ] Yes/Maybe

BASIS (supporting information is required for each question, attach additional pages as necessary; specifically note Technical Specification/Operational Safety Requirements reviewed to come to conclusion):

7A/7B The pH adjustment/transfer operations are covered by current OSRs 8.6.1, 8.6.3, 8.6.4, and 8.6.5 in the PUREX Process Control Manual Addendum I (WHC-CM-5-24 Add. I). No change in, or additional, OSR is required.

8. Post Review (Required if all questions answered "NO")

Reviewer: ____________________ Safety Qualified USQ Evaluator (Print name, sign and date)	Date:	If any question on page one in Blocks 6 or 7 is answered "Yes", completion of page two is required and is the Safety Evaluation

Figure F-8. "Possible/Maybe" Category USQ Screening Form Example.

UNREVIEWED SAFETY QUESTION (USQ)
SCREENING AND SAFETY EVALUATION

1. Identification Number: USQ-P-93-02	Completion of page one of this form satisfies the Screening Evaluation	Page 1 of 1
2. Title: Recovered Nitric Acid Destruction		
3. Qualified USQ Evaluator: R. L. Walser		Date: 06/01/93
4. Peer Reviewer:		
5. Is the matter being evaluated a CHANGE or a DISCOVERY? (Circle One) CHANGE		
6. USQ Screening (Answer the appropriate set of questions.)		

Does the proposed change:

A. Make changes in the facility as described in approved safety analyses?	[X] No	[ ] Yes/Maybe
B. Make changes in procedures as described in approved safety analyses?	[X] No	[ ] Yes/Maybe
C. Involve tests or experiments not described in approved safety analyses?	[X] No	[ ] Yes/Maybe

Will response to the discovery:

A. Require changes to the facility as described in the approved safety analyses?	[ ] No	[ ] Yes/Maybe
B. Require changes in procedures described in the approved safety analyses?	[ ] No	[ ] Yes/Maybe
C. Require tests or experiments not described in the approved safety analyses?	[ ] No	[ ] Yes/Maybe
D. Require revision or addition to SAR beyond annual update?	[ ] No	[ ] Yes/Maybe

BASIS (supporting information is required for each question, attach additional pages as necessary; specifically note SAR section reviewed to come to conclusion):

6A/6B/6C The acid will be sugar denitrated per procedures similar to those used during prior operation. The specific procedures are not listed in the SAR. However, the operation is described in Sections 6.1.1, 6.2.5, 6.5.2.1, 7.3.1.1, 9.2.11, and Table 9-3 of the SAR and found to be an acceptable risk. Studies completed during preparation of the Preliminary Hazards Analysis - Cold Standby (WHC-SD-CP-PHA-001) indicate the blowback accident postulated in the SAR would not occur. Also, the radionuclide source term will be orders of magnitude lower than during normal plant operation.

7. Safety Analyses

A. Will the proposed change or response to the discovery require a change to the existing Technical Specifications or Operational Safety Requirements?	[X] No	[ ] Yes/Maybe
B. Will the proposed change or discovery require additional Technical Specification or Operational Safety Requirements?	[X] No	[ ] Yes/Maybe

BASIS (supporting information is required for each question, attach additional pages as necessary; specifically note Technical Specification/Operational Safety Requirements reviewed to come to conclusion):

7A/7B The existing OSR's in Section 12 (12.6.6 and 12.6.7) of the Process Control Manual Addendum I (WHC-CM-5-24 Add.I) adequately cover sugar denitration and will apply during this operation. These OSR's place limits on the allowable main stack NOx emission rate and require operability of the main stack effluent NOx monitor. There is a Regulatory question that must be resolved before this action can proceed.

8. Post Review (Required if all questions answered "NO")

Reviewer: ______ Safety Qualified USQ Evaluator (Print name, sign and date)	Date:	If any question on page one in Blocks 6 or 7 is answered "Yes", completion of page two is required and is the Safety Evaluation

Figure F-9. "Yes" Category USQ Screening Form Example. (2 sheets)

UNREVIEWED SAFETY QUESTION (USQ)
SCREENING AND SAFETY EVALUATION

1. Identification Number: USQ-P-93-03 | Completion of page one of this form satisfies the Screening Evaluation | Page 1 of 2

2. Title: Co-Precipitation of U-Pu From Tk-D5/E6 Solution

3. Qualified USQ Evaluator: R. L. Walser | Date: 06/02/93

4. Peer Reviewer:

5. Is the matter being evaluated a CHANGE or a DISCOVERY? (Circle One) CHANGE

6. USQ Screening (Answer the appropriate set of questions.)

Does the proposed change:

	No	Yes/Maybe
A. Make changes in the facility as described in approved safety analyses?	☐	☒
B. Make changes in procedures as described in approved safety analyses?	☐	☒
C. Involve tests or experiments not described in approved safety analyses?	☐	☒

Will response to the discovery:

	No	Yes/Maybe
A. Require changes to the facility as described in the approved safety analyses?	☐	☐
B. Require changes in procedures described in the approved safety analyses?	☐	☐
C. Require tests or experiments not described in the approved safety analyses?	☐	☐
D. Require revision or addition to SAR beyond annual update?	☐	☐

BASIS (supporting information is required for each question, attach additional pages as necessary; specifically note SAR section reviewed to come to conclusion):

6A The proposed process involves the use of a new small tank with a calrod heater and agitator. This tank will be used with Tk-K6 for concentration. Another small tank may be needed in the hot shop for 19 molar NaOH. Additional equipment required includes a cement mixer or drum blending device, a head tank or bagport for vermiculite, a greenhouse with a drumport on the bottom, and a greenhouse blower/exhauster with or without a HEPA filter to the air tunnel. A total of about 100 standard 55-gallon drums will also be required.

6B New procedures will be required as the process is new to Hanford.

7. Safety Analyses

	No	Yes/Maybe
A. Will the proposed change or response to the discovery require a change to the existing Technical Specifications or Operational Safety Requirements?	☒	☐
B. Will the proposed change or discovery require additional Technical Specification or Operational Safety Requirements?	☐	☒

BASIS (supporting information is required for each question, attach additional pages as necessary; specifically note Technical Specification/Operational Safety Requirements reviewed to come to conclusion):

7A There are no existing OSR's that cover this operation.

7B The need for additional OSR's to cover the precipitation/concentration/drum storage operation must be evaluated. The existing criticality safety evaluation report and criticality prevention specifications will require modification. A new safety analysis report for packaging will be required and the organization responsible for solid waste management must be notified of the unique waste form produced.

8. Post Review (Required if all questions answered "NO")

Reviewer: ______________________
Safety Qualified USQ Evaluator
(Print name, sign and date)

Date:

If any question on page one in Blocks 6 or 7 is answered "Yes", completion of page two is required and is the Safety Evaluation

Figure F-9. "Yes" Category USQ Screening Form Example (2 sheets)

Identification Number: USQ-P-93-03 **SAFETY EVALUATION** Page 2 of 2

1. USQ Safety Evaluation:

These questions shall be answered if any question in block 6 or 7 is answered "YES."

Question	No	Yes	Maybe
A. Will the probability of an accident previously evaluated in approved safety analyses be increased?	[X]	[ ]	[ ]
B. Will the consequences of an accident previously evaluated in the approved safety analyses be increased?	[X]	[ ]	[ ]
C. Will the probability of a malfunction of equipment important to safety be increased?	[ ]	[ ]	[X]
D. Will the consequences of a malfunction of equipment important to safety be increased?	[ ]	[ ]	[X]
E. Will the possibility of an accident of a different type than any previously evaluated in approved safety analyses be created?	[ ]	[X]	[ ]
F. Will the possibility of a malfunction of a different type than any previously evaluated in the approved safety analyses be created?	[ ]	[X]	[ ]
G. Will the margin of safety as defined in the basis for any technical specification or safety analysis report be reduced?	[X]	[ ]	[ ]

BASIS (supporting information is required for each question, attach additional pages as necessary):

6C The proposed process and equipment have not been used at Hanford nor described in the SAR.

1A/1B/1G The propsed process and equipment are new and have not been evaluated in the approved safety analysis.

1C/1D The exact equipment to be used has not been selected or located at this time. These items will be evaluated as more information becomes available.

1E/1F The process and equipment are new and are likely to result in different accidents and malfunctions.

Additional process/equipment information is presented below.

The solution currently in tanks D5 and E6 (Tk-D5/E6) will be transferred to Tk-K6 where it will be concentrated to between 60% and 100% UNH using heated air or steam coils. The UNH-Pu solution will then be transferred in 10 gallon shots to a small heated/agitated tank in the hot shop. The solution will then be dropped into a "mixer" where NaOH is added as a solid or 19 molar solution. The hydrated sodium diuranate formed will then be dropped into drums containing vermiculite. A number of questions regarding the heat of reaction, rate of reaction, NOx evolution rate, etc., must be answered before proceeding.

Equipment requirements including the tank, mixer, greenhouse, etc., must also be defined. For example, there is a question on whether a HEPA filter is required on the greenhouse inlet/exhaust. Personnel protective equipment requirements must also be defined.

2. Plant Review Committee (PRC)*	3. Safety Review**
Meeting No. ______	
______ PRC Chairman Concurrence (Print name, sign and date) Date: ______	______ Qualified USQ Evaluator (Print name, sign and date) Date: ______

* If PRC changes any answers, append basis for change.
** Post-review required if all seven "NO" boxes are checked by PRC.

A-6000-615R (03/91)

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APPENDIX G

TECHNICAL PLANNING BASES

G1.0 INTRODUCTION

This appendix provides summary-level descriptions of the proposed work plans necessary to achieve the Plutonium-Uranium Extraction (Plant)(PUREX)/ Uranium Trioxide (Plant) (UO_3) Deactivation Project objectives. The work plans discussed in this section represent the proposed preferred alternatives identified for each major deactivation task. The details of these plans are subject to change with further engineering development. The planned work is incorporated in the cost, schedule, and technical baselines (i.e., Project objectives), which are subject to formal change control.

Systems engineering methodology was applied to select a preferred alternative from an appropriate suite of alternatives determined for each task. The alternatives were developed using an appropriate combination of engineering judgement and experience, discussions with subject matter experts, literature searches, and past practice from U.S. Department of Energy and commercial nuclear sites. The alternatives were screened against technical, cost, schedule, and end point objectives to arrive at the preferred alternative.

Activities proposed for deactivation are limited to those necessary to transition the facility from its current state to one that meets the Project objectives. Therefore, activities not included in this workscope must be accomplished during the final decontamination and decommissioning (D&D) of the facility. The proposed work plans do not include extensive characterization of all residual materials in the cells, vessels, tunnels, and other areas. Only the level of characterization and the deactivation activities necessary for the facility to be accepted to the Hanford Surplus Facilities Program will be performed. It is assumed that initial D&D activities will include detailed characterization consistent with the requirements applicable at that time.

Reference information regarding the operating configurations of the PUREX and UO_3 Plant can be found in the following documents:

- WHC-SD-CP-SAR-002, Rev. 6F, *UO_3 Plant Safety Analysis Report* (Walser 1993)
- WHC-SD-HS-SAR-001, Rev. 5, *PUREX Plant Final Safety Analysis Report*, (Roemer 1990)
- DOE-EIS-0089, Environmental Impact Statement, *Operation of PUREX and Uranium Oxide Plant Facilities* (DOE 1983).

G2.0 SYSTEMS ENGINEERING

Systems Engineering will be used to successfully manage and complete the PUREX/UO_3 Deactivation Project in compliance with DOE Order 4700.1, *Project Management System*. DOE Order 4700.1 defines systems engineering as follows:

> "...the engineering technical effort required to transform the Project objectives (i.e., system mission) into an operational system. It includes the engineering required to define the system performance parameters and the configuration to best satisfy the Project objectives."

To ensure adequate conformance to systems engineering principles, deactivation activity evaluations will be performed as follows.

- Alternatives will be developed to satisfy specific requirements identified in the technical objectives when justified.
- The system life cycle will be considered during the evaluation; benefits and costs to subsequent D&D activities will be qualitatively factored into Project decisions.
- Interactions with other programs will be defined and evaluated. This will include liquid effluents, solid waste, tank waste, special nuclear material storage, 105-KE basin, transportation, and the Hanford Surplus Facilities Program at a minimum. Cost, schedule, resource utilization, and technical impacts will be considered.

G3.0 TECHNICAL PLANNING BASES

G3.1 CHEMICAL DISPOSITION

PUREX used a wide variety of chemicals to support processing operations. The chemicals were purchased in bulk quantities and stored in uncontaminated areas such as the 2714-A and 275-EA chemical warehouses and the 211-A chemical tank farm. When processing operations ceased following the stabilization campaign in 1990, an inventory of about 1.04 million kg (2.3 million lb) of unneeded chemical products were stored at the plant. A program was initiated to excess the chemicals by resale to the commercial market, where possible, rather than through offsite disposal as hazardous waste. As of July 15, 1993, approximately 924,000 kg (2.04 million lb) of chemicals have been removed from PUREX (refer to Table G-1), with another 105,000 kg (232,000 lb) remaining in the PUREX inventory (refer to Table G-2).

The disposition of excess chemicals will continue through the use of the existing surplus sales and chemical exchange programs until it has been determined that there is no reasonable alternative to waste disposal. At that time, the chemicals will be transferred to an offsite permitted disposal facility as waste.

Table G-1. Chemicals Removed from the PUREX Inventory.

Product	Quantity Removed kg (lb)	
Nitric Acid (57%)	336,000	(741,000)
Potassium Hydroxide (45%)	126,000	(278,000)
Tributyl Phosphate	45,000	(99,000)
Sulfuric Acid (92%)	25,000	(55,000)
Silver Nitrate	245	(540)
Oxalic Acid	3,600	(8,000)
Antifoam	900	(2,000)
Aluminum Nitrate Nonahydrate	97,000	(213,000)
Ammonium Fluoride/ Ammonium Nitrate*	150,000	(331,000)
Potassium Permanganate	1,000	(2,300)
Sulfuric Acid	16,000	(36,000)
Sugar	20,000	(45,000)
Sodium Carbonate	20,000	(45,000)
Normal Paraffin Hydrocarbon	20,000	(44,000)
Hydrogen Peroxide	62,000	(137,500)
**Total	922,745	(2,036,840)

*Removed as waste
**As of July 15, 1993

Table G-2. Chemicals Remaining in PUREX Inventory.

Product	Quantity Available kg (lb)	
Normal Paraffin Hydrocarbon	4,000	(8,800)
Hydrazine (35%)	5,000	(10,300) @ 100KE
Hydroxylamine Nitrate	42,000	(93,000)
Ferrous Sulfamate	43,000	(95,000)
Antifoam	680	(1,500)
Sodium Fluoride	140	(300)
Ferric Nitrate	900	(2,000)
Rare Earth Nitrate	1,400	(3,000)
Tartaric Acid	6,000	(12,500)
Sugar	2,000	(5,000)
Mercuric Nitrate	180	(400)
*Total	105,300	(231,800)

*As of July 15, 1993

Following removal of bulk liquid chemicals from storage tanks, any remaining heels will be characterized for resale potential. Residual heels will be removed as waste or sold as product, as appropriate. The tanks will then be flushed using a commercially available high-pressure spray wand, and the associated piping will be flushed back into the tank from appropriate termination points in the aqueous makeup (AMU) area. Flushes will be performed until the waste no longer exhibits dangerous waste characteristics (pH between 2 and 12.5).

A certified hazardous waste disposal company will be subcontracted to remove rinsate from the tanks. The tanks will be emptied to the maximum extent possible within existing equipment capabilities. The AMU area will then be deactivated and isolated from the 211-A area and other process interfaces, as appropriate.

G3.2 SINGLE-PASS REACTOR FUEL DISPOSITION

The slug storage basin at the east end of the PUREX canyon contains four buckets of single-pass reactor (SPR) fuel. The fuel was placed in the basin at PUREX in 1971 after the Atomic Energy Commission requested Atlantic Richfield Hanford Company to review several types of fuel from various locations at the Hanford Site for possible processing. A decision was made to store this fuel in the PUREX slug storage basin for subsequent processing following a fuels grade campaign. The fuel has been stored in the basin since that time. Figures G-1 and G-2 show the fuel condition during a past inspection.

The SPR fuel consists of 20-cm (8-in.)-long by approximately 3.3-cm (1.3-in.)-diameter uranium cylinders enclosed in aluminum jackets. The fuel contains 2.87 metric tons of highly depleted uranium (0.27 wt% U-235) in 779 fuel elements. The fuel contains 8.7 Kg of plutonium, which is 26 wt% Pu-240. The slug storage buckets are 43 cm (17 in.) square by 52 cm (20.5 in.) tall with a grid of 1.3-cm (1/2-in.)-diameter drain holes in the bottom.

The preferred method for disposing of SPR fuel is to transfer the fuel to the 105-K east fuel storage basin. The fuel will be transferred in 3-well cask cars and K basin fuel casks. These are the same casks used to transfer N Reactor fuel from the K basins to PUREX during past PUREX operations. The transfer will be accomplished with the same rail routes and procedures used during past transfers of fuel from the K basins to PUREX. When received at the K east basin, the SPR fuel will be repackaged in canisters for long-term storage with the other 0.56 metric tons of SPR fuel currently stored in the K east basin.

Fuel elements have been shipped from PUREX back to the K basins as recently as 1989. When PUREX was shut down in December 1988, one dissolver charge of N Reactor fuel was left sitting in the cask cars in the PUREX railroad cut. This fuel was returned to the K basins in early 1989 when it was realized that the restart of PUREX would be significantly delayed.

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Figure G-1. SPR (Aluminum Clad) Reactor Fuel in PUREX Slug Basin.

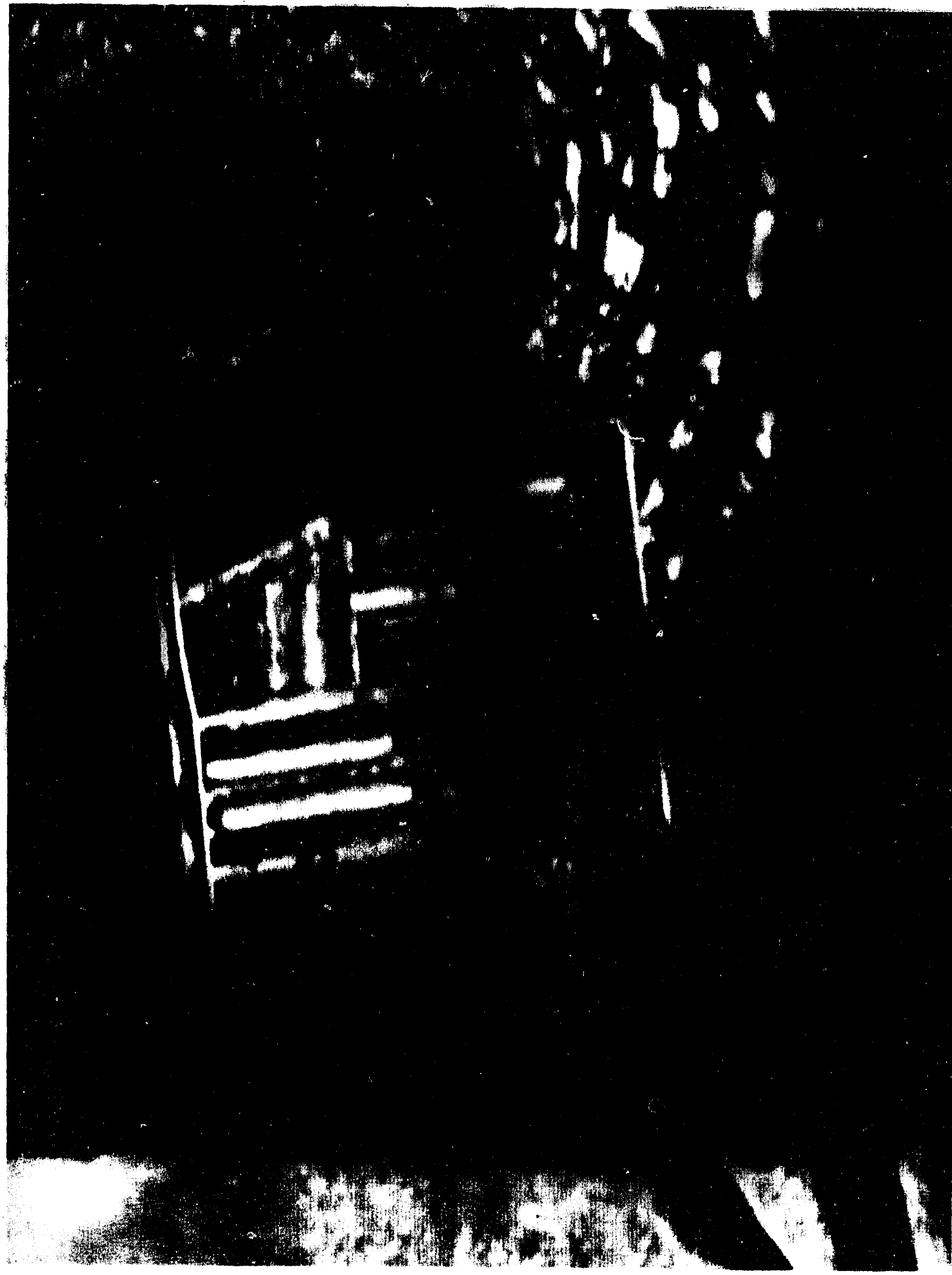
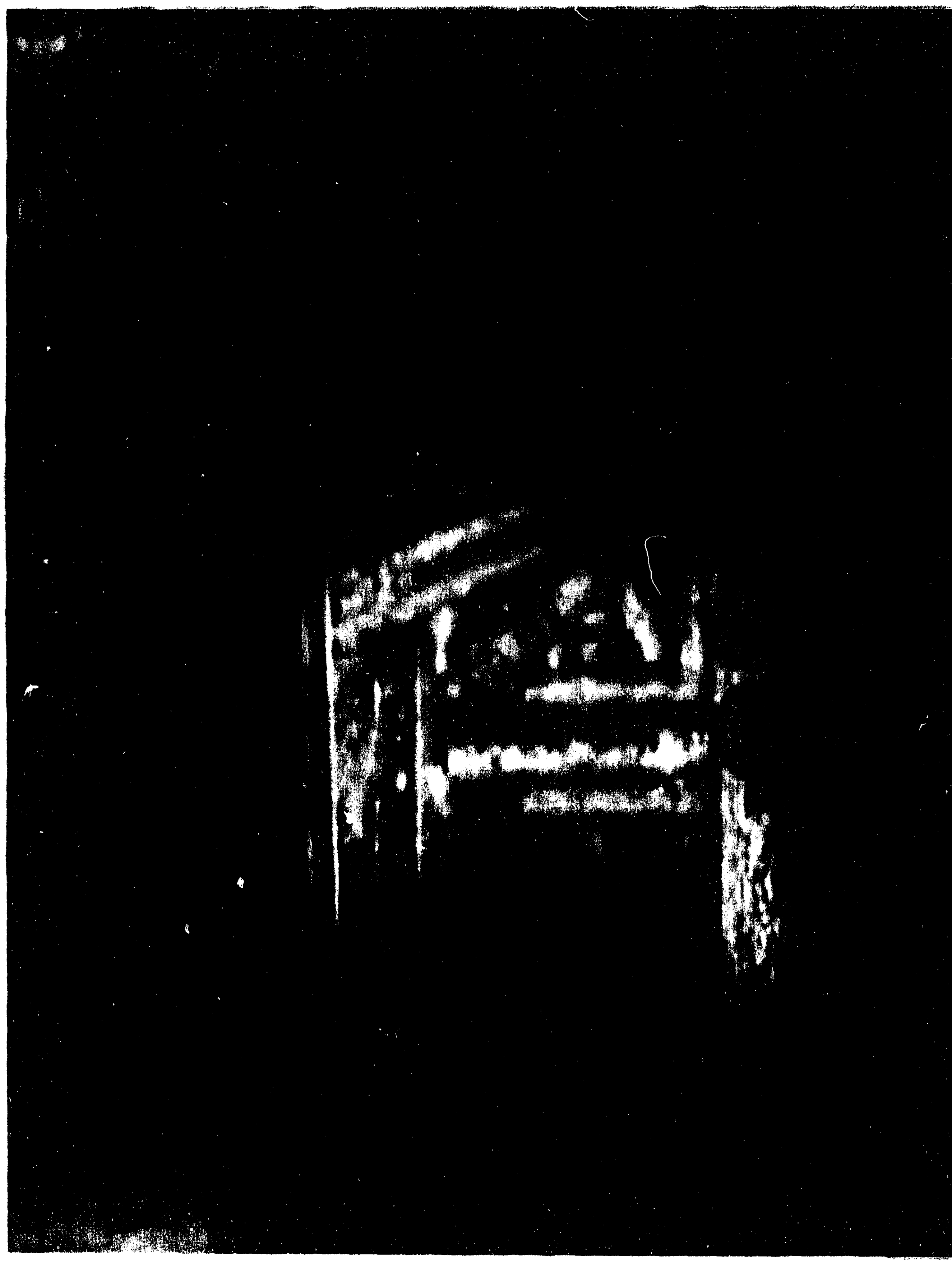


Figure G-2. SPR (Aluminum Clad) Reactor Fuel in PUREX Slug Basin.



G3.3 SLUG BASIN DEACTIVATION

The PUREX slug storage basin was used to store aluminum clad SPR fuel. Recent sample analysis of the water contained in the slug basin indicates no significant chemical or radiological residues are present (refer to Table G-3). However, further characterization of the water and any residues may be required. Worker access to the slug basin is limited and will require fabrication of access equipment and implementation of special safety procedures. Therefore, remote methods will be used to empty, flush, and stabilize any residual contaminants within the slug basin.

Table G-3. Slug Storage Basin Sample Results.

Analysis	Result
Appearance	Clear, <1% solids, No organic
pH	8.4
Total organic carbon	Incomplete
Uranium	Incomplete
Alpha Total	4.1 E-02 microcuries/liter
Total Beta	40 microcuries/liter
CePr-144	<2.29 E-01 microcuries/liter
Co-60	<9.32 E-03 microcuries/liter
Nb-95	<7.1 E-03 microcuries/liter
Ru-103	<3.86 E-02 microcuries/liter
RuRh-106	<4.17 E-01 microcuries/liter
Zr-95	<1.25 E-02 microcuries/liter
Cs-134	1.69 E-02 microcuries/liter
Cs-137	16.4 microcuries/liter
Th-228	2.0 microcuries/liter
Over the Top Dose Rate (4 oz. sample)	<.5 millirad/hour
Plutonium	4.0 E-07 grams/liter*

*Based on conversion of the Total Alpha analysis only.

The plan for lay-up of the PUREX slug storage basin consists of the following key elements.

1. All aluminum clad fuel currently stored in the basin will be removed.

2. The water will be drained and the walls and floor flushed with water using a crane-operated wand.

3. The basin surfaces will be surveyed, or sample analysis will be taken of the water to determine the level of residual contamination and the effectiveness of the flushes. Flushing will continue until an engineering evaluation determines that contamination levels are acceptable for proceeding with application of a fixating agent.

4. Any residual contamination will be coated with a fixating agent to prevent the contamination from becoming airborne.

G3.4 N REACTOR FUEL DISPOSITION

PUREX dissolver cells A, B, and C contain some N Reactor fuel elements that could not be retrieved after they were inadvertently spilled to the floor during dissolver charging operations. Figures G-3 and G-4 show examples of fuel condition and location. Most of the spilled fuel was retrieved immediately following the spillage. However, because some of the fuel could not be retrieved without removing most of the equipment in the cell, it was left for future retrieval efforts. Accountability records indicate that these fuel elements contain 240 kg of 0.95% enriched uranium and 17.3 kg of depleted uranium. A review was performed of reports and other records regarding fuel spills at PUREX, and an estimate was made of the amount and location of fuel presently on the floors of the dissolver cells. The information is summarized in Table G-4.

Table G-4. Estimate of Fuel on the PUREX Canyon Floor.

Cell	Number of Elements	Uranium (kg)
A	3.5 inners	26
B	22.5 inners, 11.5 outers	230
C	1 inner	4 to 8

Figure G-3. N Reactor Fuel on PUREX Dissolver Cell Floor.

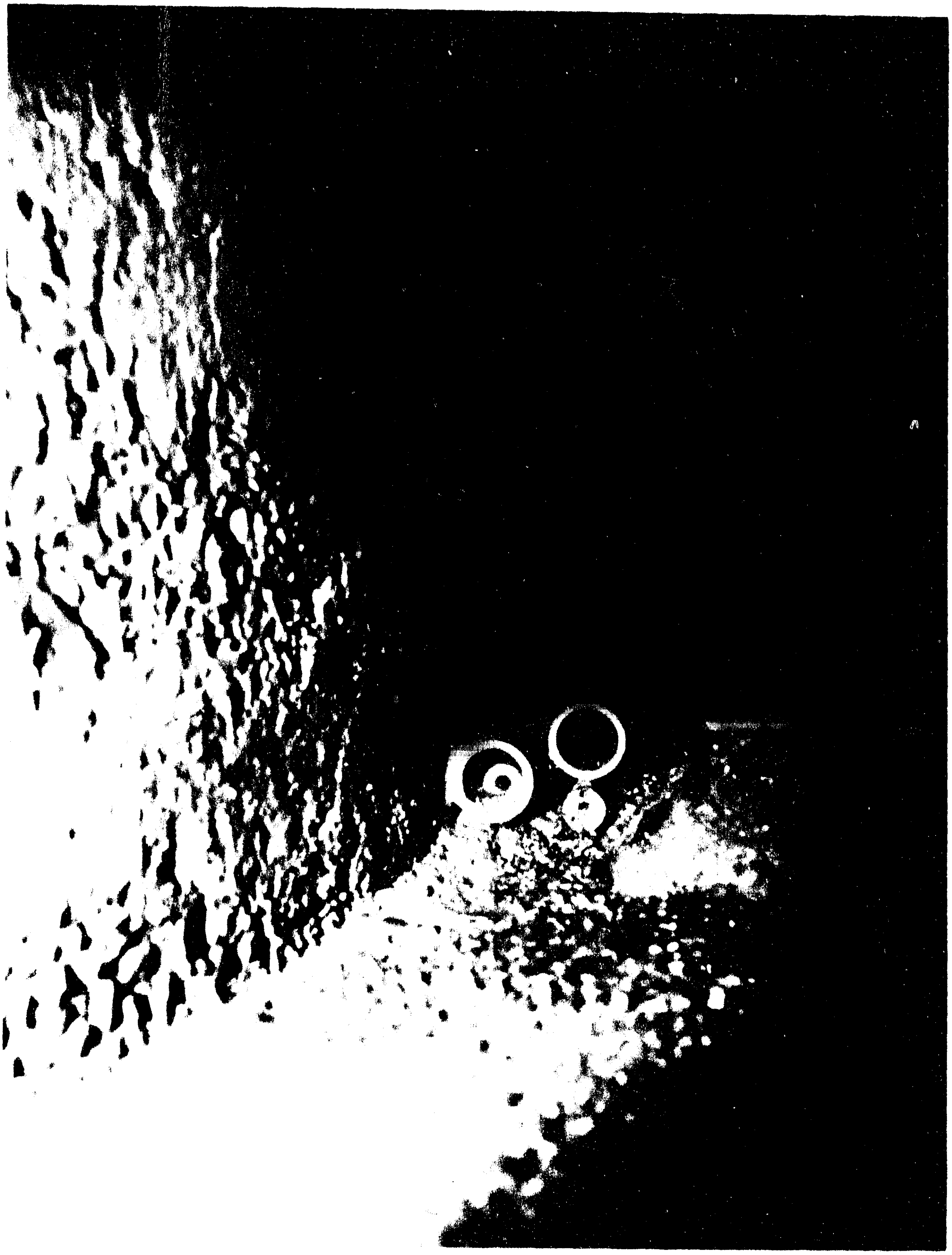
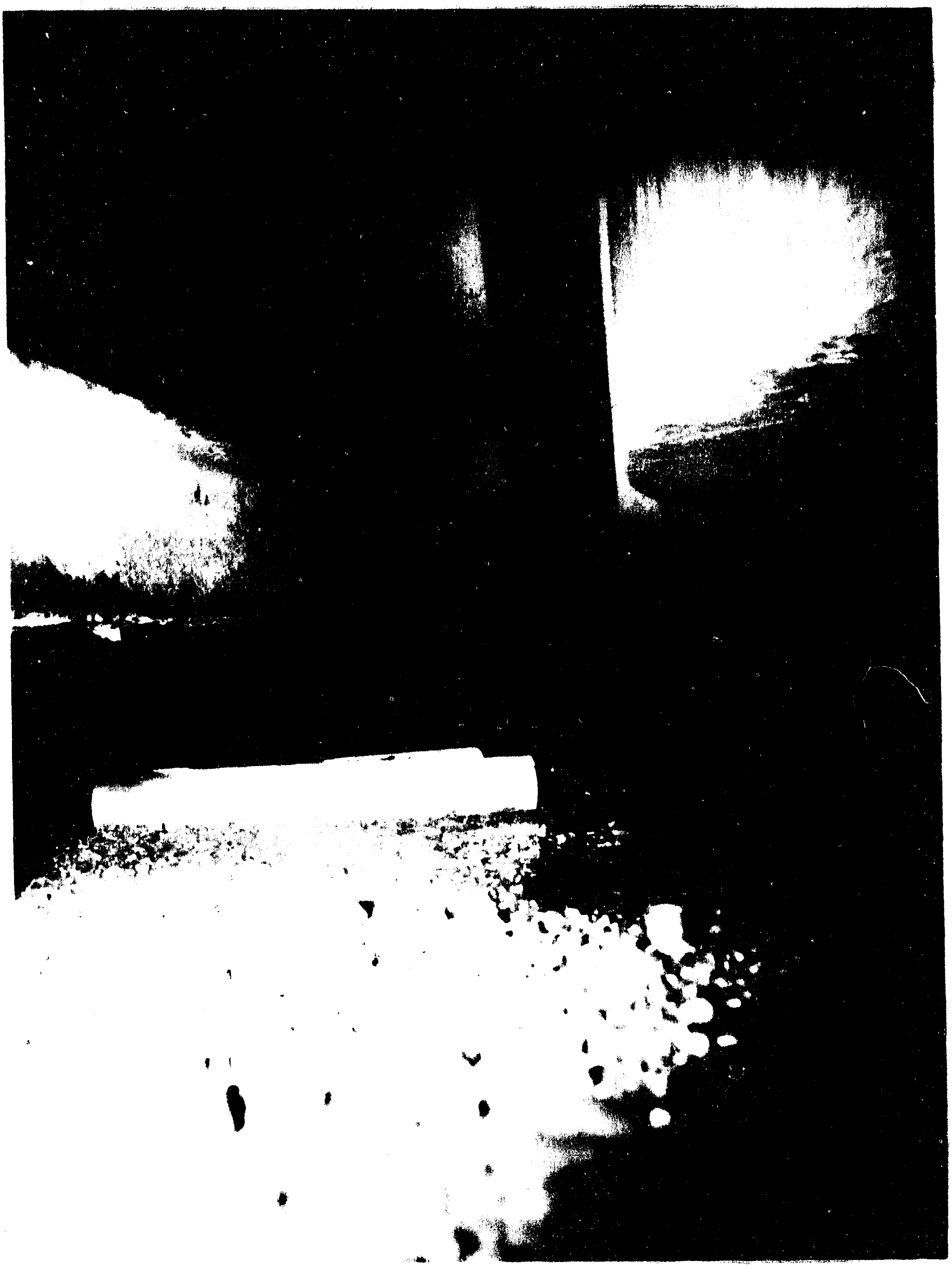


Figure G-4. N Reactor Fuel on PUREX Dissolver Cell Floor.



A recent inspection of the fuel was performed to determine the condition and location of the fuel. The video tape of the inspection showed that the fuel condition varied from little or no evidence of degradation to evidence that the fuel cladding had obviously been breached. The fuel was shown to be situated in various locations that are not accessible unless most of the canyon equipment is removed from the cell. Therefore, the proposed plan for recovery and disposition of this fuel is to remove the dissolver cell equipment one cell at a time, recover the fuel using a special crane-operated recovery tool, package the fuel in canisters, and transfer the fuel back to 105-K west basin for storage.

The fuel from all three dissolver cells will be combined so only one cask shipment to the K west basin will be required. The fuel will be transferred using the same equipment and procedures as described in Section G3.2 for SPR fuel. Following retrieval of the fuel, the dissolver cell equipment will be placed back into the cell. Failed equipment will either be stored in the dissolver cell or transferred to the number 2 PUREX storage tunnel. Jumpers will be replaced when possible, but failed jumpers will be placed in a burial box liner for storage in PUREX storage tunnel.

G3.5 ZIRCONIUM HEEL STABILIZATION

The three PUREX dissolvers currently contain pieces of zirconium from past fuel decladding operations. These zirconium pieces are immersed in water and are probably oxidized. However, a strong caustic soak will be used to further passivate these heels to prevent pyrophoric ignition. Following passivation of the heels, the water cover will not be required. The caustic and water mixture will be treated and transferred to the appropriate waste tank farm.

G3.6 METAL SOLUTION DISPOSITION

PUREX currently has approximately 22,700 L (6,000 gal) of rework quality metal solution, which was recovered from transition-to-standby cleanout activities and is stored in tanks D5 and E6. The solution consists of about 9 kg of plutonium and 5.3 metric tons of uranium in a 1 molar nitric acid matrix. The solution contains only trace quantities of fission products and 1 to 4 grams/liter cadmium (cadmium nitrate is used as a neutron poison when transferring plutonium rework solution from N cell).

The planning basis to dispose of this material is to co-precipitate the uranium, plutonium, and cadmium into 208-L (55-gal) drums using sodium hydroxide as the precipitating agent (refer to Figure G-5). The precipitated solids will be separated from any remaining supernate, and the supernate will be treated and transferred to the waste tank farms (up to 26,500 L [7,000 gal] of supernate waste would be generated). An appropriate absorbent material will be added to the precipitated solids in the drums to ensure there are no free liquids remaining (150 to 300 drums of TRU waste will be generated). The drums will be packaged and handled in accordance with the requirements for TRU waste to meet Waste Isolation Pilot Plant acceptance criteria and then transferred to the TRU waste storage facility.

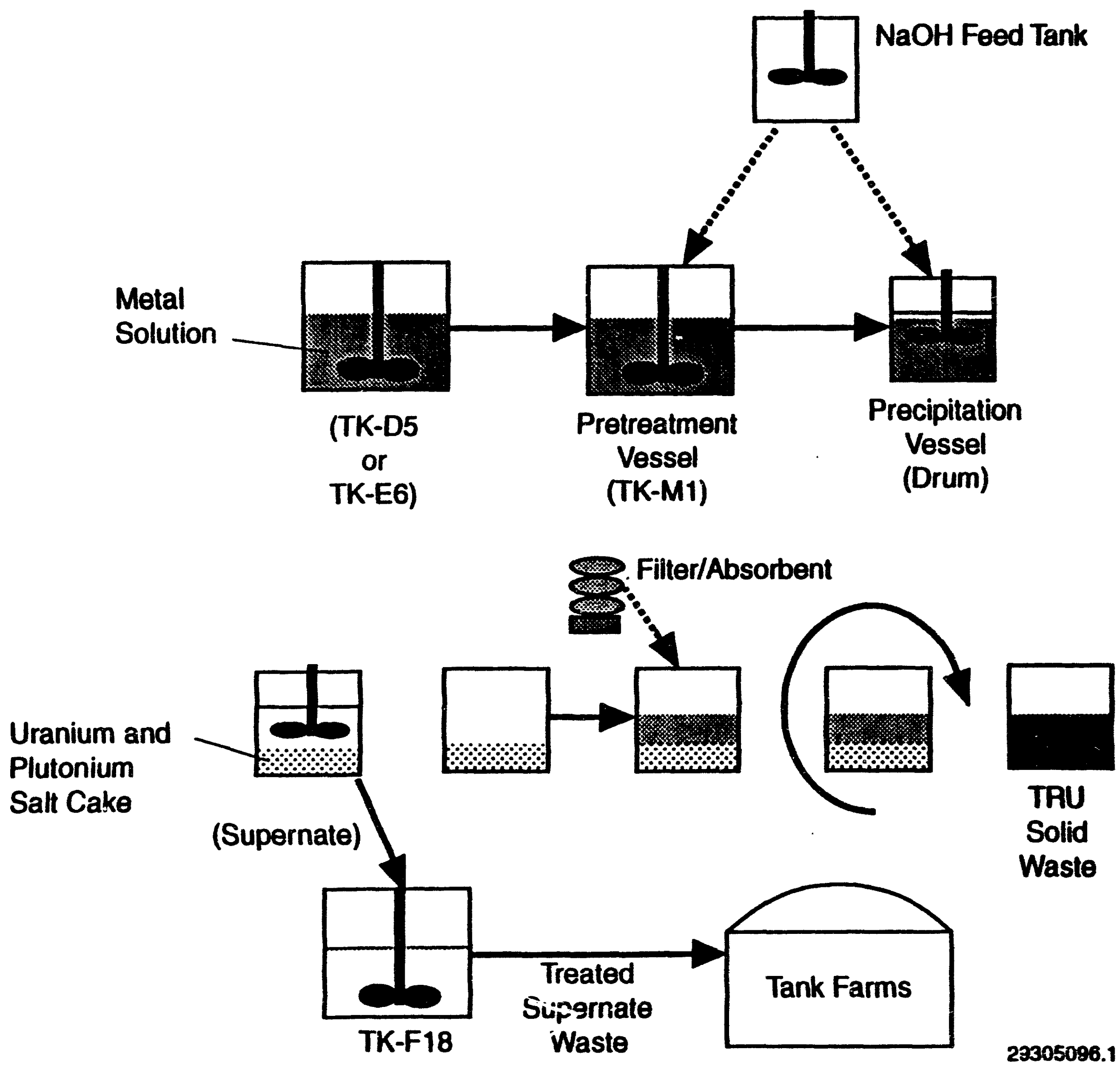


Figure G-5. Co-Precipitation Flow Diagram.

The preferred alternative to co-precipitation into drums is to neutralize and dispose of metal solution to Tank Farms' double-shell waste tanks according to existing practices. Treatment and disposal would occur within the existing regulatory, environmental, safety, and operating envelopes, and could be accomplished within the anticipated double-shell waste tank operating and criticality specifications and tank space limitations.

No incremental tank farm waste pretreatment capacity would be required, and the double-shell tank waste volume consumed (7000 gallons) is equivalent to the planning basis volume. Using the preferred alternative, the uranium disposal to double-shell waste tanks is equivalent to ~14% of 1983-1990 PUREX to Tank Farm operating losses; the plutonium disposal equivalent to ~25 % of operating losses, and <2% of total Tank Farm plutonium inventory. Repository disposal cost is equivalent to the planning basis alternative. A systems engineering study will determine the final choice for disposal of the metal solution.

G3.7 CANYON FLUSHING

The purpose for flushing the PUREX canyon walls, floors, vessels, and piping is to minimize the potential for re-suspension and migration of radioactive material and to remove hazardous materials. Permitted treatment, storage, and disposal units within the PUREX canyon will be flushed and closed in accordance with a closure plan approved by the appropriate regulatory agencies and are not discussed further herein.

Following the completion of the PUREX stabilization campaign in 1990, the process was shut down in accordance with routine operating procedures, which removed much of the special nuclear material (SNM) and fission product waste from the process piping and equipment. Subsequent activities performed in preparation for potential restart of the plant (such as tank calibration and tank integrity assessments) provided additional water flushes of most of the canyon equipment. Therefore, further internal flushing of the canyon equipment will be limited to that required to ensure that any residual heels do not exhibit dangerous waste characteristics (pH between 2 and 12.5) and to remove any suspected high potential "pockets" of SNM or fission products.

Before initiating flushing activities, an estimated 189,000 L (50,000 gal) of residual water solution currently held in various canyon vessels will be disposed of to the tank farms. The heels of each canyon vessel will be evaluated to determine the appropriate flush solution, and flushing end point (refer to Table G-5). The resulting spent flush solution will be transferred to the tank farms using routine procedures and existing piping. The liquid level in all vessels will be left at the lowest level possible using existing jets and pumps (the minimum level is generally between 76 and 379 L [20 and 100 gal]).

External surfaces of canyon vessels and the cell walls and floors will be flushed using an appropriate combination of a spray wand, cell washdown nozzles (located about 1.5 m [5 ft] above the canyon floor in each cell), and fire fog system nozzles (located above the equipment in each cell). The resulting flush solution will be sampled, and a documented evaluation will be made to determine if further flushing is required. The spent flush solution from this operation also will be transferred to the waste tank farms.

Table G-5. PUREX Process Control Canyon Cell and Equipment Flushing.

Process equipment	Flush material	Material removed	End point
Canyon filters	Water	Ammonia Nitrate and Fission Products (FP)	< 1 weight percent ammonia, Engineering Judgement (EJ)
Silver reactors (dissolvers)	None	N/A	N/A
Electric heaters	None	N/A	N/A
Steam heaters	Steam	FP	EJ
Ammonia scrubbers	None*	N/A	N/A
Ammonia scrubber catch tanks	None*	N/A	N/A
Dissolver towers	Water	FP, Nitrates	EJ
Dissolvers	None**	N/A	N/A
Canyon tanks	Water, Chemical	Special Nuclear Material (SNM), Nitrates, FP	pH > 2 and < 12, EJ
Process columns	Water, Chemical	SNM, Nitrates, FP	pH > 2 and < 12, EJ
Centrifuges	Chemical, Water	FP and SNM solids	EJ
Condensers	Steam or Water	FP and Nitrates	EJ
Acid absorber	Water	Nitrates, FP	pH > 2 and < 12, EJ
Concentrators	Water, Chemical	Nitrates, SNM, FP	pH > 2 and < 12, EJ
Organic contractor tanks (TK-G1 and TK-R1)	Water***	Nitrates	pH > 2 and < 12
Decanter tanks	Water	Nitrates	pH > 2 and < 12
Acid fractionator and support equipment	Water	Nitrates	pH > 2 and < 12
Canyon walls, floors	Water	Nitrates, SNM, FP	pH > 2 and < 12, EJ

*The ammonia scrubbers and catch tanks were flushed during process equipment integrity testing.

**The dissolvers were flushed or dispositioned during the dissolver heel removal.

***The organic contactor tanks were flushed extensively after the stabilization run to remove solids buildup.

Following the completion of all canyon systems flushing, existing routes to effluent discharge points and to the waste tank farms will be isolated to prevent any possibility of solution flowing back into the canyon.

An estimated 1.9 million L (500,000 gal) of flush solution may be generated during PUREX flushing activities. This is based on past experience using conventional methods (i.e., all solution is disposed of to the tank farms directly with no volume reduction at PUREX). Significant waste volume reductions may be achieved by cascading flushes and by using an in-plant evaporator to concentrate the waste before transfer to the waste tanks.

G3.8 IN-PLANT WASTE CONCENTRATION

Approximately 1.9 million L (500,000 gal) of flush solution will be generated during the deactivation of PUREX. An additional 757,000 L (200,000 gal) of solution are currently being held in various canyon and noncanyon vessels within the plant. The volume of waste transferred to the tank farms can be minimized by performing in-plant concentration using a concentrator formerly used during processing operations (refer to Table G-6).

Former process evaporator E-F11 has been selected as a candidate to perform in-plant concentration. The E-F11 evaporator could be operated as follows.

1. E-F11 could be operated in its normal configuration (refer to Figure G-6) to boil spent flush solutions, condense the resulting water vapor in the overhead offgas, and recycle the water to perform additional flushing. Although this mode of operation will significantly reduce the amount of waste transferred to the waste tanks, it generates cooling water, which would be disposed of to the 216-B-3 pond system.

2. E-F11 is modified to allow uncondensed water vapor from the offgas to be discharged into the canyon air stream and out the 291-A-1 stack (refer to Figure G-7). Controlled evaporation, limited to 3.8 to 22.7 L (1 to 6 gal) per minute, significantly reduces the waste volume without oversaturating the canyon air. The concentrated waste in the evaporator bottoms will be transferred to tank F18, treated to meet tank farms acceptance criteria, and transferred to the appropriate waste tank. A process test procedure has been written and approved to initiate proof of principle testing using uncontaminated water as the test solution. The equipment and piping modifications necessary to operate in this regime are minor.

Operation of the E-F11 evaporator is not necessary to achieve the deactivation but is primarily an option for waste minimization. The tank farms have reserved 5.7 million L (1.5 million gal) of tank space for PUREX deactivation activities. However, use of the 5.7 million L (1.5 million gal) of space is contingent upon restart of the 242-A waste evaporator and is further restricted by an 87,000 L (23,000 gal) per month limit on waste transfers. Because PUREX deactivation activities will closely match the 87,000 L (23,000 gal) transfer limit, operation of E-F11 provides an opportunity to maintain continuity of operations during peak waste generation periods without exceeding the 87,000 L (23,000 gal) limit.

Table G-6. Forecasted Potential Liquid Volumes for Deactivation.

Location	Composition	Current volume L (gal) (approx)	Volume if sent directly to tank farms L (gal)	Volume going to tank farms after in-plant concentration L (gal)
Flush solution (canyon vessels)	Nitric acid (1-3M) contaminated with fission products, uranium, and traces of plutonium	1.89 million (500,000) Volume expected for plant flushing	2.08 million (550,000)	94,635 (25,000)
Canyon vessels (various)	Nitric acid (pH 0-3) from tank heels and equipment operability testing	189,270 (50,000)	208,197 (55,000)	49,210 (13,000)
Tank P1	Nitric acid (pH 3-6) from UNH loadout area (203A) sumps and rainwater	363,398 (96,000)	363,398 (96,000)	94,635 (25,000)
Slug storage basin	Fuel storage water contaminated with fission products	200,626 (53,000)	200,626 (53,000)	37,854 (10,000)
Total		2.65 million (699,000)	2.85 million (754,000)	276,334 (73,000)

UNH = Uranyl nitrate hexahydrate.

Figure G-6. In-Plant Waste Evaporator (Recycle Option).

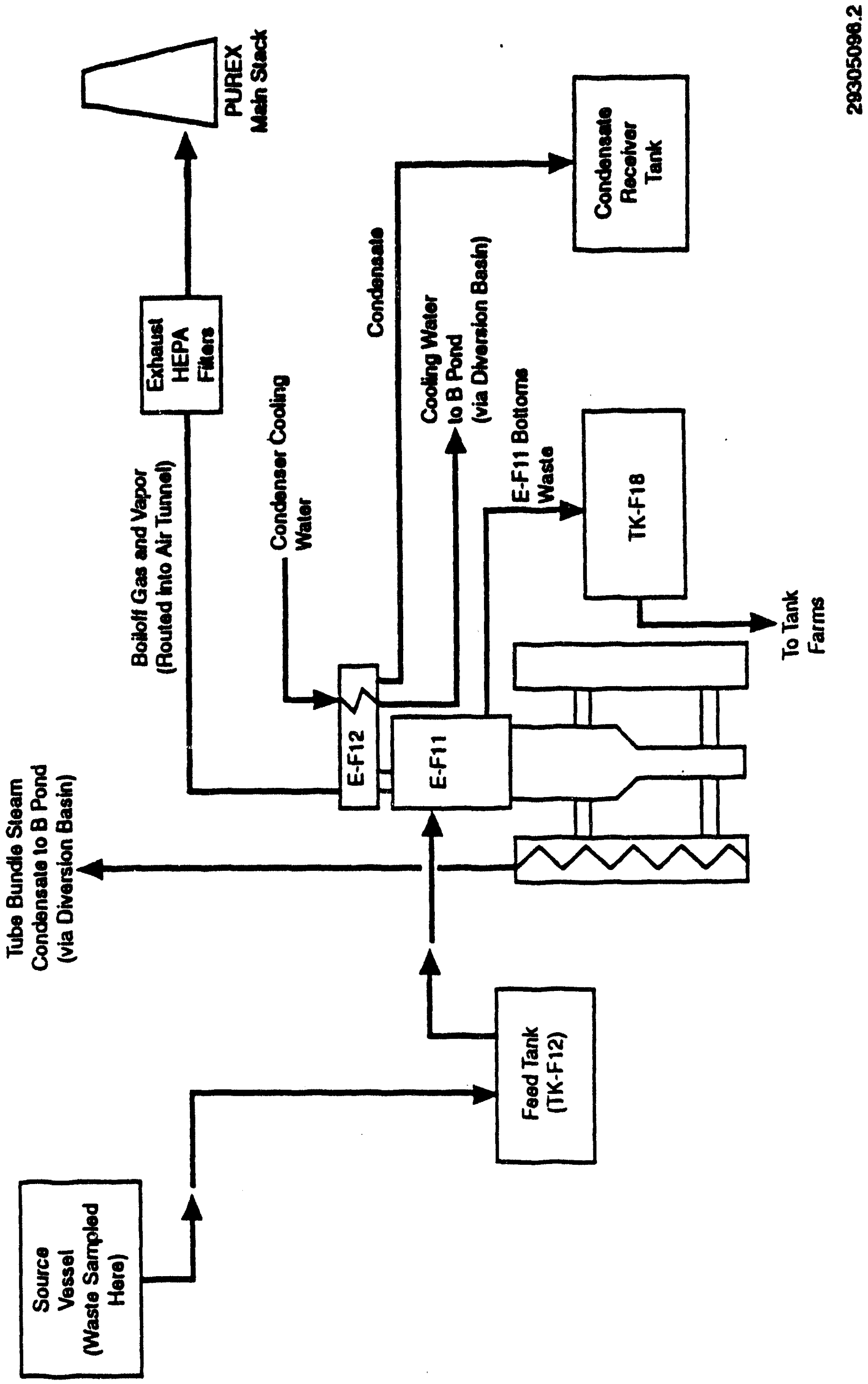
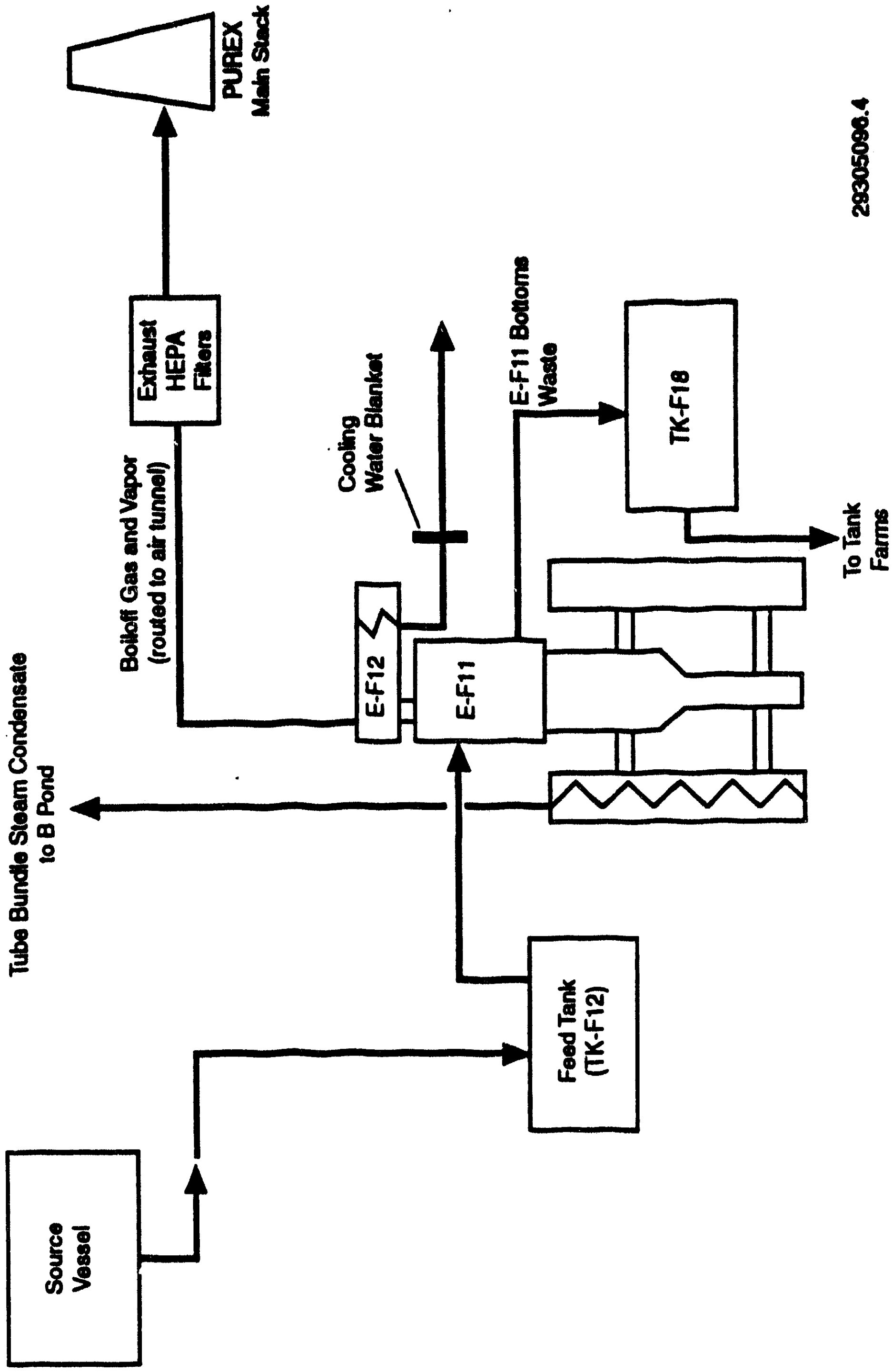


Figure G-7. In-Plant Waste Evaporator (Vapor Distillate Option).



G3.9 CONTAMINATED SOLVENT DISPOSAL

Currently about 79,000 L (21,000 gal) of slightly contaminated PUREX solvent are being stored in canyon tanks G5 and R7. The solvent is a mixture of 25 volume percent tributyl phosphate dissolved in a hydrocarbon diluent, normal paraffin hydrocarbon (n-dodecane to n-tetradecane). This solvent was used to perform plutonium and uranium solvent extraction separations during past PUREX processing operations.

Two proposed methods have been identified for disposal of the solvent. The solvent can be transferred to Idaho National Engineering Laboratory and used as fuel at the New Waste Calcining Facility. Because of the very low levels of radioactive contamination, the solvent will be shipped as low specific activity material in accordance with U.S. Department of Transportation regulations.

The alternate method to dispose of the solvent is to transfer the material to a licensed, commercial facility for incineration. The solvent will be transferred by tank truck to the incinerator and burned, and the ash will be returned to the Hanford Site for storage and disposal.

Following disposal of the organic solution, the G and R cell vessels, equipment, and piping will be flushed and deactivated.

G3.10 SUPPORT AND ANCILLARY SYSTEMS

A number of ancillary buildings that provided a variety of support services are located within the PUREX complex. The facilities and associated systems of concern include, but are not limited to, the 293-A, 203-A, 211-A, 206-A, 205-A, 212-A, and 294-A buildings, as well as the various gaseous and liquid effluent sampling and monitoring stations. The PUREX 291-A-1 stack (main stack) monitoring building (292-AB) will not be completely deactivated because some level of main stack sampling and monitoring is anticipated following PUREX deactivation.

The proposed plan for deactivating these facilities will consist of an appropriate combination of the following tasks.

1. Vessels and piping will be flushed, drained, and isolated from canyon interfaces. All access points and penetrations will be secured.

2. Motor driven equipment and electrical equipment will be disconnected and zero energy checks will be performed. Instrumentation will be shut down.

3. Surfaces will be decontaminated by hand wiping, water flushing, or for concrete surfaces, chipped or spalled to remove radiological and chemical contaminants. Concrete surfaces will be sealed or painted.

4. Safety showers and eye wash stations will be drained and isolated.

5. All emergency response equipment, tools, and supplies will be removed.

6. Weatherproofing will be performed, and building penetrations will be sealed to prevent intrusion by pests.

7. The facilities will be locked to prevent entry except as required for surveillance.

G3.11 PRODUCT REMOVAL ROOM DEACTIVATION

The product removal (PR) room previously was used to load out plutonium nitrate solution from the PUREX process into containers (PR cans) for shipment to the Plutonium Finishing Plant. The PR room was also used to transfer plutonium nitrate solution from the PUREX process to N cell and to receive rework and waste solutions from N cell for transfer back to the PUREX process.

The PR room consists of four gloveboxes that contain plutonium nitrate loadout and transfer equipment and the associated piping. During transition-to-standby activities, the PR room tanks and gloveboxes were flushed to remove any gross plutonium inventory.

The purpose of the PR room deactivation is to further reduce the residual plutonium inventory for the surveillance period. A phased approach will be used for the deactivation of the PR room analogous to that discussed for N cell. The phases consist of the following.

Phase 1: Remove small equipment that can be bagged out of the gloveboxes.

Phase 2: Remove large equipment requiring size reduction, or remove glovebox panels. Decontaminate the gloveboxes and apply a contamination fixative.

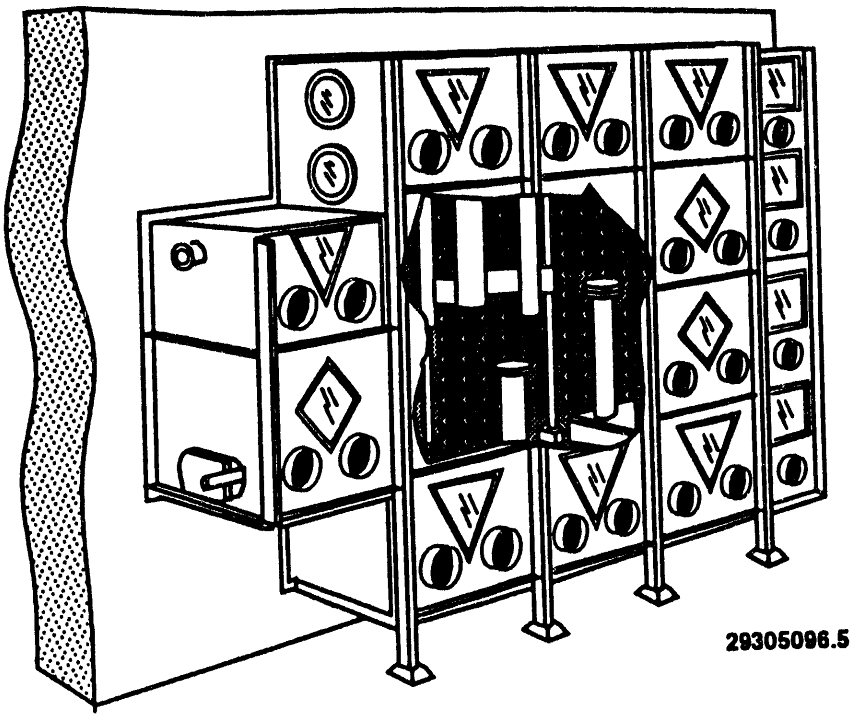
All waste removed from the PR room area will be packaged, handled, transported, and stored as TRU waste in accordance with applicable requirements.

G3.12 N CELL CLEANOUT

The Plutonium Oxide Production Facility, better known as N cell, was designed to convert plutonium nitrate solution from the PUREX process to plutonium dioxide powder (PuO_2). The process for converting plutonium nitrate to oxide powder was executed in 12 separate gloveboxes. A typical glovebox is shown in Figure G-8. The gloveboxes contain the equipment and piping necessary for the plutonium oxide conversion process.

The purpose of N cell cleanout is to remove the SNM (plutonium) from the gloveboxes and to decontaminate the processing area (including the gloveboxes) to achieve a safe configuration for future D&D activities. Although the accessible plutonium has been removed from the facility by recovering loose powder and equipment flushing, nondestructive analysis (NDA) of the plutonium

Figure G-8. Typical N Cell Glovebox.



inventory indicates that up to 10 kg of plutonium still remain (a "most likely" quantity of 3 kg was also estimated).

To ensure that the plutonium inventory in N cell is reduced such that it does not present a significant hazard during the long-term surveillance phase between deactivation and D&D, the following approach is recommended for the cleanout of N cell.

Phase 1: During this phase all of the equipment and piping that can be removed through existing gloveports will be removed. This equipment and piping will not require any unique size reduction and will be packaged as transuranic (TRU) waste and transferred to the TRU waste storage facility. This phase will be performed using procedures and practices common to equipment replacement activities during past N cell operations.

Phase 2: This phase involves size reduction and removal of any equipment that was too large to remove intact during Phase 1. Special procedures will be developed and equipment procured to perform size reduction of appropriate equipment. The equipment pieces will be removed and handled as TRU waste. An NDA will be performed at the conclusion of Phase 2. It is estimated that Phases 1 and 2 will generate approximately 17.5 m^3 (618 ft^3) of TRU waste.

G3.13 Q CELL CLEANOUT

Q cell was used to perform the final processing required for neptunium purification and shipment during past PUREX operations. Q cell is located near the PR room and N cell processing areas. Q cell was operated between 1958 and 1972, when it was flushed out and shut down. Operations were never resumed, although there was a proposal to restart this process area and some operational testing was done using water solutions. Radiological surveys conducted in the Q cell processing areas indicate that there are still areas that are grossly contaminated with neptunium. Some beta contamination exists in the form of protactinium (Pa-233), which is a neptunium decay product.

The primary objective for the Q cell cleanout activities is to remove any gross quantities of residual neptunium. The following approach, similar to that used for N cell and PR room deactivation, will be implemented.

1. Remove the maintenance glovebox equipment and package as TRU waste.
2. Perform an engineering evaluation to determine whether the gloveboxes and the hot cell equipment should be removed or left in place.
3. Decontaminate the residual contamination on the glovebox surfaces and apply a fixative, as appropriate, or remove the gloveboxes.

G3.14 SAMPLE GALLERY DEACTIVATION

The sample gallery contains equipment for taking solution samples from canyon vessels. The sample gallery hoods, equipment, and piping contain various levels of radioactive contamination. The ventilation ductwork servicing the sample gallery is also contaminated and has been a source of past contamination spreads in the sample gallery. Therefore, the proposed plan for deactivation of the sample gallery systems is as follows.

1. Flush piping and decontaminate or fix contamination in the hoods to minimize the potential for re-suspension of contaminants. All piping systems will be drained to eliminate the potential for future leaks.

2. Remove sample hoods that were used to handle concentrated SNM solutions if they cannot be decontaminated to within acceptable limits.

3. Remove the sample gallery ventilation ductwork. The ductwork will not be replaced because the ventilation system will be realigned in accordance with the plans for ventilation consolidation.

4. Discontinue services and utilities to the sample gallery.

G3.15 PIPE AND OPERATING GALLERY AND WHITE ROOM DEACTIVATION

The pipe and operating (P&O) gallery provides space for the electrical switchgear, instrument racks, nonradioactive piping, and associated gang valves which serve the canyon equipment. A few batch chemical addition tanks are also located in this gallery. Shortly after PUREX startup in 1956, the west end of the gallery became grossly contaminated with plutonium nitrate solution. Because the contamination could not be cleaned up entirely, the remaining contamination was fixed, the room was painted white, and a ventilation barrier was erected to separate it from the rest of the P&O gallery. This area is now referred to as the White Room.

The proposed plan for the deactivation of the P&O gallery/White Room areas is to flush and drain all piping headers, flush and drain or remove tanks, and apply a fixative to the White Room floor. This fixative will require less long-term maintenance than paint in providing an effective barrier to migration of contamination. The electrical switchgear and instrumentation will be de-energized and left in place.

G3.16 VENTILATION SYSTEMS CONSOLIDATION

The ventilation system in the 202-A building is designed and operated to keep normal work areas free of radioactive contamination by maintaining air flow from zones with little potential for contamination into zones of progressively greater contamination potential. The ventilation air is handled through four systems: canyon (system 1), sample gallery (system 2), service area (system 3), and laboratory (system 4). Control is provided by maintaining minimum differential pressures between the ventilation zones.

The current operation of the PUREX ventilation system requires a discharge of about 4,800 m^3 (170,000 ft^3) per minute through 11 ventilation stacks. Therefore, consolidation of the ventilation systems is recommended to minimize the volume of air discharged and the number of stack monitoring stations that must remain active following PUREX deactivation. The proposed plan is to cascade air from one ventilation system to another, with eventual discharge of all air through the canyon and main stack. This ventilation configuration will allow shutdown and deactivation of all stacks except the main stack, will reduce the total air flow discharged to about 1.7 x 10^6 liters (60,000 ft^3) per minute, and will allow possible isolation of the deep bed fiberglass exhaust filters from the final exhaust filter train. The cascade ventilation concept is shown in Figure G-9.

G3.17 UTILITIES AND SERVICE SYSTEMS

The plan for terminating and modifying PUREX utilities and services consists of the following primary elements.

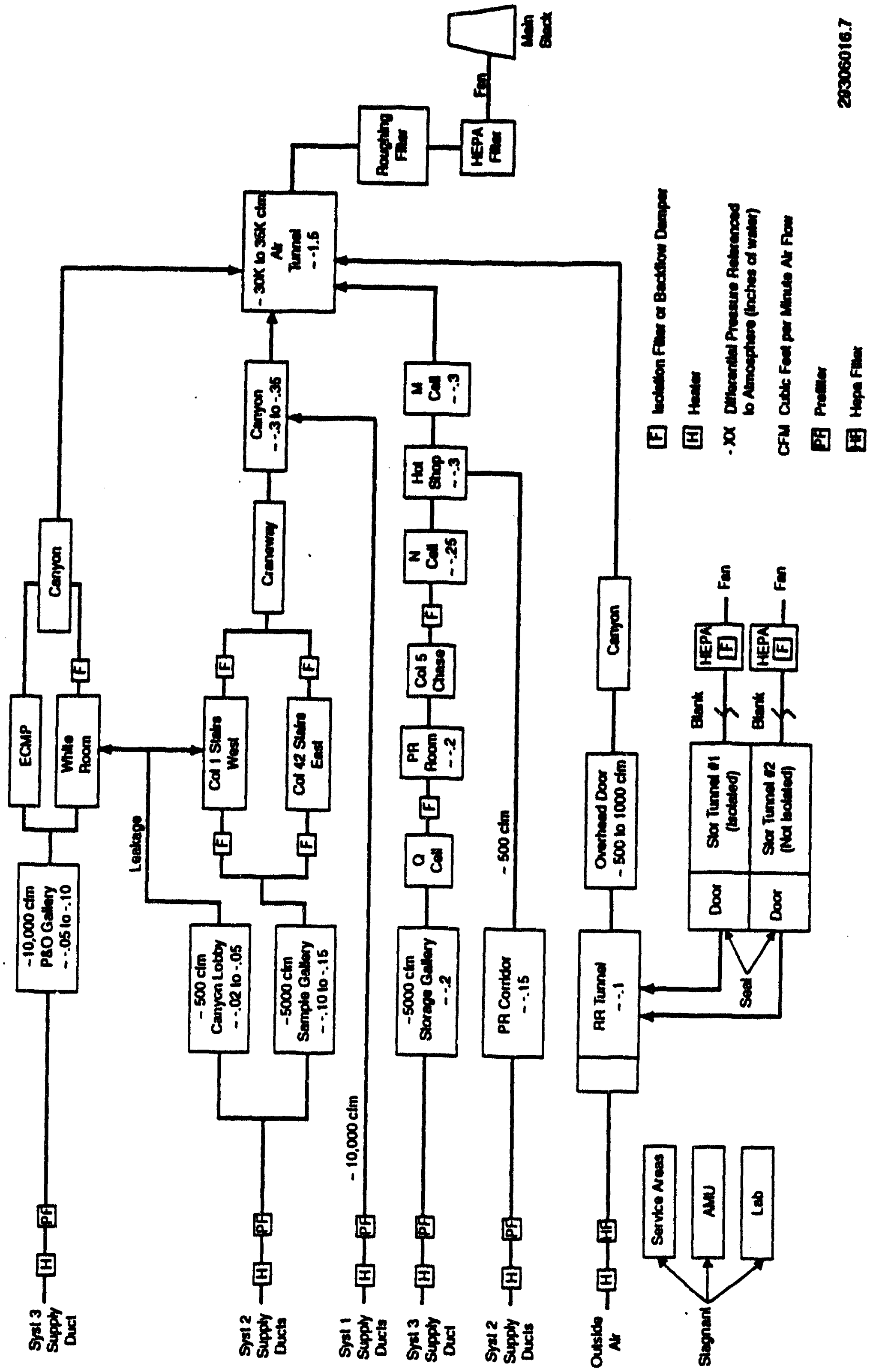
1. The water mains will be blanked as far upstream from PUREX as possible without disrupting service to other users. Much of the existing water piping is very old, and ruptures occasionally occur. Therefore, blanking the water main will minimize the chance of water intrusion into the plant in case of a line failure. The branch lines will be drained to the extent practical. The sanitary water high tank will be drained and isolated.

2. The main steam header to PUREX will be blanked as far upstream from the plant as possible without disrupting service to other users. This action will prevent condensation from steam leaks from accumulating in tanks and sumps, thereby eliminating a potential source of liquid waste.

3. The electrical distribution systems will be consolidated into one location, and systems will be shut down that feed inactive loads. Electrical distribution will be limited to that required for the remote monitoring system, ventilation equipment, and lighting. The three existing backup diesel generators will be maintained and used as backup power for the canyon ventilation fans. The underground fuel tank associated with the diesel generators will be moved above grade within appropriate containment to comply with regulatory requirements.

4. The current 202-A building fire suppression systems will be deactivated and drained. Fire protection for the 292-AB main stack monitoring building will be maintained. A dry chemical-type fire suppression system may need to be installed in the area housing the active electrical switchgear.

Figure G-9. PUREX Ventilation Consolidation.



5. An electronic system will be installed to remotely monitor the following key parameters:

   - Main stack sampling and monitoring equipment status such as flow rates, high radiation alarms, and fire protection equipment status

   - Electrical power distribution monitoring such as incoming power and emergency power status

   - Ventilation equipment monitoring consisting of monitoring the status of the canyon ventilation fans, such as motor current, motor winding temperature, bearing temperature, and an alert for fan transfer

   - Ventilation system monitoring consisting of zone differential pressures, exhaust filter differential pressures, air dew point, and temperature.

   The monitoring system will have the capability to communicate with monitoring stations located away from PUREX.

6. The compressed air systems will be shut down and deactivated. Active ventilation system equipment (fan and duct dampers) that is dependent upon compressed air for operation will be converted to electric control.

G3.18 LABORATORY

The PUREX laboratory will continue to be used to support PUREX deactivation activities until the demand for analytical services can be reduced to the extent that other onsite laboratories can be used effectively. The laboratory then will be deactivated by removing all chemical reagents and salvageable analytical equipment and by decontaminating and stabilizing radiologically contaminated areas. The D-5 sample cave laboratory services will be provided by the 222-S analytical laboratory, after the PUREX laboratory is deactivated.

G3.19 CONTAMINATED ACID DISPOSAL

PUREX has approximately 681,000 L (180,000 gal) of concentrated (~10 molar) nitric acid contaminated with uranium (10 to 15 grams/liter), which is currently being held in the 203-A area uranyl nitrate hexahydrate (UNH) product storage tanks. An additional 106,000 L (28,000 gal) of concentrated (~11 molar) nitric acid slightly contaminated with uranium (10^{-3} to 10^{-4} grams/liter) are currently being held in tanks U1 and U2 in the U cell vault area.

The proposed plan for disposition of contaminated concentrated nitric acid solutions described above consists of the following actions (refer to Figure G-10):

1. Denitration of acid in Tank F15 and/or Tank F16 to a final concentration of about 1 molar using sugar solution (sucrose) as the denitration agent (sugar denitration was a routine operation when PUREX was processing fuel)

2. Direct atmospheric dispersal of carbon and nitrogen oxides generated as a result of the denitration process (300 to 400 metric tons of NOx will be released in about 80 batches during a 240- to 320-day period)

3. Treatment (pH adjustment) of the residual denitrated/concentrated acid solution and subsequent transfer to the tank farms.

Denitration of the acid solutions before treatment for transfer to the tank farms reduces the volume of waste transferred by about 33 percent.

Following the acid disposal activities, the 203-A area vessels, piping, and equipment will be flushed and deactivated. The tanks TK-U1 and TK-U2 and associated piping and equipment will also be flushed and deactivated.

G3.20 UO_3 PLANT DEACTIVATION

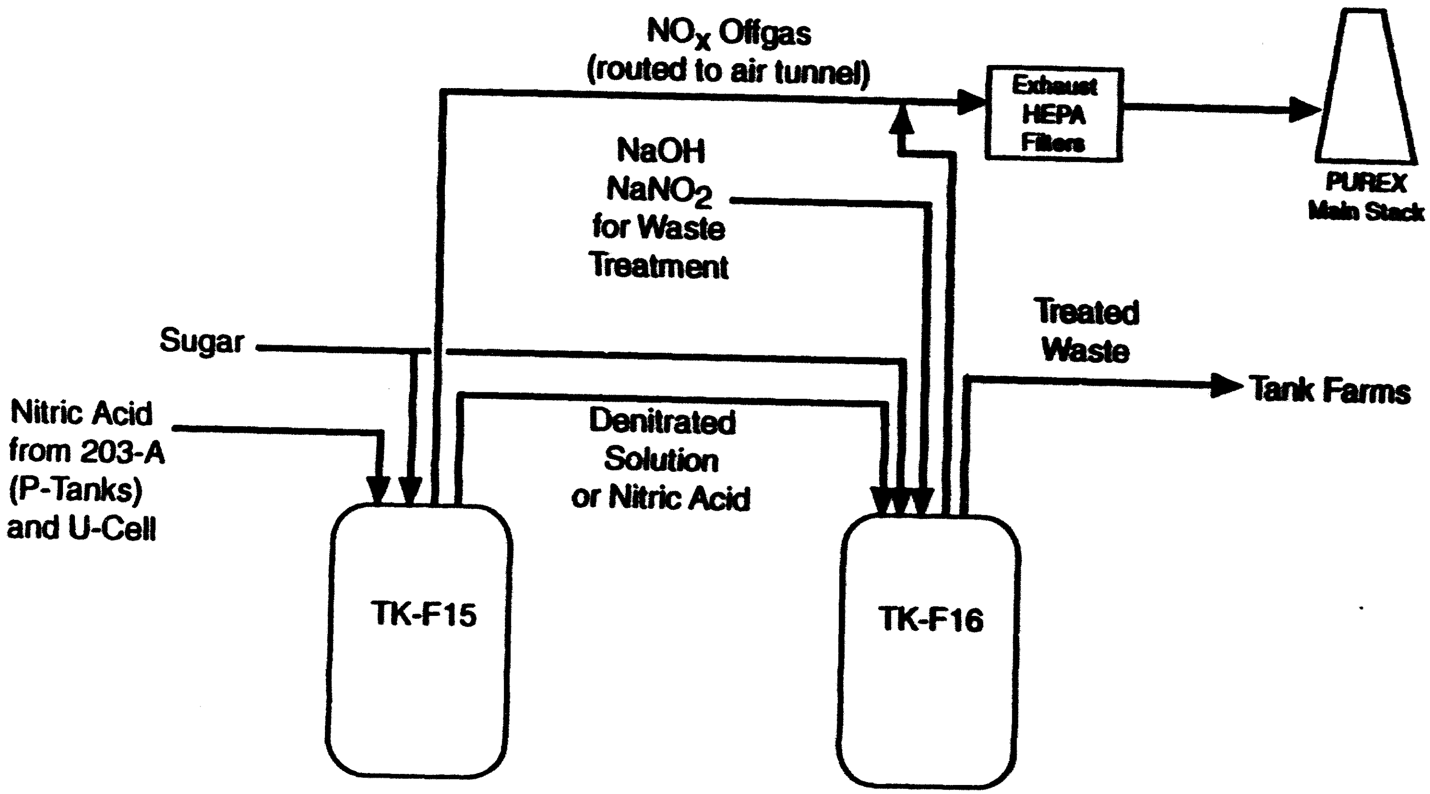
The UO_3 Plant was used to convert the UNH product from the PUREX process into a dry uranium trioxide powder. The final UO_3 Plant stabilization campaign converted about 757,000 L (200,000 gal) of UNH to uranium trioxide to support deactivation of the PUREX and UO_3 Plant. A key byproduct of the conversion of UNH is nitric acid. The nitric acid produced during the UO_3 Plant campaign represents the majority of the 757,000 L (200,000 gal) of acid to be disposed of at PUREX.

The deactivation of the UO_3 Plant mirrors many aspects of the PUREX deactivation and relies on the availability of some PUREX systems to accomplish deactivation objectives, such as disposal of acid and flush solutions.

A detailed description of the workscope and planned activities for deactivating the UO_3 Plant can be found in WHC-SD-CP-008, *UO_3 Plant Terminal Cleanout and Deactivation Plan* (Westra and Willis 1993). The key aspects of the UO_3 Plant deactivation plan are summarized here as follows.

1. Decontaminate and clean out residual uranium oxide powder from processing equipment.

2. Transfer all concentrated contaminated nitric acid solution to PUREX for disposal.



Predominant Chemical Reaction:

$$12(HNO_3)+C_{12}H_{22}O_{11} \longrightarrow 12CO+6(NO+NO_2)+17H_2O$$

29305098.3

Figure G-10. Sugar Denitration Flow Diagram.

3. Remove UNH and acid solution heels from vessels and piping and flush until the heels no longer exhibit dangerous waste characteristics. The solution heels and spent flush solutions will be concentrated at the UO_3 Plant and then transferred to PUREX for final disposal with similar materials. The vessels and piping will be drained and isolated following flushing activities.

4. Eliminate UO_3 Plant waste water processing. The UO_3 Plant waste water is generated from several sources, including contaminated stormwater collected in sumps. The areas which contribute the contaminated stormwater will be decontaminated and resurfaced as necessary; following this activity, waste water processing will not be required.

5. Decontaminate and stabilize contaminated areas.

6. Shut down steam, water, heating, ventilation, and air conditioning, fire protection, and electrical systems.

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