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				Decommissioning Long Range				
				Plan				

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6. Author

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7. Abstract

This report outlines the basic steps required to initiate the decommissioning of a major facility.

Rough Order of Magnitude cost estimates and a schedule are also given. The information given herein is based upon decommissioning not being managed under DOE Order 4700.1 as a construction project.

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9. Impact Level 4

10. RELEASE STAMP

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REDOX AND U-PLANT DECOMMISSIONING LONG RANGE PLAN

D. R. Speer

January 1992

Westinghouse Hanford Company
Post Office Box 1970
Richland, Washington

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REDOX AND U-PLANT DECOMMISSIONING LONG RANGE PLAN

1. INTRODUCTION

The Reduction Oxidation (REDOX) Plant and U-Plant facilities are surplus fuel reprocessing facilities in the 200 West Area. These plants have been idle and surplus for more than 20 years and are currently scheduled for decommissioning starting in fiscal year (FY) 2002 and FY 2004, respectively. The decommissioning of these facilities is a major effort and must be approached in a logical manner consistent with the remediation and stabilization of the 200-RO-3 (S Plant Aggregate Area) and 200-UP-2 (U Plant Aggregate Area) Operable Units as defined by the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement).

2. BACKGROUND

REDOX is 464½ feet long, 82½ feet wide, and 131 feet tall and is in generally good condition with minor spalling of the walls just below the roof. The building is divided into a canyon area and a silo area. The canyon extends 23 feet below and 60 feet above grade and consists of nine process cells arranged in two parallel rows running east-west, separated by a pipe tunnel. Concrete shielding walls, 5 feet thick, are located on the north and south faces. Concrete walls, 1½ feet thick, separate the cells from the pipe gallery. Process cells are separated by 4½-foot thick concrete walls.

The REDOX silo, located on the west end of the building, is 83½ feet by 41 feet by 131 feet. The silo is divided in two sections with the western part being the operating areas and the eastern part containing the chemical extraction columns.

The REDOX complex also includes several ancillaries as follows:

291-S	Exhaust building
291-S-1	Main stack
292-S	Jet Pit House
296-S-1	Stack
296-S-2	Stack
296-S-4	Stack
296-S-6	Stack
296-S-12	Stacks (East and West)
2711-S	Stack Gas Monitoring building
2718-S	Sand Filter Sampler building
276-S	Solvent Handling building
276-S-141	Solvent Storage Tank
276-S-141	Solvent Storage Tank

The U-Plant Building is a reinforced concrete canyon-type building with outside dimensions of 810 feet by 66 feet by 77 feet (51 feet above grade). The building is divided lengthwise into a gallery side and a process canyon side by a 5- to 9-foot thick concrete wall that runs the length of the building. The gallery side is 14 feet wide and has four floors. From bottom to top, these are the electrical gallery, the pipe gallery, the operating gallery, and the crane gallery which is open to the process side. The process side is 37 feet wide and is divided into 40 process cells, a pipe trench, and an air tunnel. The process cells are 28 feet deep and are covered by removable concrete cover blocks 6-foot thick. Above the cells is the canyon which contains a crane for cell block removal and maintenance of cell equipment.

The U-Plant complex includes several ancillaries as noted here:

271-U	Office building and transuranic material storage
276-U	Solvent Recovery Facility
291-U	Fan house and sand filter
291-U-1	Main stack
296-U-6	Stack
296-U-10	Stack

3. PLANNING ASSUMPTIONS

1. Decommissioning will be done in coordination with and concurrent with the remediation of the 200-RO-3 and 200-UP-2 Operable Units.

2. The necessary utilities and services for a major decommissioning effort will be available in the 200 West area. This includes electricity, raw water, sanitary water, railroad access, and truck access.

3. All characterization and decommissioning work will be done with existing technologies. No basic technology development will be required as part of this decommissioning effort. Implementation and adaptation of existing technologies will be used exclusively.

4. All waste generated will be minimized and will be processed into a form suitable for recycle or final disposal.

5. The facilities are not considered "waste"; however, all material removed from the facilities will be waste and will be properly characterized for disposal.

6. The final facility configuration will be consistent with the philosophy that the 200 Areas will be a "National Sacrifice Zone" and in-place entombment will be the final decommissioning mode. This assumption may be changed upon completion of land use studies or as a result of the National Environmental Protection Act (NEPA)

process. The entombed facility will contain hazardous materials above background levels and will require a landfill closure in accordance with Resource Conservation and Recovery Act (RCRA) requirements.

7. Funding will be provided in sufficient amounts to allow for the most cost effective decommissioning to be accomplished. Therefore, the detailed planning will incorporate the most efficient schedules.

8. The boundaries of decommissioning will include the facilities and all surrounding ancillaries as well as soils that became contaminated as a result of unplanned releases from the facilities. This would conceptually include surface and subsurface contamination within several hundred feet of the plants, but would exclude soils related to waste disposal sites included in the respective Operable Units. The decommissioning would not include groundwater clean-up or any other efforts already identified in the Tri-Party Agreement.

9. Facility characterization will be done only to the extent required for completion of plans and safety analyses. This means that the initial characterization will extensively use process knowledge and will be supplemented by actual surveys and sampling and analysis. Initial sampling will consist fo hte following. Additional samples may be required as necessary to make quantitative inventory estimates with reasonable confidence.

   RADIOLOGICAL

   - Surveys with dose rate and gamma ray analysis instruments.

   - One concrete core sample in every major operating area and one sample from every major process component analyzed for total alpha, total beta, gamma emitters, and transuranics.

   HAZARDOUS MATERIALS

   - One concrete core sample in every major operating area and one sample from every major process component analyzed for expected chemicals as determined from process knowledge.

   - One tenth of the samples noted immediately above analyzed for potential chemicals as determined from process knowledge.

   PHYSICAL

   - Photos of each area of significance. This includes an overhead and a floor picture of each operating cell.

   - Ground penetrating radar survey of the perimeter and other significant areas surrounding the plants.

4. DECOMMISSIONING PROCESS

The basic steps for decommissioning major facilities such as REDOX and U-Plant are:

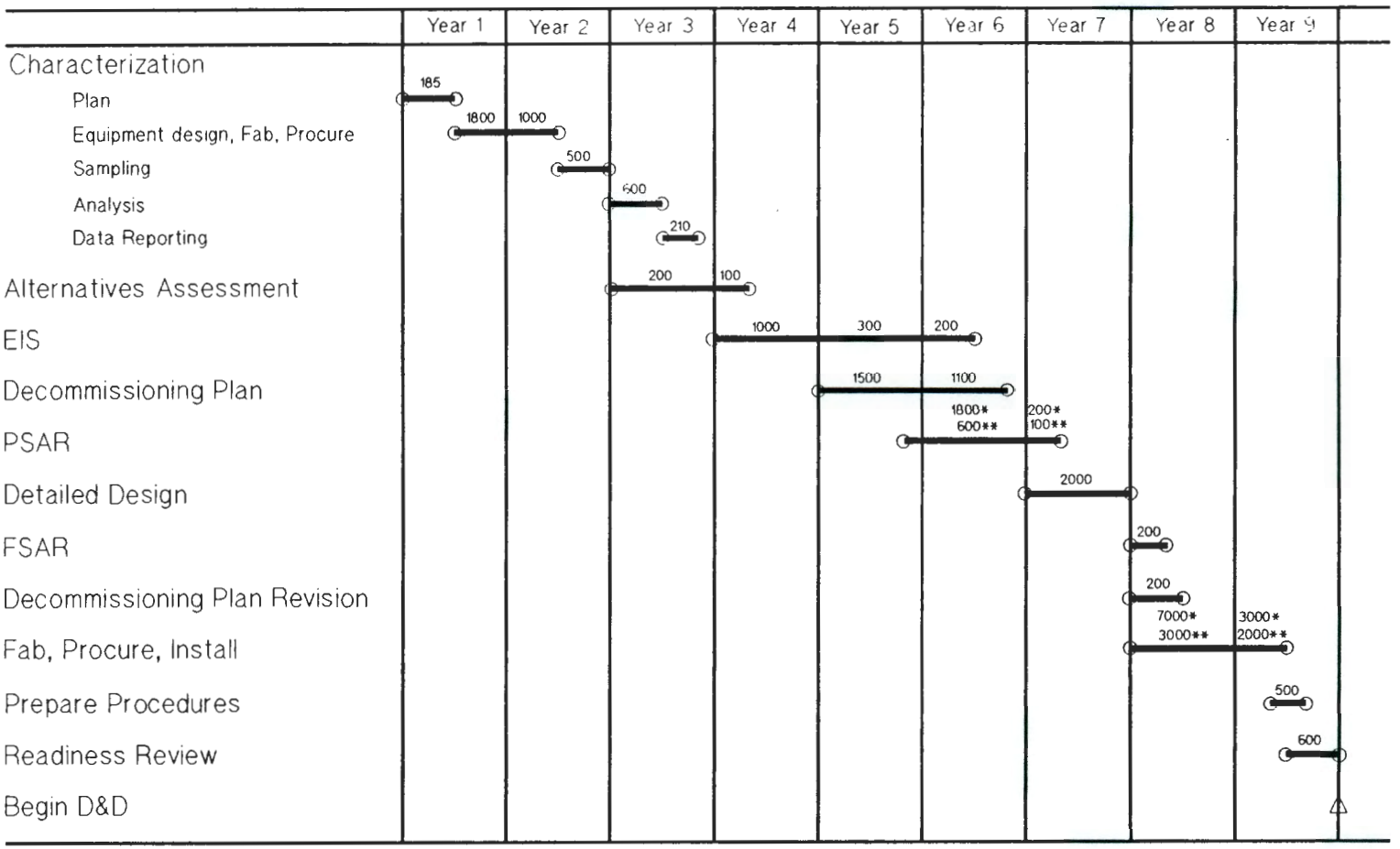
1. Characterize the facilities and surrounding areas.
2. Develop alternatives and evaluate them according to costs and risks.
3. Prepare an NEPA documentation to determine environmental risks and select an alternative. For the purposes of this document, it is assumed that an Environmental Impact Statement (EIS) will be required.
4. Prepare a detailed Decommissioning Plan.
5. Prepare a Preliminary Safety Analysis to establish a Hazard Class and evaluate risks to personnel near the facility and offsite.
6. Prepare detailed designs.
7. Prepare a Final Safety Analysis incorporating final design.
8. Revise the Decommissioning Plan if necessary based upon the Safety Analysis.
9. Procure, fabricate and install equipment necessary to begin decommissioning.
10. Prepare and issue working level procedures and safety documents.
11. Complete a Readiness Review.
12. Carry out the plans and designs.
13. Perform long-term monitoring as required.

These steps and the approximate time required to complete them are discussed below. The activities, time frames, and relative year of performance are shown on Figure 1.

4.1. FACILITY CHARACTERIZATION

The substeps on this activity are:

1. Develop and approve a characterization plan to include procedures and safety documetnation required for sampling. This task should take approximately six months.



		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
*REDOX	$ 1985K	1500	1010	1100	1800	3100	2200	7400	4100	
**U-Plant	$ 1985K	1500	1010	1100	1800	1900	2100	3400	3100	

Figure 1. REDOX and U-Plant Decommissioning Preparation.

2. Design, fabricate, and/or procure all equipment needed to complete the sampling. Prepare sampling procedures and safety documentation required for sampling. This task could take as long as one year depending on the complexity of the sampling required. Start of this task should be concurrent with the completion of task 1.

3. Perform the sampling. Six months duration.

4. Analyze the samples. Another six months.

5. Accept the analytical data, collate it, evaluate it, and issue a report. Four months.

4.2. ALTERNATIVES EVALUATION

1. Brainstorm alternatives and select the four or five most viable using Decision Making techniques. Two months.

2. Do a detailed analysis of the four or five most viable alternatives providing emphasis on risk and cost. Select the best two or three alternatives for inclusion in an Environmental Impact Statement. One year.

4.3. ENVIRONMENTAL IMPACT STATEMENT ISSUANCE

Prepare and issue an Action Description Memorandum to U.S. Department of Energy (DOE) for the determination of the eappropriate level of NEPA documentation. For the purposes of htis documnent, it is assumed that the determination will be for an EIS. Two and one-half years.

4.4. DECOMMISSIONING PLAN PREPARATION

Prepare and issue a detailed Decommissioning Plan based upon the alternative selected per the EIS Record of Decision (ROD). The Decommissioning Plan should include a Quality Assurance Plan and preliminary designs for all facilities and equipment needed to complete the facility decommissioning. This task could take one year but could start prior to the ROD. Completion should be planned for approximately six months after issuance of the ROD.

4.5. PRELIMINARY SAFETY ANALYSIS

Prepare and issue a Preliminary Safety Analysis Report (PSAR) based upon the Decommissioning Plan. This task can start several months prior to the final issuance of the Decommissioning Plan since a significant part of the PSAR is site description. In addition, dose calculations can be performed based on the overall facility characterization but they cannot be completed until the design is completed and accident scenarios have been selected. The overall time required is approximately one year.

4.6. DETAILED DESIGN

Detailed design can all be completed prior to the start of decommissioning, but a more realistic approach would be to only do that part of design required to begin and do design needed at a later date just prior to its need date based on the Decommissioning Plan schedule. This allows for minor mid-course corrections based on changing requirements and conditions. The "start design" should take approximately one year. It could start after the issuance of the Decommissioning Plan but should not be completed until well after issuance of the PSAR.

4.7. FINAL SAFETY ANALYSIS

The PSAR may need to be revised based on detailed design. If so, its revision should take no more than six months.

4.8. DECOMMISSIONING PLAN REVISION

The Decommissioning Plan may need to be revised based upon the final design and Safety Analysis. If so, its revision should take no more than four months.

4.9. FABRICATE, PROCURE AND INSTALL

This task includes the final preparations to begin decommissioning at the facility. It could take as much as 18 months.

4.10. WORKING PROCEDURES

Prepare and issue procedures and working level safety documents. This task should take approximately six months.

4.11. READINESS REVIEW

A formal Readiness Review of the magnitude required by a project of this size will take six months. It could begin prior to completion of all working level documents but cannot be completed until everything is ready.

5. STRATEGY

Decommissioning planning will be done to a high degree of detail to lessen the potential for one task impacting another. Decommissioning will be performed with Plant personnel to the extent practicable. Several major tasks

will be performed by outside contractors. These are, at a minimum, the EIS, the Preliminary and Final Safety Analyses Reports, and the final detailed design.

6. INTEGRATION WITH TRI-PARTY AGREEMENT MILESTONES

Remediation of the waste sites near REDOX and U-Plant is being planned as part of the 200-RO-3 and 200-UP-2 Operable Units as defined in the Tri-Party Agreement. The latest schedules for remediation of these Operable Units (per the Five Year Plan) shows the 200-UP-2 Operable Unit site remediation beginning in early 2002 (Figure 2). Current estimates for the time required to complete remediation are seven to ten years. This means that if the decommissioning of U-Plant is to be coordinated with Operable Unit remediation, the characterization and engineering must begin no later than 1993. Remediation of the 200-RO-3 Operable Unit is of low enough priority that no schedule has been drafted for it.

Recent proposed revisions to the Tri-Party Agreement require that an aggregate area approach be implemented in the 200 Area based on the Hanford Past Practice Investigation Strategy. This strategy combines several Operable Units into Aggregate Areas, allows for the conduct of Aggregate Area Management Studies (AAMS) which are similar to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remediation Investigation (RI)/Feasibility Study (FS) scoping studies, and thus lessens the overall amount of paperwork required to remediate those Operable Areas. The AAMS for the S-Plant aggregate area is due to be issued in March 1992. The AAMS for the U-Plant aggregate area is due in June 1992. The AAMS priority for S-Plant is higher than for the 200-RO-3 Operable unit due to the inclusion of the 241-S Tank Farms. If approved, the aggregate area strategy has the potential for accelerating the schedule for remediation of both of these areas which means that the initiation of decommissioning activities for U-Plant more important.

7. REGULATORY REQUIREMENTS

7.1. RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

RCRA establishes requirements to protect public health and the environment associated with the management and disposal of hazardous wastes. These requirements impact the management of hazardous wastes from generation to disposal ("cradle to grave"). Permits are required for any facility that treats, stores or disposes of hazardous waste. The Hanford Site is subject to all of the RCRA requirements and is currently undergoing the final permitting process.

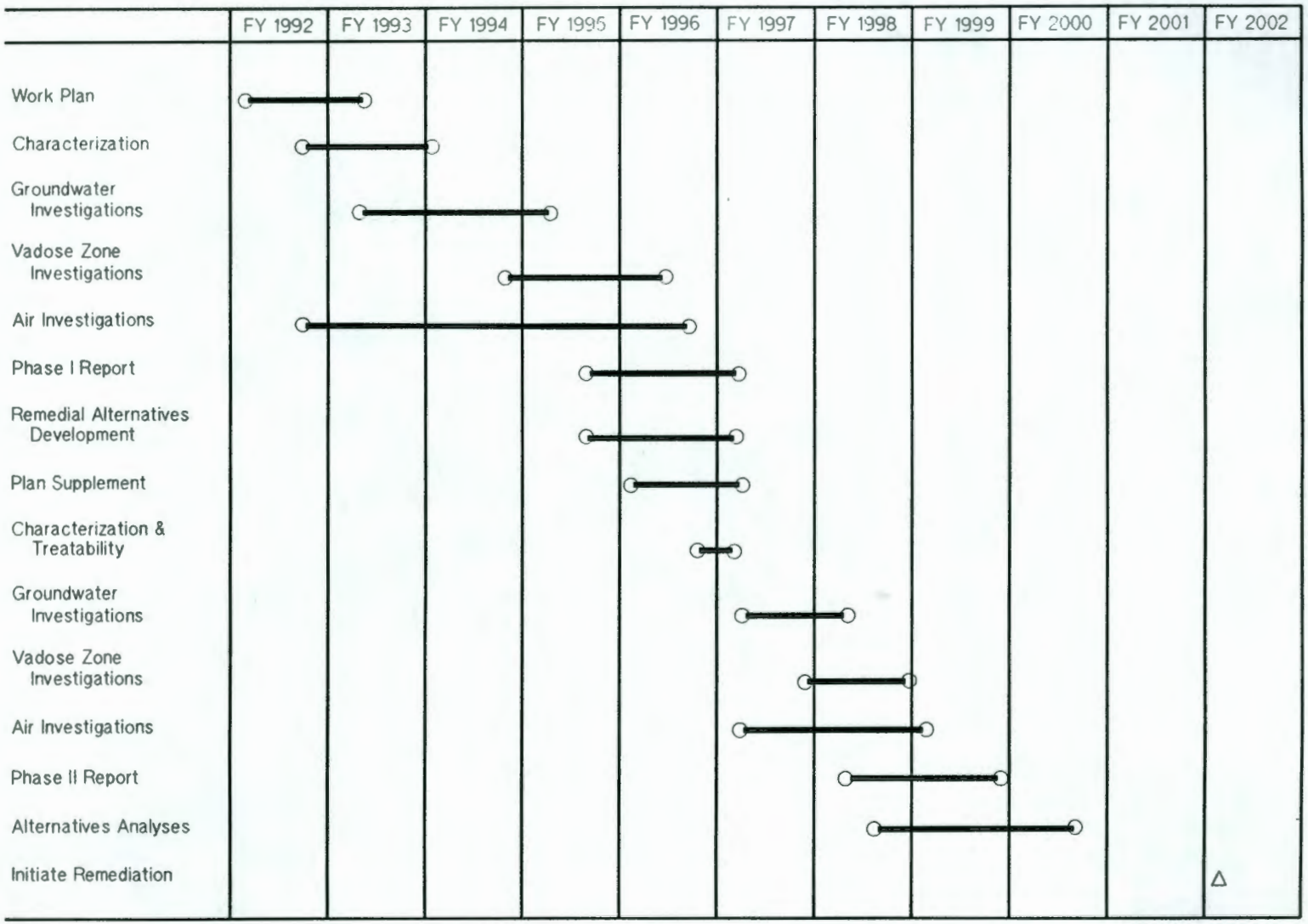


Figure 2. 200-UP-2 Draft Schedule.

Impact on D&D activities

At Hanford, all decontamination and decommissioning (D&D) activities have been thus far managed as generator type activities. Wastes that exist within the facility are considered residues and are not subject to RCRA requirements (permitting) until after they have been removed (generated) from the facility during D&D work. This has worked well during the D&D of old reactor facilities, but the D&D of processing facilities may have to be managed differently.

U-Plant and REDOX

Both of these facilities ceased operation prior to the effective date of RCRA so that RCRA would not be applicable to these facilities as long as all hazardous wastes were removed from the facilities. If hazardous wastes remain stored (i.e., in tanks) within these facilities, then it likely that RCRA treatment, storage, and disposal (TSD) requirements would apply to the D&D activities. Most significantly, a closure plan would have to be prepared and later approved by Ecology prior to many of the D&D activities commencing. The requirement of a closure plan, would also need to be included in the Tri-Party Agreement Milestone M-20. Preparation of a closure plan would add a year to the schedule and require $1 million.

As with all D&D activities, all hazardous waste generated during the activity must be managed according to RCRA requirements.

7.2. COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA)

CERCLA establishes the process for undertaking remedial action at inactive waste sites containing hazardous substances. The Act also establishes reporting requirements for releases of hazardous substances. The CERCLA remedial action process has been initiated on the Hanford Site in response to being listed on the National Priorities List (NPL). Inactive waste sites at Hanford have been grouped into 78 areas known as operable units. The purpose of the grouping is to facilitate the remediation of waste sites that are similar in characteristics.

Impact on D&D activities

U-Plant is located within the 200-UP-2 operable unit and REDOX is located within the 200-RO-3 operable unit. The plants themselves are not subject to remediation under CERCLA. The area around the two plants will undergo remediation. It may be expeditious to coordinate remediation activities within 200-UP-2 and 200-RO-3 operable units with the D&D activities at the two plants. This coordination may require that the D&D activities be incorporated into the Tri-Party Agreement.

7.3. CLEAN AIR ACT (CAA)

The CAA regulates emissions from a facility that could affect air quality. Such emissions must comply with both the performance and emission standards of the Act. The CAA provides standards for the control of the emissions source may require a prevention of significant deterioration of air quality (PSD) permit. Control of several hazardous air pollutants are required to meet the National Emission Standards for Hazardous Air Pollutants (NESHAP).

Impact on D&D activities

It is a remote possibility that D&D activities at U-Plant and REDOX might impact the existing PSD permit for PUREX and UO_3. The NESHAPs for both radionuclides and asbestos could have significant consequences for D&D activities.

7.4. CLEAN WATER ACT (CWA)

The Act regulates waste discharges into navigable waters and sets pretreatment standards for hazardous waste discharges into sewer lines that lead into publicly-owned treatment works. The CWA requires a permit and program for the discharge of pollutants from any point source into waters of the United States.

Impact on D&D activities

It is unlikely that D&D activities at U-Plant and REDOX would be impacted by the provisions of the Clean Water Act.

7.5. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

NEPA establishes broad national policy for the protection of environmental quality and provides the means for implementing that policy. All construction and cleanup projects on the Hanford Site are subject to the NEPA review process. The NEPA process must be incorporated early in the planning process.

Impact on D&D activities

All D&D activities are subject to the NEPA review process. The D&D of U-Plant and REDOX certainly could not commence without adequate NEPA documentation being in place. It is assumed that due to the size and complexity of the job, the appropriate NEPA documentation would be an EIS.

8. COST ESTIMATES

Rough-Order-Of-Magnitude (ROM) cost estimates for performing the above work are in Table 1. The estimates for characterization as well as for the design, fabrication, and procurement for facility decommissioning are subject to large changes based upon the completion of the respective plans for characterization and decommissioning. The current estimates for these activities are probably correct only by the relative order of magnitude. The remainder of the cost estimates should be more accurate since they are based upon similar activities previously completed.

Table 1. ROM Cost Estimates. (sheet 1 of 3)

	REDOX		U-PLANT	
CHARACTERIZATION				
PLAN				
3 Engineers / 6 months	$ 150K		$ 150K	
BCSR Support	20K		20K	
Reviewers (4 * 2 weeks)	15K		15K	
SUBTOTAL		$ 185K		$ 185K
DESIGN		1,200K		1,200K
FABRICATE		500K		500K
Crane Refurbishment		100K		100K
PROCUREMENT		1,000K		1,000K
SAMPLING				
200 Photos (@ 1 crew-hour)	92K		92K	
100 Concrete Samples (@ 3 crew-hrs)	138K		138K	
150 Tanks (@ 4 crew-hours)	276K		276K	
A crew includes:				
4 NPOs @ $32/hr				
1 Crane Operator @ $32/hr				
2 RPTs @ $45/hr				
1 Supervisor @ $56/hr				
2 Exempts @ $56/hr				
plus 10% for supplies				
SUBTOTAL		500K		500K
TOTAL		$ 3,485K		$ 3,485K

Table 1. ROM Cost Estimates. (sheet 2 of 3)

	REDOX		U-PLANT	
ANALYSES				
100 Concrete Radioactive	$ 40K		$ 40K	
100 Concrete Hazardous	200K		200K	
150 Tanks Radioactive	60K		60K	
150 Tanks Hazardous	300K		300K	
SUBTOTAL		$ 600K		$ 600K
DATA REPORTING				
6 people / 4 months	200K		200K	
BCSR Support	10K		10K	
SUBTOTAL		210K		210K
ALTERNATIVES EVALUATION Estimate based on actuals for 241-C-106 waste removal study		300K		300K
EIS PREPARATION Estimate based upon actuals for the Surplus Reactors EIS		1,500K		1,500K
DECOMMISSIONING PLAN Estimate based on actuals for Shippingport decommissioning		2,600K		2,600K
PSAR		2,000K		700K
DETAILED DESIGN		2,000K		2,000K
TOTAL		$ 9,210		$ 9,210

Table 1. ROM Cost Estimates. (sheet 3 of 3)

	REDOX	U-PLANT
FSAR	$ 200K	$ 200K
DECOMMISSIONING PLAN		
REV	$ 200K	$ 200K
FABRICATE, PROCURE, AND INSTALL	$10,000K	$ 5,000K
PREPARE PROCEDURES		
10 people / 6 months	$ 500K	$ 500K
READINESS REVIEW		
Readiness Review Team: 10 people/6 months	$ 500K	$ 500K
3 Operations Representatives		
3 Engineering Representatives		
1 Nuclear Safety Representative		
1 Environmental Representative		
1 Industrial Safety Representative		
1 Quality Assurance Representative		
Readiness Review Board: 4 people/3 months	$ 100K	$ 100K
1 Operations member		
1 Engineering member		
1 Safety member		
1 Quality Assurance member		
GRAND TOTAL	$ 25M	$ 18M

DISTRIBUTION SHEET

To: RCRA Closures and Facility

From: Decommissioning Engineering

Date: 02/21/92

Project Title/Work Order:

REDOX and U-Plant Decommissioning Long Range Plan

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ECN No.:

Name	MSIN	With Attachment	EDT/ECN & Comment	EDT/ECN Only
L. P. Diediker	T1-30	X		
R. G. Dieffenbacher	H4-16	X		
M. C. Hughes	L4-88	X		
R. D. Lichfield	L6-57	X		
R. L. Miller	L4-88	X		
K. S. Pedersen	S4-67	X		
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DE Files S.1.3	R2-77	X		
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Classification/Unclassified Controlled Nuclear Information	[]	[X]			
Patent - General Counsel	[]	[X]			
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Applied Technology/Export Controlled Information or International Program	[]	[X]			
WHC Program	[]	[X]			
Communications	[]	[X]			
DOE-RL Program	[]	[X]			
Publication Services	[]	[X]			
Other Program	[]	[X]			
References Available to Intended Audience	[]	[X]			
Transmit to DOE-HQ/Office of Scientific and Technical Information	[]	[X]			

Information conforms to all applicable requirements. The above information is certified to be correct.

Author/Requestor (Printed/Signature) Date

D. R. Speer

2/20/92

Responsible Manager (Printed/Signature) Date

D. R. Speer

2/20/92

Intended Audience

[] Internal [X] Sponsor [] External

INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP

Stamp is required before release. Release is contingent upon resolution of mandatory comments.

APPROVED FOR RELEASE OFFICIAL DOCUMENT KMK Date 2/24/92

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