# EDC (ENGINEERING DOCUMENT CHANGE) FORM

## Document Identification

1. Change Title:
Engineering Evaluation/Cost Analysis for the Removal of the Contaminated Waste Recovery Process Facility, Building 232-Z

Key Words:
Evaluation/Cost Analysis, 232-Z

2. Project No./Work Package No.:
N/A

3. Review Designators:
N/A ☐ D ☒ P ☐ E ☒ N ☐ R ☐ I ☐ F ☐ Q ☒
Additional Reviewers:
___ ☐ ___ ☐ ___ ☐ ___ ☐ ___ ☐ ___ ☐

8. Release:
Release CACN 119281/KA60

OCT 20 2004
DATE:
STA: 15
HANFORD RELEASE
ID: 20

| 4. Area | 5. Building | 6. Facility | 7. System No. |
|---|---|---|---|
| PFP | 232-Z | 232-Z | 232-Z |

9. USQ Required? ☐ USQ ☐ CX ☒ NA No.:

| 10. Distribution - Name | MSIN | Distribution - Name | MSIN |
|---|---|---|---|
| L. D. Brist | T1-40 | S. E. Killoy | T3-10 |
| R. C. Brunke | H8-40 | S. L. Nuest/PFP Project Files (H) | T1-40 |
| K. A. Hadley | T3-10 | C. J. Simiele | T5-51 |
| R. E. Heineman | T5-50 | T. C. Synoground | T5-30 |
| A. M. Hopkins | H8-25 | D. S. Takasumi | T5-30 |
| G. W. Jackson | H5-20 | EDMC (2H) | H6-08 |
| K. A. Jennings-Mills | T5-57 | DOE-RL (H) | H2-53 |

11. Change Description (description and reason for requested change):
Change from Draft to Final document revision. Public comments resulted in no changes to document.

## Approvals

| 12. Change Originator | TA/DA | Engineering Management/TA Manager |
|---|---|---|
| D S Takasumi<br>D. S. Takasumi 9/22/04<br>Print/Signature/Date | L. D. Brist 9/27/04<br>Print/Signature/Date | KAJennings-Mills for KASM 9/23/04<br>Print/Signature/Date |
| Title Environmental<br>C. J. Simiele 9/22/04<br>Print/Signature/Date | Title QAE, PFP-QA<br>D.R. Groth 10/11/04<br>Print/Signature/Date | Title Manager<br>DS Takasumi for T. C. Synoground 9/27/04<br>Print/Signature/Date |
| Title DOE-RL<br>W.C. Woolery 10/15/04<br>Print/Signature/Date | Title<br>Print/Signature/Date | Title<br>Print/Signature/Date |

## 13. Document Index

| Action | Number | Title | Rev (being issued) | Change Page(s) | Config Baseline |
|---|---|---|---|---|---|
| N | DOE/RL-2003-29 | Engineering Evaluation/Cost Analysis for the Removal of the Contaminated Wasate Recovery Process Facility, Building 232-Z | 0 | N/A | ☐ |

## EDC (ENGINEERING DOCUMENT CHANGE) FORM (continued)

14. Potentially Affected Documents Not Modified By This EDC:

| Document Type | Document Number/Revision | Document Owner (Organization) | Technical Authority Notified | Date Notified |
|---|---|---|---|---|
| N/A | N/A | N/A | N/A | |

Date Received for Clearance Process (MM/YY/DD) 09/27/04

# INFORMATION CLEARANCE FORM

**A. Information Category**

- [ ] Abstract
- [ ] Summary
- [ ] Visual Aid
- [ ] Full Paper
- [ ] Journal Article
- [ ] Internet
- [ ] Software
- [x] Report
- [ ] Other _____

**B. Document Number** DOE/RL-2003-29, Revision 0

**C. Title**
Engineering Evaluation/Cost Analysis for the Removal of the Contaminated Waste Recovery Process Facility, Building 232-Z

**D. Internet Address**

**E. Required Information**

1. Is document potentially Classified? (●) No ( ) Yes (MANDATORY)

(See below.)
Manager's Signature Required

If Yes _____ (●) No ( ) Yes Classified
ADC Signature Required

2. References in the Information are Applied Technology (●) No ( ) Yes

Export Controlled Information (●) No ( ) Yes

3. Does Information Contain the Following: (MANDATORY)
   a. New or Novel (Patentable) Subject Matter? (●) No ( ) Yes
      If "Yes", Disclosure No.: _____
   b. Information Received in Confidence, Such as Proprietary and/or Inventions?
      (●) No ( ) Yes If "Yes", Affix Appropriate Legends/Notices.
   c. Copyrights? (●) No ( ) Yes If "Yes", Attach Permission.
   d. Trademarks? (●) No ( ) Yes If "Yes", Identify in Document.
4. Is Information requiring submission to OSTI? (●) No ( ) Yes
5. Release Level? (●) Public ( ) Limited

**F. Complete for a Journal Article**

1. Title of Journal N/A

**G. Complete for a Presentation**

1. Title for Conference or Meeting N/A
2. Group Sponsoring _____
3. Date of Conference _____
4. City/State _____
5. Will Information be Published in Proceedings? ( ) No ( ) Yes
6. Will Material be Handed Out? ( ) No ( ) Yes

**H. Author/Requestor**
D. S. Takasumi DS Takasumi
(Print and Sign)

**Responsible Manager**
T. C. Synoground DS Takasumi for
(Print and Sign)

**I. Reviewers**

| | Yes | Print | Signature | Public Y/N (If N, complete J) |
|---|---|---|---|---|
| General Counsel | [x] | Edward V. Hiskes | EVH | (Y) / N |
| Office of External Affairs | [ ] | | | Y / N |
| DOE-RL | [x] | Stacy L. Charboneau | Stacy Charboneau | (Y) / N |
| Other | [x] | Mark A. Williams | J. Aardal for MAW, per telecon | (Y) / N |
| Other | [x] | Michael L. Spracklen | MLSpracklen | (Y) / N |

**J. If Information Includes Sensitive Information and is not to be released to the Public indicate category below.**

- [ ] Applied Technology
- [ ] Personal/Private
- [ ] Proprietary
- [ ] Business-Sensitive
- [ ] Predecisional
- [ ] UCNI
- [ ] Protected CRADA
- [ ] Export Controlled
- [ ] Procurement-Sensitive
- [ ] Patentable
- [ ] Other (Specify) _____

Information Clearance Approval

APPROVED FOR RELEASE
OFFICIAL DOCUMENT
Date 10/6/04

**K. If Additional Comments, Please Attach Separate Sheet**

A-6001-401 (12/00)

0062978

DOE/RL-2003-29
Revision 0

# Engineering Evaluation/Cost Analysis for the Removal of the Contaminated Waste Recovery Process Facility, Building 232-Z

RECEIVED
NOV 04 2004
EDMC

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

**United States Department of Energy**
P.O. Box 550
Richland, Washington 99352

**Approved for Public Release;**
Further Dissemination Unlimited

DOE/RL-2003-29
Revision 0

# Engineering Evaluation/Cost Analysis for the Removal of the Contaminated Waste Recovery Process Facility, Building 232-Z

Date Published
September 2004

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

**United States Department of Energy**
**P.O. Box 550**
**Richland, Washington 99352**

J. Aardal for M.A. Williams 9-30-2004
Release Approval Date

OCT 20 2004
DATE:
STA: 15
HANFORD RELEASE
ID:
20

**Approved for Public Release;**
Further Dissemination Unlimited

**TRADEMARK DISCLAIMER**

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy.

Printed in the United States of America

DOE/RL-2003-29
Revision 0

# Engineering Evaluation/Cost Analysis for the Removal of the Contaminated Waste Recovery Process Facility, Building 232-Z

**CONTENTS**

1.0 INTRODUCTION ..... 1
2.0 SITE CHARACTERIZATION ..... 2
2.1 GENERAL DESCRIPTION ..... 2
2.1.1 Site Access ..... 2
2.1.2 Flora and Fauna ..... 2
2.1.3 Cultural Resources ..... 2
2.2 FACILITY DESCRIPTION ..... 3
2.3 SOURCE AND NATURE OF CONTAMINATION ..... 5
2.3.1 Characterization Data ..... 6
2.3.1.2 Chemical Characterization ..... 7
2.4 STREAMLINED RISK EVALUATION ..... 8
3.0 REMOVAL ACTION OBJECTIVES ..... 9
4.0 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES ..... 10
4.1 ALTERNATIVE 1 - NO ACTION ALTERNATIVE ..... 11
4.2 ALTERNATIVES 2 AND 3 - REMOVAL ALTERNATIVES ..... 12
4.2.1 Alternative 2 - Removal and Disposal at ERDF ..... 14
4.2.2 Alternative 3 - Removal and Disposal at the LLBG ..... 14
5.0 ANALYSIS OF REMOVAL ACTION ALTERNATIVES ..... 14
5.1 EFFECTIVENESS ..... 15
5.1.1 Protectiveness ..... 15
5.1.2 Ability to Achieve Remedial Action Objectives ..... 16
5.1.3 Compliance with ARARs ..... 17
5.2 IMPLEMENTABILITY ..... 20
5.3 COST ..... 20
5.4 STATE ACCEPTANCE ..... 22
5.5 COMMUNITY ACCEPTANCE ..... 22
5.6 OTHER CONSIDERATIONS ..... 22
6.0 RECOMMENDED ALTERNATIVE ..... 23
7.0 REFERENCES ..... 24
APPENDIX A LETTER OF CONCURRENCE FROM THE WASHINGTON STATE OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION ..... A-1
APPENDIX B PLANNED ACTIVITIES FOR DEACTIVATION AND DISMANTLEMENT ..... B-1
APPENDIX C COST FOR WASTE DISPOSAL ALTERNATIVES ..... C-1
APPENDIX D ENGINEERING EVALUATION/COST ANALYSIS SUMMARY OUTLINE ..... D-1

## TABLES

Table 1. Summary of Unmitigated Seismic and Fire Assessment Based on SARAH ..... 8
Table 2. Removal Activities ..... 13
Table 3. Waste Volumes ..... 21
Table 4. Waste Disposal Costs ..... 21

## ACRONYMS

| | |
|---|---|
| ACM | asbestos containing materials |
| ANN | aluminum nitrate nonahydrate |
| ARARs | applicable or relevant and appropriate requirements |
| CA | contamination area |
| CAM | continuous air monitor |
| CERCLA | *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* |
| CFR | Code of Federal Regulations |
| CWC | Central Waste Complex |
| CX | categorical exclusion |
| DOE | U. S. Department of Energy |
| EE/CA | engineering evaluation/cost analysis |
| EPA | U. S. Environmental Protection Agency |
| ERDF | Environmental Restoration Disposal Facility |
| FY | fiscal year |
| HCA | high contamination area |
| HAER | Historic American Engineering Record |
| HEPA | high-efficiency particulate air |
| HFFACO | Hanford Federal Facility Agreement and Consent Order |
| $HNO_3$ | nitric acid |
| LLBG | Low-Level Burial Grounds |
| LLMW | low-level mixed waste |
| LLW | low-level waste |
| NCP | National Contingency Plan |
| NDA | nondestructive analysis |
| NEPA | *National Environmental Policy Act of 1969* |
| NRC | Nuclear Regulatory Commission |
| PCB | polychlorinated biphenyl |
| PFP | Plutonium Finishing Plant |
| RCRA | *Resource Conservation and Recovery Act of 1976* |
| RFETS | Rocky Flats Environmental Technology Site |
| RL | U.S. Department of Energy, Richland Operations Office |
| S&M | surveillance and maintenance |
| SAR | safety analysis report |
| SARAH | Hanford Safety Analysis and Risk Assessment Handbook |
| TBC | to be considered |
| TC | toxicity characteristic |
| TRU | transuranic |
| TSCA | *Toxic Substances Control Act of 1976* |
| TSD | Treatment, storage, and disposal |
| WAC | Washington Administrative Code |

## METRIC CONVERSION CHART

| Into Metric Units | | | Out of Metric Units | | |
|---|---|---|---|---|---|
| *If You Know* | *Multiply By* | *To Get* | *If You Know* | *Multiply By* | *To Get* |
| **Length** | | | **Length** | | |
| inches | 25.4 | millimeters | millimeters | 0.039 | inches |
| inches | 2.54 | centimeters | centimeters | 0.394 | inches |
| feet | 0.305 | meters | meters | 3.281 | feet |
| yards | 0.914 | meters | meters | 1.094 | yards |
| miles | 1.609 | kilometers | kilometers | 0.621 | miles |
| **Area** | | | **Area** | | |
| sq. inches | 6.452 | sq. centimeters | sq. centimeters | 0.155 | sq. inches |
| sq. feet | 0.093 | sq. meters | sq. meters | 10.76 | sq. feet |
| sq. yards | 0.0836 | sq. meters | sq. meters | 1.196 | sq. yards |
| sq. miles | 2.6 | sq. kilometers | sq. kilometers | 0.4 | sq. miles |
| acres | 0.405 | hectares | hectares | 2.47 | acres |
| **Mass (weight)** | | | **Mass (weight)** | | |
| ounces | 28.35 | grams | grams | 0.035 | ounces |
| pounds | 0.454 | kilograms | kilograms | 2.205 | pounds |
| ton | 0.907 | metric ton | metric ton | 1.102 | ton |
| **Volume** | | | **Volume** | | |
| teaspoons | 5 | milliliters | milliliters | 0.033 | fluid ounces |
| tablespoons | 15 | milliliters | liters | 2.1 | pints |
| fluid ounces | 30 | milliliters | liters | 1.057 | quarts |
| cups | 0.24 | liters | liters | 0.264 | gallons |
| pints | 0.47 | liters | cubic meters | 35.315 | cubic feet |
| quarts | 0.95 | liters | cubic meters | 1.308 | cubic yards |
| gallons | 3.8 | liters | | | |
| cubic feet | 0.028 | cubic meters | | | |
| cubic yards | 0.765 | cubic meters | | | |
| **Temperature** | | | **Temperature** | | |
| Fahrenheit | subtract 32, then multiply by 5/9 | Celsius | Celsius | multiply by 9/5, then add 32 | Fahrenheit |
| **Radioactivity** | | | **Radioactivity** | | |
| picocuries | 37 | millibecquerel | millibecquerel | 0.027 | picocuries |

# Engineering Evaluation/Cost Analysis for the Removal of the Contaminated Waste Recovery Process Facility, Building 232-Z

## 1.0 INTRODUCTION

This document presents an analysis of the alternatives for dispositioning the 232-Z Contaminated Waste Recovery Process Facility. The 232-Z Contaminated Waste Recovery Process Facility processed contaminated waste to recover residual plutonium through incineration and/or leaching of the scrap material. The operational history of the facility indicates that failures of equipment, as well as spills, resulted in the release of radionuclide and other contamination to the building and external soils. The facility has not been used for approximately 20 years, and the U.S. Department of Energy (DOE) has determined there is no ongoing need for the building.

The facility has a residual inventory of plutonium. A structural analysis determined the building would potentially collapse in an earthquake, resulting in a release of some portion of this inventory to the surrounding environment (Ballinger 1993). Because of the potential threat to personnel associated with ongoing maintenance, as well as the potential for a release through failure of the building envelope, the DOE has determined a non-time critical removal is appropriate to manage the risk associated with the 232-Z Facility. This decision is consistent with the requirements of the DOE and the U.S. Environmental Protection Agency (EPA) joint guidance "Policy on Decommissioning Department of Energy Facilities under CERCLA" and the Hanford Federal Facility Agreement and Consent Order (HFFACO) (Ecology et. al. 1996). HFFACO Interim Milestone M-83-40, adopted in 2002, requires the DOE to "Complete Transition and Dismantlement of the 232-Z Building". Consistent with Executive Order 12580, the DOE is the lead agency for conducting this removal action, subject to review and approval by the Washington Department of Ecology and the EPA, as required under the Tri-Party Agreement.

This engineering evaluation/cost analysis (EE/CA) reviews the alternatives considered for the removal action at Building 232-Z against the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) criteria for removals (40 CFR 300.415) and recommends a preferred alternative. Consistent with the Secretary of Energy's Policy Statement on the *National Environmental Policy Act of 1969* (NEPA) (DOE 1994), DOE Order 451.1B, Change 1, and DOE Guidance on Implementation of the DOE NEPA/CERCLA Integration Policy (DOE 1991), NEPA values have been incorporated into this EE/CA to the extent practicable.

In order to ensure the project schedule meets the Tri-Party Agreement milestone, some deactivation activities covered under this removal action may be performed under existing regulatory authority (for example, categorical exclusions under the NEPA), prior to approval of the CERCLA documentation.

## 2.0 SITE CHARACTERIZATION

This section provides an overview of the location and operating history of the 232-Z Facility as well as the sources and nature of contamination at this site.

### 2.1 GENERAL DESCRIPTION

The 232-Z Facility is located within the Plutonium Finishing Plant (PFP) Complex in the 200 West Area of the Hanford Site. The 200 West Area is located on a plateau near the middle of the Hanford Site. Highway 240 is approximately 6-km south/southwest of the PFP Complex, while the Columbia River is approximately 9 km to the north.

The 232-Z Contaminated Waste Recovery Process Facility (Incinerator) was constructed to recover plutonium from highly contaminated waste materials generated at the 234-5Z Building and the 231-Z Building. The 232-Z Building is located approximately 61 meters south of the main portion of Building 234-5Z.

#### 2.1.1 Site Access

Public access to the Hanford Site is controlled by the Hanford Patrol at the Wye Barricade on Route 4 and the Yakima and Rattlesnake Barricades on State Highway 240. All persons entering the Hanford Site are required to have badges issued by the DOE in their possession at all times when on site. Access to the PFP Complex requires additional specific approval from the DOE.

#### 2.1.2 Flora and Fauna

The area around the 232-Z Facility is predominantly disturbed land due to the construction of buildings and parking areas. What little plant community does exist is composed primarily of semiarid species common to disturbed areas, such as cheatgrass, rabbitbrush, and other non-native plant species. No plants or animals on the federal or state lists of endangered and threatened wildlife and plants are found in the vicinity of the 232-Z Facility. Additional information regarding ecological resources in the 200 Area is available in Neitzel (1999) and Sackschewsky (2002). There are no perennial or ephemeral streams in the 200 areas and there are no regulated wetlands in the 200 West Area.

#### 2.1.3 Cultural Resources

Building walkthroughs were conducted at the PFP pursuant to DOE/RL-96-77, "Programmatic Agreement Among the U.S. Department of Energy, Richland Operations Office, the Advisory Council on Historic Preservation, and the Washington State Historic Preservation Office for the Maintenance, Deactivation, Alteration, and Demolition of the Built Environment on the Hanford Site, Washington." As a result of these walkthroughs, the 232-Z Building was designated as having historic significance and recommended to be preserved for public education and interpretation through heritage tourism. However, in 1994, a Memorandum of Agreement regarding the demolition of 232-Z Building was approved by the DOE, Richland Operations Office (RL), the State Historic Preservation Officer, and Advisory Council on Historic Preservation (Nissley 1994). In accordance with the Memorandum of Agreement, a Historic

American Engineering Record (HAER) was prepared; in 1995, the U.S. Department of the Interior, National Park Service accepted the HAER. In July 2002, it was determined the planned demolition would result in an adverse effect to the 232-Z Building; however, all effects have been mitigated as outlined in the aforementioned 1994 Memorandum of Agreement (Prendergast 2002). Copies of the letter of concurrence from the Washington State Office of Archaeology and Historic Preservation and the memorandum of agreement from the Advisory Council of Historic Preservation are included as Appendix A.

## 2.2 FACILITY DESCRIPTION

The 232-Z Building was designed and built during the late 1950s and early 1960s to house a combustible waste incinerator known as the Contaminated Waste Recovery Process Facility, also known as the PFP Incinerator Building. The facility is an element of the PFP Complex, located in the 200 West Area of the Hanford Site. The building is approximately 11.3 meters wide and 17.4 meters long. It is a single story over the process and storage areas, and two stories over the service areas at the north end. The walls are of cinder block construction and the two roofs are respectively 4.6 meters and 5.8 meters above grade. They are constructed of concrete over metal decking with insulation and built-up asphalt covering.

The 232-Z Building is divided into functional areas, including the Process Room and Chemical Mix Rooms, and the Storage, Change, Ventilation Supply, and Electrical Rooms.
From 1961 until 1973, the facility was used to recover plutonium through incineration of plutonium-contaminated combustible scrap materials and leaching of non-combustible materials. Electric elements maintained the temperature in the combustion chamber at a level (700 to 800°C) to ensure incineration of the feed materials. The DOE closed the 232-Z Facility in 1973. From shutdown of the incinerator until 1983, the facility was used for waste segregation activities. The facility was placed in retired inactive status in 1984. A deactivation activity initiated in 1984 resulted in the removal of three large gloveboxes.

Building 232-Z was designed to ensure confinement of radioactive materials; ventilation and filters have been maintained at the facility for contamination control since shutdown. During operations, off-gases produced from combustion were routed to scrubber equipment and a filter system located in the scrubber cell. The gases exited the scrubber cell and passed through high-efficiency particulate air (HEPA) filter boxes before exiting the building through underground ductwork. Gases originally were routed through the exhaust stack in the 291-Z Facility. In 1990, the DOE installed a new, independent ventilation system inside and along the outside, east wall of the 232-Z Building.

Various activities have been performed to support deactivation of the facility, beginning with the removal of the wall-mounted combustible gas analyzer. Additional activities have included cleanout and removal of gloveboxes (approximately 50 percent), removal of acid digestion process equipment, installation of blanks in hoods, relocation of continuous air monitors (CAMs), and wiring modifications.

A seismic analysis of the facility indicated that potential onsite consequences from an earthquake would exceed risk-acceptance guidelines (HNF-SD-CP-SAR-021). Approval was received in

1993 to reduce the source term and a portion of the residual plutonium was removed. The remaining plutonium inventory of the building resides primarily in the gloveboxes and process hood ventilation system. The chemical form of the material is assumed to be plutonium oxide. Based on process activities conducted in the facility and previous facility inspections, it is assumed the material exists as agglomerated particles and slag bound to duct surfaces.

Since 1994, the 232-Z Facility has been in a safe and stable surveillance and maintenance (S&M) mode with controlled access and a negative pressure.

The building currently houses the major components of the incinerator; all of the equipment and chemicals related to the leach process have been removed. Remaining enclosures include the following:

- Scrubber cell
- Filter boxes 1 and 2
- One multi-section glovebox (sometimes referred to as the incinerator) made up of three sections. These sections are identified as separate gloveboxes as follows:
  - Feed glovebox
  - Incinerator glovebox
  - Ash canning glovebox.

The process equipment within the incinerator glovebox and the cell that housed the offgas scrubber are inactive, and have been isolated and partially removed. The building ventilation supply and exhaust systems, including the HEPA filtration systems, are in operation, although sections of the exhaust ventilation system piping, connecting hoods, and gloveboxes have been isolated and removed. Safety systems, such as the fire detection and alarm system, CAMs on the HEPA filtered exhaust (with audible and visible alarms), and instruments for measuring differential pressure between ventilation zones are operable. Building surveillance is provided at least once every 12 hours for detection of abnormalities. Ceiling heaters provide heat for the building.

The 232-Z Building has undergone bulk plutonium removal from the gloveboxes, hoods, and associated ventilation exhaust piping in preparation for ongoing deactivation activities. All remaining above-grade ventilation ducting and the main process enclosures (e.g., the incinerator glovebox and scrubber cell) have undergone non-destructive analysis (NDA).

## 2.3 SOURCE AND NATURE OF CONTAMINATION

As noted previously, the 232-Z Facility included two primary operations – leaching of plutonium from materials not suitable for burning and incineration of combustible materials for plutonium recovery. Leaching operations included washing in nitric acid ($HNO_3$) and aluminum nitrate nonahydrate (ANN), and rinsing. The leach solution was removed from the building for further processing. Incineration steps included sorting of incoming waste materials to determine what was appropriate for burning. Feed was sent through a chopper into a bin, which discharged the material onto a rubber belt and, from there, to a continuous wire mesh conveyor into the electrically-heated furnace. Ash was collected in a one-quart capacity steel food-pack type can, packaged out after cooling, and stored for future reclamation of plutonium.

Surveys of the 232-Z Facility have indicated radionuclide contamination in a significant percentage of the building (Ehlert 1999). The following documented incidents illustrate representative, potential sources and locations of contamination (HNF-EP-0924).

- In June of 1962 the scrubber cell pump failed and spilled contamination throughout the facility. Releases in the scrubber cell have contaminated the interior cinder block wall of the facility. Radionuclides leached through the wall to the exterior, southwest corner and contaminated soils immediately adjacent to the building. A gravel cover was placed over the contaminated area to prevent potential exposure and dispersion. The wall itself was painted over to fix any surface contamination

- On January 25, 1963 a routine radiation survey of the incinerator glove box revealed loose contamination on an electrical junction box. An investigation found that vertical furnace flues were cracked where they were welded to the burning chamber and contaminated the process room.

- Pressurization of the ash-discharge chamber resulted in ashes and clinkers being discharged onto the glovebox floor.

- On July 5, 1965 a fire involved four gloveboxes and the plastic bag port, spreading contamination within the building and into exhaust filters, contaminating the process room.

- In July 1965 vertical flues broke loose from the burning chambers resulting in virtually complete separation of flues from the chambers, contaminating the process room.

Releases associated with the change out of floor filters have contaminated underground ductwork, as well as sections of the ducts in the 291-Z Exhaust Building.

### 2.3.1 Characterization Data

The key data categories for the 232-Z Facility include the amount and location of radiological contamination (fixed and smearable), and the amount/location of chemicals/hazardous substances. The following sections provide an overview of the available characterization information.

#### 2.3.1.1 Radiological Characterization

The constituent of greatest concern and the primary contaminant of concern at the 232-Z Facility are the residual radionuclide inventory in ductwork and gloveboxes, as well as any contamination resulting from spills or other releases within the facility. A review of operations, process tests, and cleanup activities discussed in the hazard evaluation for the facility (HNF-11992) revealed the following information relative to holdup material:

- Holdup in the incinerator is likely in the form of thick slag coatings on the combustion chamber walls;
- Holdup in the cyclone separator is likely in the form of fixed material; and
- It is possible that ash remains inside the glovebox and ductwork.

The holdup material is all transuranic (TRU) and less than 10% $^{240}$Pu, consistent with the materials being processed and recovered during 232-Z facility operations (HNF-SD-CP-SAR-021, Table 9-31). The radionuclide mix (HNF-SD-CP-SAR-021, Table 9-44, and WHC-SD-CP-TI-190, Table 3-2) is as follows:

**Radionuclide Mix for Holdup Material**

| Isotope | Wt. Fraction |
|---|---|
| $^{238}$Pu | 0.0001 |
| $^{239}$Pu | 0.9370 |
| $^{240}$Pu | 0.0605 |
| $^{241}$Pu | 0.0020 |
| $^{242}$Pu | 0.0003 |
| $^{241}$Am | 0.0015 |

The latest PFP Radiological Survey Report, Number Z-020715013 (Fluor 2002a), indicates the process room dose rates vary from <0.2 mr/hr to 3.5 mrem/hr gamma and up to 0.2 mr/hr neutron. The room is posted as a contamination area (CA) with two high contamination areas (HCAs). One HCA is located on the east-side of the glovebox and the other HCA is located on the southwest side of the ash canning glovebox. The removable contamination levels in the CAs include the following values.

- 1,050 dpm/100cm$^2$ on the walls in the southwest corner

- 700 dpm/100cm$^2$ along the south and west walls and floor
- 700 dpm/100cm$^2$ along the north end of the glovebox
- 700 dpm/100cm$^2$ on the green taped pipe chase south of the HCA located on the east side of the glovebox
- <180 dpm/100 cm$^2$ for the remaining portions of the room

The HCA on the southwest side of the ash canning glovebox has loose contamination levels to 42,000 dpm/100cm$^2$ alpha, and the HCA on the east side of the glovebox has loose contamination on the scaffolding to 20,000 dpm/100 cm$^2$.

The scrubber cell located in the southwest corner of the building is segregated from the room air space. The scrubber cell has undergone a limited amount of decontamination and deactivation, but remains an airborne radioactivity area. Access to this area requires supplied breathing air and two layers of personal protective equipment.

This survey information provides a snapshot in time and is an indication of the starting conditions. Work to prepare the glovebox for process equipment removal will potentially reduce the values reported in the above survey. Radiological controls and surveys will be maintained throughout the deactivation and dismantlement activities.

#### 2.3.1.2 Chemical Characterization

During operations, chemicals were used to facilitate two major unit operations. A mixture of $HNO_3$ and ANN was used in the leaching operation within Leach Hoods #1 and #2. The second unit operation involved an offgas scrubber where a counter-current flow, 10% sodium hydroxide-water-urea solution, removed particulate and cooled the offgas before the offgas entered a series of HEPA filters. Previous deactivation activities have removed Leach Hoods #1 and #2, along with the $HNO_3$ and sodium hydroxide bulk storage tanks, and a portion of the scrubber equipment. Process chemicals are not expected to be encountered during the removal action, but are identified here to ensure they are considered during planning activities. A very small amount of the process solutions might be encountered during deactivation activities.

Aside from process chemicals, based on personnel interviews and process knowledge, it is anticipated that other hazardous substances will be encountered. Asbestos, lead, and polychlorinated biphenyls (PCBs) in paint and light ballasts will be packaged to meet Hanford Site Solid Waste Acceptance Criteria (HNF-EP-0063) and dispositioned via the appropriate, existing and approved waste disposal pathways.

Historical reports indicate that leaded rubber gloves and other assorted metal pieces were incinerated in the facility. This suggests that oxides of the metals could be present in any ash that remains. A waste designation for disposal of ash has assigned the toxicity characteristic (TC) metal codes for barium, cadmium, chromium, and lead to the ash waste. The heat of incineration would have destroyed any organic constituents that might have been included in the

feed material. In addition to ash, as noted in the previous paragraph, there are miscellaneous construction materials present that pose potential concerns for personnel safety and waste management. These include, for example, cement blocks, structural steel, drywall, plasterboard, and various components of the facility's utilities and infrastructure. Some of these same constituents could require designation of debris as mixed waste.

## 2.4 STREAMLINED RISK EVALUATION

The primary risk associated with this facility in its current configuration is due to the radiological inventory. Existing safety analyses that have been performed for the 232-Z Facility, while not prepared specifically to support a risk analysis, provide an overview of the potential dose to site workers and the public from a possible release. Scenarios from the most recent safety analysis (HNF-11992) were used to provide a qualitative analysis of the risk from the facility.

Studies have indicated that there is a potential for a release to the environment due to structural failure brought on by earthquake, wind, storms, etc, as well as ongoing exposure to site personnel. The safety analysis for 232-Z (HNF-11992) documents various accident scenarios using the methods and values from the Hanford Safety Analysis and Risk Assessment Handbook (SARAH) (HNF-8739). Two scenarios are presented in the 232-Z Safety Analysis (HNF-11992) for seismic and fire conditions to assess the maximum potential consequence of an unmitigated release. These releases serve as bounding cases.

The maximum inventory used in the bounding scenarios concluded that consequences to the hypothetical 100-meter onsite individual, the maximum onsite worker in 216-Z-9 (outside the fence, approximately 311 meters to the east/northeast of the 232-Z Facility), and the offsite receptor are below minimum guidelines that would require an evaluation to determine whether controls are required. These results correspond to "low" consequences in Garvin (2003) (Table 1). Garvin (2003) provides Hanford Site-specific hazard categorization based on DOE (1992).

**Table 1. Summary of Unmitigated Seismic and Fire Assessment Based on SARAH**

| **Unmitigated Seismic** | | | |
|---|---|---|---|
| | **100 meter** | **Onsite** | **Offsite Public** |
| Dose (rem) | 4.48 | 1.72 | 9.25E-03 |
| Min. Guideline (rem) | 25.0 | 25.0 | 1.0 |
| **Unmitigated Fire** | | | |
| | **100 meter** | **Onsite** | **Offsite Public** |
| Dose (rem) | 5.7E-01 | 2.2E-01 | 1.16E-03 |
| Min. Guideline (rem) | 25.0 | 25.0 | 1.0 |

The Offsite Public dose was compared to the emissions of radionuclide standards in 40 CFR 61.92. The Code of Federal Regulations (CFR) standard indicates the DOE shall not exceed those amounts that would cause any member of the public to receive an effective dose equivalent of 10 mrem/yr (1.0E-2 rem/yr). In the worst case unmitigated scenario the offsite public dose is below the standard.

The safety analysis did not evaluate potential ecological receptors in the vicinity of the building. As can be seen from Table 1, inventory released from a seismic event will contaminate surrounding soils. Although the ecological studies indicate there are no receptors in the immediate vicinity of the building, a collapse could result in aerial dispersion of radionuclides reaching receptors beyond the PFP fence line. In addition, although a remote possibility, a release to soils could potentially provide a pathway for migration to groundwater. Any release to soils would require remediation to prevent future environmental exposure.

## 3.0 REMOVAL ACTION OBJECTIVES

The goal of the removal action is to reduce/eliminate the risk presented by the residual radionuclides in the building based on potential structural failure. This risk is associated with the ongoing exposure to personnel conducting S&M activities from chemical, radiological, and physical hazards as well as to the general public and the environment from possible releases of contaminants due to building degradation or collapse. Specific removal action objectives include the following.

- Reduce/eliminate the inventory of hazardous/radioactive substances within the 232-Z Facility.
- Protect personnel from physical, chemical, and radiological hazards posed by the facility.
- Reduce or eliminate the potential for a release to the environment.
- Safely manage (treat and/or dispose) of waste streams generated through the removal action.
- Be consistent with future remediation plans for the 200 Areas.
- Prevent adverse impacts to cultural and natural resources.
- Reduce or eliminate the need for future S&M activities.

The DOE is in the process of developing endpoint criteria for the PFP Complex, which will establish the appropriate standards for long-term S&M after buildings have been dismantled. In accordance with TPA milestone M83-22, FH and the RL have completed an evaluation of how to organize and group the scope of work in decommissioning the PFP. Based on this review, FH and the RL have concluded that four separate EE/CAs would be most supportive of timely accomplishment of the PFP transition work scope. This approach will assure final remediation alternatives for all underground areas below the PFP are evaluated collectively and consistently. The evaluation of removal action alternatives throughout PFP will be consolidated into one EE/CA to be completed prior to the PFP Decommissioning project closeout to take full advantage of the process history and staff knowledge available in the facility. Consistent with this approach, the EE/CA for Building 232-Z will not seek to remediate any of the underground structures or utilities associated with this facility. Underground ductwork between Building 232-Z and the 291-Z Facility will be evaluated through survey techniques to determine the extent of contamination in this structure. The drain line that extends from Building 232-Z to the 241-Z waste treatment facility will be evaluated for standing liquids. If liquids are found, they will be removed, characterized, and disposed of through the CWC. There are no other below grade structures attached to this building; the structure was constructed as slab-on-grade.

To ensure there is no exposed radiological contamination, the current approach will be to characterize and then cover the remaining concrete slab with a contamination fixative (e.g., concrete cap) suitable for long term exposure to the weather. The objective for this removal

action will be to attain an end point consistent with the end point criteria strategy for the PFP. No surface soil contamination related to operations at the 232-Z Facility will remain exposed. To facilitate compliance with the schedule for accelerated cleanup and achieving the M-83-40 Milestone for the 232-Z Facility, some of the activities in support of these objectives may be accomplished under existing regulatory authorities prior to regulator approval of the CERCLA removal action evaluated in this EE/CA.

## 4.0 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

The 232-Z Facility is the first nuclear facility in the PFP Complex scheduled to be dismantled as part of the accelerated cleanup of the PFP Complex. The DOE has identified the following alternative actions for consideration through this EE/CA.

Alternative 1 - No Action - The building will be left standing, as is, and S&M activities will continue.

Alternative 2 - Dismantle and remove the building and dispose of the debris and other waste at the Environmental Restoration Disposal Facility (ERDF) on the Hanford Site.

Alternative 3 - Dismantle and remove the building and dispose of the debris and other waste at the low-level burial grounds (LLBG) on the Hanford Site.

**Common Elements of Waste Management** - With the exception of the No Action Alternative, each of the alternatives will result in generation of waste. The majority of the contaminated debris is expected to be designated as low-level waste (LLW); however, small quantities of low-level mixed waste (LLMW), dangerous waste, and TRU waste may be generated. Applicable or relevant and appropriate requirements (ARARs) for waste management are discussed in Section 5.1.3.

Viable disposal options for LLW and LLMW at the Hanford Site are the ERDF and the LLBG. The ERDF is a landfill located in the 200 West Area of the Hanford Site that was specifically designed and constructed as an isolation structure for long-term disposal of Hanford Site remediation wastes. Construction and operation of the ERDF were authorized via a CERCLA Record of Decision (EPA et al. 1995), and disposal of waste generated during demolition activities was authorized by the ERDF Explanation of Significant Difference (EPA et. al. 1996). The ERDF is a highly engineered structure designed to meet *Resource Conservation and Recovery Act of 1976* (RCRA) minimum technological requirements for landfills, including standards for a double liner, a leachate collection system, leak detection, and final cover. The LLBG are located in the 200 East and 200 West Areas of the Hanford Site and are used for disposal of a variety of Hanford Site radioactive wastes. The LLBG include unlined trenches with no leachate collection. In addition, two lined trenches in the 200 West Area can accept LLMW. At closure, all trenches will be provided with a final engineered cover consistent with the appropriate regulatory standards.

TRU waste is defined by DOE Order 5820.2A as any waste, regardless of source or form, that is contaminated with alpha-emitting TRU radionuclides with half-lives greater than 20 years and in

concentrations greater than 100 nCi/g of the waste matrix. TRU waste will be placed in interim storage at CWC and will be shipped to WIPP in accordance with the schedule established for completing remedial actions at Hanford. It is anticipated that all TRU waste will have been removed before the proposed removal action is initiated.

Mixed waste will be managed in compliance with the requirements for both dangerous waste (*Washington Administrative Code* [WAC] 173-303) and radioactive waste (10 CFR 61). Treatment may be required in order to meet disposal facility waste acceptance criteria. Treatment may include stabilization or other readily available treatment methods. Where treatment is necessary but unavailable on the Hanford Site, approval must be obtained from the EPA to ship waste to an offsite temporary treatment, storage, and disposal (TSD) facility for treatment and disposal (40 CFR 300.440). Packaging and transportation requirements for waste generated will be identified and implemented prior to movement of any wastes. Any offsite facility to which dangerous wastes would be sent will first meet all the RCRA administrative and substantive requirements. Any offsite shipment of waste will comply with appropriate U.S. Department of Transportation requirements. Any offsite shipment of waste that contains radioactive constituents (i.e., is not "free-released") must be shipped to a DOE or U.S. Nuclear Regulatory Commission (NRC) licensed facility.

For nonradioactive oils, the preferred strategy is to manage the oil as a recyclable material in accordance with the Hanford Site used oil program. Dangerous waste oils that cannot be treated to meet waste acceptance criteria may be shipped to an offsite TSD facility.

Uncontaminated material is not anticipated to be generated in any significant quantities; however, if it is, it will either be disposed to a RCRA subtitle "D" landfill, recycled, or used as clean fill, as appropriate.

If accountable nuclear materials are discovered, this material will be transferred to the Project Hanford Management Contractor for disposition.

The following sections describe the removal alternatives.

## 4.1 ALTERNATIVE 1 - NO ACTION ALTERNATIVE

For purposes of this EE/CA, the No Action Alternative consists of continued S&M of the 232-Z Facility in accordance with the PFP procedures and standards until such time as the facility is finally dispositioned. S&M programs ensure the systems or equipment important to safety of personnel, environmental protection, and continued operations will remain functional. The presence of radioactive inventories and contamination mandates the DOE maintain ventilation in contamination zones, exhaust monitoring, and fire detection and/or protection equipment until such time as these features are no longer required.

Surveillance is provided on a once-per-shift basis to evaluate operating systems and to ensure stable radiological conditions. This will become more important as deactivation activities are increased and facility conditions change more frequently. Maintenance is provided to the

ventilation, lighting, and fire detection system in accordance with the PFP standard practices and as required by the air-operating permit.

Contaminated materials and surfaces will remain and S&M activities may generate some limited volume of waste. These materials will be managed according to currently applicable requirements. As the building continues to age, it is anticipated the structure will deteriorate and actions required to maintain safe and environmentally protective conditions will increase. The building will be removed at some point in the future as part of the overall decommissioning planned for the PFP Complex. For purposes of this EE/CA, the 2035 estimated date for completion of Central Plateau activities was used as a worst-case end date. The estimated costs associated with this alternative currently are $400,000 per year for S&M; with a start date of 2003; 32 years of S&M would result in a cost of $12,800,000. This cost is exclusive of any upgrades or other required significant maintenance costs.

## 4.2 ALTERNATIVES 2 AND 3 - REMOVAL ALTERNATIVES

Since it was shut down, the 232-Z Facility has been partially deactivated through removal of miscellaneous process equipment and radionuclide inventory. Under the removal alternatives described in this EE/CA, the remaining contaminated equipment is to be removed, the building will be decontaminated and stabilized, and then dismantled. Appendix B provides an overview of the deactivation and dismantlement processes as currently planned. Completion of the removal action will eliminate the risk associated with the residual inventory in the building. Some minor level of exposure risk may remain in contaminated areas of the slab that will remain after building dismantlement. As noted in Section 3.0, once building dismantlement is complete, penetrations in the slab will be sealed and the slab itself will be covered with a fixative to eliminate the potential for exposure.

Deactivation activities are focused on removing the majority of the residual radioactive material and decontaminating the remaining materials to minimize the waste that requires special handling (i.e., TRU waste). These removal alternatives will also include dismantling the remainder of the incinerator and the ash separators (cyclone separators), followed by removal of the feed glovebox, the incinerator glovebox, the ash canning glovebox, the scrubber, and associated HEPA filters and ductwork. Once these components have been removed, the building is expected to contain only a minor percentage of the radionuclide inventory currently present. The remainder of the building contents (conduit, ventilation equipment and piping) will then be removed preparatory to or as part of building dismantlement. After process equipment removal, the building will be dismantled and disposed of as LLW. The radiological content of the structure will be well characterized and controlled, and the principal hazards will be related to common industrial demolition processes and dust generation. Industrial safety control of airborne hazards will be coordinated with radiological contamination control to ensure contamination is not spread and workers are protected. These hazards will be equivalent under either of the removal options. Table 2 identifies the activities that are currently planned as part of the proposed removal action.

The current estimate of waste, including building debris, which will be generated from the removal action is approximately 260.4 $m^3$. This will include, for example, process equipment,

ductwork, electrical equipment, structural materials, and personal protective equipment generated by workers. Building debris and waste will be disposed at an approved disposal facility. The majority of the material generated through the removal action is anticipated to be contaminated and designate as LLW. Some percentage of this material may also contain regulated hazardous or dangerous waste constituents, thus requiring designation as LLMW. Disposal options for the LLW and LLMW materials at the Hanford Site include the ERDF and the LLBG. Wastes shipped to the disposal sites must comply with the land disposal restrictions (40 CFR 268), as well as the relevant waste acceptance criteria for the disposal facility. Any materials designated as TRU waste will be managed in accordance with the DOE requirements, which cover waste packaging, shipping schedules, and compliance with WIPP requirements. Because this is the only potential pathway for TRU waste, management of TRU materials will not be evaluated further in this EE/CA. The majority of the TRU materials will be removed under existing regulatory authorities prior to commencing the proposed Removal Action under CERCLA.

**Table 2. Removal Activities**

| |
|---|
| 232-Z GloveBox Removal (including Feed, Incinerator, and Ash Canning) |
| 232-Z Scrubber Cell - Decon/Remove Process Equipment |
| 232-Z Process Exhaust Equipment Removal |
| 232-Z Filter Boxes - Decon/Remove Process Equipment |
| 291-Z Duct Isolation - Decon/Remove Process Equipment |
| 232-Z Downstream of Filter Box-Decon/Remove Equipment |
| 291-Z Deact Utilities/Inactive Duct Isolation |
| 232-Z/291 Exhaust Building - Inactive Exhaust Duct Removal |
| 232-Z Ventilation - Deactivate Inactive Duct |
| 232-Z Characterize Ventilation Duct |
| 232-Z Structural Equipment Removal – Fans/Duct/Stack |
| Final 232-Z Survey-Pre Dismantlement |
| 232-Z Structure Dismantlement |
| 232-Z Structure-Post Dismantlement |

Although the majority of the activities proposed for this removal action will occur in the 232-Z Facility, a portion of the project scope is to remove an inactive section of a 232-Z duct located inside the 291-Z Exhaust Building. In addition, below ground ductwork between the 232-Z Facility and the 291-Z Exhaust building will be surveyed, characterized for residual radioactive contamination and structural integrity, and isolated, but are not planned for removal as part of this activity. Appropriate mitigation actions may be applied pending final disposition (e.g., decontamination, in-situ stabilization). The below-ground ducts will be remediated, as

appropriate, as part of the future overall process for the PFP closure. Residual soil contamination outside the southwest corner of the 232-Z Building will be excavated and disposed of if necessary to allow access to this part of the building for planned D&D activities. In general, soil remediation will be addressed as part of follow-on past practice/spoil contamination remedial activities; there is no intention to remediate the soils adjacent to the building as part of this EE/CA.

In preparation for deactivation activities, housekeeping, assays, preventive maintenance, minor decontamination, and reactivation of gloves to allow limited use of gloveboxes to support this removal action will occur. These activities are within the scope of existing, approved site wide categorical exclusions (CXs) and are, therefore, not included in the scope of this removal action. These activities will commence in fiscal year (FY) 2003.

The proposed methods for removing residual contamination from equipment/systems and for removing equipment will be similar to those described in the PFP Stabilization Final Environmental Impact Statement (DOE 1996). Both direct-contact and remote technologies/ techniques may be used. These include laboratory analyses and NDA; chemical, brushing, washing, scrubbing, vacuum cleaning, and abrasive jetting; and using nibblers, shears, circular saws, and potentially a remote-operated laser. These methods are in use throughout the industry and the DOE Complex today. The most appropriate, proven method will be used for a particular activity, based on the judgment of the responsible project management.

The following sections describe the two removal alternatives.

### 4.2.1 Alternative 2 - Removal and Disposal at ERDF

Alternative 2 consists of building deactivation followed by dismantlement of the structure with disposal of building debris and waste at the ERDF. Upon completion of deactivation activities, the structure and any remaining internal components will be demolished and disposed at the ERDF. All waste will be characterized for waste designation prior to shipment to the ERDF and treated, as appropriate, prior to placement in the disposal facility.

### 4.2.2 Alternative 3 - Removal and Disposal at the LLBG

All debris and other wastes generated will be characterized for waste designation prior to shipment to the LLBG and treated, as appropriate, prior to placement in the disposal trenches. On completion of deactivation activity, the structure and any remaining internal components will be demolished and disposed at the LLBG. Any LLMW that can meet acceptance criteria will be disposed in the lined trenches of the LLBG.

## 5.0 ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The following sections compare and discuss the alternatives against the National Contingency Plan (NCP) screening criteria, as identified in the EPA Guidance on Conducting Removal

Actions (EPA 1993). These criteria are listed below, along with the various issues that are listed in the guidance for consideration as part of the evaluation.

1) Effectiveness
   - Protectiveness
     - Protect public health and the community
     - Protect workers during implementation
     - Protect the environment
   - Ability to achieve removal action objectives
   - Compliance with ARARs

2) Implementability
   - Technical Feasibility
   - Availability of Resources
   - Administrative Feasibility

3) Cost

Because of the limited number of alternatives and minor degree of scope among the options being considered, the analysis of alternatives is more limited in scope than might be the case for a more complex evaluation of engineered approaches. The following sections address each of the NCP criteria sequentially and provide analyses of the individual alternatives against the criteria.

## 5.1 EFFECTIVENESS

This criterion evaluates the alternatives to determine the overall protectiveness of the approach, the associated reduction, control, or elimination of risks to human health and the environment presented from the different exposure pathways (i.e., the ability of the alternative to achieve the remedial action objectives), and how well the alternative meets ARARs. The evaluation to support this analysis was based on a qualitative assessment of the risks associated with the facility and effectiveness of the various alternatives, using as a baseline the approach that was used for the Streamlined Risk Evaluation.

### 5.1.1 Protectiveness

This aspect of the effectiveness criterion considers the effectiveness of the approach in protecting public health and the community, workers during implementation of the alternative, and the environment.

The No Action Alternative (Alternative 1) will do nothing to reduce, control, or eliminate risks to human health or the environment, beyond those controls currently incorporated in the S&M program. Contaminated equipment and structures will be left in place, resulting in ongoing, if limited, exposures to personnel involved with S&M activities. The level of S&M required likely will increase as the building continues to deteriorate. Potential risk to public health, the community, and the environment also will remain from a release associated with a structural

failure, brought on by earthquake, wind, snow load, or other causes. Without some form of containment, the building will eventually deteriorate to the point where water will likely enter the building and present a pathway for contaminants to be released to the environment. Therefore, the No Action Alternative eventually will result in an increased threat to human health, the community, and the environment. This alternative also results in ongoing exposure for site workers conducting S&M activities.

The two removal alternatives (Alternatives 2 & 3) will remove the residual radionuclide contamination to the extent practicable, thereby improving the level of protection for the public, community, and environment. Short term risk to workers will be greater than under the No Action Alternative, due primarily to physical hazards associated with construction/demolition activities. Worker protection standards will be included in the remedial action plan to minimize exposure to hazardous and radioactive materials during deactivation and dismantlement. Any loose contamination will be fixed before equipment removal or building demolition. In addition, the removal alternatives include provisions that will eliminate any risk associated with the non-radionuclide inventory. Any friable asbestos will be stabilized and/or packaged as appropriate. Lead and PCB waste will be packaged and/or treated as necessary and placed in a secured landfill, designed to contain any potential release to the environment. Once the building is removed, the long term risk to site personnel in the vicinity will be reduced.

Each of the two onsite disposal facilities provides locations that are designed to receive LLW and/or LLMW. The ERDF could be considered to provide minimally greater overall protection, in that all waste cells are lined. Only the mixed waste trenches at the LLBG are lined. All waste transferred to the LLBG would, however, meet regulatory and waste acceptance criteria for that facility and will be placed in a permitted disposal unit.

### 5.1.2 Ability to Achieve Remedial Action Objectives

As discussed in Section 3, the remedial action objectives for the 232-Z Facility are directed primarily at the reduction of risk associated with hazardous and radiological contaminants in the building. Risk reduction can be accomplished through destruction of the contaminants, reduction in the quantity of contaminants, or reducing their mobility.

The No Action Alternative (Alternative 1) does not accomplish any of these goals. Although some radionuclides will undergo reduced toxicity over time through decay, this is not a practical means for reducing risk from long-lived radionuclides or other forms of contamination such as asbestos, PCBs, or lead. In addition, exposure to workers will continue for those involved with S&M activity.

The removal alternatives (Alternatives 2 & 3) will reduce risk by eliminating the sources of potential contamination from their present location and disposing of them in a location with restricted potential for mobilization. Radionuclide contamination will be removed through decontamination, or fixed prior to removal of the substrate, as appropriate. Non-radioactive contaminants will be removed, treated if necessary to meet waste acceptance criteria, and packaged for disposal. Risk will be reduced through stabilization, as appropriate, and disposal in

a regulated waste disposal facility designed for safe storage. As appropriate, waste volume also will be reduced to minimize the volumes of waste for disposal.

Because the removal alternatives significantly reduce the risk associated with the facility, these options are more capable of achieving the remedial action objectives.

### 5.1.3 Compliance with ARARs

This criterion evaluates how well an alternative, to the extent practicable, will meet ARARs or other to be considered (TBC) criteria. Applicable requirements mean those substantive environmental requirements promulgated under Federal or State environmental law that specifically address a hazardous substance, remedial action, location, or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those standards that address problems or situations sufficiently similar to those encountered at the CERCLA site so their use is well-suited to the conditions at the site. If a requirement is relevant, it may or may not be appropriate for application at the site, depending on the conditions.

The ARARs must be followed to the extent practicable for activities performed to support the removal action. Although onsite actions are exempt from obtaining federal, state, and local permits, they must meet the substantive requirements of these regulations. Response activities performed offsite must obtain the relevant permits. TBC documents, such as non-promulgated standards and guidance, may be referenced by the project to ensure the removal action is adequately protective.

The DOE orders are not ARARs because they are not promulgated; regulations referenced within the DOE orders should be captured in the ARAR review process.

The NCP at 40 CFR 300.150 specifically mandates a worker health and safety program consistent with 29 CFR 1910.120. Although health and safety standards are not ARARs, they are discussed in this section because of their close connection and interrelationship with the risk-based drivers for removal.

The following discussion considers the potential ARARs and TBCs as they apply to the 232-Z removal action. Final ARARs will be identified in the CERCLA decision document (Action Memorandum) for this EE/CA.

#### 5.1.3.1 Waste Management Standards

Radioactive wastes are governed under the authority of the Atomic Energy Act of 1954, implemented by the NRC and the DOE. Performance objectives for land disposal of low-level radioactive waste are provided in 10 CFR 61, Subpart C. Although these regulations do not apply to DOE facilities, they are relevant and appropriate for consideration for any disposal facility that will accept waste generated through any of the alternative removal actions. Under all of the alternatives, all LLW and LLMW will be disposed of in either the LLBG or the ERDF, which are managed under standards that are equivalent to those established by the NRC. Radioactive wastes are also governed under the authority of CERCLA implemented by the EPA.

The EPA guidance for establishing cleanup levels for CERCLA sites with radionuclide contamination (OSWER 9200.4-18) will be considered by the DOE when criteria are established for dismantlement. Because these dismantlement criteria will be a factor in establishing the end point for the removal action, this guidance is included as a TBC.

The RCRA, with regulations found at 40 CFR 260 et seq., as implemented by the State of Washington Dangerous Waste regulations (WAC 173-303), governs the identification, storage, treatment, and disposal of hazardous waste and the hazardous component of mixed waste. In general, the Washington regulations provide the primary authority over hazardous/dangerous waste management, and in some cases WAC 173-303 provisions are more stringent than the RCRA. Some aspects of the Federal RCRA Program have not been delegated to the State (e.g., certain components of the land disposal restriction program).

It is not anticipated that the No Action Alternative (Alternative 1) will generate any significant quantities of hazardous wastes. Any wastes that are generated will be managed according to applicable waste management procedures. The two alternatives (Alternatives 2 & 3) that include deactivation and dismantlement of the building will generate debris and miscellaneous wastes that will be managed according to the requirements of the RCRA as appropriate. A permit is not required for the management of the materials as they are generated during the deactivation/ dismantlement processes; however, disposal will be at a regulated facility. Wastes generated through either of the removal alternatives will be evaluated to ensure their proper designation prior to disposal. All wastes will be treated to comply with land disposal requirements (40 CFR 268) and the waste acceptance criteria for the relevant disposal facility. The Hazardous Materials Transportation Act (49 USC 1801, et seq.) and its implementing regulations specify requirements for packaging and transportation of hazardous materials and wastes offsite. The ERDF is considered to be an onsite disposal facility for all CERCLA actions at Hanford; therefore, that facility will not require certification for waste disposal. Any wastes that are disposed to the LLBG as part of a removal action, such as, asbestos or PCB wastes, will require an offsite disposal facility determination prior to shipping waste to that facility.

The *Toxic Substances Control Act of 1976* (TSCA) regulates the management and disposal of PCBs and PCB waste. Implementing regulations are found at 40 CFR 761. The only materials generated from the removal action anticipated to contain PCBs would qualify as remediation waste. Because these are also radioactive wastes, under the provisions of the PCB "Mega Rule," these wastes can be managed based solely on the radioactive component of the waste without regards to the PCB constituents. Nonetheless, the ERDF is authorized to accept PCB waste for disposal. The LLBG can accept bulk remediation waste with PCB concentrations greater than 50 ppm in the Lined Mixed Waste Unit, and less than 50 ppm in the unlined unit.

Under the No Action Alternative (Alternative 1), any incidental waste generated will be managed to meet Hanford Site Solid Waste Acceptance Criteria (HNF-EP-0063). Wastes generated under the removal alternatives must conform to the appropriate waste acceptance criteria for that alternative; i.e., ERDF Waste Acceptance Criteria (BHI 1998) for Alternative 2 and Hanford Waste Acceptance Criteria for Alternative 3. Because the LLBG are "offsite" disposal facilities under the CERCLA, the EPA must authorize their use if this alternative is selected (40 CFR 300.440). Although waste generated during the removal action will in most cases be

shipped directly to either the ERDF or the LLBG, if there is a need to transfer any CERCLA wastes to the CWC, that facility also must be certified as acceptable for offsite shipment of waste.

#### 5.1.3.2 Air Emissions

The only potential environmental releases anticipated under the proposed removal action are airborne releases of radionuclides. The federal *Clean Air Act* and the "Washington Clean Air Act" *Revised Code of Washington* (Chapters 70.94 and 43.21) regulate both toxic and radioactive airborne emissions. Under implementing regulations found in 40 CFR 61, Subpart H, and WAC 246-247, radionuclide airborne emissions from all combined operations at the Hanford Site may not exceed 10 mrem/yr effective dose equivalent to the hypothetical offsite maximally exposed individual. WAC 246-247 also requires verification of compliance, typically through periodic confirmatory air sampling. Any potential for a nonzero radioactive emission requires use of best available radionuclide control technology.

S&M activities under the No Action Alternative (Alternative 1) will not invoke any additional requirements for air monitoring or permitting. The deactivation/ dismantlement alternatives (Alternatives 2 & 3) will include measures to minimize the release of airborne contaminants and dust during building dismantlement. WAC 246-247 requires development of an air monitoring plan specific to the proposed activities to evaluate releases of hazardous and radionuclide constituents. A monitoring plan will be developed for either of the removal action alternatives and will be subject to review by Washington Department of Health.

#### 5.1.3.3 Cultural and Ecological Resource Protection

The National Historic Preservation Act of 1966 and its implementing regulations (36 CFR 800) require federal agencies to take into account the effect of any activity on any significant cultural resource. The Archeological and Historical Preservation Act of 1974 requires action to recover and preserve artifacts in areas where activity may cause irreparable harm, loss, or destruction of significant artifacts. The Endangered Species Act of 1973 and implementing regulations (50 CFR 502) along with WAC 232-12-297 prohibit activities that threaten the continued existence of listed species or that destroy critical habitat. All of the alternatives (Alternatives 1, 2, & 3) will comply with these standards; however, there are no remaining cultural or ecological resource protection issues associated with any of the proposed alternatives.

#### 5.1.3.4 Surface and Ground Water Impacts

The Washington State Waste Discharge Program (WAC 173-216) requires the use of all known available and reasonable methods to prevent and control the discharge of wastes into the waters of the state. Building dismantlement associated with Alternatives 2 & 3 will likely involve the use of water sprays to limit the amount of dust generated. Water volumes and run off controls will be managed consistent with site-wide discharge and surface water control plans. Water use will be evaluated against the provisions of WAC 173-216 as they apply to site activities.

#### 5.1.3.5 Worker Protection Standards

The DOE requirements for worker protection from radiation hazards are contained in "Occupational Radiation Protection" (10 CFR 835), which establishes radiation protection standards, limits, and program requirements for protecting workers from ionizing radiation. The rule also requires that measures be taken to maintain radiation exposures as low as reasonably achievable. Although not ARARs under the CERCLA, the DOE is required to meet Occupational Safety and Health Administration requirements for worker protection (e.g., 29 CFR 1910 and 29 CFR 1926). 29 CFR 1910 establishes exposure limits, personnel protection requirements, and decontamination methods for hazardous chemicals. 20 CFR 1910 also requires identification of physical hazards posed by a facility to workers including, but not limited to, confined spaces, falling hazards, fire, and electrical shock. 29 CFR 1926 provides requirements for worker safety during construction activities.

It is likely that some of the activities under either of the removal actions (Alternatives 2 & 3) will involve handling of asbestos or asbestos containing materials (ACM). Removal and disposal of asbestos and ACM are regulated under the Clean Air Act (40 CFR 61, Subpart M) and by the Occupational Safety and Health Administration (29 CFR 1920.1101). 40 CFR 61.52 specifies packaging requirements for these materials. These materials will be removed according to the proper procedures, managed appropriately, and disposed of in the burial grounds. All activities in support of the No Action Alternative (Alternative 1) or the deactivate and dismantle alternatives (Alternatives 2 & 3) will conform to worker protection standards. A combination of personal protective equipment, personnel training, and administrative controls will be used to ensure the requirements for worker safety are met. Because the removal alternatives will entail more potential for exposure of workers to physical hazards, these alternatives may be less protective of the workers. This enhanced level of hazard may be balanced by the longer duration of exposure to S&M workers over the projected life of the building without a removal.

## 5.2 IMPLEMENTABILITY

This criterion considers whether there are any technical, resource, or administrative limits that would prevent the implementation of a given alternative. The No Action Alternative (Alternative 1) is capable of being implemented. This option would continue S&M activities, which clearly can be performed. Deterioration of the structure over time could affect the ability to continue in this mode for an extended period without significant capital costs to improve the building. The two removal alternatives (Alternatives 2 & 3) can be implemented using commonly available techniques, as are currently being used on the Hanford site and elsewhere in the DOE complex. Because the methods and techniques used for either of the two alternatives are the same, the two removal alternatives are equivalent in their implementability.

## 5.3 COST

This criterion considers the relative cost of the alternatives, to the extent that the costs can be quantified. The No Action Alternative (Alternative 1) currently costs approximately $400,000 per year. This is the anticipated ongoing cost for S&M activities alone and does not include the potential costs for any future upgrades to the building to ensure structural integrity and to

minimize releases to the environment. Assuming that the building is left in place until final resolution of the Central Plateau in 2035, the extended cost for S&M is $12,800,000.

Costs for removal action (Alternative 2 & 3) are budgeted at approximately $5.4 million for deactivation and dismantlement, and administrative costs to support these activities are set at $3.5 million. Because the same approach will be used to remove the inventory and dismantle the structure, the construction costs for the two removal alternatives are expected to be equivalent regardless of which alternative is implemented. There are, however, cost differences associated with waste disposal, depending on the disposal site. Table 3 presents the estimated waste volumes that will be generated from the removal action.

**Table 3. Waste Volumes**

| Year | $Ft^3$ |
|---|---|
| 2003 | 560 |
| 2004 | 1150 |
| 2005 | 7620 |
| Total | 9330 |

Table 4 identifies the estimated cost associated with each removal alternative. In addition to actual disposal costs, the disposal costs for Alternatives 2 and 3 include costs for waste containers and transportation to the disposal unit. Details for these costs can be found in Appendix C.

**Table 4. Waste Disposal Costs**

| **Alternative #1 – Continue S&M** | | | | |
|---|---|---|---|---|
| Annual S&M cost | Duration of S&M | | | Total S&M Cost |
| $400,000 | 32 years (until 2035) | | | $12.8 Million |
| **Alternative #2 – Disposal to the ERDF** | | | | |
| Total volume of waste (ft3) | Building Demolition | Administrative Costs | ERDF Disposal cost @ $3.48/ft3 | Total ERDF Cost |
| 9330 | $5,400,000 | $3,500,000 | $32,468 | $8,932,468 |
| **Alternative #3 – Disposal to the LLBG** | | | | |
| Total volume of waste (ft3) | Building Demolition | Administrative Costs | LLBG Disposal cost @ $12.50/ft3 | Total LLBG Cost |
| 9330 | $5,400,000 | $3,500,000 | $116,625 | $9,088,787 |

Any TRU waste generated during the removal action will have an equivalent impact on cost because there is only one pathway for its disposal. Therefore, TRU waste has not been included in this analysis.

### 5.4 STATE ACCEPTANCE

The State acceptance criterion considers whether the technical and administrative concerns of the state regulatory agency(ies) have been addressed. This evaluation will be completed after the EE/CA has been through agency review and any concerns will be resolved or addressed in the Action Memorandum.

### 5.5 COMMUNITY ACCEPTANCE

This criterion considers whether the concerns of the public have been addressed in the EE/CA. This evaluation will be completed after the EE/CA has been through the public comment period and any concerns will be resolved or addressed in the Action Memorandum.

### 5.6 OTHER CONSIDERATIONS

In accordance with DOE Order 451.2 and the NEPA policy, the DOE CERCLA documents are required to incorporate the NEPA values, such as analysis of cumulative, offsite, ecological, and socioeconomic impacts, to the extent practicable.

Cumulative impacts may occur in both the short term and the long term because of the interrelationships among other activities occurring at the PFP and in the 200 Areas. Other current or future activities include the following:

- Stabilization of plutonium-bearing materials at the PFP
- Ongoing deactivation, decommissioning, and demolition of ancillary buildings at the PFP
- Ongoing waste handling activities at the CWC
- Transition activities throughout the Central Plateau
- Construction activities and operation of the Waste Treatment Facility in 200 East Area

The stabilization of plutonium-bearing materials at the PFP is scheduled to be complete by FY 2005. Deactivation, decommissioning, and demolition of ancillary buildings at the PFP was initiated in FY 2002 and will continue throughout deactivation and dismantlement of the 232-Z Building. Deactivation and dismantlement activities for the 232-Z Building are scheduled to occur in FY 2003 with other deactivation and dismantlement activities at the PFP Complex to follow-on. The PFP baseline is described in the *Integrated Project Management Plan for Decommissioning of the PFP Nuclear Materials Stabilization Project* (HNF-3617). The baseline plan is to complete Phase I PFP transition activities (including plutonium-bearing residue repackaging and shipment to the CWC, facility deactivation and dismantlement, and TSD unit pre-closure and closure) by FY 2016. The waste handling activities at the CWC and transition activities throughout the Central Plateau are expected to be ongoing for some time in the future.

Each of these activities contributes toward meeting the goals of remediating the 200 Areas. In the long term, the overall cumulative objective of taking the 232-Z Building to slab-on-grade is

to enhance the protection of workers, the public, and the environment, which is consistent with the values expressed by regulators, stakeholders, affected Tribes, and the public. Both Alternative 2 and Alternative 3 would contribute to this enhanced protection.

Offsite impacts include potential effects on the public or the environment because of the release of contaminants resulting from an activity being performed at the Hanford Site. Both Alternatives 2 and 3 could potentially result in airborne emissions of radioactive contaminants during the course of deactivation and dismantlement of the 232-Z Building. However, based upon experience with similar activities previously conducted on the Hanford Site, it is not expected that either Alternative 2 or 3 would significantly affect local or regional air quality.

Neither Alternative 2 nor 3 would be expected to affect existing natural resources. The area where work would be performed is not identified as critical habitat for any listed species. However, an annual ecological review would continue to be conducted within the PFP fence line and surrounding area throughout the life of this project to ensure that there would be no impacts to natural resources of special concern (e.g., migratory birds).

Disturbance maps indicate that because of previous Hanford Site era construction activities, no archeological deposits are likely to remain intact within the vicinity of the PFP Complex. Implementation of either Alternative 2 or 3 is not expected to affect archeological artifacts.

Alternative 2 would require an irreversible and irretrievable commitment of resources in terms of land that would be committed to the ERDF. Alternative 3 would require an irreversible and irretrievable commitment of resources in terms of land that would be committed to the LLBG. In addition, if new haul roads or other infrastructure were needed to implement either Alternative 2 or 3, this would constitute an irreversible and irretrievable commitment of resources in terms of land during the time that the infrastructure was being used.

Socioeconomic impacts, including disproportionately high and adverse impacts to minority or low-income populations, from implementing Alternative 2 or 3 would be minimal. The number of resources for implementing either alternative would not be large and would not be expected to have a significant cumulative impact on the community.

## 6.0 RECOMMENDED ALTERNATIVE

The recommended alternative is Alternative Action Number 2, deactivation and dismantle the facility with disposal to the ERDF. The planned activities involve the removal of all significant radiological inventories and removal of all contaminated equipment above grade, leading to building demolition and establishment of a slab-on-grade configuration. Below grade ductwork will be characterized only and will be addressed as part of the future below grade remedial action for PFP. The slab will be characterized and covered to prevent future exposure.

Appendix D presents a summary overview of this EE/CA process.

## 7.0 REFERENCES

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," Title 40, *Code of Federal Regulations*, Part 61, as amended.

40 CFR 260, "Hazardous Waste Management System," Title 40, *Code of Federal Regulations,* Part 260, as amended.

40 CFR 268, " Land Disposal Restrictions," Title 40, *Code of Federal Regulations,* Part 268, as amended.

40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," Title 40, *Code of Federal Regulations,* Part 300, as amended.

Ballinger, M.Y., 1993, *Review of Accident Analysis Calculations, 232-Z Seismic Scenario,* PNL-8652, Pacific Northwest National Laboratories, Richland, Washington.

BHI, 1998, *Environmental Restoration Disposal Facility Waste Acceptance Criteria,* BHI-00139, as revised, Bechtel Hanford, Inc., Richland, Washington.

DOE, 1991, *Guidance on Implementation of the DOE NEPA/CERCLA Integration Policy,* EH-20, November 1991, U.S. Department of Energy, Washington, D.C.

DOE, 1992, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports," DOE-STD-1027-92, December 1992, U.S. Department of Energy, Washington, D.C.

DOE, 1994, *Secretarial Policy Statement on the National Environmental Policy Act,* June 1994, U.S. Department of Energy, Washington D.C.

DOE, 1996, *Final Environmental Impact Statement – Plutonium Finishing Plant Stabilization*, EIS-0244F, May 1996, U.S. Department of Energy – Richland Operations Office, Richland, Washington.

Ecology, EPA, and DOE, 1995, *Record of Decision, U.S. Department of Energy Hanford Environmental Restoration Disposal Facility,* Hanford Site, Benton County, Washington.

Ecology, EPA, and DOE, 1996, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

Ehlert, A.H., 1999, "Radiological History of the Plutonium Finishing Plant," FSP-PFP-003, Rev. 0, B&W Hanford Company, Richland, Washington.

EPA, 1993, *Guidance on Conducting Non-Time Critical Removals Under CERCLA*, EPA 1540/R-93/057, OSWER Directive 9360.0-32, August 1993, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

EPA, Ecology, and DOW, 1996, *U.S. Department of Energy Hanford Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington, Explanation of Significant Difference (ESD),* U.S. Environmental Protection Agency, Washington State Department of Ecology, and U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Fluor, 2002a, "Radiological Survey Report for Building 232-Z," July 15, 2002, Fluor Hanford, Inc., Richland, Washington.

Fluor, 2002b, "Categorical Exclusion for Transition of the 232-Z Contaminated Waste Recovery Process Facility at the Plutonium Finishing Plant, 200 West Area, Hanford Site, Richland, Washington," Fluor Hanford, Inc., Richland, Washington.

HNF-3617, 2001, *Integrated Project Management Plan for Decommissioning of the PFP Nuclear Materials Stabilization Project,* September 2001, Fluor Daniel Inc., Richland, Washington.

HNF-8739, 2003, *Hanford Safety Analysis and Risk Assessment Handbook*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

HNF-11992, 2002, *232-Z Decontamination and Decommissioning Documented Safety Analysis*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

HNF-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, Rev. 7, April 2002, Fluor Hanford Inc., Richland, Washington.

HNF-EP-0924, 1997, *History and Stabilization of the Plutonium Finishing Plant (PFP) Complex, Hanford Site*, Rev. 0, Richland, Washington.

HNF-SD-CP-SAR-021, 2002, *Plutonium Finishing Plant Final Safety Analysis Report*, Rev. 4, Fluor Hanford, Richland, Washington.

Herman, S.A., E.P. Laws, T.P. Grumbly, 1995, "Policy on Decommissioning Department of Energy Facilities Under CERCLA," (external letter to Distribution, May 22, 1995), U.S. Department of Energy and U.S. Environmental Protection Agency, Washington, D.C.

Neitzel, D.A., 1999, "Hanford Site National Environmental Policy Act (NEPA) Characterization," PNL-6415, Rev. 11, Pacific Northwest National Laboratory, Richland, Washington.

Nissley, C., 1994, Western Office of Review, Advisory Council on Historic Preservation, to K. V. Clarke,

Cultural Resources Program, RL, "Memorandum of Agreement regarding the demolition of Buildings 232-Z and 233-S, Hanford Site, Washington," letter dated December 29, 1994.

Prendergast, E., 2002, of Pacific Northwest National Laboratory, e-mail to B. Nelson-Maki, Fluor Hanford, "Cultural Resources Review for Plutonium Finishing Plant (PFP) Decommissioning Project – Demolition of 232-Z Facility (HCRC# 2002-200-047)" (9/26/02).

Sackschewsky, M.R., 2002, "Blanket Biological Review of Plutonium Finishing Plant, 200 W Area, ECR #2002-200-032," (external letter to B. Nelson-Maki, May 3, 2002), Pacific Northwest National Laboratory, Richland, Washington.

WHC-SD-CP-TI-190, 1994, *Technical Basis for Characterization of Plutonium for PFP Safety Analyses,* Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Westsik, G.A., 2002, "Review of 232-Z E-4 Ductwork Assay Information," (internal letter to D.W. Nelson, August 2, 2002), Richland, Washington.

# APPENDIX A

## LETTER OF CONCURRENCE FROM THE WASHINGTON STATE OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION

# Letter Of Concurrence from the Washington State Office of Archaeology and Historic Preservation

---

STATE OF WASHINGTON

OFFICE OF COMMUNITY DEVELOPMENT
Office of Archaeology and Historic Preservation
1063 S. Capitol Way, Suite 106 - Olympia, Washington 98501
(Mailing Address) PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 Fax Number (360) 586-3067

September 4, 2002

Mr. Joel Hebdon
Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

In future correspondence, please refer to:
Log: 090402-24-DOE
Re: Demolition of 232-Z Facility HCRC 2002-200-047

Dear Mr. Hebdon:

Thank you for contacting the Washington State Office of Archaeology and Historic Preservation (OAHP) regarding the above referenced proposal. This consultation is in adherence to the National Historic Preservation Act of 1966 (as amended) and implementing regulations 36 CFR Part 800. From your correspondence I understand that the Department of Energy (DOE) proposes to undertake activities resulting in the decommissioning and demolition of the 232-Z incinerator in the 200 West Area.

In response and on behalf of the State Historic Preservation Officer (SHPO), I concur with your determination that this action will have an adverse effect the National Register of Historic Places eligible 232-Z Facility and the Hanford Site Historic District. However, in recognition of mitigation already completed in fulfillment of the Memorandum of Agreement (MOA) and the *Programmatic Agreement Among the U.S. Department of Energy Richland Operations Office, The Advisory Council on Historic Preservation, and the Washington State Historic Preservation Officer for the Maintenance, Deactivation, and Demolition of the Built Environment on the Hanford Site, Washington*, further mitigating measures related to this action are not required. However, in the event archaeological resources are discovered during any ground disturbing activities, work should be halted immediately and contact made with OAHP and interested tribal representatives.

Again, thank you for the opportunity to review and comment on this action. Should you have any questions, please feel free to contact me at 360-586-3073.

Sincerely,

Gregory Griffith
Deputy State Historic Preservation Officer

RECEIVED
SEP 10 2002
DOE-RL/RLCC

**Advisory Council On Historic Preservation**

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 730 Simms Street, #401
Golden, Colorado 80401

December 29, 1994

Kevin V. Clarke
Acting Manager
Cultural Resources Program
Department of Energy
Richland Operations Office
P.O. Box 550
Richland, WA 99352

RE: *Memorandum of Agreement regarding the demolition of Buildings 232-Z and 233-S, Hanford Site, Washington*

Dear Mr. Clarke:

The enclosed Memorandum of Agreement regarding the above referenced project has been accepted by the Council. This action constitutes the comments of the Council required by Section 106 of the National Historic Preservation Act and the Council's regulations. Please send copies of the signed Agreement to the Washington State Historic Preservation Officer and your Federal Preservation Officer.

The Council appreciates your cooperation in reaching a satisfactory resolution of this matter.

Sincerely,

for Claudia Nissley
Director, Western Office
of Review

Enclosure

RECEIVED
JAN 19 1995
DOE-RL/CCC
I95-TPA-116

MEMORANDUM OF AGREEMENT
SUBMITTED TO THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
PURSUANT TO 36 CFR SECTION 800.6(a)

WHEREAS, the U.S. Department of Energy, Richland Operations Office (DOE-RL) has determined that Building 232-Z at the Hanford Site in eastern Washington State is eligible for inclusion in the National Register of Historic Places, and that Building 233-S, while not individually eligible for listing in the Register, does appear to merit consideration as a contributing element to a potential historic district, and, thus, demolition of both 232-Z and 233-S would have an adverse effect upon their respective potential historic districts, and has consulted with the Washington State Historic Preservation Officer (SHPO) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 USC 470f); and

WHEREAS, substantial documentation exists regarding the construction and operation of potentially historic facilities on the Hanford Site, including architectural, engineering and process drawings, process deactivation plans, photographs, operating logs and significant quantities of other types of records; and

WHEREAS, the mission at the Hanford Site has changed from one of defense production to environmental remediation, and facilities formerly used for defense production are being deactivated, decontaminated and decommissioned; and

WHEREAS, many of the facilities at the Hanford Site present safety hazards due to their physical conditions and have been scheduled for closure and removal as part of the Hanford Site cleanup being undertaken pursuant to the Hanford Federal Facility Agreement and Consent Order (known as the Tri-Party Agreement), a legally binding agreement entered into by DOE-RL, the Environmental Protection Agency and the Washington Department of Ecology; and

WHEREAS, recordation of historic properties is required of Federal agencies by Section 110(b) of the National Historic Preservation Act (NHPA) and Executive Order 11593 whenever an agency action, or an action assisted by a Federal agency, may substantially alter or demolish a historic property, and requires that in such a case appropriate records be made of the property and deposited in the Library of Congress or an other appropriate repository designated by the Secretary of Interior;

NOW THEREFORE, DOE-RL and the Washington SHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on potentially historic properties.

Stipulations

DOE-RL will ensure that the following measures are carried out:

A. Upon execution of this agreement, the DOE-RL shall contact the National Park Service (NPS), Western Region, Historic American Buildings Survey/ Historic American

Engineering Record (HABS/HAER) coordinator, San Francisco, California, and request the NPS to confirm that this agreement specifies the appropriate level and kind of recordation for the property, and that copies of this documentation are made available to the SHPO and the Library of Congress.

B. All documentation must be accomplished in accordance with HAER standards and guidelines and the Secretary of Interior's Guidelines for Architectural and Engineering Documentation.

C. Demolition or alteration of the subject properties may take place only after the National Park Service has reviewed the final documentation for conformance with the standards and accepted the material.

D. Administrative conditions:

1. DOE-RL will ensure that all historic research carried out pursuant to this agreement is carried out by or under the direct supervision of a person or persons meeting at a minimum the Secretary of Interior Professional Qualifications Standards (48 FR 44738-9) for Historians; and, that all research in architectural history is carried out by or under the direct supervision of a person or persons meeting at a minimum the Secretary of Interior Professional Qualifications Standards (48 FR 44738-9) for Architectural Historians.

2. Should any party to this agreement object within thirty (30) days after receipt to any plans, specifications, contracts, or other documents provided for review pursuant to this agreement, or to the manner in which this agreement is being implemented, DOE-RL shall consult with the objecting party to resolve the objection. If DOE-RL determines that the objection cannot be resolved, DOE-RL shall forward all documentation relevant to the dispute to the Advisory Council on Historic Preservation. Within thirty (30) days after receipt of all pertinent documentation, the Council will either:

(a) provide DOE-RL with recommendations, which DOE-RL will take into account in reaching a final decision regarding the dispute; or

(b) notify DOE-RL that it will comment pursuant to 36 CFR 800.6(b) and proceed to comment. Any Council comment provided in response to such a request will be taken into account by DOE-RL in accordance with 36 CFR 800.6(c)(2).

Execution of this Memorandum of Agreement by DOE-RL and the Washington SHPO, its subsequent acceptance by the Council, and implementation of its terms, is evidence that DOE-RL has afforded the Council an opportunity to comment on the demolition of Buildings 232-Z and 233-S, and that DOE-RL has taken into account the effects of the undertaking on potentially historic properties.

Department of Energy
Richland Operations Office

Robert S. Holt December 5, 1994
(Title) Acting Program Manager DATE
Office Of Environmental Assurance,
Permits, and Policy

4702 ADMIN

005

Washington State Historic Preservation Officer

(Title) DATE 9/14/94

ACCEPTED for the Advisory Council on Historic Preservation

(Title) DATE 12/22/94

# APPENDIX B

# PLANNED ACTIVITIES FOR DEACTIVATION AND DISMANTLEMENT

**Planned Activities for Deactivation and Dismantlement**

The following overview of deactivation and dismantlement activities was prepared to support estimates of resources required to support the removal action. These activities, their scope, and sequencing are subject to change. The activities analyzed here for 232-Z include the ongoing residual operational surveillance and maintenance, along with planned deactivation and dismantlement leading to slab on grade configuration.

The deactivation activities are focused on removal of the majority of the residual radioactive material by removal of the equipment that contains the radioactivity. This removal includes, for example, dismantling the remainder of the incinerator and the ash separators (cyclone separators), then removal of the feed glovebox, the incinerator glovebox, the ash canning glovebox, the scrubber, and associated HEPA filters and ductwork. Once these components have been removed, the building is expected to contain a small percentage of the plutonium mix currently present and fall below the hazard Category 3 threshold. The remainder of the building contents (conduit, ventilation equipment and piping) will then be removed preparatory to or as part of building dismantlement.

**Ongoing Surveillance and Maintenance**

Surveillance and Maintenance of the 232-Z facility will be conducted in accordance with the PFP procedures and standards until the facility is fully dismantled. This is required due to the contained radioactive inventories and contamination which leads to the need for maintaining ventilation (contamination zones), exhaust monitoring, and fire protection equipment until such time as those features are no longer required.

Surveillance is provided on a once per shift basis to evaluate operating systems and to ensure stable radiological conditions. This will become more important as deactivation activities are increased and facility conditions change more frequently. Maintenance is provided to the ventilation, lighting, and fire detection systems in accordance with PFP standard practices and as required by the air-operating permit and the Notice of Construction.

**REMOVAL ACTIVITIES**

The 232-Z Facility has been partially deactivated. In the planned removal action, the remaining plutonium contaminated equipment is to be removed, the building decontaminated and stabilized, and then dismantled. These activities are discussed in turn below, noting that when the inventory in the major pieces of equipment has been removed, the facility is expected to be a less than hazard Category 3 facility.

**Radiological Inventory Reduction**

The inventory within 232-Z is contained primarily in the few pieces of operating equipment that remain within the facility. The major plutonium contaminated pieces of equipment will be systematically removed to reduce the inventory. The remaining equipment will then be removed. Most of the components will be removed either as whole pieces of equipment or sized

to fit into waste containers. Waste sorting will occur based on the inventory that is within each piece of equipment. As an example, the burning glovebox contains the remaining incinerator components. These components may be removed from within the glovebox and discarded, including their inventory, as TRU waste. If the incinerator components do not fit into appropriate containers for TRU disposal, they may be reduced in size within the glovebox prior to removal. If the glovebox can be decontaminated to an appropriate level, it will be disposed of as LLW. The glovebox may be reduced in size for placement into appropriate containers.

**Decontamination**

Decontamination will be accomplished by successively more aggressive mechanisms until the decontamination goals are met for each item being decontaminated. As an example, the gloveboxes will be swept to remove residual loose contamination. If this mechanism is not able to remove specific contamination, wiping with acidic solution or other decontamination solutions (such as cerium nitrate) will be employed to remove the contamination. Techniques proven effective at other sites, such as the experience gained at the Rocky Flats Environmental Technology Site, will be employed.

It is planned that the incinerator and ash separator equipment, the ductwork and some components in the scrubber cell will not be significantly decontaminated. These will be disposed of as TRU waste.

**Size Reduction**

Components will be sized to fit appropriate waste containers as necessary for economic disposal. Radiological control will establish the methods used to control contamination during the size reduction in accordance with established PFP controls and the experience gained from Rocky Flats Plant Denver, Colorado. Due to the limited amount of equipment present in 232-Z, it is planned that size reduction will be accomplished by unbolting connections or cutting with sawzalls and nibblers. Laser or Plasma arc cutter technology may be employed for size reduction in order to train personnel and demonstrate the technology.

**Radiological Control**

One of the principal activities associated with the removal of the 232-Z Facility will be the control of contamination. At the outset of the activity, the process area is a well-controlled contamination area, with all significant contamination confined within the process enclosures and the scrubber cell. The scrubber cell is an airborne contamination area with significant contamination on the wall of the structure as a result of a liquid contamination spread.

Control of contamination and management of wastes as the process equipment is disassembled will require substantial radiological engineering similar to other modification activities that have been successfully accomplished within the PFP. Zone ventilation control and temporary contamination barriers have been demonstrated effectively within the PFP and in the work performed at the Rocky Flats Environmental Technology Site, and have been incorporated into the techniques being used.

Existing process enclosures with their zone ventilation control will be used to contain contamination as the internal process equipment is disassembled. The equipment will be bagged out of the enclosures and managed as contaminated waste in accordance with its level of contamination (expected to be TRU for process enclosure contents). Similarly, as the enclosures are removed and reduced in size, temporary plastic enclosures may be utilized to manage contamination if the items being size reduced cannot be adequately decontaminated to minimize contamination spread. Likewise, the scrubber cell will be extended as a temporary enclosure while the equipment is dismantled and removed in waste containers.

Each step of the equipment removal effort will be carefully planned and controlled to ensure protection of the worker and prevention of the spread of contamination. Contamination in areas, such as the scrubber cell or on equipment within the scrubber cell, will be controlled by use of standard radiological control processes such as surface cleaning, fixatives, and bagging. Piping will be bagged and cut to ensure containment of residual liquids after ensuring that all drainable liquids have been removed.

Once the equipment is removed from the process room, surface contamination may be removed from the walls and floor of the building to the extent practicable in order to minimize potential contamination concerns during structure dismantlement. Scabbling or other surface cleaning techniques may be utilized to remove significant contamination, followed by use of fixatives for minor contamination control. Special attention will be paid to the contaminated block wall in the scrubber cell that has absorbed sprayed contaminated liquids. It is expected that a portion of the wall may need to be removed as part of the decontamination of the structure prior to dismantlement.

**Utilities**

In general, power supplies for equipment used to reduce in size, disconnect and cut up equipment and miscellaneous building contents or systems, will be provided by temporary power to reduce reliance on old wiring and to minimize the potential to cut into powered wiring. Similarly, if compressed air is required for air-operated equipment or breathing air for contamination protection, the compressed air will be run into the facility through temporary hoses from external compressors. The air sampling vacuum system connection to the exhaust monitor will be isolated when that system is deactivated just prior to dismantlement.

**Ventilation Supply**

Approximately 2,000 $ft^3$/min of air is provided by infiltration throughout the deactivated supply system on the second floor of the 232-Z Building. Maintaining differential pressure between Zones provides controlled confinement of radioactive contaminants.

The remaining piping and miscellaneous ventilation equipment within the process area will be removed or decontaminated. Residual contamination will be stabilized. The HEPA filters in the floor will be removed and the opening capped or plugged. The roof and walls will then be dismantled and disposed of as LLW or LLMW as appropriate.

**Waste Management**

The wastes from 232-Z will fall into the categories of TRU, mixed TRU, LLW, LLMW, and uncontaminated waste. Materials will be segregated by waste type and appropriately dispositioned.

The approach to building removal is to eliminate the components with the high TRU inventories first in order to be able to demonstrate below TRU levels for the remaining components, which will reduce risk, facilitate the work and ensure proper waste segregation. The determination regarding TRU will be made by NDA methods applied to the components and/or to the containers to maintain appropriate documentation. Effort will be made to minimize the amount of TRU waste by decontamination of components, e.g., gloveboxes, to minimize the cost associated with that waste stream. Likewise, facility components that can be reasonably assured to contain no measurable contamination in accordance with site procedures may be disposed of as non-contaminated waste. All remaining material will be disposed of as LLW or LLMW depending upon the waste characteristics.

During the clean out of the TRU contaminated materials within the process area, waste containers that have been filled may be stored adjacent to the facility as staging for transfer to another waste management area. The hazards analysis has included these stored materials and the accident conditions bound potential accidents involving these waste containers at the facility. Environmental regulations will also be considered and complied with in determining the specific storage conditions.

**Facility Dismantlement**

After equipment and contamination removal, the facility will be dismantled and disposed of as contaminated LLW. The radiological content of the structure will be well characterized and controlled, and the principal hazards will be related to common industrial demolition and dust control. Industrial safety control of airborne hazards will be coordinated with the radiological contamination control to ensure that contamination is not spread and that workers are protected.

As a first step of facility dismantlement, the HEPA filtered exhaust and 296-Z-14 stack will be closed in accordance with Department of Health requirements. The fire detection system will be disconnected. The remainder of the building will be systematically dismantled/ demolished and disposed of in accordance with specific work procedures developed for that activity. That procedure will define the methods necessary to control and prevent spread of contamination and ensure proper segregation of wastes being generated.

# APPENDIX C

# COST FOR WASTE DISPOSAL ALTERNATIVES

Section 5.3 of the Engineering Evaluation/Cost Analysis for the Removal of the Contaminated Waste Recovery Process Facility (EE/CA) provides a summary of the costs associated with the removal alternatives for Building 232-Z. The following information was used to support the development of the costs associated with disposal of building debris and other waste to the Low Level Burial Grounds and the Environmental Restoration Disposal Facility (ERDF).

Tables C-1 and C-2 provide an estimate of the waste volumes that will be generated at various stages of the removal action. Table C-1 provides an estimate for the number of containers that will be generated; Table C-2 identifies the estimated volumes of waste that will be generated. These volumes were used as a basis for determining the costs associated with the two disposal alternatives. The analysis presented below considers only the actual cost of disposal; it does not address any administrative costs. The latter costs are considered to be roughly equivalent for each of the disposal alternatives

Cost for Disposal to Low Level Burial Grounds

The LLBG include both lined trenches for disposal of low level mixed waste and unlined trenches for wastes that have no hazardous/dangerous waste constituents (i.e., solely low-level radioactive waste). The costs for disposal to the two types of trenches are equivalent.

The unit cost for disposal to the LLBG is $12.50 per cubic foot ($ft^3$). In addition, a waste generator must purchase a container in which the waste will be packaged for disposal. The cost for containers is $990 for a 128 $ft^3$ four foot by four foot by eight-foot box and $150 for a drum that would hold approximately nine cubic feet. In order to simplify the calculations in Section 5.3, all waste was assumed to be packaged in the larger 128 $ft^3$ boxes. As can be seen from Table C-1, this approach underestimates the actual cost for disposal to LLBG since it is anticipated that approximately 10 percent of the LLW volume will be packaged in drums.

There is no separately identifiable cost associated with shipping the waste to LLBG. Drivers for this waste are authorized to come inside the fence of PFP. The project might wish to purchase a flat bed truck, in order to ensure that waste is moved off-site in a timely manner. This cost, however, has not been factored into the calculations since it is speculative and may be recoverable from program funds. In addition, the cost for this alternative could be offset by the need for equivalent equipment for the ERDF alternative.

Cost for Disposal to the Environmental Disposal Restoration Facility

The ERDF is located in the 200 West Area approximately three miles from the PFP. ERDF is a lined waste disposal facility that can accept CERCLA waste generated anywhere on the Hanford Site.

The generally accepted cost for waste disposal to ERDF is $2.50 per cubic foot. This number, however, is an average for waste generated all over the site. In order to provide a more accurate number for this project, the projected mix of wastes was established and a project specific cost was developed based on ERDF's established unit cost of $32.88 per ton. The following assumptions were used to derive a unit cost of $3.48 per cubic foot:

| Material | Percentage of Waste | Unit Weight (lbs./ft$^3$) |
|---|---|---|
| Concrete/sheet rock | 70 | 150 |
| Steel | 40 | 490 |
| Compactible Debris | 5 | 50 |
| Soil | 5 | 125 |

Generators shipping waste to ERDF are not required to purchase a container; however, they must purchase liners for the 270 ft$^3$ containers that are supplied by ERDF. Liners cost $22.85 each.

In addition, generators must pay a fee of $1.98 per mile for transportation of waste to ERDF. The round trip from PFP to ERDF is approximately 6 miles. The total estimated weight of the material generated form this removal action is 1003 tons (based on an average value of 211.75 lb/ft$^3$), resulting in a total cost for shipment of approximately $11,735.

Because ERDF drivers and vehicles are not cleared for entrance to PFP, shipment of waste to ERDF will require the establishment of a staging area outside the secure area. This cost is anticipated to be insignificant and, therefore, is not considered in the calculations provided in Section 5.3.

**Table C-1. Waste Volume by Number of Containers**

| YEAR | LLW Drums | LLW Boxes | TRU drums | TRU SWBs | ERDF Roll off boxes |
|---|---|---|---|---|---|
| 2003 | 2 | 3 | 3 | 4 | 0 |
| 2004 | 3 | 2 | 1 | 3 | 0 |
| **2003 Total** | 5 | 5 | 4 | 7 | 0 |
| 2004 | 5 | 3 | 2 | 3 | 0 |
| 2004 | 1 | 1 | 0 | 0 | 0 |
| 2004 | 1 | 1 | 0 | 0 | 0 |
| 2004 | 1 | 0 | 0 | 0 | 0 |
| 2004 | 1 | 1 | 0 | 0 | 0 |
| 2004 | 2 | 2 | 1 | 2 | 0 |
| 2004 | 1 | 1 | 1 | 2 | 0 |
| 2004 | 1 | 1 | 0 | 0 | 0 |
| **2004 Total** | 13 | 10 | 4 | 7 | 0 |
| 2005 | 3 | 4 | 0 | 0 | 0 |
| 2005 | 1 | 1 | 0 | 0 | 0 |
| 2005 | 1 | 1 | 0 | 0 | 0 |
| 2005 | 1 | 1 | 0 | 0 | 0 |
| 2005 | 2 | 2 | 1 | 3 | 0 |
| 2005 | 1 | 1 | 1 | 0 | 0 |
| 2005 | 1 | 1 | 1 | 0 | 0 |
| 2005 | 2 | 3 | 1 | 2 | 0 |
| 2005 | 1 | 0 | 0 | 0 | 0 |
| 2005 | 1 | 1 | 1 | 0 | 31 |
| 2005 | 1 | 0 | 0 | 0 | 0 |
| **2005 Total** | 15 | 15 | 5 | 5 | 31 |
| **Grand Total** | 33 | 30 | 13 | 19 | 31 |

**Table C-2. Waste Volume in Cubic Feet**

| YEAR | LLW Drums | LLW Boxes | TRU drums | TRU SWBs | ERDF Roll off boxes |
|---|---|---|---|---|---|
| 2003 | 18.36 | 309.00 | 27.54 | 274.00 | 0.00 |
| 2004 | 27.54 | 206.00 | 9.18 | 205.50 | 0.00 |
| **2003 Total** | 45.90 | 515.00 | 36.72 | 479.50 | 0.00 |
| 2004 | 45.90 | 309.00 | 18.36 | 205.50 | 0.00 |
| 2004 | 9.18 | 103.00 | 0.00 | 0.00 | 0.00 |
| 2004 | 9.18 | 103.00 | 0.00 | 0.00 | 0.00 |
| 2004 | 9.18 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2004 | 9.18 | 103.00 | 0.00 | 0.00 | 0.00 |
| 2004 | 18.36 | 206.00 | 9.18 | 137.00 | 0.00 |
| 2004 | 9.18 | 103.00 | 9.18 | 137.00 | 0.00 |
| 2004 | 9.18 | 103.00 | 0.00 | 0.00 | 0.00 |
| **2004 Total** | 119.34 | 1030.00 | 36.72 | 479.50 | 0.00 |
| 2005 | 27.54 | 412.00 | 0.00 | 0.00 | 0.00 |
| 2005 | 9.18 | 103.00 | 0.00 | 0.00 | 0.00 |
| 2005 | 9.18 | 103.00 | 0.00 | 0.00 | 0.00 |
| 2005 | 9.18 | 103.00 | 0.00 | 0.00 | 0.00 |
| 2005 | 18.36 | 206.00 | 9.18 | 205.50 | 0.00 |
| 2005 | 9.18 | 103.00 | 9.18 | 0.00 | 0.00 |
| 2005 | 9.18 | 103.00 | 9.18 | 0.00 | 0.00 |
| 2005 | 18.36 | 309.00 | 9.18 | 137.00 | 0.00 |
| 2005 | 9.18 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2005 | 9.18 | 103.00 | 9.18 | 0.00 | 5940.00 |
| 2005 | 9.18 | 0.00 | 0.00 | 0.00 | 0.00 |
| **2005 Total** | 137.70 | 1545.00 | 45.90 | 342.50 | 5940.00 |
| **Grand Total** | 302.94 | 3090.00 | 119.34 | 1644.00 | 5940.00 |

# APPENDIX D

# ENGINEERING EVALUATION/COST ANALYSIS SUMMARY OUTLINE

## Engineering Evaluation/Cost Analysis Summary Outline (2 sheets)

| | | |
|---|---|---|
| 1 | Project Name, Location, and Description | 232-Z Contaminated Waste Recovery Process Facility (Incinerator)<br>Plutonium Finishing Plant (PFP), 200 West Area, Hanford Site, Washington<br>The Facility is an element of the PFP Complex, of cinder block construction, with dimensions approximately 37 feet by 57 feet. Adjacent land use is industrial in nature with no significant vegetation or wildlife present. No nearby surface water features are present; groundwater is at approximately 200 feet below surface. Site personnel work in the vicinity of the building; nearest potentially exposed general population is at Highway 240, approximately 6 km south/southwest. |
| 2 | Project History | Designed and built in the late 1950s and early 1960s for recovery of plutonium from scrap materials through incineration or leaching. Multiple spills and releases of contamination into the building. Facility closed in 1973. Deactivation began in 1984 with removal of some gloveboxes and portion f plutonium inventory. Seismic analysis determined that the facility is potentially subject to collapse in an earthquake, resulting in release to onsite personnel and the environment. Facility currently being maintained through PFP S&M program. |
| 3 | Community Relations History | EE/CA will be made available for public review and comment subsequent to approval from regulators. |
| 4 | Scope and Role | EE/CA evaluates alternatives for removal of the 232-Z facility to a slab-on-grade condition. Goal is to take the facility to a point that removes the potential risk associated with the plutonium inventory. No end point has been established for removal of buildings in PFP. Removal action to slab on grade will not conflict with any potential future decisions. |
| 5 | Statutory Determinations | The removal is not a final action; therefore, it is not appropriate to compare the result against the statutory preference for reduction of toxicity, mobility, or volume. The removal alternatives, however, do accomplish reduction of mobility and volume. Source term and risk associated with the contaminants is transposed to the disposal site, but is not available for exposure. |
| 6 | Summary of Project Location Characteristics | Building is contaminated with primarily radionuclides from facility operations. Ongoing limited exposure to site personnel who are involved with S&M activity. Potential for airborne environmental release due to structural failure or water transport to soil and ground/surface water due to building deterioration and rainwater infiltration.<br>Some minor amount of PCB contaminated materials is expected, primarily light ballasts and painted materials with PCB as a component.<br>Lead is expected in paints.<br>Asbestos is anticipated as a component of insulating materials |
| 7 | Summary of Project Location | Risk potential associated with structural failure due to earthquake or other causes, or fire. |

## Engineering Evaluation/Cost Analysis Summary Outline (2 sheets)

| | | |
|---|---|---|
| | Risks | Analysis indicates that dose to site personnel, onsite worker, and offsite public is within guidelines in 40 CFR 61.92. If site boundaries are reduced, potential for "offsite" dose to exceed criteria. |
| 8 | Documentation of Significant Changes | Not applicable. No alternative has been formally proposed as the preferred alternative |
| 9 | Description of Alternatives | Alternative 1 consists of continued surveillance and maintenance of the building. Site inspections will continue; critical utilities (fire, ventilation) will be maintained. It is anticipated that the building will require some structural repair before final disposition at an indeterminate point in the future.<br>Alternative 2 requires deactivation of the facility including removal of the remaining plutonium inventory and contaminated equipment. Interior equipment and utilities will be removed and non-structural components of the building taken out and disposed of at the ERDF. The building will be dismantled and disposed of at the ERDF.<br>Alternative 3 requires deactivation of the facility including removal of the remaining plutonium inventory and contaminated equipment. Interior equipment and utilities will be removed and non-structural components of the building taken out and disposed of at the LLBG. The building will be dismantled and disposed of at the LLBG. |
| 10 | Summary of Comparison of Alternatives | Alternative 1, continued S&M, provides the lowest near term potential exposure to personnel and the public, assuming the building maintains its integrity. The waste inventory remains intact and potentially mobile. The cost for this alternative is the highest, assuming 32 years of ongoing S&M at $400,000/year without any capital improvements.<br>Alternative 2 and Alternative 3 are essentially equivalent from a risk perspective. Each will eliminate the current potential for release by removing the source term. They each will use exiting technologies for the building deactivation and dismantlement and existing means for disposal. Alternative 2 (Disposal to ERDF) is moderately less expensive than Alternative 3 (Disposal to LLBG) because of the lower unit cost for disposal. |