Idaho
National
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Department
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EGG-WM-8587
October 1992
Revision 2

INFORMATION ONLY

DECONTAMINATION AND DECOMMISSIONING PLAN FOR THE SPERT-IV WASTE HOLDUP TANK AND UNDERGROUND PIPING

D. L. Smith
S. M. Hailey

EG&G Idaho

Work performed under
DOE Contract
No. DE-AC07-76ID01570

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EG&G Idaho, Inc.
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Office of Environmental Restoration and Waste Management
Under DOE Idaho Field Office
Contract No. DE-AC07-76ID01570

DECONTAMINATION AND DECOMMISSIONING
PLAN FOR THE SPERT-IV WASTE HOLDUP
TANK AND UNDERGROUND PIPING

APPROVED BY:

INFORMATION ONLY

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(Original signatures appear on DRR number ERD-712, dated October 15,1992

ABSTRACT INFORMATION ONLY

This report specifies requirements and identifies tasks associated with the decontamination and decommissioning of the Special Power Excursion Reactor Test No. 4 (SPERT-IV) waste holdup tank and underground piping. Decommissioning of the SPERT-IV waste holdup tank and associated underground piping as specified in this plan is designed to be completed in FY 1991.

INFORMATION ONLY

CONTENTS

FIGURES

TABLES

ACRONYMS

ACWP	actual cost of work performed
ALARA	as low as reasonably achievable
AWOS	Automated Work Order System
BCWS	budgeted cost of work scheduled
BCWP	budgeted cost of work performed
CAM	constant air monitor
CAPS	Cost and Planning System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
COCA	Consent Order and Compliance Agreement
CPM	Critical Path Method
D&D	decontamination and decommissioning
DFSD	Division of Facility and Site Decommissioning
DOE-ID	Department of Energy, Idaho Operations Office
EC	Environmental Checklist
EG&G Idaho	EG&G Idaho, Inc.
H&S	Health and Safety
HP	health physics
IH	industrial hygienist
INEL	Idaho National Engineering Laboratory
IPS	integrated planning sheets
IWMIS	Industrial Waste Management Information System
LLRWAC	Low-Level Radioactive Waste Acceptance Criteria
MTF	Memorandum to File
MWSF	Mixed Waste Storage Facility
NEPA	National Environmental Policy Act
NPL	National Priority List
OSR	Operational Safety Requirement
PD	Program Directive
PMP	Program Management Plan
PPE	personal protective equipment
PWA	Process Waste Assessment
QA	Quality Assurance
RCRA	Resource Conservation and Recovery Act

RWMC	Radioactive Waste Management Complex
RWMIS	Radioactive Waste Management Information System
SAP	Sampling and Analysis Plan
SAR	Safety Analysis Report
SARA	Superfund Amendments Reauthorization Act
SFMP	Surplus Facilities Management Program
SPERT-IV	Special Power Excursion Reactor Test No. 4
SWP	safe work permit
SWR	site work release
VOC	volatile organic compound
WBS	work breakdown structure
WERF	Waste Experimental Reduction Facility
WMPD	Waste Management Programs Department

DECONTAMINATION AND DECOMMISSIONING PLAN FOR THE SPERT-IV WASTE HOLDUP TANK AND UNDERGROUND PIPING

1. INTRODUCTION

The U.S. Department of Energy, Idaho Operations Office (DOE-ID) has assigned EG&G Idaho, Inc. (EG&G Idaho) the responsibility for implementing the decontamination and decommissioning (D&D) program at the Idaho National Engineering Laboratory (INEL).

This plan specifies requirements and identifies tasks associated with the D&D of the Special Power Excursion Reactor Test No. 4 (SPERT-IV) waste holdup tank and underground piping. The waste holdup tank and underground piping are part of the SPERT-IV ancillaries, which are included in the Surplus Facilities Management Program (SFMP) inventory of facilities to be decommissioned. The SPERT-IV ancillaries consist of the waste holdup tank, underground piping, leach pond, and SPERT-IV lake. The ancillaries were characterized in 1985 and 1988, and characterization results are documented in Reference 1.

The characterization results relative to the SPERT-IV leach pond and lake indicate no radiological contamination exists in the leach pond and lake, but hazardous constituents are present. Additional characterization is required in the leach pond and lake to determine the extent of hazardous contamination. This additional characterization will be followed with closure plans for the SPERT-IV leach pond and lake in accordance with the INEL Consent Order and Compliance Agreement (COCA).

The SPERT-IV ancillaries characterization results, however, clearly show that the waste holdup tank is radiologically and chemically contaminated. For this reason, a decision was made to separate the decommissioning of the waste holdup tank from the future closure of the leach pond and the lake. Decommissioning of the SPERT-IV waste holdup tank and associated underground piping as specified in this plan is designed to be completed in FY 1991.

The relative location of the SPERT-IV facility within the INEL is shown in Figure 1.

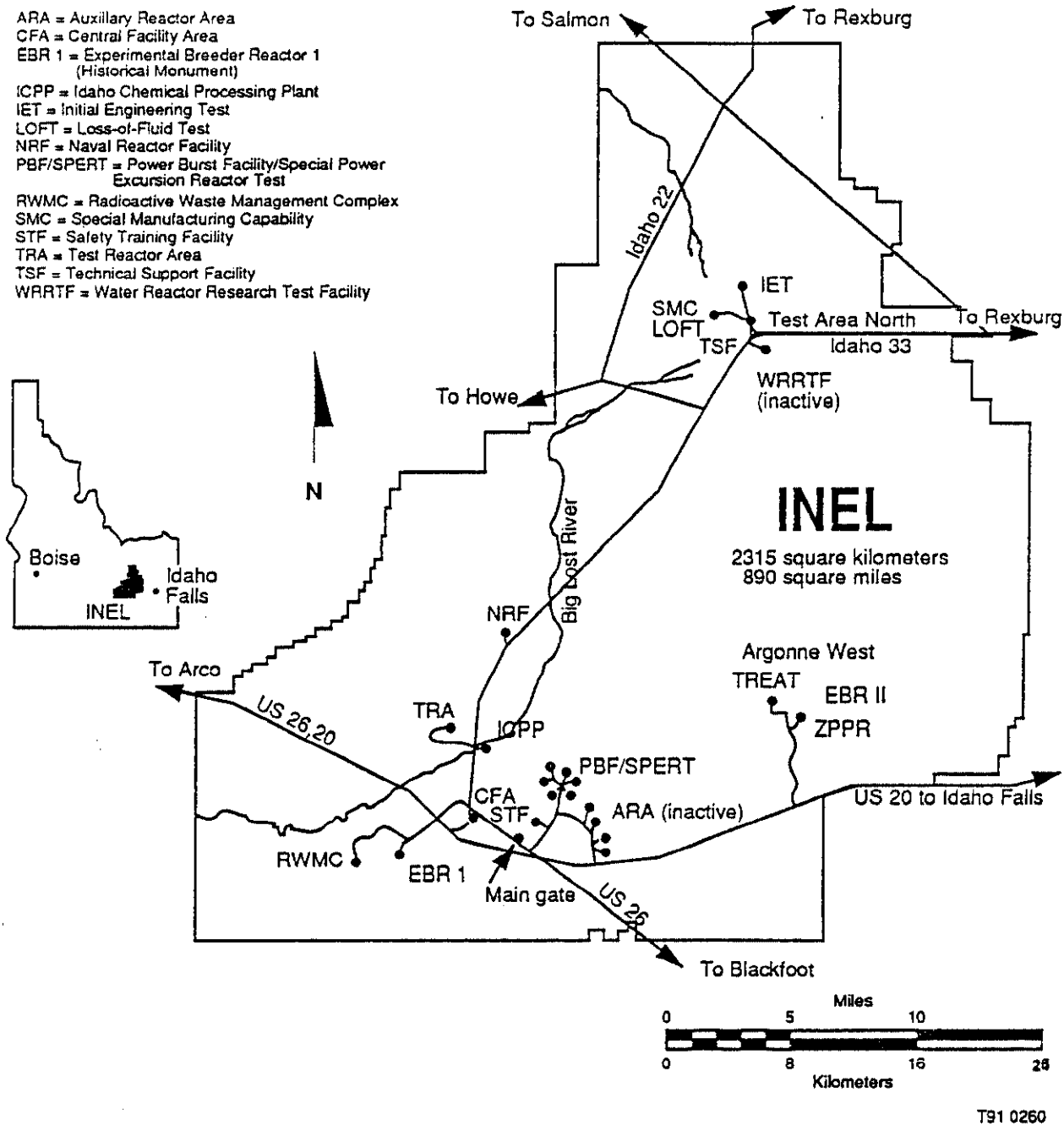

Figure 1. INEL site map.

2. PROJECT SCOPE AND OBJECTIVES

The objectives of this D&D project are to prevent future contamination spread into the environment, prevent possible radiation and hazardous exposure to the public or INEL personnel, and leave the area in a condition for unrestricted use. To meet these objectives, the following tasks must be performed:

- Remove approximately 8.3 ft^3 of dry mixed waste sludge from the waste holdup tank and transport the sludge to the Mixed Waste Storage Facility (MWSF).

- Section the waste holdup tank and transport to the Waste Experimental Reduction Facility (WERF) for size reduction and eventual disposal at the Radioactive Waste Management Complex (RWMC). If sections of the tanks can be certified non-radioactively contaminated, those sections will be recycled as scrap steel and stored in the Central Facilities scrap yard.

- Excavate approximately 150 ft of 6-in. concrete pipe between the SPERT-IV reactor building and the leach pond and dispose of radioactive waste at the RWMC.

- Excavate approximately 150 ft of uncontaminated 6-in. tile pipe between the SPERT-IV reactor building and the leach pond and dispose of the waste at the Central Facilities landfill.

- Excavate approximately 300 ft of steel pipe between the SPERT-IV reactor building and the SPERT-IV lake. If the waste pipe is determined to possess radiological contamination or mixed contamination, it will be disposed of at the RWMC or MWSF, respectively. Should the pipe be determined to be free of contamination, it will be recycled as scrap steel and stored in the Central Facilities scrap yard.

- Remove the under-tank concrete pad (~26-ft diameter) and dispose as radiologically contaminated waste, mixed waste, or noncontaminated

solid waste depending upon the outcome of contaminant analysis and monitoring.

- Remove any radiological or mixed waste contaminated soil from the tank area and dispose of the soil at the RWMC or MWSF, respectively.

- Backfill the trenches resulting from the pipe excavations and recontour and revegetate the area.

3. FACILITY DESCRIPTION

This section describes the SPERT-IV waste holdup tank and the underground pipes relative to physical, radiological, and hazardous conditions. The history and background of the SPERT-IV facility can be obtained from Reference 1. Figure 2 is the SPERT-IV site plan showing the locations of the waste holdup tank and underground piping.

3.1 Waste Holdup Tank

The waste holdup tank (PBF-714) is located 170 ft south of the reactor building. Figure 3 is a view of the waste holding tank from the east. Notice the small utility shed that houses the three-way valve, the electrical plugs, and the air line. Figure 4 is an interior view of the waste holding tank showing a vertical overflow pipe and the sparge line. Notice the dark section where condensation appears. This is the side not directly exposed to sunlight. Near the small pipe, lower right, is a collection of insulation and bits of cactus spines, apparently brought in by rodents. Figure 5 is a closeup view of the drain to the leach pond which is suspected of being the rodent's entry and exit way.

The waste holdup tank is a 26-ft-diameter by 16-ft-high (working height) welded steel tank with a 61,000-gal capacity. The overall height of the tank is 21 ft. The tank is uninsulated and is equipped with immersion heaters to prevent freezing. The tank has no asbestos in or on it. The tank has a manway at the top on the east side and a manway approximately 1-1/2 ft above the ground on the south side (see Figure 3).

In 1985 there was approximately 60 gal of contaminated water spread over the bottom of the tank to a depth of 0.5 in. The tank showed signs of corrosion where the protective coating had flaked or peeled off. There was sludge on the bottom of the tank contaminated with radioactive mixed waste. The average depth of the sludge was approximately 0.2 in., constituting a volume of approximately 8.3 ft^3. Figure 6 is a view of the contaminated waste holdup tank manual release valve and handle, which directs flow from the tank to the leach pond. It is located on the south side of the utility shed near

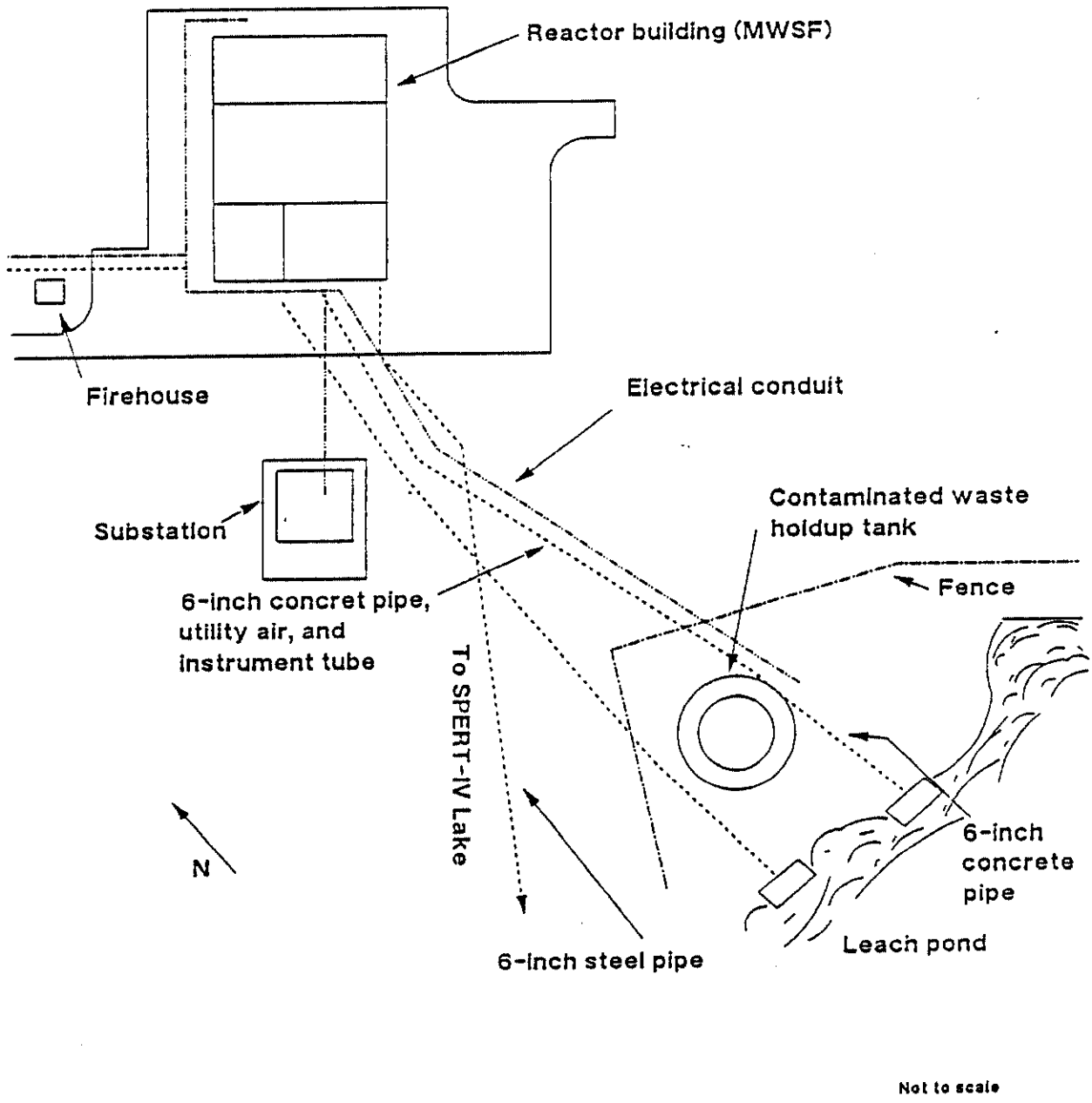

Figure 2. SPERT-IV site plan.

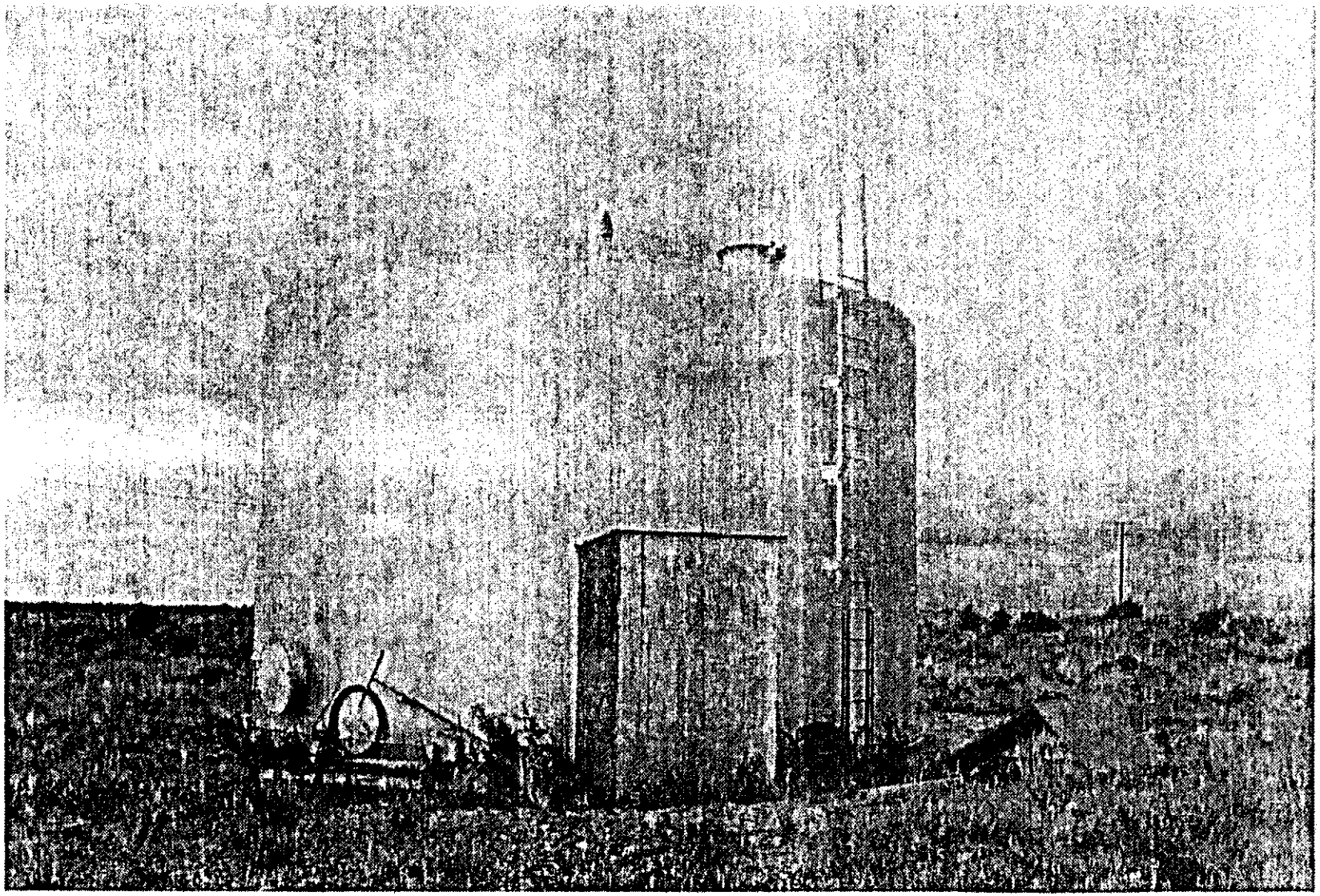

Figure 3. View of the waste holdup tank. (Note the small utility shed which houses the three-way valve, the electrical plugs, and the air line.) (85-428-1-7)

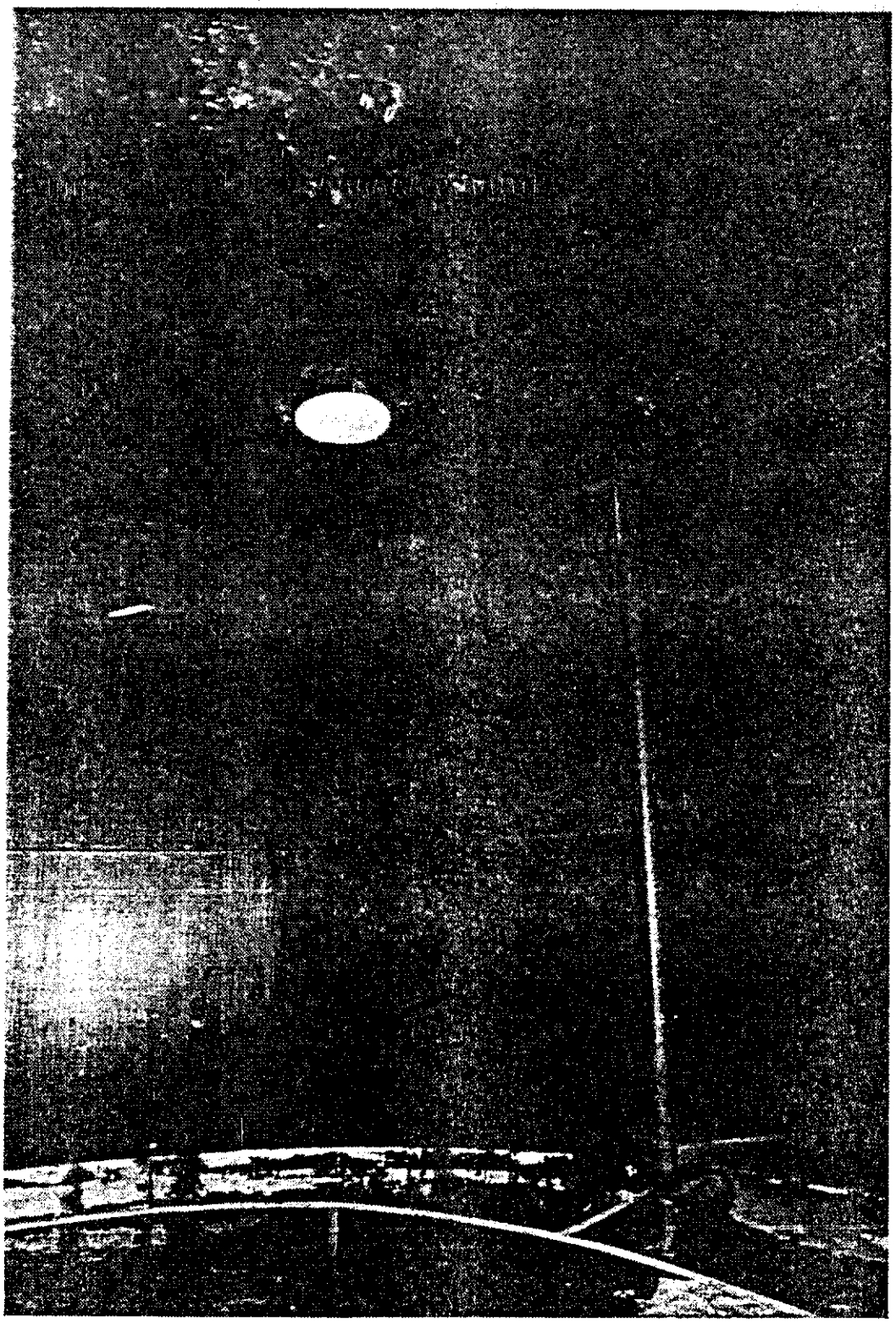

Figure 4. Interior view of the waste holdup tank. (Note the dark section where condensation appears.) (85-514-1-8)

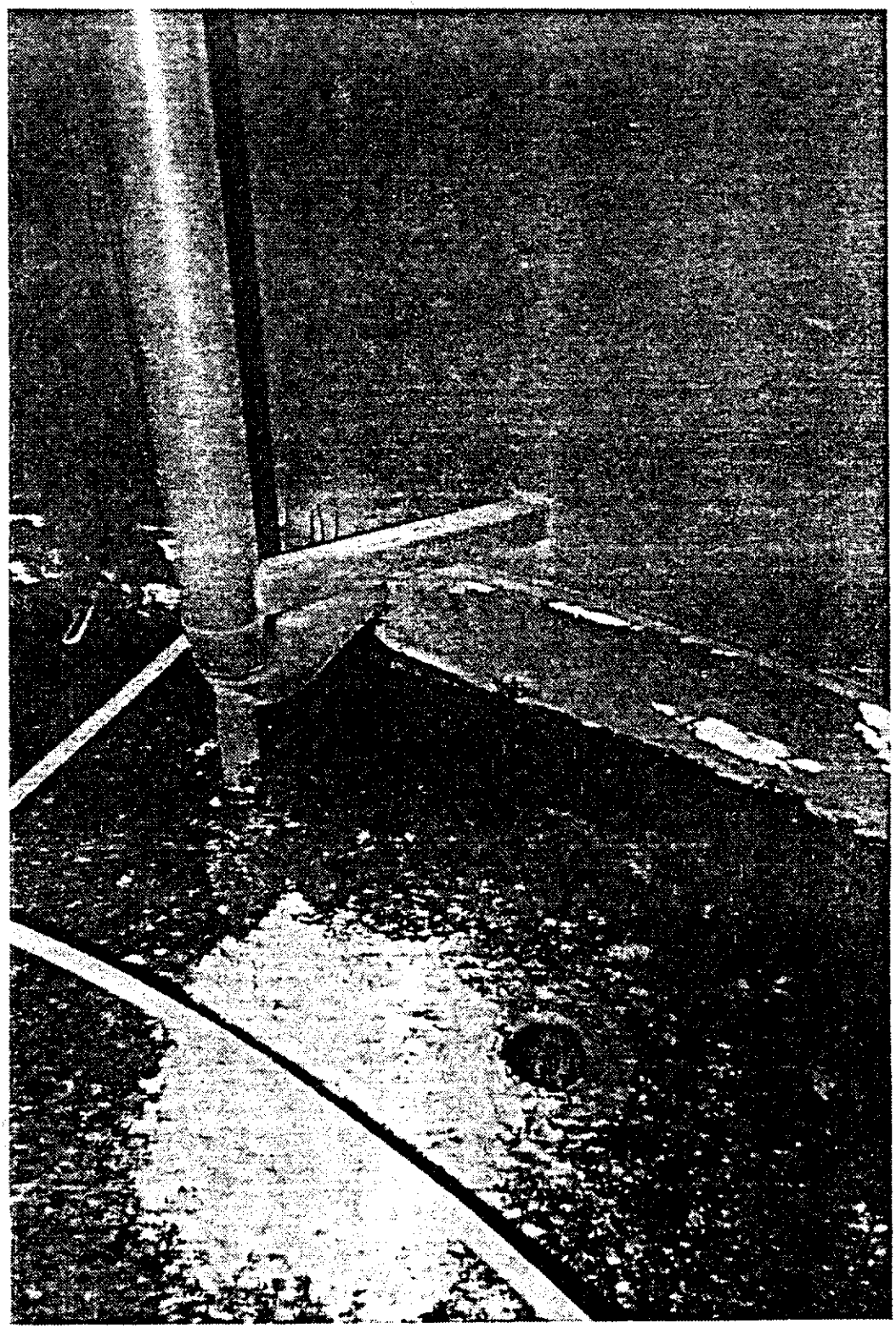

Figure 5. Closeup view of the drain to the leach pond. (Note the heating element at the left edge of the view.)(85-514-1-13)

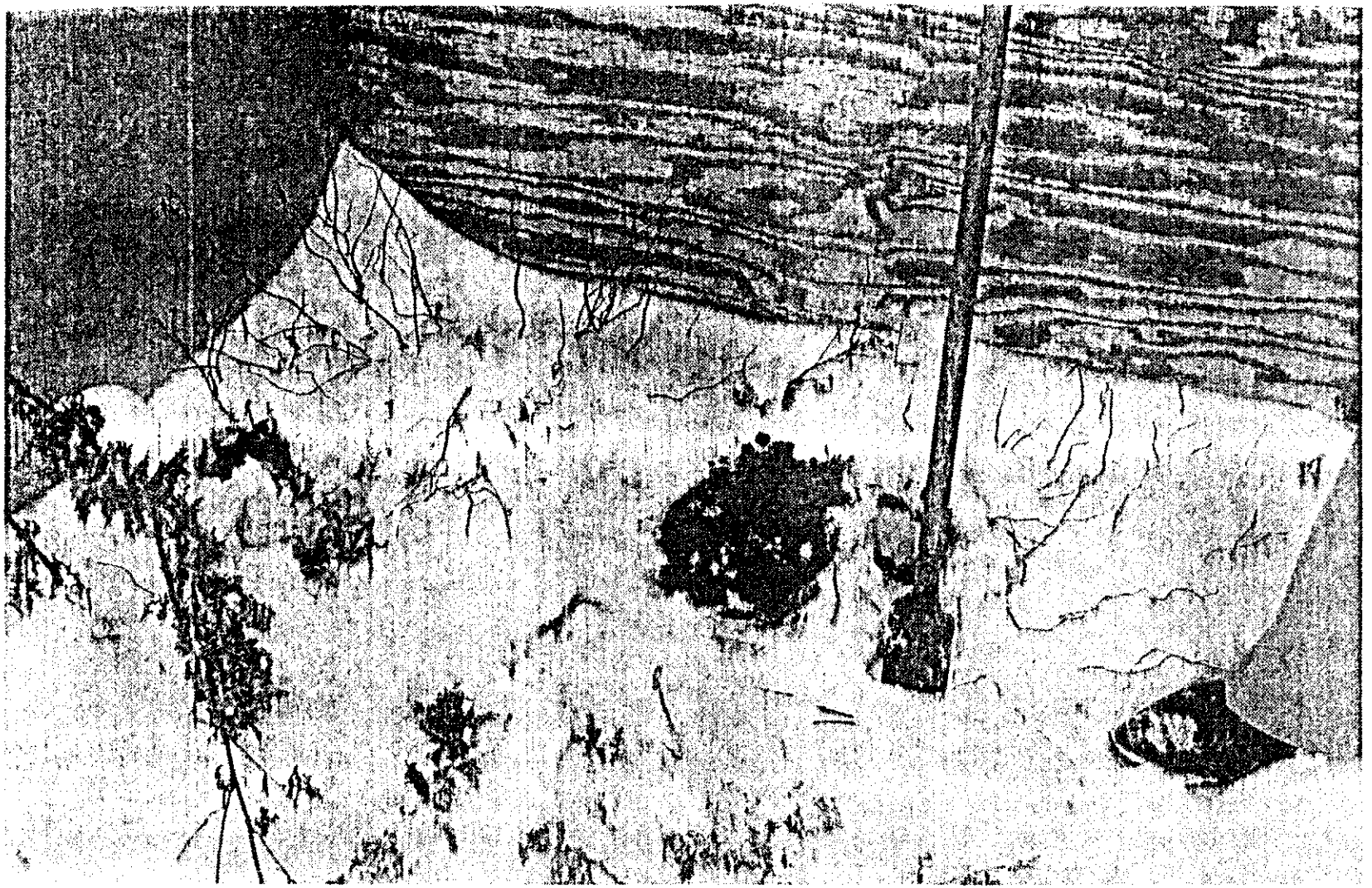

Figure 6. View of the waste holdup tank manual release valve and handle.(85-455-1-6)

the manway. The underground power from the SPERT-IV reactor building to the waste holdup tank was isolated in December 1985.

The SPERT-IV waste holdup tank and its water and sludge contents were characterized in 1985 and 1988.[1] The results of this characterization are summarized in Table 1 for radioisotopes and Table 2 for hazardous constituents.

The amount of U-235 in the SPERT-IV waste holdup tank is calculated below. This calculation is based on the amount of sludge in the tank and the concentration of U-235 given in Table 1.

$$Volume = 8.3\ ft^3 .$$

Volume is based on 3/16-in. sludge depth in the bottom of a 26-ft diameter tank.

Assuming a sludge density of 2 g/cm^3, the mass of the sludge is

$$m = (8.3\ ft^3) * (28{,}320 cm^3/ft^3) * (2\ g/cm^3) = 470{,}112\ g .^a$$

All isotopes in the sludge are neglected except U-235 because U-235 is the only fissionable isotope besides Pu-239, and the isotopic concentration of Pu-239 is insignificant compared to U-235 (see Table 1).

$$U\text{-}235\ Activity = (0.43 \times 10^{-9}\ Ci/g)\,(470{,}112\ g) = 2.2 \times 10^{-4}\ Ci .$$

$$Specific\ Activity\ of\ U\text{-}235 = \frac{3.578 \times 10^5}{(half\ life\ in\ years)\,(atomic\ mass)} .^b$$

---

a. The assumed density of 2 g/cm^3 is based on densities of soils listed in the "Handbook of Tables for Applied Engineering Science."

b. The equation was taken from the "Radiological Health Handbook," U.S. Department of Health, Education, and Welfare.

$$\text{Specific Activity of U-235} = \frac{3.578 \times 10^5}{(7.04 \times 10^8)(235)} = 2.163 \times 10^{-6}\ Ci/g.$$

TABLE 1. RADIOISOTOPIC CONCENTRATIONS IN SPERT-IV WASTE HOLDUP TANK LIQUID AND SLUDGE (1985)

Radioisotope	Liquid Sample (pCi/mL)	Sludge Sample (pCi/g)
Co-60	NDa	ND
Cs-137	(7.81 ± 1.65)E-1	(1.79 ± 0.3)E+3
Sr-90	(2.1 ± 0.4)E-1	8.0 ± 1.0E+2
Pu-238	(4.0 ± 2.0)E-4	1.60 ± 0.8E-2
Pu-239, 240	(3.4 ± 0.3)E-3	2.10 ± 0.2E+1
Am-241	(2.0 ± 1.0)E-3	1.1 ± 0.1E-1
U-238	(4.8 ± 0.3)E-1	2.2 ± 0.2E+3
U-235	(1.19 ± 0.07)E-1	4.3 ± 0.2E+2
U-234	(1.19 ± 0.07)E-1	4.3 ± 0.2E+2
U-234	1.8 ± 0.1	7.6 ± 0.4E+3

a. ND means the radioisotope was not detected.

TABLE 2. CONCENTRATIONS OF INORGANICS IN THE SPERT-IV WASTE HOLDUP TANK FROM SLUDGE ANALYSIS IN 1988

Inorganic	Concentration in Sludge (mg/kg)	Equivalent Concentration[a] (mg/L)	EP Toxicity Maximum Concentration[b] (mg/L)
Arsenic	50	2.5	5.0
Barium	95	4.8	100.0
Cadmium	2.4	0.1	1.0
Chromium	2,810	140	5.0
Lead	16,880	844	5.0
Mercury	0.12	0.01	0.2

a. Sludge concentration in mg/kg times 0.05 gives the equivalent concentration in milligrams per liter if all the containment present were to pass into solution during the EP Toxicity Test specified in 40 CFR Part 261, Appendix II.

b. These concentrations are listed in Table 1 of 40 CFR Part 261.24.

Grams of U-235 in the Sludge = activity of U-235 ÷ specific activity

$$= \frac{2.2 \times 10^{-4}\ Ci}{2.163 \times 10^{-6}\ Ci/g} = 102\ g.$$

Based on a criticality evaluation, 102 grams of U-235 will not present a problem with the sludge is containerized.[a]

In addition to analyses of liquid and sludge from the waste holdup tank, smears of 100 cm^2 were also collected from the tank interior and analyzed for gross alpha, beta, and gamma radiation. The results of these analyses are given in Table 3.

3.2 Underground Piping

Underground piping to be included in this decommissioning project is shown in Figure 2 and consists of the following:

- A 6-in.-diameter concrete pipe running from the SPERT-IV reactor building to the leach pond via the waste holdup tank. This pipe was used to transfer low-level radioactive waste to the tank or pond depending on radioisotopic concentration. Waste water with a radioactive content greater then 50 cpm above background would automatically be diverted to the waste holdup tank.

- A 6-in.-diameter red tile pipe running from the reactor building to the leach pond. This pipe carried chemical wastes produced during the regeneration of the water softener and two deionizers.

a. J. B. Briggs letter to D. L. Smith, Criticality Evaluation for the Storage of SPERT-IV Sludge at RWMSF, JBB-12-89, May 31, 1989.

- A 6-in.-diameter steel pipe running from the reactor building to the SPERT-IV lake. This pipe was primarily used to discharge uncontaminated cooling water from the SPERT-IV heat exchanger during reactor operation.

- A 1/2-in.-diameter air line and 1-in.-diameter electrical conduit running from the SPERT-IV reactor building to the utility shed adjacent to the waste holdup tank (Figure 3).

TABLE 3. RESULTS OF RADIOACTIVITY ANALYSES OF SMEARS FROM INTERIOR SURFACES OF THE WASTE HOLDUP TANK

Smear Location and Numbers	Alpha Radioactivity (dpm)[a]	Beta-Gamma Radioactivity (dpm)[a]
Tank Manway		
No. 1	220	1800
No. 2	280	1020
No. 3	60	800
Tank Wall Near Manway		
No. 1	32	260
No. 2	0	1220
No. 3	196	750
No. 4	95	0

a. dpm is disintegrations per minute above background.

Smears were taken at the discharge end on the inside surface of the 6-in.-diameter concrete pipe and the 6-in.-diameter red tile pipe. These smears were analyzed for gross alpha, beta, and gamma radiation, and no radioactivity was detected above background. However, all underground pipes (especially the concrete pipe) will be radiologically surveyed during excavation and removal of the piping.

4. MANAGEMENT APPROACH

4.1 Project Management Organization and Interfaces

The SPERT-IV D&D organization and key interfaces are shown in Figure 7. Each block shown in Figure 7 is discussed below.

4.1.1 D&D Program Management

The D&D Program Manager provides the interface between EG&G Idaho and DOE-ID. The D&D Program Manager also provides support to DOE-ID in the official reporting from DOE-ID to DOE-HQ. All official correspondence between EG&G Idaho and DOE-ID relative to this project will be between the D&D Program Manager and the appropriate manager at DOE-ID.

4.1.2 SPERT-IV D&D Project Management

The project manager is responsible for management and control of all D&D work to help ensure completion of the project within budget and on schedule. Project responsibilities include preparation of the D&D plan, review and approval of the integrated planning sheets (IPS) (procedures), preparation and update of detailed schedules, development of a work breakdown structure (WBS), interfacing with support organizations to help ensure safe completion of the project, monitoring progress of the project, and reporting progress and status to the D&D Program Manager.

4.1.3 D&D Operations

D&D operations include supervision and performance of all jobs related to this project, including the excavation of piping, concrete, etc.; boxing, and shipment of waste to the RWMC, the WERF, or to the sanitary landfill; and the restoration of disturbed areas. Required personnel, including crafts and foremen, will be assigned from EG&G Idaho Plant Services to perform the D&D operations.

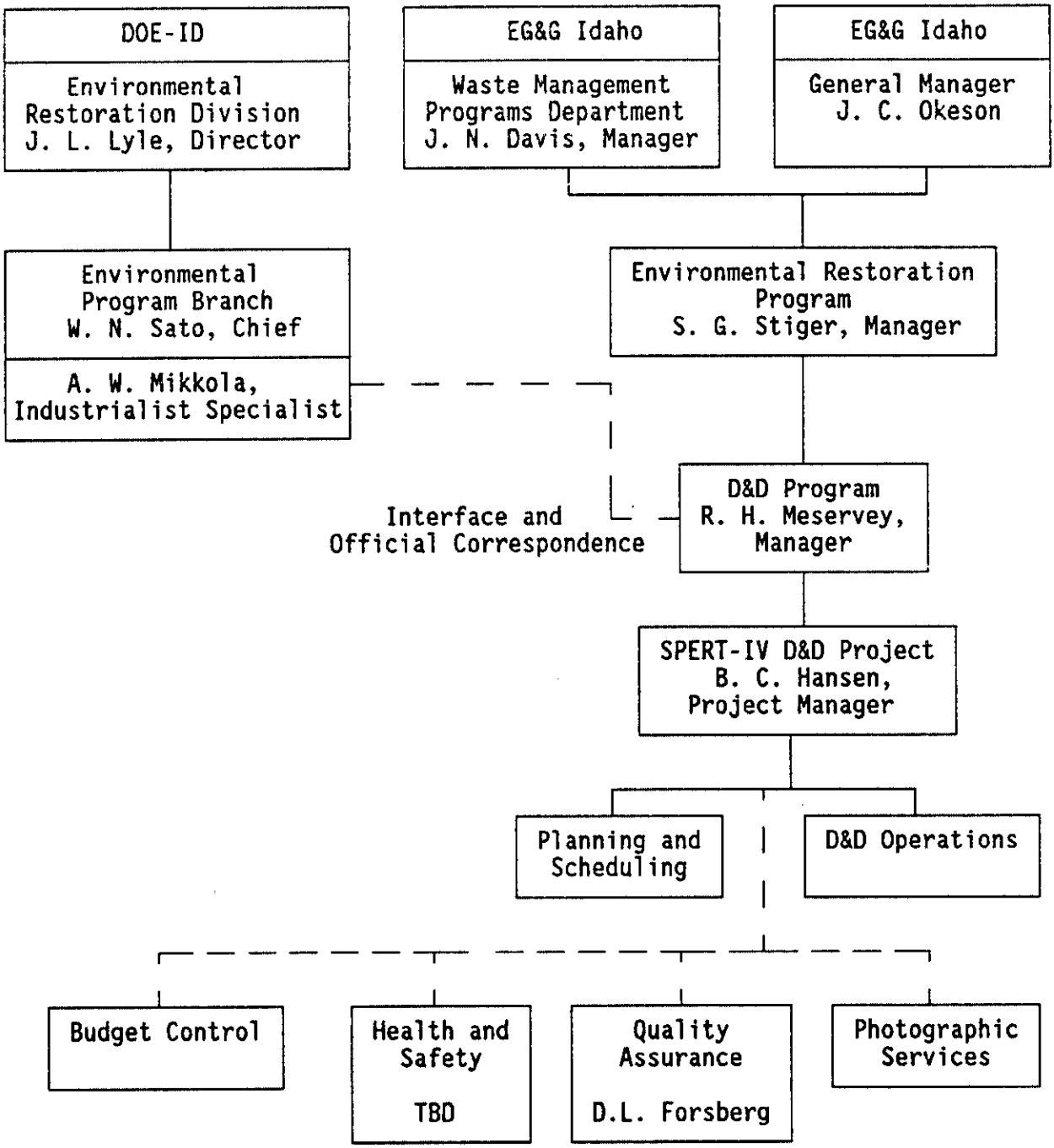

Figure 7. SPERT-IV organization and key interfaces.

During management activities of D&D operations, the project manager will identify opportunities to improve productivity. Examples of possible opportunities to improve productivity include alternate methods, tools, or techniques in performing D&D operations. The project manager shall be receptive to ideas suggested by D&D workers, which could improve productivity. Productivity savings will be shown in the monthly report.

4.1.4 Planning and Scheduling

Planning consists of preparation of work packages including site work releases (SWRs) planning sheets. Scheduling will be conducted to utilize available resources to ensure that the D&D project is completed on schedule. Planning and scheduling will be performed by Central Facilities Area (CFA) Planning and Scheduling.

4.1.5 Budget Control

The Waste Management Programs Department (WMPD) maintains a budget control staff. This staff tracks actual spending through the Cost and Planning System (CAPS) and compares it with budgeted costs. This information is made available to the project manager weekly in order to maintain budget control.

4.1.6 Quality Assurance

Quality engineering review and monitoring services will be provided by ERP Compliance Assurance. The review services include support for both design and work package activities and are to ensure compliance with EG&G Idaho Quality Assurance requirements.

4.1.7 Health and Safety

A task specific addendum for this D&D operation has been prepared for the Health and Safety Plan for Operations performed for the Environmental Restoration Program.[2] The task specific Health and Safety (H&S) plan will be followed to ensure that operations are conducted in a safe manner.

4.1.7.1 Area Safety Engineering. The area safety engineer or equally qualified designated alternate will review all work packages, including safe work permits (SWPs), to ensure incorporation of adequate safety provisions. This safety engineer and the Field Team Leader will also monitor daily work performance and practices to ensure compliance with the task specific H&S Plan (Reference 2). Together, these two individuals will act as the Health and Safety Officer.

4.1.7.2 Area Health Physics. The project health physics (HP) technician will provide radiological monitoring and control to ensure that radiologically safe working conditions are maintained throughout all D&D activities. Included will be continuous monitoring of personnel radiation exposure and airborne radioactivity concentrations. The HP will also ensure all radiation monitoring equipment (e.g., continuous air monitors) is kept in functioning order. Contamination control will be maintained during dismantling, excavation, and handling of waste material.

4.1.7.3 Industrial Hygiene. An industrial hygienist (IH) will monitor all D&D operations and provide appropriate support. The IH will be responsible for all of the monitoring equipment and programs excluding the radiological monitoring. The IH responsibilities during this operation will include monitoring for VOCs and establishing a hearing conservation program. In addition the IH will be responsible for following the guidelines specified in the task specific H&S Plan (Reference 2).

4.1.8 Photographic Services

Photographs of the SPERT-IV area will be taken before, during, and after D&D and will be included in the final report. Photographs taken during D&D will be specified in the integrated planning sheets to ensure the desired photographs are obtained. The photographer will be notified at the time specified in the integrated planning sheet. Required photographs will be defined by the project manager and specified in the integrated planning sheets.

4.2 Administrative Controls

Appropriate project administrative controls have been implemented for budget and schedule control, work control, reporting requirements, and the physical and documentation configuration control process for performing the decommissioning operations.

4.2.1 Budget and Schedule Control

The budget for the SPERT-IV decommissioning project has been established and is maintained by the CAPS used by EG&G Idaho. A cost review will be conducted by the budget officer and the project manager on a weekly basis and again monthly at the end of each accounting period. In addition to the cost review, the schedule presented in Section 6 will be reviewed by the project manager for progress and impact on the budget/schedule relationship and will be used to provide necessary elements for management budget control.

A SWR will be prepared on the Automated Work Order System (AWOS) for each subtask on the WBS discussed in Section 5. The SWR is a written agreement between the project manager and the performing organization, specifying the task to be performed and the labor hours and materials dollars allotted to complete the task. The SWR will define the work to be accomplished, the required completion date, the required reviews, and the access control interface requirements. No work beyond that described by an SWR will be authorized, except as agreed upon with and specified on an SWR field change. The SWR for this project will be identified by a nine-digit charge number of the project tracking and cost accounting purposes.

4.2.2 Work Control

Work control is performed in accordance with the Environmental Restoration Program Program Directives[3] and the Waste Management Department Directives[4], the EG&G Idaho, Inc., Project Management Manual[5], and the EG&G Idaho, Inc., Company Procedures Manual[6]. These documents cover definition of work requiring procedural coverage, procedure development, approval and change control, SWP requirements, waste disposal, final D&D reports, and D&D data files.

At routine D&D program meetings conducted by the D&D program manager, the project progress and current work plans and costs will be checked against scheduled progress and will be budgeted. Such reviews will provide the necessary perspective of work progress and schedule data, and permit management and funding decisions required for successful accomplishment of project activities. Supplemental meetings will be held by the project manager, as necessary, to ensure that proper craft work coordination/ interfaces are understood, are being implemented, and will support the overall project schedule.

4.2.3 Reporting Requirements

4.2.3.1 Periodic Status Reports. The project manager will prepare a monthly project progress report including a description of the work accomplished, a discussion of any problems and resolutions, a description of the work planned for the future, a cost of performance sheet (budget versus actual to date and variance), and a milestone schedule status to be sent to DOE-ID, DOE-HQ, and submitted for inclusion in the Waste Management Programs Status Report that is transmitted to DOE-ID. Informal reports describing progress will be made to the Waste Management Programs Department (WMPD) management as requested. In addition, weekly informal status reports are submitted to DOE-ID and SFMP.

4.2.3.2 Waste Release Reports.

4.2.3.2.1 Radiological and Mixed Waste--In accordance with EG&G Idaho Safety Manual[7] Section 15, "Waste Management," and the EG&G Idaho Radiological Controls Manual[8] Chapter 6, "Radioactive Waste Management," radiological airborne, liquid, and solid waste disposal data will be reported to the INEL Radioactive Waste Management Information System (RWMIS) on Form ID F 5480.2, Radioactive Waste Form for Airborne, Liquid, and Stored Solid Waste, and Form ID F 5480.2A, Disposed Solid Radioactive Waste Form. The forms will be completed for each radioactive or mixed solid waste load being transferred either to the RWMC, WERF, or MWSF. They will be submitted in accordance with "Low-Level Radioactive Waste Acceptance Criteria" (LLRWAC), DOE/ID-10112.[9]

4.2.3.2.2 Industrial Waste--In accordance with EG&G Idaho Safety Manual (Reference 7) Section 15, "Waste Management," nonradioactive airborne, liquid, and solid waste information will be reported to the INEL Industrial Waste Management Information System (IWMIS) on Form ID F 136, "Industrial Waste Form." The form will be completed for each nonradioactive, nonhazardous solid waste load being transferred to the sanitary landfill and retained in the project data package.

4.2.4 Configuration Control Process

4.2.4.1 Engineering Drawings. Preparation and processing of engineering drawings to reflect modifications to the SPERT-IV facility will be in accordance with the EG&G Idaho Drawing Requirements Manual.[10] Drawings will be changed according to the ERP PD 4.1 and approved according to ERP PD 2.2.

4.2.4.2 Documentation. Project control of documentation consists of establishing and maintaining D&D project data files. D&D data files will be established and maintained in accordance with ERP PDs 1.8 and 1.9. Reports will be prepared in accordance with ERP PD 4.4. Changes to documentation will be in accordance with ERP PD 4.1.

4.2.4.3 Building Configuration Control. Upon project completion, the final status of the SPERT-IV facility will be reported to EG&G Facility Management for the INEL status and information requirements.

4.2.5 Change Control

A change control process (methodology and procedure) provides for management control of changes to the approved schedule, budget, funding, scope, and technical baselines of the project. The objectives of the change control process are to assure that proposed changes are properly assessed, only authorized changes are incorporated, that changes are incorporated in a timely manner, and that traceability to the originally approved baseline is maintained.

The change control process includes guidelines for assessing and approving proposed changes and authorizing and implementing approved changes to the program baselines. The change control process involves the following steps: (a) change identification, (b) development and documentation, (c) evaluation, (d) approval/disapproval, and (e) implementation. The change control process promotes orderly project change and may involve DOE-HQ, DOE-ID and/or EG&G Idaho depending upon the degree of change involved.

All changes are identified as Class I, II, or III based on their degree of impact on the project. See change classification, Figure 8. All Class I, II, and III changes are to be documented on a Change Request form.

4.2.5.1 Class I and II Changes. EG&G Idaho initiated changes that are classified as either Class I or II require DOE approval. A Class I change also requires DOE-HQ approval and a Class II change requires DOE-ID approval. In summary, a Class I or II change involves modification to the approved schedule, approved budget, scope, and/or technical baselines contained in the current EG&G Idaho Program Management Plan (PMP).

Class	Change Description	Approval Required
I	Changes of scope, total estimated budget, program baseline schedule, and/or product quality impacting DOE-HQ monitored milestones	Project Manager D&D Program Unit Manager DOE-ID Chief, Environmental Program Branch DOE-HQ Program Manager
II	Changes of scope, budget obligation, schedules, and/or product quality impacting DOE-ID[a] monitored milestones	Project Manager D&D Program Unit Manager DOE-ID Chief, Environmental Program Branch
III	Changes of task, scope, task budget, schedules, and/or product quality impacting monthly reportable milestones	Project Manager D&D Program Unit Manager

a. DOE-Idaho.

Figure 8. Change classification

4.2.5.2 Class III Changes. Class III changes are approved by EG&G Idaho. Class III changes are lower level changes that do not affect project baseline parameters. Class III changes[a] are used to correct obvious errors or changes which do not impact the baseline requirements.

Class III changes include the following restrictions:

- Personnel safety must not be compromised.
- Major project master schedule milestones must not be impacted.
- Requirements baseline must not be impacted.
- System function of process cannot be altered.
- Design margins with respect to performance requirements or applicable codes and standards cannot be altered.
- The ability of equipment, components, structures, or systems to perform their required function must not be reduced.
- The safety or quality classification of equipment components, structures, or systems must not be altered.

4.2.5.3 Initiating Changes. Once a change has been recognized as necessary, a project change request is initiated by the person identifying the change. The project change request form (which can be obtained from the project manager) requires a description of the change; the reason for the change; the impact on scope, cost, and schedule; and the impact to the project if the change is not approved. In general, the project change request is supported by cost estimates and engineering calculations.

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a. Changes that involve converting planning packages into work packages, revising/updating planning packages, or revising/updating unopened work packages are not controlled changes as long as they do not impact the project baseline requirements.

4.2.5.4 Change Priority. The change request initiator should indicate a preliminary priority for the change (the priority identification may be changed during the review/approval cycle).

- Emergency - changes that are of a safety nature or which will force work to stop if not implemented within 24 hours. Class III emergency changes may be approved by verbal communication by the EG&G Idaho program manager. The change will then be documented and processed through the normal change control procedure.

- Urgent - required approval of project change request and authorization documents within five working days to (a) correct a potentially hazardous condition, (b) meet significant contractual requirements, and/or (c) effect a change that potentially would cause a schedule slippage or increased cost.

- Routine - changes that can be processed in a routine manner. Class III changes should normally be processed within 15 calendar days of being initiated.

4.2.5.5 Change Evaluation and Approval. The project change request should be evaluated by the financial services representative, reviewed by all appropriate safety personnel and approved by the responsible project manager. Each reviewer should assure that all assessments have been included and that they agree with the proposed change. Questions or proposed amendments should be resolved, if possible. Nonconcurrence with the project change request by a reviewer should be indicated with the reasons noted on the project change request. The project change request is then evaluated and dispositioned by the D&D program manager. The D&D program unit manager may elect to convene a change request meeting of the responsible managers prior to final disposition.

- Approved - authority to implement the change. All affected documentation should be revised as soon as practical (within 30 days if possible).

  - Class I or Class II change - requires evaluation and disposition by program manager prior to implementation.

- Class III Change - change is authorized and is to be implemented.

- Disapproved - change is not to be implemented. (A revised project change request may be requested by the program manager for resubmittal.)

- Deferred - disposition on hold until a later date. May require additional information or other input prior to final evaluation and disposition.

4.2.5.6 Change Traceability. The project manager will perform the duties of the Change Control Administrator. The Change Control Administrator will (a) assign a document number to EG&G Idaho initiated change requests, (b) maintain the record file of all change documentation, (c) maintain a listing (log) of all project change requests, (d) assist the financial services representative in determining the cost impact of changes, (e) track all project change requests through the change control process, (f) provide a final check that all documents indicated on an approved project change request have been completed, and (g) provide copies (comment and final) of the project change request to the affected staff. Copies of comment project change requests (Class I and II) and final project change requests (Class I, II, and III) will be distributed to DOE-ID and DOE-HQ.

4.3 Performance and Completion Measurement Criteria

The activities shown in Figure 9, Critical Path Method (CPM) network, will be used to measure and report schedule performance. Each node represents a milestone completion. The computer program CAPS used at EG&G Idaho will provide budget versus cost information on a weekly basis, which also includes monthly and cumulative project element cost information. The CAPS report is the basis for the monthly and cumulative project cost data for the control and reporting requirements discussed in Sections 4.2.1 and 4.2.3.1.

The "Earned Value" concept will be used to measure and report project performance. Cost and schedule will be tracked and variances reported.

For this project, cost and schedule variances are defined as follows:

Cost Variance = BCWP - ACWP

Schedule Variance = BCWP - BCWS

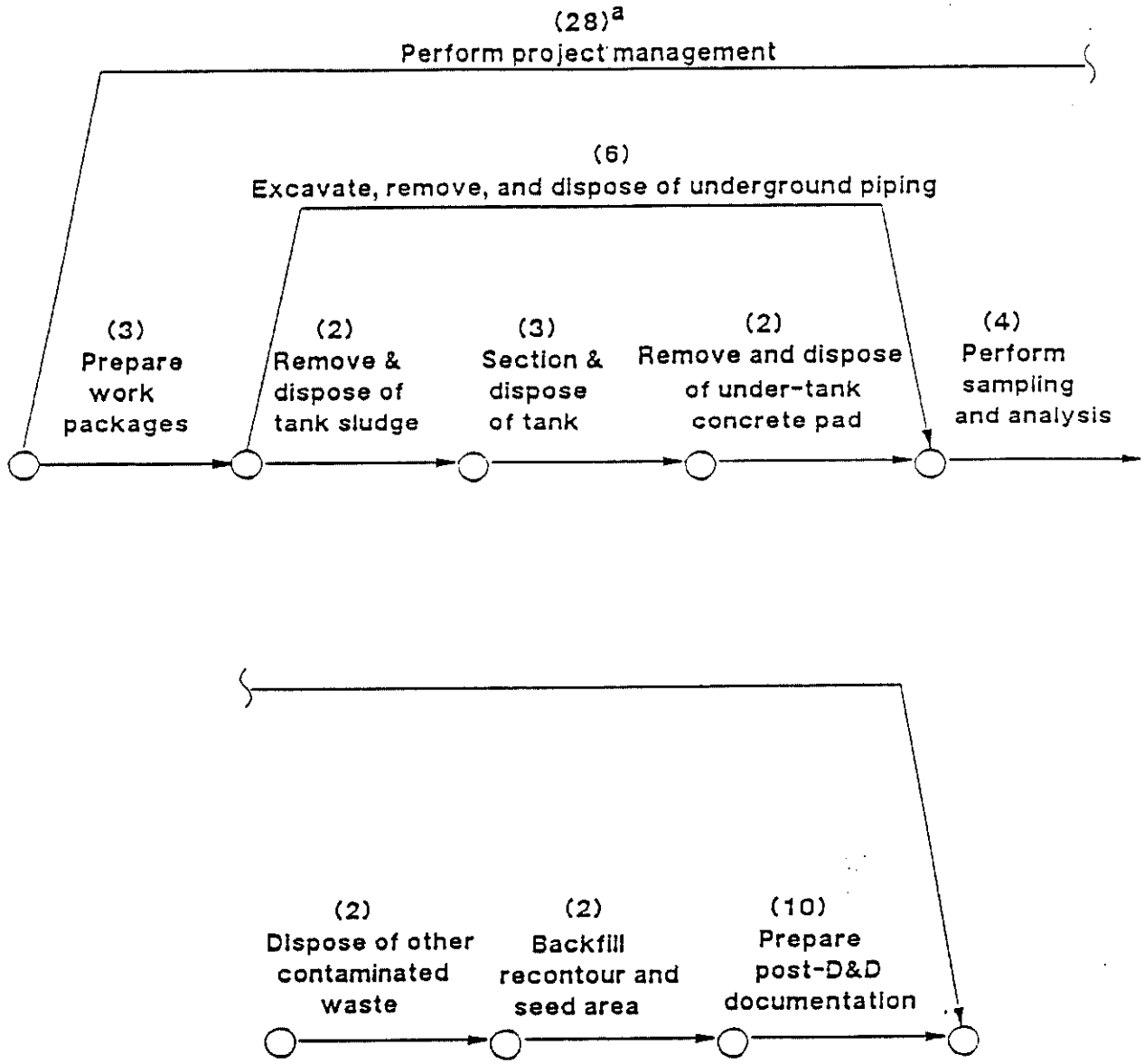
where

ACWP = Actual Cost of Work Performed. The ACWP is the sum of the costs incurred in accomplishing work. These data are obtained from CAPS reports.

BCWP = Budgeted Cost of Work Performed. The BCWP is known as earned value and is the cost budgeted for work actually completed.

BCWS = Budgeted Cost of Work Scheduled. The BCWS represents the Budgeted Cost of Work Scheduled in a time-phased manner in the baseline. The BCWS used in calculating the schedule variance at a given time is the BCWS at that given time.

Figure 10 shows four possible project performance measurement conditions.



a - Numbers in parentheses are estimated durations in weeks.

Figure 9. Critical path method network for decommissioning SPERT-IV waste holdup tank and underground piping.

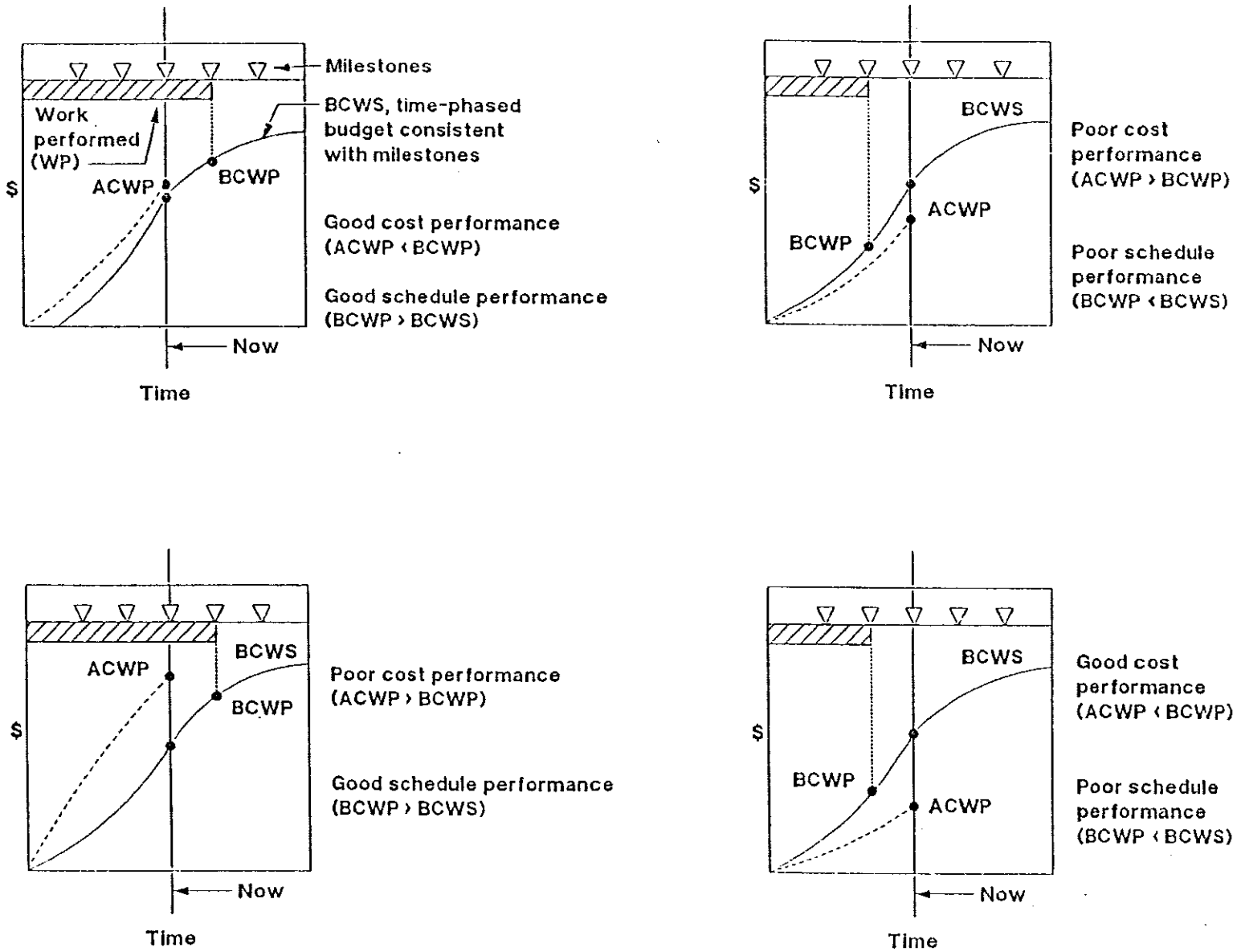


Figure 10. Cost and schedule analyses.

5. TECHNICAL PLAN

This section specifies the tasks required to accomplish the project objectives given in Section 2. In addition, project engineering is discussed in this section.

5.1 Engineering

5.1.1 Alternative Selection

Selection of the alternative for decommissioning the SPERT-IV waste holdup tank and associated underground piping was performed informally by considering two alternatives. The two alternatives considered were (1) removal and disposal of the tank and piping and (2) do nothing.

Alternative 1 was selected because it accomplishes the objectives specified in Section 2 and Alternative 2 does not meet any of the objectives.

5.1.2 Design Criteria

The design criteria for equipment and modifications of existing DOE-ID facilities are outlined in the INEL Architectural Engineering Standards (1979) and ID 12044, Operational Safety Design Criteria Manual as revised September 1988.

Rigging and lifting equipment required for the project will be designed, fabricated, and tested in accordance with guidelines and requirements in the DOE Hoisting and Rigging Manual[11] and the EG&G Safety Manual (Reference 7).

5.2 Work Breakdown Structure

The WBS for decommissioning of the SPERT-IV waste holdup tank and underground piping is shown in Figure 11. Each work element shown in Figure 11 is described briefly in this section. Detailed procedures

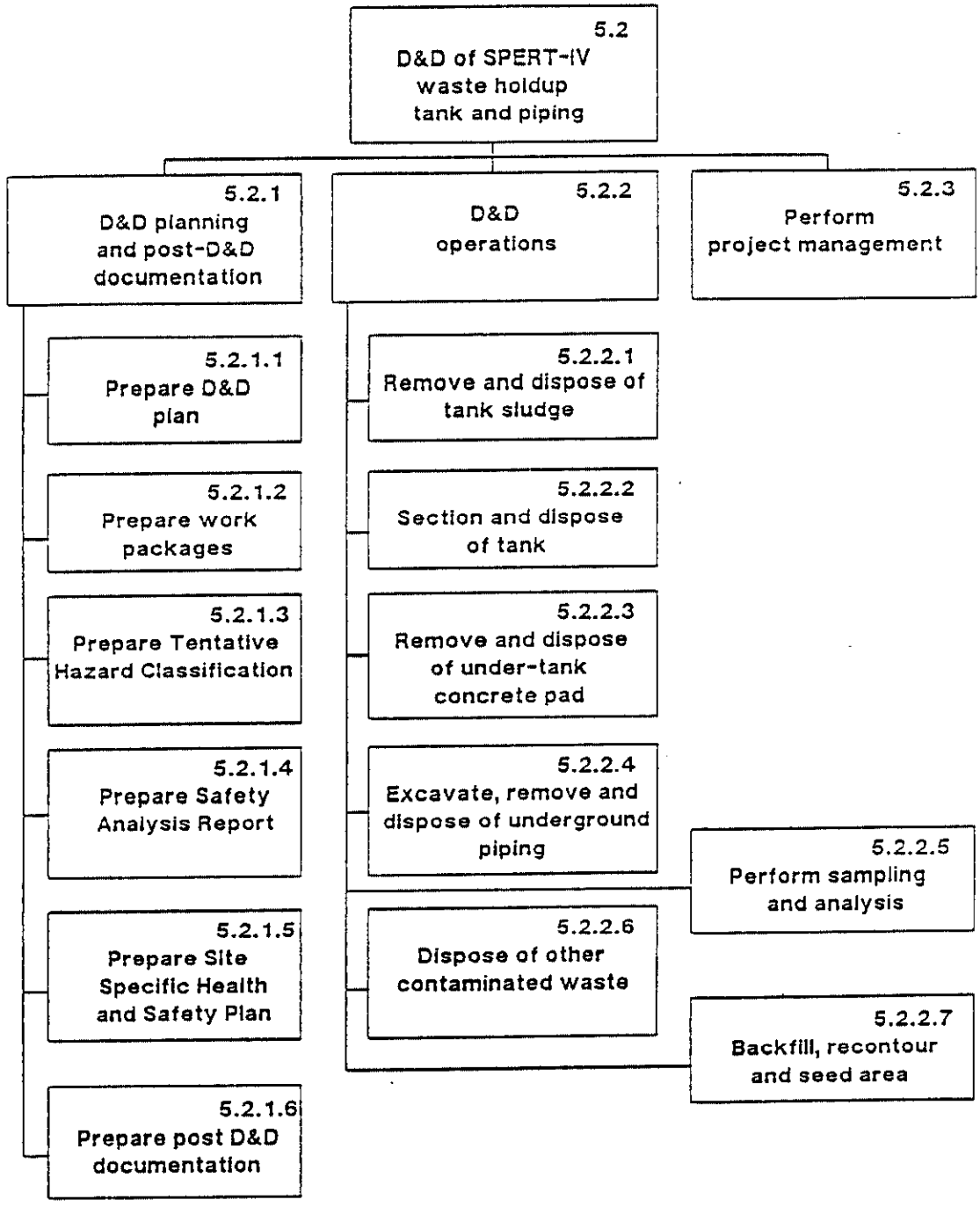


Figure 11. Work breakdown structure for SPERT-IV D&D project.

covering each work element under D&D operations will be specified in the integrated planning sheets to be prepared prior to start of decommissioning operations. At the present time this is expected to be adequate. If an unexpected problem occurs during operations that involves an unusually complicated or hazardous task, detailed operating procedures will need to be written and approved per ERP PD 5.11.

The following general work control guidelines will be adhered to throughout D&D activities and are given here in order to avoid repeating them for each activity. Specific safety related requirements are contained in the task specific H&S Plan (Reference 2). In performing all of the D&D operations in radiation areas and with contaminated components, it is mandatory that personnel exposure to radiation be maintained as low as reasonably achievable (ALARA). Anti-C clothing, full-face respirators, and other protective equipment are, without exception, to be worn or used by all personnel in accordance with requirements of the EG&G Idaho Radiological Controls Manual (Reference 8). At least two persons, with an HP technician and IH to monitor radiation and other hazards, will perform D&D operations. All D&D operations will be accomplished in accordance with approved SWRs and SWPs.

When performing work with a high probability of spreading airborne radioactive contamination, an air monitor or sampling device will be used to detect airborne radioactivity to provide information for personnel protection and prevent the spread of radioactive contamination. This work will include dry sludge removal and excavation. Also, fugitive dust will be controlled as necessary by using water or appropriate soil fixatives to prevent contamination spread. Excavation will be performed in compliance with 29 CFR 1926, Subpart P and EG&G Safety Manual, Section 20, Appendix B for prevention of cave-in, fall-in, rupture of underground systems, and machine contact with overhead or buried electrical lines.

Cutting operations will be stopped when handling, hoisting, or other removal of piping or equipment is to be initiated in the vicinity of the cutting operations. Cutting operations will be resumed only after hoisting operations have been completed. Other D&D activities will be controlled with equal rigor and a primary emphasis on safe work practices and ALARA principles.

Radiological surveys, visual inspections, and evaluations of operating data, including discussions with safety and maintenance personnel, indicate that all problem areas, such as radioactive contamination, have been identified. Methods for dealing with radioactivity if found in piping, concrete, or soil will be specified in the integrated planning sheets. Should an unexpected problem be encountered, a plan with backup options will be developed to deal with the problem.

Inspection and evaluation will be performed to ensure that all piping and equipment have been drained. However, precautions will be taken throughout D&D operations to check for trapped or residual liquids when cutting pipe. If liquids are encountered, they will be containerized, sampled, and analyzed for chemical and radioactive compositions. They will be disposed of appropriately using approved waste disposal procedures.

During excavation of soil and removal of the under-tank concrete pad, the HP technician will measure the radioactivity of the soil. If any radioactivity is above background, a soil sample will be collected and analyzed on an instrument capable of detecting gross alpha, beta, and gamma. Subsequent analyses will be determined by the project manager based on the results of the gross measurement. In addition to radioactivity measurements by the HP technicians, the IH will check for VOCs using an HNU or other meter capable of detecting VOCs.

5.2.1 D&D Planning and Post-D&D Documentation

5.2.1.1 Prepare D&D Plan. The D&D plan incorporates guidelines set forth in References 14 and 15. The D&D plan also reflects the results of predecommissioning characterization and calculations presented in Section 3.1 of the D&D plan and supporting calculations.[a]

5.2.1.2 Prepare Work Packages. This activity will be accomplished prior to and throughout implementation of the SPERT-IV D&D project to direct and authorize the performance of D&D operations as described in Section 5.2.2.

SWR planning sheets will be used for work instructions in the work packages. Details of procedures will depend on the related hazards and the complexity of the task.

5.2.1.3 Prepare Tentative Hazard Classification. This document will be prepared prior to the Safety Analysis Report.[12] It will identify the major hazards associated with the D&D operation and contain some initial analyses of the magnitude of the severity of the hazards.

5.2.1.4 Prepare Safety Analysis Report. A Safety Analysis Report (SAR) contains a detailed analysis of the hazards associated with the activity in question. This will include some calculations involving worst case accident scenarios as well as an identification of all possible hazards associated with the activity. In addition, the SAR will contain an Operational Safety Requirements (OSR) section that defines the safety envelope for conducting the project.

5.2.1.5 Prepare Site Specific Health and Safety Plan. This plan will be used as a field guide for ensuring that all operations are conducted in a safe manner. The Health and Safety Plan identifies all the foreseen hazards involved in an activity and provide guidance in mitigating these hazards. Guidance for selecting PPE, decontamination procedures, and emergency action items are among the topics included.

5.2.1.6 Prepare Sampling and Analysis Plan. The Sampling and Analysis Plan (SAP)[13] will be prepared in accordance with ERP PD 5.2. The plan will provide a basis for determining the extent of radiolytic and chemical contamination in the soil, piping, concrete, and metal. This will ensure that all material is properly disposed.

5.2.1.7 Prepare Post-D&D Documentation. Following completion of all D&D operations as defined in Section 5.2.2, post-D&D documentation will be prepared. The post-D&D documentation will include the following:

- Project final report

- Record of completion
- Project data package

- Project photo book.

5.2.2 D&D Operations

5.2.2.1 Remove and Dispose of Tank Sludge. Approximately 8.3 ft^3 of dry sludge will be removed, placed in 55-gal drums, and stored at the INEL RWMC. When the sludge is removed, EG&G Safeguards shall be notified in writing that an estimated 102 grams of U-235 are being stored.

Care must be taken during this sludge removal to ensure no airborne contamination leaves the interior of the tank. The area outside and downwind of the waste holdup tank will be air monitored to detect any radioactivity above background. This will be done using a constant air monitor (CAM) during sludge removal. A criticality calculation was made to verify that no criticality problem exists even if all of the sludge is placed in a single 55-gal drum.[a]

Specific instructions for sludge removal will be specified in the SWR planning sheets. The final condition of the interior surfaces of the waste holdup tank following the removal of the sludge must be such that no contamination will become airborne or otherwise spread during subsequent tank sectioning.

5.2.2.2 Remove and Dispose of Tank. The SPERT-IV waste holdup tank and adjacent utility shed will be sectioned and radioactivity contaminated parts transported to either the WERF for sizing or transported directly to the RWMC. If approval can be obtained to ship large sections of the tanks to the WERF for sizing and if sizing at WERF is cost effective compared to sizing in the field, the tank sections will be shipped to WERF.

The standard method for packaging waste for shipment to WERF is to section components to fit into waste bins which are 4 x 4 x 8 ft. Standard packaging of the tank sections for shipment to WERF, of course, would not make

sense for this project because sections 4 x 8 ft could not be volume reduced. Approval of a nonstandard packaging and transportation method to WERF will be sought if sizing at WERF instead of in the field is cost effective. To determine if shipping to WERF is cost effective, the exact WERF requirements for packaging and transportation of large, nonstandard sections must be evaluated and the cost compared with additional sizing in the field. The required size of the tank sections for shipment to WERF compared to the required size of the tank sections for shipment directly to the RWMC is specified in Section 5.3. Whether the tank is sized in the field or at WERF will be decided during the preparation of SWRs and specified in the planning sheets.

No tank decontamination effort will be made other than cleaning of the interior tank surface following removal of the sludge. During tank sectioning, sections will be radiologically surveyed. Sections found to meet unrestricted release criteria will be sent to the CFA scrap yard.[14,15] Remaining sections will either be sent to WERF or the RWMC as discussed above.

Constant air monitoring will be performed downwind during tank sectioning to detect airborne contamination. Should airborne contamination be detected above background, the sectioning will be stopped until resolution of the problem by the project manager and H&S representative.

5.2.2.3 Remove and Dispose of Under-Tank Concrete Pad. The under-tank concrete pad will be broken up and disposed of as solid waste unless radiation measurements show it to be contaminated. The method used for breaking the concrete will be the most cost-effective, available method and will be specified in the integrated planning sheets.

Removing the under-tank concrete pad will not commence until after the tank has been sectioned, removed, and the area cleaned of any debris and potential loose contamination.

Following the removal of the under-tank concrete pad, the soil beneath the concrete pad will be checked for radioactivity. If radioactivity is found above background, the soil will be sampled and analyzed for hazardous constituents specified in the SAP (Reference 13). In addition, any

radioactively contaminated soil found beneath the concrete pad will be removed and disposed of as specified in Section 5.2.2.6.

5.2.2.4 Excavate, Remove, and Dispose of Underground Piping. This section discusses the excavation, removal, and disposal of the following underground piping at SPERT-IV:

- Approximately 150 ft of 6-in. concrete pipe between the SPERT-IV reactor building (MWSF) and the leach pond (see Figure 2). Included with this pipe are a utility air line, an instrument tube, and an electrical conduit running parallel and adjacent to the 6-in. concrete line from the reactor building to the waste holdup tank (see Figure 2).

- Approximately 150 ft of 6-in. tile pipe between the SPERT-IV reactor building (MWSF) and the leach pond (see Figure 2).

- Approximately 300 ft of steel pipe between the reactor building (MWSF) and the SPERT-IV lake (see Figure 2).

Each pipe, line, or electrical cable will be removed up to the MWSF building. In addition, each pipe, line, or electrical cable will be removed inside the building to a termination point to be specified in the appropriate SWR. Excavation of all the specified pipes will comply with the requirements in the site specific H&S Plan (Reference 2).

During excavation, the removed soil will be monitored for radioactivity. If radioactivity significantly above background is detected, the soil will be analyzed for hazardous constituents in accordance with the SAP. If analyses show the soil to be mixed waste, the contaminated solid will be placed in containers and stored at the MWSF. If the soil is only radioactively contaminated it will be shipped to the RWMC.

The disposal of piping will depend upon results of visual inspection of piping and radiological measurements. If the concrete or tile piping appears physically clean and is not radiologically contaminated, it will be considered uncontaminated and disposed of as solid waste at the INEL sanitary landfill.

If the steel pipe, metal conduit, electrical cables, metal airline, or instrument tubing appear physically clean and are not radioactively contaminated they will be recycled at the CFA scrap yard.

Should any piping have a physical appearance that suggests hazardous contamination, the project manager will determine if a hazardous analysis is required.

Should any piping contain radioactivity above background, a hazardous analysis will be performed in accordance with the SAP prior to disposal of the radioactively contaminated piping. If the piping is determined to be radioactively mixed waste, it will be appropriately contained and stored at the MWSF. If the piping is radioactive waste, it will be placed in containers and shipped to the RWMC. If radioactive debris is found in the piping, an isotopic analysis will be performed to determine if the debris contains fissile material. Disposition of the debris will be based on results of the isotopic analysis.

5.2.2.5 Perform Sampling and Analyses. Sampling and analyses of soil and piping will be performed for hazardous constituents if required by results of radiation measurements or visual observations during the performance of D&D operations. Based on results of the SPERT-IV ancillaries characterization, sampling and analyses are not expected to be required. However, contingency planning is given in case unexpected contamination is discovered. Unexpected contamination is contamination not reported in Reference 1. Further detail will be found in the SAP. Situations which would require sampling and analyses for hazardous constituents are as follows:

- Radioactivity above background detected in the under-tank concrete pad, the soil beneath the under-tank concrete pad, soil during excavation, or in any of the excavated components and radioactivity sufficiently above background to classify the waste as radioactive waste as defined in Reference 9 would require analyses for hazardous constituents.

- Visual, smell, VOC detection, or other observations during D&D operations indicate suspected hazardous contamination. These

observations would require sampling and analyses even if no radioactivity is detected. Examples of this unlikely situation are (a) deposits inside piping, (b) unusual odor from soil during excavation, (c) discoloration in soil around piping or beneath the under-tank concrete pad, (d) oily deposits in soil around piping, or (e) any other suspicious observation. These examples, as a minimum, will be included in the integrated planning sheets to alert workers of observations to report to their supervisor or the health and safety representative.

The reason radioactively contaminated concrete, soil, or underground components must be sampled for hazardous constituents is to determine if the waste is to be disposed of as radioactive or mixed waste.

If radioactivity is detected in concrete, soil, or excavated components, the hazardous analyses will be limited to hazardous constituents found in significant concentrations during the SPERT-IV ancillaries characterization. The constituents are cadmium, chromium, lead, and Aroclor 1254 (Reference 1).

If visual, smell, VOC detection, or other observations during D&D operations reveal possible hazardous contamination, the analyses will include constituents to be determined by the project manager based on observations.

5.2.2.6. Dispose of Other Contaminated Waste. The sludge and tank discussed in Sections 5.2.2.1 and 5.2.2.2, respectively, are known to be contaminated. Their disposal, covered in Sections 5.2.2.1 and 5.2.2.2, and is, therefore, not discussed in this section.

Contaminated waste discussed in this section includes only contaminated waste not expected to be encountered. Concrete, soil, or excavated components, if through radiation measurements and hazardous analyses are determined to be either radioactive, mixed, or hazardous waste, are covered in this section.

In the event concrete, soil, or excavated components are determined to be contaminated, the waste will be disposed of as follows:

- Radioactive waste will be appropriately packaged and retained at the SPERT-IV area in appropriate containers protected from the weather until the waste is determined to be only radioactive. The waste will then be shipped to the RWMC.

- If radioactive waste is determined also to be hazardous, the radioactive mixed waste will be appropriately packaged and stored at the MWSF.

- Hazardous waste (if encountered) will be disposed of as determined by the project manager based on the type of hazardous waste.

During the SPERT-IV D&D actions, residual radioactivity in soil is not expected to be encountered. However, in the event radioactively contaminated soil (as defined in the EG&G Idaho Radiological Controls Manual, (Reference 8) Chapter 6) is detected during excavation, the contaminated soil shall be removed if localized. In the event the contamination is extensive and its removal is not practical or cost effective, soil samples will be collected and analyzed to determine the concentration of specific radioisotopes and the extent of contamination. The results of this soil characterization will be used to determine if the area can be released for unrestricted use in accordance with Section 5.4.

5.2.2.7 Backfill, Recontour, and Seed Area. Following completion of all previously described work, the areas disturbed during removal of the under-tank concrete pad and the excavation of piping will be backfilled with top soil, recontoured to match surrounding terrain, and seeded with crested wheat grass if damage to existing vegetation warrants seeding. Any asphalt surface area removed or damaged during excavation of piping will be replaced.

5.2.3 Perform Project Management

The WBS includes project management. The project manager will have overall responsibility for the satisfactory completion of the project. Tasks are specified in Section 4.1.2, "SPERT-IV D&D Project Management."

5.3 Waste Management

The dry sludge inside the SPERT-IV waste holdup tank will be packaged in accordance with acceptance criteria specified by the MWSF. The drums of sludge will be stored at the RWMC.

If cost effective, the sections of the waste holdup tank will be shipped to WERF for sizing, packaging, and shipment to the RWMC. The tank sections will be sized at WERF in the sizing room. The door to the sizing room is approximately 12 ft wide and 10 ft high. The sizing room is approximately 16 x 20 ft and the height to the crane hook is 9 ft. Therefore, each section of the tank shipped to WERF must be no larger than 10 x 12 ft to allow easy movement into the sizing room and also allow adequate space for the operators to perform sizing operations. Tank sections to WERF will be shipped as a nonstandard shipment to save costs and reduce contamination spread during sectioning. Nonstandard shipments require approval in accordance with Reference 9. Specific instructions relative to packaging and shipping the nonstandard shipments will be included in the integrated planning sheets after approval from WERF of the nonstandard shipments. If sizing at WERF is not cost effective, the tank will be sectioned and sized to fit in waste boxes 4-ft wide, 8-ft long, and 2-ft high packaged in waste boxes, and shipped directly from the tank area to the RWMC.

Radioactively contaminated valves, small diameter pipes (less than 6 in.), and other hardware in the utility shed (see Figure 2) will be packaged and shipped directly to the RWMC. There would be no volume reduction achieved by shipping these items to WERF. Packaging and shipping to the RWMC will be in accordance with Reference 9.

The under-tank concrete pad, the 6-in. diameter concrete pipe, and the 6-in. diameter tile pipe will be disposed of as solid waste in the INEL landfill unless radiation measurements or hazardous analyses show these items to be contaminated. If radioactively contaminated, the waste will be disposed of at the RWMC. The tile pipe, if radioactively contaminated, will be crushed for volume reduction, boxed, and shipped to the RWMC. Radioactive mixed waste will be stored at the MWSF. Should any of these items be contaminated with

hazardous constituents, disposal of the hazardous waste will be determined based on the results of analyses and the type of hazardous waste.

The steel piping between the SPERT-IV reactor building (MWSF) and the SPERT-IV lake will be recycled as scrap steel (if uncontaminated) by shipping it to the CFA scrap yard. In addition, the utility air line, instrument tube, and electrical conduit and cable between the reactor building and waste holdup tank will be recycled if they are uncontaminated. If these items prove to be radioactive, mixed, or hazardous waste, they will be disposed of as discussed above.

5.3.1 Waste Minimization

A Process Waste Assessment (PWA) was performed to determine if additional measures could be taken to further the waste minimization effort. One possibility involves the decontamination of the tank after sludge removal. Some effort will be put into determining the best means of decontaminating the portion of the tank that had been in contact with the sludge. Sectioning may also be conducted to maximize the amount of tank that can be disposed of as clean waste.

5.4 Release Requirements

5.4.1 Release Criteria

In this decommissioning project, all known contamination is contained within the SPERT-IV waste holdup tank. The tank contents and the tank will be disposed of after they are removed. Since no attempt will be made to decontaminate the tank for its release, release criteria do not apply to the tank.

Should unexpected subsurface radioactivity above background be encountered during D&D operations, including excavation, and should unexpected radioactivity be so extensive that its removal is not practical or cost-effective, release criteria for the disturbed soil areas will be based on current DOE guidelines as specified in Reference 15. If stricter criteria are

deemed necessary by the INEL, justification will be prepared and documented providing the basis for the stricter criteria.

5.4.2 Verification

Prior to releasing the areas disturbed during this D&D project, steps will be taken to verify there is no residual radioactive contamination as defined in the EG&G Radiological Controls Manual, (Reference 8) Chapter 6 and Reference 15 and 16. The disturbed areas will consist of the area from which the SPERT-IV waste holdup tank will be removed and the soil from which the underground pipes will be removed.

Verification will consist of review and approval of the final project reports by DOE-HQ, Division of Facility and Site Decommissioning (DFSD). In addition, the DFSD may provide an independent verification contractor to perform radiation measurements and collect and analyze samples.

The final project reports to be reviewed and approved by DFSD consist of the following:

- The Final Report for Decommissioning the SPERT-IV Waste Holdup Tank and Underground Piping.
- The Record of Completion of Decommissioning the SPERT-IV Waste Holdup Tank and Underground piping.
- The Project Data Package.

Information and data contained in these final project reports will describe the work performed and show the final condition of the SPERT-IV areas affected by decommissioning the waste holdup tank and underground piping.

6. COST AND SCHEDULE

6.1 Cost Estimate

The estimated cost of decommissioning the SPERT-IV waste holdup tank and underground piping is $221K including $37K for contingency. This estimate covers the work specified in the WBS (Figure 9). The cost estimate for each work element in Figure 9 is listed in Table 4 and includes labor and material.

The assumptions on which this estimate is based are listed below:

- No contamination will be encountered in soil during excavation of underground piping.
- All underground piping, conduit, instrument tubing, and electrical cables will be uncontaminated.
- The under-tank concrete pad will be uncontaminated.
- Unexpected contaminated waste will be a maximum of 128 ft^3.
- Soil contamination around the tank will be only surface soil contamination.
- Analyses will be performed at INEL.
- The tank can be sectioned and shipped to WERF as a nonstandard shipment without sectioning into small pieces if packaged in WERF bins.
- The D&D operations will be completed within eight weeks. This assumes excavation and tank work will be performed in parallel.
- The project manager is funded at half time for 14 weeks.

TABLE 4. ESTIMATED COST FOR EACH WBS WORK ELEMENT

Work Element No. and Title			Estimated Cost ($ x 1000)
5.2.1	D&D planning and post-D&D documentation		38
5.2.1.1	Prepare D&D plan	16	
5.2.1.2	Prepare work packages	9	
5.2.1.3	Prepare post-D&D documentation	13	
5.2.2	D&D operations		105
5.2.2.1	Remove and dispose of tank sludge	9	
5.2.2.2	Section and dispose of tank	31	
5.2.2.3	Remove and dispose of under-tank concrete pad	7	
5.2.2.4	Excavate, remove, and dispose of underground piping	34	
5.2.2.5	Perform sampling and analyses	11	
5.2.2.6	Dispose of other contaminated waste	7	
5.2.2.7	Backfill, recontour, and seed area	6	
5.2.3	Perform project management[a]		41
	Subtotal		184
	20% Contingency		37
	Total		221

a. Project management costs cover only the decommissioning of the waste holdup tank and underground piping.

6.2 Schedule Estimate

The estimated schedule for performance of this project is shown in the CPM network (Figure 9) and includes some contingency for delays due to weather. The number in parentheses above each task is the task duration in weeks. The project start date is the date on which the D&D Plan and other required documents have received appropriate and required approval, and the date that resources are available.

7. OCCUPATIONAL EXPOSURE ESTIMATES

Predictions of radiation exposure to personnel are made to estimate the number of workers required to complete the D&D project. During the project, individual exposure must be kept ALARA and, in any event, never exceed the maximum permissible radiation exposures as specified in the EG&G Idaho Radiological Controls Manual (Reference 8). ALARA radiation exposures will be assured through procedures specified in the integrated planning sheets. A worker whose exposure approaches the maximum limits must be replaced with another worker with a lower exposure history. The predicted radiation exposure to personnel during the project will help determine to what extent (if any) workers will have to be replaced. It is emphasized, however, that the actual replacement of personnel because of radiation exposure will be based on measured exposure during the work.

The only expected radiation exposure to workers during this project will occur during the removal of sludge from the SPERT-IV waste holdup tank and during the sectioning of the tank. During these tasks, the radiation exposure will be limited to external radiation because respiratory protection will be required.

The estimated radiation exposure for each task is shown in Table 5. In converting rads to rem, a conversion factor of 1 was used.

TABLE 5. PREDICTED RADIATION EXPOSURES

Task	Radiation Field (mR/R)	Estimated Task Duration (R)	Predicted Individual Exposure (rem)	Allowed Individual Exposure[a] (rem)	Total Exposure[b] (man-rem)
Remove Sludge	1	40	0.04	0.2	0.08
Section Tank	0.5	80	0.04	0.4	0.08

a. Taken from EG&G Idaho Radiological Controls Manual, Table 2-3 (Reference 8).

b. Two persons will be exposed to radiation during the performance of each task.

8. WASTE VOLUME PROJECTIONS

Table 6 summarizes the waste volume projections for this project. The categories of waste are the most probable based on previous characterization.

TABLE 6. WASTE VOLUME PROJECTIONS FOR DECOMMISSIONING THE SPERT-IV WASTE HOLDUP TANK AND UNDERGROUND PIPING

Item	Estimated Volume	Waste Category	Comments
Dry sludge	110 gal	Mixed	2, 55-gal drums
Waste holdup tank (carbon steel)	105 ft^3	Radioactive	Volume includes 40% void volume after sizing at WERF
Utility shed, valves, and pipes	32 ft^3	Radioactive	--
Concrete pad	375 ft^3	Solid	Includes 40% void volume
Concrete pipe	41 ft^3	Solid	Assumes pipe is not crushed
Tile pipe	41 ft^3	Solid	Assumes pipe is not crushed
Steel pipe	82 ft^3	Recycled	--
Soil	64 ft^3	Radioactive	One 2 x 4 x 8 ft box from cleanup around tank

9. QUALITY ASSURANCE PROGRAM

A QA Program for this project is the responsibility of the project manager. The purpose of the QA Program is to ensure the decommissioning of the SPERT-IV waste holdup tank and underground piping is performed in accordance with specifications and requirements contained in this D&D plan. The QA Program for this project and all ERP projects are controlled by the guidelines outlined in the Quality Program Plan for the Environmental Restoration Program[17] (QPP-149).

9.1 Confirmation of Adequate Planning

Adequacy of the following planning and implementation documents will be confirmed through appropriate EG&G reviews. Discrepancies or deficiencies in the following planning and implementation documents will be corrected before issuing the documents:

- D&D plan
- Integrated planning sheets (IPS)
- Tentative Hazard Classification
- Safety Analysis Report
- Health and Safety Plan
- Sampling and Analysis Plan.

9.2 Verification During Operations

Verification that D&D operations are being performed in accordance with the D&D plan and procedures contained in the SWR planning sheets will be accomplished through the use of checkpoints in the procedures. These checkpoints must be signed by the project manager or designated alternate.

10. SAFETY EVALUATION

Two documents cover in detail the hazards and risks associated with D&D of the SPERT-IV waste holdup tank and underground piping. These documents are a Safety Analysis Report (Reference 12) and a H&S Plan (Reference 2). In addition, all of the SWRs will have been reviewed by qualified safety personnel. This section is a summary of the most significant hazards that are associated with this project and a brief description of the controls that have been implemented to mitigate these hazards. In addition, it briefly covers the implementation of the Emergency Preparedness Plan.

10.1 Significant Hazards Associated with Operation

All personnel involved in this operation will be adequately trained for the task which they are performing. This is addressed as an administrative control OSR.

Another general control that will be in place throughout this operation involves lockout of the building sump. An OSR covers this requirement and ensures that sump contents will not be accidentally released during the course of this D&D operation.

10.1.1 Removal and Disposal of Sludge

During this initial phase of the operation, the most significant hazard involves the possible exposure of personnel to radiological and/or chemical hazards from the inhalation of the sludge. Personnel will wear respiratory equipment and anti-C clothing any time they enter the tank during sludge removal operations. The sludge will also be misted to keep the airborne concentrations of sludge down. An OSR identifies specific operating limits for airborne contamination and the surveillance requirements for monitoring these limits.

Another inherent hazard involved in the sludge removal operation is that personnel will be working in a confined space. This will be mitigated by careful adherence to all of the company requirements presented in the EG&G

Idaho Company Procedures Manual (Reference 6) Section 11.3 and the EG&G Idaho Industrial Hygiene Manual[18] Section 19.0.

10.1.2 Sectioning of the Waste Holdup Tank

Sectioning the waste holdup tank will require working at heights as well as heavy lifting operations involving heavy equipment. Lifting instructions and/or integrated planning sheets with rigging sketches will be included in the work packages. In conducting the work outlined in these packages, strict adherence to the DOE Hoisting and Rigging Manual (Reference 11) will be maintained at all times. Further details on safe work practices during hoisting and rigging for this project can be found in the task specific H&S Plan (Reference 2).

In addition to the day-to-day hazards involved in tank sectioning, the weather can also be a factor in conducting safe operations. In particular, high winds and electrical storms can pose a threat. An OSR defines the precise limits of wind speed that will entail the temporary stoppage of work. At any sign of an electrical storm, tank sectioning will stop until the storm has passed.

10.1.3 Removal and Disposal of Tank Foundation Pad

Silica dust inhalation is a possible hazard during the breakup of the concrete pad. This will be mitigated by the use of respirators and IH monitoring of the dust levels.

10.1.4 Excavation, Removal and Disposal of Piping

One hazard associated with the excavation of the piping involves encountering live electrical lines. This will be mitigated through the use of lock and tagout procedures. An OSR addresses this issue.

Another hazard during excavation involves the possibility of a cave-in. An OSR lists the specific OSHA requirements for excavations that are greater than 5 feet deep.

10.2 Emergency Preparedness

Section 11.4 of the H&S Plan (Reference 2) is the Emergency Response Plan for this D&D operation. This plan includes emergency actions, procedures, and a listing of the emergency equipment which will be on hand at all times as well as an evacuation route. These and other contingency plans are found throughout the H&S Plan (Reference 2).

10.2.1 Spill Control Plan

The guidelines for spill control presented in the Waste Reduction Operations Complex/Power Burst Facility Emergency Plan/RCRA Contingency Plan, Volume II[19] will be followed. These guidelines present proper procedures for controlling a spill, location of spill equipment and the proper guidelines for reporting a spill.

11. ENVIRONMENTAL COMPLIANCE

In accordance with DOE policy, the following environmental statutes were considered during the planning of this project:

- National Environmental Policy Act (NEPA)
- Resource Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments Reauthorization Act (SARA).

In compliance with NEPA, an Environmental Checklist (EC), Form IDF 5440.1a, was prepared and submitted to EG&G Idaho Environmental Technical Support. Based on the SPERT-IV waste holdup tank and underground piping D&D project description and a list of minor environmental concerns, a Memorandum to File (MTF) was prepared by the EG&G Idaho Environmental Technical Support organization, and the MTF (Number PBF 89-308) was submitted to DOE-ID for approval. Upon approval by DOE of the MTF, no further NEPA documentation will be required.

The SPERT-IV waste holdup tank is not a RCRA regulated unit nor is it on the COCA list. The sludge in the tank is not currently regulated under RCRA, however, the sludge will become subject to RCRA regulation upon removal from the tank and will be treated as a generated mixed waste and stored at the MWSF. The waste originally deposited in the holdup tank was not mixed waste; therefore the holdup tank itself should not leach heavy metals and will not be a RCRA regulated waste. The tank will be disposed of as low-level radioactive waste.

If unexpected soil contamination is encountered during this D&D operation, reevaluation of the applicability of CERCLA may need to be made by the Project Engineer. If the contamination falls under COCA guidelines, it will be necessary to obtain COCA Management and Integration Unit concurrence that procedure requirements for COCA are being met.

12. READINESS REVIEW

Prior to start of decommissioning operations, a readiness review will be conducted to ensure that all necessary activities have been completed and documented. The purpose of the review is to help assure smooth and safe decommissioning operations.

The items, as a minimum, to be covered in this readiness review are listed below:

- D&D Plan--Is the plan complete and approved?
- Integrated planning sheets (IPS)--Are the planning sheets complete and approved?
- Personnel and equipment--Are the personnel and equipment appropriate, available, and scheduled?
- NEPA documentation--Is the documentation complete and approved?
- Quality assurance--Is quality assurance included in the IPS?
- Emergency preparedness--Are the emergency plans/procedures complete? Is there agreement between the D&D Plan and the Emergency Action Plan?
- Personnel training--Is the training complete and appropriate for the task?
- Environmental monitoring--Is the monitoring equipment appropriate and available?
- Safety Analysis requirements--Is the SAR approved and are the OSRs implemented?"
- Health and Safety provisions--Is the emergency response equipment available?

13. REFERENCES

1. R. A. Suckel, SPERT-IV Facility Ancillaries Characterization, WM-PD-86-002, Revision 1, April 1989.

2. S. M. Hailey, Task Specific Addendum to the Health and Safety Plan for Operations Performed for the Environmental Restoration Program, Decontamination and Decommissioning of the SPERT-IV Waste Holdup Tank and Underground Piping, Revision 0, May 1991.

3. Environmental Restoration Program Program Directives.

4. Waste Management Department Directives.

5. EG&G Idaho, Inc., Project Management Manual.

6. EG&G Idaho, Inc., Company Procedures Manual.

7. EG&G Idaho, Inc., Safety Manual.

8. EG&G Idaho, Inc., Radiological Controls Manual.

9. U.S. Department of Energy, Idaho Operations Office, INEL Low-Level Radioactive Waste Acceptance Criteria, DOE/ID-10112.

10. EG&G Idaho, Inc., Drawing Requirements Manual.

11. Department of Energy, Hoisting and Rigging Manual.

12. EBASCO Services Inc., Draft Safety Analysis Report for the Special Power Excursion Reactor Test No. IV (SPERT-IV), 8559K.

13. S. M. Thurmond, Abbreviated Sampling and Analysis Plan for Decontamination and Decommissioning of the SPERT-IV Waste Holdup Tank and Underground Piping, EGG-WM-9649, In Preparation.

14. "DOE Surplus Facilities Management Program," Draft Resource Manual, April 1989.

15. U.S. Department of Energy, U.S. Department of Energy Guidelines for Residual Radioactive Material at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites, March 1987.

16. U.S. Department of Energy, A Manual for Implementing Residual Radioactive Material Guidelines, DOE/CH/8901, June 1989.

17. Quality Program Plan for the Environmental Restoration Program, QPP-149, October 1990, Revision 2.

18. EG&G Idaho, Inc., Industrial Hygiene Manual.

19. EG&G Idaho, Inc., Waste Reduction Operations Complex/Power Burst Facility Emergency Plan/RCRA Contingency Plan, Volume II.