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CONCEPTUAL DECOMMISSIONING COST ESTIMATES FOR 26 ORNL SURPLUS CONTAMINATED FACILITIES

VOLUME II

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PREPARED BY

ADVANCED SCIENCES, INC.
OAK RIDGE, TENNESSEE

ORNL/RAP-31

CONCEPTUAL DECOMMISSIONING COST ESTIMATES FOR 26 ORNL CONTAMINATED FACILITIES

VOLUME II

Prepared for the
Assistant Secretary for Energy Research

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September 1987

Prepared by

ADVANCED SCIENCES, INC. (ASI)
107-F Jefferson Avenue
Oak Ridge, Tennessee 37830

Oak Ridge National Laboratory
Oak Ridge, Tennessee 37831
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FACILITY 1.1

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SECTION I

INTRODUCTION

Throughout its history, the Oak Ridge National Laboratory (ORNL) has conducted numerous activities and studies involving radioactive and hazardous materials. As a result of these actions, portions of the ORNL complex have become contaminated. When the facilities reach the end of their useful life, decommissioning options must be addressed.

Advanced Sciences, Inc. has been contracted to examine 26 of these surplus contaminated facilities and to develop appropriate decommissioning alternatives and conceptual cost estimates. This report describes the decommissioning alternatives for each facility, and the conceptual cost estimates.

After reviewing the list of the 26 facilities and holding interviews and discussions with ORNL personnel, many decommissioning alternatives were identified for each facility. These alternatives were screened considering the limited characterization data available and information gained from facility inspections. These screened alternatives considered to be most practical are presented here and were submitted to ORNL for selection of the preferred alternative(s) for conceptual cost and schedule estimates.

For each decommissioning alternative selected by ORNL, a description of the technical approach was prepared to assist in the development of the cost estimates. The technical approach and associated cost is based on the engineering assessment of available data. Where data gaps are encountered, assumptions to support sound engineering assessments were made and are described.

Existing data sometimes do not completely identify or quantify contaminants and contaminated materials. At some sites accurate data reflecting these factors are essential for precise estimates of decommissioning alternatives

and associated costs. In the absence of such data, best engineering judgment was used to provide conceptual cost estimates. Cost information provided by ORNL was supplemented as necessary to develop the decommissioning costs. The resulting cost estimates and associated schedule of activities for each of the decommissioning alternatives is presented in Volume II of this report.

1.1 Oil Storage Tank (7860A)

The following decommissioning alternatives were considered for this facility:

- Decontamination
- Total Dismantlement and Disposal
- Entombment

For this facility, the decommissioning alternative selected for further development is total dismantlement and disposal. This alternative involves removing the waste oil from the tank to appropriate liquid waste containers for disposal, treatment, or incineration. The soil surrounding the tank is uncontaminated but must be excavated. All connecting pipes will be disconnected. The exposed pipe ends would be sealed. The tank would be segmented for removal and disposal.

The estimate is structured so it may be approriately scaled when accurate site characterization data become available. The following assumptions were made for cost estimating purposes.

- The soil area surrounding the tank to be excavated is rectangular and approximately 15 ft by 16 ft by 15 ft deep.

- The concrete pad will be disposed of in the contractors' landfill.

- Respirators, protective clothing, and eye protection are anticipated during the tank sectioning.

The total estimated cost and time duration is $392,000 and 167 days. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and cost breakdown of these activities are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Removal of Tank Contents
- Excavation of the Tank
- Equipment Dismantlement
- Waste Packaging, Transportation, and Disposal
- Site Cleanup and Restoration
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. The initial field walk-over radiation survey will cover approximately 240 square feet. Both initial tank content sampling and soil sampling surveys will be taken to determine the types and quantities of contamination. For the tank survey 5 samples will be taken, and for the soil survey 18 samples will be taken for analysis.

Site Preparation. The perimeter of the work area will be isolated with movable barricades and flags. Workers will undergo prework training to reduce exposure time.

Removal of the Tank Contents. Approximately 4,500 gallons of a contaminated oil-water mixture will be pumped into 55-gallon drums for transport to K-25 for disposal by incineration. Approximately 82 drums will be needed for the operation.

Excavation of the Tank. Approximately 100 cubic yards of soil will be excavated. Since the pit will measure 15 ft deep, the walls will be shored against collapse. Dewatering may be required to remove ground water seepage

during excavation. The excavated soil will be stockpiled to be used as backfill.

Equipment Dismantlement. Three pipe connections will be severed into sections less than six feet long for disposal. The three remaining exposed underground pipe ends will be plugged with concrete and sealed with a cap. The tank will be cut into sections and packaged for disposal. The concrete tank-support base, which measures 11 ft by 10 ft by 1.5 feet thick, will be broken up, removed, and disposed.

Waste Packaging, Transportation, and Disposal. The pipe and tank sections shall be wrapped and packaged for disposal, and transported to SWSA 6. The concrete rubble will be disposed in the contractor's landfill.

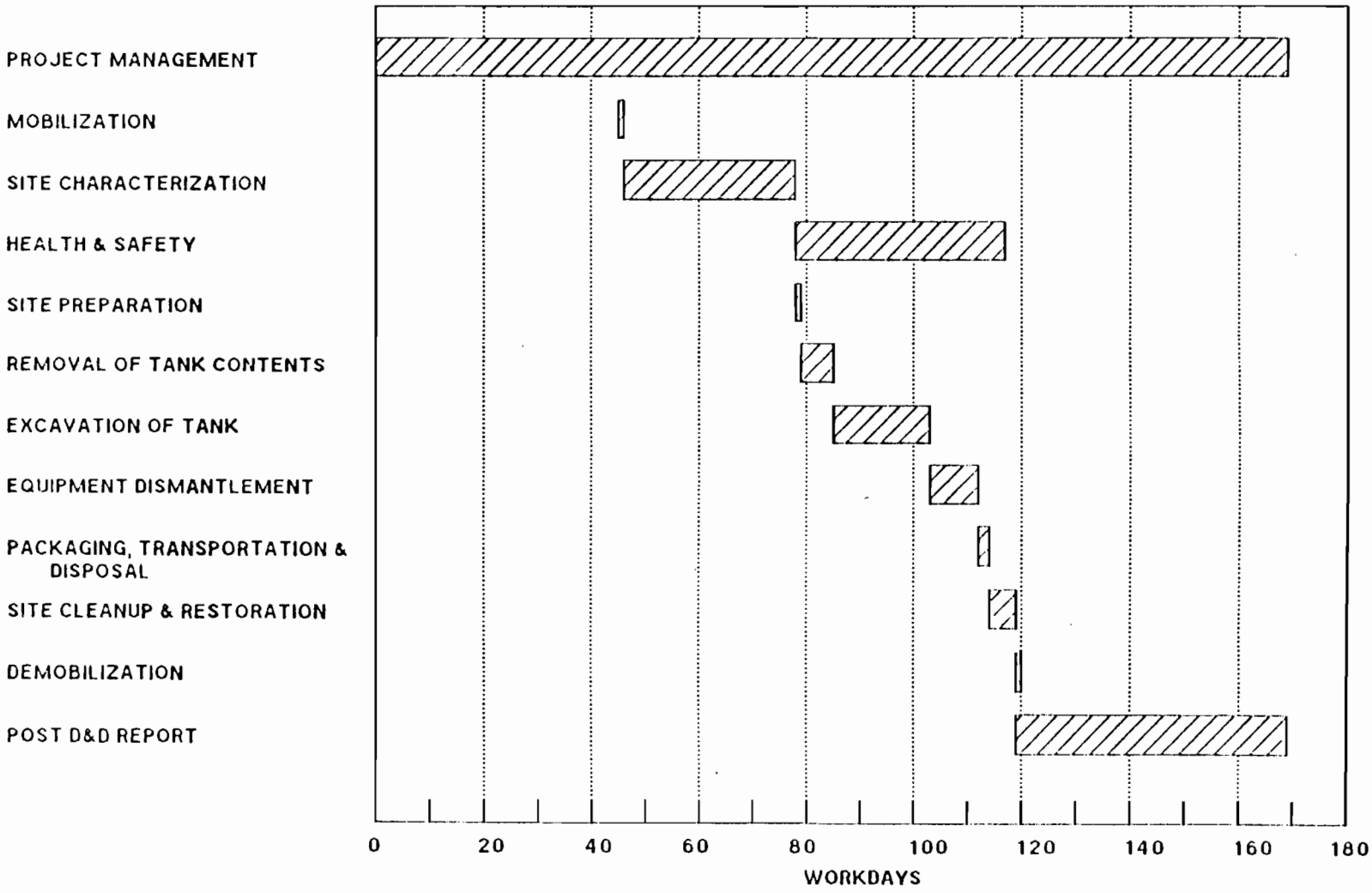
Site Cleanup and Restoration. After the soil has been excavated and the equipment dismantled and removed, the shoring in the pit will be removed. The pit will be backfilled with the excavated soil plus cleanfill, graded, seeded, and mulched to prevent erosion. The barricades and flags will then be removed.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE after the tank and pipe sections are transported to SWSA 6 and the site has been cleaned and restored. The report will contain a detailed description of the project, the pre- and post-D&D conditions, sectioning and disposal of the pipe and tank sections, the total dollar and man-rem costs, and the time duration of the project.

Waste Volume Estimates:	1.1 Oil Storage Tank (Tank #7860a)	
Solid Low Level	8	cubic yd
Liquid Low Level	4,500	gal
CH-TRU		cubic yd
RH-TRU		cubic yd
Contaminated Soil		cubic yd
Uncontaminated Scrap		cubic yd
Hazardous Chemical		lb
Mixed		drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	6	cubic yd
Sanitary Landfill		cubic yd

SCHEDULE FOR SURPLUS FACILITY 1.1

Oil Storage Tank (Site 7860A)



09/09/87

ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate for Facility 1.1 - Oil Storage Tank (Tank #7860a)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$14,700
II. Site Preparation	$800	
III. Decommissioning Operations		
Removal of Tank Contents	$54,500	
Excavation of Tank	$7,300	
Equipment Dismantlement	$9,600	
Waste Packaging, Transportation and Disposal	$11,400	
Site Clean-up and Restoration	$4,000	
Mobilization/Demobilization	$2,000	
Subtotal III	$88,800	
Subtotal II & III	$89,600	
Overhead and Profit (OH&P)	$25,800	
Total II & III		$115,400
IV. Final D & D Report		$56,000
V. Engineering and Management		$40,400
VI. ORNL Overhead		$74,700
Subtotal I thru VI		$301,200
Contingency		$90,800
Total		$392,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 1.1 - Oil Storage Tank (Tank #7860a)

Sheet 1 of 3
Prepared by BWH 8/20/87
Checked by BWH 9/8/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Walkover Survey	1	LT	0.00	0			8.000	8.00	24.40	195	
2. Initial Tank Sampling	5	EA	350.00	1750			1.000	5.00	24.40	122	
3. Initial Soil Sampling	18	EA	350.00	6300			1.500	27.00	24.40	659	
4. Review During Dismantle	1	LT	0.00	0			224.000	224.00	24.40	5466	
5. Final Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
SUBTOTAL (I)				8050				272.00		6637	$14,700
II. Site Preparation											
1. Place Perimeter Barricade	80	LF	1.26	101			0.0267	2.14	19.00	41	
2. Prework Training	1	LT	0.00	0			32.000	32.00	22.00	704	
SUBTOTAL (II)				101				34.14		745	$800
III. Decommissioning Operations											
1. Removal of Tank Contents											
Pump Contaminated Oil/Water From Tank Into 55 Gal. Drums for Transport (1)	4500	GAL	1.40	6300	0.02	90	0.007	31.50	14.83	467	
Load-out, Transport to K-25, Dispose by Incineration (2)	4500	GAL	9.50	42750	0.41	1845	0.033	148.50	20.60	3059	
SUBTOTAL				49050		1935		180.00		3526	$54,500
2. Excavation of Tank											
Soil Excavaton with Hyd. Crawler Backhoe	100	CY	0.50	50	3.90	390	0.160	16.00	18.90	302	
Pit Shoring to 15' Deep	930	SF	1.66	1544	0.65	605	0.210	195.30	15.28	2984	
Dewatering Allowance	1	LT	15.00	15	90.00	90	32.000	32.00	16.87	540	
Excavated Soil Stockpile Handling Allowance	100	CY	0.50	50	3.90	390	0.160	16.00	18.90	302	
SUBTOTAL				1659		1475		259.30		4128	$7,300
3. Equipment Dismantlement											
Hacksaw Cut Pipe Connections at Tank (8" dia. pipe)	3	EA	5.77	17	13.63	41	2.000	6.00	22.00	132	

(1) Allow 52 55-Gallon Drums.
(2) [redacted]

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 1.1 - Oil Storage Tank (Tank #7860a)

Sheet 2 of 3
Prepared by BWH 8/20/87
Checked by BWH 9/8/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Equipment Dismantlement (Cont.)											
Provide Polyethylene Ground Cover Beneath Tank	240	SF	0.05	12	0.00	0	0.003	0.72	12.80	9	
Hacksaw Cuts on Pipe (3)	6	EA	5.77	35	13.63	82	2.000	12.00	22.00	264	
Handle/Pkg Cut Pipe Sections	6	EA	16.00	96	24.17	145	2.000	12.00	22.00	264	
Place Concrete Plug with Cap at Remaining Pipe Ends	3	EA	12.00	36	0.00	0	1.670	5.01	19.40	97	
Section Tank for Removal (4)	140	LF	5.95	833	20.78	2909	1.250	175.00	22.00	3850	
Break-up Concrete Tank Support Base (5)	6	CY	15.00	90	53.92	324	3.900	23.40	15.24	357	
SUBTOTAL				1119		3501		234.13		4973	$9,600
4. Packaging, Transportation and Disposal											
Package, Load-out, Transport and Dispose of Pipe and Tank Contaminated Sections	8	CY	1167.00	9336	89.90	719	6.200	49.60	15.26	757	
Load-out, Transport, Dispose of Concrete Foundation (6)	6	CY	21.00	126	55.83	335	1.330	7.98	15.90	127	
SUBTOTAL				9462		1054		57.58		884	$11,400
5. Site Clean-up and Restoration											
Remove Tank Pit Shoring	930	SF	0.15	140	0.65	605	0.070	65.10	15.28	995	
Remove Perimeter Barricade	80	LF	0.00	0	0.00	0	0.0267	2.14	19.00	41	
Backfill, Compact Clean Fill	128	CY	2.44	312	5.08	650	0.560	71.68	16.10	1154	
Place, Grade Topsoil	5	CY	8.32	42	5.08	25	0.250	1.25	16.10	20	
Reseed, Mulch	240	SF	0.012	3	0.00	0	0.0053	1.27	12.80	16	
SUBTOTAL				497		1280		141.44		2226	$4,000
6. Mobilization/Demobilization (7)	1	LT	285.00	285	1060.00	1060	36.00	36.00	18.90	680	$2,000
SUBTOTAL (III)				62072		10305		908.45		16117	$88,800

(3) Hacksaw cuts on 8" dia. pipe 6' back from tank.
(4) Includes packaging, hacksaw cut and handling from pit.
(5) Includes handling from pit. Base measures 11'x 10'x 1.5'.
(6) Dispose at contractor's landfill with 12 CY dump truck.
(7) Includes 12 CY dump truck, hacksaw with air compressor, hyd. crawler backhoe, and 12 ton yard crane.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 1.1 - Oil Storage Tank (Tank #7860a)

Sheet 3 of 3
Prepared by BWH 8/20/87
Checked by BWH 9/8/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
SUBTOTAL (II and III)				62173		10305		942.58		17162	$89,600
Overhead & Profit				15543		2576				7723	$25,800
SUBTOTAL (II & III with OH&P)				77716		12881		942.58		24885	$115,400
IV. Final O & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								254.00	70.00	17780	
2. Engineering Inspection (Title III)								147.00	40.00	5880	
3. Project Management								167.00	40.00	6680	
4. Health and Safety								252.00	40.00	10080	
SUBTOTAL (V)											$40,400
VI. ORNL Overhead											$74,700
SUBTOTAL I thru VI											$301,200
CONTINGENCY											$90,800
TOTAL											$392,000

FACILITY 2.1

2.1 FPDL LLW Transfer Line

The transfer line is contaminated with Sr-90 and Cs-137. The pipe interior exposure rate is assumed to be a maximum of 5R/hr. Since there is no evidence of leakage, the soil around this line is assumed to be clean. For cost estimating purposes, it is assumed that the pipe is 1.5 inches in diameter and 1,500 feet long. It is also assumed that the pipe is made of stainless steel and that it is void of internal liquid.

The following decommissioning alternatives were considered for this facility:

- Decontamination
- Entombment
- Excavation

For this facility, entombment was selected as the decommissioning alternative. This alternative involves excavation at each end of the line to gain access to the transfer line. Two pits will be excavated to expose the pipe and will be 50 feet apart. In the absence of specific leakage data it is assumed that the contamination spread horizontally generally in a 25 ft circle. The excavation pit separation was chosen to ensure that no contaminated soil will be excavated. This will also ensure that workers will require minimum protection. Detailed characterization would be required prior to entombing the pipe.

The total estimated cost and time duration is $135,000 and 76 work days. The following description is of the decommissioning activities of this site. The schedule, cost summary, and cost breakdown are provided at the end of the description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Excavation
- Pipe Stabilization

- Pipe Stabilization
- Backfill, Grade, and Reseed
- Mobilization and Demobilization
- Post D&D Report

Project Management. This element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties for the entombment of the transfer line. It also includes engineering functions and health and safety support.

Site Characterization. For health and safety purposes, a field walk-over radiation survey shall be made. The survey will also be taken during entombment and after entombment has been completed. Internal transfer line characterization will not be measured, but will be based on historical use data.

Site Preparation. The perimeter of the work area measuring 66 linear feet will be isolated with movable barricades and will be flagged. If any doors from adjacent buildings open onto the construction area they will be marked with detour signs. Workers will undergo pre-work training to reduce exposure time.

Excavation. At each end of the contaminated line, soil shall be excavated to expose two sections of the pipe. Each pit will measure 6 ft by 5 ft by 3 ft. The backhoe shall excavate the first foot and the remaining 2 feet will be hand shoveled to expose the pipe. The excavated clean soil will be stockpiled nearby. Since the trench measures 5 feet deep the walls of the pit will be shored and supported with jackscrew pans.

Pipe Stabilization. After the two pipe sections have been exposed in the clean soil areas, they will be crimped to isolate the leak source. The floor of the pit underneath the crimped sections will be covered with a sheet of 10 mil polyethylene film to catch any contaminated debris from the pipe grouting operation.

A grout hole will be drilled in each end of the isolated section of the pipe. The drill shavings will be collected on the sheet. A grout valve will be installed on the downstream end of the exposed pipe. A vent valve will be installed on the upstream end of the exposed pipe, and it will be monitored and HEPA filtered during grout injection.

The grout will be pumped into the pipe from the downstream ends, and pumping will stop when the grout comes out at the upstream end. The grout will stabilize any residues and prevent migration into the abandoned pipe.

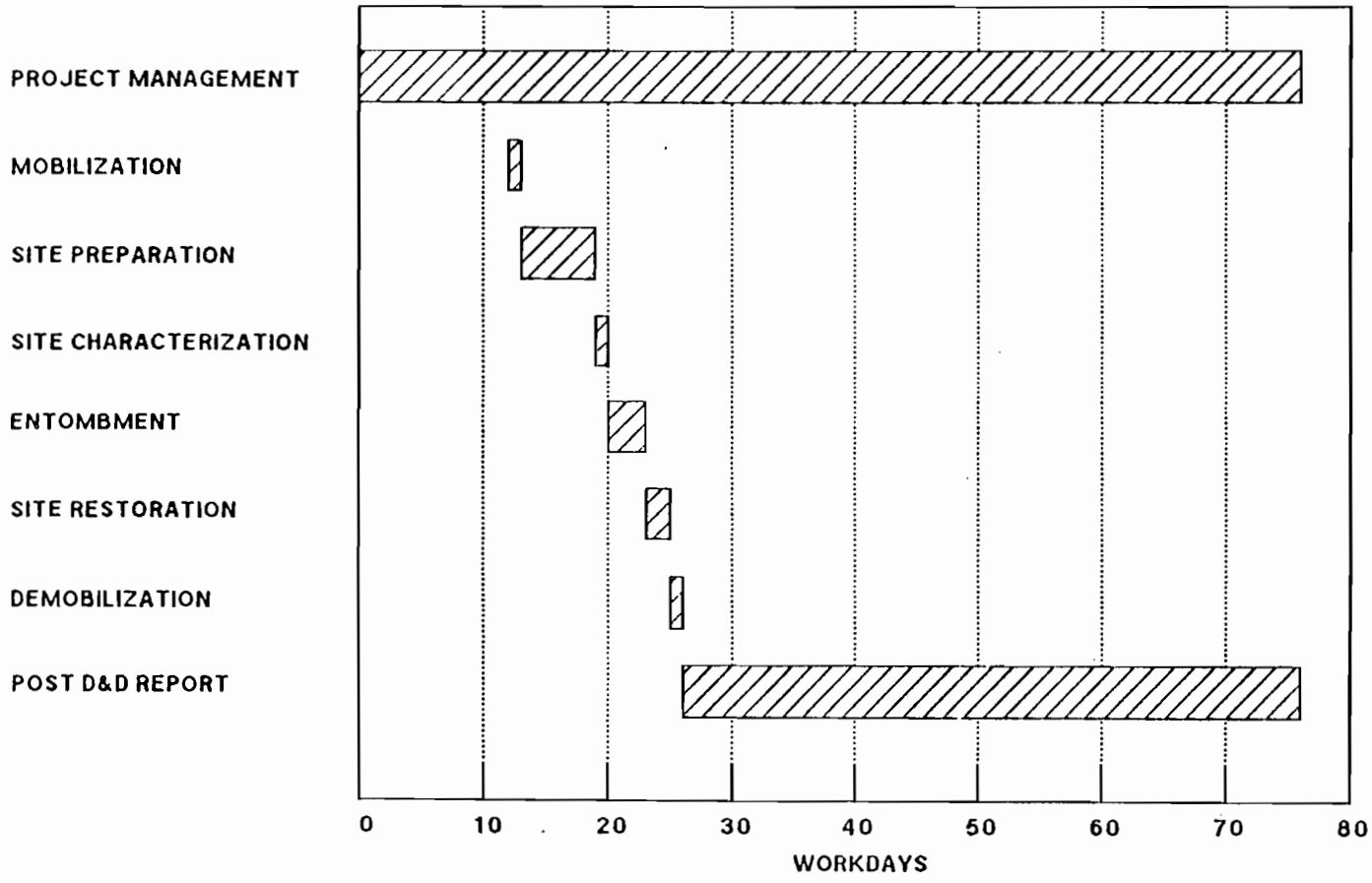
Backfill, Grading, Reseed. The two excavated pits will be backfilled, graded, and reseeded to restore the area to its original condition.

Mobilization and Demobilization. All equipment brought onto the site will be assembled and disassembled on the site.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued after the site has been restored to its original condition. The report will contain a detailed description of the project, the pre- and post D&D conditions, the pipe stabilizing process, restoration, the total dollar and man-rem costs, and the time duration of the project.

Waste Volume Estimates:	2.1 FPDL - LLW Transfer Line (Bldg. 3517)
Solid Low Level	0 cubic ft
Liquid Low Level	0 gal
CH-TRU	0 cubic yd
RH-TRU	0 cubic yd
Contaminated Soil	0 cubic yd
Uncontaminated Soil	0 cubic yd
Hazardous Chemical	0 lb
Mixed	0 drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	0 cubic yd
Sanitary Landfill	0 cubic yd

SCHEDULE FOR SURPLUS FACILITY 2.1
FPDL LLW Transfer Line (3517)



09/09/87

ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 2.1 - Fission Product Development Laboratory (FPDL)
LLW Transfer Line (Building 3517)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$1,200
II. Site Preparation	$500	
III. Decommissioning Operations		
Excavation	$700	
Pipe Stabilization	$900	
Site Clean-up and Restoration	$400	
Mobilization/Demobilization	$1,000	
Subtotal III	$3,000	
Subtotal II & III	$3,500	
Overhead and Profit (OH&P)	$1,300	
Total II & III		$4,800
IV. Final D & D Report		$56,000
V. Engineering and Management		$16,300
VI. ORNL Overhead		$25,800
Subtotal I thru VI		$104,100
Contingency		$30,900
Total		$135,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 2.1 - Fission Products Development Laboratory (FPDL) LLW Transfer Line (Bldg. 3517)

Sheet 1 of 2
Prepared by BWH 8/20/87
Checked by BWH 9/8/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial	1	LT	0.00	0			8.000	8.00	24.40	195	
2. During Entombment	1	LT	0.00	0			32.000	32.00	24.40	781	
3. Final	1	LT	0.00	0			8.000	8.00	24.40	195	
SUBTOTAL (1)				0				48.00		1171	$1,200
II. Site Preparation											
1. Place Perimeter Barricade	66	LF	1.26	83			0.0267	1.76	19.00	33	
2. Prework Training	1	LT	0.00	0			16.000	16.00	22.00	352	
SUBTOTAL (II)				83				17.76		385	$500
III. Decommissioning Operations											
1. Excavation											
Backhoe Excavation (2 ea.)	2.7	CY	2.58	8	9.75	26	0.500	1.35	18.90	26	
Hand Excavation with	4	CY	0.00	0	0.00	0	1.000	4.00	12.80	51	
Backhoe Assist (2 ea.)	4	HR	5.75	23	19.50	78	1.000	4.00	18.90	76	
Transport to Stockpile	6.7	CY	3.85	26	13.07	88	0.670	4.49	18.90	85	
Trench Shoring (1)	180	SF	0.40	72	0.00	0	0.044	7.92	19.00	150	
SUBTOTAL				129		192		21.76		388	$700
2. Pipe Stabilization											
Crimp Pipe in Pits	2	EA	0.00	0	4.50	9	1.000	2.00	22.00	44	
Line Bottom and 2' of Upstream Pit with 10 mil Polyethylene Film (6'x 10' sheet) (2)	2	EA	5.00	10	0.00	0	1.000	2.00	12.80	26	
Drill Grout Hole in Pipe (1/2 " IPS) Saddle Tap - Drill Thru and Catch Chips	2	EA	23.20	46	8.25	17	2.000	4.00	22.00	88	
Install Grout Valve on Down Stream and Vent Valve on Upstream Saddles	2	EA	20.00	40	0.00	0	0.500	1.00	22.00	22	
Pump Chemical Grout into Pipe - Monitor Vent and Collect Any Material Discharged	30	CF	9.50	285	1.75	53	0.267	8.01	19.40	155	
Remove Trench Shoring	180	SF	0.00	0	0.00	0	0.044	7.92	19.00	150	
SUBTOTAL				381		79		24.93		485	$900

(1) Based on shoring to 5 ft. deep, wood sheet with jacks 4 ft. on center.
[redacted]

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 2.1 - Fission Products Development Laboratory (FPDL) LLW Transfer Line (Bldg. 3517)

Sheet 2 of 2
Prepared by BWH 8/20/87
Checked by BWH 9/8/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Site Clean-up and Restoration											
Transport from Stockpile	6.7	CY	3.85	26	13.07	88	0.670	4.49	18.90	85	
Backfill, Compact Fill Matl.	6.7	CY	2.44	16	5.08	34	0.560	3.75	16.10	60	
Fine Grade Surface	36	SF	0.00	0	0.00	0	0.110	3.96	12.80	51	
Reseed, Mulch	36	SF	0.125	5	0.00	0	0.055	1.98	12.80	25	
SUBTOTAL				47		122		14.18		221	$400
4. Mobilization/Demobilization (3)	1	LT	100.00	100	300.00	300	32.000	32.00	18.90	605	$1,000
SUBTOTAL (III)				657		693		92.87		1699	$3,000
SUBTOTAL (II and III)				740		693		110.63		2084	$3,500
Overhead & Profit				185		173				938	$1,300
SUBTOTAL (II & III with OH&P)				925		866		110.63		3022	$4,800
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								115.00	70.00	8050	
2. Engineering Inspection (Title III)								67.00	40.00	2680	
3. Project Management								76.00	40.00	3040	
4. Health and Safety								62.00	40.00	2480	
SUBTOTAL (V)											$16,300
VI. ORNL Overhead											$25,800
SUBTOTAL I thru VI											$104,100
CONTINGENCY											$30,900
TOTAL											$135,000

(3) Includes backhoe/loader, grout mixer/pump, drill, shoring, etc.

FACILITY 3.1

3.1 FPDL Filter Pit (3517)

This facility consists of two filter pits containing banks of air filters arranged in series. The older filters (stainless steel back-washable filters), were replaced with High Efficiency Particulate Air (HEPA) Filters. The stainless steel filters were acid backwashed, which leaked and contaminated the filter pit. The radiation level of the filters is approximately 200R/hr. The main contaminants are Sr-90 and Cs-137. A large quantity of contaminated soil has been removed from around this vault, but an undetermined amount still remains.

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Excavation
- Entombment

The alternative selected is entombment. This alternative consists of removal and disposal of the pit internals, filling the pit with grout, entombment of the soil contamination by pressure injection of grout, and placement of a final cover over the entombment. For cost estimating purposes the soil area to be entombed by grouting is 30 ft by 40 ft. The grout will be injected 10 feet deep. The two filter pits measure 10 ft by 10 ft by 10 ft deep. A permanent placard placed in a conspicuous position will describe the contaminants that have been entombed.

The total estimated cost and time duration is $739,000 and 257 workdays. The following description is of the decommissioning activities. The schedule, cost summary, and detailed cost breakdown of these activities are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization

- Site Preparation
- Equipment Dismantlement and Removal
- Entombment
- Waste Disposal and Handling
- Mobilization Demobilization
- Post D&D Report

Project Management. This element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, general administrative duties, and engineering functions and health and safety support to entomb the filter pit.

Site Characterization. A field walk-over radiation survey shall be conducted before and during decommissioning operations. Detailed pit characterization will be done after the pit internals are removed. Eighteen soil samples will be taken to determine the level and type of contamination, and to determine the lateral and vertical extent of contamination in the soil.

Site Preparation. Movable construction barriers and flags shall be placed around the perimeter of the site. Detour signs will also be placed around the facility. Radiation alarms and monitors will be placed at appropriate points around the facility. To prevent the spread of contamination, a ground cover will be laid. Workers will undergo prework training to reduce exposure time.

Equipment Dismantlement and Removal. Fourteen in-line HEPA Filters and ancillary equipment will be removed with a crane, placed in storage containers, and disposed in an appropriate disposal facility.

Entombment. The HEPA filter pits will be filled with a non-shrinking cement based grout which will fix the contamination in place. 48 injection wells will be drilled 10 feet deep, and will be injected with a 10 percent polyacrylamide grout to stabilize the soil. The facility will be covered with a 4 inch layer of clay, a 4 inch layer of soil, and a 2 inch layer of asphalt. The cover will be sloped 2 percent to allow for proper drainage. The asphalt cover will extend 3 feet beyond the contaminated area on all sides where possible.

Waste Disposal and Handling. All wastes generated during the operation will be radioactive and will be disposed of by packaging in proper containers and transported to an appropriate disposal facility.

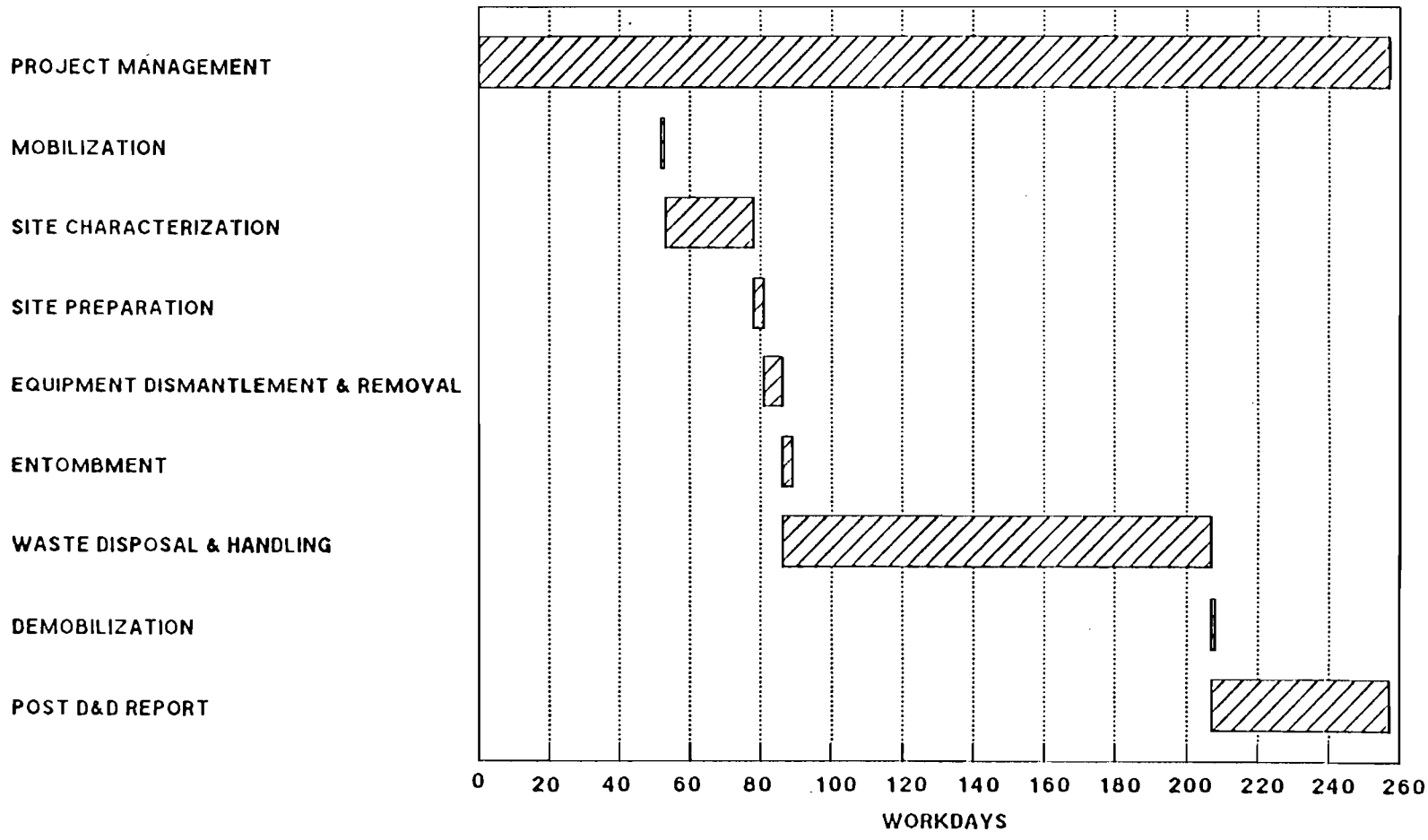
Mobilization and Demobilization. All equipment brought onto the site will be assembled and disassembled on the site. This "assembly" consists primarily of wrapping or otherwise protecting equipment from contamination.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to DOE after the site has been Decommissioned and Decontaminated. The report will contain a detailed description of the project, the pre- and post-D&D conditions, the removal of the HEPA filters, the grouting of the facility, covering of the facility, the total dollar and man-rem costs, and the time and duration of the project.

Waste Volume Estimates:	3.1 FPDL - Filter Pit (Bldg. 3517)	
Solid Low Level	448	cubic ft
Liquid Low Level	_____	gal
CH-TRU	_____	cubic yd
RH-TRU	_____	cubic yd
Contaminated Soil	_____	cubic yd
Uncontaminated Soil	_____	cubic yd
Hazardous Chemical	_____	lb
Mixed	_____	drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	_____	cubic yd
Sanitary Landfill	_____	cubic yd

SCHEDULE FOR SURPLUS FACILITY 3.1

FPDL Filter Pit (3517)



09/09/87

ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate for Facility 3.1 - Fission Product Development Laboratory (FPDL) Filter Pit (Building 3517)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$15,500
II. Site Preparation	$2,800	
III. Decommissioning Operations		
Equipment Dismantlement and Removal	$5,100	
Entombment	$135,700	
Waste Disposal and Handling	$28,700	
Mobilization/Demobilization	$3,200	
Subtotal III	$172,700	
Subtotal II & III	$175,500	
Overhead and Profit (OH&P)	$56,100	
Total II & III		$231,600
IV. Final D & D Report		$56,000
V. Engineering and Management		$124,600
VI. ORNL Overhead		$141,100
Subtotal I thru VI		$568,800
Contingency		$170,200
Total		$739,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 3.1 - Fission Products Development Laboratory (FPDL) Filter Pit (Bldg. 3517)

Sheet 1 of 2
Prepared by BWH 8/21/87
Checked by BWH 9/9/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
2. Initial Soil Sampling	15	EA	350.00	6300			1.500	27.00	24.40	659	
3. Contamination Review During Work	1	LT	0.00	0			336.000	336.00	24.40	8198	
4. Final Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
SUBTOTAL (I)				6300				379.00		9247	$15,500
II. Site Preparation											
1. Place Perimeter Barricade	525	LF	1.26	662			0.0267	14.02	19.00	266	
2. Place Radiation Alarms, Monitors	1	LT	300.00	300			16.000	16.00	20.40	326	
3. Place Ground Cover Protection	2400	SF	0.03	72			0.0040	9.60	12.80	123	
4. Prework Training	1	LT	0.00	0			48.000	48.00	22.00	1056	
SUBTOTAL (II)				1034				87.62		1771	$2,800
III. Decommissioning Operations											
1. Equipment Dismantlement and Removal											
Remove In-line HEPA Filters With Crane to Container	14	EA	125.50	1757	108.75	1523	9.000	126.00	14.83	1869	$5,100
2. Entombment											
Place Grout in HEPA Filter Pits	2000	CF	11.45	22900	7.45	14900	0.876	1752.00	15.85	27769	
Prepare Ground Injection Wells	48	EA	6.94	333	16.74	804	1.250	60.00	15.85	951	
(1200 SF Area, 10 LF Deep)	450	LF	14.50	6960	7.70	3696	0.576	276.48	15.85	4382	
Inject Polyacrylamide/10% and Grout/90% Mixture in Soil	26928	GAL	0.578	15564	0.45	12118	0.053	1427.18	14.33	20452	
Deliver, Spread, Compact 4" Layer of Clay	36	CY	12.01	432	6.48	233	0.560	20.16	16.10	325	
Deliver, Spread, Compact 4" Layer of Soil	36	CY	10.51	378	6.48	233	0.560	20.16	16.10	325	
Deliver, Spread, Compact 2" Layer of Asphalt	356	SF	4.45	1584	1.73	616	0.128	45.57	16.10	734	
SUBTOTAL				48151		32600		3601.55		54938	$135,700

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 3.1 - Fission Products Development Laboratory (FPDL) Filter Pit (Bldg. 3517)

Sheet 2 of 2
Prepared by BWH 8/21/87
Checked by BWH 9/9/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Waste Disposal and Handling Load-out, Transport and Dispose of HEPA filters	16.6	CY	1585.00	26311	62.89	1044	5.800	96.28	14.35	1382	$28,700
4. Mobilization/Demobilization (1)	1	LT	585.00	585	1600.00	1600	56.000	56.00	18.90	1058	$3,200
SUBTOTAL (III)				76804		36767		3879.83		59247	$172,700
SUBTOTAL (II and III)				77838		36767		3967.45		61018	$175,500
Overhead & Profit				19460		9192				27458	$56,100
SUBTOTAL (II & III with OH&P)				97298		45959		3967.45		88476	$231,600
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								848.00	70.00	59360	
2. Engineering Inspection (Title III)								400.00	40.00	16000	
3. Project Management								616.00	40.00	24640	
4. Health and Safety								616.00	40.00	24640	
SUBTOTAL (V)											$124,600
VI. ORNL Overhead											$141,100
SUBTOTAL I thru VI											$568,800
CONTINGENCY											$170,200
TOTAL											$739,000

(1) Includes backhoe/loader with breaker attachment, 12 ton yard crane, grout mixer/pump, flatbed truck with auger, injection pump, gradal and roller.

FACILITY 4.1

4.1 LLW Tank W1-A (Site 3023)

The following decommissioning alternatives were considered for this facility:

- Decontamination
- Partial Dismantlement and Entombment

For this facility the decommissioning alternative selected for further development is partial dismantlement and entombment. This alternative involves removing the liquid wastes from the tank and decontaminating the tank. The surface surrounding the tank would be covered with general fill, clay, and asphalt layers. All connecting pipes would be disconnected and removed. The exposed pipe ends would be sealed. The tank would be entombed with grout. Detailed tank characterization would be required prior to entombment.

The estimate is structured so it may be appropriately scaled up or down when accurate site characterization data becomes available. The following assumptions were made for cost estimating purposes.

- The tank is full (4,000 gallons).

- The tank contents are to be disposed of as liquid low level waste.

The total estimated cost and time duration is $531,000 and 201 workdays. The following description is of the decommissioning activities of this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation

- Removal of Tank Contents
- Tank Stabilization
- Soil Grouting
- Covering
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties to entomb this facility. It also includes engineering functions and health and safety support.

Site Characterization. Prior to any decommissioning activities, a three phase site characterization shall be conducted. For health and safety purposes, a field walk-over radiation survey shall be made of the facility. In the second phase, the tank contents, both liquid and sludge, will be sampled to determine the types and quantities of wastes in the tank, and the degree of contamination. Eighteen initial soil samples will be taken of the soil surrounding the tank to determine the lateral and vertical extent of contamination resulting from tank operations. Both surface and subsurface soil samples will be taken.

Site Preparation. The perimeter of the facility will be isolated with movable barricades and flags. Workers will undergo prework training to reduce exposure time.

Removal of Tank Contents. Tank W-1A is connected to the LLW system through a valve pit adjacent to the tank. However, because recent investigations indicate poor integrity of the upstream drain lines, the existing discharge lines should not be used to empty the tank without adequate testing. If the lines are not serviceable, approximately 4,000 gallons of contaminated

contents will be pumped into a tanker and transported to the west end treatment plant.

Tank Stabilization. The tank will be left in place and stabilized by filling it with concrete grout.

Soil Grouting. The contaminated soil surrounding the tank shall be grouted with acrylamide grout. Fifteen injection wells will be drilled 15 feet deep to accomplish the grouting operation.

Covering. The contaminated area will be covered with soil, bentonite clay, and a 2-inch layer of asphalt. The asphalt layer will extend three feet beyond the contaminated area.

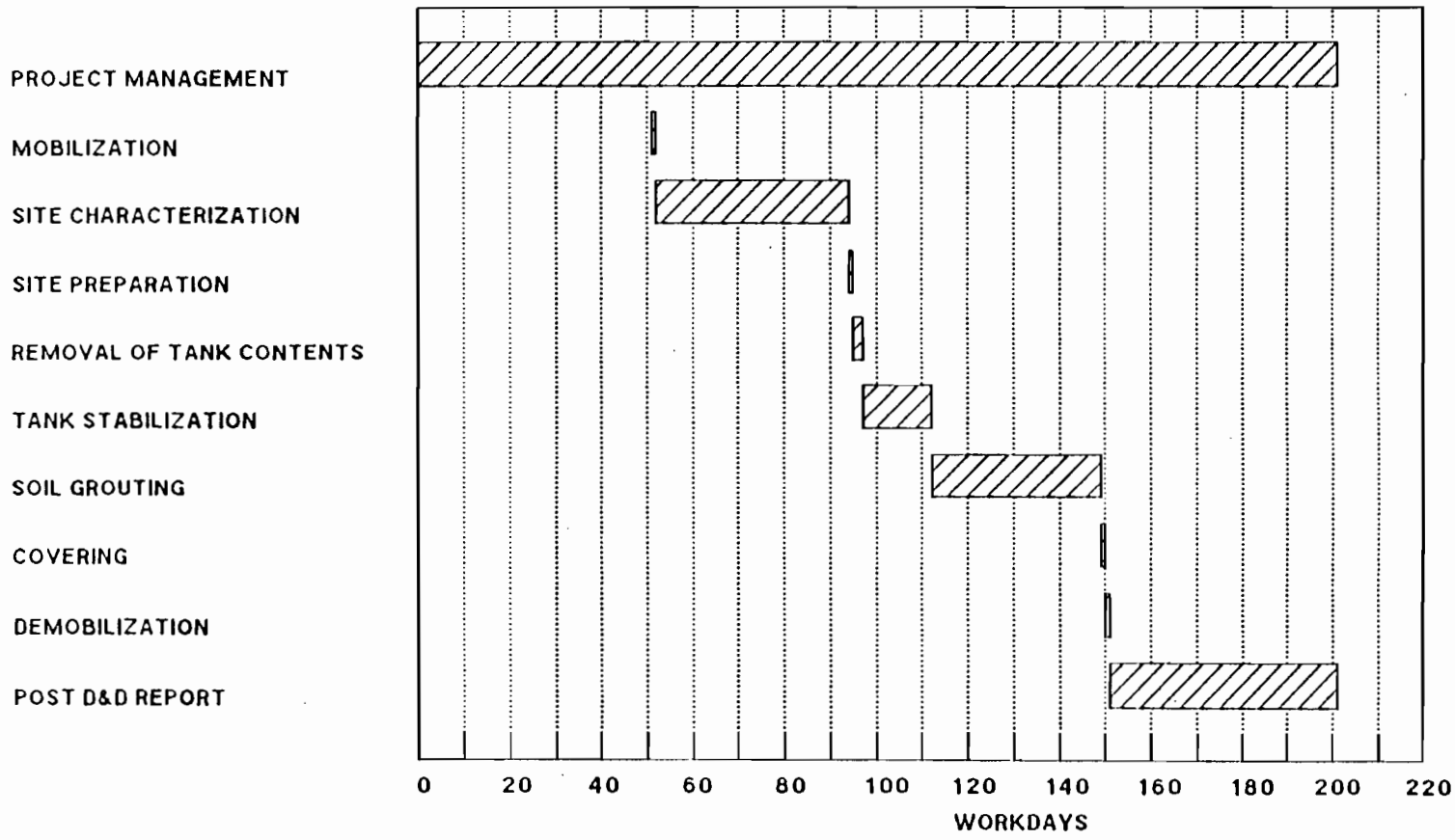
Mobilization and Demobilization. Any equipment brought onto the site will be decontaminated by a mobile decontamination unit at the site. If any equipment is assembled on the site it will be disassembled before it is taken from the site.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE after the facility has been entombed. The report will contain a detailed description of the project, the pre- and post-D&D conditions, the process of removing the tank contents, the grouting operations, the total dollar and man-rem costs, and the time duration of the project.

Waste Volume Estimates:	4.1 Low Level Waste Tank (Tank #W-1A)
Solid Low Level	_____ cubic ft
Liquid Low Level	4.000 gal
CH-TRU	_____ cubic yd
RH-TRU	_____ cubic yd
Contaminated Soil	_____ cubic yd
Uncontaminated Soil	_____ cubic yd
Hazardous Chemical	_____ lb
Mixed	_____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	_____ cubic yd
Sanitary Landfill	_____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 4.1

LLW Tank W1-A (Site 3023)



09/09/87

ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate for Facility 4.1 - Low Level Waste Tank (Tank #W-1A)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$16,600
II. Site Preparation	$1,100	
III. Decommissioning Operations		
Removal of Tank Contents	$45,800	
Tank Stabilization	$17,500	
Soil Grouting	$30,000	
Covering	$1,600	
Mobilization/Demobilization	$3,200	
Subtotal III	$98,100	
Subtotal II & III	$99,200	
Overhead and Profit (OH&P)	$29,200	
Total II & III		$128,400
IV. Final D & D Report		$56,000
V. Engineering and Management		$105,900
VI. ORNL Overhead		$101,300
Subtotal I thru VI		$408,200
Contingency		$122,800
Total		$531,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 4.1 - Low Level Waste Tank (Tank #W-1A)

Sheet 1 of 2
Prepared by BWH 8/24/87
Checked by BWH 9/3/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
2. Initial Tank Contents Sampling Survey	5	EA	350.00	1750			1.000	5.00	24.40	122	
3. Initial Soil Sampling	18	EA	350.00	6300			1.500	27.00	24.40	659	
4. Final Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
5. Review During Work	1	LT	0.00	0			304.000	304.00	24.40	7418	
SUBTOTAL (I)				8050						8589	$16,600
II. Site Preparation											
1. Place Perimeter Barricade	200	LF	1.26	252			0.0267	5.34	19.00	101	
2. Prework Training	1	LT	0.00	0			32.000	32.00	22.00	704	
SUBTOTAL (II)				252						805	$1,100
III. Decommissioning Operations											
1. Removal of Tank Contents											
Pump Contam. Contents into Transport Tanker	4000	GAL	1.40	5600	0.02	80	0.007	28.00	14.83	415	
Transport to West End Treatment Plant	4000	GAL	1.05	4200	0.41	1640	0.002	8.00	12.80	102	
LLW Disposal	4000	GAL	8.45	33800	0.00	0					
SUBTOTAL				43600		1720				517	$45,800
2. Tank Stabilization											
Fill Tank with Concrete Grout	535	CF	11.45	6126	7.45	3986	0.876	468.66	15.85	7428	$17,500
3. Soil Grouting											
Soil Grout (Acrylate)	12414	GAL	0.578	7175	0.45	5586	0.053	657.94	14.33	9428	
Prepare Injection Wells	15	EA	6.94	104	16.74	251	1.250	18.75	15.85	297	
Well Installation, 15 ea. x 15' dp.	225	LF	14.50	3263	7.70	1733	0.576	129.60	15.85	2054	
Remove Perimeter Barricade	200	LF	0.00	0	0.00	0	0.0267	5.34	19.00	101	
SUBTOTAL				10542		7570				11880	$30,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 4.1 - Low Level Waste Tank (Tank #W-1A)

Sheet 2 of 2
Prepared by BWH 8/24/87
Checked by BWH 9/3/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
4. Covering											
General Fill	5	CY	10.51	53	6.48	32	0.560	2.80	16.10	45	
Bentonite Clay	5	CY	202.00	1010	6.48	32	0.560	2.80	16.10	45	
2" Asphalt Cover	50	SY	4.45	223	1.73	87	0.128	6.40	16.10	103	
SUBTOTAL				1286		151				193	$1,600
5. Mobilization/Demobilization (1)	1	LT	585.00	585	1600.00	1600	56.000	56.00	18.90	1058	$3,200
SUBTOTAL (III)				62139		15027				21076	$98,100
SUBTOTAL (II and III)				62391		15027				21881	$99,200
Overhead & Profit				15598		3757				9846	$29,200
SUBTOTAL (II & III with OH&P)				77989		18784				31727	$128,400
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								832.00	70.00	58240	
2. Engineering Inspection (Title III)								240.00	40.00	9600	
3. Project Management								168.00	40.00	6720	
4. Health and Safety								784.00	40.00	31360	
SUBTOTAL (V)											$105,900
VI. ORNL Overhead											$101,300
SUBTOTAL I thru VI											$408,200
CONTINGENCY											$122,800
TOTAL											$531,000

(1) Includes tanker truck, grout mixer/pumper, truck with auger, injection pump, gradal, roller, and asphalt spreader.

FACILITY 5.1

5.1 Decontamination Facility (7819)

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Total Dismantlement and Disposal
- Entombment

The decommissioning alternative chosen for this facility is total dismantlement and disposal. This alternative involves dismantling the building and contaminated equipment, where possible. The concrete pad would be demolished and the contaminated soil excavated. Conventional excavation equipment and techniques would be used. The contaminated materials would be disposed of in an approved waste disposal facility, and transported in an environmentally acceptable manner. This would include the demolition and removal of the concrete floor and pits within the building, and the outside concrete pad. The excavation will be backfilled with clean materials. The site would then be graded and re-seeded.

The estimate is structured so it may be scaled up or down once accurate site characterization data becomes available. For cost estimating purposes, some major assumptions were made and are listed below:

- The soil surrounding the building is contaminated to a distance of 75 feet.

- There is water in the decontamination pits.

- 30 percent of the building's interior surfaces are contaminated and will be painted with a contaminant fixative.

- All equipment and material (with the exception of decontaminated concrete) is contaminated.

- 50 percent of the concrete surface area is contaminated.

- As a waste volume reduction measure, approximately 1,600 square feet of concrete surface will be decontaminated.

- The total area to be graded and reseeded is 17,700 square feet.

The total estimated cost and time duration is $4,690,000 and 501 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and annual cost breakdown of these activities are provided at the end of this discription.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Equipment and Material Disposal
- Excavation of Contaminated Soil and Sand
- Decontamination of Concrete
- Dismantlement of Building
- Demolition of Concrete
- Site Cleanup and Restoration
- Mobilization and Demobilization
- Post D & D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. An initial field walk-over radiation survey will be taken of the inside and outside of the building. Smear samples will be taken of hot spots on equipment and material surfaces located during the radiation survey. Existing data will be verified by the walk-over and will also clearly define the contaminated soil areas surrounding the building. The statistical method described in Appendix A will be used to develop a grid pattern. A total of 200 soil samples will be taken from the contaminated area.

Site Preparation. The perimeter of the work area will be isolated with moveable barricades and flags. Workers will undergo prework training to reduce exposure time. Thirty percent of the building's interior walls are contaminated. These "hot spots" will be sprayed to fix the contamination in place.

Equipment and Material Disposal. Any contaminated equipment and material will be dismantled, packaged, and disposed of in an approved waste disposal facility.

Excavation of Contaminated Soil and Sand. The contaminated soil and sand will be excavated, packaged, and disposed of in an approved waste disposal facility.

Decontamination of Concrete. Before dismantlement of the building, contaminated surface areas will be decontaminated. Contaminated dust on the inside of the facility will be controlled by the existing walls of the facility. Prior to decontaminating the outside concrete surfaces, water within the acid pit will be pumped into a tank truck and transported to the liquid LLW treatment plant. The chips and contaminated dust will be vacuumed and appropriately packaged and disposed of in an approved waste disposal facility.

Dismantlement of Building. The Butler building will be dismantled in sections so it may be easily transported to an approved waste disposal facility. Clean materials will be disposed at the contractors' landfill.

Demolition of Concrete. Approximately 232 cubic yards of clean concrete (the pad, floor, tank saddles, and acid pit) will be demolished and disposed at the contractors' landfill.

Site Cleanup and Restoration. The barricades and flags will be removed from the area. The area will be covered with clean fill and topsoil. The area will be graded, seeded, and mulched for protection against erosion.

Mobilization and Demobilization. All equipment brought onto the site will be assembled and disassembled on the site.

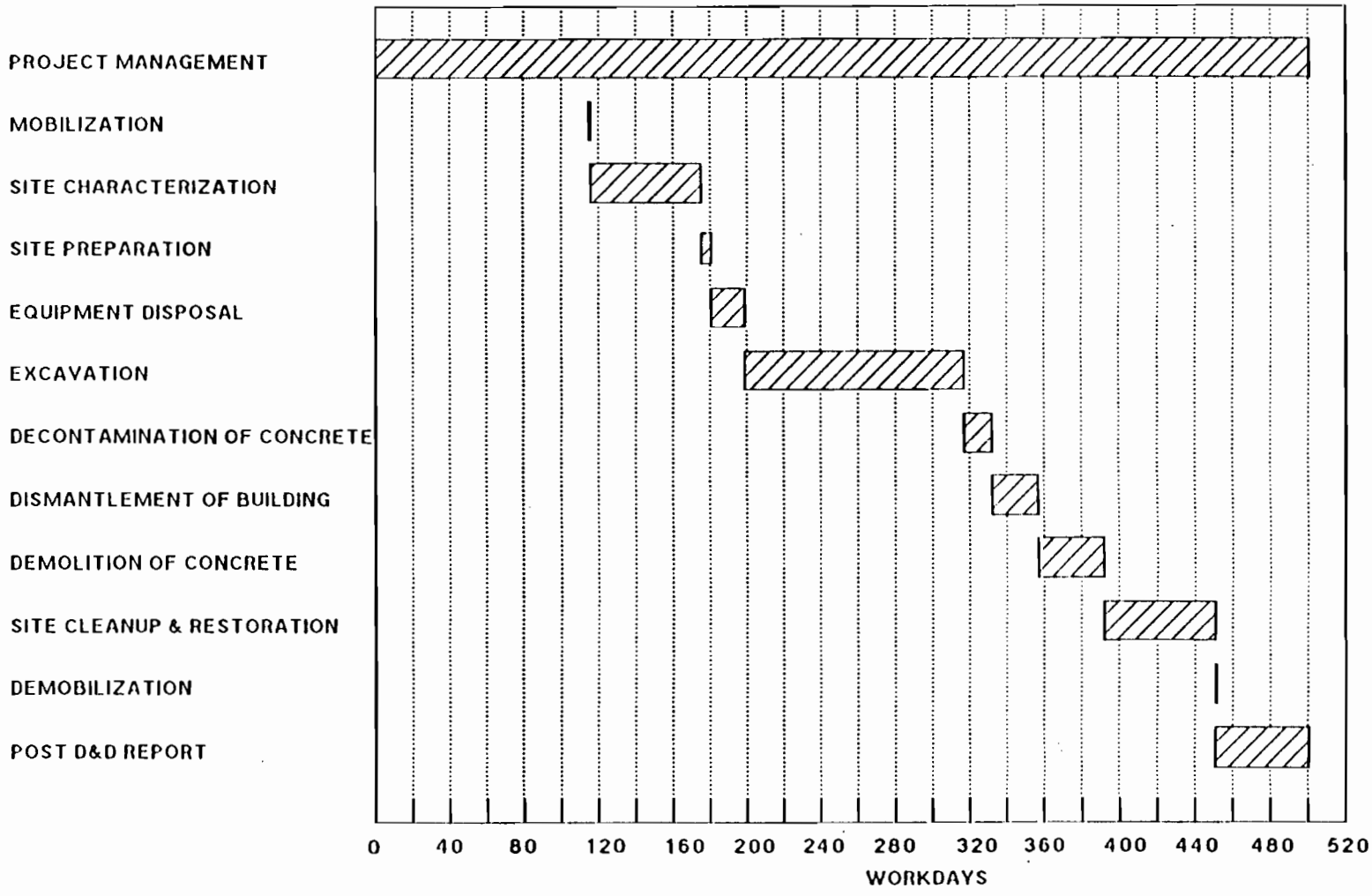
Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued after the site has been decontaminated and decommissioned. The report will contain a detailed description of the project, the pre- and post D&D conditions, the decontamination, dismantlement, and demolition processes, restoration, the total dollar and man-rem costs, and the time duration of the project.

WASTE GENERATION PROJECTION

	YR 1	YR 2	YR 3
Solid Low Level (cu. ft.)	2295	----	
Liquid Low Level (gal.)	----	12,900	
CH-TRU (cu. ft.)	----	----	
RH-TRU (cu. ft.)	----	----	
Contaminated Soil (cu. yd.)	524	600	
Uncontaminated Scrap (cu. yd.)	----	120	
Hazardous Chemical (lb.)	----	----	
Mixed Drums (7.35 cu. ft.)	----	----	
Landfilled Waste			
Contractors' Landfill (cu. yd.)	----	232	
Sanitary Landill (cu. yd.)	----	----	
Annual Cost	$1.8 M	$2.9 M	

SCHEDULE FOR SURPLUS FACILITY 5.1

Decontamination Facility (7816)



09/11/87

ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate for Facility 5.1 - Decontamination Facility (Bldg. 7819)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$95,300
II. Site Preparation	$5,400	
III. Decommissioning Operations		
Equipment and Material Disposal	$119,200	
Excavation of Contam. Soil and Sand	$1,382,900	
Decontamination of Concrete	$123,700	
Dismantlement of Building	$104,600	
Demolition of Concrete	$48,100	
Site Clean-up and Restoration	$29,300	
Mobilization/Demobilization	$2,900	
Subtotal III	$1,810,700	
Subtotal II & III	$1,816,100	
Overhead and Profit (OH&P)	$480,900	
Total II & III		$2,297,000
IV. Final D & D Report		$56,000
V. Engineering and Management		$264,300
VI. ORNL Overhead		$895,200
Subtotal I thru VI		$3,607,800
Contingency		$1,082,200
Total		$4,690,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 5.1 - Decontamination Facility (Building 7819)

Sheet 1 of 3
Prepared by BWH 8/24/87
Checked by BWH 9/11/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			24.000	24.00	24.40	586	
2. Review During Dismantle	1	LT	0.00	0			560.000	560.00	24.40	13664	
3. Final Contamination Review	1	LT	0.00	0			16.000	16.00	24.40	390	
4. Soil Sample Survey	200	EA	350.00	70000	16.74	3348	1.500	300.00	24.40	7320	
SUBTOTAL (1)				70000		3348		900.00		21960	$95,300
II. Site Preparation											
1. Place Perimeter Barricade	1600	LF	1.26	2016			0.0267	42.72	19.00	812	
2. Locate Underground Utility	1	LT	0.00	0			4.000	4.00	22.00	88	
3. Relocate Overhead Electric Lines	1	LT	150.00	150	300.00	300	24.000	24.00	20.40	490	
4. Prework Training	1	LT	0.00	0			48.000	48.00	22.00	1056	
5. "Hot Spot" Painting	800	SF	0.10	80	0.10	80	0.0200	16.00	20.00	320	
SUBTOTAL (II)				2246		380		134.72		2766	$5,400
III. Decommissioning Operations											
1. Equipment and Material Disposal											
Package, Transport Contaminated Material Outside Bldg. (1)	15	CY	1167.00	17505	89.90	1349	6.200	93.00	15.26	1419	
Package, Transport Contaminated Material Inside Bldg. (1)	20	CY	1167.00	23340	118.90	2378	8.200	164.00	15.26	2503	
Dismantle, Transport Contaminated Equipment Inside Bldg. (1)	50	CY	1167.00	58350	101.56	5078	9.600	480.00	15.26	7325	
SUBTOTAL				99195		8805		737.00		11247	$119,200
2. Excavation of Contaminated Soil and Sand											
Excavate Contaminatd Soil	1124	CY	2.88	3237	4.69	5272	0.250	281.00	18.90	5311	
Load-out to Double-lined 12CY Trucks, Transport and Dispose	1121	CY	1167.00	1311708	7.56	8197	2.850	3203.40	15.26	48884	
SUBTOTAL				1314945		13769		3484.40		54195	$1,382,900

(1) Includes pick-up, packaging, load-out and transport to disposal/storage facility.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 5.1 - Decontamination Facility (Building 7819)

Sheet 2 of 3
Prepared by BWH 8/24/87
Checked by BWH 9/11/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Decontamination of Concrete											
Scarify Concrete Surface	178	SY	0.10	18	0.50	89	0.0588	10.47	12.80	134	
Build Temporary Tent Enclosure	1534	SF	2.25	3452	0.00	0	0.220	337.48	19.00	6412	
Vacuum, Package Concrete Chips and Dust	179	SY	0.40	71	0.50	89	0.2700	48.06	12.80	615	
Load-out, Transport, Dispose of Contaminated Chips and Dust	0.55	CY	1167.00	642	10.08	6	3.850	2.12	15.26	32	
Remove Standing Water from Outside Acid Pits (2)	12900	GAL	8.50	109650	0.07	903	0.007	90.30	17.58	1587	
SUBTOTAL				113833		1087		488.42		8780	$123,700
4. Dismantle Building											
Dismantle, Package, Load-out, Transport and Dispose of Contaminated Bldg. Material	60	CY	1167.00	70020	100.39	6023	7.200	432.00	20.10	8683	
Dismantle, Package, Load-out, Transport and Dispose of Clean Building Material	120	CY	21.00	2520	47.25	5670	4.850	582.00	20.10	11698	
SUBTOTAL				72540		11693		1014.00		20381	$104,600
5. Demolition of Concrete											
Demolish Concrete Pads, Floor, Tank Saddles and Acid Pits	232	CY	11.10	2575	63.75	14790	3.000	696.00	16.10	11206	
Load-out, Transport and Dispose of Concrete (3)	232	CY	21.00	4872	36.64	8500	1.750	406.00	15.26	6196	
SUBTOTAL				7447		23290		1102.00		17402	$48,100
6. Site Clean-up and Restoration											
Remove Perimeter Barricade	1600	LF	0.00	0	0.00	0	0.0267	42.72	19.00	812	
Remove Temporary Tent Enclosure	1534	SF	0.00	0	0.00	0	0.180	276.12	19.00	5246	
Backfill, Compact Clean Fill	1092	CY	2.44	2664	5.08	5547	0.560	611.52	16.10	9545	
Place, Grade Topsoil	219	CY	8.32	1822	5.08	1113	0.250	54.75	16.10	881	
Reseed, Mulch	17700	SF	0.01	212	0.00	0	0.0053	93.81	12.80	1201	
SUBTOTAL				4698		6660		1078.92		17985	$29,300

(2) Includes transport by tanker truck to LLLW Treatment Plant.
(3) Disposal will take place at contractors' landfill.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 5.1 - Decontamination Facility (Building 7819)

Sheet 3 of 3
Prepared by BWH 8/24/87
Checked by BWH 9/11/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
6. Mobilization/Demobilization (4)	1	LT	375.00	375	1334.00	1334	64.000	64.00	18.90	1210	$2,900
SUBTOTAL (III)				1613033		66638		7968.74		131200	$1,810,700
SUBTOTAL (II and III)				1615279		67018		8103.46		133966	$1,816,100
Overhead & Profit				403820		16755				60285	$480,900
SUBTOTAL (II & III with OHAP)				2019099		83773		8103.16		194251	$2,297,000
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								2080.00	70.00	145600	
2. Engineering Inspection (Title III)								600.00	40.00	24000	
3. Project Management								1032.00	40.00	41280	
4. Health and Safety								1336.00	40.00	53440	
SUBTOTAL (V)											$264,300
VI. ORNL Overhead											$895,200
SUBTOTAL I thru VI											$3,607,800
CONTINGENCY											$1,082,200
TOTAL											$4,690,000

(4) Includes backhoe/front end loader, stake truck, 12 CY dump truck, crane with wrecking ball, and tanker truck.

FACILITY 6.1

6.1 Storage Pad (3503)

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Dismantlement and Disposal
- Entombment
- Partial Dismantlement

The decommissioning alternative selected for this facility is dismantlement and disposal. This alternative involves dismantlement and disposal of the surplus facility and restoration of the area. Non-explosive demolition technique such as backhoe mounted rams, rock splitter, demolition compounds, and sawing would be used to dismantle the concrete.

The concrete would be appropriately packaged, labeled, and disposed of in an approved waste disposal facility. The metal tray would be packaged and disposed of as low level waste at an approved waste disposal facility. The metal shed is not contaminated and would be dismantled and disposed in the contractors' landfill. The contaminated soil surrounding the site would be excavated for treatment or disposal in an approved waste disposal facility. Conventional excavation techniques would be used. The excavated area would be backfilled with clean material.

The estimate is structured so it may be scaled, if necessary, once accurate site characterization data becomes available. For cost estimating purposes the following assumptions were made:

- The concrete pad measures 40 ft by 50 ft.
- 25 percent of the pad is covered by a metal shed.
- A portion of the pad under the shed is covered by a metal tray measuring 15 ft by 15 ft and is 2 inches thick.
- The metal tray and soil are contaminated.
- 140 linear feet of fencing will be dismantled.

The total estimated cost and time duration is $220,000 and 91 workdays. The following description is of the decommissioning activities for this site. The schedule, cost summary, and cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Dismantlement
- Covering
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties to dismantle and dispose the material. It also includes engineering functions and health and safety support.

Site Characterization. An initial field walk-over radiation survey will be made of this facility. Surveys will also be taken during and after the dismantlement and disposal operation.

Site Preparation. The facility is already isolated by a fence so no additional barricades will be needed.

Dismantlement. The metal tray will be dismantled and disposed of at an approved waste disposal facility. The metal shed will be dismantled and disposed of at the contractors' landfill since it is assumed to be uncontaminated. Approximately 140 linear feet of fencing that surrounds the storage pad will be dismantled and disposed of at the contractors' landfill. The concrete pad will be excavated and transported to the appropriate solid LLW facility. Approximately 11 cubic yards of soil will be excavated and

disposed of at an approved waste disposal facility. The excavated area will be backfilled with clean soil.

Covering. The existing concrete pad will be covered with an additional 6 inches of concrete which will also extend 3 feet beyond the perimeter of the existing pad. Topsoil will be used to cover the new concrete pad and the area will be seeded.

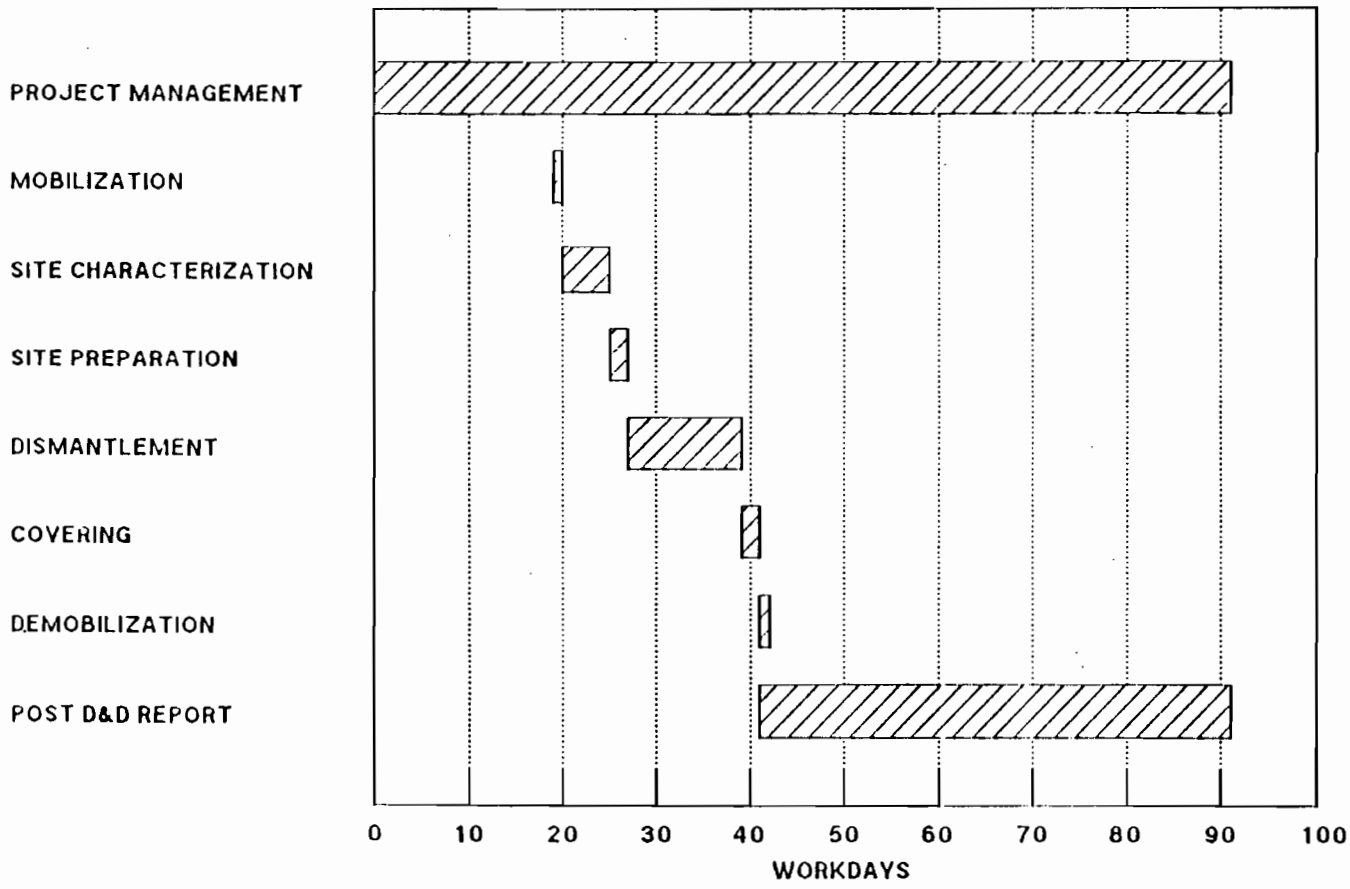
Mobilization and Demobilization. This element consists of gathering and removing labor forces and equipment to and from the site.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE after the material has been dismantled and disposed. This report will contain a detailed description of the project, the pre- and post-D&D conditions, the process of dismantling and disposing the materials, the total dollar and man-rem costs, and the time duration of the project.

Waste Volume Estimates:	6.1 Storage pad At Bldg. 3503	
Solid Low Level	_____	cubic yd
Liquid Low Level	_____	gal
CH-TRU	_____	cubic yd
RH-TRU	_____	cubic yd
Contaminated Soil	11	cubic yd
Uncontaminated Scrap	37	cubic yd
Hazardous Chemical	_____	lb
Mixed	_____	drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	_____	cubic yd
Sanitary Landfill	_____	cubic yd

SCHEDULE FOR SURPLUS FACILITY 6.1

Storage Pad (3503)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 6.1 - Storage Pad at Building 3503

DESCRIPTION	COST	TOTAL
I. Site Characterization		$1,000
II. Site Preparation	$400	
III. Decommissioning Operations		
Demolition	$50,000	
Covering	$1,700	
Mobilization/Demobilization	$1,000	
Subtotal III	$52,700	
Subtotal II & III	$53,100	
Overhead and Profit (OH&P)	$16,700	
Total II & III		$69,800
IV. Final D & D Report		$56,000
V. Engineering and Management		$32,600
VI. ORNL Overhead		$52,600
Subtotal I thru VI		$212,000
Contingency		$64,000
Total		$276,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 6.1 - Storage Pad at Building 3503

Sheet 1 of 2
Prepared by BWH 8/25/87
Checked by BWH 9/9/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
2. Review During Decontamination	1	LT	0.00	0			24.000	24.00	24.40	586	
3. Final Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
SUBTOTAL (1)				0				40.00		976	$1,000
II. Site Preparation											
Place Perimeter Barricade	230	LF	1.26	290	0.00	0	0.0267	6.14	18.00	117	$400
III. Decommissioning Operations											
A. Demolition											
1. Dismantle Fence	140	LF	0.00	0			0.0835	11.69	19.00	222	
2. Load-out, Transport, Dispose of Fence	9.9	CY	21.00	208	6.35	63	1.750	17.33	15.26	264	
3. Dismantle Metal Shed (1)	1475	SF	0.22	325	0.08	118	0.0835	123.16	18.30	2254	
4. Load-out, Transport, Dispose of Uncontaminated Metal Shed (1)	27.3	CY	21.00	573	19.83	541	1.750	47.78	15.26	729	
5. Dismantle Metal Spill Tray (2)	235	SF	0.22	52	0.08	19	0.0835	19.62	18.30	359	
6. Load-out, Transport, Dispose of Contaminated Metal Tray (2)	1.2	CY	1167.00	1400	34.33	41	3.850	4.62	15.26	71	
7. Concrete Pad Demolition	2000	SF	6.10	12200	0.40	800	0.330	660.00	16.50	10890	
8. Load-out, Transport, Dispose of Contaminated Concrete	49	CY	88.58	4340			0.330	16.17	16.50	267	
9. Soil Excavation (3)	11	CY	1.44	16	4.88	54	0.250	2.75	18.90	52	
10. Soil Load-out, Transport and Dispose at Contamination Site	11	CY	1167.00	12837	39.64	436	3.850	42.35	15.26	646	
11. Backfill, Compact, Clean Soil	11	CY	2.44	27	5.08	56	0.560	6.16	16.10	99	
SUBTOTAL (A)				31978		2128		951.63		15853	$50,000
B. Covering											
Backfill, Compact, Topsoil	56	CY	8.320	466	5.08	284	0.75	42.00	16.10	676	
Seed, Mulch	3016	SF	0.012	36	0.00	0	0.0053	15.98	12.80	205	
SUBTOTAL (B)				502		284		57.98		881	$1,700

(1) 20'x 25'x 10' high, clean (2) 15'x 15'x 2" lip x 1/8" thick, contaminated (3) 3'x 99'x 1' deep

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 6.1 - Storage Pad at Building 3503

Sheet 2 of 2
Prepared by BWH 8/25/87
Checked by BWH 9/9/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
C. Mobilization/Demobilization (4)	1	LT	75.00	75	510.00	510	24.00	24.00	18.90	454	$1,000
SUBTOTAL (III)				32555		2922		1033.61		17188	$52,700
SUBTOTAL (II and III)				32845		2922		1039.75		17305	$53,100
Overhead & Profit				8211		730				7787	$16,700
SUBTOTAL (II & III with OH&P)				41056		3652		1039.75		25092	$69,800
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								240.00	70.00	16800	
2. Engineering Inspection (Title III)								56.00	40.00	2240	
3. Project Management								138.00	40.00	5520	
4. Health and Safety								200.00	40.00	8000	
SUBTOTAL (V)											$32,600
VI. ORNL Overhead											$52,600
SUBTOTAL I thru VI											$212,000
CONTINGENCY											$64,000
TOTAL											$276,000

(4) Includes front-end loader with backhoe, 12 CY dump truck, tamper and stake truck.

FACILITY 7.1

7.1 Offgas Filter House (3121)

The following decommissioning alternatives were considered for this facility:

- Decontamination, Leave in Place
- Decontamination, Repair, and Reuse
- Protective Storage
- Total Dismantlement and Disposal

The decommissioning alternative chosen for this facility is total dismantlement and disposal. This alternative entails the complete removal of the structure and equipment from the facility and disposal at an approved waste disposal or treatment facility. A containment structure would be constructed around the building prior to dismantlement to control the contaminants during dismantlement. The removal of the duct line from Building 3019 would be included in this alternative and it would be disposed of with the rest of the contaminated equipment.

Historical data indicates that the building is 12 ft by 12 ft by 10 ft and is contructed on a concrete pad. Two parallel HEPA filter banks with dampers and demisters are contained in the building. The building has an original flat roof with a gable roof on top of this.

Even with the historical data some assumption still had to be made for estimating purposes. These assumptions are:

- The interior of the building is contaminated.
- Radon gas is present in the building.
- The equipment can be contained in two 16 m^3 boxes.
- The building sections can be contained in three 16 m^3 boxes.
- The enclosure can be contained in one 16 m^3 box.
- Supplied air respirators are required for all activities except transportation and disposal.

The total estimate cost and time duration is $876,000 and 225 workdays. The following description is of the decommissioning activities for this site. The

schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Equipment Dismantlement and Removal
- Building Demolition
- Transportation and Disposal
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties to dismantle and dispose the material. It also includes engineering functions and health and safety support.

Site Characterization. An initial field radiation survey will be made of this facility. Surveys will also be taken during and after the dismantlement and disposal operation.

Site Preparation. The facility will be isolated with moveable barricades and flags. Workers will undergo prework training to reduce exposure time. Over the filter house a 16 ft by 24 ft by 16 ft high enclosure will be constructed to enclose the building and form an air-lock and packaging area. The ground in the air lock area will be covered with plastic. A 4 ft by 20 ft by 16 ft high enclosure will be constructed around the stainless steel ductwork connected to Building 3019.

Equipment Dismantlement and Disposal. The HEPA filters, demisters, dampers, ducting, piping, and electrical equipment will be dismantled and packaged in boxes for disposal. The plastic on the ground will be wrapped around the boxes and they will be placed in a second container. All ventilation duct

material from Building 3019 will be dismantled and packaged in boxes for disposal. The duct opening at Building 3019 will be sealed.

Building Demolition. After all the equipment has been removed from the building, the interior surfaces will be spray coated to fix contaminants. The double roof will be dismantled by hand labor, packaged in boxes, and disposed. The walls and concrete floor, and any remaining items will be dismantled, and packaged in boxes and disposed.

Both enclosures that were set up during site preparation will be dismantled and packaged upon completing the demolition operation.

Transportation and Disposal. All material will be transported in 16 cubic meter boxes. Waste will be disposed at the TRU-waste storage area.

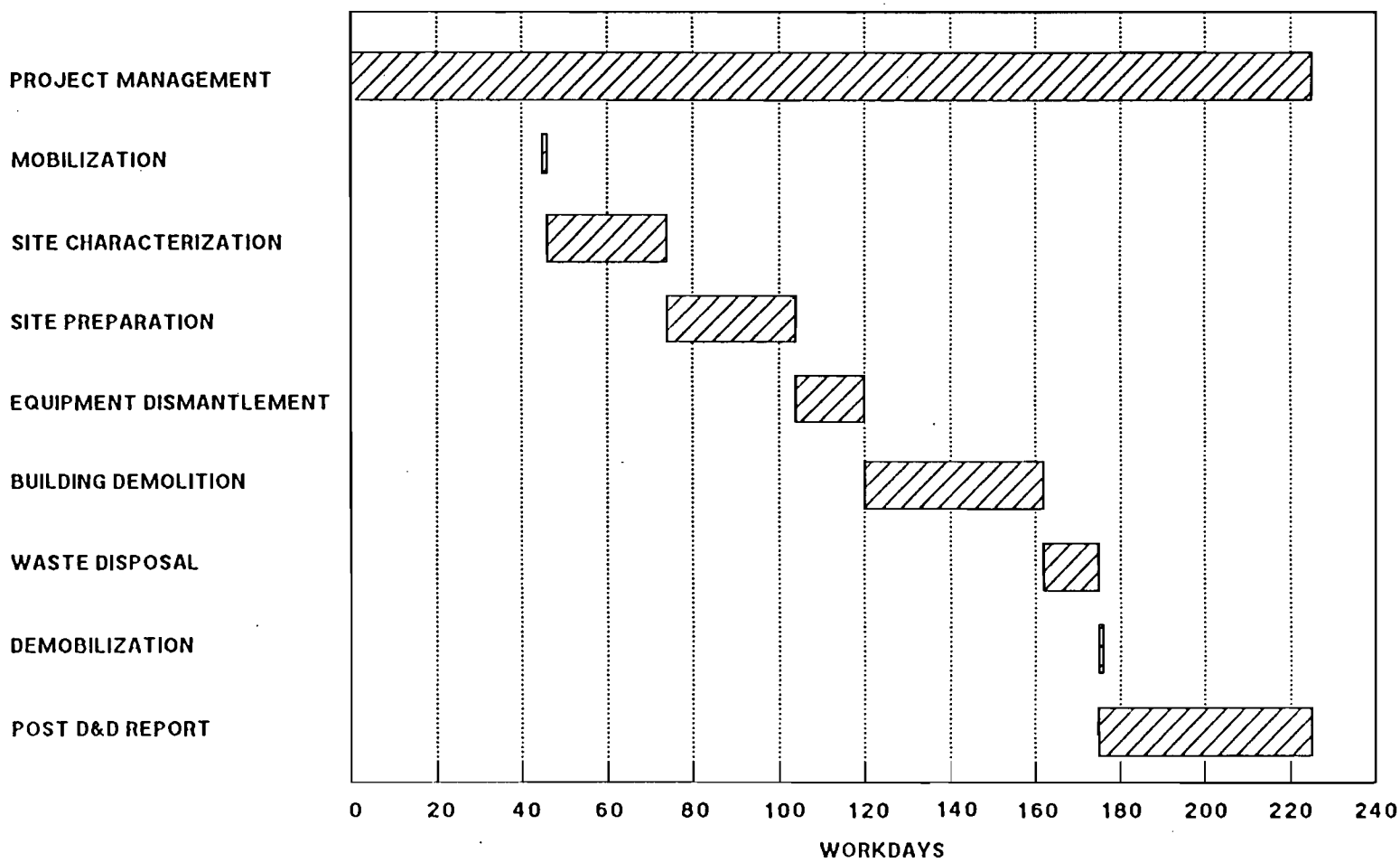
Mobilization and Demobilization. This element consists of gathering and removing labor forces and equipment to and from the site.

Post D&D Report. A detailed decontamination (D&D) report will be developed and issued to the DOE after the facility has been dismantled and disposed. This report will contain a detailed description of the project, the pre- and post-D&D conditions, the process of dismantling and disposing the materials, the total dollar and man-rem costs, and the time duration of the project.

Waste Volume Estimates:	7.1 Offgas Filter House - Bldg. 3121	
Solid Low Level	_____	cubic ft
Liquid Low Level	_____	gal
CH-TRU	106	cubic yd
RH-TRU	_____	cubic yd
Contaminated Soil	_____	cubic yd
Uncontaminated Soil	_____	cubic yd
Hazardous Chemical	_____	lb
Mixed	_____	drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	_____	cubic yd
Sanitary Landfill	_____	cubic yd

SCHEDULE FOR SURPLUS FACILITY 7.1

Offgas Filter House (3121)



09/10/87

ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate for Facility 7.1 - Offgas Filter House, Building 3121

DESCRIPTION	COST	TOTAL
I. Site Characterization		$9,800
II. Site Preparation	$27,800	
III. Decommissioning Operations		
Equipment Dismantlement and Removal	$16,100	
Building Demolition	$25,300	
Contaminated Waste Disposal	$190,100	
Mobilization/Demobilization	$2,000	
Subtotal III	$233,500	
Subtotal II & III	$261,300	
Overhead and Profit (OH&P)	$75,900	
Total II & III		$337,200
IV. Final D & D Report		$56,000
V. Engineering and Management		$103,400
VI. ORNL Overhead		$167,100
Subtotal I thru VI		$673,500
Contingency		$202,500
Total		$876,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 7.1 - Offgas Filter House, Building 3121

Sheet 1 of 2
Prepared by BWH 8/25/87
Checked by BWH 9/9/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/HH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			32.000	32.00	24.40	781	
2. Review During Dismantle and Remove	1	LT	0.00	0			360.000	360.00	24.40	8784	
3. Final Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
SUBTOTAL (1)				0				400.00		9760	$9,800
II. Site Preparation											
1. Place Perimeter Barricade	104	LF	1.26	131			0.0267	2.78	19.00	53	
2. Prework Training	1	LT	0.00	0			64.000	64.00	22.00	1408	
3. Build Temporary Enclosure, 16'x 24'x 16' high with Airlock and Packaging Area	384	SF	6.50	2496			1.200	460.80	19.00	8755	
4. Build Temporary Enclosure, 4'x 20'x 16' high	80	SF	6.50	520			1.200	96.00	19.00	1824	
5. Scaffolding, Tubular Steel Frames with Planking (Includes Removal)	324	LF	0.00	0	3.50	1134	0.355	115.02	19.00	2185	
6. Portable, Temporary Air Filtration Equipment (Includes Removal)	5.5	MO	125.00	688	850.00	4675	34.900	191.95	20.60	3954	
SUBTOTAL (II)				3835		5809		930.55		18179	$27,800
III. Decommissioning Operations											
1. Equipment Dismantlement and Removal											
Dismantle, Handle, Package (1)	35	CY	92.94	3253	9.94	348	11.000	385.00	24.40	9394	
Dismantle, Handle, Package (2)	7	CY	92.94	651	9.94	70	11.000	77.00	24.40	1879	
Seal Duct Opening at Bldg. 3019	1	LT	75.00	75	0.00	0	16.00	16.00	24.40	390	
SUBTOTAL				3979		418		478.00		11663	$16,100
2. Building Demolition											
Encapsulate Contaminates (3)	768	SF	0.45	346	0.25	192	0.042	32.26	20.00	645	
Dismantle Double Roof	310	SF	0.00	0	0.00	0	0.268	83.08	19.00	1579	
Package Roof for Disposal	24	CY	88.58	2126	16.90	406	2.600	62.40	19.00	1186	
Dismantle CMU Walls	480	SF	0.98	470	1.10	528	0.185	88.80	12.80	1137	
Package CMU Walls for Disposal	14	CY	88.58	1240	16.90	237	2.600	36.40	12.80	466	
Dismantle Misc. Items, i.e. Elect.	1	LT	25.00	25	0.00	0	16.000	16.00	20.40	326	
Package Misc. Items for Disposal	2	CY	88.58	177	0.00	0	2.600	5.20	20.40	106	

(1) Includes all HEPA filters, demisters, dampers, ducting, piping and electrical equipment.
(2) Includes all duct material connecting to Bldg. 3019.
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ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 7.1 - Offgas Filter House, Building 3121

Sheet 2 of 2
Prepared by BWH 8/25/87
Checked by BWH 9/9/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
2. Building Demolition (Cont.)											
Dismantle Concrete Floor	144	SF	6.10	878	6.79	978	1.143	164.59	14.83	2441	
Package Floor for Disposal	8	CY	88.58	709	16.90	135	2.600	20.80	14.83	308	
Dismantle Both Enclosures	464	SF	0.00	0			0.720	334.08	19.00	6348	
Package Enclosures for Disposal	16	CY	88.58	1417			1.600	25.60	19.00	486	
Plug and Seal LLW Connection	1	EA	50.00	50			2.000	2.00	22.00	44	
Fine Grade Surface Soil	144	SF	0.00	0			0.110	15.84	12.80	203	
Reseed, Mulch	144	SF	0.125	18			0.055	7.92	12.80	101	
SUBTOTAL				7456		2476		894.97		15376	$25,300
3. Load-out, Transport, Disposal Contaminated Matl. of Total Project to TRU-Waste Disposal Area	106	CY	1657.00	175642	77.96	8264	3.850	408.10	15.26	6228	$190,100
4. Mobilization/Demobilization (4)	1	LT	250.00	250	550.00	550	64.000	64.00	18.90	1210	$2,000
SUBTOTAL (II and III)				191162		17517		2775.61		52656	$261,300
Overhead & Profit				47791		4379				23695	$75,900
SUBTOTAL (II & III with OH&P)				238953		21896		2775.61		76351	$337,200
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								736.00	70.00	51520	
2. Engineering Inspection (Title III)								480.00	40.00	19200	
3. Project Management								563.00	40.00	22520	
4. Health and Safety								253.00	40.00	10120	
SUBTOTAL (V)											$103,400
VI. ORNL Overhead											$167,100
SUBTOTAL I thru VI											$673,500
CONTINGENCY											$202,500
TOTAL											$876,000

(4) Includes working and breathing air compressors, backhoe, forklift, stake truck and 12 ton yard crane.

FACILITY 8.1

8.1 Tower Shielding Facility (7700)

There were three sections of this facility considered individually. Section 1 is the depleted uranium sheets, section 2 is the sodium shield tank, and section 3 is the scrap material located outside.

The following decommissioning alternatives were considered:

- Protective Storage of Depleted Uranium Sheets
- Dismantlement and Disposal of Depleted Uranium Sheets
- Protective Storage of Sodium Shield Tank
- Transfer of Sodium to a New Tank
- Rupture of the Sodium Tank in the Explosive Detonation Trench
- Commercial Disposition of the Sodium Tank
- Segregation plus Subalternatives

For Section 1 the decommissioning alternative selected is dismantlement and disposal of depleted uranium sheets. This alternative involves repackaging the corroded aluminum box and depleted uranium sheets. The depleted uranium sheets and aluminum box would be disposed in an approved waste disposal facility.

For Section 2, the alternative selected is commercial disposition. Inquiries into the costs and time required for commercial disposition of this material were unrequited. ASI and ORNL agreed that the $50,000 rough estimate received from one vendor was unreasonable. With no background experience in sodium disposition, it was agreed that $20,000 would be a more reasonable estimate.

For Section 3, the decommissioning alternative selected is segregation plus recycling uncontaminated material and disposal of contaminated material and soil. This alternative involves segregation of the scrap material into contaminated and uncontaminated groups. A geochemical soil survey would be conducted in areas where contaminated materials are found.

The reusable materials would be transported to the K-25 salvage facility. The contaminated surplus material and soils would be disposed in an approved waste disposal facility. The surplus material would be shielded, contained, transported and disposed in accordance with approved ORNL procedures. Conventional excavation equipment techniques would be used to remove the contaminated soil. The removed soils would be transported for disposal in accordance with approved ORNL procedures. The resulting excavation would then be graded and re-seeded.

The structure of the estimate allows it to be scaled as accurate site characterization data become available. For cost estimating purposes, the following assumptions were made for Section 1:

- 6.66 cubic feet of depleted uranium.
- The approximate weight of the uranium sheets is 8,000 lb.
- Personnel exposure in this project will be less than 20 mR/day and therefore will not require a radiation work permit.
- The dimensions of the overpack are 5.5 ft by 5.5 ft by 0.41 ft.

The assumptions for Section 3 are:

- Total amount of contaminated material is 35 cubic yards.
- Total amount of clean material is 15 cubic yards.
- Approximately 21,639 cubic feet of contaminated soil will be excavated and shipped to a disposal facility.
- The area to be replanted is 10,816 square feet.

The total estimated cost and time duration for the three sections of this facility is $1,259,000 and 146 workdays. The following description is of the decommissioning activities for this facility. the schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

SECTION 1 Dismantlement and Disposal of the Depleted Uranium Sheets

The major elements of this alternative are discussed below:

- Project Management
- Site Characterization
- Site Preparation
- Overpacking
- Transportation and Storage
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. A field walk-over radiation survey will be taken of the aluminum container, and personnel exposure rates will be determined for handling the depleted uranium in its container. Radiation surveys will also be taken during and after decommissioning operations to monitor the area.

Site Preparation. A steel overpack container will be constructed and transported to the site. Workers will undergo pre-work training to reduce personnel exposure time.

Overpacking. A fork-lift will be used to place the aluminum container and uranium sheets into the steel overpack. The overpack will be placed onto a flat bed trailer for transportation.

Transportation and Storage. The depleted uranium sheets will be transported as solid low level waste to an approved waste disposal facility for storage.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the waste

generated and their disposal, the total dollar and man-rem costs, and the project duration.

SECTION 2 Incineration of Sodium-filled Shield

This alternative will be contracted to a qualified metals incinerator. The contractor will be responsible for the handling, transportation, and incineration of the sodium shield.

SECTION 3 Segregation and Recycle or Disposal of Scrap Material

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Segregation
- Packaging
- Excavation
- Transportation and Recycle or Disposal
- Site Cleanup and Restoration
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. A field walk-over radiation survey will be conducted over the scrap material and soil. All contaminated material will be marked appropriately and contaminated soil areas will be roped off.

Segregation. Segregation of clean and contaminated materials will be performed during site characterization.

Packaging. Contaminated material will be appropriately packaged following ORNL procedures. The packaged contaminated material will be trucked to an appropriate waste disposal site.

Excavation. The soil underlying the contaminated material will be surveyed and any hot spots will be excavated using a backhoe. The soil will be loaded into a lined dump truck for transportation to the disposal site.

Transportation and Recycle or Disposal. Clean material will be transported to the K-25 salvage yard. Packaged contaminated material will be transported to an approved waste disposal facility.

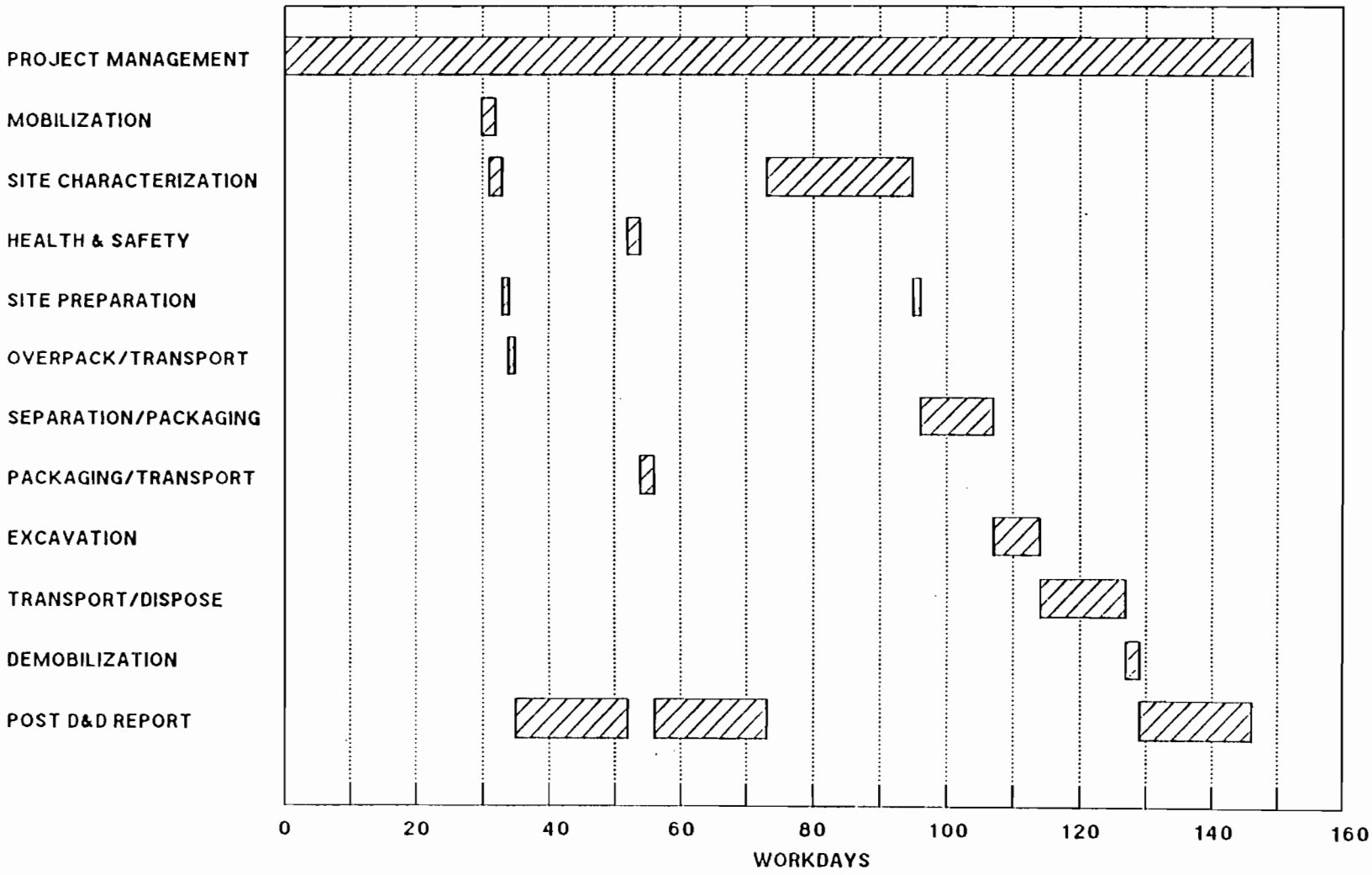
Site Cleanup and Restoration. After decommissioning activities have been completed, the excavated surface will be regraded and seeded.

Mobilization and Demobilization. This work element consists of gathering and removing labor forces and necessary equipment to and from the site.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the waste generated and their disposal, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	8.1 Tower Shielding Facility - Surplus Equipment - (Bldg. 7700)	
Solid Low Level	35	cubic ft
Liquid Low Level		gal
CH-TRU	0.4	cubic yd
RH-TRU		cubic yd
Contaminated Soil	438	cubic yd
Uncontaminated Soil		cubic yd
Hazardous Chemical		lb
Mixed		drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	15	cubic yd
Sanitary Landfill		cubic yd

SCHEDULE FOR SURPLUS FACILITY 8.1, SECTION 1, 2, & 3
Tower Shielding Facility Equipment (7700)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 8.1 - Tower Shielding Facility-Surplus Equipment (Bldg. 7700)

DESCRIPTION	COST	TOTAL
Section 1. Depleted Uranium Sheets		
I. Site Characterization		$300
II. Site Preparation	$1,100	
III. Decommissioning Operations		
Overpacking	$300	
Transportation and Storage	$900	
Mobilization/Demobilization	$300	
Subtotal III	$1,500	
Subtotal II & III	$2,600	
Overhead and Profit (OH&P)	$800	
Total II & III		$3,400
Section 2. Disposal of Sodium Filled Shield		
I. Site Health and Safety		$400
II. Decommissioning Operations		
Packaging and Transport (Subcontract)		$20,000
Section 3. Segregation/Recycle or Disposal of Scrap Material		
I. Site Characterization		$18,200
II. Site Preparation	$700	
III. Decommissioning Operations		
Segregation/Packaging	$10,500	
Excavation of Contaminated Soil	$5,800	
Transport/Recycle and Dispose of Site Material	$488,600	
Site Clean-up and Restoration	$3,800	
Mobilization/Demobilization	$2,500	
Subtotal III	$511,200	
Subtotal II & III	$511,900	
Overhead and Profit (OH&P)	$130,600	
Total II & III		$642,500
Sections 1 Thru 3 Combined		
IV. Final D & D Reports		$57,000
V. Engineering and Management		$46,900
VI. ORNL Overhead		$260,300
Subtotal I thru VI		$1,049,000
Contingency		$210,000
Total		$1,259,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 8.1 - Tower Shielding Facility - Surplus Equipment (Bldg. 7700)

Sheet 1 of 4
Prepared by BWH 8/27/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
Section 1. Depleted Uranium Sheets											
I. Site Characterization											
1. Initial Site Survey	1	LT	0.00	0			2.00	2.00	24.40	49	
2. Survey During Work	1	LT	0.00	0			10.00	10.00	24.40	244	
3. Final Site Survey	1	LT	0.00	0			2.00	2.00	24.40	49	
SUBTOTAL (I)				0				14.00		342	$300
II. Site Preparation											
1. Procure Steel Overpack Container (FOB at X-10)	1	EA	820.00	820			0.00	0.00	0.00	0	
2. Prework Training	1	LT	0.00	0			16.00	16.00	18.90	302	
SUBTOTAL (II)				820				16.00		302	$1,100
III. Decommissioning Operations											
1. Overpacking											
Place Aluminum Box with Uranium Sheets Within New Container	1	LT	22.50	23	95.00	95	8.00	8.00	18.90	151	$300
2. Transportation and Storage											
Load-out, Transport and Dispose of Boxed Uranium Sheets, SLLW (1)	12	CF	44.80	556	19.05	236	0.77	9.55	15.26	146	$900
3. Mobilization/Demobilization (2)	1	LT	50.00	50	198.00	198	5.33	5.33	18.90	101	$300
SUBTOTAL (II and III)				1449		529		38.88		700	$2,600
Overhead and Profit				362		132				315	$800
SUBTOTAL (II and III w/ OH&P) - Sect. 1				1811		661		38.88		1015	$3,400

(1) 8000 lb. uranium sheets.
(2) Includes semi-truck/trailer and 12 ton yard crane.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 8.1 - Tower Shielding Facility - Surplus Equipment (Bldg. 7700)

Sheet 2 of 4
Prepared by BWH 8/27/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
Section 2. Disposal of Sodium Filled Shield											
I. Site Health and Safety											
1. Survey During Work	1	LT	0.00	0			16.00	16.00	24.40	390	$400
II. Decommissioning Operations											
1. Packaging and Transport											
Package, Transport to Incineration Location By Subcontractor (3)	1	LT	20000	20000							$20,000
Section 3. Segregation/Recycle or Disposal of Scrap Material											
I. Site Characterization											
1. Initial Site Survey	1	LT	0.00	0			40.00	40.00	24.40	976	
2. Soil Sample Survey	27	EA	350.00	9450			1.50	40.50	24.40	988	
3. Review During Work	1	LT	0.00	0			272.00	272.00	24.40	6637	
4. Final Site Survey	1	LT	0.00	0			8.00	8.00	24.40	195	
SUBTOTAL (I)				9450				360.50		8796	$18,200
II. Site Preparation											
1. Place Perimeter Barricades	420	LF	1.26	529			0.0267	11.21	19.00	213	$700
III. Decommissioning Operations											
1. Segregation/Packaging											
Package Contaminated Materials in Containers Ready to Transport (Includes Breakdown Labor Allow.)	35	CY	95.10	3329	71.30	2496	9.60	336.00	13.83	4647	$10,500
2. Excavation of Contaminated Soil (Including Load-out)	403	CY	2.74	1104	6.81	2744	0.25	100.75	18.90	1904	$5,800

(3) One sodium shield (leakage seen), approximately 1230 gallons.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 8.1 - Tower Shielding Facility - Surplus Equipment (Bldg. 7700)

Sheet 3 of 4
Prepared by BWH 8/27/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Transport/Recycle and Dispose of Site Material											
Transport/Dispose of Contam. Soil	403	CY	1086.00	437658	11.55	4655	0.33	132.99	12.90	1716	
Transport/Dispose of Contam. Matls.	35	CY	1167.00	40845	20.95	733	3.85	134.75	14.35	1934	
Transport/Dispose of Clean Materials at K-25 Salvage (4)	15	CY	12.00	180	23.75	356	2.56	38.40	14.35	551	
SUBTOTAL				478683		5744		306.14		4201	$488,600
4. Site Clean-up and Restoration											
Regrade Excavated Surface	1210	SY	0.36	436	1.52	1839	0.03	36.30	18.90	686	
Reseed, Mulch	10890	SF	0.012	131	0.00	0	0.0053	57.72	12.80	739	
SUBTOTAL				567		1839		94.02		1425	$3,800
5. Mobilization/Demobilization (5)	1	LT	419.00	419	1285.00	1285	40.00	40.00	18.90	756	$2,500
SUBTOTAL (II and III)				484631		14108		888.12		13146	$511,900
Overhead & Profit				121158		3527				5916	$130,600
SUBTOTAL (II & III with OH&P) - Sect. 3				605789		17635		888.12		19062	$642,500
SUBTOTAL (II & III w/ OH&P) - All Sections				627600		18296		927.00		20077	$665,900
IV. Final D & D Reports											
1. Section 1	1	LT	0.00	0	0.00	0	272.000	272.00	70.00	19040	
2. Section 2	1	LT	0.00	0	0.00	0	272.000	272.00	70.00	19040	
3. Section 3	1	LT	0.00	0	0.00	0	272.000	272.00	70.00	19040	
SUBTOTAL (IV)				0		0		816.00		57120	$57,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								336.00	70.00	23520	
2. Engineering Inspection (Title III)								216.00	40.00	8640	
3. Project Management								256.00	40.00	10240	
4. Health and Safety								112.00	40.00	4480	
SUBTOTAL (V)											$46,900

(4) Includes load-out. (5) Includes 12 CY dump truck, backhoe/loader, stake truck, 12 ton yard crane, grader, semi-tractor/trailer.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 8.1 - Tower Shielding Facility - Surplus Equipment (Bldg. 7700)

Sheet 4 of 4
Prepared by BWH 8/27/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
VI. ORNL Overhead											$260,300
SUBTOTAL I thru VI											$1,049,000
CONTINGENCY											$210,000
TOTAL											$1,259,000

FACILITY 9.1

9.1 High Level Chemical Development Laboratory (4507)

The following decommissioning alternatives have been considered for this facility:

a. Decontamination, Repair and Reuse, and Partial Dismantlement
b. Protective Storage
c. Dismantlement and Disposal

For this facility, the decommissioning alternative selected for further development is dismantlement and disposal. This alternative involves removing of the control panel, radiation monitors, lighting, low voltage power supplies, 10 ton air conditioner, steam condensate, sprinkler system, manipulators, monorail and hoist, the electrical conduit. The concrete will be decontaminated, and the reinforced concrete will be line drilled. The building will be dismantled and all waste will be disposed. The cells in this building were designed and built to be decontaminated. It is assumed that after decontamination operations have been completed there will be no need for extensive radiation protection during demolition.

The estimate is structured so it may be appropriately scaled when accurate site characterization data become available. The following assumptions were made for cost estimating purposes.

- The cranes in the facility are all operable.
- All cell manipulators are operable.
- All portable instrument racks are salvageable.
- 80% of all disassembled equipment will be LLW.
- The building dimensions are: 1st level -2212 ft^2 x 12.5 ft high, penthouse - 1096 ft^2 x 17.5 ft
- The tank pit dimensions are 12.5 ft long x 6 ft wide x 12 ft deep.
- The soil dimensions requiring grouting are: 10 ft beyond perimeter of the tank pit and 10 ft deep.
- The amount of clean fill soil required will be 700 yd^3.
- One tank exists in the tank pit - T-30 and its dimensions are 4.5 ft in diameter x 7.5 ft high.

The total estimated cost and time duration is $2,485,000 and 421 days. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and cost breakdown of these activities are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Equipment Dismantlement and Disposal
- Decontamination
- Building Demolition
- Waste Handling/Packaging and Disposal
- Pit and Soil Grouting
- Backfill and Seeding
- Post D&D Report

Project Management This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. Additional facility characterization will be performed to determine the lateral and vertical extent of the contamination for delineation of the areas requiring remedial action. Characterization is primarily accomplished through analysis of a radiation walk-over survey of the floor, ceiling, and walls; and smear samples taken from the floor, ceiling walls, and equipment inside the building. A radiation walk-over will also be done over the soil around the building, as well as soil samples around the tank pit.

Site Preparation. Following characterization, construction barriers, detours, and signs will be erected to direct personnel around the site. Radiation monitors and alarms will be placed at appropriate points prior to beginning

work. Ground cover, to prevent the spread of contamination, will be laid inside the facility and just outside the entrances. Protective clothing and shoe covers will be available at the entrance for personnel entering and leaving the factory. A 2-story temporary containment structure will be built at one end of the facility to allow transport of equipment from the penthouse without spreading airborne contamination. A portable shower will be provided at the facility to decontaminate personnel.

Equipment Dismantlement and Disposal. All free-standing equipment will be removed from the penthouse and the first-floor lab. The noncontaminated equipment will go to K-25 for resale and the contaminated equipment will be bagged, placed in bins, and buried. Slightly contaminated equipment that can be decontaminated easily by wiping it off will also be salvaged.

Next, all the mounted equipment will be removed and disposed of, or salvaged, depending upon contamination. The utilities will remain until the building is ready to be demolished. The equipment in the fan pit will also be removed. The portable gloveboxes and hot cell in the penthouse will be filled with foam before removing. All the filters in the facility will be replaced with new until the decontamination is complete, at which time they will be bagged out and disposed.

Decontamination. Once all the equipment has been removed, another survey will be done to determine the amount of transferable contamination. The interior of the hot cells will initially be cleaned using the manipulators. High pressure spalling equipment will be used to reduce surface contamination on concrete to below 200 mR. The interior walls, floor, and ceiling of the building will be scraped and cleaned to remove transferable contamination. All contaminated interior surfaces will then be spray painted with an epoxy-based paint to fix any remaining contamination.

Building Demolition. After decontamination, a crane will be erected to begin dismantling the building. The penthouse will be cut into manageable sections using torches, and placed into a lined dump truck. The lower section will require a wrecking ball and pneumatic hammers to demolish. A backhoe and front-end loader will be used to place the debris into a lined dump truck.

Hot cell walls, ceiling and footing are so constructed that line drilling of the slabs for removal and disposal shall be required.

Waste Handling/Packaging and Disposal. All waste will be surveyed to determine the extent of contamination. Noncontaminated equipment will be sent to K-25 for salvage. Noncontaminated construction debris will be taken to the contractors' landfill. Contaminated equipment and construction debris will be handled as low level waste. It will be contained and buried in the appropriate waste disposal areas.

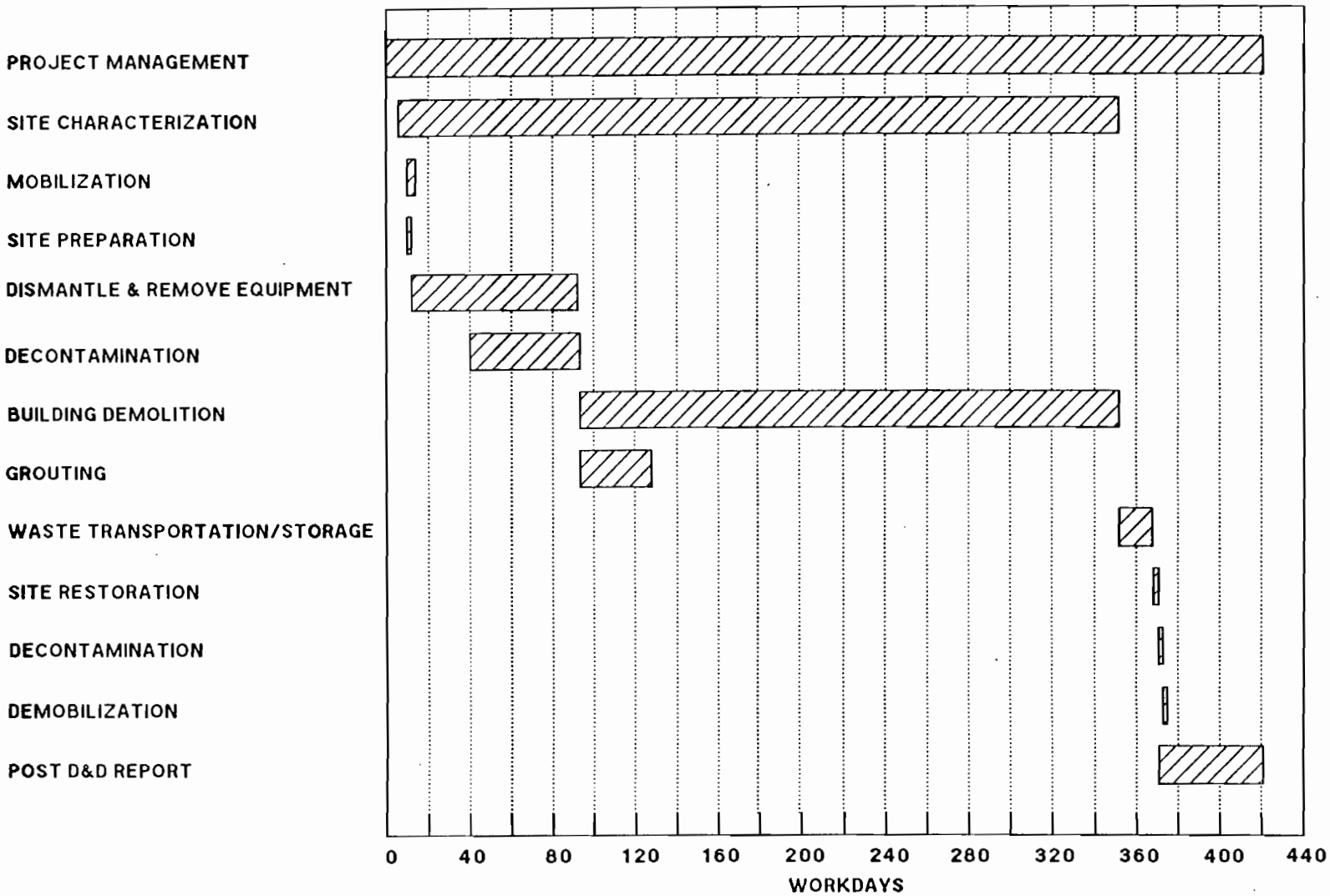
Pit and Soil Grouting. To fix contamination, the tank and pit will be filled with cement based grout and the contaminated soil surrounding the pit will be injected with polyacrilamide grout.

Backfill and Seeding. The excavated foundation cavity will be backfilled with clean soil and reseeded.

Post D&D Report. A final field radiation walk-over survey shall be conducted to evaluate the effectiveness of the decommissioning activities.

Waste Volume Estimates:	9.1 High Level Chemical Development Laboratory - (Bldg. 4507)
Solid Low Level	1.176 cubic ft
Liquid Low Level	5,900 gal
CH-TRU	____ cubic yd
RH-TRU	____ cubic yd
Contaminated Soil	____ cubic yd
Uncontaminated Soil	____ cubic yd
Hazardous Chemical	____ lb
Mixed	____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	900 cubic yd
Sanitary Landfill	____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 9.1
High Level Chemical Development Laboratory



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 9.1 - High Level Chemical Development Laboratory (Bldg. 4507)

DESCRIPTION	COST	TOTAL
I. Site Characterization	$198,200	
II. Decontamination	$127,000	
Operating Contractor Total		$325,200
II. Site Preparation	$1,000	
III. Decommissioning Operations		
Mobilization	$171,300	
Strip and Prepare for Transport Internal Equipment and Components	$327,700	
Grout Tank and Pit	$38,200	
Waste Transportation	$4,600	
Waste Disposal	$49,500	
Site Clean-up and Restoration	$3,300	
Equipment Decontamination	$500	
Demobilization	$1,000	
Subtotal III	$596,100	
Subtotal II & III	$597,100	
Overhead and Profit (OH&P)	$215,100	
Total II & III		$812,200
IV. Final D & D Report		$56,000
V. Engineering and Management		$243,600
VI. ORNL Overhead		$474,200
Subtotal I thru VI		$1,911,200
Contingency		$573,800
Total		$2,485,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 9.1 - High Level Chemical Development Laboratory (Bldg. 4507)

Sheet 1 of 7
Prepared by KDC 9/19/87
Checked by BWH 9/22/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Walk Thru Building Radiation Survey,	2	TECH					24.000	48.00	45.00	2160	
Sample Grid Layout Based on Building	1	HP					12.000	12.00	45.00	540	
Layout (Dwg. D-24008)											
2. Obtain Smear Samples (By Hand) on	1	TECH					10.000	10.00	45.00	450	
Hot Spots (Approx. 20 at 1/2 hr.)	1	HP					10.000	10.00	45.00	450	
3. Obtain Smear Samples From Inside	1	TECH					24.000	24.00	45.00	1080	
Cells (By Manipulators) (48 Total)	1	HP					24.000	24.00	45.00	1080	
4. Data Analysis	1	ENGR					24.000	24.00	70.00	1680	
5. Lab Analysis (Spot)	68	EA	350.00	23800							
6. Lab Analysis (Absolute)	6	EA	2500.00	15000							
Outside Building:											
7. Drive Tube Samples in 10' Strip	8	EA	0.00	0			3.000	24.00	45.00	1080	
Around Tank Pit											
8. Obtain Smear Samples on Tank - Pit	8	EA	0.00	0			0.500	4.00	45.00	180	
Walls and Floor											
9. Lab Analysis (Drive Tube)	8	EA	350.00	2800							
10. Lab analysis (Smear Samples)	8	EA	350.00	2800							
11. Lab Analysis (Absolute)	2	EA	2500.00	5000							
12. HP Surveillance During Demolition	1	HP					3114.00	3114.00	45.00	140130	
(Approx. 18 months)											
SUBTOTAL (I)				49400				3294.00		148830	$198,200
II. Decontamination											
1. Spot Clean Floors, Walls and Equip-	1	LT	0.00	0			692.00	692.00	45.00	31140	
ment; Wash and Wet Vacuum Pick-up											
2. Pressure Wash, Acid Etch, Detergent	1	LT	0.00	0			1008.00	1008.00	45.00	45360	
and Rinse Cell Interiors (1)											
3. Dispose of Contaminated Waste (2)											
Liquid LLW	5500	GAL	8.45	46475							
Solid LLW	100	CF	40.00	4000							
SUBTOTAL (II)				50475				1700.00		76500	$127,000
OPERATING CONTRACTOR TOTAL				99875				4994.00		225330	$325,200

(1) Fluids will gravity drain to waste tank (5500 gallons).
(2) Liquid LLW waste from washdown and vacuum; solid LLW includes wipes, floor paper, etc.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 9.1 - High Level Chemical Development Laboratory (Bldg. 4507)

Sheet 2 of 7
Prepared by KDC 9/19/87
Checked by BWH 9/22/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
(Work Not Performed By Operating Contractor)											
II. Site Preparation											
1. Isolate Construction Area With Movable Barricades, Flagging and Appropriate Signs.	1	LT	500.00	500			30.0000	30.00	16.10	483	$1,000
III. Decommissioning Operations											
1. Mobilization	1	LT	1000.00	1000							
50 Ton Hydraulic Crane	12	MO			6195.00	74340					
1.5 CY Backhoe/Loader	12	MO			3500.00	42000					
12 Ton Dump Truck	12	MO			1725.00	20700					
10 Ton Flatbed Truck	12	MO			1275.00	15300					
600 CFM Air Compressor	12	MO			1500.00	18000					
SUBTOTAL				1000		170340					$171,300
2. Strip and Prepare for Transport Internal Equipment and Components (3)											
a. Ground Floor											
Control Panels and Devices Including Conduit, Wire and Tubing	1	LT					800.00	800.00	22.65	18120	
Radiation Monitors, Portable and Fixed, and Fire Alarm System	1	LT					400.00	400.00	22.65	9060	
Lighting and Low Voltage Power System Including 75KW Transf. and Lighting Panels	1	LT					480.00	480.00	22.65	10872	
10 Ton Air Conditioner Including Ductwork and Registers	1	LT					160.00	160.00	23.10	3696	
Steam, Condensate and Sprinkler Piping	1	LT					160.00	160.00	23.30	3728	
Misc. Benches, Cabinets, Desks, Etc.	1	LT					120.00	120.00	16.10	1932	
Manipulators (Deliver to ORNL Manipulator Pool)	6	EA					80.00	480.00	21.25	10200	
Monorail and Hoist Including Feeder	1	LT					48.00	48.00	22.40	1075	
SUBTOTAL (a.)								2648.00		58683	$58,700

(3) Transport to K-25 Salvage unless otherwise noted.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 9.1 - High Level Chemical Development Laboratory (Bldg. 4507)

Sheet 3 of 7
Prepared by KDC 9/19/87
Checked by BWH 9/22/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
2. Strip and Prepare for Transport Internal Equipment and Components											
b. Make-up Area											
DP Cell Rack and Tubing	1	LT					40.00	40.00	23.30	932	
Monorail and Hoist	1	LT					16.00	16.00	22.40	358	
Lighting System & Service Outlets	1	LT					32.00	32.00	22.65	725	
Piping Systems	1	LT					120.00	120.00	23.30	2796	
Exhaust Fans and Glovebox	1	LT					60.00	60.00	23.10	1386	
Misc. Material, Parts, Etc.	1	LT					40.00	40.00	16.10	644	
SUBTOTAL (b.)								308.00		6841	$6,800
c. Penthouse											
Control Panels and Devices Including Conduit, Wire and Tubing	1	LT					160.00	160.00	22.65	3624	
Radiation Monitors, Portable and Fixed	1	LT					200.00	200.00	22.65	4530	
Lighting and LV Power Systems	1	LT					80.00	80.00	22.65	1812	
Gloveboxes, Self-contained and Modular, Including Manipulators	1	LT					160.00	160.00	23.10	3696	
Steam, Sprinkler and Service Piping	1	LT					120.00	120.00	23.30	2796	
Remove Cell Roof Plugs, Cover Plates and Steel Plugs to K-25, Concrete Plugs to Contractors' Landfill	4	EA					9.00	36.00	21.50	774	
Misc. Benches, Cabinets and Tables	1	LT					24.00	24.00	16.10	386	
Gantry and Monorail Crane (Trucks and Frame as a Unit)	1	LT					120.00	120.00	21.50	2580	
SUBTOTAL (c.)								900.00		20198	$20,200
d. Building Shell											
Penthouse Roof and Siding - Metal "Q" Deck (Inc. Covered Walkway)	3910	SF					0.03	113.39	16.10	1826	
Penthouse Structural Steel Framing (Inc. Gantry Crane Rails and Outdoor Steel Structure)	1	LT					80.00	80.00	21.50	1720	

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 9.1 - High Level Chemical Development Laboratory (Bldg. 4507)

Sheet 4 of 7
Prepared by KDC 9/19/87
Checked by BWH 9/22/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
2. Strip and Prepare for Transport Internal Equipment and Components											
d. Building Shell (Cont.)											
Roll-up Door (12'x 18' including track and operator)	1	EA					40.00	40.00	21.50	860	
Remove Build-up Roofing, 1" Rigid Insulation and Vapor Barrier, Trans. to Contractors' Landfill	1000	SF					0.035	35.00	16.50	578	
Remove Metal Deck	2800	SF					0.030	84.00	17.32	1455	
Second Floor Structural Steel	1	LT					120.00	120.00	21.50	2580	
Masonry Walls (8" Concrete Block with Brick Veneer	2340	SF					0.110	257.40	16.50	4247	
Repair Masonry on South Wall of Bldg. 4505, Sandblast Painted Brick (Approx. 1200 SF)	1	LT	2500.00	2500			80.00	80.00	17.32	1386	
Metal Doors, Frames and Hardware (2 dbl. and 8 single)	1	LT					16.00	16.00	16.10	258	
Misc. Stairs, Ladder, Gas Cylinder Rack	1	LT					80.00	80.00	21.50	1720	
SUBTOTAL (d.)				2500				905.79		16630	$19,100
e. Building Floor Slabs, Foundations and Footings											
Curtain Wall and Footing	42	CY					6.00	252.00	16.50	4158	
Column Flanges	12	CY					6.00	72.00	16.50	1188	
Floor Slab (6" Reinf. Concrete)	1960	SF					0.33	646.80	16.50	10672	
Crushed Stone (18" dp. nom.)	110	CY					4.00	440.00	16.50	7260	
SUBTOTAL (e.)								1410.80		23278	$23,300
f. Cell Block (4)											
Motorized Plugs, Carriage and Drive to K-25 Salvage, Concrete Plug to Contractors' Landfill	4	EA	150.00	600			24.00	96.00	21.50	2064	
Roof (5' thk., Line drill into 4 pcs/cell, 192 holes total)	1	LT	4880.00	4880			2100.00	2100.00	21.50	45150	

(4) High density concrete to floor level.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 9.1 - High Level Chemical Development Laboratory (Bldg. 4507)

Sheet 5 of 7
Prepared by KDC 9/19/87
Checked by BWH 9/22/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
2. Strip and Prepare for Transport Internal Equipment and Components											
f. Cell Block (Cont.)											
Rear Column (5'6"x 4'x 11', Approx. 27 tons each)	5	EA	150.00	750			60.00	300.00	21.50	6450	
Side Panels (4' thk. x 10'x 11', Approx. 49 tons each, Line drill front edge - 66 holes 4' dp. plus Rigging Plates)	5	EA	1500.00	7500			196.00	980.00	21.50	21070	
Front Wall (4'thk. x 11' x 45'lg., Line drill into 4 slabs-3 cuts, Approx. 198 holes plus rigging)	1	LT	4520.00	4520			556.00	556.00	21.50	11954	
Front Footer (4'x 4'x 45'lg., Concrete, Line drill into 4 pcs., Approx. 72 holes plus rigging)	1	LT	2040.00	2040			312.00	312.00	21.50	6708	
Wall Footers (4'x 4'x 10', Normal Concrete, Line drill into 4 pcs., 900 holes plus rigging)	5	EA	150.00	750			30.00	150.00	21.50	3225	
Rear Footer (4'thk.x 5' x 45', Concrete, Line drill into 4 pcs., 900 holes plus rigging)	1	LT	600.00	600			1896.00	1896.00	21.50	40764	
Crushed Stone Fill	78	CY	0.00	0			4.00	312.00	16.50	5148	
Spread Footing (1'9" thk. x 24'6"x 49'6", Saw cut into 20 pcs.)	1	LT	3648.00	3648			1304.00	1304.00	21.50	28036	
Concrete Duct (Precast Slab, Remove Intact, Load into B-25 Boxes for Disposal, Approx. 260 CF)	1	LT	1800.00	1800			120.00	120.00	16.20	1944	
Subtotal (f.)				27088				8126.00		172513	$199,600
SUBTOTAL				29588				14298.59		298143	$327,700
3. Grout Pit and Tank											
Fill Tank with Non-shrinking Cement Grout	120	CF	11.00	1320			0.060	7.20	16.10	116	
Fill Pit with Non-shrinking Cement Grout	600	CF	11.00	6600			0.060	36.00	16.10	580	
Drill Grout Holes Around Tank Pit (13' dp. 5'ctrs., 18 holes)	234	LF	0.00	0			0.488	114.19	16.40	1873	

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 9.1 - High Level Chemical Development Laboratory (Bldg. 4507)

Sheet 6 of 7
Prepared by KDC 9/19/87
Checked by BWH 9/22/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Grout Pit and Tank (Cont.)											
Chemical Grout Injection	21000	GAL	0.26	5523			0.044	924.00	23.96	22139	
SUBTOTAL				13443				1081.39		24708	$38,200
4. Waste Transporation											
To K-25 Salvage	40	TRIP	3.00	120			4.000	160.00	16.95	2712	
To Contractors' Landfill	40	TRIP	2.00	80			2.000	80.00	16.95	1356	
To LLW Storage	10	TRIP	3.00	30			2.000	20.00	16.95	339	
SUBTOTAL				230				260.00		4407	$4,600
5. Waste Disposal											
LLW Solid Waste (Bulk)	500	CF	40.00	20000							
LLW Solid Waste (B-25 Boxes)	6	EA	3840.00	23040							
LLW Solid Waste (Drums)	4	EA	270.00	1080							
Contractors' Landfill	800	CY	6.00	5400							
SUBTOTAL				49520							$49,500
6. Site Clean-up and Restoration											
Compacted Fill	318	CY	6.50	2067			0.058	18.44	17.91	330	
Topsoil	32	CY	10.00	320			0.058	1.86	17.91	33	
Grading	350	CY	0.20	70			0.021	7.35	27.62	203	
Fertilize, Seed and Mulch	3000	SF	0.02	60			0.005	15.00	17.20	258	
SUBTOTAL				2517				42.65		824	$3,300
7. Equipment Decontamination	1	LT								500	$500
8. Demobilization	1	LT	1000.00	1000							$1,000
SUBTOTAL (II and III) (5)				97798		170340		15712.63		329065	$597,100
Overhead & Profit				24450		42585				148079	$215,100
SUBTOTAL (II & III with OH&P)				122248		212925		15712.63		477144	$812,200

(5) Does not include work performed by operating contractor.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 9.1 - High Level Chemical Development Laboratory (Bldg. 4507)

Sheet 7 of 7
Prepared by KDC 9/19/87
Checked by BWH 9/22/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)										127900	
2. Engineering Inspection (Title III)										42600	
3. Project Management										48700	
4. Health and Safety										24400	
SUBTOTAL (V)											$243,600
VI. ORNL Overhead (Includes OC work)											$474,200
SUBTOTAL I thru VI											$1,911,200
CONTINGENCY											$573,800
TOTAL											$2,485,000

FACILITY 10.1

10.1 High Level Radiation Analytical Facility (3019-B)

The following decommissioning alternatives were considered for this facility:

- Decontamination
- Protective Storage
- Dismantlement and Disposal

For this facility the decommissioning alternative selected for further development is dismantlement and disposal. This alternative would be a carefully planned dismantlement, packaging, and disposal of all removable parts of this facility. After the facility is completely stripped, the inner surfaces (walls and floors) would be decontaminated to as-near background levels as practicable.

The estimate is structured so it may be appropriately scaled when accurate site characterization become available. The following assumptions were made for cost estimating purposes:

- All removable items in the storage cell and hot cells, the manipulators, and all the Zinc Bromide have been removed during prior clean-up operations performed by ORNL.

- Radiation levels encountered inside the cells are approximately 45 mR/hr except in two instances where 100,000 mR/hr will be encountered.

The total estimated cost and time duration for this facility is $3,787,000 and 720 workdays. The following description is of the decommissioning activities. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation

- Mobilization and Demobilization
- Dismantlement of Operating Room Items
- Removal of Radioactive Waste in Hot Cells
- Dismantlement of Hot Cells
- Dismantlement of LLW Drain System
- Removal of Floor Tile
- Transportation and Disposal
- Site Restoration
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. Prior to any decommissioning activities a radiation survey will be performed over the entire area. Smear samples will be taken from hot spots identified during the survey. Two soil samples shall be taken underneath the concrete floor to test for contamination migrating from the LLW drain line. The air will also be monitored for asbestos fibers.

Site Preparation. Workers will undergo pre-work training to reduce personnel exposure time. The duct work immediately above the hot cells will be replaced to operating standards. The low level waste line will be capped at the hot cell drain. Containment tents will be built on both sides of each cell, and a staging area will be prepared near the exit of the cell operating room. A pre-shipping storage area will also be constructed near the bay door.

Mobilization and Demobilization. This work element consists of gathering and removing labor forces and necessary equipment to and from the site.

Dismantlement of Operating Room Items. Miscellaneous items, such as benches and equipment, will be removed from the facility to avoid being contaminated. Contaminated material will be dismantled and appropriately packaged for transportation.

Removal of Radioactive Waste in Hot Cells. The cell access doors will be opened and laboratory equipment will be removed and packaged for transportation, and utilities will be disconnected.

Dismantlement of Hot Cells. The concrete walls will be demolished using a rock splitter and chipping hammer, and the conveyer and electric cart shall be manually disassembled. A HEPA-filtered vacuum exhaust system will be used to collect dust particles. The concrete rubble along with dismantled scrap material will be packaged in appropriate containers. The demolition will start at cell 7 and proceed toward cell 6. Any asbestos insulation encountered during demolition will be segregated and appropriately packaged.

Dismantlement of LLW Drain System. After dismantlement of the hot cells, the concrete overlying the LLW drain line will be removed and the drain line shall be filled with urethane foam and cut into 28-inch sections. Each section will be capped at both ends. The pipe will be packaged in 17H stainless steel 55-gallon drums. Excavated dirt will also be appropriately packaged. The concrete footer will be filled with concrete. The pipe line will be cut and capped at the building intersection, as well as the pipe 5 feet beyond the building.

Removal of Floor Tile. The floor tile will be cleaned and then removed. Manually operated scrapers will be used to remove the tiles.

Transportation and Disposal. All uncontaminated material will be loaded into trucks and transported to the contractors' landfill for disposal. Low level waste will be transported to an approved waste disposal facility for storage. The LLW drain line will be taken to the TRU retrievable storage facility at SWSA 5.

Site Restoration. After decommissioning activities have been completed, the excavated pipe line trench will be filled and covered with concrete. The floor will be recovered, and the room shall be painted. The containment and HEPA system will be removed and disposed in an approved waste disposal facility.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions. The dismantling of the operating room items, hot cells, low level waste drain system and the removal of the floor tile will be discussed. The total dollar and man-rem costs, and the project duration will also be included.

Annual Waste Volume Projections for 10.1

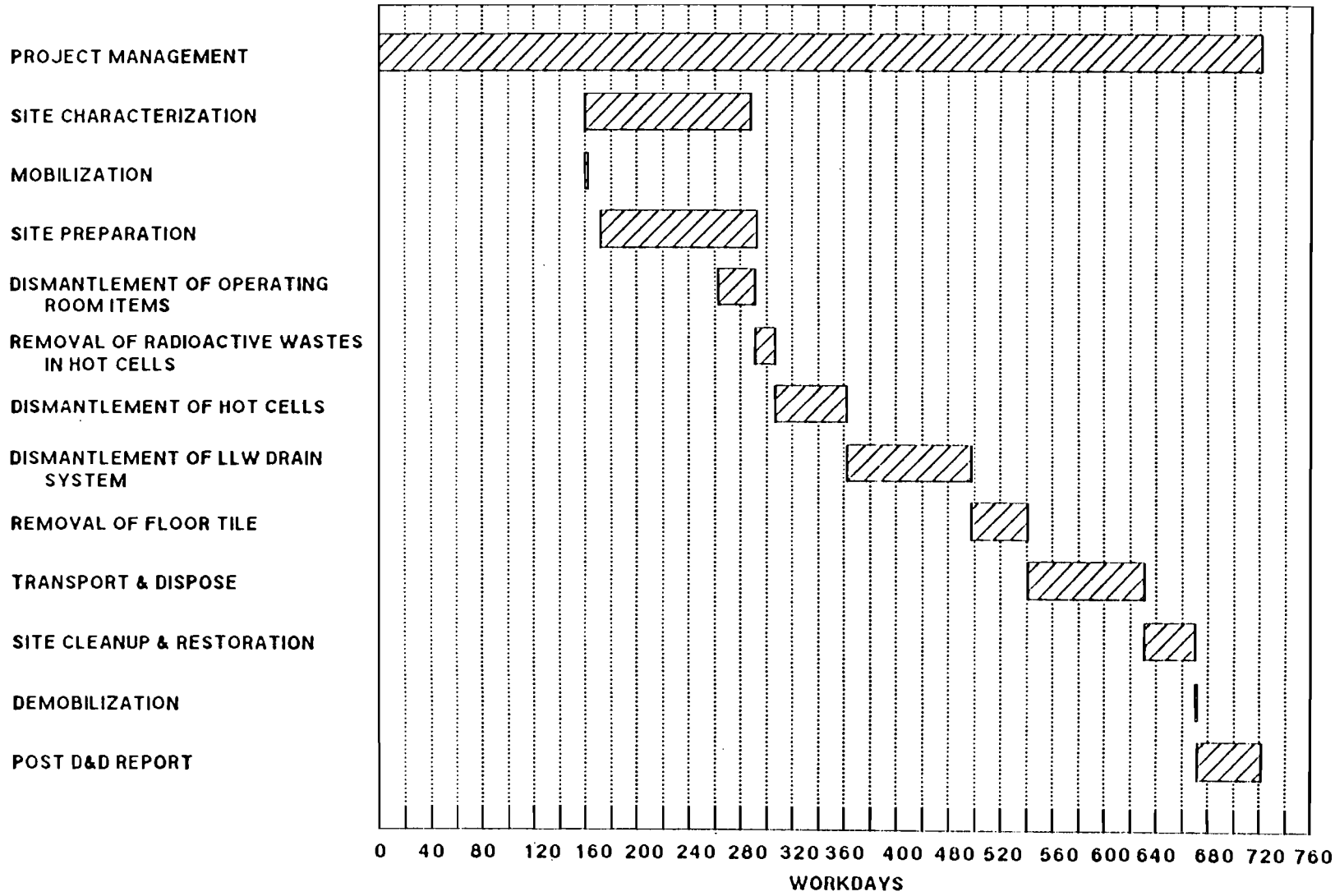
	YEAR 1	YEAR 2	YEAR 3
Solid:			
Soil (LLW)	-	100 CF	-
Soil (TRU)	-	-	-
Rubble (LLW)	-	12,885 CF	250 CF
Rubble (TRU)	-	-	-
Metal (LLW)	300 CF	180 CF	-
Metal (TRU)	-	93 CF	1,150 CF
Misc (LLW)	-	455 CF	-
Misc (TRU)	-	-	-
TOTAL (LLW)	300 CF	13,620 CF	1,400 CF
TOTAL (TRU)	-	93 CF	-
Liquid:			-
Process waste	-	-	-
LLW	-	440 gal	-

SUMMARY OF ANNUAL EXPENDITURE REQUIREMENTS

Facility 10.1 - High Level Radiation Analytical Facility

Year	Workday Period	Cost
1	1-260	$520,160
2	261-520	$1,224,592
3	520-722	$2,042,249
Total		$3,787,000

SCHEDULE FOR SURPLUS FACILITY 10.1
High Level Radiation Analytical Facility



09/16/87

ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate for Facility 10.1 - High Radiation Level Analytical Facility, Bldg. 3019-B

DESCRIPTION	COST	TOTAL
I. Site Characterization		$48,400
II. Site Preparation	$110,900	
III. Decommissioning Operations		
Dismantlement of Cells	$160,900	
Dismantlement of LLW Drain System	$127,200	
Removal of Floor Tile	$13,700	
Transportation and Disposal	$732,100	
Site Clean-up and Restoration	$31,500	
Mobilization/Demobilization	$2,400	
Subtotal III	$1,067,800	
Subtotal II & III	$1,178,700	
Overhead and Profit (OH&P)	$351,500	
Total II & III		$1,530,200
IV. Final D & D Report		$56,000
V. Engineering and Management		$555,840
VI. ORNL Overhead		$722,800
Subtotal I thru VI		$2,913,240
Contingency		$873,760
Total		$3,787,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 10.1 - High Radiation Level Analytical Facility, Building 3019-B

Sheet 1 of 4
Prepared by BWH 7/17/87
Checked by BWH 9/14/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			80.000	80.00	24.40	1952	
2. Initial Soil Sampling (1)	2	EA	410.00	820	34.50	69	6.000	12.00	24.40	293	
3. Air Sample Tests for Airborne Asbestos Fibers	2	EA	125.00	250			2.000	4.00	24.40	98	
4. Review During Work	1	LT	0.00	0			1824.00	1824.00	24.40	44506	
5. Final Contamination Review	1	LT	0.00	0			16.000	16.00	24.40	390	
SUBTOTAL (I)				1070		69		1936.00		47239	$48,400
II. Site Preparation											
1. Prework Training	1	LT	0.00	0			352.000	352.00	20.40	7181	
2. Remove/Package Ductwork Above Hotcells	2000	LB	0.30	600			0.230	460.00	20.60	9476	
3. Replace Ductwork Above Hotcells	2000	LB	0.64	1280			0.180	360.00	20.60	7416	
4. Build Temporary Enclosure (2)	2540	SF	2.75	6985			0.440	1117.60	19.00	21234	
5. Build Temporary Enclosure as Stagging Dress-out Area	375	SF	2.75	1031			0.440	165.00	19.00	3135	
6. Build Temporary Enclosure as Pre-shipping Storage Area	375	SF	2.75	1031			0.440	165.00	19.00	3135	
7. Cap the Hotcell Drain at the Cell Floor Location	7	EA	45.00	315			2.750	19.25	22.00	424	
8. Scaffold Handling	500	CCF	0.35	175	46.80	23400	2.540	1270.00	19.00	24130	
SUBTOTAL (II)				11417		23400		3908.85		76131	$110,900
III. Decommissioning Operations											
1. Dismantlement of Cell Operating Room Items (Includes Cell Internals)											
Remove Misc. Items to Prevent Contamination	112	CF	2.95	330	1.50	168	0.860	96.32	12.80	1233	
Remove, Dismantle, Package for Disposal Other Items as SLLW	448	CF	3.25	1456	1.50	672	1.750	784.00	22.00	17248	
Open Cell Access Doors	7	EA	0.00	0			3.500	24.50	12.80	314	
Remove Lab Equipment and Package for Contaminated Disposal	56	CF	3.25	182			8.500	476.00	12.80	6093	
Disconnect Utilities to Each Cell	8	EA	0.00	0			8.000	64.00	20.40	1306	

(1) Includes sampling beneath concrete floor, core bore, and regrout.
(2) Includes enclosure at both sides of hotcells and sample storage cell.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 10.1 - High Radiation Level Analytical Facility, Building 3019-B

Sheet 2 of 4
Prepared by BWH 7/17/87
Checked by BWH 9/14/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
1. Dismantlement of Cell Operating Room Items (Cont.)											
Power Wash Interior of Cells	8	EA	15.00	120	43.88	351	3.000	24.00	12.80	307	
Recover Wash Water for Disposal	440	GAL	2.35	1034	0.25	110	0.070	30.80	12.80	394	
Encapsulate Surface Contaminates With Bridging Spray Paint	5200	SF	0.35	1820	0.07	364	0.042	218.40	20.00	4368	
Demolish Cell Concrete Walls, Package for Disposal (3)	15750	CF	3.00	47250	0.69	10868	0.240	3780.00	12.80	48384	
Dismantle Conveyor System and Electric Cart, Package for Disposal	180	CF	1.25	225			1.330	239.40	22.60	5410	
Prepare HEPA Filter Vacuum Exhaust System to Support Cell Demolition	1	LT	4800.00	4800			256.000	256.00	20.60	5274	
Segregate Asbestos Pipe Insulation, Package for Disposal	7	CF	8.50	60			4.600	32.20	24.40	786	
SUBTOTAL				57277		12533		6025.62		91117	$160,900
2. Dismantlement of LLW Drain System											
Break-up/Package for Disposal Concrete to Access LLW Drain	35	CY	1120.00	39200	41.98	1469	3.650	127.75	12.80	1635	
Fill the Drain Line with Foam	415	GAL	6.00	2490	2.10	872	1.150	477.25	19.40	9259	
Cut Drain Pipe into 28" Sections	156	EA	8.66	1351	20.44	3189	3.000	468.00	22.00	10296	
Foam Fill, Cap Both Ends, Package Sections for Disposal (4)	156	EA	8.50	1326	0.00	0	0.500	78.00	22.00	1716	
Place Concrete/Grout Mixture in LLW Drain Footer Trough	1500	CF	11.45	17175	7.45	11175	0.876	1314.00	15.85	20827	
Plug/Seal Both Sides of External Wall at Drain Penetration	2	EA	18.00	36	0.00	0	4.000	8.00	19.40	155	
Hand Excavate to 5 LF Away From Bldg. for Drain Line	3.7	CY	0.00	0	0.00	0	12.00	44.40	12.80	568	
Package Excavated Soil for Disposal As SLLW	100	CF	37.10	3710	0.00	0	0.450	45.00	12.80	576	
Plug/Cap LLW Drain Line at 5 LF From Building and Abandon	1	EA	18.00	18	0.00	0	4.000	4.00	19.40	78	
Backfill, Compact Clean Fill	3.7	CY	9.35	35	5.54	20	1.500	5.55	12.80	71	
SUBTOTAL				65341		16725		2571.95		45181	$127,200

(3) Use splitter and chipping hammer; allow 20% as clean to CLF.
(4) Use 14, SS-17H, 55-gallon drums, fill voids with sand.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 10.1 - High Radiation Level Analytical Facility, Building 3019-B

Sheet 3 of 4
Prepared by BWH 7/17/87
Checked by BWH 9/14/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Removal of Floor Tile											
Decontaminate Floor With Solvent	5000	SF	0.20	1000			0.090	450.00	12.80	5760	
Remove Floor Tile and Package for Disposal as SLLW (5)	625	CF	4.75	2969	1.44	900	0.390	243.75	12.80	3120	
SUBTOTAL				3969		900		693.75		8880	$13,700
4. Transportation and Disposal											
Load-out, Transport, Dispose at K-25 Clean, Salvagable Equipment	56	CF	0.95	53	2.52	141	0.360	20.16	14.50	292	
Load-out, Transport, Dispose Clean Concrete, Floor Tile (6)	122	CY	8.85	1080	7.00	854	3.850	469.70	14.50	6811	
Load-out, Transport, Dispose Contaminated Items, SLLW (7)	15630	CF	41.50	648645	1.63	25477	0.150	2344.50	14.50	33995	
Load-out, Transport, Dispose Contaminated Items, CH-TRU (8)	2.6	CM	4000.00	10400	32.08	83	2.950	7.67	14.50	111	
Load-out, Transport, Dispose LLLW	440	GAL	8.50	3740	0.50	220	0.033	14.52	14.50	211	
SUBTOTAL				663918		26775		2856.55		41420	$732,100
5. Site Clean-up and Restoration											
Place New Tile on Floors	6700	SF	1.50	10050			0.025	167.50	19.00	3183	
Paint Walls	7600	SF	0.09	684	0.06	456	0.008	60.80	20.00	1216	
Remove Containment Tenting and Package for Disposal	1097	CF	0.15	165			0.540	592.38	19.00	11255	
Remove/Package HEPA System for Disposal	54	CF	1.25	68			4.000	216.00	20.60	4450	
SUBTOTAL				10967		456		1036.68		20104	$31,500
6. Mobilization/Demobilization (9)	1	LT	385.00	385	760.00	760	64.000	64.00	18.90	1210	$2,400
SUBTOTAL (II and III)				813274		81549		17157.40		284043	$1,178,700
Overhead & Profit				203319		20387				127819	$351,500

(5) Allow 20% as clean to CLF.
(6) Dispose at contractors' landfill.
(7) Includes the following SLLW: Ductwork, equipment outside cells, lab concrete walls, lab conveyor, HEPA system, asbestos, concrete at LLW drain, contaminated soil, floor tile, and containment tents.
(8) Includes equipment in cells and LLW drain pipe sections.
(9) Includes 12 CY dump truck, forklift, air equipment, and grout mixer.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 10.1 - High Radiation Level Analytical Facility, Building 3019-B

Sheet 4 of 4
Prepared by BWH 7/17/87
Checked by BWH 9/14/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
SUBTOTAL (II and III with OH&P)				1016593		101936		17157.40		411862	$1,530,200
IV. Final D & D Report	1	LT	0.00	0			800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								3520.00	70.00	246400	
2. Engineering Inspection (Title III)								920.00	40.00	36800	
3. Project Management								1760.00	40.00	70400	
4. Health and Safety								5056.00	40.00	202240	
SUBTOTAL (V)											$555,840
VI. ORNL Overhead											$722,800
SUBTOTAL I thru VI											$2,913,240
CONTINGENCY											$873,760
TOTAL											$3,787,000

FACILITY 11.1

11.1 Remote Coating Furnace Loop (4508, Rm 265A)

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Dismantle and Dispose
- Partial Decontamination and Dismantlement

The decommissioning alternative chosen for this facility is partial decontamination and dismantlement. This alternative involves careful dismantlement of the process equipment for reuse or resale. The remaining support equipment would be dismantled as scrap; sending noncontaminated equipment to K-25 as surplus and the contaminated equipment to an approved waste disposal facility.

The estimate is structured so it may be appropriately scaled when accurate site characterization data become available. The following assumptions were made for cost estimating purposes:

- The plexiglass enclosure dimensions are 12 ft by 20 ft by 16 ft high.
- 30 percent of the process equipment will be salvaged.
- All electrical instrumentation outside the enclosure will be salvaged.

The total estimated cost and time duration for this facility is $300,000 and 121 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Equipment Dismantlement and Removal
- Decontamination

- Waste Handling, Packaging, and Disposal
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. Additional facility characterization will be performed to determine the lateral and vertical extent of the contamination so areas possibly requiring remedial action may be outlined. Characterization is primarily accomplished through analysis of a radiation survey of the floor, ceiling, and walls; and smear samples taken from the floor, ceiling, walls, and equipment inside the plexiglass enclosure. Contamination surveys will also be taken during and after dismantlement.

Site Preparation. Following characterization, construction barriers, detours, and signs will be erected to direct personnel around the facility. Radiation monitors and alarms will be placed at appropriate points prior to beginning work. Ground cover, to prevent the spread of contamination, will be laid inside the facility and just outside the entrances. Protective clothing and shoe covers will be available at the entrance for personnel entering and leaving the facility. Workers will also undergo pre-work training to reduce personnel exposure time.

Equipment Dismantlement and Removal. Instrument panels outside the enclosure will be removed and sent to K-25 for salvage. The glovebox will be filled with foam, disconnected, and disposed as low level waste. The scrubber system will be disconnected, packaged, and disposed of as low level waste.

Inside the enclosure the process equipment will be dismantled. The major process equipment will be set aside for decontamination, while all other equipment, piping, and wiring will be packaged and disposed of as low level waste. The plexiglass enclosure will be decontaminated and then dismantled, packaged, and disposed of as low level waste.

Decontamination. The process equipment will be decontaminated externally for ease of handling. The type of decontamination procedure will depend upon the extent of contamination. It will be manually wiped with a wash solution and wiped dry. The plexiglass walls will be decontaminated by manually wiping with a mild detergent and will be wiped dry. The floor of the facility will be cleaned merely by removal of the plastic sheeting laid for protection.

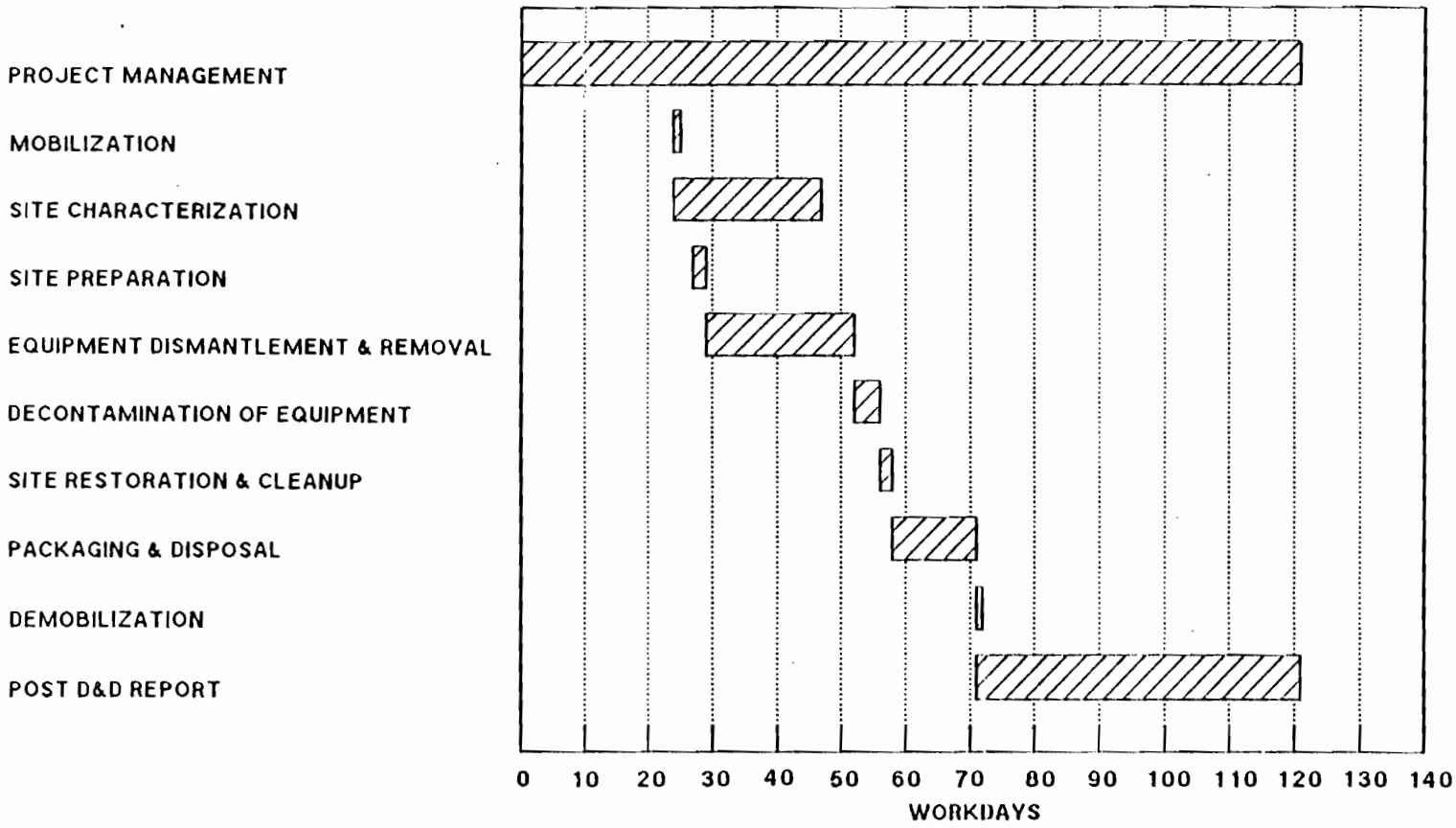
Waste Handling, Packaging, and Disposal. All waste will be surveyed to determine the extent of contamination. Noncontaminated equipment will be sent to K-25 for salvage. Noncontaminated construction debris will be taken to the contractors' landfill. Contaminated equipment, construction debris, and decontamination waste will be handled as low level waste. It will be contained and buried in the appropriate landfill.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the equipment dismantlement and removal, site restoration, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	11.1 Remote Coating Furnace Loop (Bldg. 4508 Rm 265A)	
Solid Low Level	462	cubic ft
Liquid Low Level	55	gal
CH-TRU		cubic yd
RH-TRU		cubic yd
Contaminated Soil		cubic yd
Uncontaminated Soil		cubic yd
Hazardous Chemical		lb
Mixed		drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill		cubic yd
Sanitary Landfill		cubic yd

SCHEDULE FOR SURPLUS FACILITY 11.1

Remote Coating Furnace Loop (4508, Rm 265A)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 11.1 - Remote Coating Furnace Loop (Bldg. 4508, Rm. 265A)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$8,200
II. Site Preparation	$1,000	
III. Decommissioning Operations		
Equipment Dismantlement and Removal	$9,400	
Decontamination and Clean-up	$900	
Site Restoration and Clean-up	$300	
Packaging and Disposal	$30,500	
Mobilization/Demobilization	$2,000	
Subtotal III	$43,100	
Subtotal II & III	$44,100	
Overhead and Profit (OH&P)	$14,000	
Total II & III		$58,100
IV. Final D & D Report		$56,000
V. Engineering and Management		$51,040
VI. ORNL Overhead		$57,200
Subtotal I thru VI		$230,540
Contingency		$69,460
Total		$300,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 11.1 - Remote Coating Furnace Loop (Bldg. 4508, Rm. 265A)

Sheet 1 of 3
Prepared by BWH 9/14/87
Checked by BWH 9/16/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			24.000	24.00	24.40	586	
2. Review During Dismantlement	1	LT	0.00	0			304.00	304.00	24.40	7418	
3. Final Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
SUBTOTAL (I)				0				336.00		8199	$8,200
II. Site Preparation											
1. Place Perimeter Barricade	100	LF	1.26	126			0.027	2.67	19.00	51	
2. Prework Training	1	LT	0.00	0			24.000	24.00	22.00	528	
3. Place Plastic Cover Over Floor	2000	SF	0.04	86			0.0064	12.80	12.80	164	
SUBTOTAL (II)				212				39.47		743	$1,000
III. Decommissioning Operations											
1. Equipment Dismantlement and Removal											
Remove Salvagable Items from Control Panels	1	LT	0.00	0			64.000	64.00	20.40	1306	
Dismantle Pipe Sections, Cut Near Glovebox	2	EA	5.00	10			0.500	1.00	22.00	22	
Cut Pipe into Small Sections, Place in Glovebox	1	LT	15.00	15			3.000	3.00	22.00	66	
Detach Legs, Cut into Small Sections Place in Glovebox	1	LT	15.00	15			3.000	3.00	20.10	60	
Inject Foam into Glovebox	20	CF	42.00	840			0.250	5.00	19.40	97	
Place Glovebox in Standard Burial Container	1	LT	225.00	225			2.000	2.00	12.80	26	
Fill Remainder of Container with Foam, Seal Container	15	CF	42.00	630			0.250	3.75	19.40	73	
Disconnect and Dismantle Scrubber System	1	LT	0.00	0			4.000	4.00	22.00	88	
Place Scrubber System in Approved LLW Container	1	LT	225.00	225			2.000	2.00	12.80	26	
Disconnect and Dismantle Major Process Equipment	1	LT	0.00	0			120.000	120.00	22.00	2640	
Disconnect and Dismantle Piping and Wiring	1	LT	0.00	0			64.000	64.00	22.00	1408	

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 11.1 - Remote Coating Furnace Loop (Bldg. 4508, Rm. 265A)

Sheet 2 of 3
Prepared by BWH 9/14/87
Checked by BWH 9/16/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
1. Equipment Dismantlement and Removal (Continued)											
Place Piping and Wiring in Approved LLW Container	1	LT	25.00	25			24.000	24.00	12.80	307	
Dismantle Decontaminated Plexiglass Enclosure (1)	1	LT	0.00	0			32.000	32.00	22.00	704	
Place Plexiglass Enclosure in Approved LLW Container	1	LT	25.00	25			48.000	48.00	12.80	614	
SUBTOTAL				2010				375.75		7437	$9,400
2. Decontamination and Clean-up											
Hand Scrub Process Equipment	1	LT	50.00	50			48.000	48.00	12.80	614	
Hand Scrub Plexiglass Enclosure	1	LT	30.00	30			16.000	16.00	12.80	205	
SUBTOTAL				80				64.00		819	$900
3. Site Restoration and Clean-up											
Remove Plastic Cover Over Floor and Package (2)	1	LT	0.00	0			16.000	16.00	12.80	205	
Remove Perimeter Barricade	100	LF	0.00	0			0.027	2.70	19.00	51	
SUBTOTAL				0				18.70		256	$300
4. Packaging and Disposal											
Load-out, Transport, Dispose of All Contaminated Items (3)	17.1	CY	1120.00	19152	60.75	1039	6.000	102.60	14.50	1488	
Load-out and Transport Salvagable Equipment (4)	77.8	CY	18.00	1400	38.98	3033	3.850	299.53	14.50	4343	
SUBTOTAL				20552		4072		402.13		5831	$30,500
5. Mobilization/Demobilization (5)	1	LT	2000.00	2000							$2,000

(1) Following decontamination, Plexiglass enclosure (12'x 20'x 16') will be dismantled and cut into small sections.
(2) Package in standard LLW container with piping and wiring.
(3) All contaminated items packaged in standard LLW containers will be loaded-out, transported, and disposed at proper disposal/storage facility.
(4) Uncontaminated equipment, including equipment panels and process equipment, will be transported to K-25 for salvage.
(5) Includes flat bed truck, lifting equipment, cutting equipment, and tools.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 11.1 - Remote Coating Furnace Loop (Bldg. 4508, Rm. 265A)

Sheet 3 of 3
Prepared by BWH 9/14/87
Checked by BWH 9/16/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
SUBTOTAL (II and III)				24854		4072		900.05		15086	$44,100
Overhead & Profit				6214		1018				6789	$14,000
SUBTOTAL (II and III with OH&P)				31068		5090		900.05		21875	$58,100
IV. Final D & D Report	1	LT	0.00	0			800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								336.00	70.00	23520	
2. Engineering Inspection (Title III)								160.00	40.00	6400	
3. Project Management								336.00	40.00	13440	
4. Health and Safety								192.00	40.00	7680	
SUBTOTAL (V)											$51,040
VI. ORNL Overhead											$57,200
SUBTOTAL I thru VI											$230,540
CONTINGENCY											$69,460
TOTAL											$300,000

FACILITY 12.1

12.1 Ceramic Processing Laboratory (4508, Rm 189)

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Decontamination, Repair, and Reuse
- Partial Dismantlement and Decontamination

For this facility the decommissioning alternative selected for further development is decontamination, and reuse. The alternative involves decontaminating the entire facility and its associated equipment. Transformers in this facility contain PCB and must be disposed in an approved waste disposal facility.

The estimate is structured so it may be appropriately scaled when accurate site characterization data become available. The following assumptions were made for cost estimating purposes:

- The contaminated laboratory dimensions are: 50 ft by 75 ft by 16 ft high.
- 10 percent of the equipment will be salvaged.
- All electrical instrumentation will be salvaged.
- All contaminated equipment can be disposed as low level waste.
- The laboratory floor, ceiling, and walls can be decontaminated with soap and water.

The total estimated cost and time duration for this facility is $274,000 and 139 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization

- Site Preparation
- Equipment Dismantlement and Disposal
- Decontamination
- Waste Handling, Packaging, and Disposal
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. Additional facility characterization will be performed to determine the lateral and vertical extent of the contamination so areas possibly requiring remedial action may be outlined. Characterization is primarily accomplished through analysis of a radiation survey of the floor, ceiling, and walls; and smear samples taken from the floor, ceiling, walls, and equipment inside the contaminated area of the lab.

Site Preparation. Following characterization, construction barriers, detours, and signs will be erected to direct personnel around the facility. Radiation monitors and alarms will be placed at appropriate points prior to beginning work. Ground cover to prevent the spread of contamination will be laid inside the facility and just outside the entrances. Protective clothing and shoe covers will be available at the entrance for personnel entering and leaving the facility.

Equipment Dismantlement and Disposal. Equipment to be dismantled and disposed as low level waste includes: 2 hoods, associated ductwork and filters back to the main header, tables, miscellaneous lab equipment, pilot process equipment, and piping. PCB-containing capacitors will be sent to K-25 in overpacks where the oil will be drained and incinerated and the carcasses decontaminated.

Equipment to be salvaged shall include lab scales, instrumentation, and recorders. This equipment will be decontaminated, if necessary, based on a radiation survey, and then either reused or salvaged at K-25.

Decontamination. The equipment to be salvaged will depend on the difficulty of decontamination. Equipment that can be decontaminated by wiping with a mild solvent or detergent will be salvaged; otherwise, they will be disposed as low level waste. The PCB contaminated capacitors will be decontaminated, after the oil is removed, by flushing with a strong organic solvent. The laboratory floor, walls, and ceiling will be decontaminated by scrubbing with a mild detergent or solvent and then painted if data from the radiation survey indicates these procedures are necessary. The ceiling tiles will be removed and disposed.

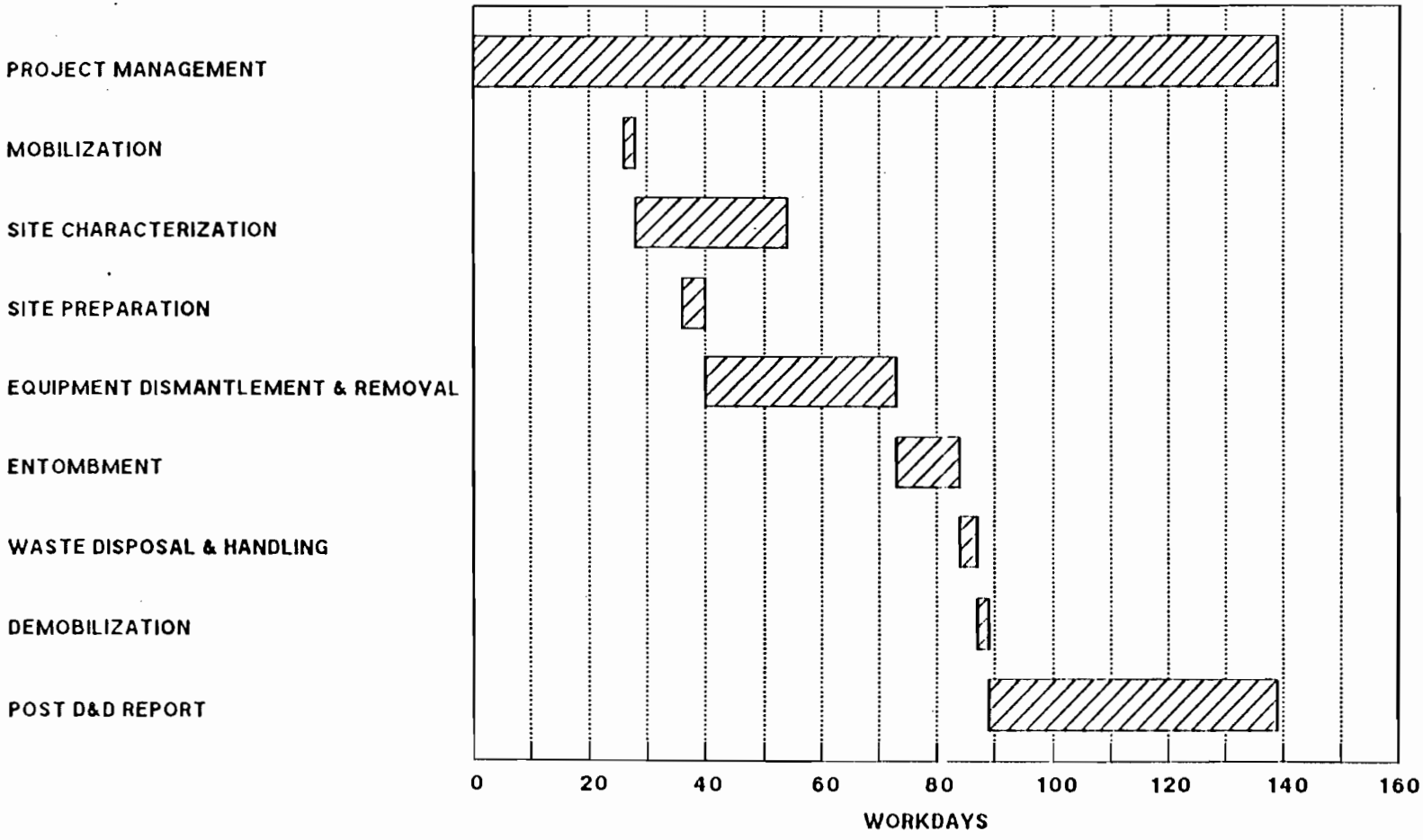
Waste Handling, Packaging, and Disposal. All waste will be surveyed to determine the extent of contamination. Uncontaminated equipment will be sent to K-25 for salvage. Contaminated equipment, construction debris, and decontamination waste will be handled as low level waste. It will be contained and buried in the appropriate landfill.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the dismantlement of the equipment and disposal, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	12.1 Ceramic Processing Laboratory (Bldg. 4508 Rm 189)
Solid Low Level	324 cubic ft
Liquid Low Level	165 gal
CH-TRU	_____ cubic yd
RH-TRU	_____ cubic yd
Contaminated Soil	_____ cubic yd
Uncontaminated Soil	_____ cubic yd
Hazardous Chemical	_____ lb
Mixed	_____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	_____ cubic yd
Sanitary Landfill	_____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 12.1

Ceramic Processsing Laboratory (4508, Rm 185)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 12.1 - Ceramic Processing Laboratory (Bldg. 4508, Rm. 189)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$9,000
II. Site Preparation	$2,400	
III. Decommissioning Operations		
Equipment Dismantlement and Removal	$9,900	
Decontamination	$2,800	
Packaging and Disposal	$15,800	
Mobilization/Demobilization	$2,000	
Subtotal III	$30,500	
Subtotal II & III	$32,900	
Overhead and Profit (OH&P)	$10,900	
Total II & III		$43,800
IV. Final D & D Report		$56,000
V. Engineering and Management		$49,400
VI. ORNL Overhead		$52,200
Subtotal I thru VI		$210,400
Contingency		$63,600
Total		$274,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 12.1 - Ceramic Processing Laboratory (Bldg. 4508, Rm. 189)

Sheet 1 of 3
Prepared by BWH 9/15/87
Checked by BWH 9/16/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			32.000	32.00	24.40	781	
2. Review During Dismantlement	1	LT	0.00	0			320.00	320.00	24.40	7808	
3. Final Contamination Review	1	LT	0.00	0			16.000	16.00	24.40	390	
SUBTOTAL (I)				0				368.00		8979	$9,000
II. Site Preparation											
1. Place Perimeter Barricade	100	LF	1.26	126			0.0267	2.67	19.00	51	
2. Prework Training	1	LT	0.00	0			36.000	36.00	22.00	792	
3. Place Plastic Cover Over Floor	3750	SF	0.043	161			0.0064	24.00	12.80	307	
4. Place Radiation Monitors and Alarms	1	LT	300.00	300			32.000	32.00	20.40	653	
SUBTOTAL (II)				587				94.67		1803	$2,400
III. Decommissioning Operations											
1. Equipment Dismantlement and Removal											
Remove Salvagable Items from Control Panels	1	LT	0.00	0			32.000	32.00	20.40	653	
Dismantle for Disposal Hoods, Ductwork, Filters to Main Header, Tables and Misc. Equipment	1	LT	0.00	0			192.000	192.00	20.60	3955	
Package Equipment in Approved LLW Containers	225	CF	3.25	731			0.350	78.75	12.80	1008	
Pump PCB from Transformers into Drum for Transport	10	GAL	10.00	100			2.000	20.00	24.40	488	
Load-out, Transport to K-25, Dispose by Incineration (1)	10	GAL	125.00	1250	3.00	30	1.500	15.00	14.50	218	
Dismantle for Decontamination Lab Scales, Instrumentation and Recorders	1	LT	0.00	0			64.000	64.00	22.60	1446	
SUBTOTAL				2081		30		401.75		7768	$9,900
2. Decontamination											
Hand Scrub With Wash All Equipment To Be Salvaged	1	LT	150.00	150			56.000	56.00	12.80	717	

(1) 5 gal. PCB, 5 gal. spent cleaning agent.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 12.1 - Ceramic Processing Laboratory (Bldg. 4508, Rm. 189)

Sheet 2 of 3
Prepared by BWH 9/15/87
Checked by BWH 9/16/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
2. Decontamination (Cont.)											
Flush All Lines With Cleaning Agent (2)	5	GAL	20.00	100			3.200	16.00	22.00	352	
Package Floor Cover in Proper LLW Container	15	CY	3.25	49			1.070	16.05	12.80	205	
Decontaminate by Hand Scrubbing Floor, Walls and Ceiling	11500	SF	0.02	230			0.007	80.50	12.80	1030	
SUBTOTAL				529				168.55		2304	$2,800
3. Packaging and Disposal											
Load-out, Transport, Dispose of All Contaminated Items (3)	12	CY	1120.00	13440	60.75	729	8.000	72.00	14.50	1044	
Load-out and Transport Salvagable Equipment (4)	5	CY	18.00	90	38.98	195	3.850	19.25	14.50	279	
SUBTOTAL				13530		924		91.25		1323	$15,800
4. Mobilization/Demobilization (5)	1	LT	2000.00	2000							$2,000
SUBTOTAL (II and III)				18727		954		756.22		13198	$32,800
Overhead & Profit				4682		239				5939	$10,900
SUBTOTAL (II and III with OH&P)				23409		1193		756.22		19137	$43,800
IV. Final D & D Report	1	LT	0.00	0			800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								304.00	70.00	21280	
2. Engineering Inspection (Title III)								112.00	40.00	4480	
3. Project Management								296.00	40.00	11840	
4. Health and Safety								296.00	40.00	11840	
SUBTOTAL (V)											$49,400

(2) Flush after PCB is pumped from transformers.
(3) All contaminated items packaged in standard LLW containers will be loaded-out, transported, and disposed at proper disposal/storage facility.
(4) Uncontaminated equipment will be transported to K-25 for salvage.
(5) Includes flat bed truck and lifting equipment.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 12.1 - Ceramic Processing Laboratory (Bldg. 4508, Rm. 189)

Sheet 3 of 3
Prepared by BWH 9/15/87
Checked by BWH 9/16/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
VI. ORNL Overhead											$52,200
SUBTOTAL I thru VI											$210,400
CONTINGENCY											$63,600
TOTAL											$274,000

FACILITY 13.1

13.1 Transuranium Research Laboratory (5505, Rm 45)

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Dismantlement and Disposal

For this facility, the decommissioning alternative chosen is dismantlement and disposal. This alternative involves disconnecting, packaging and disposing of ten gloveboxes and one fume hood located in room 45. Exposed contamination left by this operation would be decontaminated chemically or by high pressure jets to return the room to background levels.

This estimate is structured so it may be appropriately scaled when accurate site characterization data become available. The following assumptions were made for cost estimating purposes:

- Room 45 measures approximately 24 x 48 ft.
- The ceiling is approximately 20 ft high.
- The equipment will be packaged before leaving the room to prevent dispersion of contaminants.
- 10 of the 13 gloveboxes will be dismantled.

The total estimated cost and time duration for this facility is $323,000 and 88 workdays. The estimated waste from this project is 28 cubic yards of TRU. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdowns are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Dismantlement and Disposal
- Post D & D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. For health and safety purposes, a walk-over radiation survey shall be made. The survey will be set up from the grid pattern discussed in Appendix A. The data will be analyzed to determine the worker radiation protection requirements.

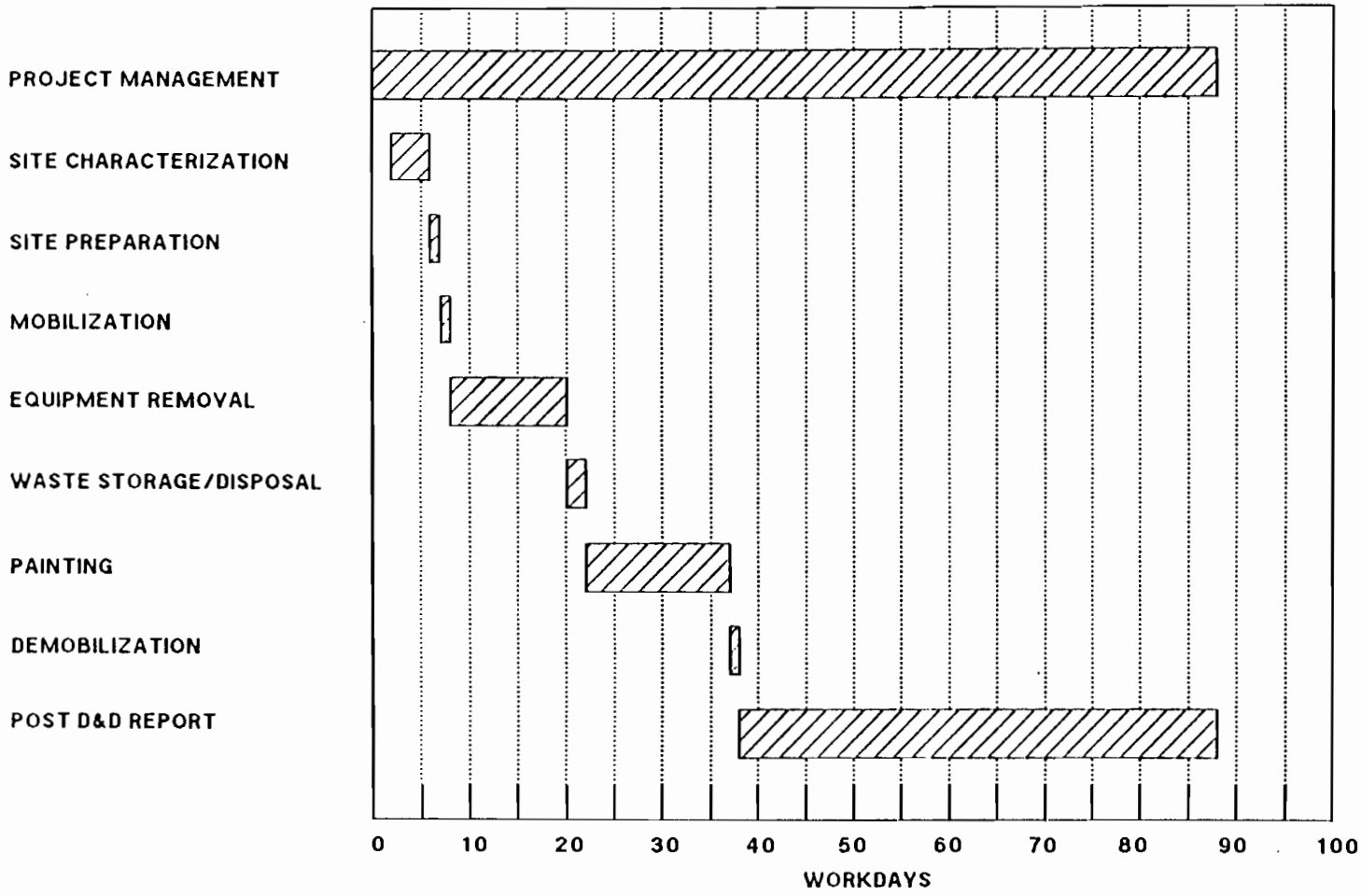
Site Preparation. After the site characterization, the perimeter of the area shall be barricaded and marked with appropriate warning signs. Any adjacent doorways in Building 5505 shall be barricaded and marked with detour signs to alternate exits. Three of the thirteen gloveboxes shall be removed from the room before decontamination activities begin.

Dismantlement and Disposal. The research equipment and components from the gloveboxes and hood will be removed. Ductwork, service piping, and electrical services will be disconnected and the ductwork will be closed. Ten of the gloveboxes and all components inside will be dismantled and filled with foam for stabilization. The equipment and components, hood, and gloveboxes will be packaged in B-25 boxes and disposed as TRU waste.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the removal of the gloveboxes, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	13.1 Transuranic Research Facility - Bldg. 5505 Rm 45	
Solid Low Level	____	cubic ft
Liquid Low Level	55	gal
CH-TRU	28	cubic yd
RH-TRU	____	cubic yd
Contaminated Soil	____	cubic yd
Uncontaminated Soil	____	cubic yd
Hazardous Chemical	____	lb
Mixed	____	drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	____	cubic yd
Sanitary Landfill	____	cubic yd

SCHEDULE FOR SURPLUS FACILITY 13.1
Transuranium Research Laboratory 45 (5505)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 13.1 - Transuranic Research Facility (Bldg. 5505, Rm. 45)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$3,800
II. Site Preparation	$400	
III. Decommissioning Operations		
Mobilization	$1,000	
Dismantlement of Hood and Gloveboxes	$26,400	
Waste Transportation and Storage	$56,400	
Demobilization	$1,000	
Subtotal III	$84,800	
Subtotal II & III	$85,200	
Overhead and Profit (OH&P)	$23,100	
Total II & III		$108,300
IV. Final D & D Report		$56,000
V. Engineering and Management		$32,500
VI. ORNL Overhead		$55,500
Subtotal I thru VI		$256,100
Contingency		$66,900
Total		$323,000

ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 13.1 - Transuranic Research Facility (Bldg. 5505, Rm. 45)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$3,800
II. Site Preparation	$400	
III. Decommissioning Operations	-	
Mobilization	$1,000	
Dismantlement of Hood and Gloveboxes	$26,400	
Waste Transportation and Storage	$56,400	
Demobilization	$1,000	
Subtotal III	$84,800	
Subtotal II & III	$85,200	
Overhead and Profit (OH&P)	$23,100	
Total II & III		$108,300
IV. Final D & D Report		$56,000
V. Engineering and Management		$32,500
VI. ORNL Overhead		$55,500
Subtotal I thru VI		$256,100
Contingency		$66,900
Total		$323,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 13.1 - Transuranic Research Facility (Bldg. 5505, Rm. 45)

Sheet 1 of 2
Prepared by GSD 9/18/87
Checked by BWH 9/18/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Radiation Survey: Grid Set Up,	2	TECH					12.000	24.00	45.00	1080	
	1	HP					12.000	12.00	45.00	540	
2. Radiation Survey, Walkover	2	TECH					12.000	24.00	45.00	1080	
	1	HP					12.000	12.00	45.00	540	
3. Data Analysis	1	ENGR					8.000	8.00	70.00	560	
SUBTOTAL (I)								80.00		3800	$3,800
II. Site Preparation											
1. Isolate Construction Area with Movable Barricades, Flagging & Appropriate Signs	1	LT	250.00	250			8.000	8.00	16.10	129	$400
III. Decommissioning Operations											
1. Mobilization	1	LT	1000.00	1000							$1,000
2. Gloveboxes and Hood Dismantlement											
Remove Research Equipment and Components from Gloveboxes/Hood	1	LT					20.000	20.00	16.10	322	
Disconnect Ductwork	1	LT					2.000	2.00	23.10	46	
Disconnect Service Piping	1	LT					4.000	4.00	23.30	93	
Disconnect Electrical Service	1	LT					24.000	24.00	22.65	544	
Close Ductwork	1	LT	30.00	30			2.000	2.00	23.10	46	
Fill Voids in Gloveboxes and Hood with Foam	1930	GAL	1.32	2548	0.24	463	0.044	84.92	23.96	2035	
Package Equipment/Components in B-25 Box	1	EA	1800.00	1800			4.000	4.00	16.10	64	
Package Hood in B-25 Box	2	EA	1800.00	3600			4.000	8.00	16.10	129	
Package Gloveboxes in B-25 Box	5	EA	1800.00	9000			4.000	20.00	16.10	322	
Decontaminate Room 45, Wet Vacuum Floor	1155	SF	0.00	0			0.007	8.00	16.10	129	
Paint Walls and Ceiling, Airless Spray, Two Coats	2900	SF	0.15	435			0.084	243.60	19.55	4762	
SUBTOTAL				17413		463		420.52		8492	$26,400

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 13.1 - Transuranic Research Facility (Bldg. 5505, Rm. 45)

Sheet 2 of 2
Prepared by GSD 9/18/87
Checked by BWH 9/18/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Waste Transportation and Storage											
Load-out and Transport	28	CY	0.00	0	8.70	244	0.429	12.01	16.95	204	
Dispose at TRU Storage Area	28	CY	2000.00	56000							
SUBTOTAL				56000		244		12.01		204	$56,400
4. Demobilization	1	LT	1000.00	1000							$1,000
SUBTOTAL (II and III)				75663		707		440.53		8825	$85,200
Overhead & Profit				18916		177				3971	$23,100
SUBTOTAL (II & III with OH&P)				94579		884		440.53		12796	$108,300
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)										17100	
2. Engineering Inspection (Title III)										5700	
3. Project Management										6500	
4. Health and Safety										3200	
SUBTOTAL (V)											$32,500
VI. ORNL Overhead											$55,500
SUBTOTAL I thru VI											$256,100
CONTINGENCY											$66,900
TOTAL											$323,000

FACILITY 14.1

14.1 Cobalt-60 Storage Garden (3029)

The following decommissioning alternatives were considered for this facility:

- Dismantlement and Entombment
- Entombment
- Dismantlement and Decontamination
- Protective Storage

For this facility, the decommissioning alternative selected is a combination of dismantlement and entombment. This alternative involves disposal of the Co-60 canisters and tubes, and some other equipment. After removal of the grating, the tube caps, and the Co-60 canisters, the chamber will be filled with concrete, and the area will then be appropriately posted.

The structure of the estimate allows it to be appropriately scaled once accurate site characterization data become available. The following assumptions were made for cost estimating purposes:

- Due to the Co-60 canisters being highly radioactive, special rod containers and shield walls will be required. To be conservative, 92 Co-60 canister disposal containers were priced.
- The removed equipment and tube plugs are considered low level waste.
- The grout cap on the site shall be 12-inches thick.

The total estimated cost and time duration for this facility is $1,410,000 and 250 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Removal and Disposal
- In Situ Grouting

- Waste Disposal
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. For health and safety purposes, a field walk-over radiation survey shall be made prior to start of work. Each of the 92 Co-60 tubes will be surveyed prior to grout injection. Contamination reviews will also be conducted during and after decommissioning operations.

Site Preparation. After the site characterization, the contaminated areas shall be clearly marked. The perimeter of the storage facility shall be posted with appropriate warning signs. Any adjacent doorways in Building 3029 shall be barricaded and marked with detour signs to alternate exits. The grating above the chamber along with each tube plug shall be removed. Since each Co-60 rod produces a radiation field of approximately 1,200 R/hr, a movable lead shield wall will be constructed to shield the workers during rod extraction. In addition, 92 transport casks will be fabricated for Co-60 rod extraction and transportation to the disposal site.

Removal and Disposal. All canisters of Co-60 pellets shall be removed and disposed. A transport cask will be positioned over each rod and then the rod will be pulled up into the cask. When the rod is completely raised so it is contained by the cask, the cask will be locked shut for disposal. As certain sections of the garden are cleared, the lead shield walls will be reoriented to remove the rods from another section. The additional equipment to be disposed include: the transfer shield, lifting rod and magnet, and spotting rings. The equipment shall be dismantled on-site and packaged for disposal.

In Situ Grouting. Each of the 92 stainless-steel tubes shall be completely plugged with cement grout. The cement shall be pressure injected. The exhausted air from the tubes will be monitored and HEPA filtered. Once each hole is grouted, a grout cap shall be placed over the entire storage facility.

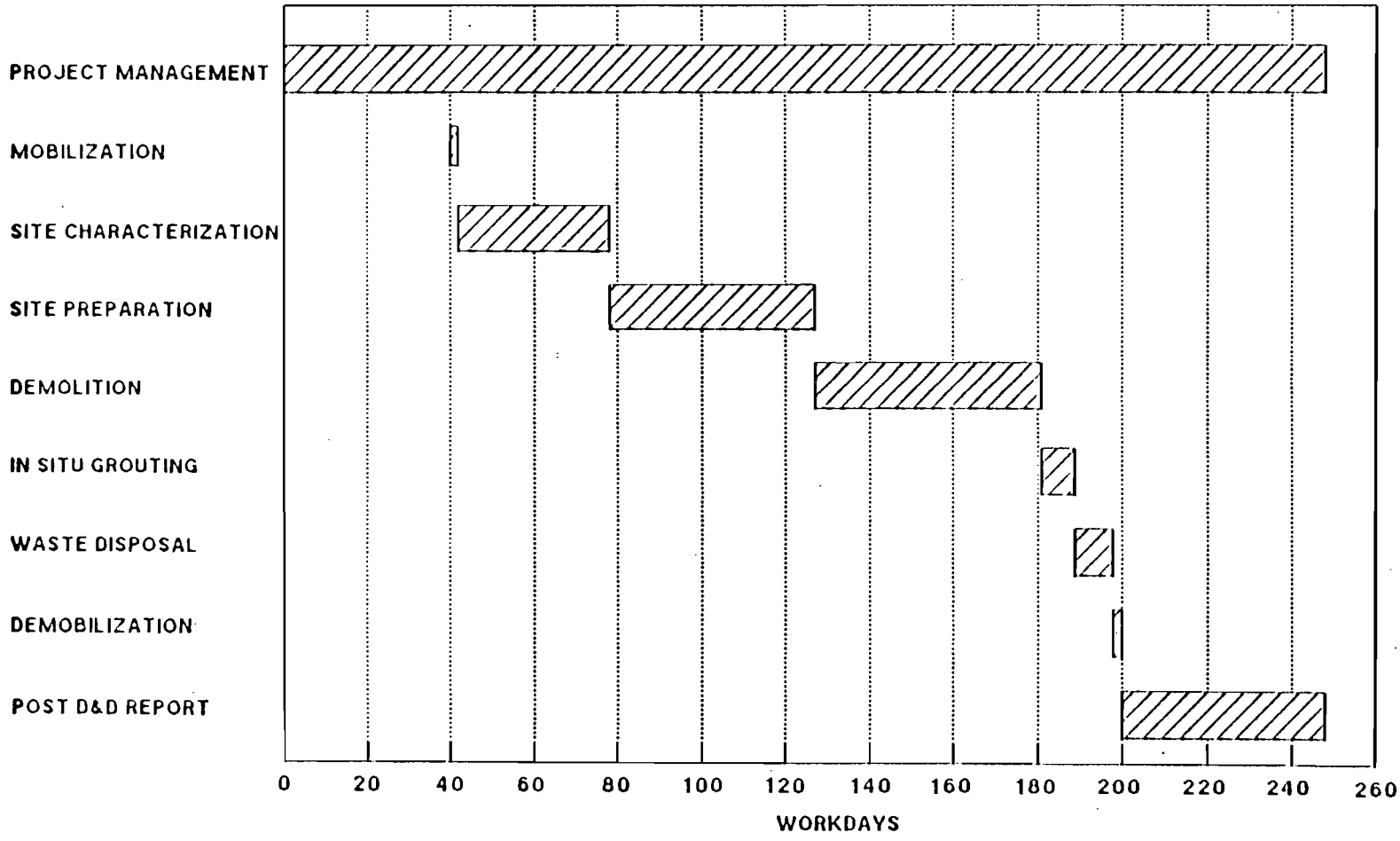
Waste Disposal. All removed equipment and the 92 tube plugs shall be assayed for radioactivity. Based on the results of the monitoring, the waste will be transported to an appropriate disposal facility.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the removal of the rods, the disposal of the Co-60 tubes, the total dollar man-rem costs, and the project duration.

Waste Volume Estimates:	14.1 Cobalt-60 Storage Garden (Bldg. 3029)	
Solid Low Level	166	cubic ft
Liquid Low Level		gal
CH-TRU	15.7	cubic yd
RH-TRU		cubic yd
Contaminated Soil		cubic yd
Uncontaminated Soil		cubic yd
Hazardous Chemical		lb
Mixed		drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill		cubic yd
Sanitary Landfill		cubic yd

SCHEDULE FOR SURPLUS FACILITY 14.1

Co-60 Storage Garden (3029)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 14.1 - Cobalt-60 Storage Garden (Bldg. 3029)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$13,600
II. Site Preparation	$370,300	
III. Decommissioning Operations		
Demolition	$33,900	
In Situ Grouting	$10,100	
Waste Storage/Disposal	$43,200	
Mobilization/Demobilization	$2,100	
Subtotal III	$89,300	
Subtotal II & III	$459,600	
Overhead and Profit (OH&P)	$125,300	
Total II & III		$584,900
IV. Final D & D Report		$56,000
V. Engineering and Management		$160,720
VI. ORNL Overhead		$269,000
Subtotal I thru VI		$1,084,220
Contingency		$325,780
Total		$1,410,000

EPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 14.1 - Cobalt-60 Storage Garden (Bldg. 3029)

Sheet 1 of 3
Prepared by BWH 7/15/87
Checked by BWH 9/18/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
2. Survey Cobalt-60 Tube	92	EA	0.00	0			0.50	46.00	24.40	1122	
3. Contamination Review During Work	1	LT	0.00	0			496.000	496.00	24.40	12102	
3. Final Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
SUBTOTAL (I)				0				558.00		13614	$13,600
II. Site Preparation											
1. Place Perimeter Barricade	40	LF	1.26	50			0.027	1.07	19.00	20	
2. Prework Training	1	LT	0.00	0			48.000	48.00	20.00	960	
3. Remove/Package for Disposition the Grating above the Chamber	25	CF	3.50	88			0.3200	8.00	20.10	161	
4. Remove/Package for Disposition the Tube Caps (92 ea.)	28	CF	3.50	98			0.5000	14.00	12.80	179	
5. Procure/Transport to Work Site "Special Rod Disposal Container", Stainless Steel with Lead Liner, (1100 lbs. each)	92	EA	3685.00	339020	83.50	7682	16.5000	1518.00	14.50	22011	
SUBTOTAL (II)				339256		7682		1589.07		23331	$370,300
III. Decommissioning Operations											
1. Demolition											
Place Spotting Ring and Transfer Shield Above Each Cobalt-60 Tube	92	EA	0.00	0	0.00	0	1.2500	115.00	18.90	2174	
Locate/Prepare "Special Container" To Receive Cobalt-60 Tube	92	EA	0.00	0	5.75	529	0.7500	69.00	12.80	883	
Place Lead Brick Shield Wall For Protection of Tube Lift Crew (1)	300	SF	21.00	6300	18.50	5550	2.4000	720.00	12.80	9216	
Pull-out and Place Within "Special Container" the Cobalt-60, 7 ft. length, Tube	92	EA	0.00	0	0.00	0	2.6000	239.20	18.90	4521	
Package for Disposal, the Transfer Shield, Lifting Rod with Magnet and Spotting Ring	46	CF	3.50	161	10.70	492	1.3900	63.94	12.80	818	
Place/Relocate as Required Herculite Blanket Over Lead Brick Shield Wall	200	SF	3.50	700	0.00	0	1.0000	200.00	12.80	2560	
SUBTOTAL				7161		6571		1407.14		20172	$33,900

(1) Includes relocating the wall 4 times. The lead brick shield wall, 10'x 10'x 1' (minimum), protects the tube lift crew.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 14.1 - Cobalt-60 Storage Garden (Bldg. 3029)

Sheet 2 of 3
Prepared by BWH 7/15/87
Checked by BWH 9/18/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
2. In Situ Grouting											
Pressure Injection of Cement/Grout Mixture in Cobalt-60 Tubes	162	CF	11.45	1855	8.80	1426	1.0500	170.10	19.40	3300	
Form/Pour Concrete Grout As a Cap (12" thk.) Over Storage Garden	190	CF	12.50	2375	1.25	238	0.2500	47.50	19.40	922	
SUBTOTAL				4230		1664		217.60		4222	$10,100
3. Waste Storage/Disposal											
Load-out, Transport and Dispose of Cobalt-60 Containers (92 ea. at Approx 11.72 CM ea.)	12	CM	2235.00	26820	22.40	269	2.9500	35.40	14.50	513	
Load-out, Transport and Dispose of Containers with Grating, Tube Caps and Herculite Blanket	120	CF	41.50	4980	1.50	180	0.2000	24.00	14.50	348	
Remove, Load-out and Transport Lead Bricks (12"x 12"x 4") to Storage	300	EA	0.50	150	18.50	5550	0.6000	180.00	12.80	2304	
Load-out, Transport and Dispose of Transfer Shield, Lifting Rod and Spotting Ring	46	CF	41.50	1909	1.50	69	0.2000	9.20	14.50	133	
SUBTOTAL				33859		6068		248.60		3298	$43,200
5. Mobilization/Demobilization (2)	1	LT	750.00	750	450.00	450	48.0000	48.00	18.90	907	$2,100
SUBTOTAL (II and III)				385256		22435		3510.41		51930	459600
Overhead & Profit				96314		5609				23369	$125,300
SUBTOTAL (II and III with OH&P)				481570		28044		3510.41		75299	$584,900
IV. Final D & D Report	1	LT	0.00	0			800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								1016.00	70.00	71120	
2. Engineering Inspection (Title III)								408.00	40.00	16320	

(2) Includes grout pump/injector equipment, flatbed truck, lead bricks and forklift.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 14.1 - Cobalt-60 Storage Garden (Bldg. 3029)

Sheet 3 of 3
Prepared by BWH 7/15/87
Checked by BWH 9/18/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
V. Engineering and Management (Cont.)											
3. Project Management								816.00	40.00	32640	
4. Health and Safety								1016.00	40.00	40640	
SUBTOTAL (V)											$160,720
VI. ORNL Overhead											$269,000
SUBTOTAL I thru VI											$1,084,220
CONTINGENCY											$325,780
TOTAL											$1,410,000

FACILITY 15.1

15.1 Sr-90 Power Generators

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Disposal
- Dismantlement and Disposal

The decommissioning alternative selected for further development is dismantlement and disposal. The Sr-90 generator containers would be cut open to expose the internals for disassembly and appropriate disposal. The Sr-90, the thermoelectric generators, the lead shielding, and the external structures would be surveyed and disposed appropriately.

The materials involved and the physical configuration necessitate that a significant portion of the disassembly of these units be done in a hot cell. For cost estimating purposes, the following assumptions were made:

- Grinding off the welds on the casing will enable the top to be removed, but will not allow any radiation to leak prior to putting the generator in a hot cell.
- The generator cover and strontium tubes can be removed using manipulators within the hot cell.
- The generator will not be contaminated after the strontium has been removed.
- Hot cells are able to accommodate a small hoist and power tools.
- Sr-90 Generator dimensions are: 3 SNAPs - 24 inch diameter x 24 inches high; 1 Sentry - 24 inch diameter x 42 inches high.
- The volume of lead, steel, and strontium to be disposed are (each): SNAPs- 5.8 cubic ft lead, 3.5 cubic ft steel, 0.51 cubic ft Sr-90. Sentry- 10.2 cubic ft lead, 6.2 cubic ft steel, 0.77 cubic ft Sr-90.
- Lead is assumed uncontaminated.

The total estimated cost and time duration for this facility is $282,000 and 65 workdays. The following description is of the decommissioning activities. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Equipment Dismantlement and Disposal
- Waste Handling, Packaging, and Disposal
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. These generators have been surveyed and the outer cases are uncontaminated.

Site Preparation. Radiation monitors will be required during dismantling of the generators. The appropriate equipment, tools, and vehicles will be assembled at the dismantling site. A shielded shipping container must be placed inside the hot cell in which to load the strontium.

Equipment Dismantlement and Disposal. The generators will be loaded by a crane onto a truck and taken to the cell access area. Here the welded seals will be ground off to allow the top of the casing to be removed (Figure 15.1-1). The generator will then be loaded into the hot cell where the top will be removed. The strontium tubes will be lifted out and placed in a shielded shipping container.

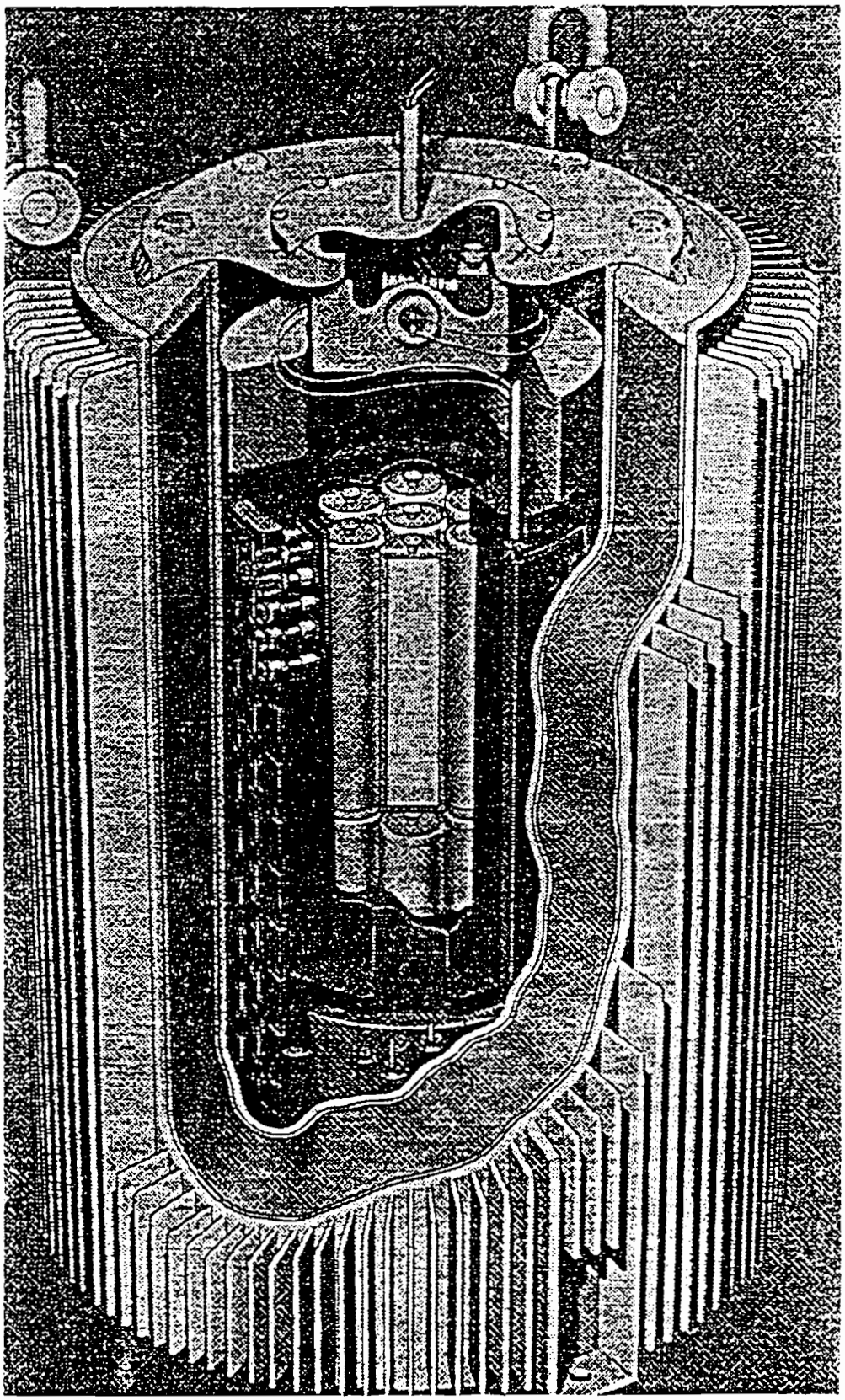


FIGURE 15.1-1 Cutaway view of the SNAP-73 isotopic generator.

Once the strontium tubes have been removed from the hot cell and placed in the shielded container, the remaining assembly will be surveyed to determine if a significant amount of contamination remains. If there is a significant amount, the remaining dismantlement will have to be done remotely within the hot cell. If not, then the assembly will be removed from the cell and again placed in the temporary enclosure, where the metal outer casing will be cut off to recover the lead. The lead will be recovered for reuse or resale at K-25 and the metal components will be decontaminated, if necessary, and salvaged. The lead-telluride thermocouples will be retained for possible reuse.

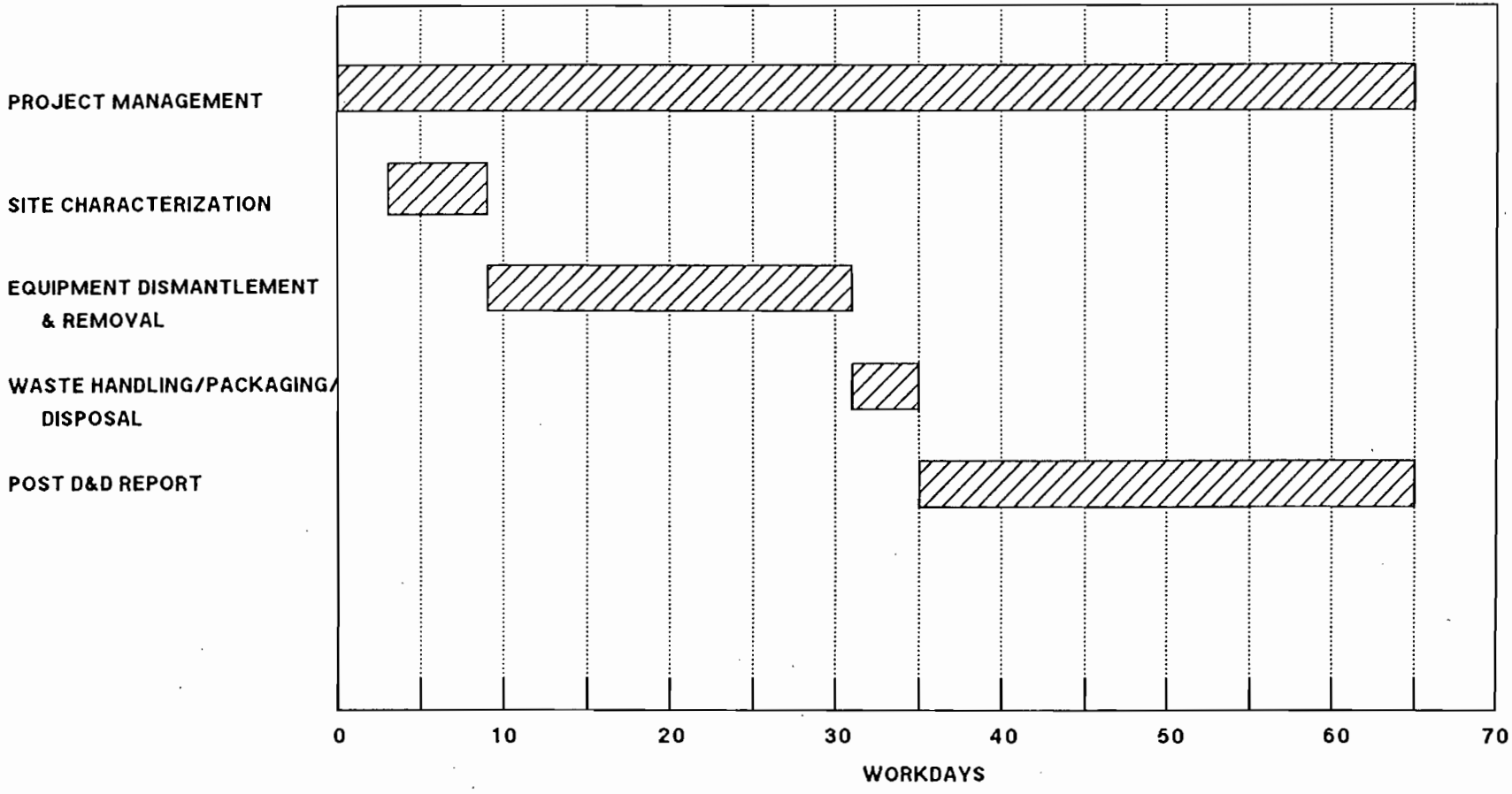
Waste Handling, Packaging, and Disposal. All waste will be surveyed to determine the extent of contamination. The strontium will be placed in 6-foot-diameter concrete casks and stored in a solid waste storage area (SWSA 6). The metal casing, lead and other metal components will be salvaged as metal.

The strontium storage containers will be periodically monitored to verify the shielding effectiveness and integrity. As mentioned above, all components will be surveyed prior to disposal or reuse to determine whether any contamination remains and to ensure that it is properly disposed.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the removal of the strontium tubes, the disposal of the tubes, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	15.1 Strontium 90 Power Generators (3029, 3001)
Solid Low Level	680 cubic ft
Liquid Low Level	_____ gal
CH-TRU	_____ cubic yd
RH-TRU	_____ cubic yd
Contaminated Soil	_____ cubic yd
Uncontaminated Scrap	_____ cubic yd
Hazardous Chemical	_____ lb
Mixed	_____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	_____ cubic yd
Sanitary Landfill	_____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 15.1
Sr-90 Power Generators (3029, 3001)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 15.1 - Strontium 90 Power Generators (3029, 3001)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$7,800
II. Site Preparation (1)	$0	
III. Decommissioning Operations		
1. Mobilization (2)	$0	
2. Load Generators and Transport to Hot Cell Facility	$1,400	
3. Grind Seal Welds on Perifery of Case Top	$2,300	
4. Lower Generator into Hot Cell Through Top Plug	$1,100	
5. Dismantle Generator and Load Sr-90 Cans into Shielded Shipping Cask	$36,300	
6. Remove Case from Hot Cell, Transport to Machine Shop	$1,400	
7. Disassemble Thermocouple Arrays	$2,200	
8. Separate Lead Shielding from Steel Jacket and Transport Both to K-25 for Salvage	$2,900	
9. Waste Handling/Disposal	$28,600	
Subtotal III	$76,200	
Subtotal II & III	$76,200	
Overhead and Profit (OH&P) (3)	$0	
Total II & III		$76,200
IV. Final D & D Report		$56,000
V. Engineering and Management		$22,900
VI. ORNL Overhead		$53,800
Subtotal I thru VI		$216,700
Contingency		$65,300
Total		$282,000

(1) Since dismantling of the four generators will be done in fully equipped, operating hot cells, no site preparation will be required.
(2) Since the entire subproject will done by the operating contractor utilizing existing equipment, no mobilization or equipment rental costs are applicable.
(3) No overhead and profit additives are applicable.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 15.1 - Strontium 90 Power Generators (3029, 3001)

Sheet 1 of 2
Prepared by KDC 9/19/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Radiation Survey Inside Casing,	1	HP					32.000	32.00	45.00	1440	
Take Smear Samples (1)	16	EA					1.000	16.00	45.00	720	
2. Sample Analysis	16	EA	350.00	5600							
SUBTOTAL (I)				5600				48.00		2160	$7,800
II. Site Preparation											
Since dismantling of the four generators will be done in fully equipped operating hot cells, no site preparation will be required.											
III. Decommissioning Operations											
1. Mobilization (2)											
2. Load Generators and Transport to Hot Cell Facility (Bldg. 4705)	4	EA	0.00	0			8.000	32.00	45.00	1440	$1,400
3. Grind Seal Welds on Perifery of Case Top (10" weld/hr)	507	IN	0.00	0			0.100	50.70	45.00	2282	$2,300
4. Lower Generator into Hot Cell Through Top Plug	4	EA	0.00	0			6.000	24.00	45.00	1080	$1,100
5. Dismantle Generator and Load Sr-90 Cans into Shielded Shipping Cask (6' dia. concrete)	4	EA	8000.00	32000			24.000	96.00	45.00	4320	$36,300
6. Remove Case from Hot Cell, Transport to Machine Shop	4	EA	0.00	0			8.000	32.00	45.00	1440	$1,400
7. Disassemble Thermocouple Arrays (Lead-telluride) and Hold for Reuse	4	LT	0.00	0			12.000	48.00	45.00	2160	$2,200
8. Separate Lead Shielding from Steel Jacket and Transport Both to K-25 for Salvage (3)	4	EA	0.00	0			16.000	64.00	45.00	2880	$2,900
9. Waste Handling/Disposal											
Transport Casks to SWSA 6	4	EA	0.00	0			8.000	32.00	45.00	1440	
Storage Fee	680	CF	40.00	27200							
Subtotal (9)				27200				32.00		1440	$28,600

(1) No measurable contamination exists on the outer surface of the generators and none is expected inside unless one or more of the Sr-90 cans is leaking internally. Therefore, no radiation survey is appropriate until the Sr-90 cans have been removed from the hot cell.
(2) Since this entire subproject will be done by the operating contractor utilizing existing equipment, no moblization or equipment rental costs are applicable.
(3) Inner and outer case will be removed from lead by sawing into segments with slitting saws.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 15.1 - Strontium 90 Power Generators (3029, 3001)

Sheet 2 of 2
Prepared by KDC 9/19/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
SUBTOTAL (II and III) (4)				59200				378.70		17042	$76,200
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management										22900	$22,900
VI. ORNL Overhead											$53,800
SUBTOTAL I thru VI											$216,700
CONTINGENCY											$65,300
TOTAL											$282,000

(4) No overhead and profit is applicable.

FACILITY 16.1

16.1 Filter House 3110/Isotope Ductwork

The following decommissioning alternatives were considered for this facility:

- Decontamination and Leave in Place
- Protective Storage
- Total Dismantlement and Disposal
- Entombment

For this facility, the decommissioning alternative selected for further development is entombment. This alternative involves the removal of 42 High Efficiency Particulate Air (HEPA) and Roughing Filters from the filter house, and pumping a cement base grout into the isotopes ductwork and the filter house. This alternative will entomb the radioactive contamination within the facility and will reduce the potential of soil contamination surrounding the underground system.

The estimate is structured so it may be appropriately scaled when accurate site data become available. The following assumptions were made for cost estimating purposes.

- Ductwork size is 3 ft x 3 ft concrete structure.
- Ductwork length underground of 2000 ft.
- Roughing and HEPA filters are to be removed by existing procedures.
- Filter housings and internal structures of the filter house (3110) are left in place.
- Blank flanges in the ductwork isolating the various facilities are structurally sound.
- Louvered dampers on the air outlets of filter house will be left in place and in the shut position.
- LLW Drain Line is plugged (per information available).
- Sump pump shall be removed and disposed.
- Cement base grout will be used for entombment of this facility.
- Maximum lift of 10 ft with 2 day cure time between lifts.
- Filter house is approximately 20 ft x 30 ft x 10 ft.

The total estimated cost and time duration is $3,275,000 and 364 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and cost breakdown of the activities are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Mobilization
- Filter (HEPA) Removal
- Ductwork Entombment
- Filter House Characterization
- Filter House Entombment
- Waste Disposal
- Demobilization
- Site Cleanup and Restoration
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and safety support. Due to various types of work conducted in the facilities serviced by the ductwork, an in-depth review of the history and use of each facility should be conducted to arrive at an accurate assessment of the duct condition and potential problems that may arise during this project.

Site Characterization Prior to any decommissioning activities, a site characterization will be conducted to determine the working conditions along the underground ductwork and the filter house radiation levels, which would establish the amount of engineering control required for work protection from ionizing radiation.

Site Preparation. After the site characterization and review, sound engineering decisions and a review shall be required for the location and identification of the actual work areas to be readied. This element shall include the relocation of any overhead obstruction, (i.e., power lines, stored material, etc.) that may inhibit access to the work area. Filter removal will require numerous shipping containers for this disposal of the filters contained in this facility. Construction of a temporary exhaust system with HEPA Filters will be required.

Mobilization. This element involves the movement of all necessary supplies and equipment to a central location for use during the decommissioning activity. Items of major concern shall be stored and tagged for this activity to ensure expeditious filter removal with minimum delay which could cause undue radiation exposure to personnel.

Filter (HEPA) Removal. Due to the high levels of activity anticipated with the HEPA and roughing filter removal, engineering controls are a requirement for this element. Using ORNL filter change procedures, the roughing and HEPA filters can be removed safely under the control of the health physicist. The availability and accessibility of containers for disposal of the removed filters is a requirement since the filters could present an exposure field of 17 R/h.

Filter House Characterization. Prior to the entombment of the filter house, a survey would be conducted for isotope identification to document the amount of radioactivity left behind after the filters are removed.

Ductwork Entombment. This element involves opening the ductwork for a tube/pipe entry so the cement base grout could be injected for entombment. Prior to the injection, the location and condition of the blanks installed in the ductwork must be determined. This information is necessary to determine the quantity of grout to be injected.

Filter House Entombment. With the filters removed and a characterization survey performed, the next step is to fill the two story structure with cement base grout. This can be accomplished by pouring the cement base grout through

any of the access plugs on each level of the filter house. Consideration shall be given for the height of lift for filling the internals of the filter house. For mass concrete construction, the normal lifts range from 2.5 to 10 feet. The 10-foot lift will be used in costing and scheduling for this facility.

Air exhausted from the building during grout injection will be channeled through HEPA filters and monitored before being released to the atmosphere.

Waste Disposal. The waste generated from this decommissioning activity shall be sorted and disposed of in accordance with ORNL procedures. The waste will vary from contaminated to uncontaminated general waste. Filter disposal will range up to 40 cubic yards of waste.

Demobilization. This element involves the removal of any temporary containments, equipment, or excess supplies that may have been assembled at the work site. It also includes cleanup of items left over that are reusable prior to the actual restoration of the surface areas.

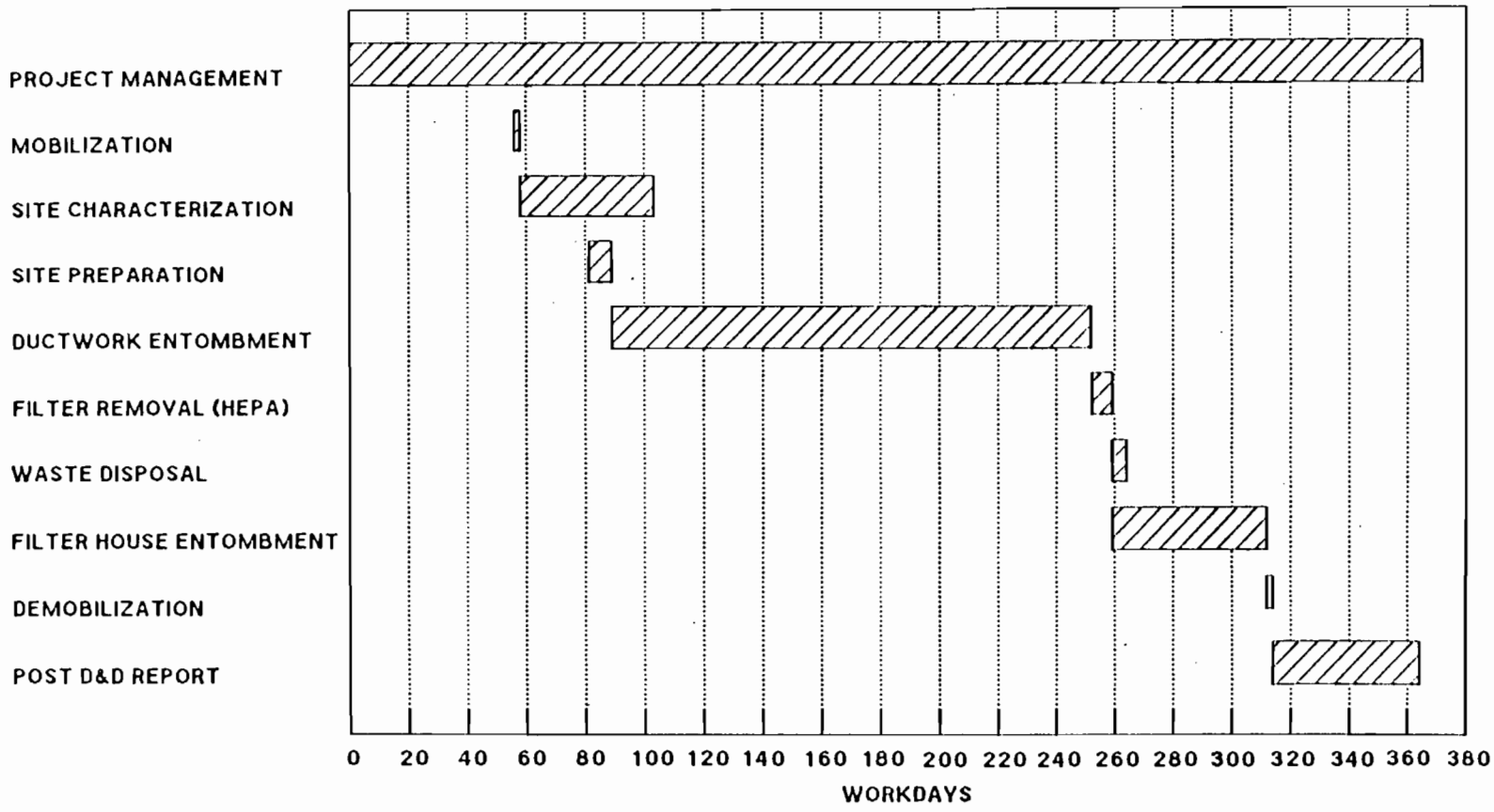
Site Cleanup and Restoration. After completion of the decommissioning activities, the areas disturbed for access to the ductwork and filter house shall be repaired to original condition.

Post D & D Characterization. The survey shall be used in the determination of the required posting and marking of this facility after the decommissioning activities are completed. This data will be used in the final D & D report documenting the activity left behind.

Waste Volume Estimates:	16.1 Filter House Bldg. 3110
Solid Low Level	____ cubic ft
Liquid Low Level	____ gal
CH-TRU	40 cubic yd
RH-TRU	____ cubic yd
Contaminated Soil	____ cubic yd
Uncontaminated Soil	____ cubic yd
Hazardous Chemical	____ lb
Mixed	____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	____ cubic yd
Sanitary Landfill	____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 16.1

Filter House (3110)/Isotopes Ductwork



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 16.1 - Filter House (3110)/Isotopes Ductwork

DESCRIPTION	COST	TOTAL
I. Site Characterization		$8,700
II. Site Preparation	$12,800	
III. Decommissioning Operations		
Equipment Dismantlement	$12,100	
Entombment of Filter House	$126,100	
Entombment of Filter Duct	$1,088,100	
Waste Disposal	$48,200	
Mobilization/Demobilization	$1,900	
Subtotal III	$1,276,400	
Subtotal II & III	$1,289,200	
Overhead and Profit (OH&P)	$404,900	
Total II & III		$1,694,100
IV. Final D & D Report		$56,000
V. Engineering and Management		$135,400
VI. ORNL Overhead		$625,100
Subtotal I thru VI		$2,519,300
Contingency		$755,700
Total		$3,275,000

SUMMARY OF ANNUAL EXPENDITURE REQUIREMENTS

Facility 16.1 - Filter House (3110)/Isotopes Ductwork

Year	Workday Period	Cost
1	1-260	$2,747,200
2	261-364	$527,800
Total		$3,275,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 16.1 - Filter House (3110)/Isotopes Ductwork

Sheet 1 of 2
Prepared by BAF 7/14/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
2. Review During Work	1	LT	0.00	0			340.00	340.00	24.40	8296	
3. Final Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
SUBTOTAL (1)				0				356.00		8686	$8,700
II. Site Preparation											
1. Prework Training	1	LT	0.00	0			40.000	40.00	18.90	756	
2. Place Perimeter Barricade	500	LF	1.26	630			0.0267	13.35	19.00	254	
3. Place Ground Cover	5000	SF	0.03	150			0.0040	20.00	12.80	256	
4. Construct Temporary Exhaust System To New HEPA Filter System	1	LT	7600.00	7600	500.00	500	96.000	96.00	20.60	1978	
5. Place Radiation Alarms	1	LT	300.00	300			16.000	16.00	20.40	326	
SUBTOTAL (II)				8680		500		185.35		3570	$12,800
III. Decommissioning Operations											
1. Equipment Dismantlement											
Remove HEPA Filters with Crane to Storage Containers	42	EA	105.50	4431	58.90	2474	6.500	273.00	18.90	5160	$12,100
2. Entombment of Filter House											
Place Cement Grout Mix Within Filter House	6000	CF	11.45	68700	2.48	14880	0.365	2190.00	19.40	42486	$126,100
3. Entombment of Filter Duct											
Provide Wells For Grout Injection	50	EA	540.00	27000	132.25	6613	5.300	265.00	18.90	5009	
Place Cement Grout in Ducts	49950	CF	11.45	571928	2.48	123876	0.365	18231.75	19.40	353696	
SUBTOTAL				598928		130489		18496.75		358705	$1,088,100
4. Waste Disposal											
Load-out, Transport and Dispose of Filters and Temporary Ductwork	40	CY	1120.00	44800	29.25	1170	3.850	154.00	14.50	2233	$48,200

(1) Includes flatbed truck, 12 ton yard crane and grout mixer/pumper.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 16.1 - Filter House (3110)/Isotopes Ductwork

Sheet 2 of 2
Prepared by BAF 7/14/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
5. Mobilization/Demobilization (1)	1	LT	200.00	200	800.00	800	48.000	48.00	18.90	907	$1,900
SUBTOTAL (II and III)				725739		150313		21347.10		413061	$1,289,200
Overhead & Profit				181435		37578				185877	$404,900
SUBTOTAL (II and III with OH&P)				907174		187891		21347.10		598938	$1,694,100
IV. Final D & D Report	1	LT	0.00	0			800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								928.00	70.00	64960	
2. Engineering Inspection (Title III)								400.00	40.00	16000	
3. Project Management								672.00	40.00	26880	
4. Health and Safety								688.00	40.00	27520	
SUBTOTAL (V)											$135,400
VI. ORNL Overhead											$625,100
SUBTOTAL I thru VI											$2,519,300
CONTINGENCY											$755,700
TOTAL											$3,275,000

FACILITY 17.1

17.1 86 Inch Cyclotron (9201-2) Y-12

The following decommissioning alternatives were considered for this facility:

- Decontamination and Leave in Place
- Protective Storage
- Dismantlement and Disposal

For this facility, the decommissioning alternative selected for further development is dismantlement and disposal. This alternative involves the removal of extraneous items stored on the removable shielding blocks, removal of the shielding blocks (approximately 625 ft^2), disposal of transformer and capacitors, dismantle and removal of the cyclotron and water accumulation in the pit, a hot cell dismantlement removal of a roof section and placing a temporary cover over opening, removal of a fire control consoles and switch gear, waste disposal and restoration of the work site.

The estimate is structured so it may be appropriately scaled when accurate site characterization data become available. The following assumptions were made for cost estimating purposes.

- An area in close proximity to the building is available for a crane set up.
- The cyclotron magnet yoke and miscellaneous uncontaminated components will be lifted out in four lifts at 80 tons each.
- Contaminated components will require 3 lifts, at 30 tons each.
- The roof of the building is built-up roofing and can be removed.
- 12 lifts are required, by the existing overhead crane, to remove the concrete shield blocks.
- The main body of the cyclotron, which is contaminated, can be disposed of without additional packaging.
- Approximately 20 boxes of radioactively contaminated components will be generated.
- Including the cyclotron components, a total of 350 tons of uncontaminated components will be generated.

- The walls of the hot cell are 1-foot thick.
- The hot cell is 5 ft x 5 ft x 10 ft.

The total estimated cost and time duration is $2,456,000 and 420 days. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and cost breakdown of the activities are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Equipment Dismantlement and Removal
- Transportation
- Disposal
- Restoration
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. Prior to any decommissioning activities, a site characterization will be conducted including a radiation survey and a swipe survey. Additional surveys will be required during the disassembly of the equipment.

Site Preparation. This activity includes utility disconnection, establishing an equipment disassembly area, construction of special lifting rigging, crane mobilization, and pre-work training of workers to minimize exposure in accordance with the ALARA concept. In addition, a plastic enclosure approximately 20 ft x 20 ft with double doors will be constructed in the hot cell area, removal of items stored on the shielding blocks, removal of shielding blocks.

Equipment Dismantlement and Removal. Miscellaneous uncontaminated items will be removed first including the control center, switch gear, and AC-DC power generator. For removal of the cyclotron, a 25 ft x 25 ft section of roof will be removed for crane access. A 200-ton crane will be used to facilitate the maximum lifts possible. The concrete shield blocks would be removed and replaced at the conclusion of the work. The cyclotron will be disconnected from all piping and will then be sealed and bagged where disconnected. The unit will be disassembled and lifted through the roof to the packaging area.

The uncontaminated hot cell area components will be dismantled first, with the exception of the monorail which will be utilized during dismantling of the hot cell. The exterior plate of the hot cell will also be removed for disposal.

The hot cell will have all interior surfaces coated prior to dismantling to minimize the spread of contamination. All work will be performed in full dress and air supplied respirators. Miscellaneous components of the cell will be removed and boxed. The concrete walls will be saw cut for loading into standard boxes. The floor and ceiling will be decontaminated by scabbling. At the completion of packaging the containment structure will also be removed and packaged.

Transportation. The cyclotron components weighing more than 20 tons will be transported by special equipment trailers. All other components will be transported by stake-body truck or tractor-trailer.

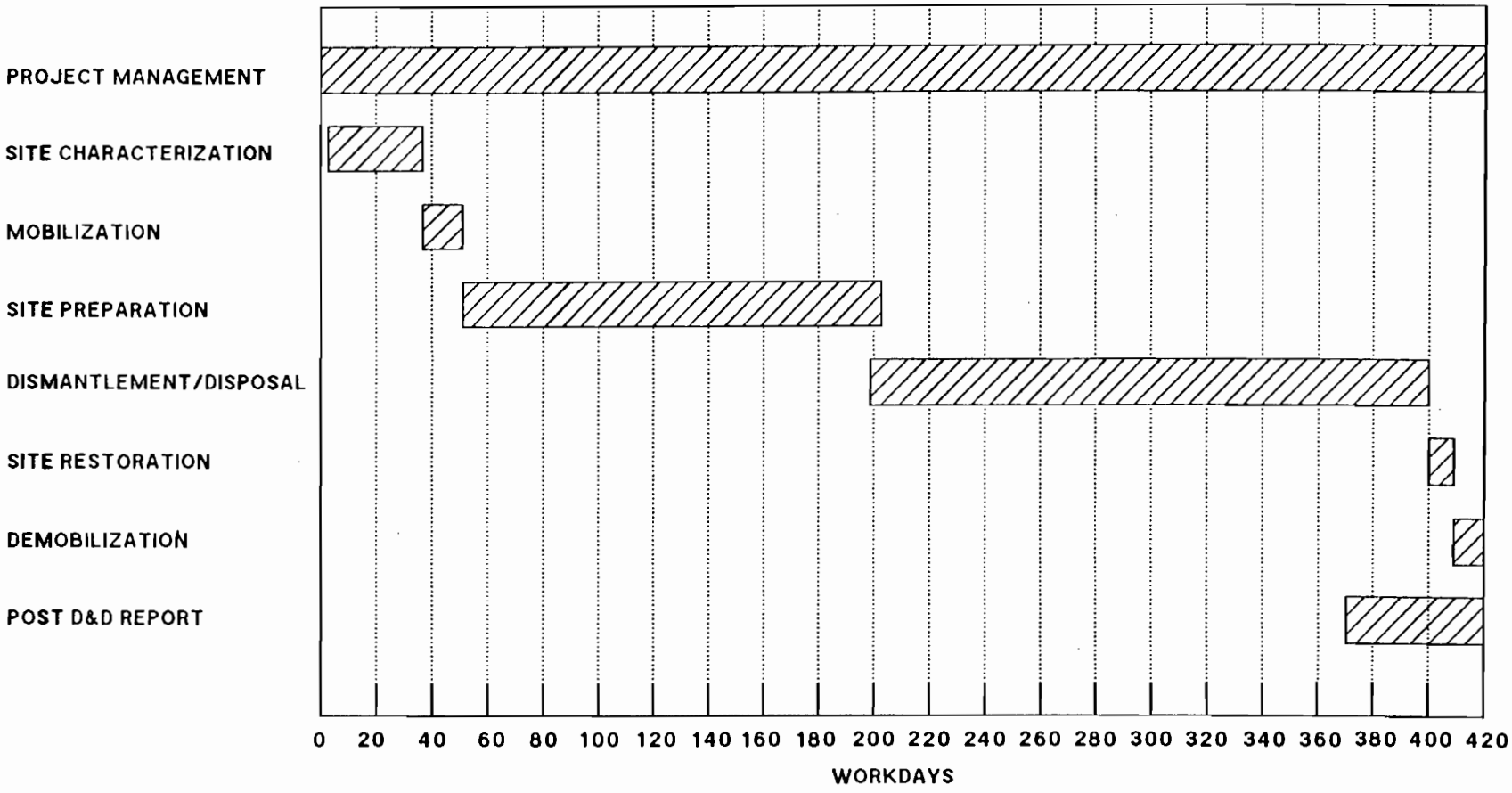
Disposal. The uncontaminated components will be sent to the K-25 salvage yard. The contaminated main components of the cyclotron will be buried without additional packaging. Other contaminated parts will be disposed of in standard boxes at the burial grounds.

Restoration. Following the completion of decommissioning activities, the roof and the concrete shield blocks will be replaced, the crane will be removed, and the grounds will be restored.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE after completion of this alternative and the site has been cleaned and restored. The report will contain a detailed description of the project, the pre- and post-D&D conditions, and disposal of the waste, the total dollar and the man-rem costs, and the time duration of the project.

Waste Volume Estimates:	17.1 86" Cyclotron
Solid Low Level	4,640 cubic ft
Liquid Low Level	1,200 gal
CH-TRU	_____ cubic yd
RH-TRU	_____ cubic yd
Contaminated Soil	_____ cubic yd
Uncontaminated Soil	_____ cubic yd
Hazardous Chemical	_____ lb
Mixed	_____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	394 cubic yd
Sanitary Landfill	_____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 17.1
86-inch Cyclotron (9201-2)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 17.1 - 86" Cyclotron

DESCRIPTION	COST	TOTAL
I. Site Characterization		$32,800
II. Site Preparation		
1. Removal of Built-up Roof	$7,700	
2. Move Extraneous Items on Top Floor To Access Cyclotron	$17,500	
3. Move Shielding Blocks	$257,200	
4. Dismantlement and Disposal of Transformer and Capacitor	$600	
5. Cyclotron Dismantlement	$16,200	
6. Hot Cell Dismantlement/Disposal	$11,300	
Subtotal II	$310,500	
III. Decommissioning Operations		
1. Removal/Disposal of Built-up Roof	$11,700	
2. Dismantlement/Disposal of Control Center, Switch Gear	$13,700	
3. Dismantlement and Disposal of Transformer and Capacitor	$80,100	
4. Cyclotron Dismantlement/Disposal	$288,200	
5. Hot Cell Dismantlement/Disposal	$27,500	
6. Site Restoration (Roof Repair)	$5,500	
7. Mobilization/Demobilization	$34,600	
Subtotal III	$461,300	
Subtotal II & III	$771,800	
Overhead and Profit (OH&P)	$252,500	
Total II & III		$1,024,300
IV. Final D & D Report		$56,000
V. Engineering and Management		$307,300
VI. ORNL Overhead		$468,700
Subtotal I thru VI		$1,889,100
Contingency		$566,900
Total		$2,456,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 17.1 - 86" Cyclotron

Sheet 1 of 6
Prepared by BWH/SMC 7/15/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization (All Components)											
1. Initial Contamination Review	1	LT	0.00	0			80.00	80.00	24.40	1952	
2. Contamination Review During Work	1	LT	0.00	0			1240.00	1240.00	24.40	30256	
3. Final Contamination Review	1	LT	0.00	0			24.00	24.00	24.40	586	
SUBTOTAL (I)				0				1344.00		32794	$32,800
II. Site Preparation											
1. Removal of Built-up Roof											
a. Place Perimeter Barricade	2500	LF	1.26	3150			0.0267	66.75	19.00	1268	
b. Prework Training	1	LT	0.00	0			96.000	96.00	18.90	1814	
c. Construct Canvas Tent Below Work Area	900	SF	0.33	297			0.0700	63.00	19.00	1197	
SUBTOTAL				3447				225.75		4279	$7,700
2. Move Extraneous Items on Top Floor To Access Cyclotron											
a. Dismantlement and Removal for Temporary, Uncontaminated Storage											
Pack and Compact Items (approx. 30% of Room Volume) in Existing Boxes and Stack Along Outer Walls	1	LT	0.00	0			80.000	80.00	12.80	1024	
Pack Loose Items in Boxes and Stack Along Outer Walls	1	LT	60.00	60			100.000	100.00	12.80	1280	
Unbolt Railing From Floor and Move Aside	1	LT	0.00	0			16.000	16.00	12.80	205	
Construct a Temporary Tent Wall To Isolate Misc. Items from the Crane Work Space	1000	SF	6.50	6500			0.220	220.00	19.00	4180	
Take Down and Dispose of Temporary Wall in LLW Disposal Site	80	CF	41.50	3320	3.30	264	0.430	34.40	19.00	654	
SUBTOTAL				9880		264		450.40		7343	$17,500
3. Move Shielding Blocks											
a. Removal/Restoration of Shielding Blocks (1)	625	SF	0.50	313			0.660	412.50	12.80	5280	

(1) Use monorail crane in place. Shielding bricks will be set onto plastic (4'x 4') lattice pad.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 17.1 - 86" Cyclotron

Sheet 2 of 6
Prepared by BWH/SMC 7/15/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
II. Site Preparation (Continued)											
3. Move Shielding Blocks (Cont.)											
b. Heavy Lift Crane, 200 Ton	9	MO	5200.00	46800	16200	145800	346.600	3119.40	18.90	58957	
SUBTOTAL				47113		145800		3531.90		64237	$257,200
4. Dismantlement/Disposal of Transformer and Capacitor											
a. Place Perimeter Barricade	100	LF	1.26	126			0.0267	2.67	19.00	51	
b. Prework Training	1	LT	0.00	0			24.000	24.00	18.90	454	
SUBTOTAL				126				26.67		505	$600
5. Cyclotron Dismantlement											
a. Disconnect Utilities	1	LT	200.00	200			40.000	40.00	20.40	816	
b. Prepare Equipment Disassembly Area	1	LT	500.00	500			80.000	80.00	19.00	1520	
c. Prework Training	1	LT	0.00	0			144.000	144.00	12.80	1843	
d. Remove Water Accumulation in Pit Area (Include in Disposal as LLLW)	1	LT	10200	10200	50.00	50	80.000	80.00	12.80	1024	
SUBTOTAL				10900		50		344.00		5203	$16,200
6. Hot Cell Dismantlement/Disposal											
a. Prework Training	1	LT	0.00	0			64.000	64.00	18.90	1210	
b. Build Tent Enclosure with Air Lock	400	SF	2.25	900			0.440	176.00	19.00	3344	
c. Prepare HEPA Filter Vacuum Exhaust System	1	LT	4800.00	4800			32.000	32.00	20.60	659	
d. Encapsulate Internal Contaminates with Bridging Mixture	200	SF	0.35	70	0.18	36	0.070	14.00	20.00	280	
SUBTOTAL				5770		36		286.00		5493	$11,300
SUBTOTAL (II)				77236		146150		4864.72		87060	$310,500

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 17.1 - 86" Cyclotron

Sheet 3 of 6
Prepared by BWH/SMC 7/15/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations											
1. Removal/Disposal of Built-up Roof											
a. Demolition/Disposal											
Set-up Roof Supports (8 Hydraulic Jacks)	1	LT	1600.00	1600			23.000	23.00	19.00	437	
Cut/Remove 25'x 25' Roof Section	625	SF	1.00	625	1.80	1125	0.190	118.75	19.00	2256	
Rid/Derig Rain Tarp Over Opening (30'x 30')	900	SF	0.33	297	1.50	1350	0.1067	96.03	19.00	1825	
Transport/Dispose of Roof Materials at Contractors' Landfill	23	CY	8.00	184	29.25	673	3.8500	88.55	14.50	1284	
SUBTOTAL				2706		3148		326.33		5802	$11,700
2. Dismantlement/Disposal of Control Center, Switch Gear											
a. Remove/Dismantle All Wiring and Electrical Conduit to Control Center, Switch Gear and Power Generator	4	CY	0.00	0			40.0000	160.00	20.40	3264	
b. Dismantle Control Center, Switch Gear and Power Generator into Sections for Removal to K-25	36	CY	0.00	0			4.4500	160.20	20.40	3268	
c. Package Above for Load-out	40	CY	87.50	3500			2.5000	100.00	20.40	2040	
d. Load-out, Transport and Dispose (2)	40	CY	4.80	192	12.15	486	1.6000	64.00	14.50	928	
SUBTOTAL				3692		486		484.20		9500	$13,700
3. Dismantlement/Disposal of Transformer and Capacitor											
a. Dismantle/Plug All Piping Connecting Storage Tank to Transformer and Capacitor	1	LT	0.00	0			1.6700	1.67	22.00	37	
b. Dismantle for Removal Transformer and Capacitor	1	LT	100.00	100			48.000	48.00	20.40	979	
c. Package Transformer and Capacitor in Approved Waste Container	1	LT	150.00	150			24.000	24.00	20.40	490	

(2) Dispose at K-25 Salvage Yard.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 17.1 - 86" Cyclotron

Sheet 4 of 6
Prepared by BWH/SMG 7/15/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Dismantlement/Disposal of Transformer and Capacitor (Cont.)											
n. Load-out, Transport and Dispose of Transformer and Capacitor (3)	65	CY	1120.00	72800	29.25	1901	3.8500	250.25	14.50	3629	
SUBTOTAL				73050		1901		323.92		5135	$80,100
4. Cyclotron Dismantlement/Disposal											
a. Dismantlement and Removal											
Disconnect Piping and Electrical Services to 86" Cyclotron Unit (4)	1	LT	400.00	400			640.000	640.00	22.00	14080	
Disassemble Cyclotron Magnetic Yoke and Related Clean Components (4)	4	EA	1500.00	6000			850.000	3400.00	22.60	76840	
Disassemble Contaminated Cyclotron Components (4)	3	EA	600.00	1800			640.000	1920.00	22.60	43392	
b. Transportation and Disposal											
Load-out, Transport and Dispose of Clean Material	320	CY	18.00	5760	29.25	9360	3.850	1232.00	14.50	17864	
Load-out, Transport and Dispose of Contaminated Material by Direct Burial	90	CY	1120.00	100800	45.50	4095	6.000	540.00	14.50	7830	
SUBTOTAL (4.)				114760		13455		7732.00		160006	$288,200
5. Hot Cell Dismantlement/Disposal											
a. Dismantlement and Removal											
Dismantle and Package Clean Components for Transport to K-25 Salvage	54	CF	1.25	68	14.25	770	1.875	101.25	12.80	1296	
Remove Manipulator and Package for SLLW Disposal	96	CF	0.00	0			2.000	192.00	22.60	4339	
Scarify Interior Surfaces to Remove Encapsulated Contaminates (5)	16.7	CF	3.13	52	12.00	200	12.000	200.40	12.80	2565	

(3) Disposal in ORNL approved waste facility.
(4) Includes packaging for disposal.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 17.1 - 86" Cyclotron

Sheet 5 of 6
Prepared by BWH/SMG 7/15/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
5. Hot Cell Dismantlement/Disposal (Cont.)											
Remove Exterior Plate, Cut-up and Package for Disposal (6)	1	LT	50.00	50	70.00	70	40.000	40.00	12.80	512	
Cut-up, Remove Concrete Walls, Package for Disposal (6)	7.4	CY	18.00	133	25.00	185	2.700	19.98	12.80	256	
Remove Tent Coverings and HEPA Filters for Disposal (6)	142	CF	41.50	5893			0.150	21.30	19.00	405	
b. Transportation and Disposal											
Load-out, Transport and Dispose of Clean Waste (6)	54	CF	20.00	1080	29.25	1580	3.850	207.90	14.50	3015	
Load-out, Transport and Dispose of Contaminated Waste (SLLW)	113	CF	41.50	4690	1.15	130	0.150	16.95	14.50	246	
SUBTOTAL (5.)				11966		2935		799.78		12634	$27,500
6. Site Restoration (Roof Repair)	625	SF	4.10	2563	0.50	313	0.220	137.50	19.00	2613	$5,500
7. Mobilization/Demobilization (7)	1	LT	19400	19400			804.000	804.00	18.90	15196	$34,600
SUBTOTAL (II and III)				305373		168388		15472.45		297946	$771,800
Overhead and Profit				76343		42097				134076	$252,500
SUBTOTAL (II and III with OH&P)				381716		210485		15472.45		432022	$1,024,300
IV. Final D & D Report	1	LT						800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)										161300	
2. Engineering Inspection (Title III)										53800	
3. Project Management										61500	
4. Health and Safety										30700	
SUBTOTAL (V)											$307,300

(5) Includes packaging for SLLW disposal.
(6) Disposal at contractors' landfill.
(7) Includes 200-ton crane, concrete equipment, forklift, cutting equipment, tractor/trailers, power hacksaw, etc.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 17.1 - 86" Cyclotron

Sheet 6 of 6
Prepared by BWH/SMC 7/15/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
VI. ORNL Overhead											$468,700
SUBTOTAL I thru VI											$1,889,100
CONTINGENCY											$566,900
TOTAL											$2,456,000

FACILITY 18.1

18.1 Plutonium Process Condensate Tank (9720-8) Y-12

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Dismantlement and Disposal

The decommissioning alternative selected is dismantlement and disposal. This alternative involves dismantling the tank from the external supports, disconnecting piping and valves, and all external features using appropriate cutting techniques. The tank openings would be sealed, and the tank, and all removed equipment would be disposed in an approved waste disposal facility.

The structure of the estimate allows it to be scaled once accurate site characterization data become available. For cost estimating purposes the following assumption was made:

- Assuming the external contamination level is considered clean, no special mobilization considerations should be neccesary.

The total estimated cost and time duration is $141,000 and 64 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Equipment Dismantlement and Removal
- Packaging and Disposal
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. Prior to any work performed on site a safety evaluation should be performed to determine if the area is safe to work in and that all conditions comply with ORNL safety procedures. A radiation check should be performed on the storage tank to make sure its integrity has been maintained.

Site Preparation. After site characterization the preparation of the site will consist of placing movable barricades, flagging and signs as required.

Equipment Dismantlement and Removal. This work involves the dismantling of all external parts of the tank. These include all valves, piping, external supports, and all other external features using the appropriate ORNL techniques. All external parts removed must be sealed, wrapped, or bagged and placed in an approved waste storage container.

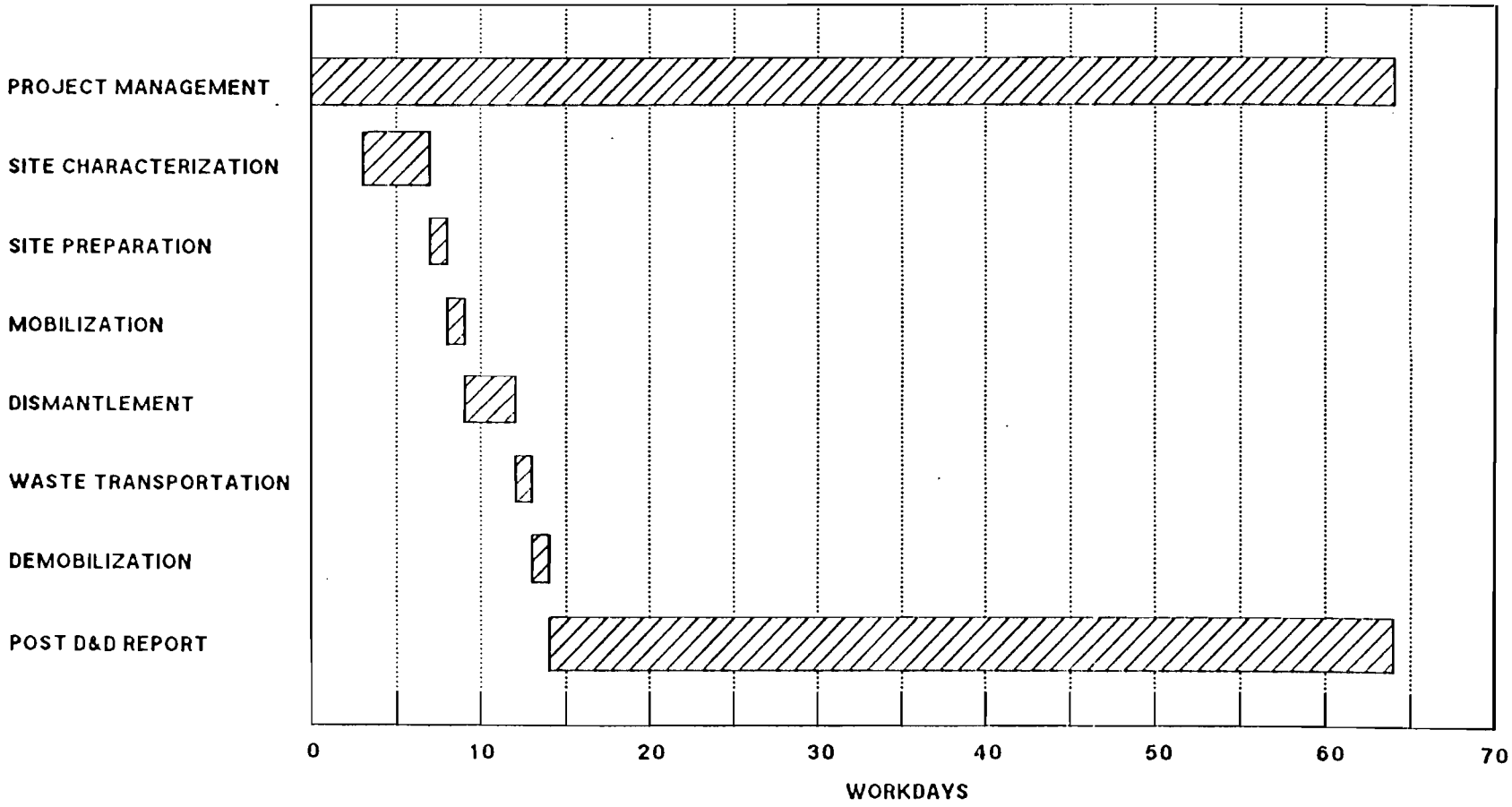
Packaging and Disposal. The external parts removed will be packaged and stored in approved containers and disposed of according to ORNL Procedures. The tank will be filled with 3 cubic yards of cement grout or until all void space within the tank is filled. The tank's opening will then be sealed using appropriate ORNL techniques. The tank now filled with cement can be placed in the approved storage container lined with vermiculite, sealed, and disposed of in the appropriate ORNL waste disposal facility for burial or storage.

Mobilization and Demobilization. Provide the necessary equipment and labor force for transportation of the Pu Condensate Tank from the storage area to the waste disposal facility. All equipment will be returned after the project has been completed provided the equipment has not been exposed to any radioactivity.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the wastes generated and their disposal, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	18.1 Pu Process Condensate Tank (Bldg. 9720-8 @ Y-12)	
Solid Low Level	112	cubic ft
Liquid Low Level	_____	gal
CH-TRU	_____	cubic yd
RH-TRU	_____	cubic yd
Contaminated Soil	_____	cubic yd
Uncontaminated Soil	_____	cubic yd
Hazardous Chemical	_____	lb
Mixed	_____	drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	_____	cubic yd
Sanitary Landfill	_____	cubic yd

SCHEDULE FOR SURPLUS FACILITY 18.1
Pu Processing Condensate Tank (9720-8)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 18.1 - PU Process Condensate Tank (Bldg. 9720-8 at Y-12)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$3,800
II. Site Preparation	$400	
III. Decommissioning Operations		
Mobilization	$5,500	
Dismantlement and Removal	$6,100	
Demobilization	$1,000	
Subtotal III	$12,600	
Subtotal II & III	$13,000	
Overhead and Profit (OH&P)	$3,500	
Total II & III		$16,500
IV. Final D & D Report		$56,000
V. Engineering and Management		$5,000
VI. ORNL Overhead		$26,800
Subtotal I thru VI		$108,100
Contingency		$32,900
Total		$141,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 18.1 - PU Process Condensate Tank (Bldg. 9720-8 at Y-12)

Sheet 1 of 2
Prepared by GSD 9/21/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Radiation Survey, Grid Set-up	2	TECH					12.000	24.00	45.00	1080	
	1	HP					12.000	12.00	45.00	540	
2. Radiation Survey, Walkover	2	TECH					12.000	24.00	45.00	1080	
	1	HP					12.000	12.00	45.00	540	
3. Data Analysis	1	ENGR					8.000	8.00	70.00	560	
SUBTOTAL (I)								80.00		3800	$3,800
II. Site Preparation											
1. Isolate Construction Area with Movable Barricades, Flagging & Appropriate Signs	1	LT	250.00	250			8.000	8.00	16.10	129	$400
III. Decommissioning Operations											
1. Mobilization	1	LT	1000.00	1000							
12 Ton Motor Crane	1	MO	0.00	0	2625.00	2625					
12 Ton Flatbed Truck	1	MO	0.00	0	1725.00	1725					
Torch, Cutting, Acetylene-Oxygen	1	MO	0.00	0	140.00	140					
SUBTOTAL				1000		4490					$5,500
2. Dismantlement and Removal											
Cut-off All External Leg Supports From Tank	4	EA	0.00	0			6.000	24.00	22.10	530	
Load Tank and Leg Supports Into A B-25 Container	1	LT	0.00	0			4.000	4.00	22.10	88	
Transport to Waste Storage Area	1	LT	4480.00	4480			16.000	16.00	19.36	310	
Cement Grout, Fill Tank, Fill All Voids	3	CY	65.00	195							
Remove Fill Lines from Tank	2	EA	0.00	0			2.000	4.00	22.10	88	
Fill All Voids of Container Box With Vermiculite	200	CF	1.39	278			0.040	8.00	20.55	164	
SUBTOTAL				4953				56.00		1180	$6,100
3. Demobilization	1	LT	1000.00	1000							$1,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 18.1 - PU Process Condensate Tank (Bldg. 9720-8 at Y-12)

Sheet 2 of 2
Prepared by GSD 9/21/87
Checked by BWH 9/23/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
SUBTOTAL (II and III)				7203		4490		64.00		1309	$13,000
Overhead and Profit				1801		1123				589	$3,500
SUBTOTAL (II & III with OH&P)				9004		5613		64.00		1898	$16,500
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)										2600	
2. Engineering Inspection (Title III)										900	
3. Project Management										1000	
4. Health and Safety										500	
SUBTOTAL (V)											$5,000
VI. ORNL Overhead											$26,800
SUBTOTAL I thru VI											$108,100
CONTINGENCY											$32,900
TOTAL											$141,000

FACILITY 19.1

19.1 Plutonium Processing Facility (9209, Rm 116) Y-12

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Dismantlement and Disposal

The decommissioning alternative selected for this facility is dismantlement and disposal. This alternative involves dismantling the glovebox and evaporator tanks and disposing of them in an approved waste disposal facility. When complete, the room would be decontaminated to return the room to background conditions.

The estimate is structured so it may be appropriately scaled when accurate site characterization data becomes available. The following assumptions were made for cost estimating purposes:

- The floor area of the room is 24 square feet with a ceiling height of 12 feet.
- 3/4 of the room is equipment.
- The volume of the equipment is 216 cubic feet.
- The equipment will be packaged before leaving the room to prevent dispersion of the contaminants.

The total estimated cost and time duration is $230,000 and 93 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Dismantlement and Disposal
- Site Cleanup and Restoration

o Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. A radiological survey will be performed to determine the extent of the contamination on all of the inner surfaces. Surveys will also be taken during and after to monitor the area while decommissioning operations are performed.

Site Preparation. The local work area will be barricaded and marked with appropriate warning signs. The passageway passing the work site will be barricaded and marked with detour signs to alternate routes. Workers will undergo pre-work training to reduce exposure time. A temporary "tent" enclosure will be built to prevent contamination leaking through cracks in the plexiglas enclosure.

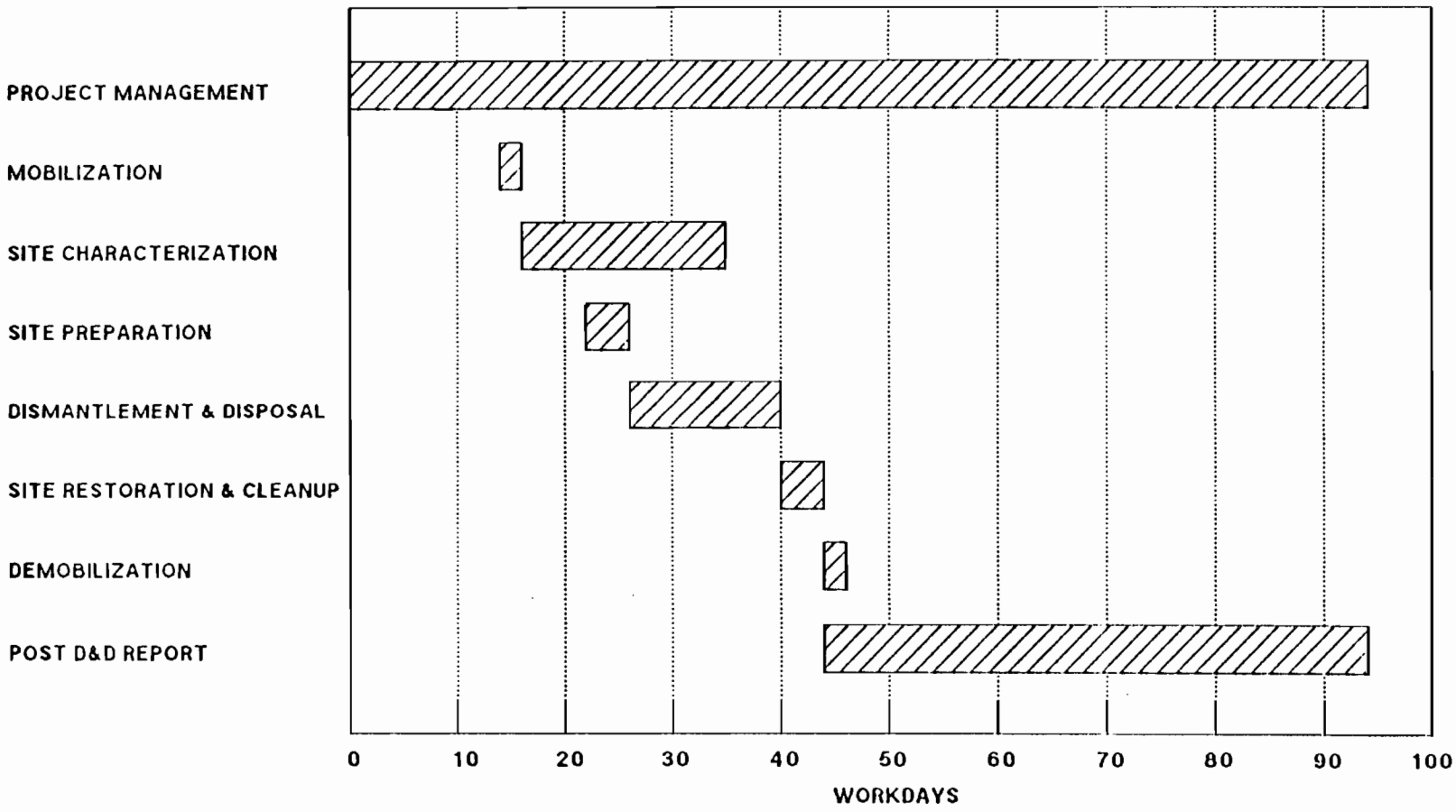
Dismantlement and Disposal. The pipes, evaporator tanks, plexiglass, glovebox, and miscellaneous equipment shall be dismantled and transported to an approved TRU waste disposal facility.

Site Cleanup and Restoration. After the room is clear of debris, the walls, floor, and ceiling within the plexiglass enclosure will be decontaminated by removal of the strippable coating designed for this purpose. The coating shall be disposed of in an approved waste disposal facility. After decontamination, the ventilation ducts shall be sealed off. The temporary tend will be dismantled, packaged, and disposed at an appropriate waste disposal facility. All temporary barricades will be removed.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the dismantlement and disposal operations, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	19.1 Pu Processing Facility (Bldg. 9204-3, Rm 116)	
Solid Low Level	100	cubic ft
Liquid Low Level	____	gal
CH-TRU	8	cubic yd
RH-TRU	____	cubic yd
Contaminated Soil	____	cubic yd
Uncontaminated Soil	____	cubic yd
Hazardous Chemical	____	lb
Mixed	____	drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	____	cubic yd
Sanitary Landfill	____	cubic yd

SCHEDULE FOR SURPLUS FACILITY 19.1
Pu Processing Facility (9209, Rm 116)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 19.1 - PU Processing Facility (Bldg. 9204-3, Rm. 116)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$6,800
II. Site Preparation	$2,200	
III. Decommissioning Operations		
Dismantlement and Disposal	$19,700	
Site Restoration and Clean-up	$3,800	
Mobilization/Demobilization	$2,000	
Subtotal III	$25,500	
Subtotal II & III	$27,700	
Overhead and Profit (OH&P)	$8,600	
Total II & III		$36,300
IV. Final D & D Report		$56,000
V. Engineering and Management		$33,600
VI. ORNL Overhead		$43,800
Subtotal I thru VI		$176,500
Contingency		$53,500
Total		$230,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 19.1 - PU Processing Facility (Bldg. 9204-3, Rm. 116)

Sheet 1 of 2
Prepared by BWH 7/16/87
Checked by BWH 9/17/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
2. Contamination Review During Work	1	LT	0.00	0			264.00	264.00	24.40	6442	
3. Final Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
SUBTOTAL (I)				0				280.00		6832	$6,800
II. Site Preparation											
1. Place Perimeter Barricade	20	LF	1.26	25			0.0267	0.53	19.00	10	
2. Build Temp. Tent Enclosure	150	SF	2.25	338			0.220	33.00	19.00	627	
3. Prework Training	1	LT	0.00	0			48.00	48.00	12.80	614	
4. Encapsulate Internal Contaminates With Bridging Mixture, Spray Interior of Glovebox Surface	480	SF	0.35	168			0.042	20.16	20.00	403	
SUBTOTAL (II)				531				101.69		1654	$2,200
III. Decommissioning Operations											
1. Dismantlement and Disposal											
Dismantle/Package All Equipment Including Glovebox Sides	216	CF	1.25	270			1.875	405.00	12.80	5184	
Load-out, Transport and Dispose of CH-TRU Waste	6.1	CM	2235.00	13634	43.05	263	4.250	25.93	14.50	376	
SUBTOTAL				13904		263		430.93		5560	$19,700
2. Site Clean-up and Restoration											
Spray Coat All Building Surface Within Containment Tent for Decontamination	360	SF	0.35	126	0.11	40	0.042	15.12	20.00	302	
After Drying, Scrape Off Coating and Package for Disposal	15	CF	0.25	4			0.750	11.25	12.80	144	
Repaint All Scraped Surfaces	360	SF	0.09	32	0.11	40	0.010	3.60	20.00	72	
Remove Temp. Tent and Package for Disposal	150	SF	0.00	0			0.180	27.00	19.00	513	

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 19.1 - PU Processing Facility (Bldg. 9204-3, Rm. 118)

Sheet 2 of 2
Prepared by BWH 7/16/87
Checked by BWH 9/17/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
2. Site Clean-up and Restoration (Continued)											
Load-out, Transport and Dispose of Paint Chips and Temporary Tent	52	CF	41.50	2158	1.52	79	0.150	7.80	14.50	113	
Seal-off After Decontamination All Ventilation Ducts	1	LT	75.00	75			6.000	6.00	20.80	124	
Remove All Temporary Barricades	1	LT	0.00	0			0.500	0.50	19.00	10	
SUBTOTAL				2395		159		71.27		1278	$3,800
3. Mobilization/Demobilization (1)	1	LT	2000.00	2000							$2,000
SUBTOTAL (II and III)				18830		422		603.89		8492	$27,700
Overhead & Profit				4708		106				3821	$8,600
SUBTOTAL (II and III with OH&P)				23538		528		603.89		12313	$36,300
IV. Final D & D Report	1	LT	0.00	0			800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								224.00	70.00	15680	
2. Engineering Inspection (Title III)								48.00	40.00	1920	
3. Project Management								176.00	40.00	7040	
4. Health and Safety								224.00	40.00	8960	
SUBTOTAL (V)											$33,600
VI. ORNL Overhead											$43,800
SUBTOTAL I thru VI											$176,500
CONTINGENCY											$53,500
TOTAL											$230,000

(1) Includes spray paint equipment, disposal containers, stake truck and forklift.

FACILITY 20.1

20.1 Radioisotope Processing Facility Curium Handling Glovebox (9203-2) Y-12

The following decommissioning activities were considered for this facility:

- Protective Storage
- Dismantlement and Disposal

For this facility, the decommissioning alternative selected is dismantlement and disposal. This alternative involves removal of the legs, filling the internal void space with a filler media, and placing the glovebox in a package designed for disposal. The operation would be conducted by remote handling methods to the extent possible, and workers would need protective clothing. The container would be disposed in an approved waste disposal facility.

The estimate is structured so it may be appropriately scaled as accurate site characterization data becomes available. The following assumptions were made for cost estimating purposes:

- A containment tent will be required and will cover an area of 255 square feet.
- The size of the glovebox is 4 ft by 4 ft by 7 ft.

The total estimated cost and time duration is $152,000 and 76 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Fixation of Pipes
- Painting

- Dismantlement of External Pipes and Legs
- Stabilization
- Packaging
- Transportation and Storage
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. Prior to any decommissioning an instrument radiation survey will be conducted over the external parts, and smear samples shall be taken on the internal and external surface areas.

Site Preparation. Workers will undergo pre-work training to reduce exposure time. A containment tent shall enclose the glovebox to control the contamination.

Fixation of Pipes. Prior to the dismantlement of pipes connected to the glovebox, the pipes will be filled with polyurethane foam to fix the internal contaminants. The foam will be applied by cutting the pipe at the end opposite of the glovebox and injecting the foam into the pipe.

Painting. The internal surface of the glovebox will be spray painted with a coating to fix internal contamination.

Dismantlement of External Pipes and Legs. The exterior pipes will be cut at their junction with the glovebox and cut into short lengths. Concrete cinder-blocks will be placed under the glovebox for support while the legs are being dismantled. While the glovebox is still under negative pressure, the sectioned pipe and legs will be placed inside the glovebox.

Stabilization. After the glovebox has been dismantled and packaged, the internals of the glovebox will be stabilized with polyurethane foam. The foam

will be injected through the gloveport until the glovebox is full of foam.

Packaging. The negative pressure hose will be cut and capped, and the glovebox shall be placed inside a standard TRU shipping container. The internal part of the container will then be filled with foam to fill the remaining void space.

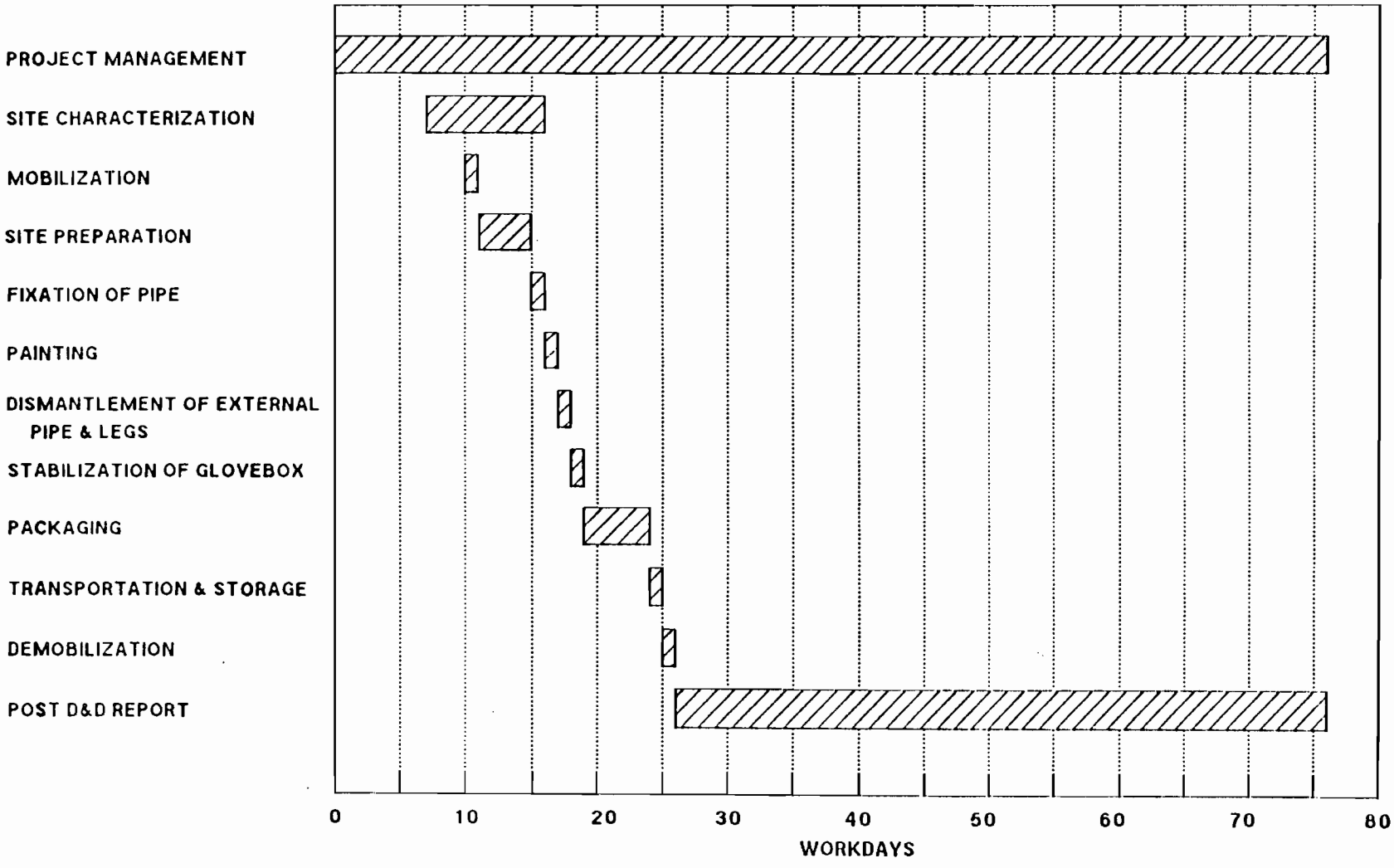
Transportation and Storage. The packaged glovebox will be transported to the TRU retrievable storage facility at SWSA 5 for storage.

Mobilization and Demobilization. This work element consists of gathering and removing labor forces and necessary equipment to and from the site.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	20.1 Curium Handling Glovebox Bldg. 9204-3 @ Y-12	
Solid Low Level	_____	cubic ft
Liquid Low Level	_____	gal
CH-TRU	4.19	cubic yd
RH-TRU	_____	cubic yd
Contaminated Soil	_____	cubic yd
Uncontaminated Soil	_____	cubic yd
Hazardous Chemical	_____	lb
Mixed	_____	drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	_____	cubic yd
Sanitary Landfill	_____	cubic yd

SCHEDULE FOR SURPLUS FACILITY 20.1
CM Handling Glovebox (9204-3, 2nd Floor)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 20.1 - Curium Handling Glovebox (Bldg. 9204-3 at Y-12)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$1,800
II. Site Preparation	$1,900	
III. Decommissioning Operations		
Fixation of Pipes	$50	
Painting	$200	
Dismantlement of External Pipes & Legs	$200	
Glovebox Stabilization	$1,400	
Packaging and Clean-up	$2,400	
Transporation and Storage	$7,500	
Mobilization/Demobilization	$2,000	
Subtotal III	$13,750	
Subtotal II & III	$15,650	
Overhead and Profit (OH&P)	$4,500	
Total II & III		$20,150
IV. Final D & D Report		$56,000
V. Engineering and Management		$10,000
VI. ORNL Overhead		$29,000
Subtotal I thru VI		$116,950
Contingency		$35,050
Total		$152,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 20.1 - Curium Handling Glovebox (Bldg. 9204-3 at Y-12)

Sheet 1 of 3
Prepared by BWH 7/10/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			8.000	8.00	24.40	195	
2. Review During Dismantlement	1	LT	0.00	0			64.00	64.00	24.40	1562	
3. Final Contamination Review	1	LT	0.00	0			1.000	1.00	24.40	24	
SUBTOTAL (I)				0				73.00		1781	$1,800
II. Site Preparation											
1. Prework Training	1	LT	0.00	0			24.000	24.00	20.00	480	
2. Build Temporary Tent Enclosure	225	SF	2.25	506			0.220	49.50	19.00	941	
SUBTOTAL (II)				506				73.50		1421	$1,900
III. Decommissioning Operations											
1. Fixation of Pipes											
Open Access to Pipe Sections at End Opposite Glovebox	3	EA	5.00	15			0.250	0.75	12.80	10	
Inject Foam into Pipe Sections Glovebox	0.87	GAL	6.00	5			1.150	1.00	19.40	19	
SUBTOTAL				20				1.75		29	$50
2. Painting											
Encapsulate Contaminants with Bridging Mixture, Spray Coating of Interior Glovebox Surface	60	SF	0.35	21	1.35	81	0.066	3.96	20.00	79	$200
3. Dismantlement of External Pipes and Legs											
Dismantle Pipe Sections, Cut Near Glovebox	3	EA	5.00	15			0.300	0.90	22.00	20	
Cut Pipe Sections into Small Lengths and Place within Glovebox	1	LT	15.00	15			1.200	1.20	22.00	26	
Place Concrete Cinder Blocks Beneath Glovebox for Support	1	LT	25.00	25			2.000	2.00	12.80	26	
Detach Legs, Cut into Small Sections and Place within Glovebox	1	LT	15.00	15			2.000	2.00	22.00	44	
SUBTOTAL				70				6.10		116	$200

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 20.1 - Curium Handling Glovebox (Bldg. 9204-3 at Y-12)

Sheet 2 of 3
Prepared by BWH 7/10/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
4. Glovebox Stabilization											
Inject Foam into Glovebox Until Full	30	CF	42.00	1260			0.250	7.50	19.40	146	$1,400
5. Packaging and Clean-up											
Remove, Cap and Seal the Negative Pressure Hose	1	LT	20.00	20			1.000	1.00	12.80	13	
Place Glovebox within Standard Burial Container	1	LT	125.00	125			2.000	2.00	12.80	26	
Fill Balance of Space within Container with Foam	26	CF	42.00	1092			0.250	6.50	19.40	126	
Take Down Temporary Tent Enclosure, Place with Glovebox for Storage (Approx. 56 CF)	1	LT	0.00	0			40.000	40.00	19.00	760	
Final Clean-up and Remove Concrete Cinder Blocks	1	LT	50.00	50			16.000	16.00	12.80	205	
SUBTOTAL				1287				65.50		1130	$2,400
6. Transportation and Storage											
Load-out, Transport and Dispose at CH-TRU Waste Facility	3.2	CM	2235.00	7152	43.00	138	4.250	13.60	14.50	197	$7,500
7. Mobilization/Demobilization (1)	1	LT	2000.00	2000							$2,000
SUBTOTAL (II and III)				12316		219		171.91		3118	$15,650
Overhead & Profit				3079		55				1403	$4,500
SUBTOTAL (II and III with OH&P)				15395		274		171.91		4521	$20,150
IV. Final D & D Report	1	LT	0.00	0			800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								56.00	70.00	3920	
2. Engineering Inspection (Title III)								40.00	40.00	1600	

(1) Includes concrete blocks, lifting equipment, spray equipment, etc.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 20.1 - Curium Handling Glovebox (Bldg. 9204-3 at Y-12)

Sheet 3 of 3
Prepared by BWH 7/10/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
V. Engineering and Management (Cont.)											
3. Project Management								72.00	40.00	2880	
4. Health and Safety								40.00	40.00	1600	
SUBTOTAL (V)											$10,000
VI. ORNL Overhead											$29,000
SUBTOTAL I thru VI											$116,950
CONTINGENCY											$35,050
TOTAL											$152,000

FACILITY 21.1

21.1 MSRE Fuel Handling Facility (9201-3) Y-12

The following decommissioning alternatives were considered for this facility:

- o Decontamination and Leave in Place
- o Protective Storage
- o Dismantlement and Disposal

The decommissioning alternative selected for this facility is dismantlement and disposal. This alternative involves removal and disposal of the facility from the active laboratory. The dismantlement procedures would have to be well planned. The structure is a sectional steel box with lifting lugs on each section. The removal of sections in their entirety was considered to be the optimal method to satisfy release requirements per ORNL Radiation Protection Manual. The ceiling is sectioned for removal of items too large for the access doorway. Results of the inspection tour indicates that there is office furniture that may be clean and it would therefore be removed from the area to reduce the generation of waste.

The structure of the estimate allows it to be appropriately scaled once accurate site characterization data become available. For cost estimating purposes, the following assumptions were made:

- o The facility consists of three compartments measuring 16 by 16 by 8 ft. It is completely enclosed on two levels and there is a steel walkway on the third level.
- o Three quarters of each compartment is contaminated. The volume of the box sturcture is 6100 cubic feet.

The total estimated cost and time duration is $900,000 and 208 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Dismantlement and Disposal
- Site Cleanup and Restoration
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. A walk-over radiation survey will determine the lateral and vertical extent of the contamination inside this structure. It will also determine the worker radiation protection requirements.

Site Preparation. The work area shall be isolated with movable barricades and marked with appropriate warning signs. Any doorways opening into the work area shall be barricaded and marked with detour signs to alternate routes.

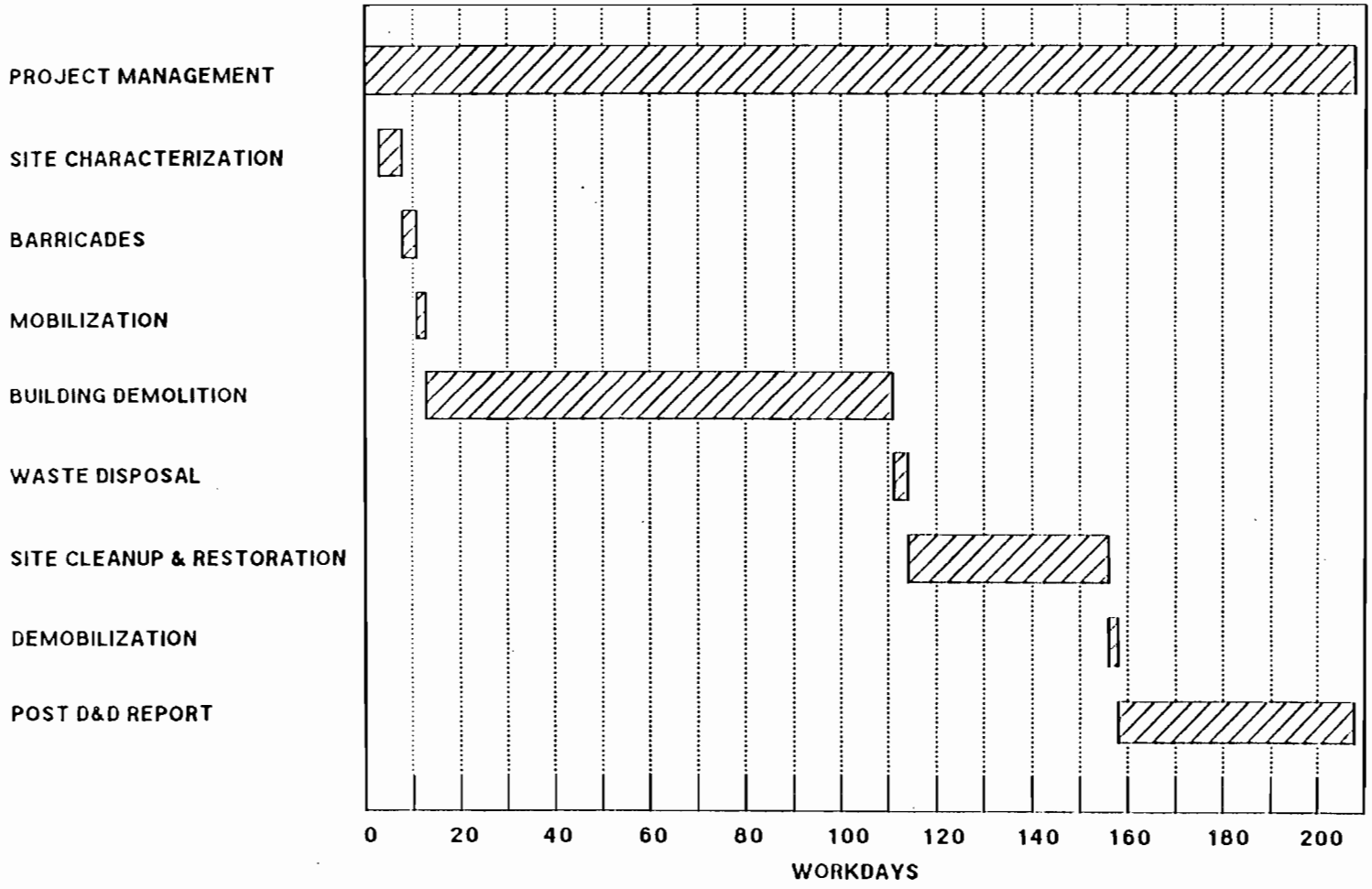
Dismantlement and Disposal. The miscellaneous office equipment (desks, file cabinets, chairs, etc.) outside the steel box shall be transported to the K-25 Salvage Yard. Then the metal floor on the third level shall be dismantled, packaged, and set aside. The existing crane on the third level shall then be used to lift equipment from the second level out of the box to be packaged for disposal. The floor on the second level shall be removed, packaged and set aside. Then the crane shall remove equipment from the first level out of the box and packaged securely. After the box is clear of debris, it shall be dismantled and properly packaged for disposal. When all the contaminated material is secured, room 235 shall be decontaminated using a strippable coating. The crane in building 9201-3 shall be used to lift the packaged material and loaded onto a truck for transportation to an approriate waste disposal site.

Site Cleanup and Restoration. The changeout room adjacent to room 235 shall be decontaminated using a strippable coating. Scraped surfaces remaining will be repainted. the roof hatch will be replaced.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the wastes generated and their disposal, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	21.1 MSRE Fuel Handling Facility (Bldg. 9201-3, Rm 235)
Solid Low Level	2,976 cubic ft
Liquid Low Level	_____ gal
CH-TRU	_____ cubic yd
RH-TRU	_____ cubic yd
Contaminated Soil	_____ cubic yd
Uncontaminated Scrap	_____ cubic yd
Hazardous Chemical	_____ lb
Mixed	_____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	_____ cubic yd
Sanitary Landfill	_____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 21.1
MSRE Fuel Handling Facility (9201-3, Rm 235)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 21.1 - MSRE Fuel Handling Facility (Bldg. 9201-3, Rm. 235)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$15,900
II. Site Preparation	$1,100	
III. Decommissioning Operations		
Mobilization	$19,300	
Dismantlement and Disposal	$78,100	
Site Clean-up and Restoration	$40,400	
Waste Disposal	$119,500	
Demobilization	$1,000	
Subtotal III	$258,300	
Subtotal II & III	$259,400	
Overhead and Profit (OH&P)	$85,800	
Total II & III		$345,200
IV. Final D & D Report		$56,000
V. Engineering and Management		$103,600
VI. ORNL Overhead		$171,800
Subtotal I thru VI		$692,500
Contingency		$207,500
Total		$900,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 21.1 - MSRE Fuel Handling Facility (Bldg. 9201-3, Rm. 235)

Sheet 1 of 3
Prepared by GSD 9/20/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Radiation Survey, Grid Set-up	2	TECH					12.000	24.00	45.00	1080	
	1	HP					12.000	12.00	45.00	540	
2. Radiation Survey, Walkover	2	TECH					12.000	24.00	45.00	1080	
	1	HP					12.000	12.00	45.00	540	
3. Swipe Collection	2	TECH					12.000	24.00	45.00	1080	
	1	HP					12.000	12.00	45.00	540	
4. Lab Analysis	30	EA	350.00	10500							
5. Data Analysis	1	ENGR					8.000	8.00	70.00	560	
SUBTOTAL (I)				10500				116.00		5420	$15,900
II. Site Preparation											
1. Isolate Construction Area with Movable Barricades, Flagging & Appropriate Signs	1	LT	750.00	750			24.000	24.00	16.10	386	$1,100
III. Decommissioning Operations											
1. Mobilization	1	LT	1000.00	1000							
12 Ton Motor Crane	2	MO	0.00	0	2625.00	5250					
12 Ton Flatbed Truck	2	MO	0.00	0	3315.00	6630					
12 Ton Dump Truck	1	MO	0.00	0	1725.00	1725					
4000 Lb. Fork Lift	2	MO	0.00	0	1675.00	3350					
Vacuum Cleaner	2	MO	0.00	0	100.00	200					
7" Grinder Saw	8	MO	0.00	0	140.00	1120					
SUBTOTAL				1000		18275					$19,300
2. Dismantlement and Disposal											
Dust Removal of Box	2700	SF	0.03	81			0.010	27.00	16.10	435	
Remove Roof Hatch (Rm. 235)	900	SF	0.10	90			0.076	68.00	21.50	1462	
Load-out Furniture	1007	CF	0.70	705			0.050	50.00	18.65	933	
Dispose of Furniture (Surplus Sales)	1007	CF	0.00	0			0.008	8.00	16.70	134	
Disconnect Utilities	1	LT	100.00	100			24.000	24.00	23.30	559	
Disconnect Ductwork	126	CF	0.30	38			0.127	16.00	23.10	370	
Cut Box Apart	1144	LF	0.00	0			2.500	2860.00	22.10	63206	
Package, Load-out Contaminated Material	1350	CF	0.10	135			0.024	32.00	16.10	515	
Load into B-25 Containers	14	EA	600.00	8400			4.000	56.00	16.10	902	
SUBTOTAL				9549						68516	$78,100

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 21.1 - MSRE Fuel Handling Facility (Bldg. 9201-3, Rm. 235)

Sheet 2 of 3
Prepared by GSD 9/20/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Site Clean-up and Restoration											
Dust Removal in Room 235	6200	SF	0.03	186			0.0100	62.00	16.10	998	
Spray Coat Room 235	8800	SF	0.35	3080			0.0420	370.00	19.55	7234	
After Drying, Scrape Off Coating and Package for Disposal	1500	CF	0.25	375			0.7500	1125.00	16.10	18113	
Load-out for Disposal	1500	CF	0.10	150			0.0267	40.00	16.10	644	
Repaint All Scraped Surfaces	8800	SF	0.10	880			0.0420	370.00	19.55	7234	
Replace Roof Hatch	900	SF	0.10	90			0.0750	67.50	21.50	1451	
SUBTOTAL				4761				2034.50		35674	$40,400
4. Waste Disposal											
Ductwork	126	CF	40.00	5040			0.0085	1.07	16.70	18	
Material from Box and Paint Chips	2850	CF	40.00	114000			0.0085	24.23	16.70	405	
SUBTOTAL				119040				25.30		423	$119,500
5. Demobilization	1	LT	1000.00	1000							$1,000
SUBTOTAL (II and III)				136100		18275		2083.80		104999	$259,400
Overhead & Profit				34025		4569				47250	$85,800
SUBTOTAL (II & III with OH&P)				170125		22844		2083.80		152249	$345,200
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)										54400	
2. Engineering Inspection (Title III)										18100	
3. Project Management										20700	
4. Health and Safety										10400	
SUBTOTAL (V)											$103,600

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 21.1 - MSRE Fuel Handling Facility (Bldg. 9201-3, Rm. 235)

Sheet 3 of 3
Prepared by GSD 9/20/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
VI. ORNL Overhead											$171,800
SUBTOTAL I thru VI											$692,500
CONTINGENCY											$207,500
TOTAL											$900,000

FACILITY 22.1

22.1 Coolant Salt Technology Facility, Tritium Test Loop (9201-3) Y-12

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Decontamination and Leave in Place
- Decontamination and Salvage
- Dismantlement and Disposal

The decommissioning alternative selected is dismantlement and disposal. This alternative involves dismantlement of the facility and disposal of the components as clean salvage or radwaste. After dismantlement and disposal of the Test Loop and instrumentation racks, the floor area of Building 9201-3 would be decontaminated as necessary for unrestricted release.

The structure of the estimate allows it to be appropriately scaled once accurate site characterization data become available. For cost estimating purposes, the following assumptions were made:

- The control system is free of contamination.
- Total amount of waste produced is 960 cubic feet.
- All material and equipment is uncontaminated except for the following items: One 75 hp pump motor, two instrument control cabinets.

The total estimated cost and time duration for this facility is $243,000 and 84 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Dismantlement of Control System
- Dismantlement of Test Loop
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operation, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. The interior and exterior parts of the test loop, and the exterior parts of the control system will undergo a radiological survey. Smear samples will be taken from hot spots identified in the radiation survey. The radiation review will also be taken during and after the decommissioning activities.

Site Preparation. Workers will undergo pre-work training to reduce exposure time. The construction area will be isolated with movable barricades and flags. The interior of the facility will be vacuumed and loose material will be gathered for disposal. Loose salvageable items will be taken to K-25 salvage.

Dismantlement of Control System. All salvageable items from the control panels, the electrical conduit, cable tray and tube rack material will be dismantled from the control system. These items will be segregated for disposal at either K-25 or the Contractors' Landfill. The control panels will then be disconnected from the floor and will be disposed of in an appropriate waste disposal facility.

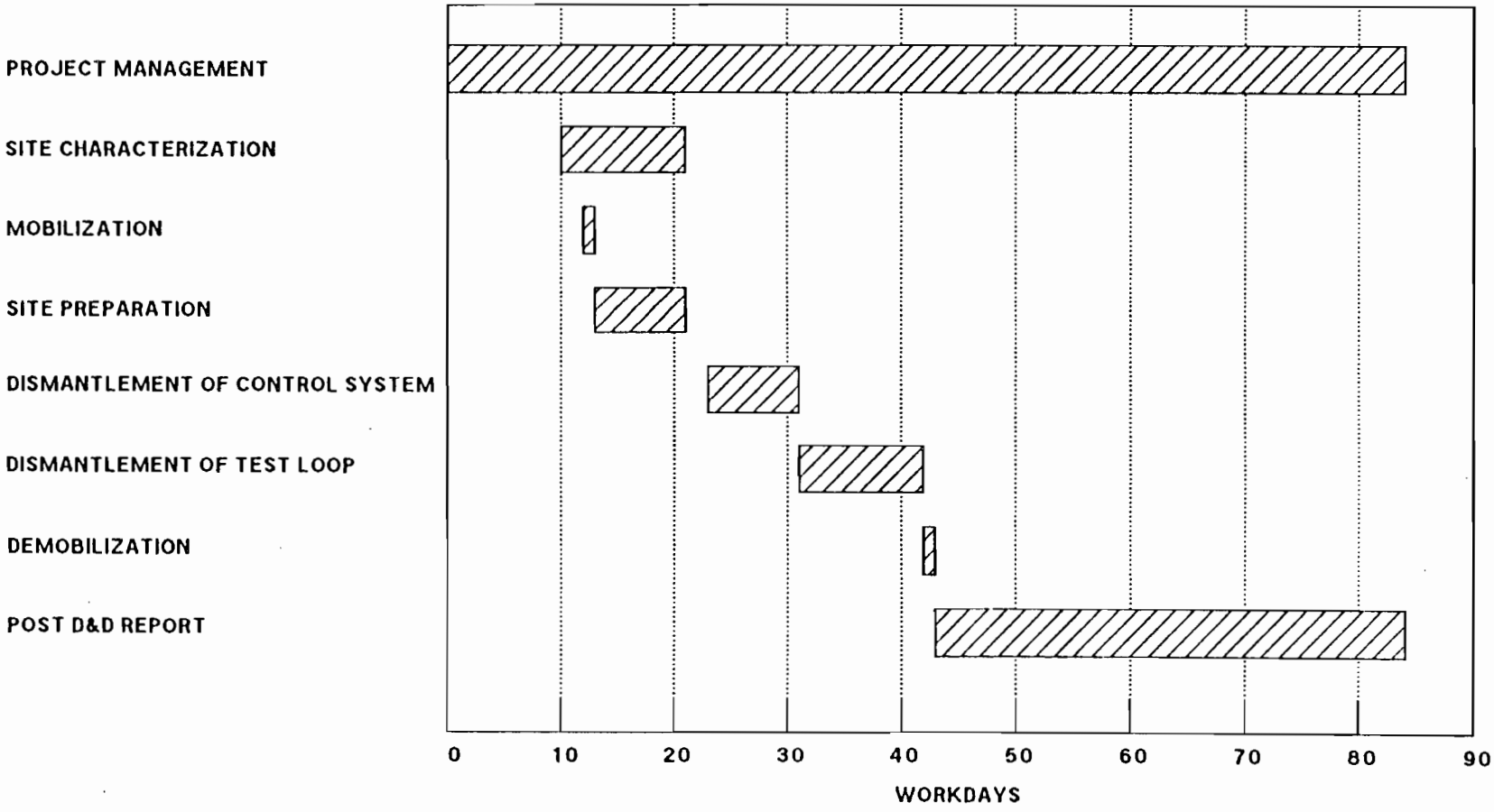
Dismantlement of Test Loop. The 20-ton bridge crane located at the east end of Building 9201-3 will be utilized in the dismantlement of the facility. The two instrument panels and the 75 hp pump motor will be removed, packaged, and transported to an approved waste disposal facility for storage. The remaining parts of the facility will be dismantled and loaded into trucks for transportation for the contractors' landfill or LLW Disposal Areas as required.

Mobilization and Demobilization. This work element consists of gathering and removing labor forces and necessary equipment to and from the site.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the dismantling and disposal of all materials, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	22.1 Tritium Test Loop, CSTF (Bldg. 9204-3)	
Solid Low Level	240	cubic ft
Liquid Low Level	_____	gal
CH-TRU	_____	cubic yd
RH-TRU	_____	cubic yd
Contaminated Soil	_____	cubic yd
Uncontaminated Soil	_____	cubic yd
Hazardous Chemical	_____	lb
Mixed	_____	drums (7.35 cubic ft)
Landfilled Waste		
Contractors' Landfill	_____	cubic yd
Sanitary Landfill	_____	cubic yd

SCHEDULE FOR SURPLUS FACILITY 22.1
Coolant Salt Technology Facility (9419-1)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 22.1 - Tritium Test Loop, CSTF (Bldg. 9204-3 at Y-12)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$3,400
II. Site Preparation	$1,900	
III. Decommissioning Operations		
Dismantlement of Control System	$2,900	
Dismantlement of Test Loop	$24,400	
Site Clean-up and Restoration	$14,600	
Mobilization/Demobilization	$800	
Subtotal III	$42,700	
Subtotal II & III	$44,600	
Overhead and Profit (OH&P)	$13,900	
Total II & III		$58,500
IV. Final D & D Report		$56,000
V. Engineering and Management		$22,800
VI. ORNL Overhead		$46,400
Subtotal I thru VI		$187,100
Contingency		$55,900
Total		$243,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 22.1 - Tritium Test Loop, CSTF (Bldg. 9201-3 at Y-12)

Sheet 1 of 3
Prepared by BWH 7/11/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			16.000	16.00	24.40	390	
2. Review During Dismantlement	1	LT	0.00	0			120.00	120.00	24.40	2928	
3. Final Contamination Review	1	LT	0.00	0			4.000	4.00	24.40	98	
SUBTOTAL (I)				0				140.00		3416	$3,400
II. Site Preparation											
1. Prework Training	1	LT	0.00	0			18.000	18.00	22.00	396	
2. Place Perimeter Barricade	100	LF	1.26	126			0.0267	2.67	19.00	51	
3. Vacuum Decon. Interior of Test Loop Enclosure	1024	SF	0.02	20			0.016	16.38	12.80	210	
4. Gather All Loose Material, Segregate Salvagable Items for Transport to K-25, Balance to Contractors' Burial	1	LT	100.00	100			16.000	16.00	12.80	205	
5. Load-out, Transport Above Items for Proper Disposal	1	LT	97.00	97	243.00	243	32.000	32.00	14.50	464	
SUBTOTAL (II)				343		243		85.05		1326	$1,900
III. Decommissioning Operations											
1. Dismantlement of Control System											
Remove All Salvagable Items from Control Panels	1	LT	0.00	0			16.000	16.00	20.40	326	
Remove All Electrical Conduit, Pull-back Cable	1	LT	0.00	0			32.000	32.00	20.40	653	
Remove All Cable Tray and Tube Rack Material	1	LT	0.00	0			32.000	32.00	20.40	653	
Segregate All Above Items, K-25 or Contractors' Burial	1	LT	125.00	125			8.000	8.00	20.40	163	
Disconnect Control Panels From Floor, Make Ready for Load-out	2	EA	0.00	0			4.000	8.00	20.40	163	
Load-out, Transport Above Items for Proper Disposal	1	LT	97.00	97	243.00	243	32.000	32.00	14.50	464	
SUBTOTAL				222		243		128.00		2422	$2,900
2. Dismantlement of Test Loop											
Disconnect, Package 75HP Contam- [redacted] d Pu[redacted]tor	128	CF	40.00	5120			0.125	16.00	22.00	352	

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 22.1 - Tritium Test Loop, CSTF (Bldg. 9201-3 at Y-12)

Sheet 2 of 3
Prepared by BWH 7/11/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
2. Dismantlement of Test Loop (Cont.)											
Disconnect, Package the Contaminated Instrument Test Panels (2 ea.)	112	CF	40.00	4480			0.350	39.20	22.00	862	
Disconnect, Break-down All Internal Piping, Equipment, Etc. for Transport to Contractors' Burial	1	LT	150.00	150			48.000	48.00	22.00	1056	
Disassemble, Break-down the Steel Enclosure Shell for Transport to Contractors' Landfill	1	LT	100.00	100			32.000	32.00	12.80	410	
Load-out, Transport and Dispose of Clean Material	1	LT	350.00	350	250.00	250	32.000	32.00	14.50	464	
Load-out, Transport and Dispose of Contaminated Material	240	CF	41.50	9960	1.15	276	0.150	36.00	14.50	522	
SUBTOTAL				20160		526		203.20		3666	$24,400
3. Site Clean-up and Restoration											
Final Clean-up and Decontamination of Floor Area As Required	1	LT	150.00	150			16.000	16.00	12.80	205	
Remove Perimeter Barricade	100	LF	85.00	8500			3.000	300.00	19.00	5700	
SUBTOTAL				8650				316.00		5905	$14,600
4. Mobilization/Demobilization (1)	1	LT	85.00	85	225.00	225	24.000	24.00	18.90	454	$800
SUBTOTAL (II and III)				29460		1237		756.25		13773	$44,600
Overhead & Profit				7365		309				6198	$13,900
SUBTOTAL (II and III with OH&P)				36825		1546		756.25		19971	$58,500
IV. Final D & D Report	1	LT	0.00	0			800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								152.00	70.00	10640	
2. Engineering Inspection (Title III)								64.00	40.00	2560	

(1) Includes stake truck, storage containers, barricade and vacuum equipment.

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 22.1 - Tritium Test Loop, CSTF (Bldg. 9201-3 at Y-12)

Sheet 3 of 3
Prepared by BWH 7/11/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
V. Engineering and Management (Cont.)											
3. Project Management								120.00	40.00	4800	
4. Health and Safety								120.00	40.00	4800	
SUBTOTAL (V)											$22,800
VI. ORNL Overhead											$46,400
SUBTOTAL I thru VI											$187,100
CONTINGENCY											$55,900
TOTAL											$243,000

FACILITY 23.1

23.1 Storage Tank (9201-3) Y-12

The following decommissioning alternatives were considered for this facility:

- Decontamination
- Protective Storage
- Total Dismantlement and Disposal

The decommissioning alternative selected for this facility is total dismantlement and disposal. This alternative involves dismantling the tank for disposal. Pipes and valves attached to the tank would be removed using appropriate cutting techniques. Because of the limited access to the room, the equipment would be cut into pieces small enough to be removed through the existing ladder access. The tank would then be sectioned into appropriate sized pieces for removal. The wastes would be disposed in an appropriate waste disposal facility.

The structure of the estimate allows it to be appropriately scaled as accurate site characterization data become available. For cost estimating purposes, the following assumptions were made:

- The 3,000-gallon tank is completely empty.
- Piping connected to the tank is clean.

The total estimated cost and time duration for this facility is $428,000 and 111 workdays. The following description is of the decommissioning activities. The schedule, cost summary, and detailed cost breakdown are provided at the end of the description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Dismantlement and Packaging
- Transportation and Disposal
- Site Cleanup and Demobilization

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. Prior to any decommissioning activities an initial radiation survey will be taken of the mezzanine. The grid pattern for the survey will be developed by using the statistical method described in Appendix A. Appropriate safety/emergency facilities will be provided accordingly. The facility will be monitored during demolition to document the conditions.

Site Preparation. Preparation of the site will consist of isolating the mezzanine for dust particle containment. The access door to the mezzanine must be removed to maximize workspace. A temporary door must be used to cover the door opening when tank sections are not being moved through it. A temporary tent must also be built to contain particles generated by the cutting of the tank.

Due to the cutting of the glass lined tank, the necessary ventilation (filtration) apparatus will be provided to maintain acceptable air levels within the mezzanine. Personnel respirators, protective clothing, and protective eye gear will also be provided to the workforce operating the cutters and bagging the tank sections.

Electrical and water lines outside the access door will be shut-off and disconnected to provide lift access. A scaffold will be erected at the access door to support tank sections until they are lowered to the floor.

Dismantlement and Packaging. The mixer/settler tank and stand lines will be removed and capped within the mezzanine. The tank and stand will be removed and packaged for disposal. The storage tank is approximately 7 ft x 10 ft and the access door through which the tank pieces will be removed is approximately 5 ft x 2 ft. The tank will be cut lengthwise, as a trough, then sliced radially into 1-1/2-foot sections which will then be cut in half and bagged. These bagged pieces will be lowered out of the mezzanine one at a time. The tank manhole cover will be cut from the tank and bagged separately.

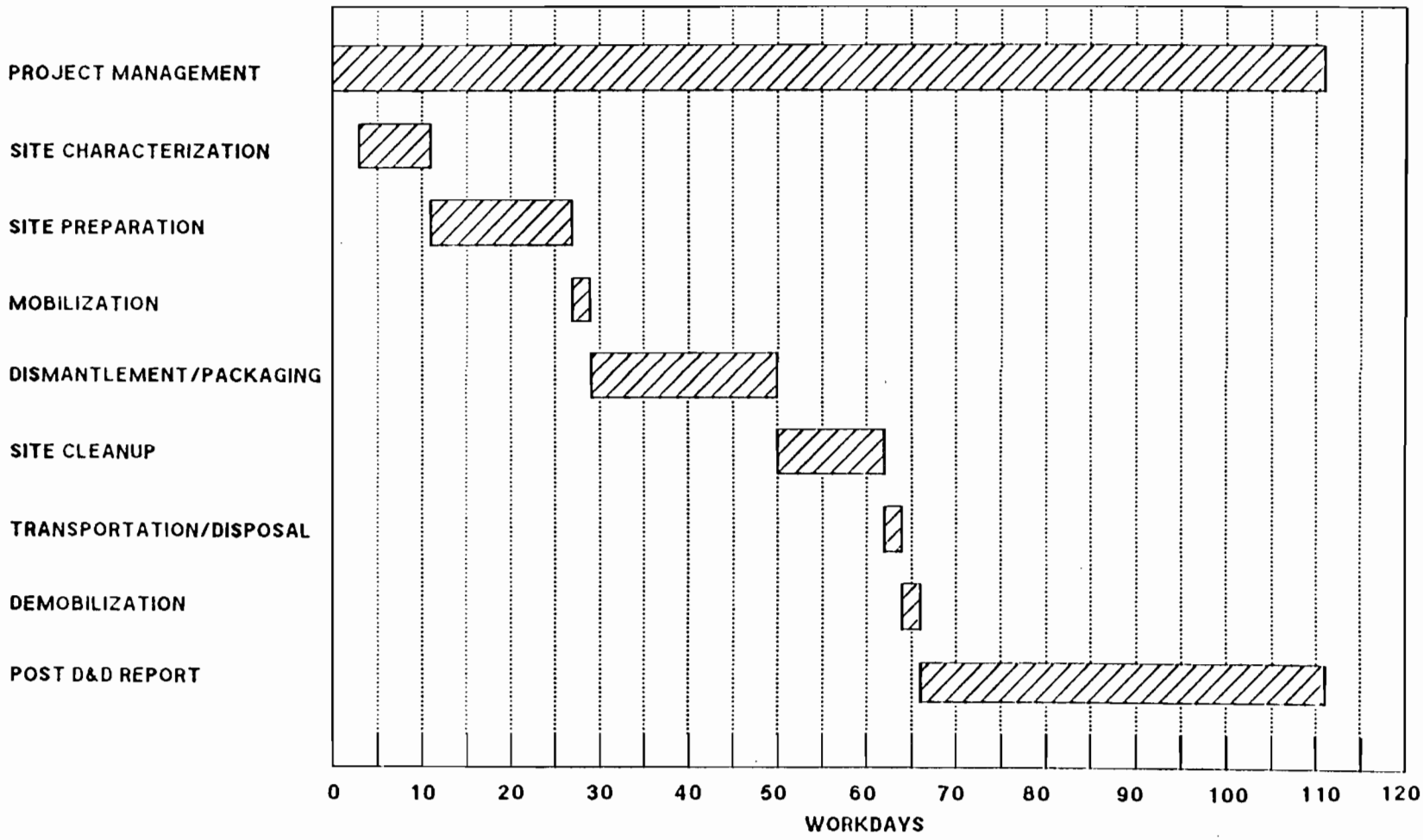
Transportation and Disposal. The bagged tank sections will be loaded into an appropriate shipping crate. The pieces will be packed in vermiculite and transported to an appropriate ORNL disposal site.

Site Cleanup and Demobilization. The mixer and metal stand will be returned to their original mountings and all piping to the mixer reconnected. Piping which led to the tank will be capped off per ORNL specification. The sheeting will be removed and disposed of properly. Electrical and water lines are to be reconnected and the scaffold taken down. The room filtration apparatus will be removed and the access door will be rehung.

Post D&D Report. A detailed decontamination and decommissioning (D&D report will be developed and issued to DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the dismantlement and disposal operations, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	23.1 Storage Tank Bldg. 9201-3)
Solid Low Level	730 cubic ft
Liquid Low Level	_____ gal
CH-TRU	_____ cubic yd
RH-TRU	_____ cubic yd
Contaminated Soil	_____ cubic yd
Uncontaminated Soil	_____ cubic yd
Hazardous Chemical	_____ lb
Mixed	_____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	_____ cubic yd
Sanitary Landfill	_____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 23.1
Storage Tank (9201-3)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 23.1 - Storage Tank (Bldg. 9201-3 at Y-12)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$9,200
II. Site Preparation	$35,300	
III. Decommissioning Operations		
Mobilization	$1,000	
Dismantlement and Packaging	$27,100	
Site Clean-up and Restoration	$10,800	
Transportation and Waste Disposal	$29,400	
Demobilization	$1,000	
Subtotal III	$69,300	
Subtotal II & III	$104,600	
Overhead and Profit (OH&P)	$35,800	
Total II & III		$140,400
IV. Final D & D Report		$56,000
V. Engineering and Management		$42,100
VI. ORNL Overhead		$81,700
Subtotal I thru VI		$329,400
Contingency		$98,600
Total		$428,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 23.1 - Storage Tank (Bldg. 9201-3 at Y-12)

Sheet 1 of 3
Prepared by GSD 9/19/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Radiation Survey, Grid Set-up	2	TECH					12.000	24.00	45.00	1080	
	1	HP					12.000	12.00	45.00	540	
2. Radiation Survey, Walkover	2	TECH					12.000	24.00	45.00	1080	
	1	HP					12.000	12.00	45.00	540	
3. Data Analysis	1	ENGR					8.000	8.00	70.00	560	
4. Monitor During Demolition	1	HP					120.000	120.00	45.00	5400	
SUBTOTAL (I)								200.00		9200	$9,200
II. Site Preparation											
1. Prework Training	1	LT	0.00	0			24.000	24.00	20.91	502	
2. Mezzanine Isolation Tent	2800	SF	2.50	7000			0.100	280.00	19.03	5328	
3. Outside Isolation Tent	4000	SF	2.50	10000			0.100	400.00	19.03	7612	
4. Remove Access Door	1	EA	0.00	0			2.000	2.00	20.55	41	
5. Remove Electrical Conduit and Wiring	1	LT	0.00	0			16.000	16.00	22.65	362	
6. Remove Water Lines	1	LT	0.00	0			16.000	16.00	23.30	373	
7. Build Scaffold to Access Door	1	LT	0.00	0			24.000	24.00	19.06	457	
8. Disconnect Piping to Mixer	1	LT	0.00	0			8.000	8.00	23.30	186	
9. Connect Ventilation and Filtration System	1	LT	1500.00	1500	1600.00	1600	16.000	16.00	23.10	370	
SUBTOTAL				18500		1600		786.00		15231	$35,300
III. Decommissioning Operations											
1. Mobilization	1	LT	1000.00	1000							$1,000
2. Dismantlement and Packaging											
Dismantle Mixer	1	LT	0.00	0			10.000	10.00	21.25	213	
Disconnect and Cap Piping to Tank	3	EA	5.00	15			4.000	12.00	23.30	280	
Cut Tank Mechanically (Grinder)	300	LF	0.00	0	1.20	360	2.500	750.00	23.30	17475	
Bag Tank Pieces	37	EA	10.00	370			4.000	148.00	16.10	2383	
Pack Tank Pieces In B-25 Container	5	EA	600.00	3000	100.00	500	16.000	80.00	16.10	1288	
Fill Voids in B-25 Containers with Vermiculite	300	CF	1.40	420			0.133	39.90	20.50	818	
SUBTOTAL				3805		860		1039.90		22457	$27,100

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 23.1 - Storage Tank (Bldg. 9201-3 at Y-12)

Sheet 2 of 3
Prepared by GSD 9/19/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Site Clean-up and Restoration											
Remove and Pack Isolation Tents	6800	SF	0.00	0			0.0800	544.00	19.03	10352	
Disconnect and Remove Ventilation System	1	LT	0.00	0			16.0000	16.00	23.10	370	
Rehang Access Door	1	EA	0.00	0			2.0000	2.00	20.55	41	
SUBTOTAL				0				562.00		10763	$10,800
4. Transportation and Disposal											
Load-out, Transport and Dispose of B-25 Containers	480	CF	40.00	19200	0.24	115					
Dispose of Tents	250	CF	40.00	10000	0.24	60					
SUBTOTAL				29200		175					$29,400
5. Demobilization	1	LT	1000.00	1000							$1,000
SUBTOTAL (II and III)				53505		2635		2387.90		48451	$104,600
Overhead & Profit				13376		659				21803	$35,800
SUBTOTAL (II & III with OH&P)				66881		3294		2387.90		70254	$140,400
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)										22100	
2. Engineering Inspection (Title III)										7400	
3. Project Management										8400	
4. Health and Safety										4200	
SUBTOTAL (V)											$42,100

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 23.1 - Storage Tank (Bldg. 9201-3 at Y-12)

Sheet 3 of 3
Prepared by GSD 9/19/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
VI. ORNL Overhead											$81,700
SUBTOTAL I thru VI											$329,400
CONTINGENCY											$98,600
TOTAL											$428,000

FACILITY 24.1

24.1 Contaminated Attic Area (9204-1) Y-12

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Decontamination, Repair, and Reuse

For this facility, the decommissioning alternative selected for further development is decontamination, repair, and reuse. This alternative involves decontaminating the attic. A protective plastic cover would be placed over any equipment or furniture to prevent the spread of contamination. The attic walls and roof would be hand cleaned as would the ducting, piping, and conduit contained in this area. The attic floor would be vacuumed and the entire area would then be surveyed and repainted. The protective plastic would be carefully disposed in an approved waste disposal facility.

The estimate is structured so it may be appropriately scaled when accurate site characterization data become available. The following assumptions were made for cost estimating purposes:

- The walls and ceiling are constructed of concrete.
- Total volume of waste is 600 cubic feet.
- Total area to be scraped and painted is 29,000 square feet.
- The paint is to be non lead-based.

The total estimated cost and time duration for this alternative is $356,000 and 196 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Decontamination
- Site Cleanup
- Waste Disposal

- Post D&D Report
- Mobilization and Demobilization

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. A radiation survey will be conducted over the entire site. Smear samples will be taken from hot spots identified in the radiation survey. The data collected in the characterization will be used to calculate personnel exposure rates. A walk-over survey will also be conducted during and after decommissioning operation to document the conditions.

Site Preparation. The floor of the site will be cleaned by vacuuming fallen paint chips. The chips will be packaged in plastic bags. A plastic cover will be placed on the floor of the facility to prevent the spread of contamination to the offices below the attic. Walk-boards will be placed on the floor of the site to support the weight of workmen and a four-foot scaffold.

Decontamination. The flaked and cracked paint attached to the walls and ceiling will be removed by manually scraping the wall and ceiling surfaces. At the end of each day the scraped paint chips will be vacuumed and packaged into plastic bags for transportation.

Site Cleanup. The facility will be repainted and the plastic cover shall be carefully removed and packaged in plastic bags. The scaffolding and walk-boards will be removed from the facility.

Waste Disposal. All plastic bags of paint flakes will be compacted, packaged in drums, and transported to an approved waste disposal facility.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to the DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the cleaning and

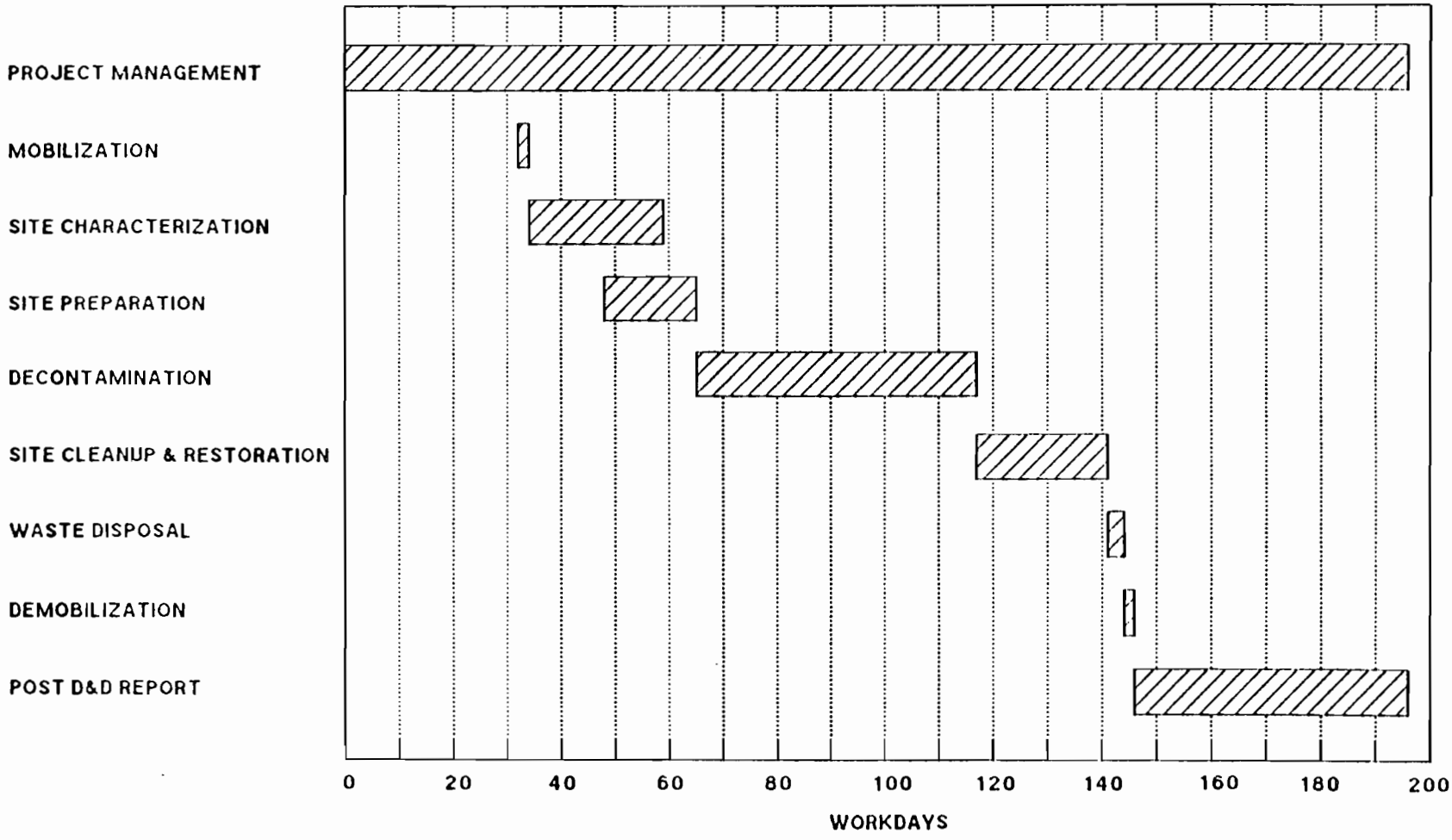
decontaminating operations, the total dollar and man-rem costs, and the project duration.

Mobilization and Demobilization. This work element consist of gathering and removing labor forces and necessary equipment to and from the site.

Waste Volume Estimates:	24.1 Contaminated Attic Area (Bldg. 9204-1)
Solid Low Level	1,032 cubic ft
Liquid Low Level	_____ gal
CH-TRU	_____ cubic yd
RH-TRU	_____ cubic yd
Contaminated Soil	_____ cubic yd
Uncontaminated Soil	_____ cubic yd
Hazardous Chemical	_____ lb
Mixed	_____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	_____ cubic yd
Sanitary Landfill	_____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 24.1

Attic (9204-1)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 24.1 - Contaminated Attic Area (Bldg. 9204-1 at Y-12)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$8,600
II. Site Preparation	$8,400	
III. Decommissioning Operations		
Decontamination	$11,500	
Site Clean-up and Restoration	$13,800	
Waste Disposal	$19,100	
Mobilization/Demobilization	$2,000	
Subtotal III	$46,400	
Subtotal II & III	$54,800	
Overhead and Profit (OH&P)	$18,700	
Total II & III		$73,500
IV. Final D & D Report		$56,000
V. Engineering and Management		$67,600
VI. ORNL Overhead		$67,900
Subtotal I thru VI		$273,600
Contingency		$82,400
Total		$356,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 24.1 - Contaminated Attic Area (Bldg. 9204-1 at Y-12)

Sheet 1 of 2
Prepared by BWH 7/10/87
Checked by BWH 9/17/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Initial Contamination Review	1	LT	0.00	0			32.000	32.00	24.40	781	
2. Review During Decontamination	1	LT	0.00	0			304.00	304.00	24.40	7418	
3. Final Contamination Review	1	LT	0.00	0			16.000	16.00	24.40	390	
SUBTOTAL (I)				0				352.00		8589	$8,600
II. Site Preparation											
1. Vacuum Clean-up of Existing Fallen Paint Chips	10000	SF	0.02	200			0.0058	56.00	12.80	717	
2. Package Fallen Paint Chips in Plastic Bags	1	LT	100.00	100			24.000	24.00	12.80	307	
3. Place Plastic Cover Over Attic Floor	10000	SF	0.043	430			0.0064	64.00	12.80	819	
4. Place Additional Walk-boards for Workmen and Scaffolding	600	SF	2.84	1704			0.097	58.20	19.00	1106	
5. Erect, Move As Required 4' High Scaffolding	1	LT	300.00	300			144.000	144.00	19.00	2736	
SUBTOTAL (II)				2734				346.20		5685	$8,400
III. Decommissioning Operations											
1. Decontamination											
Hand Scrape Paint from Ceiling, Walls, Ducts, Piping, Conduit, etc.	29000	SF	0.01	145			0.0250	725.00	12.80	9280	
Vacuum Pick-up Chipped Paint Flakes Each Day	1	LT	450.00	450			56.000	56.00	12.80	717	
Bag Paint Flakes Daily	1	LT	300.00	300			48.000	48.00	12.80	614	
SUBTOTAL				895				829.00		10611	$11,500
2. Site Clean-up and Restoration											
Repaint All Scraped Surfaces	29000	SF	0.09	2610	0.11	3190	0.0100	290.00	20.00	5800	
Remove Scaffold Sets	1	LT	0.00	0			44.000	44.00	19.00	836	
Remove Excess Walk-boards	1	LT	0.00	0			36.000	36.00	19.00	684	
Remove, Package Plastic Cover for Disposal	10000	SF	0.015	150			0.0040	40.00	12.80	512	
SUBTOTAL				2760		3190		410.00		7832	$13,800

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 24.1 - Contaminated Attic Area (Bldg. 9204-1 at Y-12)

Sheet 2 of 2
Prepared by BWH 7/10/87
Checked by BWH 9/17/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Waste Disposal											
Compact All Plastic Bags of Paint Flakes	600	CF	0.25	150			0.015	9.00	12.80	115	
Load-out, Transport and Dispose of Contaminated Waste	16	CY	1120.00	17920			3.850	61.60	14.50	893	
SUBTOTAL				18070				70.60		1008	$19,100
4. Mobilization/Demobilization (1)	1	LT	2000.00	2000							$2,000
SUBTOTAL (II and III)				26459		3190		1655.80		25136	$54,800
Overhead & Profit				6615		798				11311	$18,700
SUBTOTAL (II and III with OH&P)				33074		3988		1655.80		36447	$73,500
IV. Final D & D Report	1	LT	0.00	0			800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)								504.00	70.00	35280	
2. Engineering Inspection (Title III)								104.00	40.00	4160	
3. Project Management								304.00	40.00	12160	
4. Health and Safety								400.00	40.00	16000	
SUBTOTAL (V)											$67,600
VI. ORNL Overhead											$67,900
SUBTOTAL I thru VI											$273,600
CONTINGENCY											$82,400
TOTAL											$356,000

(1) Includes paint equipment, compactor, scaffolding, and vacuum equipment.

FACILITY 25.1

25.1 East End Basement (9204-1) Y-12

The following decommissioning alternatives were considered for this facility:

- Protective Storage
- Entombment
- Excavation and Disposal
- Covering
- Decontamination

The decommissioning alternative selected for this facility is decontamination. This alternative would involve excavating and disposing the contaminated soil. The excavated area would be backfilled with clean material, hand leveled.

The structure of the estimate allows it to be appropriately scaled once accurate site characterization data become available. For cost estimating purposes, the following assumptions were made:

- The soil will be excavated to a depth of 1 ft.
- 212 DOT-approved 55-gallon steel drums will be used.
- Total volume of clean material to be backfilled is 1,560 cubic feet with a swell allowance of 20 percent.

The total estimated cost and time duration for this facility is $395,000 and 112 workdays. The following description is of the decommissioning activities for this facility. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are discussed below:

- Project Management
- Site Characterization
- Site Preparation
- Excavation and Packaging
- Transportation and Disposal
- Site Cleanup and Restoration
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. A field walk-over radiation survey will be performed over the area to identify hot spots. The survey shall be followed by a soil sampling program. Ten percent of the grid intersections will be used as sampling locations. Two samples will be used for "absolute" analysis. The site characterization will confirm existing data and determine worker radiation protection requirements.

Site Preparation. Following the site characterization, the area to be excavated will be isolated with movable barricades. The transportation pathway out of the building will be clearly marked and entrance ways opening to the building will be sealed. Workers will undergo pre-work training to reduce exposure time.

Excavation and Packaging. Laborers, wearing appropriate protective clothing, will manually excavate and package the contaminated soil. The soil will be packaged in DOT-approved 55-gallon drums. An ORNL health physicist will continuously monitor the soil being excavated for beta-gamma and alpha radiation. The drums will be palletized and banded, and loaded onto trucks for disposal.

Transportation and Disposal. Before being transported, the drums will be checked for radiation by an ORNL health physicist. The waste will then be transported to the X-10 solid low level waste storage facility.

Site Cleanup and Restoration. After decommissioning activities have been completed, clean soil will be used to fill and level the site.

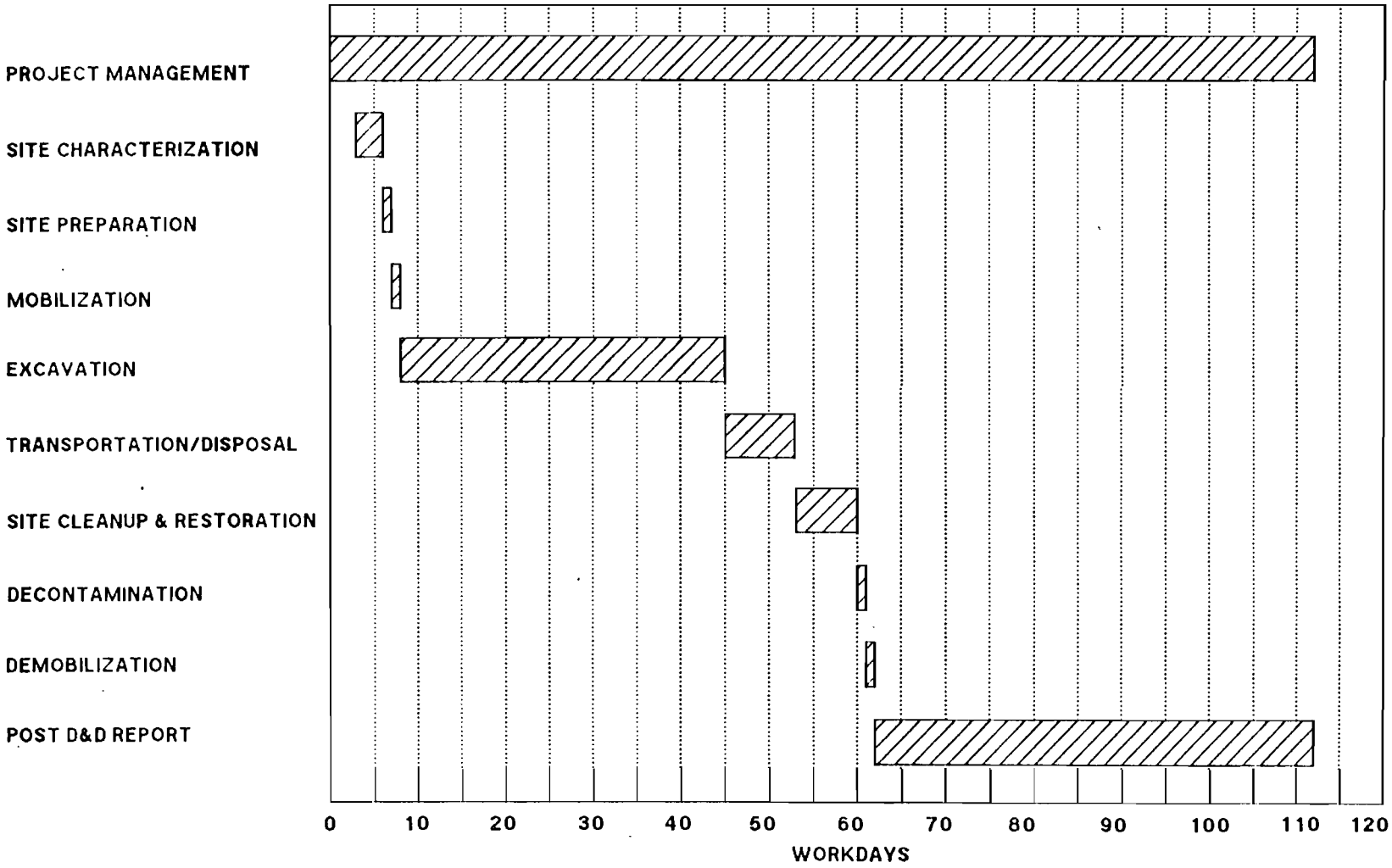
Mobilization and Demobilization. This work element consists of gathering and removing labor forces and necessary equipment to and from the site.

Post D & D Characterization. A detailed decontamination and decommissioning (D&D) report will be developed and issued to DOE. This report will include a

detailed description of the project, the pre- and post-D&D conditions, the sampling results, the excavating operation, waste transportation and disposal, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	25.1 East End Basement (Bldg. 9204-1)
Solid Low Level	1,560 cubic ft
Liquid Low Level	_____ gal
CH-TRU	_____ cubic yd
RH-TRU	_____ cubic yd
Contaminated Soil	_____ cubic yd
Uncontaminated Soil	_____ cubic yd
Hazardous Chemical	_____ lb
Mixed	_____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	_____ cubic yd
Sanitary Landfill	_____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 25.1
East End Basement (9204-1)



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 25.1 - East End Basement (Bldg. 9204-1)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$10,400
II. Site Preparation	$400	
III. Decommissioning Operations		
Mobilization	$10,400	
Excavation	$19,900	
Waste Transportation	$1,200	
Waste Disposal	$62,400	
Site Clean-up and Restoration	$2,400	
Equipment Decontamination	$300	
Demobilization	$500	
Subtotal III	$97,100	
Subtotal II & III	$97,500	
Overhead and Profit (OH&P)	$27,000	
Total II & III		$124,500
IV. Final D & D Report		$56,000
V. Engineering and Management		$37,300
VI. ORNL Overhead		$75,300
Subtotal I thru VI		$303,500
Contingency		$91,500
Total		$395,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 25.1 - East End Basement (Bldg. 9204-1)

Sheet 1 of 3
Prepared by KDC 9/18/87
Checked by BWH 9/18/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Radiation Survey: Grid Set Up,	2	TECH					8.000	16.00	45.00	720	
Survey and Measure (Walk Over)	1	HP					8.000	8.00	45.00	360	
2. Data Collection	2	TECH					8.000	16.00	45.00	720	
	1	HP					8.000	8.00	45.00	360	
3. Data Analysis	1	ENGR					8.000	8.00	70.00	560	
4. Drive Tube Samples (10% of Grid Intersections)	6	EA					2.000	12.00	45.00	540	
5. Lab Analysis (Spot)	6	EA	350.00	2100							
6. Lab Analysis (Absolute)	2	EA	2500.00	5000							
SUBTOTAL (I)				7100				68.00		3260	$10,400
II. Site Preparation											
1. Isolate Construction Area with Movable Barricades, Flagging & Appropriate Signs	1	LT	250.00	250			8.000	8.00	16.10	129	$400
III. Decommissioning Operations											
1. Mobilization	1	LT	500.00	500							
Drum Loading Chute	1	MO	0.00	0	80.00	80					
Vibrator Drum Loader/Compactor	1	MO	0.00	0	800.00	800					
Fork Lift with Drum Attachment	1	MO	0.00	0	1400.00	1400					
10 Ton Flat Bed Truck	1	MO	0.00	0	1725.00	1725					
Georgia Buggie 2/3 CY Gas-Powered	1	MO	0.00	0	630.00	630					
12 CY Dump Truck	1	MO	0.00	0	1725.00	1725					
1.5 Backhoe/Loader	1	MO	0.00	0	3500.00	3500					
SUBTOTAL				500		9860					$10,400
2. Excavation											
Hand Excavate (Air Spade and Shove	58	CY	0.00	0			2.000	116.00	16.10	1868	
Drum and Compact	212	DRM	45.00	9540			2.000	424.00	16.10	6826	
Palletize and Band Drums(4/Pallet)	53	EA	15.50	822			1.000	53.00	16.10	853	
SUBTOTAL				10362						9547	$19,900

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 25.1 - East End Basement (Bldg. 9204-1)

Sheet 2 of 3
Prepared by KDC 9/18/87
Checked by BWH 9/18/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
3. Waste Transportation											
Load Pallets on Truck (Fork Lift to Crane Bay, Bldg. Crane to Truck)	53	EA	0.00	0			0.750	39.75	20.75	825	
Haul to X-10 LLW Solid Waste Area (10 pal./truck, 20 mi. rt.)	6	TRIP	0.00	0			4.000	24.00	16.95	407	
Unload at Storage Site (Part of of Storage Fee)											
SUBTOTAL				0				63.75		1232	$1,200
4. Waste Disposal											
LLW Burial Fee	1560	CF	40.00	62400							$62,400
5. Site Clean-up and Restoration											
Select Clay Fill, End Loader and Dump Truck to Bldg.	58	CY	6.50	377			0.047	2.73	62.05	169	
Transport Via Georgia Buggies To Excavated Area	58	CY	0.00	0			1.000	58.00	16.10	934	
Spread and Hand Tamp	58	CY	0.00	0			1.000	58.00	16.10	934	
SUBTOTAL				377				118.73		2037	$2,400
6. Equipment Decontamination	1	LT								300	$300
7. Demobilization	1	LT	500.00	500							$500
SUBTOTAL (II and III)				74389		9860		190.48		13245	$97,500
Overhead & Profit				18597		2465				5960	$27,000
SUBTOTAL (II & III with OH&P)				92986		12325		190.48		19205	$124,500
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 25.1 - East End Basement (Bldg. 9204-1)

Sheet 3 of 3
Prepared by KDC 9/18/87
Checked by BWH 9/18/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
V. Engineering and Management											
1. Engineering Design (Title I & II)										19600	
2. Engineering Inspection (Title III)										6500	
3. Project Management										7500	
4. Health and Safety										3700	
SUBTOTAL (V)											$37,300
VI. ORNL Overhead											$75,300
SUBTOTAL I thru VI											$303,500
CONTINGENCY											$91,500
TOTAL											$395,000

FACILITY 26.1

26.1 Decontamination Facility (9419-1) Y-12

The following decommissioning alternatives were considered for this facility:

- o Protective Storage
- o Dismantlement and Disposal

The decommissioning alternative selected is complete disposal. This alternative involves the complete dismantlement of the building including the concrete pad. After a complete radiological survey, equipment inside the building would be segregated into clean and contaminated materials. The clean material would be disposed of in the contractors' landfill and the contaminated material packaged in approved containers and transported to an approved waste disposal facility. The building would be dismantled and disposed of in the contractors' landfill, if uncontaminated. The concrete pad would be dismantled by conventional demolition techniques, such as backhoe mounted rams, rocksplitters, demolition compounds and sawing. The concrete would be disposed of in an appropriate waste disposal facility. The drain line to the concrete pit would be capped at the building intersection. The resulting void due to decommissioning activities would be filled with clean materials, graded and re-seeded.

The estimate is structured so it may be appropriately scaled as accurate site characterization data become available. Once the building is decontaminated and the site characterization, radiation survey is taken, the building can either be returned to active service or it can be completely disposed. The estimate considers disposal.

The total estimated cost and time duration to dismantle this facility is $235,000 and 111 workdays. The following description is of the decommissioning activities. The schedule, cost summary, and detailed cost breakdown are provided at the end of this description.

The major elements of this alternative are described below:

- Project Management
- Site Characterization
- Site Preparation
- Segregation and Disposal
- Dismantlement of Building
- Transportation and Disposal
- Site Cleanup and Restoration
- Mobilization and Demobilization
- Post D&D Report

Project Management. This work element includes project planning and management, procedure development, acquisition of permits, coordinating with other plant operations, and general administrative duties. It also includes engineering functions and health and safety support.

Site Characterization. Prior to characterization the building interior will be cleaned with a high pressure detergent, hot water, steam cleaner. Water will drain to a pit located outside the building. The liquid will be disposed of as low level waste. A field walk-over radiation survey will be made of the facility. The survey will follow a grid pattern which was developed by using the statistical method discussed in Appendix A. Ten swipe samples and 10 spot samples will be taken from the area. One sample will be used for absolute analysis.

Site Preparation. After characterization of the site, the perimeter of the decommissioning area will be barricaded and marked with appropriate warning signs. The location of any underground utilities on the site shall be determined and overhead electrical lines shall be relocated as necessary. Workers will undergo pre-work training. Due to the current dirty conditions dust will be removed via vacuum cleaner. Hot spots identified in the radiological survey will be painted to affix transferable radiation.

Segregation and Disposal. Material stored in the building will be classified as clean or contaminated. The clean material will be placed on trucks for transportation, and contaminated material will be appropriately packaged and loaded onto a truck for transportation.

Dismantlement of Building. The corrugated roof and siding, wood roof trusses, monorail hoist, monorail, and steel support structure will be removed and transported to K-25 surplus. All piping and electrical wiring, roof ventilation and exhaust systems will be removed and will also be transported to K-25. The floor slabs will be cut and transported to contractors' landfill.

Transportation and Disposal. All noncontaminated material will be transported to the contractors' landfill for disposal, and all contaminated material will be transported to an approved waste storage facility.

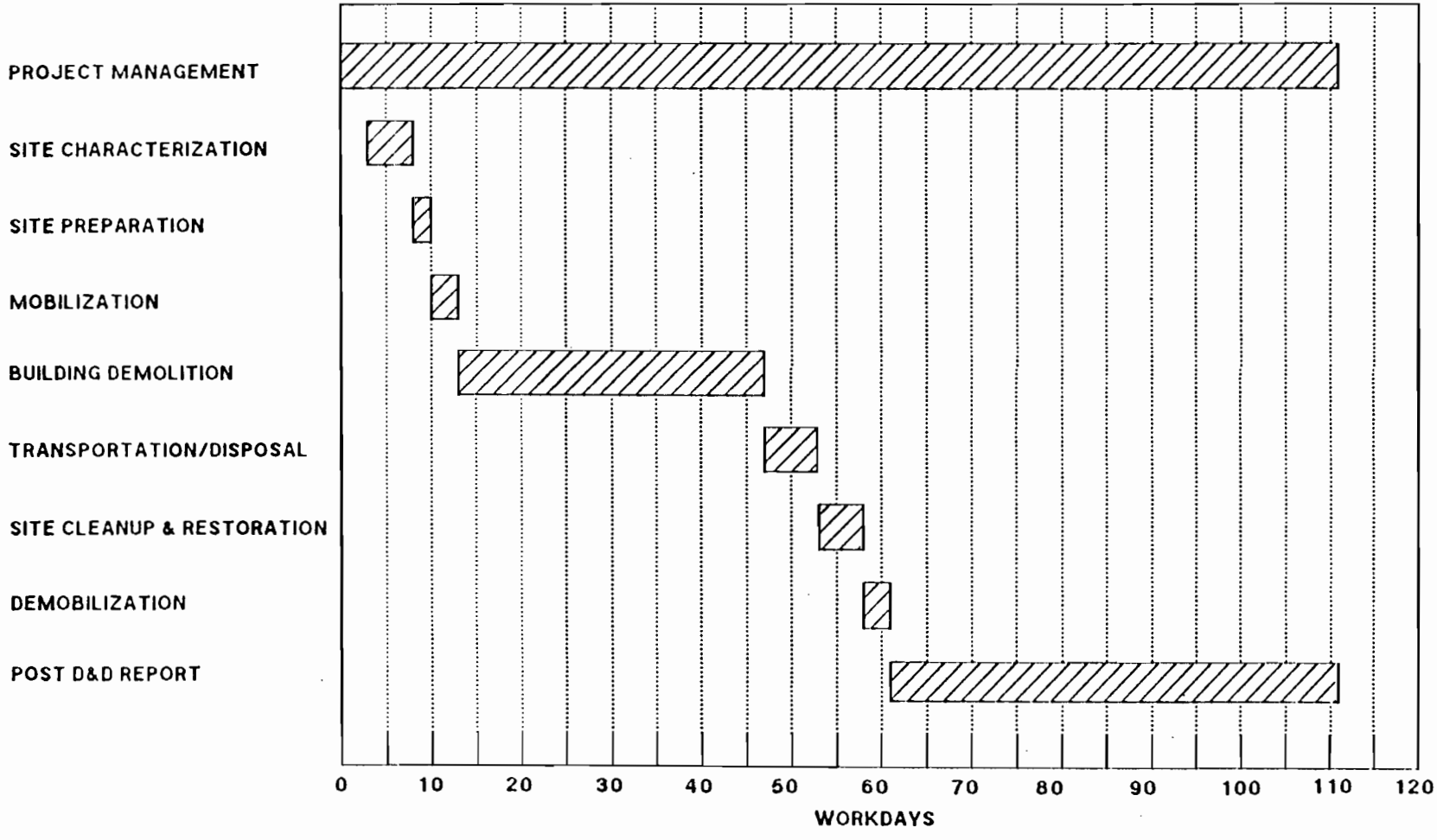
Site Cleanup and Restoration. After demolition and disposal of the concrete pad, the excavation will be backfilled with clean fill, graded and seeded.

Mobilization and Demobilization. This work element consists of gathering and removing labor forces and equipment to and from the site.

Post D&D Report. A detailed decontamination and decommissioning (D&D) report will be developed and issued to DOE. This report will include a detailed description of the project, the pre- and post-D&D conditions, the cleaning and decontaminating operations, the total dollar and man-rem costs, and the project duration.

Waste Volume Estimates:	26.1 Decontamination Facility (Bldg. 9419-1)
Solid Low Level	_____ cubic ft
Liquid Low Level	11,030 gal
CH-TRU	_____ cubic yd
RH-TRU	_____ cubic yd
Contaminated Soil	_____ cubic yd
Uncontaminated Soil	_____ cubic yd
Hazardous Chemical	_____ lb
Mixed	_____ drums (7.35 cubic ft)
Landfilled Waste	
Contractors' Landfill	_____ cubic yd
Sanitary Landfill	_____ cubic yd

SCHEDULE FOR SURPLUS FACILITY 26.1
Decontamination Facility (9419-1) Y-12



ASI COST ESTIMATE SUMMARY

Decommissioning Conceptual Estimate
for
Facility 26.1 - Decontamination Facility (Bldg. 9419-1)

DESCRIPTION	COST	TOTAL
I. Site Characterization		$22,000
II. Site Preparation	$500	
III. Decommissioning Operations		
Mobilization	$14,600	
Building Demolition	$14,800	
Site Clean-up and Restoration	$1,800	
Demobilization	$1,500	
Subtotal III	$32,700	
Subtotal II & III	$33,200	
Overhead and Profit (OH&P)	$11,200	
Total II & III		$44,400
		$56,000
IV. Final D & D Report		
V. Engineering and Management		$13,300
VI. ORNL Overhead		$44,800
Subtotal I thru VI		$180,500
Contingency		$54,500
Total		$235,000

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 26.1 - Decontamination Facility (Bldg. 9419-1)

Sheet 1 of 3
Prepared by KDC 9/18/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
I. Site Characterization											
1. Prior to characterization, building interior is to be cleaned with a high pressure detergent, steam (hot water) cleaner. Water will gravity drain to outside pit.	5515	SF	0.15	827			0.016	88.24	45.00	3971	
Dispose of liquid as process, radioactive waste and plug drain at curtain wall.	11030	GAL	0.85	9376							
2. Radiation Survey, Walk thru, Grid	2	TECH					8.000	16.00	45.00	720	
Set-up and Data Collection	1	HP					8.000	8.00	45.00	360	
3. Data Analysis	1	ENGR					8.000	8.00	70.00	560	
4. Collect Swipe Samples	10	EA	0.00	0			0.500	5.00	45.00	225	
5. Lab Analysis (Spot)	10	EA	350.00	3500							
6. Lab Analysis (Absolute)	1	EA	2500.00	2500							
SUBTOTAL (I)				16203				125.24		5836	$22,000
II. Site Preparation											
1. Isolate Construction Area with Movable Barricades, Flagging & Appropriate Signs	1	LT	250.00	250			16.000	16.00	16.10	258	$500
III. Decommissioning Operations											
1. Mobilization	1	LT	1500.00	1500							
25 Ton Motor Crane	1	MO	0.00	0	4590.00	4590					
10 Ton Flatbed Truck	1	MO	0.00	0	3315.00	3315					
1.5 CY Backhoe/Loader	1	MO	0.00	0	3500.00	3500					
12 CY Dump Truck	1	MO	0.00	0	1725.00	1725					
SUBTOTAL				1500		13130					$14,600
2. Building Demolition											
Remove Corrigated Transite Roof and Siding, Transport to K-25 Surplus Sales (1)	4350	SF	0.00	0			0.029	126.15	16.10	2031	
Remove Wood Roof Trusses, Transport to K-25 Surplus Sales	25	EA	0.00	0			2.000	50.00	20.55	1028	
Remove Fiberglass Panels from Inside Face of Col., Transport to K-25	1800	SF	0.00	0			0.025	45.00	19.60	882	

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 26.1 - Decontamination Facility (Bldg. 9419-1)

Sheet 2 of 3
Prepared by KDC 9/18/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
III. Decommissioning Operations (Cont.)											
2. Building Demolition (Cont.)											
Remove Wood Framing (6'x 6'x 20') on 4' Centers, Transport to K-25	700	LF	0.00	0			0.040	28.00	20.55	575	
Remove Monorail Hoist, Monorail and Steel Support Structure and Transport to K-25 Surplus Sales	1	LT	0.00	0			32.000	32.00	22.10	707	
Remove Change House Fixtures, WC, Urinal, Lavatory, Safety Shower and Water Heater Including Piping Transport to K-25 Surplus Sales	1	LT	0.00	0			40.000	40.00	23.30	932	
Remove Lights and Recpt. Including Conduit, Transport to K-25	1	LT	0.00	0			32.000	32.00	22.65	725	
Remove Roof Ventilator and Exhaust Systems, Transport to K-25	1	LT	0.00	0			24.000	24.00	23.10	554	
Saw Cut Floor Slab Into 4'x 12.5' Slabs, Transport to Contractors' Landfill (Approx. 25 slabs)	325	LF	5.76	1872			0.630	204.75	18.45	3778	
Hauling from Y-12 to K-25	20	TRIP	2.40	48			4.000	80.00	16.95	1356	
Hauling from Y-12 to Contractors' Landfill	10	TRIP	1.20	12			2.000	20.00	16.95	339	
SUBTOTAL				1932				681.90		12907	$14,800
3. Site Clean-up and Restoration											
Remove Barricades, Signs & Flagging	1	LT	0.00	0			16.000	16.00	16.10	258	
Compacted Clay Fill	40	CY	6.40	256			0.782	31.28	16.10	504	
Topsoil	18	CY	10.00	180			0.571	10.28	16.10	165	
Fertilize, Seed and Mulch	417	SY	0.15	63			0.048	20.02	17.01	340	
SUBTOTAL				499				77.57		1267	$1,800
4. Demobilization	1	LT	1500.00	1500							$1,500
SUBTOTAL (II and III)				5681		13130		775.47		14432	$33,200
Overhead & Profit				1420		3283				6494	$11,200
SUBTOTAL (II & III with OH&P)				7101		16413		775.47		20926	$44,400

ASI CONCEPTUAL COST ESTIMATE

Project: ORNL 26 Site Decontamination & Decommissioning Study
Description: Facility 26.1 - Decontamination Facility (Bldg. 9419-1)

Sheet 3 of 3
Prepared by KDC 9/18/87
Checked by BWH 9/21/87

ITEM			MATERIAL		EQUIPMENT RENTAL		LABOR				TOTAL AMOUNT
Description	Qty	Unit	Unit Price	Amount	Unit Price	Amount	MH/Unit	Man-Hours	$/MH	Amount	
IV. Final D & D Report	1	LT	0.00	0	0.00	0	800.000	800.00	70.00	56000	$56,000
V. Engineering and Management											
1. Engineering Design (Title I & II)										7000	
2. Engineering Inspection (Title III)										2300	
3. Project Management										2700	
4. Health and Safety										1300	
SUBTOTAL (V)											$13,300
VI. ORNL Overhead											$44,800
SUBTOTAL I thru VI											$180,500
CONTINGENCY											$54,500
TOTAL											$235,000

APPENDIX

APPENDIX A

SITE CHARACTERIZATION METHODOLOGY

Appendix A describes the sampling protocol assumed for the various types of sites discussed in this report. The protocol is based on the statistical methodology described in the ORNL publication A Statistical Methodology for Radiological Surveying, IAEA-SM-299/103, June 1978. This publication presents guidelines for statistical sampling of indoor and outdoor areas of various dimensions. A minimum sample quantity of 30 is recommended and a preliminary survey should be done to formulate plans for an efficient, comprehensive survey.

For indoor areas, the grid block should be between 3 to 5 m on a side. For outdoor areas the survey block should measure from 5 to 15 m on a side. Variations of this suggested grid spacing will be assumed so a minimum sample size of 30 can be maintained for any specific area.

1. Spill Sites and Line Leaks. For contamination emanating from a single point, a radiation survey will be conducted over a radial grid 32 feet in diameter, sectioned by 8 equally spaced spokes and 4 concentric circles spaced at 4-foot intervals. The total number of sample points equals 33. This radial distance (4 x 4 ft = 16 ft) is chosen for estimating reasons. For the spill and leak sites which are undefined, it was assumed that the contamination would be covered by a 25-foot-diameter hemisphere. Based on this assumption, sampling a 32-foot-diameter circle would define the contamination boundaries. For contamination from other than a point source or for those areas where the dimensions are known, a rectangular survey grid will be used. The grid dimensions will vary depending on the total area to be surveyed. The grid will consist of a minimum of 30 grid points with a maximum spacing of 50-foot intervals.

Soil and/or concrete core samples will be taken at each grid intersection. The depths of the core samples will be site dependent. For conceptual estimation where the soil depth and amount of leakage are unknown, it was assumed that core samples would be taken at the surface and at several

intermediate depths to a maximum depth of 12 1/2 feet.

Soil beneath buildings will be characterized in the same manner. The concrete floor of the buildings will be cored at the grid points to access the soil. The concrete will also be analyzed.

2. SWSAs. A survey grid will be laid out over the entire SWSA. This grid will extend 10 feet beyond the SWSA boundaries. The grid intervals over the SWSAs will be 50 feet.

3. White Oak Lake and Associated Waterways. Existing aerial radiation survey maps will be used for initial characterization of these waterways.

This initial characterization will define where sediment samples must be taken. For estimating purposes it has been assumed that 22 "hot spots" will require sampling (ten for White Oak Lake, ten for White Oak Creek, and 2 for White Oak Embayment).

4. Landfill Areas. Survey grids will be established over landfills using 10-foot intervals. These grids will also extend 10 feet beyond the landfill boundaries.

5. Pits and Trenches. Survey grids over these sites will be at 5-foot intervals. These grids will also extend 10 feet beyond the pit or trench boundary.

6. Wells. There are a number of well Plug and Abandonment (P&A) projects estimated in this report. By ORNL direction the estimates assume three samples will be analyzed from each well.

7. Impoundments. The impoundments in this report will have grout injection wells drilled at 5-foot intervals. In conformance with the guides described in the ORNL publication cited above, it is assumed that randomly selecting 30 of these wells for radionuclide sampling will adequately define the contamination in the impoundment sediment. It is further assumed that sample specimens will be taken at three depths from each of the 30 selected wells,

and the "hottest" of each group of 3 will be used for "absolute" radionuclide analysis.

8. Buildings. For all buildings involved in these decommissioning projects, radiation surveys will be conducted over walls, floors, and ceilings on 5-foot grids. Swipes will be taken from the surfaces of the building interior and also from the surfaces of any equipment in the building. An average of 30 swipes will be taken for each building area.

9. Trees. A radiation survey of the Cesium Forest floor will be conducted over a 10-foot grid pattern which will extend 10 feet beyond the site boundary. Tree coring will be conducted on the 30 injected trees with three corings per tree. Trees removed from other contaminated sites will also be cored for radiological analysis.