ENGINEERING CHANGE NOTICE

Page 1 of 2

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19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐	Tickler File	☐
Environmental Report	☐	Inspection Plan	☐	NONE	☒
Environmental Permit	☐	Inventory Adjustment Request	☐		☐

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Cog. Mgr.	MJ SUTEY	Mj Sutey	9/25/01	QA		
QA	JF BORES	JF Bores	9/25/01	Safety		
Safety	N/A			Design		
Environ.	N/A			Environ.		
Other	WT THOMPSON	W.T. Thompson	9/25/01	Other		
	RC WILSON	RC Wilson	9/25/01			

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ADDITIONAL

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PRELIMINARY ENGINEERING REPORT FOR THE 241-S-112 RETRIEVAL SYSTEM

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U.S. Department of Energy Contract DE-AC27-99RL14047

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Abstract: This report provides a programmatic planning basis for the S-112 full-scale demonstration of in-tank dissolution and retrieval of waste. The retrieval method is defined, as is the infrastructure and process equipment. The fact that the project, as currently scoped, is predominately based on SSCs utilized in the Interim Stabilization Project is described. The current TPA schedule is also described. TPC is also estimated.

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PRELIMINARY ENGINEERING REPORT FOR THE 241-S-112 RETRIEVAL SYSTEM

RPP-7526, Revision 1

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EXECUTIVE SUMMARY

This Preliminary Engineering Report provides a programmatic planning basis for the proposed full-scale demonstration testing of in-tank dissolution and subsequent recovery of saltcake waste from Hanford's Single-Shell Tank 241-S-112. The results of this demonstration will provide valuable data to support the development of production-level dissolution retrieval systems that can be deployed to recover the contents from other saltcake single-shell tanks. The Hanford Federal Facility Agreement and Consent Order, a.k.a. the Tri-Party Agreement, establishes milestones for life-cycle activities required to complete a full-scale saltcake waste retrieval technology demonstration in 241-S-112. The technical, cost and schedule information presented in this report are specific to 241-S-112; however, much of the information could also be directly applied to other saltcake single-shell tanks.

The retrieval method selected for the 241-S-112 demonstration introduces water into the tank in a controlled manner using dispersion nozzles to promote dissolution of the soluble waste salts. The resulting waste solution can then be readily pumped from the single-shell tank to a more reliable double-shell tank. Studies have identified this approach as a viable technique to effectively recover soluble waste types. Dissolution retrieval has the potential to cost effectively recover a significant portion of the current Hanford single-shell tank waste inventory, thereby reducing the risk of further contamination of the Hanford soil column, groundwater, and Columbia River.

The infrastructure, process equipment, and manpower required to deploy and operate the retrieval system is relatively modest when compared to other baseline SST retrieval methods (e.g., sluicing). The system is predominantly based on the systems, structures, and components utilized by the Interim Stabilization Project. A temporary water distribution system will be provided to allow the addition of solvent (water) into 241-S-112. The pre-conceptual design configuration utilizes three symmetrically oriented sprinkler assemblies, installed through existing risers in the tank dome, to initiate and maintain the waste dissolution process. Equipment designs currently used to support saltwell pumping will be used, with minor modifications, to provide liquid retrieval systems for the dissolved waste solution and to pump it to the designated double-shell

tank receiver, 241-SY-102. Controls and interlocks will be provided to ensure proper coordination between the water distribution system and liquid retrieval system, as well as with other interfacing systems. The transfer pipeline system supporting the technology demonstration will utilize existing buried, encased transfer lines and pit jumpers, as well as temporary hose-in-hose transfer lines, to transport the pumped waste solution from 241-S-112 to 241-SY-102.

The rough-order-of-magnitude estimate of the Total Project Cost for this project, including activities beginning with initial project definition through hot operations and subsequent deactivation of the dissolution retrieval system, is approximately $21.1 million. The preliminary project schedule developed for this effort indicates that the saltcake dissolution retrieval systems can be deployed, tested, and operated to support the M-45-03C completion milestone of September 30, 2005. Additional efficiencies against this current baseline could be realized by integration of this project with Interim Stabilization. Tank S-112 is scheduled for saltwell pumping by the Interim Stabilization Project in November 2002 to meet the Tri-Party Agreement.

PRELIMINARY ENGINEERING REPORT FOR THE 241-S-112 RETRIEVAL SYSTEM

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ACRONYM LIST/TERMS AND DEFINITIONS

AB	Authorization Basis
ALARA	As Low As Reasonably Achievable
BATEA	Best Available Technology Economically Available
BBI	Best Basis Inventory
BM	Benchmark
CAM	Continuous Air Monitor
CCTV	Closed Circuit Television
cfm	cubic feet per minute
CGM	Combustible Gas Monitor
CHG	CH2MHill Hanford Group, Inc.
COC	Constituents of Concern
CY	Calendar Year
DCRT	Double Contained Receiver Tank
DOE	Department of Energy
DST	Double Shell Tank
F	Fahrenheit
FSAR	Final Safety Analysis Report
FY	Fiscal Year
gph	gallons per hour
gpm	gallons per minute
HTWOS	Hanford Tank Waste Operations Schedules
ILL	Interstitial Liquid Level
kVA	kilo-volt-amps
LDMM	Leak Detection, Monitoring, and Mitigation
LLCE	Long-Length Contaminated Equipment
LOW	Liquid Observation Well
LT	Level Transmitter
LVDG	Low Volume Density Gradient
mgal	million-gallons
MPS	Master Pump Shutdown
OGT	Over-Ground Transfer Line
PIC	Pumping Instrumentation and Control
PLC	Programmable Logic Controller
PNNL	Pacific Northwest National Laboratory
psi	pounds per square inch
RPP	River Protection Project
RRC	Retrieval Release Criterion
SHMS	Standard Hydrogen Monitoring System
SMP	Sludge Measurement Port
SpG	Specific Gravity
SPL	System Performance Limits
SSC	Systems, Structures, and Components
SST	Single Shell Tank
TLDR	Target Leak Detection Rate
TMACS	Tank Monitoring and Control System

TPA	Tri-Party Agreement
TT	Temperature Transmitter
VB	Volumetric Balance
VOC	Volatile Organic Compound
WAC	Washington Administrative Code
WBS	Work Breakdown Structure
WFD	Waste Feed Delivery
WRS	Waste Retrieval System

1.0 INTRODUCTION

1.1 MISSION

The River Protection Program (RPP) mission, as defined in HNF-SD-WM-MAR-008, *Tank Waste Remediation System Mission Analysis Report*, includes the retrieval, immobilization, storage, and disposal of Hanford Site tank waste. In order to immobilize the waste for subsequent storage and eventual disposal, both single-shell tank (SST) and double-shell tank (DST) wastes must be retrieved for processing. Because of concerns related to the liquid integrity of the older SSTs, waste from the SSTs will be retrieved and staged temporarily in the newer and more reliable DSTs. The current baseline reference technology for the retrieval of SST waste is "past practice sluicing." This technique has been used successfully at the Hanford Site to retrieve SST waste, and it is considered one of the primary tools available to support the programmatic objective of retrieving SST waste. However, sluicing is an expensive process, utilizing large volumes of water and a production that relies solely upon this technology establishes a prohibitive cost baseline for achieving the SST Retrieval Program objectives.

The SST Retrieval Program has initiated activities to identify and demonstrate, under actual field conditions, alternative retrieval technologies exhibiting the potential to support the RPP Waste Feed Delivery (WFD) requirements while reducing the overall cost for tank cleanup and closure activities. One of these initiatives focuses on retrieval of SST saltcake wastes. Dissolution based retrieval involves the addition of a solvent (water) to the contents of a saltcake tank to dissolve the soluble salts. The resulting waste solution can then be readily pumped from the SST and transferred to the DST system. This approach has the potential to recover a significant portion of the current Hanford Site SST waste inventory and Constituents of Concern (COC). The long-lived mobile radionuclides present in the Hanford Site SSTs pose a significant risk to the environment and, in particular, the groundwater and Columbia River. Recovery of these COCs would reduce the risk of further contamination of the Hanford Site soil column and groundwater, at a fraction of the cost that would be incurred using the baseline reference technology (i.e., sluicing).

A number of different saltcake dissolution retrieval methods have been considered in support of production-level retrieval of Hanford's SSTs (RPP-6821). One of the process methods selected by the SST Retrieval Program for further evaluation is the Low Volume Density Gradient (LVDG) method. The LVDG process introduces water into a SST containing saltcake waste at a controlled rate using a "sprinkler" type device that distributes water over the surface of the saltcake, thus promoting dissolution of the soluble waste constituents (HNF-3554). The resulting solution can then be pumped from the SST to a more reliable DST. The SST Retrieval Program has identified the LVDG method as the "benchmark" saltcake retrieval technology in its out-year planning. The program planning includes deployment of a temporary system to conduct full-scale demonstration testing of in-tank dissolution and subsequent recovery of saltcake waste from one of Hanford's SSTs using the LVDG method (RPP-8725). The results of this demonstration will provide valuable data to support the development of production-level

saltcake retrieval systems that can be deployed to recover waste from other SSTs. Tank selection activities conducted in FY 2000 have identified SST 241-S-112, located in the 200 West Area's S Tank Farm, as a suitable candidate for staging the saltcake dissolution retrieval demonstration.

1.2 PURPOSE

Renegotiation of the Tri-Party Agreement (TPA) M-45 series of milestones has slated 241-S-112 for a full-scale saltcake waste retrieval technology demonstration. Inclusion of 241-S-112 in the TPA milestones established the basis and need to proceed with the development of the 241-S-112 Retrieval Demonstration Project. The generation of this engineering report is intended to present a preliminary retrieval system design and operating concept and identify the activities and issues requiring resolution during latter design phases. The retrieval system development includes provisions to satisfy the following:

- RPP mission
- SST program mission
- WFD Functions and Requirements (F&Rs)
- Dissolution demonstration test objectives, and 241-S-112 F&Rs

Rough order of magnitude cost and schedule estimates are developed and included for the preliminary design concept to support the M-45 retrieval milestone activities and dates. These include additional development and validation activities required to reduce programmatic and technical uncertainty. Interfaces with other systems and projects have been identified and management methods proposed.

1.3 SCOPE

The Saltcake Retrieval Demonstration Project will provide temporary structures, systems and components (SSCs) as necessary to demonstrate dissolution retrieval of the saltcake waste from 241-S-112, and to transfer the dissolved waste to receiver 241-SY-102, in accordance with the applicable project requirements. The pre-conceptual planning presented in this report is based upon implementation of the LVDG dissolution retrieval methodology as discussed in Section 2.2 of this report. The main scope elements required to deploy and demonstrate the LVDG process include the following general systems:

- Tank S-112 Waste Retrieval System
- Water Distribution System
- S-Farm Waste Transfer System
- SY-Farm Waste Transfer System
- Inter-farm Transfer System

- Tank SY-102 Receiver Tank
- Instrumentation, Monitoring and Control System (including leak detection, monitoring, and mitigation)
- Other Utilities

The requirements basis and technical justification for the Saltcake Dissolution Retrieval Demonstration Project is provided in Tank S-112 Waste Retrieval Demonstration Level 2 Specification (RPP-7598). This document identifies the key system functions and associated technical requirements for the demonstration project. Furthermore, the preliminary retrieval system design shall function to satisfy the *Test Objectives for the Saltcake Dissolution Retrieval Demonstration* (RPP-7010) established by the SST retrieval program.

1.4 BACKGROUND

This section describes the initial (existing) conditions of 241-S-112, 241-SY-102, and the adjoining transfer lines. Numerous activities are either planned or ongoing in both the 241-S and 241-SY Tank Farms. As such, the precise configuration(s) is anticipated to change throughout the project lifecycle.

1.4.1 Existing 241-S-112 Configuration and Conditions

S Tank Farm was constructed between 1950 and 1951 and is located in the 200 West Area. Tank S-112 is the third tank in a cascade series of three tanks including 241-S-110 and 241-S-111.

Tank S-112 is constructed with a painted grout layer asphalt (waterproof) membrane and outer reinforced concrete shell to maintain the structural integrity of the steel liner by protecting it from soil loads. The reinforced concrete shell is cylindrical with a domed roof. The interior of the tank contains the steel liner that is constructed of mild steel. The steel liner extends up the tank wall to a height of approximately 25 feet providing a nominal operating capacity of 750,000 gallons.

Tank S-112 was removed from service in 1976 and declared inactive the same year. It is assumed sound and currently contains an estimated 523,000 total gallons of waste. An estimated 81,000 gallons of pumpable liquid remain (Best Basis Inventory [BBI]). The tank has been partially interim isolated, but awaits interim stabilization, scheduled for mid-FY 2002. Limited characterization data exists for this tank, with recent grab and core sampling completed in July 2001. Analytical sample results will be available in FY 2002. The long-lived mobile radionuclide constituents defined in the SST Retrieval Tank Sequencing Report (RPP-7087) are contained in Table 1-1. The breakdown by constituents are as reported in the BBI.

Table 1-1 Long Lived Mobile Radionuclides

Radionuclide	Curies
^{14}C	6.68E+01
^{79}Se	6.97E+00
^{99}Tc	4.76E+02
^{129}I	9.17E-01
^{238}U	1.08E+00*
TOTAL	5.52E+02

*8.12E-01 Curies of ^{238}U reported in RPP-7087

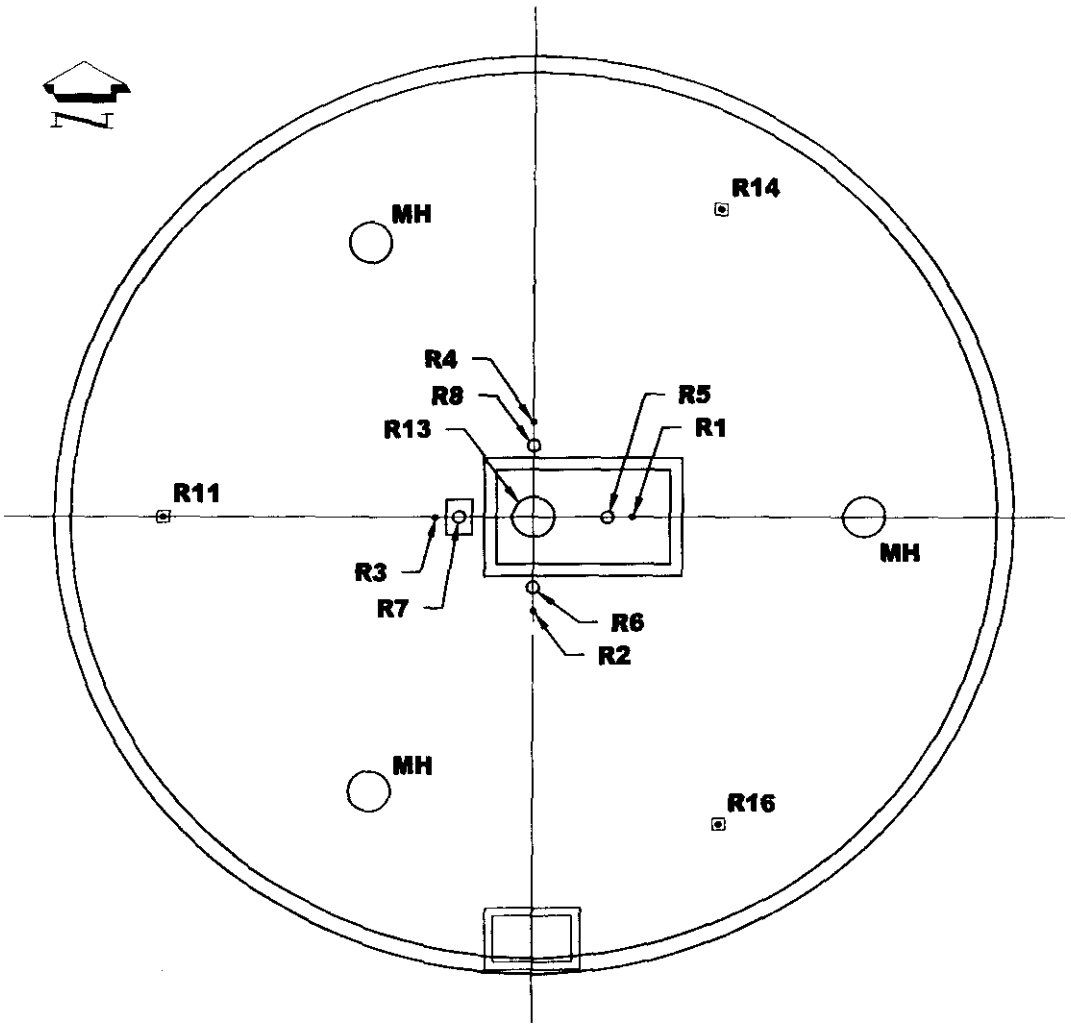
A single pit, 241-S-12A Pump Pit, located above the centerline of the tank provides a sub-surface, shielded, installation location for jumpers (temporary piping connections), pumps, and other equipment necessary to establish process piping/routing capabilities. The existing pit is constructed of reinforced concrete. The walls and floor are located below grade, and the pit is provided with a removable concrete cover located slightly above grade (663 feet above sea level).

Table 1-2, summarizes the current status of the risers in 241-S-112, and Figure 1-1 shows a plan view of the riser arrangement:

Table 1-2 Existing 241-S-112 Riser Utilization

Riser	Size	Utilization and Comments
1	4"	Connector Nozzle
2	4"	Blind Flange [BM CEO-36907, CEO-41066]
3	4"	Level Gage [ECN-620751]
4	4"	Temperature Probe
5	12"	Saltwell Screen and Pump (abandoned)
6	12"	B-222 Observation Port
7	12"	Blind Flange [ECN-706501]
8	12"	B-436 Liquid Observation Well
11	4"	SMP
13	42"	Saltwell Screen
14	4"	SHMS, Breather Filter [CEO-41066, ECN-W369-11]
16	4"	SMP [BM CEO-36907]
Condenser	12"	Not Used
MH	42"	Construction Man Holes

Figure 1-1: 241-S-112 Riser Layout



1.4.1.1 Pump Pit 241-S-12A

The 241-S-112 Waste Retrieval System (WRS) will interface with the existing S-12A Pump Pit shown in H-2-46197 (see also H-2-46418, Rev. 4, and H-2-73191, Rev. 5). Risers 1, 5, and 13 are in the 241-S-12A Pump Pit. Riser 5 has an old saltwell screen and pump, installed in July 1978, and Riser 13 contains the new saltwell screen, installed in October 2000. A new saltwell pump will be installed in Riser 13 near the time Interim Stabilization saltwell pumping is scheduled to begin (April 2002).

1.4.1.2 Electrical System

The power for 241-S Farm is primarily supplied from three 50 kilo-volt-amps (kVA) pole-mounted transformers (C68486P, C68487P, and C68488P). These three transformers supply power for several other loads, as well. CH2M Hill Hanford Group, Inc. (CHG) Equipment Engineering performed a field walk-down on August 9, 2000 to verify the identities and number of these loads, and the transformers appear to be heavily loaded (see calculation 4412-70-ECAL-001 in Appendix C).

1.4.1.3 Water System

Upgrades to provide a 241-S and 241-SX Farm raw water source were completed by the Interim Stabilization project in FY 2000. A temporary 1-½-inch water line runs above grade from 241-SY Farm due South over 241-S-101, 104, 107, and 110 before continuing on to 241-SX Farm (ECN 660754). A capped tee is located over 241-S-110 due East of the 241-S-12A Pump Pit that is unused and available.

1.4.1.4 Ventilation System

Tank S-112 is passively ventilated by means of a breather filter installed at Riser R14. Riser 14 is also connected to a SHMS cabinet that has been placed in isolation.

1.4.2 Existing 241-SY-102 Configuration and Conditions

Tank SY-102 is one of three DSTs located in the 200 West Area's SY Tank Farm. Tank SY-102 currently serves as the staging tank for cross-site transfers of liquid wastes from the 200 West Area to the 200 East Area. Tank SY-102 has an active ventilation system, is sound, and is not on the Watch List (HNF-EP-0182-146).

Tank SY-102 was constructed with a carbon steel primary liner (heat-treated and stress-relieved), a carbon steel secondary liner (not heat-treated), and a reinforced concrete shell. The tank has a flat bottom. An insulating concrete layer separates the bottoms of the primary and secondary liners. There is a grid of drain slots in both the insulating concrete layer and the concrete foundation beneath the secondary liner.

Tank SY-102 has 25 risers ranging in diameter from 4 inches to 42 inches that penetrate the dome of the primary tank and 34 risers providing access to the annulus between the primary and secondary liners (H-14-010531, Rev.5, Sheet 2).

Tank SY-102 went into service in the second quarter of 1977 when it became the feed tank for the 242-S Evaporator, receiving supernatant from 200 West Area SSTs. Since the last 242-S Evaporator campaign in 1980, 241-SY-102 received supernatant from other 200 West Area tanks and processes and became the staging tank for cross-site transfers to the 200 East Area DSTs. Tank SY-102 currently contains Plutonium Finishing Plant sludge, complexed concentrate transferred from Tank SY-101, and is receiving saltwell liquids pumped from SSTs in the 200 West Area.

Supernatant samples in 241-SY-102 have been taken primarily for process control purposes. The most recent grab sampling events were on January 10, February 28, and

April 11, 2000, following cross-site transfers. The solids were core sampled in 1988, 1990, and 1997.

The BBI estimates for 241-SY-102 vary from month to month as saltwell pumped liquids are continually being added. The supernatant inventory will continue to change as saltwell liquids are pumped from SSTs to 241-SY-102 and the liquids are cross-site transferred from 241-SY-102 to the 200 East Area.

A "flex-n-float" style transfer pump is currently installed in 241-SY-102 for cross-site transferring of waste. The design of the pump and solids level in the tank limit the operable capacity to approximately 500 kgal. Of additional concern, the pump is approximately 3 million-gallons (Mgal) beyond its intended design life.

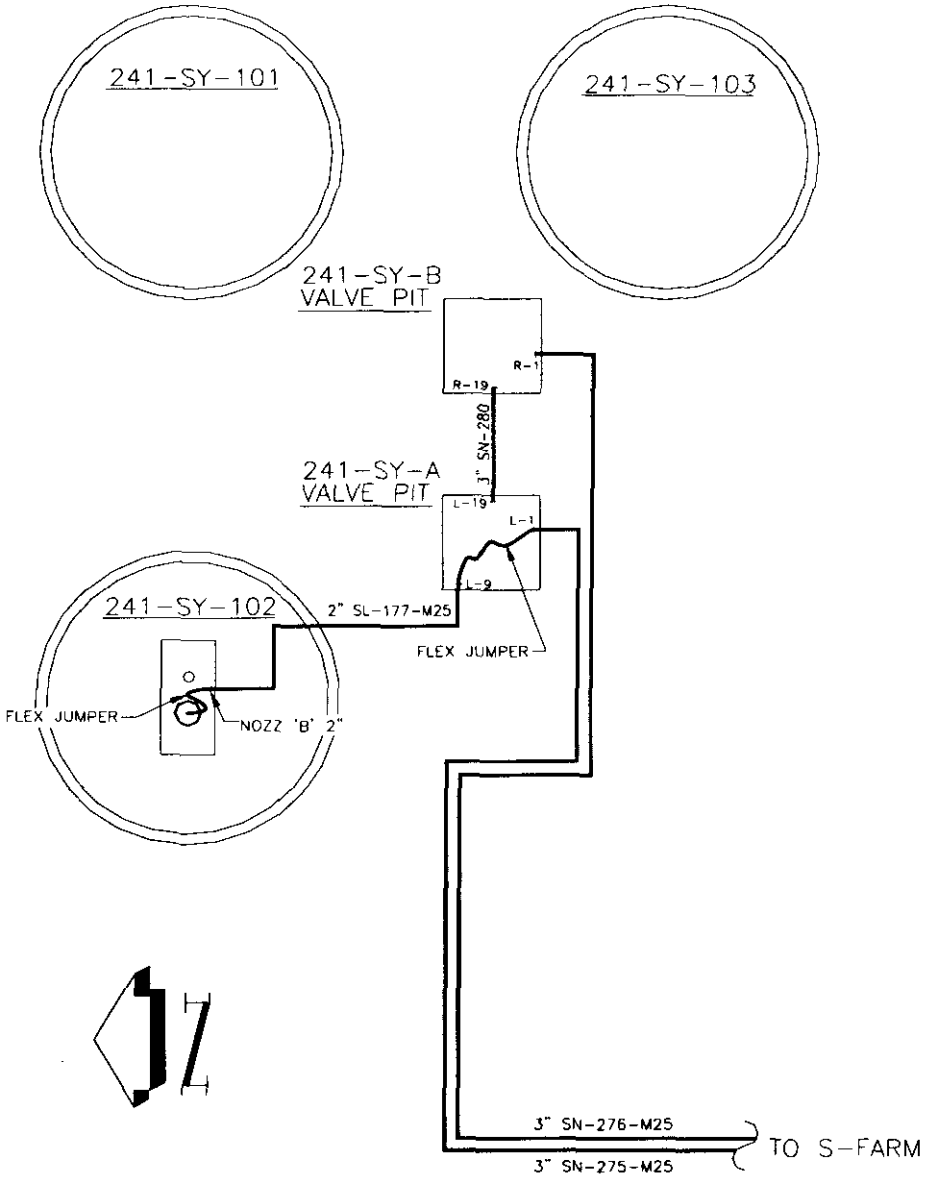
Project W-211, Initial Waste Retrieval Systems, will be installing mixer pumps and a new transfer pump into this tank, but not in time to support the Saltcake Dissolution Retrieval Demonstration. This issue is captured in Section 4.2.1, Tank SY-102 Waste Space Availability.

Upgrades and modification to the DST system are not considered within the scope of the dissolution demonstration, or the preliminary engineering, beyond the definition of interfaces. This PER assumes that an operable waste transfer system will be in place to accommodate the retrieval demonstration.

1.4.3 Existing Waste Transfer Piping System

The existing piping route between 241-S-112 and 241-SY-102 is not functionally contiguous. There is an existing 2-inch encased line between the 241-SY-02A pump pit and the 241-SY-A Valve Pit (SL-177), and an existing 3-inch encased line between the 241-SY-A Valve Pit and the 241-S-A Valve Pit (SN-275) as shown in Figure 1-2. Waste had been transferred by the Interim Stabilization project between the 241-S-B and 241-S-D Valve Pits using an above grade one-inch hose-in-pipe shielded with concrete shield blocks. This route was recently abandoned due to design life concerns and integration with newly implemented hose-in-hose transfer lines. A new temporary, 2-inch hose-in-hose was installed connecting the 241-S-A and 241-S-C (see Figure 1-3) Valve Pits. The Interim Stabilization project has established the precedence of no longer utilizing any of the original existing buried carbon steel piping in either 241-S or 241-SX Farm due to the degraded condition of transfer lines. The discovery of the SN-219 failure during routine surveillances on January 6, 2000, and the observance of a small surface pool led to the decision to utilize hose-in-hose over-ground transfer lines (OGT) for the remaining saltwell waste transfers in the 241-S and 241-SX Farms A transfer line failure document was generated on the failure of transfer line SN-219 from 241-S-103 to the 241-S-A Valve Pit (RPP-5825), this document provides additional information with regards to the abandonment of direct buried transfer lines within 241-S and 241-SX Farms for Interim Stabilization waste transfers.

Figure 1-2: SY Farm Piping



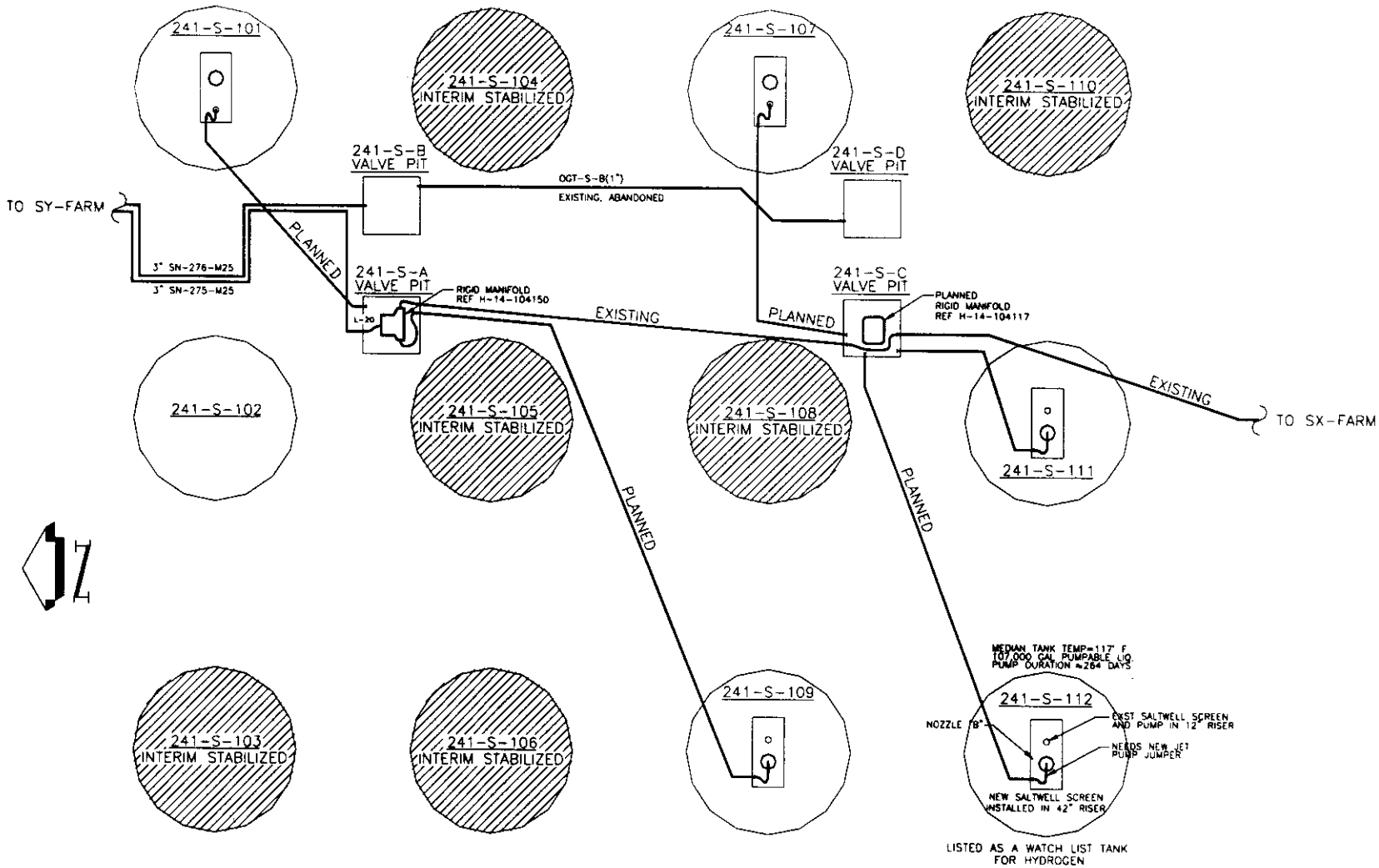


Figure 1-3: S Farm Piping

The Interim Stabilization Project will utilize over-ground transfer lines exclusively for the remaining S and SX Farm tanks to be saltwell pumped. In the case of 241-S-112, the current design plan is to install a 2-inch in 4-inch hose from the 241-S-12A Pump Pit to the 241-S-C Valve Pit. A flexible jumper will connect the 241-S-112 hose termination to a routing manifold (H-14-104117) to direct flow into the existing 241-S-C to 241-S-A OGT. On the other end, a flex jumper in the 241-S-A Valve Pit connects the 241-S-A to 241-S-C OGT to a manifold (H-14-104150) and another separate flex connects the manifold to the existing encased SN-275 transfer line via nozzle L-20 (see Figure 1-3).

1.4.4 Master Pump Shutdown System

The existing Master Pump Shutdown (MPS) system located in the 241-SY Farm will interface with the 241-S-112 WRS. This interface will consist of a data link or hardwire interlocks between the Programmable Logic Controller (PLC) and the existing MPS inputs located in the 241-SY Farm. The data exchanged between these systems will consist of those signals necessary to monitor and shut down the WRS operations in the event of a detected off-normal event.

1.4.5 Monitoring and Control System

A Pumping Instrumentation and Control (PIC) skid located on 241-S-112 will monitor the waste dissolution retrieval operations. Signals for pressure, flow, specific gravity, and temperature will be routed to the instrument enclosure located on the PIC skid. The PIC skid PLC will monitor the process variables and provide a local readout for operations personnel. These inputs will be used by an additional PLC, as well, to perform the volumetric inventory balancing calculations and determination of the presence of a leak.

The closed circuit television (CCTV) camera located in 241-S-112 will be monitored and controlled remotely from the 242-S Evaporator Facility.

1.5 PROJECT INTERFACES

There are five projects conducting activities in 241-S and/or 241-SY Farm, which may be in the vicinity of the saltcake dissolution retrieval demonstration. Depending upon the execution schedules for these activities there are likely to be interferences. These projects include:

- Project W-521, Waste Feed Delivery Systems, is scheduled to be performing construction activities in the 241-SY Farm near the start of 241-S-112 retrieval operations. Jumpers and manifolds are planned for installation in the 241-SY-02A Pump Pit and the 241-SY-A Valve Pit.
- Project W-211, Initial Waste Retrieval Systems, is scheduled to be upgrading 241-SY-102 to install mixer pumps and a new transfer pump. These activities are planned well after the demonstration completion, however a change in the W-211 project schedule could result in concurrent activities in 241-SY Farm.

- Project W-314, Tank Farm Restorations and Safe Operations, will be performing construction activities to bypass the 244-S Double Contained Receiver Vessel (DCRT) in FY 2002.
- Project W-314 will be upgrading the 241-SY-A Valve Pit in FY 2004 to add a pit liner.
- Project W-525, DST Resource conservation and Recovery Act Compliance Upgrades, will be upgrading select transfer lines terminating in the 241-SY-A Valve Pit and the 241-SY-02A Pump Pit. The upgrades will extend the encasements into the pit to provide for the required continuous encasement.
- Interim Stabilization is scheduled to be pumping from numerous 241-S and 241-SX Farm tanks concurrent to the 241-S-112 retrieval demonstration construction and operation activities.
- Tank S-102 initial waste retrieval is planned for FY 2006. The project baseline is to retrieve waste into 241-SY-102. Construction activities are scheduled for completion in FY 2005.
- The potential conflicts and resulting project impacts from these projects are discussed further in Section 4.2, Uncertainties.

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2.0 PROCESS & OPERATIONAL DESCRIPTION

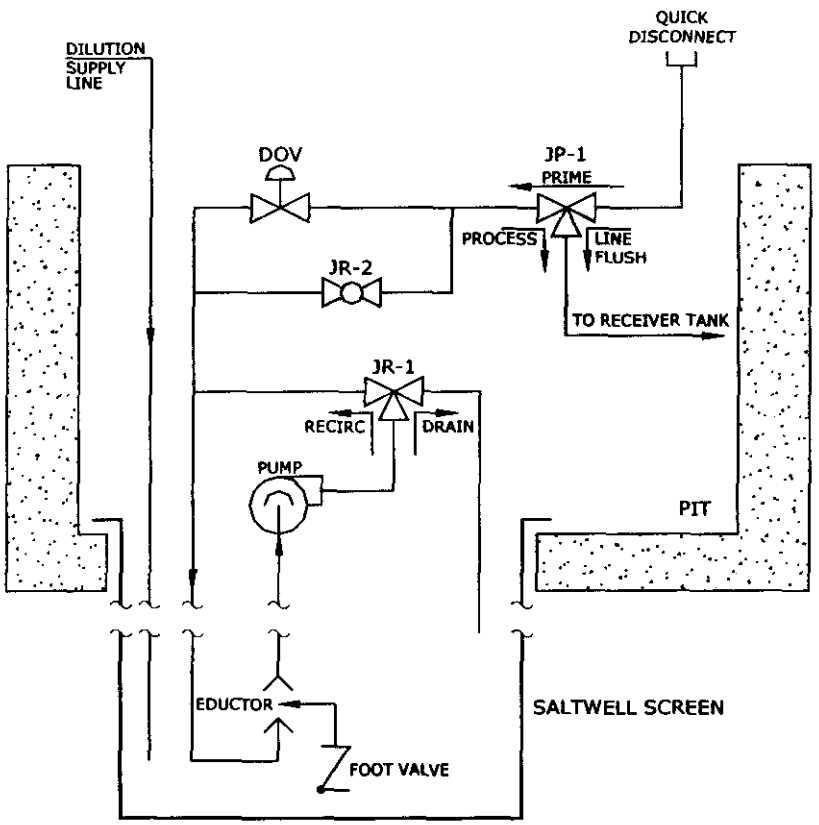
This section provides an overview of the WRS planned to support the Saltcake Dissolution Retrieval Demonstration. This approach utilizes existing equipment and procedures developed and utilized by the Interim Stabilization Project for saltwell pumping operations to the greatest extent practical. Additional SSCs and processes will be integrated with the saltwell pumping system for retrieval of saltcake waste. A description of the current saltwell pumping process is included in Section 2.1.1. The WRS description with associated sub-systems is provided in Section 2.2. An overview of the recommended leak detection, monitoring, and mitigation (LDMM) strategy used with the WRS method is provided in Section 2.3.

2.1 PROCESS OVERVIEW

2.1.1 Current Saltwell Pumping Process Overview

The 241-S-112 dissolution retrieval process will utilize existing saltwell pumping SSCs and procedures to the extent practical. Figure 2-1 represents a simplified schematic of the saltwell pumping process. Pressure, temperature, dip tubes (SpG) and flow elements, which monitor and control the process, are not shown for clarity.

Figure 2-1: *Simplified Saltwell Pumping Schematic*



The four primary operational modes for saltwell pumping are: system flush, prime, pump startup (process), and line flush.

2.1.1.1 System Flush

Interim Stabilization has observed increased success in starting the pump when a system flush is performed prior to pumping initiation. The saltwell pump is flushed by introducing water to the pump legs and allowing it to drain out the foot valve.

The following steps are executed to perform a system flush:

- The water source is connected to the quick disconnect.
- Valve JP-1 is placed in the "PRIME" position.
- Valve JR-2 is opened.
- Valve JR-1 is placed in the "RECIRC" position.
- The foot valve is manually opened.

This configuration is maintained until the desired water volume has flushed through the system. After the flush, the foot valve is allowed to close. The water addition volume is measured by a flow meter on the water truck. After the system has been flushed, the pump is primed.

2.1.1.2 Prime

The water tank on the PIC skid can be used to prime the pump, temporary water supply line, or a water truck connected to the system flush quick disconnect can provide the water supply. The water tank on the PIC skid cannot support the volume required to perform a typical system flush, which is performed immediately prior to pump priming. Since the water truck, or water supply line used to perform the system flush, is still coupled to the system flush quick disconnect, the system can be primed by either source. The following steps are executed to perform a system prime:

- The water source is connected to the quick disconnect.
- Valve JP-1 is placed in the "PRIME" position.
- Valve JR-2 is opened.
- Valve JR-1 is placed in the "DRAIN" position to bleed air out of the loop.
- A nominal volume, sufficient to fill the pump legs, is introduced.
- Valve JR-1 is placed in the "RECIRC" position.
- Valve JR-2 is closed.
- Valve JP-1 is placed in the "PROCESS" position.

The water addition volume is measured by a flow meter. After the system is primed, the pump is ready to be started.

2.1.1.3 Pump Start-up

With the system already primed, all of the valves are lined up as required to start the pump. Following startup of the saltwell system the pumping system may be operated in two different modes, "MANUAL" or "AUTOMATIC." The preferred method is to run the pump in the automatic mode. Information on waste specific gravity and depth are used to maintain the desired liquid waste column height in the screen. This is accomplished by modulating the diaphragm operated valve further open or shut to compensate for variability in interstitial liquid flow through the saltwell screen. Automatic operation is typically performed after the saltwell screen has been initially pumped dry a couple times at higher transfer flow rates. After readily available supernatant or interstitial liquid is removed the remaining inflow to the saltwell screen is limited by the mobility of the liquid through the saltcake matrix and into the screen. Automatic operation is used to minimize the volume of liquid within the screen and maximize the height differential between pumping system inlet and the level of the interstitial liquid.

The manual mode of operation bypasses the more restrictive diaphragm operated valve and routes waste directly through a ball valve (JR-2). Manual operation is used to obtain higher transfer flow rates when the saltwell screen is readily filling with pumpable liquid.

Two saltwell pump systems are currently in use by the Interim Stabilization project. Most of the systems use a 1½-horsepower Chempump™ and a Goulds® eductor. The stock of Goulds® eductors has been depleted and cannot be replenished, as this eductor has not been made in over two decades. This configuration produces typical maximum flow rates from four (4) to six (6) gpm depending upon available head. The other pump system uses a 4-horsepower Sundyne™ pump and a Myers® eductor. This configuration produces typical maximum flow rates from eight (8) to ten (10) gpm depending upon the available head from tank inventory. The Sundyne™ pumping configuration has only been used recently and there has not been sufficient use to establish a reliability history. It is anticipated however, that this configuration will improve upon the nominal operating availability of the Chempump™ and Goulds® pumping system by resolving previous pumping failure mechanisms (RPP-6883).

Leak detection in the tank is performed entirely by mass-balance calculations by the Interim Stabilization project. A flow meter on the saltwell pumping system measures outgoing waste flow. The water into the tank is also measured by flow meters either on the PIC skid, dilution skid, or water truck. The DST waste volume received is determined by measuring liquid level in the receiving tank.

2.1.1.4 Line Flushing

To prevent transfer line plugging, line flushes are typically performed weekly, or whenever the system is secured. A normal line flush consists of running one and a half to two line volumes through the transfer route. Flushes are directed from the recovery SST to the receiving DST. The water is typically heated to a maximum of 160° F and

pressurized up to 120 psi. The increased temperature, pressure, and flow rates are intended to dissolve and motivate any trapped solids out of the transfer line.

The following steps are executed to perform a line flush:

- The saltwell system pump is turned off.
- Valve JR-2 is closed, Valve JP-1 in positioned to "PRIME", Valve JR-1 is positioned to "DRAIN."
- With Valve JP-1 in the "PRIME" position, the hot water source is connected to the quick disconnect.
- Valve JP-1 is placed in the "LINE FLUSH" position.
- One and a half to two transfer line volumes are pumped through the lines.
- Valve JP-1 is returned to the "PRIME" position.
- Water source is disconnected.

Transfer line plugging has resulted numerous times throughout SST stabilization history. Most of the obstructions were the result of waste crystallization and solids deposition in system low points. The low waste transfer velocity and insufficient heat trace have been found as the primary contributors to transfer line plugging. Generally, transfer line obstructions occur in portions of the transfer route that are un-insulated, un-heat traced, at a corner such as a PUREX head, or low points such as in a flex jumper. Transfer line obstructions can normally be removed with bi-directional system flushing. The water addition volume introduced during transfer line unplugging is measured by a flow meter and accounted for on the material balance data sheets.

2.1.2 WRS Process Differences

The 241-S-112 WRS will be deployed in a fashion to utilize the existing saltwell pumping design and equipment to the greatest extent possible. This will reduce the time, cost, and validation required to deploy and operate the system. However, to accommodate the addition of solvent to the tank and additional LDMM requirements (RPP-7825) some new systems and modification to the current saltwell systems will be required. These differences are described below.

2.1.2.1 Pumping Instrumentation and Control (PIC) Skid

The current design of the PIC skid will require minor modifications to the existing PLC, which include additional inputs such as leak detection and other farm specific required inputs for safe shutdown (i.e., low transfer pressure, high temperature, flammable gas). An additional PLC, or inputs to the existing PLC, will also be required on the PIC skid to control and monitor the water addition, chemical injection (if required), and perform volumetric balancing calculations for leak determination.

2.1.2.2 Dilution Skid

The current dilution skid in 241-S Farm, which is tied to the temporary raw water supply, will be utilized without modification.

2.1.2.3 Pump and Jumper

The current saltwell pump and jumper designs will be utilized in the 241-S-12A Pump Pit without modification. The Sundyne™ pump and a Myers® eductor have been selected for deployment, due to the higher pumping capacity and resulting reduction in the retrieval operations duration as the result of increased system reliability and operability. This increase in system reliability is attributed to Sundyne pump and saltwell system design to correct failure mechanisms discovered with the previously used pump. The Sundyne saltwell pumping system requires additional support equipment to adequately satisfy the pump operation and application. Additional support equipment includes an Injection Skid, used to provide bearing supply and cooling water, Filter Skid to filter bearing supply water to 20 microns and a backflow preventer assembly and mounting box to prevent process fluid from being routed above grade.

2.1.2.4 Water Distribution System

A water addition system utilizing in-tank water distribution devices will be the primary difference to the saltwell pumping system. The water distribution assemblies installed in the tank will be connected directly to the temporary (an backflow prevented) raw water supply line.

The water distribution assemblies will each have an independent throttle valve downstream of two master shutoff valves. One of the master valves will be manually operated to provide a water source and either a manual bypass valve or an automatic valve will be used to control water entry into the tank. Either a motor or air operated or solenoid fail-shut valve connected to the PLC on the PIC skid can be utilized as the automatic water introduction valve. The manual bypass valve will be opened to supply water to the waste surface in the event water addition is required prior to pumping system startup. This bypass valve would require a level of administrative control to prevent inadvertent operation. Once the waste is sufficiently saturated, the saltwell pump will be primed and started. This will open the automatic valve, and an operator will shut the manual valve. In the event the saltwell pump is shut down for any reason, the automatic valve will shut, stopping the water addition to the tank. The sprinkler system will also have flow measurement equipment to monitor the influx volume into the tank. Indication will be provided to allow the operator to suspend the water supply to the sprinkler mechanisms in the event that the rate of accumulation of solvent in the tank exceeds the extraction rate.

The water distribution devices will be designed to promote global and/or localized dissolution of saltcake material as the dissolution process develops.

2.1.2.5 Chemical Injection Skid and Sampling Station

A chemical injection skid installed upstream of the water addition system will be used to buffer the solvent, if required. This is to accommodate for the depletion of corrosion inhibitors in the tank throughout the recovery process, or to aid in the dissolution of varying salts. A sample station will allow for monitoring of the removed solutions chemistry, if required. The collected sample data will be used to adjust the introduction of buffers or corrosion inhibitors to the water introduction system via the Chemical Injection Skid. This data will also be used to analyze the system performance for future retrieval consideration.

2.1.2.6 Ventilation

It has been conservatively assumed that active ventilation will be required for the retrieval demonstration. An exhauster with demister will be operable while solvent is being added to mitigate the generation of aerosols and filter saturation and accumulation of hydrogen. The generation of aerosols by the water distribution system and possible gas releases during the retrieval should be evaluated in subsequent project phases. This will be required to specify the requirements for the ventilation system.

2.2 WRS DESCRIPTION AND OPERATING APPROACH

The 241-S-112 WRS method consists of two separate primary systems, a water distribution system and a solution removal system. Water will be introduced to the tank through three water distribution mechanisms; one each installed in Risers 11, 14, and 16.

The Interim Stabilization Project will install a saltwell pump and jumper, leak detector, and over ground piping transition in the 241-S-12A Pump Pit.

Three water distribution assemblies installed in Risers 11, 14, and 16 will be operated independently or simultaneously at an average combined flow rate equal to the maximum solution removal rate of the saltwell pump. Once equilibrium is reached, the rate of solvent introduction (8 to 10 gpm) will approximately equal the rate of solution removal (8 to 10 gpm). The designed water introduction rate is based on the highest anticipated retrieval rate of the new saltwell pump assembly design, which utilizes a Sundyne™ pump and Myers® eductor (See Section 2.1.1 and 3.1). New dip-tubes installed in the existing saltwell screen (Riser 13) will monitor the dissolution process by measuring the specific gravity (SpG) of the solution in the well. The dip-tubes will also be used to measure the accumulation depth of solution in the screen.

The water added to the tank through the dissolution distribution system may be heated to prevent cooling of the waste by the solvent. Cooling of the waste may slow the dissolution process and increase volume of secondary waste produced by the retrieval. With DST space at a premium it is desirable to minimize the waste generation and need (and expenditure) for evaporator runs at the end of retrieval. Heated solvent (above the temperature of the waste) may also increase the solution saturation and waste recovery efficiency. Depending upon the design of the water introduction system there may be a propensity for aerosol generation with water heated above the waste temperature. The

removed solution should be maintained at the temperature it is removed, or increased, in transit to the DST to prevent salt form coming out of solution. The issue of solvent introduction parameters (temperature, pH) will require further examination and consideration during the conceptual engineering phase of the project. At this time, the preliminary engineering development and associated cost estimate assumes that the water supply will not require heating and will be introduced to the tank at ambient temperature.

Conventional, continuous saltwell pumping will maintain a minimum volumetric inventory in the well. The liquid inventory will be minimized at all times during the retrieval by maintaining the lowest liquid level possible. A liquid level will be required to be maintained above the outlet of the two lower dip tubes to monitor the dissolution process (tank volume level and specific gravity). Once the waste becomes saturated, the rate of solvent addition will be balanced to approximately equal the rate of solution removal. As the water permeates through the waste it will dissolve and/or erode the saltcake and flow into the saltwell. Buffers or corrosion inhibitors may be fed into the water distribution stream as required during operations to ensure the recovered solution is within the transfer specification. Transfer line samples can be analyzed periodically to provide data for buffer or corrosion inhibitor feed adjustments. Transfer line flushing will occur as needed and at the end of each operating period.

It is anticipated that the WRS will operate at a maximum of 24 hours a day and 7 days a week only interrupted for line flushing, static leak testing and equipment failures. Static leak testing in 241-S-112 will be performed weekly subsequent to line flushing. Dynamic leak detection will be performed continuously during retrieval operations using flow meters, interstitial liquid measurement, and level gage(s). The operations will continue in this manner until all saltcake waste has been retrieved from 241-S-112, or retrieval efficiency degrades to the point of cost prohibition (a.k.a. limits of technology).

Two interruptions in operations are estimated to occur to perform cross-site waste transfers from the recipient vessel 241-SY-102 to the East area DST. These interruptions are in addition to the weekly suspension of operations to perform line flushes and static leak tests. Each transfer shutdown period is approximated to require 30 days to complete all activities. It has been assumed that the tank will initially be emptied to the greatest extent and not require a pre-retrieval waste transfer from 241-SY-102. The dissolution ratio is assumed to be 2.3 to 1 (i.e., approximately 2½ gallons of water added to dissolve 1 gallon of saltcake) and the retrieval efficiency is expected to be improved over the nominal operating efficiencies of previous saltwell pumping operations by using the Sundyne pumping system. In this configuration, assuming a 10 gpm average pumping rate, the retrieval campaign is anticipated to take approximately 8 ½ months (see calculation 4412.070.PCAL.001 in Appendix C). The current estimated retrieval duration may be reduced if alternative pumping technologies and retrieval methods are identified and evaluated.

The existing design of the saltwell pumping system is to exclude particles greater than 1/20 of an inch, maximum size of opening in saltwell screen material, removal of solids with a size larger than this dimension can not be performed by the saltwell system. The

saltwell pumping system was designed to remove supernatant and interstitial liquid that enters the saltwell screen, an ideal application for the LVDG retrieval demonstration. As the result of the saltwell pumping systems inability to transport solids a secondary pumping system or technology may be deployed in conjunction with the saltwell pumping system to achieve necessary waste volume removal and potentially improve upon the projected duration of the retrieval campaign by accelerating the retrieval transfer rate.

The dissolution ratio estimate (2.3:1) was based on the production of a 5 molar sodium solution. A fully saturated sodium solution is assumed as being 10 molar. Dip tubes installed in the saltwell will measure specific gravity, which in turn will be used to estimate the solution saturation. The recovered solution dilution ration will be based on that typically used by Interim Stabilization for saltwell pumping. Saturated solutions are diluted one to one with water. Recovered solutions with a saturation of 5 molar or less will not be diluted for transfer to the DST system. Dilution will increase from zero up to a maximum of one to one (1:1) for saturations ranging from 5 to 10 molar, respectively. As long as the dissolution is effective enough to generate at least a 5 molar sodium solution the DST waste volume generated will not change based on saturation (a.k.a. retrieval effectiveness).

2.2.1 Saltwell Pumping Components and Functions

Liquid waste will be removed from 241-S-112 via a saltwell eductor pump and a piping system connected to receiver 241-SY-102. The preliminary design concept for the waste removal portion of the system is functionally identical to existing Interim Stabilization waste retrieval systems. The WRS therefore offers the same degree of reliability and maintainability as the current Interim Stabilization system.

2.2.2 Water Distribution System Components and Functions

Water will be added to 241-S-112 utilizing the temporary water supply installed by the Interim Stabilization Project (see Section 1.4.1). Above ground piping and pipe supports will be required to extend the service the approximate 200 feet from 241-S-110 to the solvent distribution system at 241-S-112. Intermediate pipe supports, heat trace and other requirements listed in ECN 660754 will apply to this extension. Self-regulating heat tracing will minimize maintenance needs and a flow control loop will be installed to measure and control water addition. Pre-installation maintenance of the existing infrastructure used by the Project (i.e., replace valve packing, equipment calibration) should minimize field maintenance over the relatively short utilization time (i.e., approximately 9 months). While none of this equipment is required for saltwell pumping, it is relatively simple to maintain and therefore represents only a moderate incremental maintenance burden compared to current Interim Stabilization activities.

The water added through the dissolution distribution system may be heated to accelerate dissolution. At this time, the preliminary engineering development and associated cost estimate assumes that the water supply will not require heating and will be introduced to the tank at ambient temperature (Section 2.2)

2.2.3 Ancillary Components and Functions

The data acquisition system for the WRS will consist of: dip tubes to monitor tank waste level and SpG; flow measuring equipment, interstitial liquid measurement equipment; and a CCTV camera for observation of in-tank events. Psychometric monitoring equipment to measure ambient conditions, exhauster flow rates, outlet conditions, and other parameters may be required if the uncompensated performance of the LDMM systems is not sufficient. Uncompensated performance means that the readings have not been corrected for error factors. Error factors may hide a leak or may lead to the incorrect determination that the tank contents have leaked. With the exception of the CCTV, psychometric monitoring equipment and other possible LDMM equipment, and modifications described in Section 2.1.2, all of the data acquisition equipment is currently used for Interim Stabilization.

The portable exhauster currently installed between 241-S-103 and 241-S-106, POR-004, will be relocated to near the 241-S-112 Condenser Pit. A demister will be added to the exhauster inlet, which will drain to Riser 16. The exhauster will maintain a stable negative pressure within the tank and prevent saturation of the breather filter. The outlet will connect to the existing condenser pit. The existing pit cover (Drawing H-2-38785) will be replaced with a cover and integral riser. The new cover will bolt to the pit and be sealed with a compressible gasket. A flexible hose will connect the exhauster to the riser on the condenser pit cover.

The retrieval system will be monitored and controlled from a PIC skid located near the 241-S-12A Pump Pit. This skid is essentially the same skid used for saltwell pumping activities with minor modifications as discussed in Section 2.1.2. The skid includes a PLC, an air compressor (that connects to the weight factor instrumentation in the tank), an 80-gallon water tank (for instrument purge and priming the pump), and controls for the pump. In addition to monitoring and controlling the retrieval process, the PIC skid also will send signals to the 242-S Evaporator Facility so that the process can be monitored remotely from outside the 241-S Tank Farm.

Tank corrosion inhibitors will be added from a chemical injection skid upstream of the three sprinkler lines and downstream of the connection to the central Pump Pit, if required. Chemical injections will be made in accordance with a Process Control Strategy for 241-S-112 Retrieval to be developed during the conceptual design phase of the project. Determination of batch-feed adjustments will be performed after analyzing data from computer modeling and/or grab sampling. A valve will be installed to isolate the chemical injection supply from the Water Distribution System.

Because the corrosion inhibitors will deplete at varying rates over the extent of the retrieval campaign, adjustments to the chemical injection rate will be required periodically. A sample station will be located in the 241-S-12A Pump Pit, if required. Samples taken at the station will be used to determine the pH and salt concentration of the waste stream leaving 241-S-112. This information can then be used to adjust the rate corrosion inhibitors are added to the tank by the Chemical Injection System.

2.2.4 Waste Transfer System

The waste transfer lines will consist of existing temporary hose-in-hose transfer lines as well as existing encased pipe with flexible jumpers in the Valve Pits. Leak detectors located in the 241-S-C and 241-S-A Valve Pits and 241-S-12A Pump Pit will be monitored at the PIC skid. The 241-SY-A and 241-SY-02A Pits will be monitored from the 242-S Evaporator Facility and Instrument Building 241-SY-271. The 242-S Evaporator, the 241-SY-271 Instrument Building and the tank monitor and control system (TMACS) will connect to the PIC skid so that the WRS will shutdown upon detection of a leak in either farm.

2.2.5 DST System

Tank SY-102 has been identified as the DST to receive waste generated during the 241-S-112 Saltcake Retrieval Demonstration. Tank 241-SY-102 has an active ventilation system, leak detection system, and continuous air monitor (CAM) alarm system. In addition to these systems, dome pressure, waste and dome temperature, combustible gas concentration and liquid level will be monitored for WRS operations at 241-S-112. These signals will be monitored by the PIC skid and off normal conditions of these signals will initiate a shutdown of the retrieval operation, including pumping system and water addition system. The PIC skid PLC will be provided with a data link for transfer of operational data from the 241-SY Farm interfaces as shown on Drawing 4412-0470-IDWG-101 (Appendix C).

It is assumed that the two cross-site transfers will be required from 241-SY-102 to support the continued retrieval from 241-S-112. Approximately 1.34 Mgal of solution will be produced over the campaign. This assumes the waste transferred (into the DST System) is an average 5 molar sodium solution (see calculation 4412.70.PCAL.001). Calculation performed will be refined after 241-S-112 waste samples are analyzed and more detailed information is obtained. Further, the waste retrieval will be discontinued during the transfer periods. The two transfers will each total approximately 500 kgal and approximately 300 kgal of waste (800 kgal) will be left in 241-SY-102 at the conclusion of the 241-S-112 waste recovery efforts. The infrastructure will have to be in place to support the transfer and receipt of this waste into the East area DST System. This will require integration and coordination between the demonstration retrieval project and the DST System and Projects.

2.3 LEAK DETECTION, MONITORING AND MITIGATION STRATEGY

The LDMM Strategy for the 241-S-112 Saltcake Waste Retrieval Demonstration is under development parallel to the preliminary engineering effort. The 241-S-112 Functions and Requirements (a.k.a. S-112 TPA F&R) document is required for submittal to the Washington State Department of Ecology (Ecology) by December 30, 2001 in accordance with TPA milestone M-45-03-T03. The S-112 TPA F&R, once approved by the stakeholders, will establish the strategy for LDMM and operations.

One of the Tank S-112 retrieval demonstration goals is to establish performance characteristics and limits of an integrated retrieval and LDMM system designed to

minimize leakage during retrieval, if it occurs, and to detect leakage within a risk-based performance envelope. An integrated LDMM and retrieval strategy will therefore be employed to manage the risk posed by potential waste leakage during Tank S-112 retrieval using the best available leak detection, leak monitoring, and leak mitigation technologies economically achievable. The preliminary strategy developed for the retrieval and LDMM demonstration is based on a risk-based retrieval release protection strategy and the Retrieval Performance Evaluation (RPE) process, as well as technology and programmatic considerations. The RPE methodology is used to assess the long-term risk from tank residuals (i.e., past leaks, leak losses, and residual tank waste) following retrieval to establish system performance requirements that are protective of human health and the environment. When integrated with the retrieval technology, the risk-based approach establishes the minimum leak detection limit as a function of potential retrieval leak loss volume and residual waste remaining in the tank following completion of retrieval activities. The minimum acceptable leak detection limit is used to develop the target leak detection rate for the LDMM system, direct the LDMM methods selection and operations strategies, and develop release response actions for use during retrieval operations. This retrieval release protection strategy allows for a tank-specific LDMM strategy to be developed for each SST based on its process history and posed risk.

Upon completion of the Tank S-112 retrieval activities, this demonstration will provide a basis (along with other SST retrieval projects and demonstration lessons learned) for deploying retrieval and LDMM technologies in the remaining SSTs.

The primary method for LDMM proposed for the Tank S-112 Retrieval Demonstration utilizes both tank internal and external systems. The internal tank system includes provisions for both static and dynamic volumetric inventory balancing by conventional methods. External leak detection will be performed by routine surveillance using the existing drywell casings and a radiation monitor. In the event a leak occurs and goes undetected by the primary internal method, the secondary external method should detect the leak, by measuring the increased radioactivity in the soil column. External leak detection systems, other than drywell monitoring, are unproven in the scale and application required for this retrieval. Further evaluation and testing of alternative external systems is required prior to implementation (besides the baseline method of drywell monitoring) (RPP-8476).

The preliminary LDMM system for the 241-S-112 saltcake dissolution retrieval demonstration consist of a combination of the following:

- Leak detection: In-tank volumetric system and external method
- Leak monitoring: In-tank volumetric system and external method
- Leak mitigation: Minimization of tank liquid inventory and retrieval campaign duration

2.3.1 Leak Detection

The requirement to detect liquid waste releases from an SST during waste retrieval operations is quantified using a graded approach. While a very small leak may be undetectable using any of the available technologies, leaks with environmental impacts must be detected. The leak rate determination is expressed in terms of the risk or programmatic based on retrieval release criterion (RRC). Upon evaluation of the tank-specific requirements, a TLDR can be established. The requirement is as follows:

> **The TLDR requirement will be less than or equal to the RRC divided by the expected duration of the retrieval campaign.**

From this requirement, it is apparent that the retrieval campaign duration will play a major role in determining the acceptable TLDR.

The next requirement is to consider the performance of the leak detection system. This requirement is intended to reduce the possibilities of false alarms and includes all errors and uncertainties associated with the instruments, means of measurement, and analysis method. The requirement is as follows:

> **The performance of the leak detection method or combination of methods will have a probability of detection of 95% against the TLDR and a probability of false alarm less than or equal to 5%.**

The leak detection system or technology selected is required to be operable or functional during the entire retrieval campaign. The requirement is as follows:

> **The leak detection method or combination of methods shall be functional during all retrieval operations.**

In the event the TLDR is below the LDMM system performance capabilities then the Best Available Technology, Economically Achievable (BATEA), will be selected and deployed. Based on the preliminary RPE output, the TLDR for S Farm (including 241-S-112) will be well below the system performance limits (SPL). The only currently available leak detection technologies with proven performance histories in application in Hanford tanks (or similar applications) are volume balancing methods (internal) and drywell radiation monitoring (external).

2.3.1.1 In Tank Leak Detection

Volumetric inventory balance techniques require that a system be established such that all of the inputs and outputs are known. For 241-S-112 this will require volumetric measurement of the inflow, outflow, and change in inventory. Primarily, only liquids will flow into or out of the tank. The volume in the tank however, consists of solids, liquids, and even a gaseous void fraction. Estimates of the volume of solids and gases present in the tank at any given time will have a high degree of uncertainty. The liquid volume in the tank however, can be measured and estimated with a relatively high degree

of confidence. The liquid will flow to form a level, measurable surface, and conform to the shape of the tank. Because the geometry of the tank is known, a volume can be calculated by obtaining a single level measurement on a free liquid surface. For this reason, only the liquid volume will be measured as part of the volumetric inventory balance for 241-S-112. This approach is consistent with the leak mitigation strategy, as insoluble solids and gases will not "leak" into the soil.

Four primary error sources associated with volumetric leak detection have been identified for the 241-S-112 retrieval. These error sources are associated with the following measurements:

- Volumetric inflow
- Volumetric outflow
- Level measurement (and volumetric conversion)
- Volumetric changes resulting from chemical reaction or dissolution

Additional error is introduced from changes in barometric pressure and temperature, which can be minimized by measurement and compensation. These sources are not, however, significant contributors to the total measurement error. These external error sources will require identification and design compensation measure, which will be defined in a latter project phase.

Volumetric inflow and outflow are easily measured directly using flow meters with known and measurement accuracy. The liquid volume measurement (by level) can be more difficult to accurately obtain. In the absence of a free liquid surface, the interstitial liquid level (ILL) will not be uniform throughout the entire tank. Saltwell pumping of the SSTs by Interim Stabilization has demonstrated that fluid flow through the waste matrix is very slow. Often months are required for the ILL measured in the saltwell casing and LOW to become relatively equal (the discrepancy is primarily contributed to capillary action in the waste matrix. Numerous measurements are then required to obtain an accurate liquid profile. The more liquid level measurement locations, the greater the accuracy in the volume estimate. Filling the tank to a level where a free liquid surface is present will eliminate this problem, however is contrary to the leak mitigation strategy of liquid inventory reduction.

The main criterion for successful implementation of a volumetric methodology for leak detection in 241-S-112 is the presence of a measurable liquid level in the tank before, during, and after operation. Methods for measuring, and interpreting, interstitial liquid level need to be refined and final design concepts selected prior to definitive design of the LDMM system. Additionally, testing with actual waste samples is required to determine the effects of dissolution on solvent/solution volume and the correlation between saturation and specific gravity. Dynamic and static volumetric inventory balance leak detection techniques are described in the following sections.

Second to the volumetric inventory estimate error, is the error introduced by dissolution. Chemical reactions are not anticipated during the retrieval and are considered an error source. Dissolution, however, will occur continuously over the entire campaign. The successful completion of the retrieval project relies on the fact that the waste is comprised primarily of soluble constituents. As the waste dissolves the solvent (water), becomes saturated with the solute (waste salt). The result is an increase in liquid volume. For the initial portions of the waste retrieval campaign the solution will be predominantly saturated with sodium constituents. As the retrieval progresses and the sodium are depleted, the less soluble constituents will be dissolved. The result is a continuously changing dissolution ratio. For example, one gallon of water added at the onset of operations may produce 1.4 gallons of solution, while a gallon toward the end will only produce 1.2 gallons (this example is provided for illustrative purposes only). The accuracy of the compensation for dissolution will then become dependent upon how well the dissolution process is understood before retrieval, monitored during retrieval, and the initial constituent inventory estimates (chemical and porosity).

Test should be performed on actual waste sample to develop a model for the anticipated dissolution process. Correlations should then be made to directly measurable characteristics (e.g. specific gravity, speed of sound, opacity, etc.) to allow for real time compensation in the volumetric calculation. Analytical laboratory results that take days or months to acquire after samples are obtained, will not allow for continuous leak detection. It would be far from optimal to implement a system, which would detect a leak a month or longer after it occurs. Sampling will however allow for verification and/or adjustment of the dissolution model through the process.

Based upon the available data, a strategy and method(s) for in-tank leak detection have been developed. The preliminary LDMM strategy for 241-S-112 consists of in-tank dynamic testing (during retrieval operations) and static testing (operations suspended), and ex-tank drywell monitoring.

2.3.1.1.1 Dynamic Leak Detection

Dynamic leak detection will be performed while retrieval operations are ongoing. The volume of water added, waste removed, liquid level, and specific gravity will be measured continuously. An algorithm, or formula, will be used to take the inputs and determine if an inventory discrepancy greater than the instrument error exists. A discrepancy in the 241-S-112 liquid inventory greater than the error associated with the measurements will be used as an indication of a leak. Samples may be taken throughout the retrieval campaign to adjust the dissolution model and maximize the accuracy of the compensation for dissolution.

A free liquid surface is assumed to not be available during retrieval operations for measurement. A liquid profile will be produced using the only two level measurement locations available: the dip tubes in the saltwell casing and the LOW. These measurements along with the waste porosity estimates and dissolution model will be used to calculate the liquid (solvent and solution) inventory.

Table 2-1 provides a list of measurements that are required, the proposed method of obtaining the measurement, and the intended purpose.

Table 2-1 Equipment List for Dynamic Inventory Balance Leak Test

Preliminary Engineering Equipment List for Static and Dynamic Volumetric Inventory Balance Leak Detection		
Monitoring Function	**Equipment/ Instrumentation**	**Purpose**
Free Liquid Surface Level Inside *retrieval* tank	Dip tubes (pressure transducer) Level gage	Indirect measurement of free liquid surface in the pump well. Input into algorithm for modeling ILL profile.
Specific Gravity	Dip tubes (pressure transducer)	Indirect measurement of liquid specific gravity pump well. Input into algorithm for compensation of dissolution.
Interstitial Liquid Level Inside *retrieval* tank	Gamma Probe and LOW	Indirect measurement of interstitial liquid level in the retrieval tank. Input into algorithm for modeling ILL profile.
Free Liquid Surface Level Inside *receiver* tank	Level Gauge	Direct measurement of free liquid surface in receiver tank. Secondary verification of outflow from retrieval tank.
Volumetric/mass flow into *retrieval* tank	Flow Meter	Direct measurement of volumetric or mass flow of dissolution water into the retrieval tank. Primary input into the leak detection algorithm.
Volumetric/mass flow out-of *retrieval* tank	Flow Meter	Direct measurement of volumetric or mass flow of waste out of the retrieval tank. Primary input into the leak detection algorithm.
Volumetric/mass flow into *receiver* tank	Flow Meter	Direct measurement of volumetric or mass flow of waste into the receiver tank. Redundant check on volumetric/mass flow of waste out of *retrieval* tank.
Additional Error Compensation	Pressure, Temperature, etc	Tertiary measurements acquired at TBD locations for the purposes of improving detection accuracy.
Chemical Analysis of recovered solution	Batch Sample and Laboratory Analysis	Verification and/or adjustment of dissolution model

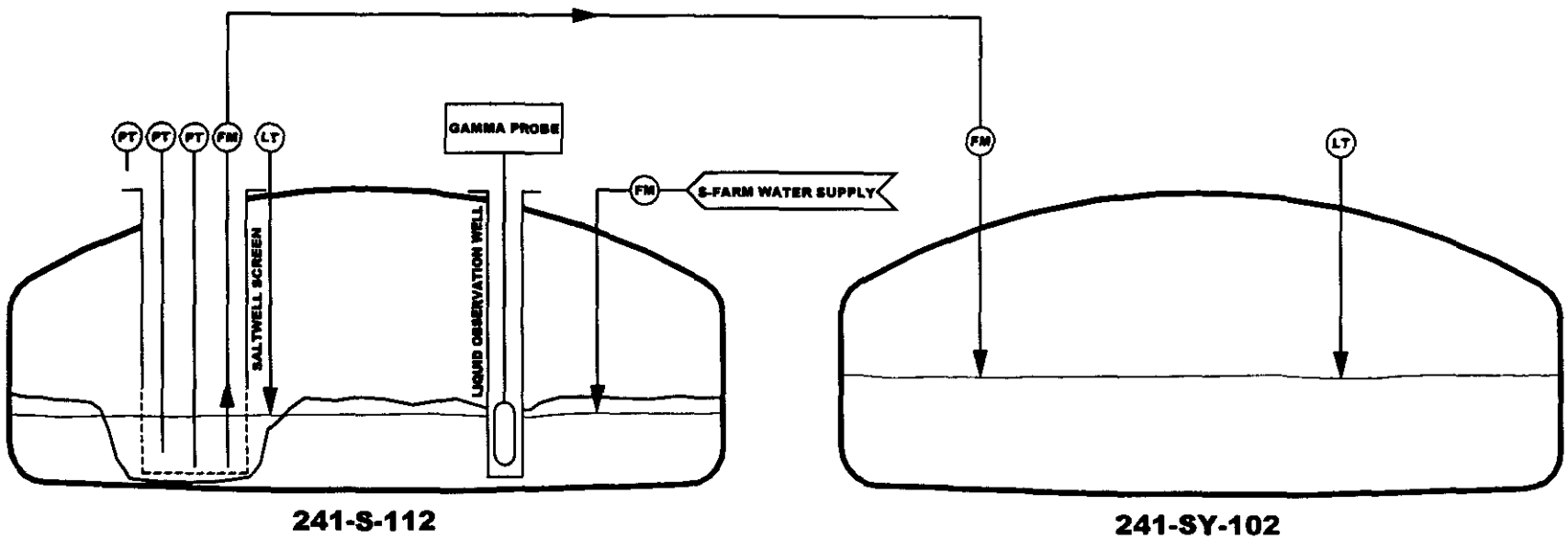


Figure 2-2: Dynamic Leak Detection Instrumentation

2.3.1.1.2 Static Leak Detection

Static leak detection is largely the same as dynamic leak detection with the absence of an inflow or outflow from the tank. This allows the tank to be treated as a closed loop system. Volumetric precision methods (static leak tests) measure changes in the liquid surface and convert these level changes to volume changes using the known geometry of the tank and waste porosity estimates. Compared to dynamic leak detection, there is a high degree of precision by the elimination of several variables. The precision of the static test is a function of the following:

- Equilibrium of the tank (amount of ongoing dissolution or flowing liquids),
- Accuracy of the liquid level measurement, and
- Estimated waste porosity.

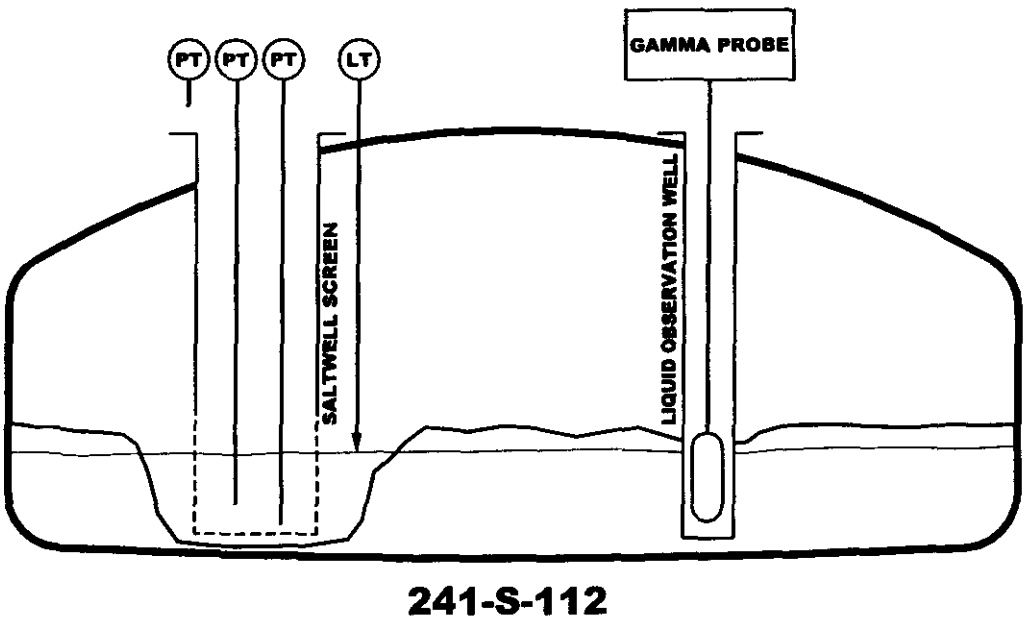
In general, the longer the duration of the static test the greater the accuracy. The longer the duration allowed for the tank to reach equilibrium, the more accurate the static test. The accuracy will continue to increase with the duration of the test as long as the influences of error associated with the input measurements are relatively small contributors. For longer test durations, the uncertainty associated with the input variables establishes a maximum accuracy threshold, which cannot be extending the test duration.

An accurate leak detection system is desirable for the reduction of risk. Unfortunately, the longer the test duration (to reach equilibrium and perform the test) and greater the frequency of tests, the longer liquid is present in the tank. The leak mitigation strategy is to minimize both the liquid volume inventory and duration that liquid is present. A compromise between the two will have to be reached, based on the performance expectations of the system developed.

Table 2-2 Equipment List for Static Volumetric Precision Leak Test

Preliminary Engineering Equipment List for Static Volumetric Precision Leak Test		
Monitoring Function	**Equipment/ Instrumentation**	**Purpose**
Free Liquid Surface Level Inside *retrieval* tank	Diptubes (pressure transducer) Level gage	Indirect measurement of free liquid surface in the pump well. Input into algorithm for modeling ILL profile.
Interstitial Liquid Level Inside *retrieval* tank	Gamma Probe and LOW	Indirect measurement of interstitial liquid level in the retrieval tank. Input into algorithm for modeling ILL profile.
Additional Error Compensation	Pressure, Temperature, etc	Tertiary measurements acquired at TBD locations for the purposes of improving detection accuracy.

Figure 2-3: Static Leak Detection Instrumentation



Based on LVDG retrieval rates and anticipated operational scenarios, a duration of 168 hours of continuous retrieval operation between static leak test frequency was selected to maximize operational continuity while providing acceptable operational checks of tank integrity. This duration corresponds to the standard time between line flushes now used by the Interim Stabilization project and incorporated into the preliminary 241-S-112 retrieval operation strategy. An eight-hour static test will be performed during the shutdown period to perform the weekly flushes. This selected duration is based on the desire to mitigate tank leakage by reducing the retrieval duration. Additional retrieval duration time associated with static leak testing provides more time for an undetected leak to contaminate the soil column.

Leak tests may also be performed during any unanticipated outages. The duration of these tests will be dependent upon the length the tank remains in equilibrium.

2.3.1.2 Ex-Tank Methods

A variety of ex-tank methods with potential utility at Hanford have been identified and evaluated (RPP-6797). Testing of six ex-tank methods are underway and results from the testing are not anticipated until later this year (RPP-8476). A final determination of which ex-tank leak detection method, if any, cannot be made until the completion of this

first round of testing. None of the tested technologies will be recommended for implementation unless the testing reveals a system capable of meeting the performance requirements (or exceeding the static leak testing performance expectations). The identified BATEA will be utilized.

In the absence of any data, the existing drywell casings and radiation monitors will be used exclusively for ex-tank leak detection.

2.3.2 Leak Monitoring Design Concepts

Leak monitoring is the quantification of a liquid waste release volume from an SST after detection of a leak, during or after waste retrieval operations (only past leaks are excluded). A leak volume estimate must be accurately predicted to quantify the environmental impact resulting from a leak. The requirement for leak monitoring is as follows:

> **Estimate the total volume of a release, if one occurs, and the accuracy of this estimate.**

The accuracy of the estimated leak is necessary to establish the probability that the TLDR, or the RRC has, or has not, been exceeded.

The same technologies and methods used to address the leak detection function can also be used to address the leak volume quantification requirements for the leak monitoring function. The same internal volumetric method recommended for leak detection can also provide calculations of leak rate as part of the tests. The flow rate and estimate of when the leak initiated can be used to estimate the volume of a release.

If a release were to occur, the volume could be estimated from the results of the volumetric tests conducted before, during, and after retrieval operations. Estimating the volume of a release produced by retrieval operations requires that the integrity of the tank be known immediately before retrieval operations begin. The most accurate estimates can be made if the test conducted immediately before the retrieval operations begin indicates that the tank is non-leaking.

2.3.3 Leak Mitigation Design Concepts

The primary goal of the LDMM system is to employ a technology that can prevent or mitigate the potential for a leak to result during waste retrieval operations and/or can minimize the impact of a leak. The following requirement identifies an administrative control for implementation of a plan to minimize the risk to the environment and to minimize any potential human health effects. The requirement is as follows:

> **A tank-specific leak response and mitigation plan shall be developed that minimizes the leak risk potential and reduces the environmental impact of a leak, if one occurs during waste retrieval operations.**

Leak mitigation is the primary means of minimizing environmental impact caused by releases during retrieval of SST waste. By designing retrieval systems with leak mitigation features, such as reducing the amount of free (drainable) liquids and minimizing retrieval operations duration, potential leak volumes can be minimized.

Minimization of liquids in 241-S-112 during retrieval operations is an important consideration in minimizing environmental damage, should a leak occur. To minimize liquids within 241-S-112 during retrieval operations, the rate of liquid addition will be controlled to approximately match the rate of liquid removal. The liquid inventory will be maintained at a minimum level at all times. In the LVDG dissolution retrieval method, the removal of saturated liquid via the saltwell pump will be limited by the flow rate of liquids through the waste to the saltwell screen. Historically, maximum flow rates of approximately 4 to 6 gpm have been recorded during saltwell pumping operations. The new saltwell pumping system is anticipated to increase this outflow to approximately 8 to 10 gpm. This flow rate is established from initial testing performed in shop demonstrations and preliminary results of units installed in 241-AX-101, 241-BY-105 and 241-BY-106. The flow rate of water introduced into the tank via the Water Distribution System spray nozzles will be adjusted to match the flow rate of waste discharged from the tank via the saltwell pump. Because the distribution pattern of the water on the surface of the waste is dependent on flow rate through the sprinkler nozzles, adjustment of the water introduction rate may be time-averaged (i.e., operated part-time at design flow rates and secured part-time to achieve desired average flow rate).

In addition to reducing the liquid inventory, retrieval operations will be accelerated to the greatest extent possible to minimize the duration liquid is present. Measures to accelerate the retrieval include:

- Utilizing the larger capacity saltwell pumping system.
- Operating 24 hours a day, 7 days a week.
- Minimizing the static test frequency.
- Reducing static leak test frequency.

The alternative of not retrieving the S-112 waste will result in its eventual and certain release, when the tank ultimately fails. If the tank is not retrieved, the risk is proportional to the curies trapped in the residual waste (523,000 gallons). The assured eventual release of all 523,000 gallons if the tank is not retrieved carries a much higher risk than the potential loss that might occur during retrieval. The risk of not retrieving is estimated to be about 1,000 times greater than if the waste is retrieved and a leak does occur during retrieval, based on historical Hanford tank leak data. Therefore, any waste retrieval will reduce the long-term risk to human health and the environment.

2.4 AUTHORIZATION BASIS ASSESSMENT

The scope of work identified in this Preliminary Engineering Report for demonstration of saltcake dissolution retrieval is based to a large extent upon activities that have been previously analyzed and documented (saltwell pumping) in the Tank Waste Remediation

System Final Safety Analysis Report (a.k.a. FSAR, HNF-SD-WM-SAR-067). An assessment of the project's proposed configuration and operating strategy against the approved Authorization Basis (AB) provided in the FSAR should be performed during the early conceptual design phase to verify that these activities are within the operating limits bounded by the FSAR. The planning presented in this report includes performance of an AB assessment and preliminary hazard analysis during the conceptual design phase of the project, followed by development of additional documentation to support incorporation of the dissolution retrieval systems into the FSAR during the detailed design phase. It is expected that only minor descriptive changes will be required and that this information can be included as part of the annual AB update performed by Tank Farms personnel.

2.5 PERMITTING

An Environmental Approvals and Permitting Plan prepared for the Saltcake Dissolution Retrieval Project (RPP-7596) describes the environmental actions, required permits, and other agency approvals affecting the project. This document, which addresses deployment of the dissolution retrieval system in 241-S-112, presents a strategy and plan for meeting environmental requirements during construction and installation of systems, structures, and components for waste retrieval. The Environmental Plan includes a summary of required permits and approvals, planning assumptions, cost estimates, and schedule information for implementing the selected environmental permitting strategies. The information provided in this document has been used as the basis for rough order of magnitude cost and schedule information presented in this Preliminary Engineering Report.

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3.0 DEVELOPMENT AND EVALUATION

3.1 RETRIEVAL OPERATIONS

Two primary modes of operation were considered for the introduction of solvent to the tank: intermittent and continuous. For both methods of addition, it is assumed that the saltwell pumping extraction of solution will be continuous. An additional operational mode was considered that could be implemented with both continuous and intermittent solvent addition: solvent/solution recirculation. One objective of the 241-S-112 Saltcake Retrieval Demonstration is to minimize the volume of DST space consumed by identifying methods of maximizing the saltcake dissolution rate through effective utilization of the solvent distribution and minimizing retrieval duration by incorporating effective waste transfers.

3.1.1 Intermittent Water Additions

The operating approach for intermittent solvent addition would be to increase the rate of addition and decrease the duration of addition proportionally to balance with the removal over a given period of time. For example, the introduction rate could be tripled for an eight-hour period such that the average introduction rate over a twenty four-hour period is equal to the rate of solution removal.

The primary advantage to this alternative is that less automation may be required for this alternative; an operator could manual turn the system on and off during the same shift. This alternative will also allow for solvent introduction at higher flow rates than the saltwell pump is capable of recovering (8 to 10 gpm). This may be required in order to increase the water distribution range to cover the entire waste surface area. The primary disadvantage for this alternative include:

- Increased liquid inventory and potential leak volume
- Increased likelihood of waste channeling, short circuiting, and decreased retrieval efficiency
- Process control difficulties from varying solution saturations.

Part of the leak mitigation strategy is to minimize the liquid inventory in the tank at all times. In this way the potential leak volume is minimized. If a leak is detected during retrieval, the duration that waste is leaking is a function of the liquid inventory and duration to remove the liquid inventory. In the intermittent water addition alternative, the rate of addition would be greater than the rate of removal (during the addition period) and an inventory of solvent would accumulate in the tank.

The saltwell pumping system removes liquid from the salt matrix at the same rate that the liquid is relinquished. Intermittent liquid additions will add water at a rate greater than the removal rate. It may be difficult to control the duration of additions as to not exceed waste saturation. In the event the waste is completely saturated and water is still added, short-circuiting will occur. This will result in either channeling and/or over-surface flow.

Neither scenario is desirable and will result in unsaturated or not fully saturated solution from reaching the saltwell pump. This will decrease retrieval efficiency, result in varying dilution ratios and/or increased waste volume generation, and complicate the chemical adjustment requirements, if required.

The potential shortcomings of this alternative could be reduced to some extent by monitoring the specific gravity of the solution in the well (via dip tubes) and suspending water additions to the tank when the solution density begins to decrease.

3.1.2 Continuous Water Addition

The operating approach for continuous solvent addition would be to match the rate of solvent addition to the rate of solution removal. A steady state would be achieved where the inventory of liquid within the tank is minimized at all times. This requires that the water introduction system be automated such that the flow rates in and out of the tank be balanced at all times. The advantages to this method are the elimination of the potential problems that could result from intermittent additions (see Section 3.1.1).

This alternative is selected for the retrieval of 241-S-112 primarily due to the concerns over DST space limitations. Steady-state retrieval operations will allow for accurately diluting the recovered waste stream. Varying solution saturation levels would likely result in over dilution in the event of tank over saturation. This in turn would result in an increased waste volume being sent into the DST system.

The precise means of operating a continuous addition system is not completely resolved. The proposed design utilizes three solvent addition points (a.k.a. sprinklers), which could operate simultaneously or singularly. In the event sufficient coverage cannot be obtained by utilizing a 2 1/2 to 3 gallon per minute flow, the flow could be increased to 8 to 10 gallons per minute. One sprinkler would operate for a set duration, be turned off, the next sprinkler turned on and the process repeated.

3.1.3 Solution Recirculation

Considerable uncertainty exists surrounding the ability to manage the removal of only saturated solutions from the tank. Initially, it is anticipated that the solvent added will quickly saturate and only saturated solutions will collect in the saltwell screen. As waste volume gets low and the more soluble waste constituents have already been recovered, it is likely that the collecting solution will be less than fully saturated. There are two potential means of managing this likelihood: stopping and allowing more time for dissolution and solvent recirculation. There is little doubt that the added agitation of recirculating the solution will speed the dissolution process.

The complexity (and associated costs) of adding a method of solution recirculation must be weighed against the time (and subsequent costs) gained by utilizing the system verses not using such a system. At this time, a solution recirculating system is not recommended. However, the retrieval schedule narrowly fits within the operating window outlined in the TPA milestones. Solution recirculation may be one means of

accelerating the waste recovery schedule and should be thoroughly evaluated in the conceptual design phase of the project.

3.2 WATER DISTRIBUTION CONFIGURATION

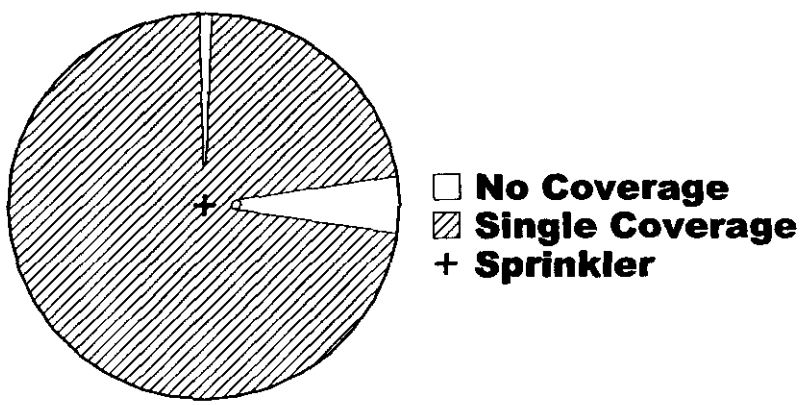
The risers available on 241-S-112 were examined to identify potential installation locations for a water distribution system. Combinations of one, two, three, and four "sprinkler arrays" were considered to effectively cover the waste surface with solvent. There are numerous obstructions suspended from the tank dome. The most significant obstructions are the saltwell screens in Risers 5 and 13. Other obstructions include the liquid observation well in Riser 8 and temperature probe in Riser 4. The "shadowing" effect from this equipment varies for the various sprinkler array options.

3.2.1 Single Sprinkler Option

The single sprinkler approach is to install a sprinkler centrally in Riser 13 (see Figure 3-1). The large shadow created is the result of the saltwell screen in Riser 5. The sprinkler nozzle range would have to be near 40 feet radially to effectively cover the entire waste surface. This approach offers numerous disadvantages, which eliminated this option from further consideration. The primary disadvantages include:

- Requires removal and disposal of the saltwell screen from Riser 13 (Long Length Contaminated Equipment [LLCE])
- Large shadowed area created by saltwell screen in Riser 5
- Minimal control over application of solvent

Figure 3-1: Single Sprinkler Option



3.2.2 Dual Sprinkler Option

The dual sprinkler approach is to install sprinklers in diametrically opposed risers. As can be seen from Figure 3-2, this option is only marginally better than the single sprinkler option, only eliminating the shadowing effects caused by the saltwell screen. Sprinkler installation risers would be a significant concern with this option. The only available risers are centrally located and many are occupied with LLCE. For these reasons the dual sprinkler option is not considered a viable alternative.

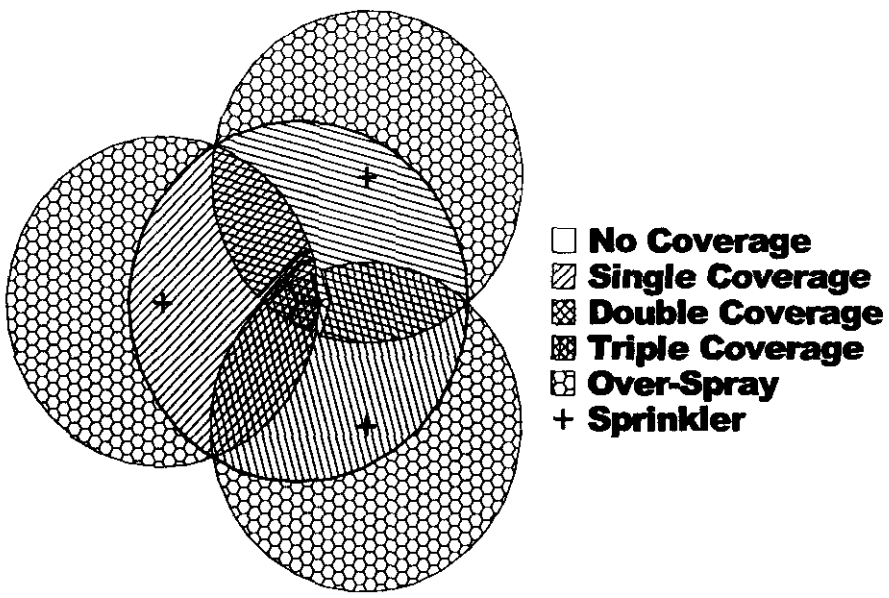
Figure 3-2: Dual Sprinkler Option

3.2.3 Three Sprinkler Option

The three-sprinkler approach is to install sprinklers in risers equidistant from the center of the tank and 120° apart. Risers 11, 14, and 16 are the only available risers suitable for this installation option. As can be seen from Figure 3-3, a significant volume of solvent (approximately 40%) will be projected against the tank wall. This may or may not be of significant concern but sprinkler design issues such as this will be addressed in conceptual and definitive design. This configuration will likely clean the tank walls and saltwell screens near the center of the tank. Additionally with three sprinklers, there is some added control over the dissolution process. If a particular section of the tank is being removed more quickly, the sprinkler supply of solvent to the area could be throttled or turned off until the other areas catch up.

This option will require the removal and relocation of two pieces of equipment. The breather filter and SHMS on Riser 14 will require removal and relocation, or replacement and disposal. For the purposes of the estimate the SHMS cabinet will be relocated and the breather filter replaced.

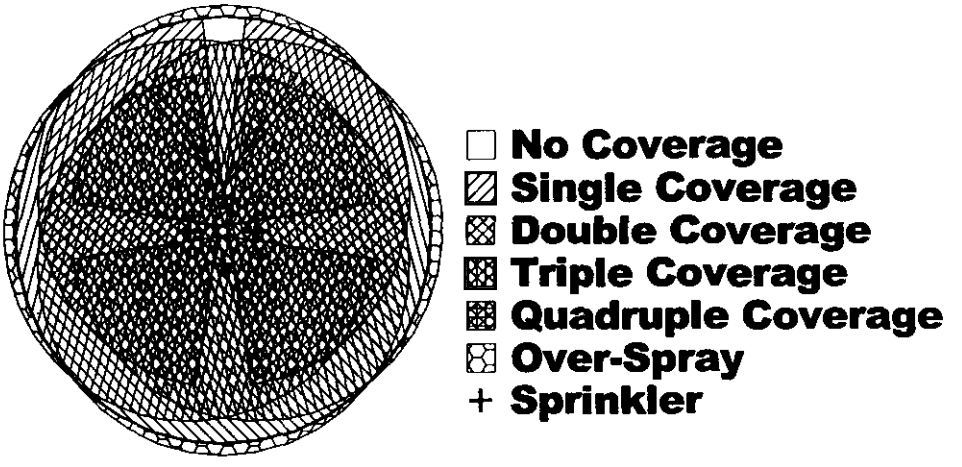
Figure 3-3: Three Sprinkler Option



3.2.4 Four Sprinkler Option

The four-sprinkler approach is to install sprinklers in risers equidistance from the center of the tank and 90° apart. Risers 1, 2, 3, and 4 or Risers 5, 6, 7, and 8 are the only available risers suitable for this installation option. Riser 3 contains a level gauge, Riser 4 contains a temperature probe, Riser 5 a saltwell screen, and Riser 8 contains a LOW. A LLCE removal will therefore be required for installation in either configuration. One LLCE removal is required for the first option and two for the second. For this reason, Risers 1, 2, 3, and 4 were chosen for this alternative arrangement. As can be seen from Figure 3-4, there is significant overlap in the sprinkler coverage due to the near central location of the four risers. This is far from an ideal configuration. A stabilized tank results in a concave waste surface with the waste at the center of the tank several feet lower than near the periphery. The near center location of the installation risers also eliminates most of the ability to control the dissolution process. Shutting off two of the sprinklers will still provide nearly even coverage. Additionally, this option eliminates many of the available risers, leaving a riser shortage. If this option were chosen, it is likely that additional equipment removals would be required to accommodate the necessary in tank equipment. Installation of an additional riser is considered to be cost prohibitive.

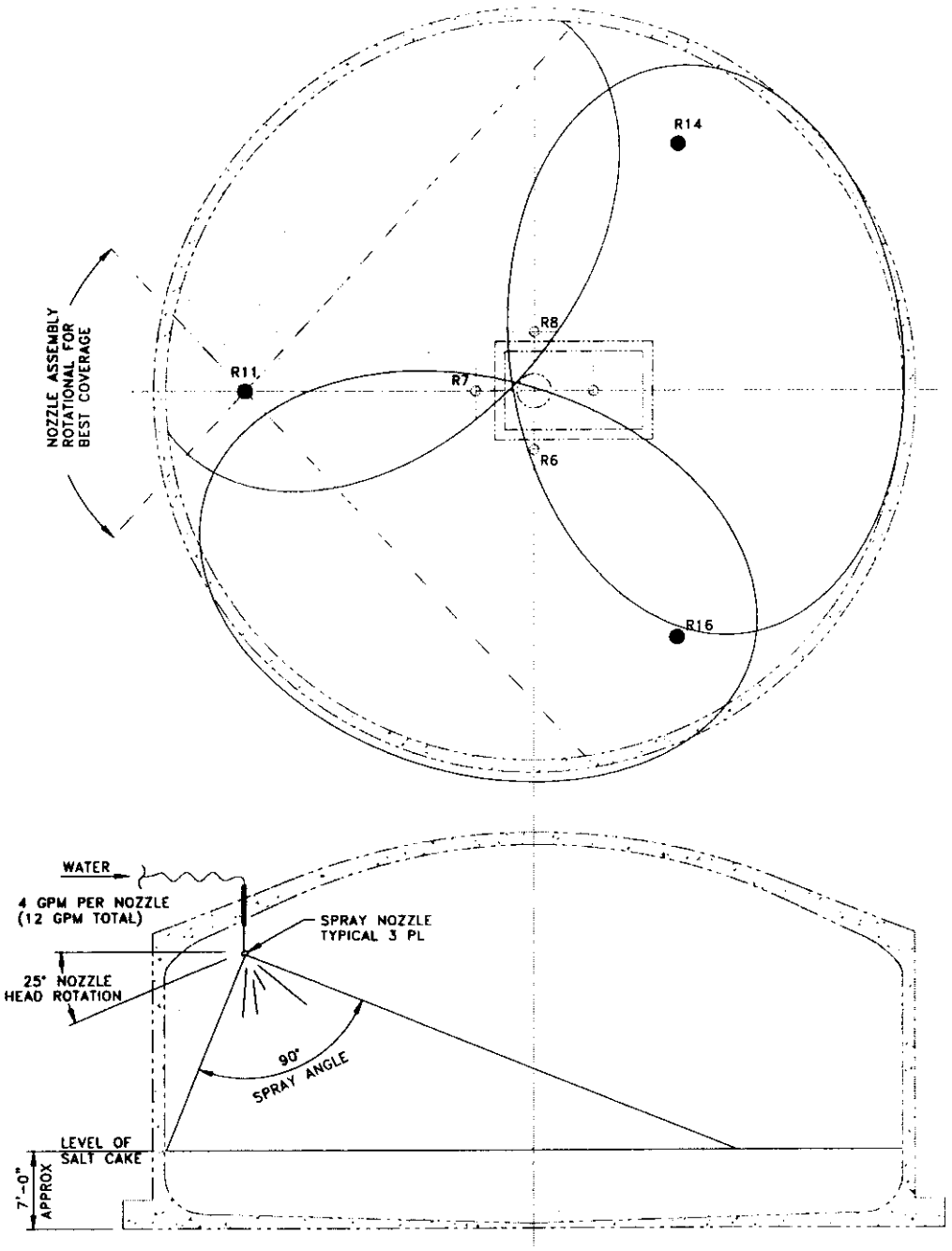
Figure 3-4: Four Sprinkler Option



3.2.5 Preferred Sprinkler Arrangement

The preferred option is to install three sprinklers in the tank. Utilization of three sprinklers is preferred over four sprinklers due to the shortage of available risers as discussed in Section 3.3. Utilization of three sprinklers instead of one or two is preferred due to the improved distribution of solvent associated with three sprinklers. This alternative will wash the tank walls and distribute most of the solvent a significant distance from the saltwell pump. This should increase recovery efficiency and shorten the retrieval operation duration. Numerous sprinkler designs will have to be evaluated during conceptual design to determine the best-suited method/technology to distribute the solvent. One option shown in Figure 3-5 is to install sprinklers with elliptical spray patterns to minimize solvent distribution overlap and overlap.

Figure 3-5: Preferred Sprinkler Option



3.3 EQUIPMENT PLACEMENT RATIONALE

Following the placement of the sprinklers in Risers 11, 14, and 16, the remainder of the risers required for equipment installations are selected. These remaining pieces of equipment are:

- Saltwell screen and pump
- Dip tubes
- Level Gauge(s)
- Thermocouple tree
- CCTV Camera
- Combustible/flammable gas monitor
- Ventilation/Exhauster system
- Ventilation condensate return
- Ventilation inlet

Riser selection and placement of each piece of equipment was established based upon the following criteria (listed in order of importance):

- LLCE removal minimization,
- Equipment performance optimization and shielding,
- Infrastructure and utility modification minimization, and
- Tank S-112, S-Farm, and drywell access optimization.

A preliminary recommended riser utilization schedule is included in Table 3-1.

Table 3-1 Riser Utilization

Riser	Size	Utilization and Comments
1	4"	Not Used
2	4"	SHMS
3	4"	Level Gage
4	4"	Temperature Probe
5	12"	Not Used
6	12"	Camera
7	12"	Vent Inlet
8	12"	Liquid Observation Well
11	4"	Sprinkler
13	42"	Saltwell Screen and Pump
14	4"	Sprinkler
16	4"	Sprinkler / Condensate Return
Condenser		Vent Outlet
MH	42"	Not Used

3.3.1 Saltwell Pump and Dip Tube Location

Tank S-112 has a dish-shaped bottom making it critical to locate the saltwell pump at or near the tank center to maximize the recovery volume and minimize the liquid inventory during retrieval. In addition, the pump should be located in a pit to reduce worker radiation exposure and for other associated ALARA reasons. Two risers, which are adequately sized (i.e., 12 inches or larger) to meet these requirements, are Risers 5 and 13.

Both Riser 5 and Riser 13 contain saltwell screens. Riser 5 contains an old saltwell pump and dip tubes, installed in July 1978, legacy of the last pumping campaign. Riser 13 contains a newly installed screen, installed in October 2000, to accommodate a new saltwell pumping system to be installed in the second quarter of FY 2002. Interim Stabilization has had no success in restarting old pumps after extended down time and replacement is always executed. Riser 13 is the preferred riser to contain the pump to support the Saltcake Dissolution Retrieval Demonstration due to its central location, location within a pit, and size. Utilization of this riser will require removal of the existing pump and jumper, pump legs, dip tubes, and lancing of the saltwell screen. The pump legs and dip tubes could be cut up and disposed of in a standard burial box along with the other removed components.

An early project demonstration start date could make use of the saltwell pumping equipment installed by the Interim Stabilization Project in 2002. This would save significant dollars by eliminating otherwise redundant engineering and fabrication efforts. Additionally, and most significantly, a LLCE removal and disposal would be eliminated. Substantial potential savings could be incurred by coordinating the retrieval with the upcoming stabilization campaign.

3.3.2 Ventilation Inlet

The ventilation inlet should be as large as possible, and practical, so as not to impede air inflow to the tank. This becomes essential when the waste volume gets low and the minimum tank vacuum is restricted to prevent exceeding established negative pressure limit. Risers 5, 6, 7, and 8 are 12-inch risers and Riser 13 is a forty-two (42) inch riser. The remainder of the risers on the tank are 4-inches. An additional tank access is available through the condenser hatchway in the condenser pit. Risers 5 and 13 are in the 241-S-12A Pump Pit and are occupied with saltwell screens. Riser 8 contains a liquid observation well. Riser 7 had been designated as the ventilation riser previously, and will serve this purpose again for the dissolution WRS.

3.3.3 CCTV Camera

The CCTV camera used to observe the WRS operations requires a 10-inch or larger riser to accommodate installation into the tank. Following the logic for the placement of the other components, the only available riser is Riser 6.

3.3.4 Ventilation Exhaust

Following a similar rationale for the ventilation inlet filter placement, the only suitable location for the exhaust stream is the riser in the condenser pit. The other available risers are not adequately sized or sufficiently distant from the ventilation inlet. If it is determined that active ventilation is required the existing cover plate will be replaced with a steel cover with 12-inch flange. The cover plate will seal to the condenser pit with a compressible gasket. A flexible duct will connect span the gap between the pit and the exhauster.

3.3.5 Combustible Gas Monitor

A combustible gas monitor/flammable gas monitor (CGM) may need to be installed in the tank dome. Location of this piece of equipment is less critical than the other pieces of equipment. Ideally it is located away from the ventilation inlet and outlet. Airflow near these locations may skew the actual combustible gas concentration by dilution with ambient air. Riser 6 has sufficient room to contain both the CCTV camera and a CGM. Location in this riser will eliminate the need for an additional riser entry. If collocation with the camera is deemed impractical, the dome space CGM could be placed in Riser 1 or 2. Location in Riser 2 would however, place the CGM between the ventilation inlet and outlet, possibly resulting in inaccurate flammable gas concentration readings. Interim Stabilization previously placed a CGM directly below the Pump Pit cover plate on other installations where a CGM was required, if a CGM is required to support 241-S-112 waste retrieval, this may be the selected location.

Tank S-112 is listed on the flammable watch list for hydrogen generation. Therefore, a Standard Hydrogen Monitoring System (SHMS) will be used as the combustible gas monitor. The isolated SHMS cabinet near Riser 14 will be relocated to serve this purpose.

3.3.6 Condensate Return

In the event an exhauster is incorporated into the final design a condensate return from the exhauster to the tank will be required. The condensate return line from the exhauster does not have any special requirements. It is desirable, however, from a mass balance perspective to return the condensate to the tank. The condensate return may be through any available riser or combined with other equipment into a common riser.

3.3.7 Temperature Probe

The existing thermocouple tree in Riser 4 is functioning and will continue to be used for the WRS. The temperature measurements will be used primarily for the internal tank volumetric balancing and leak detection.

3.3.8 Dip Tubes

Dip tubes will be installed in the saltwell screen in Riser 13 adjacent to the saltwell pump legs. The dip tubes will function to obtain specific gravity measurements as well as liquid waste depth measurements. This will eliminate the need for a second dedicated level measurement device. Installation of the dip tubes in the same well as the saltwell pump has been the convention of the Interim Stabilization project. In the case of 241-S-112, there are two adjacent wells that could support installation of the dip tubes.

Installation of the dip tubes in the saltwell screen in Riser 5, would produce more accurate measurements by distancing the tube/pipe outlet(s) from the disturbances created by the waste re-circulating eductor, but may require removal of the abandoned saltwell pumping system from Riser 5 to gain access. This would also, however, raise concerns that the level in the Riser 5 well is not the same as in the Riser 13 well. If the level differences were significantly, the pump in Riser 13 could lose prime. For this reason, Riser 13 is preliminarily selected to contain the dip tubes.

3.3.9 Level Gauge(s)

An ENRAF™ level gauge is currently installed in Riser 3. The design of the ENRAF (plumb-bob) will not allow for operation concurrent with the water distribution system. The water impacting the wire and plummet may cause it to swing and potentially break the relatively fragile instrument and produce varying level feedback. One solution is to relocate the existing ENRAF be relocated to Riser 5 in the central Pump Pit. This would require the removal of the abandoned saltwell pump and jumper from Riser 5 and incorporation of a removable ENRAF design to support potential Pump Pit cover plate removal for potential equipment repairs. This would locate the plummet the greatest distance from the distribution sprinklers and internal to the old saltwell screen. If it is determined that real-time surface level measurements are not required, then the ENRAF should be left in position in Riser 3. If a central location for the ENRAF is not desired then an alternative riser will have to be selected.

The dip tubes and weight factor transmitter currently incorporated in the saltwell pumping system will be used to provide liquid level data at the pump inlet in Riser 13.

A Liquid Observation Well (LOW) is installed in Riser 8. A neutron probe will be used in the LOW to obtain the Interstitial Liquid Level (ILL) measurements to be used by the leak detection system.

3.4 TANK VENTILATION

Tank S-112 is passively ventilated through a breather filter installed on Riser 14. The introduction of water through distribution devices is anticipated to generate aerosol with the potential of saturating the passive HEPA filter. Additionally, the tank is postulated to contain a significant volume of entrained gases. Disruption of the salt matrix is anticipated to release significant quantities of toxic and flammable gases. Until the water retrieval system design is developed in sufficient detail to estimate the aerosol generation and gas release, the ventilation requirements cannot be accurately ascertained.

There are numerous options that should be considered in subsequent phases of the project for ventilating the tank and preventing saturation of the breather filter. One option is to continue passively ventilating 241-S-112. The primary advantage to this option is not having the increased expenditure and maintenance associated with an exhauster. A heater placed between the riser and filter could be used to protect the filter medium from saturation. In the case of the 241-U-107 Poof of Concept, the breather filter was heat traced and insulated (RPP-8382). Another option is to make use of the portable exhauster, POR-004, installed between 241-S-103 and 241-S-106. This exhauster would require, at a minimum, modification for the addition of a demister on the inlet and relocation to 241-S-112.

Past practice for retrieval at Hanford would dictate the installation of an exhauster, as has been the convention with sluicing. Considering 241-S-112 is listed as a hydrogen-generating tank, this further substantiates the need for an exhauster. Use of portable exhauster, POR-004, modified with the addition of a demister, will be used as the preliminary baseline. The exhauster will be relocated and a demister installed with a condensate return line back to the tank.

3.5 TRANSFER PIPING

3.5.1 S-Farm Transfer Piping System

The existing underground transfer pipelines in the 241-S Farm complex have incurred numerous failures due to external corrosion between the pipeline and heat trace conduit (RPP-5825). Recent initiation of saltwell pumping efforts in S Farm brought the transfer line integrity concerns to the forefront. In spite of initial hydro-testing and annual testing of the 241-S Farm lines, the transfer line from 241-S-103 to 241-S-A Valve Pit, 3-inch supernatant line SN-219, resulted in a line failure and surface contamination pool. As a result of this failure and in conjunction with high failure rates of the other lines, an administrative decision was reached by the Interim Stabilization program to no longer use any of the un-encased 241-S and 241-SX Farm transfer lines.

New temporary hose-in-hose transfer line, installed slightly below grade is being utilized by the Interim Stabilization Project to transfer the remaining pumpable liquids from the 241-S Complex, with the exception being 241-S-102, which has an encased pipe line connected to the 241-S-A Valve Pit.

A temporary hose has already been installed connecting the 241-S-A and 241-S-C Valve Pits. A line will be installed from the 241-S-C Valve Pit to the 241-S-12A Pump Pit prior to saltwell pumping scheduled for the second quarter of FY 2002. The service life of this temporary hose has been reduced from 7 (HNF-6711) to 3 years (HNF-6711 Rev. 1). The three year service life is currently being reviewed with hopes of extending the service life of the hose-in-hose installations up to 5 years. If the 3 year service life reduction is imposed, then the line connecting the existing hose-in-hose transfer line between 241-S-A and 241-S-C Valve Pits will exceed its service life prior to the completion of saltwell pumping in 241-S and 241-SX Farms, unless the accelerated saltwell pumping schedule is not maintained. The existing hose-in-hose transfer line between 241-S-C and 241-S-A Valve Pits was installed in April 2000 and first used to transfer waste in 6 June 2000. The existing three-year service life starts on the date of initial waste transfer; replacement of this hose section may be necessary to support 241-S-112 retrieval, if an alternative service life is not established. The current schedule for retrieval of 241-S-112 may extend beyond the life of the hose assembly yet to be installed between the 241-S-12A and 241-S-C pits. Coordination of the saltwell pumping and waste retrieval Project should be considered to eliminate this potentially redundant expenditure. For preliminary engineering purposes, it has been assumed that a compliant transfer route will be available from the 241-S-C Valve Pit to the 241-SY-02A Pump Pit. Annual hydro pressure testing, as well as an initial integrity (proof-of-flow) and pressure test will be required.

Interim Stabilization activities are scheduled to continue in 241-S Farm through February 2003. Activities are also planned for FY 2002 by Project W-314 to bypass the 244-S DCRT to support 222-S lab transfers to 241-SY Farm. The renegotiated TPA M-45 Milestones identify a second waste retrieval in 241-S Farm for 241-S-102. Operation of the 241-S-112 retrieval system is scheduled to overlap with the 241-S-102 construction activities. Project integration with all of these potentially interfering activities is warranted as the 241-S-112 retrieval project demonstration schedule is further developed.

Figure 3-6 and Figure 3-7 show details of the hose-in-hose transfer line cross-section and transition into a pit, respectively.

Figure 3-6: Hose-in-Hose Cross Section

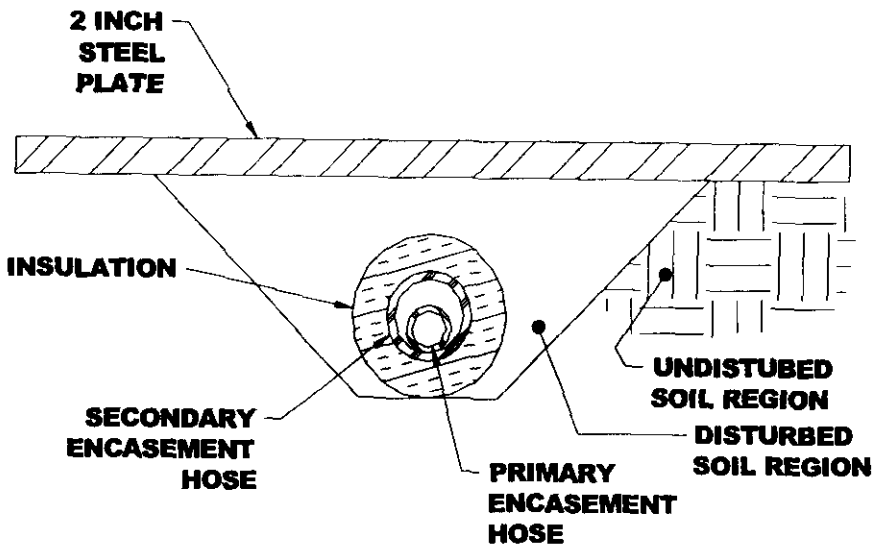
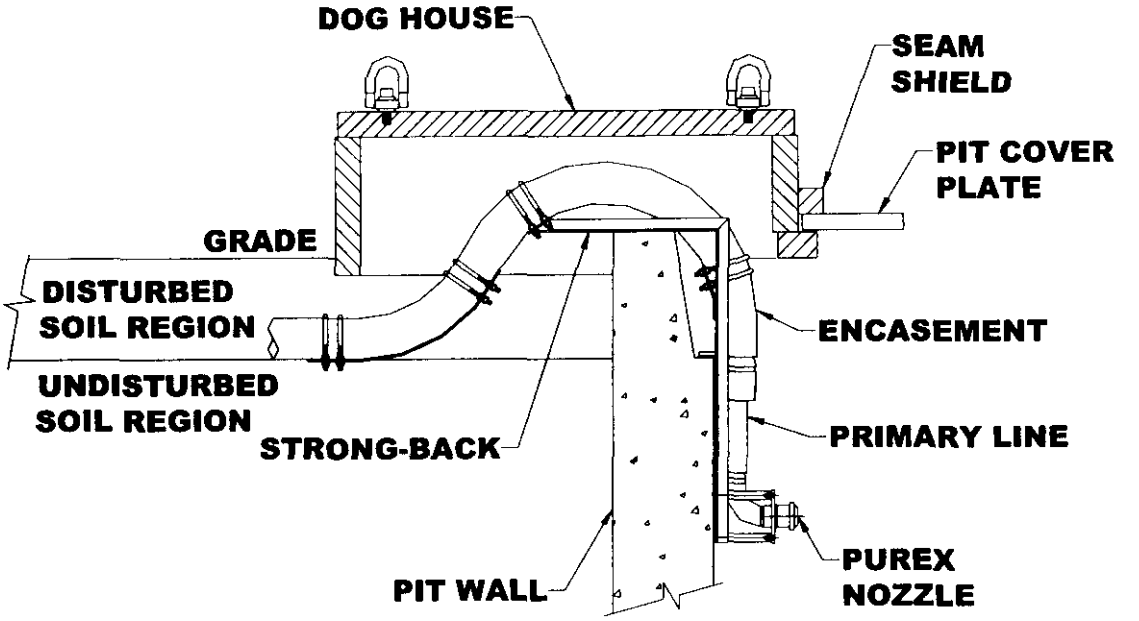


Figure 3-7: Hose-in-Hose Pit Entry Cross Section



3.5.2 SY-Farm and Inter-Farm Piping

Two transfer lines installed during the 241-SY Farm construction connect the 241-SY-A and B Valve Pits to the 241-S-A & B Valve Pits. There is an existing 3-inch encased line (SN-275) between the 241-SY-A Valve Pit and the 241-S-A Valve Pit, and an existing 2-inch encased line (SL-177) between the 241-SY-02A Pump Pit and the 241-SY-A Valve Pit. Utilization of this route will capitalize on the existing lines installed by the Interim Stabilization Project and is preferred for this reason for the 241-S-112 retrieval demonstration.

The 241-SY Farm infrastructure is well maintained and operable. Waste is currently being received from Interim Stabilization saltwell pumping in 241-U Farm, 241-S Farm, and 241-SX Farm. Additionally, waste is routed through the 244-S DCRT from the 222-S Labs. All of the waste is currently directed into 241-SY-102, which is designated as the cross-site transfer/staging tank. Retrieved waste from all of the 200 West Tank Farms will be directed through 241-SY-102 to the 200 East DSTs for eventual treatment, immobilization and disposal.

The SY Farm transfer lines (SL-177 and SN-275) are suitable to support the retrieval of 241-S-112, however, these lines will no longer be compliant as of June 30, 2005, as the result of the existing encasements not extending into the pit structures. The TPA

(December 1998) M-43 series of milestones requires that all waste transfer lines be fully compliant by that time. This will require modification or replacement of all of the 241-SY Farm transfer lines. See Appendix I for the Department of Ecology's interpretation of the M-43 milestone series. These upgrades are included within the scope of Project W-211.

Several projects are anticipated to have activities within 241-SY Farm and 241-S Farm that could impact the configuration and availability of the transfer system. In particular, Projects W-521, W-525, and W-314 are scheduled to complete upgrades in the 241-SY-A Valve Pit. Project W-525 will also be completing activities in the 241-SY-02A Pump Pit. Project W-525 activities are not currently planned to be performed in the 241-S-A Valve Pit. Integrating the needs of the SST retrieval projects with the DST system and Tank Farm Upgrades is paramount for timely and cost effective utilization of the common architectures. Acceleration of the retrieval to coincide with the Interim Stabilization pumping schedule would eliminate most of the potential project conflicts. This issue is further discussed in Section 4.2.

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4.0 ASSUMPTIONS AND UNCERTAINTIES

4.1 ASSUMPTIONS

This section describes the assumptions that were made to enable development of the proposed LVDG demonstration. Each assumption is described, and the description is followed by a discussion of the sensitivity of the analysis if the assumption is invalid. Uncertainties associated with the proposed project are identified and described thereafter.

Assumption No. 1 – The SST selected for the saltcake dissolution retrieval demonstration, 241-S-112, is sound (i.e., non-leaking).
Sensitivity – A determination has been made that 241-S-112 is a sound tank (HNF-EP-0182-146). If this condition changes, then the engineering basis of the saltcake dissolution and retrieval method developed in this document is undermined and the cost and schedule estimates would be invalidated. The tank used for demonstration of saltcake dissolution retrieval using the process described herein must be sound.

Assumption No. 2 – The "benchmark" saltcake dissolution retrieval process described in this report is based, to the greatest extent practical, on a system configuration and operating process similar to that used for current Interim Stabilization salt well pumping operations.
Sensitivity – The pre-conceptual cost estimate and schedule are based largely upon the relevant salt well pumping data. Any changes to the assumed configuration or process will impact the estimated cost and schedule for the demonstration project. Development and engineering activities have taken credit of work already done within the Interim Stabilization Project.

Assumption No. 3 – The assumed dissolution ratio for the 241-S-112 waste is 2.3 to 1 (i.e., approximately 2½ gallons of water added to the SST to dissolve 1 gallon of saltcake)(see calculation 4412.070.PCAL.001, in Appendix C).
Sensitivity – The total volume of waste to be received by the DST system (i.e., 241-SY-102) is dependant upon the dilution ratio required to achieve saltcake dissolution. Testing with actual waste to gain a further understanding of the dissolution retrieval process is needed during the conceptual design stage to verify the DST storage space requirements for the demonstration. Additionally, the overall retrieval duration and associated costs will be impacted by any changes to the resultant pumping volume.

Assumption No. 4 – Cross-site transfers from the recipient vessel will be made to accommodate the recovered volume. The receiver tank (241-SY-102) will initially be emptied to the greatest extent possible using existing equipment.
Sensitivity – The estimated DST space requirements for the recovery of 241-S-112 far exceeds the space available in any single Hanford DST. Complete recovery of the demonstration tank will require additional DST space beyond that available in 241-SY-102. The baseline estimate and schedule assumes this will be accomplished by two transfers occurring during the retrieval process. Rerouting of the waste to an alternate tank (e.g. 241-SY-101 or 241-SY-103) would require additional dollars and time which

have not been included in the pre-conceptual cost estimate. Additional cross-site transfers from 241-SY-102 may result in schedule delays (see also Section 4.2.1).

4.2 UNCERTAINTIES

4.2.1 Tank SY-102 Waste Space Availability

In retrieving 241-S-112 waste, approximately 1.34 Mgals of waste (see calculation 4412.070.PCAL.001 in Appendix C) will be introduced into the DST system via 241-SY-102. Numerous potential issues arise, including space availability in 241-SY-102 and compatibility of the S-112 waste with the SY-102 waste. Planning for the receipt of the waste into the DST system will have to be completed in the conceptual stage of design based on Hanford Tank Waste Operations Schedules (HTWOS) modeling.

The estimated 1.34 Mgal waste volume is a based on the current BBI and estimates for the required dilution. Tank S-112 has not been characterized by sampling and the estimates within the BBI are likely to change. Core sampling of the tank has recently been completed, however, the analytical results are not currently available to support this activity. The exact dilution requirements (if any) have yet to be determined. Using the Interim Stabilization generic operating approach of diluting one to one (1:1), based on CHG Process Engineering guidance was used as the baseline.

Regardless of other concerns, the space available in 241-SY-102 will not support the retrieval even if the tank is empty prior to pumping initiation. The current 241-SY-102 inventory cannot be reduced to below approximately 200-inches by design of the transfer pump. This limits the available space to approximately 500,000 gallons. The cost and schedule developed factor two transfer out of the tank, during the retrieval demonstration.

The September HTWOS model assumes three transfers from 241-SY-102 to support the recovery of waste from 241-S-112. The first transfer will make space available for the introduction of waste. Two interruptions in the retrieval operations will be made to empty the tank to near the solids level. Tank SY-102 will be near full at the completion of the Saltcake Dissolution Retrieval Demonstration.

One potential means of mitigating the DST space concern, and those associated with using 241-SY-102 in particular, would be to utilize 241-SY-101 in lieu of, or in addition to 241-SY-102. Plans are underway to make 241-SY-101 the cross-site staging tank providing the capabilities to readily remove the tank contents. If 241-SY-101 is successfully upgraded to be the cross site transfer tank prior to the demonstration, it is recommended that it be utilized as an additional receiving tank.

4.2.2 Effects of Water Distribution System on Existing Hardware

The effects of the addition of the water distribution system on existing tank equipment requires consideration. The projection of water at ambient (ex-tank) temperature against the thermocouple tree will undoubtedly yield erroneous dome space temperatures. Waste channeling around the thermocouple tree may also yield erroneous tank waste temperatures. Additionally, the ENRAF, as a function of its design, cannot be operated

in an environment where it could be impinged by the water from the distribution system. One potential solution is to install the ENRAF in the unused saltwell screen in Riser 5, following removal of the abandoned saltwell pump. This configuration will, however, provide redundant measurements, albeit more accurately, as the dib tubes installed in the same riser. Location of the ENRAF and effects on the thermocouple tree will have to be resolved during conceptual design.

4.2.3 Use of existing Saltwell Pumping Equipment

The design of the WRS is based on the design of current SST Interim Stabilization equipment. The current Interim Stabilization baseline schedule shows completion of the 241-S and 241-SX Farm complex prior to the initiation of the 241-S-112 dissolution retrieval demonstration effort. Substantial project savings are possible if select Interim Stabilization equipment could be reused. A closer evaluation of hardware availability (and reliability) should be performed during subsequent stages of design. The estimate provided conservatively assumes the procurement of all new equipment.

The greatest efficiencies can be realized if the 241-S-112 Waste Retrieval Demonstration are integrated with the Interim Stabilization of the tank. Stabilization does not however, have the flexibility to extend the stabilization completion date for 241-S-112 beyond FY 2003. The Consent Decree dictates that all of the tanks be stabilized by that 2003. Project integration would require an acceleration of the retrieval activities and negotiation with the Interim Stabilization Project.

4.2.4 Interim Stabilization Schedule Conflict

The current Interim Stabilization baseline schedule forecasts completion of the 241-S and 241-SX Farm activities prior to the initiation of the 241-S-112 saltcake dissolution retrieval demonstration. Thus, there is no coordination problem between these activities at this time. However, in the event the Interim Stabilization activities are delayed, or the demonstration schedule is accelerated, the saltcake dissolution retrieval demonstration and interim stabilization project will have to coordinate engineering, construction and operations activities.

4.2.5 Project W-314 Schedule Conflict

Concerns over the design life of the 244-S DCRT have spurred the initiation of activities to bypass this interim staging vessel. The W-314 project will be conducting construction activities early in the dissolution retrieval demonstration project lifecycle. Thus, there is no coordination problem between these activities at this time. However, in the event the W-314 activities are delayed, or the demonstration schedule is accelerated, the saltcake dissolution retrieval demonstration and W-314 Project will have to coordinate engineering, construction and operations activities (see also Section 1.5).

4.2.6 Tank S-102 Initial Tank Retrieval Schedule Conflict

The renegotiated TPA M-45 milestones, M45-00-01A, establishes the schedule for both the 241-S-112 retrieval demonstration and 241-S-102 initial tank retrieval. The retrieval of 241-S-102 is scheduled for completion late FY 2006. Construction activities for this

effort will overlap with the operation of the 241-S-112 WRS. It is highly probable that these two systems will require use of the same infrastructure and utility sources. Engineering activities for these projects should be closely coordinated to eliminate redundant efforts, overtaxing of the utilities, and resource integration.

4.2.7 Use of Existing Transfer Lines

The proposed routing for the transfer of 241-S-112 waste to 241-SY-102 includes two existing encased transfer lines, 3-inch SN-275 and 2-inch SL-177. Both of these existing lines are considered to be non-compliant with applicable WAC regulations concerning secondary containment of systems containing hazardous waste (i.e., encasement piping does not penetrate pit walls, resulting in a potential leak path to the environment). Current Tri-Party Agreement requirements allow the non-compliant transfer lines to be operated until June 30, 2005, at which time all operational transfer systems are required to fully comply with the WAC regulations. The current schedule for completing the saltcake waste transfers shows completion of this activity after the expiration date for operation of non-compliant transfer systems (September 30, 2005).

The design life of the current hose-in-hose assemblies has been reduced from the initial 7 to 3 years (RPP-6711 Rev. 1). The full impacts of this determination have yet to be assessed. The OGT connecting the 241-S-A and 241-S-C Valve Pits was installed in the summer of 2000. The saltwell pumping of 241-S and 241-SX Farms are anticipated to extend beyond the 3-year installation and service anniversary. Efforts are underway to increase the design life from 3-years to 5-years. The outcome and final determination will have an impact on the preliminary cost and schedule provided in this report. The current assumption is that a compliant transfer route will exist from the 241-S-C Valve Pit to the 241-SY-02A Pump Pit.

4.2.8 SY Farm Upgrades Schedule Conflict

As discussed previously in Section 1.4.2 and 4.2.7, the 241-SY Farm transfer lines are noncompliant for waste transfers. The upgrade of these lines is planned around the time of the 241-S-112 demonstration project (by Project W-525). The current demonstration schedule leaves inadequate time to upgrade the lines after the demonstration. Additionally, Project W-314 is scheduled to decontaminate the 241-SY-A Valve Pit and add a liner to it. The current saltwell pumping transfer route is directed through this pit, Coordination of the construction activities are likely to impact the operations schedule. Upgrades are also planned by Projects W-211 and W-521, which will impact the routing and configuration of the jumpers in the 241-SY-A Valve Pit (see also Sections 4.2.4, 4.2.5, and 4.2.6).

4.2.9 Ventilation

A review of the preliminary design indicates that the amount of entrained moisture should be minimal. The nozzles direct spray downward and away from the point where the ventilation system withdraws air from the tank. The flow rate of air leaving the tank will be approximately 500 cfm (if POR-004 exhauster is utilized); large droplets will likely fall out of suspension before the air reaches the ventilation system. Furthermore, it is anticipated the water distribution devices will be installed well below the elevation at

which the ventilation system withdraws air. All of these factors reduce the likelihood that large amounts of entrained moisture will reach the ventilation system. Without appreciable amounts of entrained moisture, an exhauster will not be required for this demonstration. It is possible however, that the 25% lower flammability limit for hydrogen could be reached, at which time an exhauster is required. Without this information immediately available, an exhauster was conservatively included in the preliminary design.

If an exhauster is determined in the later project phase to be required then the re-use potential for the existing POR-004 exhauster should be made. While this existing system should prove adequate for the retrieval campaign, the system lacks a de-entrainer or demister. This device is necessary if large amounts of entrained moisture (liquid droplets) are drawn into the system's filtration units.

A saltcake dissolution "proof-of-concept" is scheduled for September 2001 in 241-U-107. This test should be used to provide additional information regarding the aerosol generation issue. The determination of whether an exhauster is required or not should consider the data gathered during the proof-of-concept test.

4.2.10 Retrieval Transfer Rate

The current estimated retrieval duration of 8 ½ months may be reduced if alternative pumping technologies and retrieval methods are identified and evaluated. The saltwell pumping system was designed to remove supernatant and interstitial liquid that enters the saltwell screen at relatively low rates, an ideal application for the LVDG retrieval demonstration. As the result of the saltwell pumping systems inability to transport solids and achieve high transfer flow rates a secondary pumping system or technology may be deployed in conjunction with the saltwell pumping system to achieve necessary waste volume removal and potentially improve upon the projected duration of the retrieval campaign by accelerating the retrieval transfer rate.

4.2.11 Dissolution Water Distribution

Even distribution of the dissolution water on the top of the waste is anticipated to be desirable in order to evenly saturate the salt with solvent and mitigate waste channeling. Even distribution of the dissolution water will be achieved by proper placement of the sprinklers within the tank. The risers available on 241-S-112 limit the possible installation locations for the water distribution system. Risers 11, 14, and 16 are selected to optimize the spacing over the tank surface. The ability to "evenly" distribute the water over the entire waste surface will have to be further analyzed during subsequent design phase. Furthermore, the assumption that the water should be evenly distributed should be validated prior to detailed design.

Additionally, a determination must be made on the operations of the solvent distribution system. To cover the required area, and not exceed the saltwell pump removal rate, it is unlikely that a 2 ½ to 3 gpm flow rate per sprinkler will be sufficient. This may require that only one, or two water distribution devices, operating at 8 to 10 gpm, be operable at a

time. Data collected from the proof-of-concept testing performed in 241-U-107 should be used to mitigate this uncertainty.

4.2.12 Preferential Dissolution

As with any dissolution retrieval method, preferential dissolution is likely to occur to some extent. The corrosion inhibitors are likely to be retrieved first due to the high solubility of the nitrate and sodium hydroxide. This could potentially result in non-compliant waste pH. Further analysis and/or sampling will be required to estimate the affects, if any, that may be caused.

This issue may be further mitigated by the performance of laboratory testing to determine the dissolution behavior of the 241-S-112 waste. Testing of this nature can also resolve uncertainties about the dissolution ratio and specific volume of a saturated solution.

Preferential dissolution may also reduce the retrieval efficiency, as the waste volume gets low as is discussed in Section 4.2.13.

It is possible that sufficient volume of waste is recovered during the 241-U-107 proof-of-concept testing to observe this phenomenon. Preoperational sampling should be compared with post-demonstration sampling to determine the effects (if any) of preferential dissolution. The comparison of inline solution samples during the onset with those obtained near the conclusion of the demo may also be used to resolve or learn about these effects.

4.2.13 Retrieval Effectiveness

For the development of the WRS, 100% of the saltcake is assumed soluble; this is unlikely to be the case. The true effectiveness of this method to recover waste will not be determined until the completion of the Saltcake Dissolution Retrieval Demonstration effort. The anticipated reduction in retrieval efficiency, however, can be mitigated by solution recirculation as discussed previously in Section 3.1.3 and heating the dissolution water to accelerate dissolution. At this time, the preliminary engineering development and associated cost estimate assumes that the water supply will not require heating or recirculation. Water will be introduce to the tank ant ambient temperature (Section 2.2) and not require recirculation.

Waste "channeling" is likely to result in short circuiting where solvent flows easily and quickly to the transfer pump. Dissolution of the 241-S-112 salt waste will require some dwell time, that, as of now is indeterminate. The preliminary retrieval modeling performed for the development of this report does not take these effects into account. Additionally, as waste levels in 241-S-112 recede to near the level of the transfer pump, it is possible that the waste liquid pumped from the tank may not be saturated with dissolved salts. There may also be short-circuiting caused by relatively quick "overland" travel of the water to the pump. This effect may cause retrieval effectiveness to decline when the waste volume gets low. Again, there is no accurate method of estimating this effect until actual demonstration data are collected.

It is unlikely that sufficient waste will be recovered during the 241-U-107 proof-of-concept tests to witness this phenomenon. Nonetheless, visual observance of effects such as waste channeling and/or short-circuiting should be closely monitored and recorded.

4.2.14 Power Availability

The power for 241-S Farm is primarily supplied from three 50 kVA pole-mounted transformers (C68486P, C68487P, and C68488P). These three transformers supply power for several other loads, as well. A field walk-down performed by CHG Equipment Engineering on August 9, 2000 to verify the identities and number of these loads, and the transformers appear to be heavily loaded (see calculation 4412-470-ECAL-001 in Appendix C). Provided there is no load growth between now and the time this project is deployed, there appears to be adequate capacity to handle the small number of new loads required by this project. However, a more detailed investigation will be necessary in conceptual design to determine if an upgrade is required to accommodate the requirements of the WRS as well as other ongoing efforts.

Activities scheduled by other projects discussed previously may also increase the load burden on the distribution center. Upgrading these transformers would not be difficult and should be considered to mitigate the concerns of power availability.

4.2.15 Estimating the 241-S-112 Liquid Inventory / Leak Detection

The accuracy and performance of the volumetric mass balancing method of leak detection is a function of the accuracy of the liquid inventory estimates. It has been assumed that an accurate liquid inventory estimate can be obtained by measuring the liquid level at only two points. Inaccuracies associated with the ILL model and the waste porosity estimate may exceed the system accuracy requirements. This uncertainty will require some performance evaluation testing to bound the scope of the issue. Without the 241-S-112 RPE complete the accuracy and performance requirements of the volumetric balancing (leak detection) are indeterminate. The possibility exists that current technology will not measure the required leak size with the required accuracy.

4.2.16 Tank S-112 Waste Volume and Condition

Interim Stabilization will be performing saltwell pumping of this tank in FY 2002. The configuration of the equipment on the tank has yet to be determined. Decommissioning, decontamination, and disposal activities are likely to be required to make use of the limited space and riser availability. These additional activities will not be well defined until the later stages of the project.

The values used for the development of the retrieval volumes and durations are based on the current waste volumes reported in the BBI. These values should be conservative considering that the Interim Stabilization Project will be removing significant quantities of liquid prior to the retrieval demonstration operations.

4.2.17 Safety Classification of Structures, Systems and Components

The pre-conceptual cost estimate and schedule for the saltcake dissolution retrieval demonstration are based on the preliminary engineering information presented in this report. This engineering basis includes utilization of equipment currently covered by an existing AB to support SST saltwell pumping activities. Any changes to the current AB, such as change to the safety classification of a significant component or system utilized to support the dissolution retrieval effort, could impact the estimated cost and schedule for this project. The AB will be assessed for impacts from the proposed demonstration project during the conceptual design phase. A detailed analysis of SSC safety classifications will also be performed to support detailed project planning.

4.2.18 Regulatory Issues

The addition of water to any of the SSTs should be carefully planned and minimized as a best management practice. The State of Washington Dangerous Waste Regulations (Washington Administrative Code 173-303) do not preclude the addition of water for the purpose of retrieving tank waste in support of tank cleanout and closure; however, prudent use of water will minimize the potential for contaminants to be carried into the environment in the event tank integrity is not maintained. The Washington State Department of Ecology (Ecology) should be appraised at an early stage of project development of any plans to use water for the dissolution retrieval demonstration, along with the intended steps to minimize the liquid volume and optimize waste removal. Ecology staff personnel do not have to specifically approve the addition of water for waste retrieval, but they will approve the overall methodology for cleanup and eventual closure of the tank. Tank S-112 is neither known nor suspected to have leaked in the past, so Ecology should not object to the addition of dissolution water in support of the dissolution technology demonstration and expeditious cleanup and closure.

4.2.19 Release Threshold Value

A Retrieval Performance Evaluation (RPE) has not been performed to date. The LDMM concept development (RPP-6797) and integration with the preliminary engineering development cannot be completed until the release criterion can be established. A RPE should be conducted early in the project cycle to mitigate the potential impacts.

4.2.20 Leak Detection Performance Criteria

The leak detection performance requirements are established in the 241-S-112 TPA F&R. The RPE for 241-S-Farm and 241-S-112 have not been completed. The requirements identified in the final TPA F&R will be approved by the TPA stakeholders. The requirements laid forth in the TPA F&R in conjunction with the output of the RPE will be used to develop and finalize the integrated retrieval strategy, which accounts for the minimization of environmental risk. It is anticipated this will be accomplished primarily through mitigation of the potential likelihood of a leak occurring during retrieval. This will include the acceleration of retrieval operations, reduction of liquid inventory in the tank, and measures to prevent actions that may cause a leak

4.2.21 Closure

The 241-S-112 BBI estimates the tank to contain 6,000 gallons of sludge. This waste is not anticipated to be soluble and as such, is expected to remain following completion of the demonstration. Additional insoluble salts are likely to remain, as well. Tri-Party Agreement milestone M45-03C states the goal of the demonstration should be 99% recovery of the tank volume. At this time it is not likely that this "goal" can be achieved even assuming 100% retrieval efficiencies are observed for strictly the dissolvable saltcake waste inventory. Closure, however, while not included within the scope of this demonstration should be a consideration during the project development. The existing design of the saltwell pumping system is to exclude pumping solids. As the result of the saltwell pumping systems inability to transport solids a secondary pumping system or technology may be deployed in conjunction with the saltwell pumping system to achieve necessary waste volume removal.

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5.0 COST & SCHEDULE

5.1 WORK BREAKDOWN STRUCTURE

A preliminary Work Breakdown Structure (WBS) for 241-S-112 saltcake dissolution retrieval demonstration is provided in Appendix A. The WBS provides a deliverable-oriented grouping of scope elements that organizes and defines the total scope of the demonstration project. Work not identified in this WBS is considered outside the scope of the project.

5.2 PLANNING BASIS AND ASSUMPTIONS

A rough order of magnitude (ROM) cost estimate has been developed for the scope of work defined in this Preliminary Engineering Report for the 241-S-112 dissolution retrieval demonstration project. The discussion below presents the approach used to develop the ROM cost estimate. The project WBS identifies the project elements that require resources, thus the WBS is the primary input to the cost estimate.

5.3 COST ESTIMATE

The pre-conceptual cost estimate developed to support planning of the 241-S-112 dissolution retrieval demonstration is presented in Appendix A of this report. The total project cost for this project is estimated to be $21.1 million, including escalation.

5.3.1 Cost Estimate Basis

A description of the technical scope of work is found in the Section 2.0 of the engineering report. This cost estimate has been prepared primarily using:

- Similar work from SST Interim Stabilization Project (i.e., saltwell pumping),
- Vendor estimates, and
- Historical factors and percentages from previous projects at Hanford.

5.3.2 Estimate Purpose

The estimate is a pre-conceptual cost estimate developed from design information contained in the Preliminary Engineering Report for 241-S-112 dissolution retrieval demonstration and other relevant project documentation. This estimate is intended to identify the cost of resources required to complete the project activities and establish the planning basis for the out-year costs associated with the demonstration of saltcake dissolution retrieval in 241-S-112.

5.3.3 Estimate Organization

This cost estimate is organized in accordance with the 241-S-112 saltcake dissolution retrieval demonstration project WBS.

5.3.4 Escalation

Information regarding escalation was obtained from the following sources:

- U.S. Department of Energy Office of Environmental Management, "Accelerating Cleanup: Paths to Closure," Attachment D. Project Baseline Summary Format and Instructions, dated April 1998.
- U.S. Department of Commerce, "Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis," NISTIR 85-3273-14r, dated April 1999.

The Department of Energy source quoted an annual escalation rate of 2.7% and the Department of Commerce source quoted annual escalation rates of between 2.7% and 3.1%. Based on this information, an annual escalation rate of 3.0% was used for this cost estimate.

5.3.5 Contingency

Contingency was evaluated and calculated based on consideration of the following definition provided by the Department of Energy (DOE). "Contingency" covers costs that may result from incomplete design, unforeseen and unpredictable conditions, or uncertainties within the defined project scope. The amount of contingency will depend on the status of design, procurement, construction, and the complexity and uncertainties of the component parts of the project. Contingency levels have been established based upon study-level engineering evaluations of relatively well understood technologies and processes. A contingency analysis is provided as a part of the ROM cost estimate in Appendix A of this report.

5.3.6 Rounding

The project cost summary report is summarized and adjusted/rounded as follows. The escalated total costs, contingency total costs, and the total dollar costs are adjusted/ rounded to the nearest $10,000. The total project cost is adjusted/rounded to the nearest $100,000.

5.4 SCHEDULE

Tank S-112 dissolution retrieval demonstration schedule requirements are specified in the Multi-Year Work Plan and summarized on the mission summary diagram. Pre-conceptual planning efforts for each of these activities indicates that these schedule requirements are easily achievable. As design activities progress, schedule difficulties may arise, but none are evident at this time. The schedule is organized in accordance with the WBS for the 241-S-112 saltcake dissolution retrieval demonstration project and identifies the summary-level activities required to produce the deliverables identified within the Preliminary Engineering Report. The pre-conceptual project schedule for the 241-S-112 saltcake dissolution retrieval demonstration project is included in Appendix A of this report. This schedule was developed to support the TPA milestones associated with the 241-S-112 Saltcake Dissolution Retrieval Demonstration listed in Table 5-1.

Table 5-1 TPA Milestones

Milestone	Activity	Completion Date
M-45-03C	Complete full scale saltcake waste retrieval technology demonstration at single-shell tank S-112	9/30/2005
M-45-03-T03	Complete S-112 saltcake waste retrieval technology demonstration functions and requirements document	12/30/2001
M-45-03D	Complete S-112 saltcake waste retrieval technology demonstration design	5/31/2003
M-45-03E	Complete S-112 saltcake waste retrieval technology demonstration construction	9/30/2004

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6.0 REFERENCES

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HNF-3554, *Investigation of Low Volume Density Gradient (LVDG) for Waste Recovery in Hanford's Single-Shell Tanks*, Hertzel, J.S., Numatec Hanford Corporation, Richland, Washington, 1998.

PNNL 1999. *Partitioning Tracers for Leak Detection During Waste Retrieval Operations.* Condensed version of EMSP proposal, Gauglitz, Phillip A., et al. al., Pacific Northwest National Laboratory, Richland, Washington, April 1999.

RPP-5825, *Technical Evaluation of 3"SN-219 Failure and S/SX Tank Farms Saltwell Piping,* Revision 0, CH2M Hill Hanford Group, Richland, Washington, 2000.

RPP-6711, *Evaluation of Hose-in-Hose Transfer Line Service for Hanford's Interim Stabilization Program*, Revision 0, CH2MHill Hanford Group, Richland, Washington, 2000.

RPP-6711, *Evaluation of Hose-in-Hose Transfer Line Service for Hanford's Interim Stabilization Program*, Revision 1, CH2MHill Hanford Group, Richland, Washington, 2001.

RPP-6797 (Draft), *Leak Detection, Monitoring, and Mitigation Design Concepts Evaluation Report for Saltcake Dissolution Based Retrieval Technologies*, CH2MHill Hanford Group, Richland, Washington

RPP-6821, *Technology Evaluation Report for Saltcake Dissolution Retrieval Demonstration,* Revision 0, CH2M Hill Hanford Group, Richland, Washington, 2000.

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RPP-7010, *Test Objectives for the Saltcake Dissolution Retrieval Demonstration*, Revision 0, CH2MHill Hanford Group, Richland, Washington, 2000.

RPP-7087, *Single-Shell Tank Retrieval Sequence: Fiscal Year 2000 Update,* Revision 0, CH2M Hill Hanford Group, Richland, Washington, 2000.

RPP-7596 (Draft), *241-S-112 Tank Waste Retrieval System Environmental Permit and Approval Plan,* CH2M Hill Hanford Group, Richland, Washington.

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RPP-7825 (Draft), *Single Shell Tank S-112 Full-Scale Saltcake Waste Retrieval Technology Demonstration Functions and Requirements,* CH2M Hill Hanford Group, Richland, Washington.

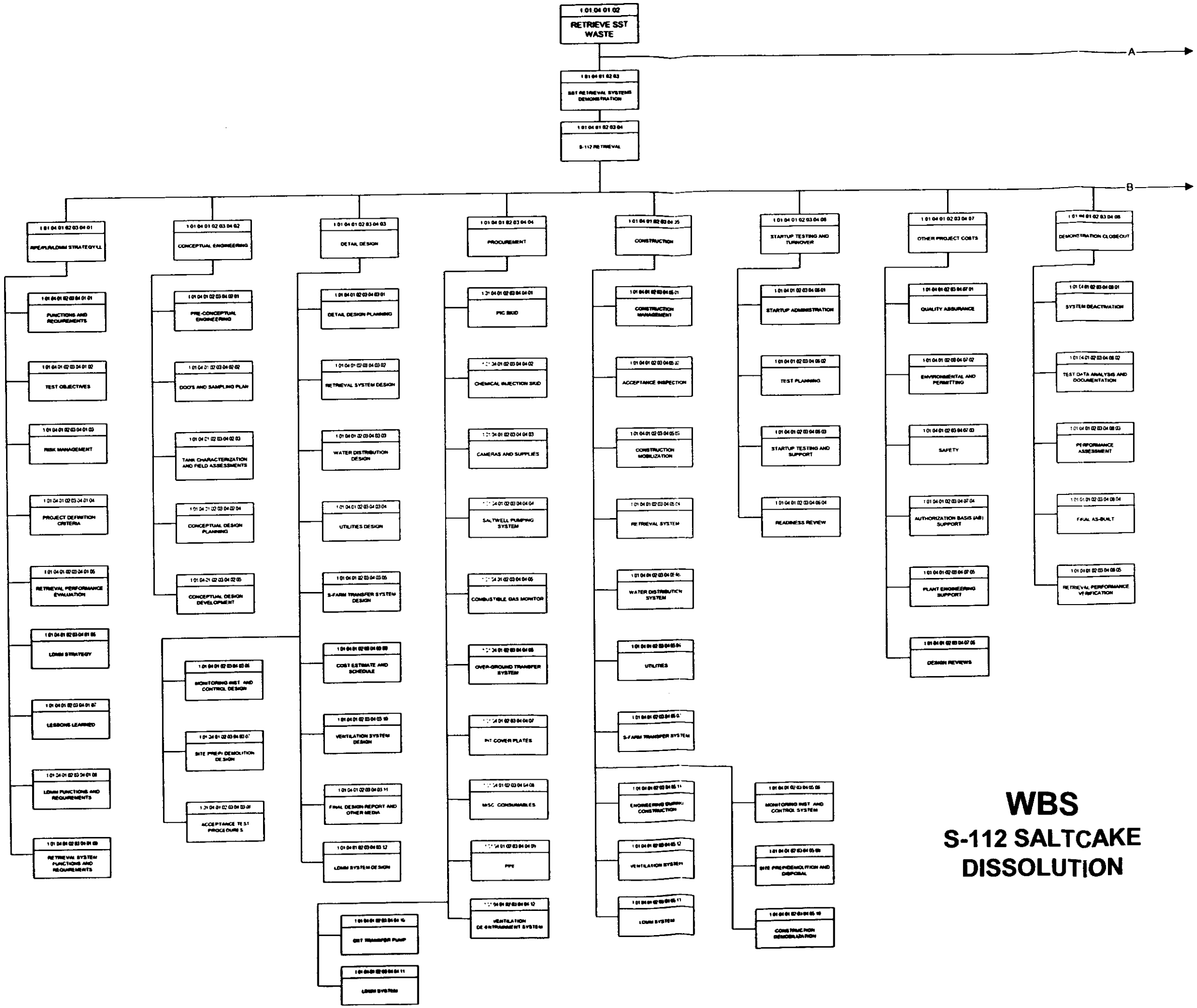
RPP-8476, *Ex-tank Leak Detection and Leak Monitoring Technologies for Test Specification for FY 2001 Demonstration,* CH2M Hill Hanford Group, Richland, Washington.

RPP-8725, *Letter Report for the S-112 Waste Retrieval Technology Demonstration Validation of Alternative Technologies,* Revision 0, CH2M Hill Hanford Group, Richland, Washington, 2001.

U.S. DOC, 1999, *Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis*, U.S. Department of Commerce, NISTIR 85-3273-14r, dated April 1999.

U.S. DOE, 1998, *Accelerating Cleanup: Paths to Closure, Attachment D. Project Baseline Summary Format and Instructions*, U.S. Department of Energy Office of Environmental Management, dated April 1998.

Appendix A
Cost Estimate, Schedule, and Work Breakdown Structure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RETRIEVE SST WASTE
A
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SST RETRIEVAL SYSTEMS DEMONSTRATION
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S-112 RETRIEVAL
B
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RPE/PLAN/DMM STRATEGY/LL
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FUNCTIONS AND REQUIREMENTS
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TEST OBJECTIVES
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RISK MANAGEMENT
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PROJECT DEFINITION CRITERIA
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RETRIEVAL PERFORMANCE EVALUATION
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LDMM STRATEGY
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LESSONS LEARNED
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RETRIEVAL SYSTEM FUNCTIONS AND REQUIREMENTS
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CONCEPTUAL ENGINEERING
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PRE-CONCEPTUAL ENGINEERING
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TANK CHARACTERIZATION AND FIELD ASSESSMENTS
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CONCEPTUAL DESIGN PLANNING
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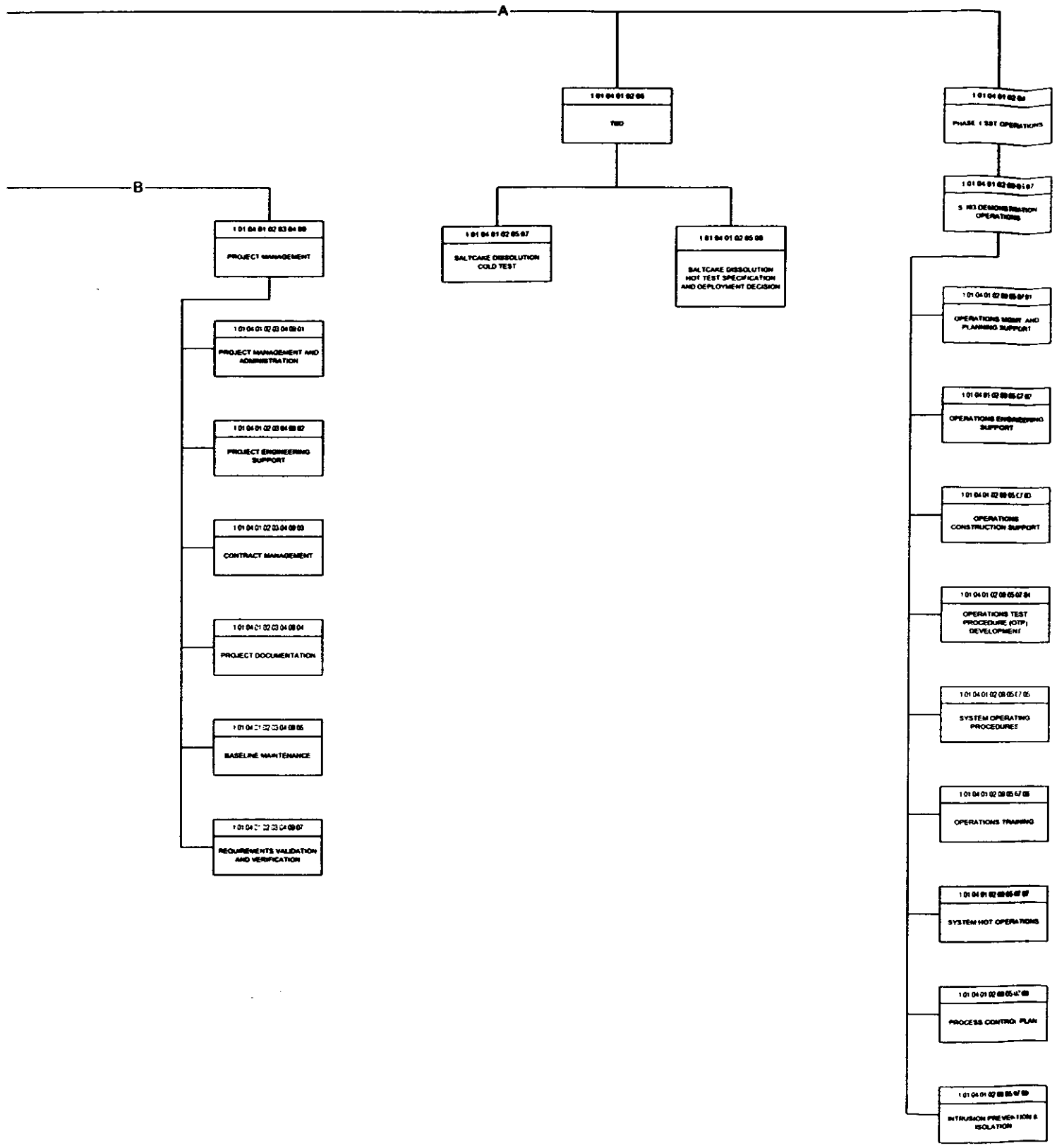
S-112 SALTCAKE DISSOLUTION



WBS
S-112 SALTCAKE DISSOLUTION

S-112 ENGINEERING STUDY PROJECT COST SUMMARY REPORT
BY WBS

WBS	WBS DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	GRAND TOTAL
.03.04.01	RPE/F&R/LDMM STRATEGY/LESSONS LEARNED	1,090,000	10%	109,100	1,200,000
.03.04.02	CONCEPTUAL ENGINEERING	1,710,000	10%	171,300	1,880,000
.03.04.03	DETAIL DESIGN	2,310,000	10%	230,700	2,540,000
.03.04.04	PROCUREMENT	4,210,000	10%	420,800	4,630,000
.03.04.05	CONSTRUCTION	4,480,000	10%	448,200	4,930,000
.03.04.06	STARTUP TESTING AND TURNOVER	530,000	10%	52,700	580,000
.03.04.07	OTHER PROJECT COSTS	790,000	10%	79,000	870,000
.03.04.08	DEMONSTRATION CLOSEOUT	340,000	10%	33,800	370,000
.03.04.09	PROJECT MANAGEMENT	1,350,000	10%	135,000	1,490,000
.09.05.07	S-112 DEMONSTRATION OPERATIONS	2,660,000	10%	265,800	2,930,000
		19,470,000			
	TOTAL PROJECT COST (TPC)	**19,470,000**	**10%**	**1,946,400**	**21,420,000**

REMARKS:

The escalated total costs, and the total project costs are adjusted/rounded to the nearest $10,000.

Hanford site allocations are included in the escalated total cost column.

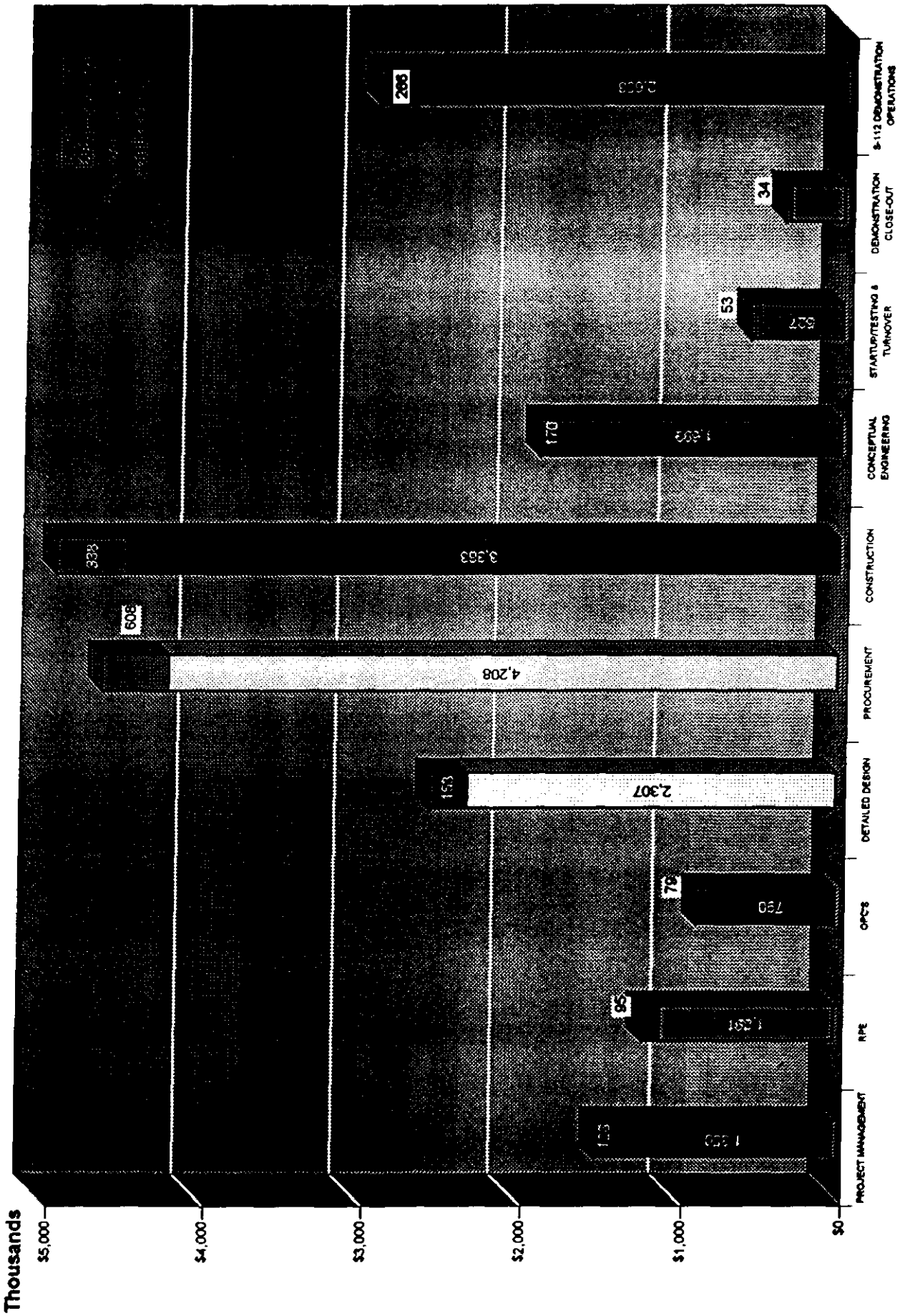
TYPE OF ESTIMATE: Study

JANUARY 24, 2001

HND TEAM LEAD ESTIMATOR:

HND TEAM PROJECT MANAGER: 1-26-01

CHG:


S-112 ENGINEERING STUDY ESTIMATE SUMMARY
Thousands
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$4,000
$3,000
$2,000
$1,000
$0
PROJECT MANAGEMENT
R/E
OPC'S
DETAILED DESIGN
PROCUREMENT
CONSTRUCTION
CONCEPTUAL ENGINEERING
STARTUP/TESTING & TURNOVER
DEMONSTRATION CLOSE-OUT
S-112 DEMONSTRATION OPERATIONS
1,650
153
1,291
59
790
72
2,307
153
4,208
608
3,363
338
1,699
170
657
53
34
2,658
233

S-112 ENGINEERING STUDY ESTIMATE SUMMARY

WBS	WBS DESCRIPTION	ESTIMATE SUBTOTAL	SUBTOTAL	ESCALATION %	ESCALATION TOTAL	CONTINGENCY SUBTOTAL	CONTINGENCY %	CONT EST SUBTOTAL	CONTINGENCY TOTAL	GRAND TOTAL
[illegible]	[illegible]ACTCAKE DISSOLUTION RETRIEVAL DEMONSTRATIONS	16,213,543	16,213,543	3.65%	591,800	16,805,343	10.00%	1,680,534	1,680,534	18,485,877
.03.04.01	RPE/F&R/LDMM STRATEGY/LESSONS LEARNED	1,076,087	1,076,087	1.34%	14,432	1,090,519	10.00%	109,052	109,052	1,199,571
.03.04.02	CONCEPTUAL ENGINEERING	1,667,460	1,667,460	1.51%	25,481	1,712,941	10.00%	171,294	171,294	1,884,235
.03.04.03	DETAIL DESIGN	2,242,254	2,242,254	2.87%	64,385	2,306,639	10.00%	230,664	230,664	2,537,303
.03.04.04	PROCUREMENT	4,063,300	4,063,300	3.56%	144,611	4,207,911	10.00%	420,791	420,791	4,628,702
.03.04.05	CONSTRUCTION	4,285,291	4,285,291	4.60%	197,075	4,482,366	10.00%	448,237	448,237	4,930,602
.03.04.06	STARTUP TESTING AND TURNOVER	496,583	496,583	5.65%	28,166	526,749	10.00%	52,675	52,675	579,424
.03.04.07	OTHER PROJECT COSTS	761,453	761,453	3.73%	28,414	789,867	10.00%	78,987	78,987	868,854
.03.04.08	DEMONSTRATION CLOSEOUT	303,870	303,870	11.25%	34,175	338,045	10.00%	33,804	33,804	371,849
.03.04.09	PROJECT MANAGEMENT	1,295,245	1,295,245	4.25%	55,062	1,350,307	10.00%	135,031	135,031	1,485,338
[illegible]	[illegible]AKE DISSOLUTION COLD TESTS	-	-	0.50%	-	-	10.00%	-	-	-
[illegible]	[illegible]AKE DISSOLUTION HOT TEST SPEC & DEPLOY	-	-	2.19%	-	-	10.00%	-	-	-
[illegible]	[illegible]STRATION OPERATIONS	2,507,925	2,507,925	6.00%	150,518	2,658,443	10.00%	265,844	265,844	2,924,287
.03.06.07	S-112 DEMONSTRATION OPERATIONS	2,507,925	2,507,925	6.00%	150,518	2,658,443	10.00%	265,844	265,844	2,924,287
	Adjustment					6,214		21	21	6,235
GRAND TOTAL		18,721,468	18,721,468	3.97%	742,318	19,470,000	10.00%	1,946,400	1,946,400	21,420,[illegible]

SST Retrieval Systems Demonstrations (1.01.04.01.02.03)
ost Estimate Summary

January 24, 2001

Title	WBS	Total Hrs	Total Cost	Paid by Others
RPE/F&R/LDMM Strategy/Lessons Learned	1.01.04.01.02.03.04.01	-	$ 1,076,087	$ 113,014
Conceptual Engineering	1.01.04.01.02.03.04.02	10,972	$ 1,687,460	$ 2,500,000 (1)
Detail Design	1.01.04.01.02.03.04.03	17,555	$ 2,242,254	$ -
Procurement	1.01.04.01.02.03.04.04	-	$ 4,063,300	0
Construction	1.01.04.01.02.03.04.05	7,468	$ 4,285,291	$ -
Startup Testing & Turnover	1.01.04.01.02.03.04.06	3,503	$ 498,583	$ -
Other Project Costs	1.01.04.01.02.03.04.07	13,133	$ 761,453	$ -
Demonstration Closeout	1.01.04.01.02.03.04.08	2,249	$ 303,870	$ 134,702 (2)
Project Management	1.01.04.01.02.03.04.09	23,281	$ 1,295,245	$ -
1.01.04.01.02.03.04		78,161	$ 16,213,543	$ 2,747,716
Saltcake Dissolution Cold Tests	1.01.04.01.02.05.07	-	$ -	$ 430,000
Saltcake Dissolution Hot Test Spec. & oloyment Decision	1.01.04.01.02.05.08	-	$ -	0
S-103 Demonstration Operations	1.01.04.01.02.09.05.07	38,023	$ 2,507,925	$ -
Total (w/o site allocations, escalation and contingency)		**116,184**	**$ 18,721,468**	**$ 3,177,716**

(1) Paid by Characterization (TW01)
(2) Paid by Interim Stabilization (TW04)

Saltcake Dissolution Retrieval Demonstrations
RPE/F&R/LDMM Strategy/Lessons Learned (1.01.04.01.02.03.04.01)

January 24, 2001

Title	WBS	Total Hrs	Total Cost	Paid by Others
TPA Functions & Requirements (F&R)	1.01.04.01.02.03.04.01.01	0	$ 112,289	
Test Objectives	1.01.04.01.02.03.04.01.02	0	$ 5,000	
Risk Management	1.01.04.01.02.03.04.01.03	0	$ -	
Project Definition Criteria (PDC)	1.01.04.01.02.03.04.01.04	0	$ -	
Retrieval Performance Eval.	1.01.04.01.02.03.04.01.05	0	$ 826,899	
LDMM Strategy	1.01.04.01.02.03.04.01.06	0	$ 56,899	
Lessons Learned	1.01.04.01.02.03.04.01.07	0	$ -	$ 36,899
LDMM F&R	1.01.04.01.02.03.04.01.08	0	0	$ 76,115
Retreival System F&R	1.01.04.01.02.03.04.01.09	0	$ 75,000	$ -
Total RPE\F&R\LDMM\...		0	$ 1,076,087	$ 113,014

Deployment of Saltcake Dissolution Retrieval

TPA Functions and Requirements (1.01.04.01.02.[illegible].04.01.01)

Estimate by:	K. E. A[illegible]
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumes existing functions and requirements will be changed to reflect tank selected for demonstation.
TPA Milestone M-45-T03 requires LDMM Requirements document, RPE and Lessons Learned Documents.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	update/issue functions and requirements plus 17.1% G&S Adder		Proposal Estimate						$ 90,000
2	CHG Task Mgr Support	M020	task manager		100			$ 68.99	$ 15,390
									$ 6,899
TOTAL					0				$ 112,289

Deployment of Saltcake Dissolution Retrieval

Test Objectives (1.01.04.01.02.03.04.01.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumes that existing test objectives will be updated to reflect tank selected for demonstration.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	update/issue test objectives		allocation						$ 5,000
TOTAL					0				$ 5,000

Deployment of Saltcake Dissolution Retrieval

Risk Management (1.01.04.01.02.03.04.01.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Workscope completed.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
	workscope completed no new workscope identified								$ -
TOTAL					0				$ -

Deployment of Salt... Dissolution Retrieval

Project Definition Criteria (1.01.04.01.02.03.04.01.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Workscope completed.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
	workscope completed no new workscope identified								
									$ -
TOTAL					0				$ -

Retrieval Performance Evaluation (1.01.04.01.02.03.04.01.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:
Deliverable in support of TPA M-45-T03.
Reference email backup dated 9-7-00 from Kirk Boes.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Retrieval Performance Evaluation (RPE)		email backup dated 9-7-00						$ 820,000
2	CHG Task Mgr Support	M020	task manager		100			$ 68.99	$ 6,899
TOTAL					0				$ 826,899

Deployment of Saltcake Dissolution Retrieval

LDMM Strategy (1.01.04.01.02.03.04.01.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Deliverable in support of TPA M-45-T03.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	LDMM Strategy Document		allocation						$ 50,000
2	CHG Task Mgr Support	M020	task manager		100			$ 68.99	$ 6,899
TOTAL					0				$ 56,899

Lessons Learned (1.01.04.01.02.03.04.01.07)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:
Deliverable in support of TPA M-45-T03.
Lessons learned will include applicable portions of the AZ-101 thermocouple removal effort.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Lessons Learned Document		allocation-paid by others						$ 30,000
2	CHG Task Mgr Support	M020	task mngr-paid by others		100			$ 68.99	$ 6,899
TOTAL					0				$ 36,899

LDMM Functions & Requirements (1.01.04.01.02.03.04.01.08)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	LDMM Functions and Requirements		Proposal Estimate - paid by others						$ 65,000
	17.1% G&S Adder								$ 11,115
TOTAL					0				$ 76,115

Deployment of Salt...e Dissolution Retrieval

Retrieval System Functions & Requirements (1.01.04.01.02.03.04.01.09)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Retrieval System F&R Preparation		allocation						$ 75,000
TOTAL					0				$ 75,000

Saltcake Dissolution Retrieval Demonstrations
nceptual Engineering (1.01.04.01.02.03.04.02)

January 24, 2001

Title	WBS	Total Hrs	Total Cost	Paid by Others
Pre-Conceptual Engineering	1.01.04.01.02.03.04.02.01	0	$ -	
Data Quality Objectives and Sampling Plan	1.01.04.01.02.03.04.02.02	0	$ 56,000	
Tank Characterization & Field Assessments	1.01.04.01.02.03.04.02.03	1330	$ 696,699	$ 2,500,000
Conceptual Design Planning	1.01.04.01.02.03.04.02.04	754	$ 41,509	
Conceptual Design Development	1.01.04.01.02.03.04.02.05	8,888	$ 893,252	$ -
Total Conceptual Engineering		10,972	$ 1,687,460	$ 2,500,000

Deployment of Saltcake Dissolution Retrieval

Pre(nceptual Engineering (1.01.04.01.02.03.04.[illegible].01)

Estimate by:	K. E. A[illegible]
Revision	0
Date	1/24/01

Estimate Basis Notes: Fixed price contract cost for HND study, for which this estimate was prepared, is complete ($300,000).

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
	Workscope complete.						Hours		
									$ -
TOTAL					0				$ -

Deployment of Saltc(e Dissolution Retrieval

Data Quality Objectives & Sampling Plan (1.01.04.01.02.03.04.02.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: The TSAP cost was provided by B. E. Brendel in a CHG schedule fragnet prepared by G. A. Stanton. Field sampling is estimated under Tank Characterization and Field Assessments (1.01.04.01.02.03.04.02.03).

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Write Tank Sampling Analysis Plan (TSAP)		G. A. Stanton fragnet						$ 6,000
2	update DQO and review mtg's		allocation						$ 50,000
TOTAL					0				$ 56,000

Tank Characterization & Field Assessments (1.01.04.01.02.03.04.02.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Field walkdowns based on assumption of one walkdown per drawing sheet consisting of 5 hours per walkdown.
Sampling costs provided by B. E. Brendel in a CHG schedule fragnet prepared by G. A. Stanton.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Mechanical Field Walkdowns 25 drawing sheets includes civil/structural layout drawings includes interface control drawings	E070	Mechanical Engineer		125			$ 51.90	$ 6,488
		T050	HP Tech		125			$ 39.71	$ 4,964
		R050	Operator		125			$ 42.16	$ 5,270
		C060	pipe fitter		125			$ 39.52	$ 4,940
		P090	Industrial Hygienist		125			$ 46.63	$ 5,829
		C120	Ironworker		125			$ 39.52	$ 4,940
		E130	Engineer		125			$ 62.09	$ 7,761
2	Electrical Field Walkdowns 13 drawing sheets	E040	Electrical Engineer		65			$ 54.36	$ 3,535
		T050	HP Tech		65			$ 39.71	$ 2,581
		R050	Operator		65			$ 42.16	$ 2,740
		C020	electrician		65			$ 42.06	$ 2,734
		T070	instrument tech		65			$ 42.17	$ 2,741
		E130	Engineer		65			$ 62.09	$ 4,036
		P090	Industrial Hygienist		65			$ 46.63	$ 3,031
3	Plan, schedule, material for grab sample		G. A. Stanton fragnet						$ 12,050
4	Acquire 1 Liter Grab Sample		G. A. Stanton fragnet						$ 67,080
5	Grab Sample Analysis		G. A. Stanton fragnet						$ 25,000
6	Grab Sample Data Report		G. A. Stanton fragnet						$ 31,000
7	Core Sampling and Analysis	000	paid for by others			2	ea.	$ 1,250,000.00	$ 2,500,000
8	analysis of long life mobile products (provided via B. E. Brendel from characterization)								$ 500,000
TOTAL					1330				$ 3,196,889

Deployment of Salt Lake Dissolution Retrieval

Conceptual Design Planning (1.01.04.01.02.03.04.02.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumption: The conceptual design will be procured through the A/E pool, therefore; conceptual design planning is assumed to be an RFP development effort.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	prepare conceptual design spec and SOW	E130	Engineer		160			$ 62.09	$ 9,934
		G020	clerk		8			$ 21.18	$ 169
		P030	buyer		10			$ 41.42	$ 414
2	Issue spec and SOW for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		8			$ 51.12	$ 409
		E130	Design Authority		8			$ 62.09	$ 497
		E080	nuclear safety		8			$ 63.72	$ 510
		E130	Engineer		8			$ 62.09	$ 497
		P030	buyer		8			$ 41.42	$ 331
		E130	System Cog Engineer		8			$ 62.09	$ 497
3	Incorporate RCR comments	E130	Engineer		8			$ 62.09	$ 497
4	Approve supporting document	G020	Clerk		80			$ 21.18	$ 1,687
		E130	Design Authority		24			$ 62.09	$ 506
		E110	Quality Assurance		2			$ 51.12	$ 124
		E080	nuclear safety		2			$ 63.72	$ 102
		E130	Engineer		2			$ 62.09	$ 127
		E130	System Cog Engineer		2			$ 62.09	$ 124
5	Release supporting document at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E130	Engineer		8			$ 62.09	$ 497
6	develop request for proposal (RFP)	P030	buyer		40			$ 41.42	$ 1,657
		E130	Engineer		8			$ 62.09	$ 497
7	Issue RFP to A/E pool	P030	buyer		8			$ 41.42	$ 331
		E130	Engineer		8			$ 62.09	$ 497
8	evaluate proposal using SEB	P030	Buyer		60			$ 41.42	$ 2,486
		E130	Engineer		60			$ 62.09	$ 3,725
		E110	Quality Assurance		60			$ 51.12	$ 3,067
		E130	Design Authority		60			$ 62.09	$ 3,725
		E080	Nuclear Safety		60			$ 63.72	$ 3,823
9	award contract	P030	buyer		16			$ 41.42	$ 663
		E130	Engineer		16			$ 62.09	$ 993
TOTAL					754				$ 41,509

Deployment of Salt Lake Dissolution Retrieval

Conceptual Design Development (1.01.04.01.02.03.04.02.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: A/E Pool Rates include 17.1% G&S Adder

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Prepare ESP Analytical Model		allocation						$ 130,000
2	Prep/chk process control plan	A/E Pool Rate	chemical engineer		320			$ 100.07	$ 32,024
3	Issue plan for review	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Quality Assurance		2			$ 101.56	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Manager		2			$ 101.15	$ 202
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
4	Incorporate RCR comments	A/E Pool Rate	chemical engineer		32			$ 100.07	$ 3,202
5	PNNL Support		allocation						$ 180,000
6	Prep LDMM spec's	A/E Pool Rate	electrical engineer		320			$ 100.07	$ 32,024
7	Issue LDMM spec's for review	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Quality Assurance		2			$ 101.56	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Manager		2			$ 101.15	$ 202
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
8	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
9	Prep sprinkler spec's and riser location deter.	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
10	Issue sprinkler spec's for review	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Quality Assurance		2			$ 101.56	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Manager		2			$ 101.15	$ 202
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
11	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		32			$ 100.07	$ 3,202
12	Prep CCTV spec's and riser location deter.	A/E Pool Rate	electrical engineer		80			$ 100.07	$ 8,006
13	Issue CCTV spec's for review	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Quality Assurance		2			$ 101.56	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Manager		2			$ 101.15	$ 202
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
14	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
15	prep chemical addition system spec's	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
16	Issue chem addition spec's for review	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Quality Assurance		2			$ 101.56	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Manager		2			$ 101.15	$ 202
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
17	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402

Conceptual Design Development (1.01.04.01.02.03.04.02.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: A/E Pool Rates include 17.1% G&S Adder

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
18	prep riser assessment doc.	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
19	issue riser assessment for review	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Quality Assurance		2			$ 101.56	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Manager		2			$ 101.15	$ 202
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
20	incorporate RCR comments	A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
21	prep revised cost and schedule estimate	A/E Pool Rate	Sr. Estimator		200			$ 97.16	$ 19,432
		A/E Pool Rate	project manager		80			$ 101.15	$ 8,092
		A/E Pool Rate	project engineer		80			$ 81.67	$ 6,533
22	prepare concept design report	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
		A/E Pool Rate	electrical engineer		80			$ 100.07	$ 8,006
		A/E Pool Rate	project engineer		80			$ 81.67	$ 6,533
		A/E Pool Rate	project manager		80			$ 101.15	$ 8,092
		A/E Pool Rate	nuclear safety		80			$ 82.40	$ 6,592
		A/E Pool Rate	clerk		80			$ 36.00	$ 2,880
23	issue for internal review	A/E Pool Rate	Clerk		16			$ 36.00	$ 576
		A/E Pool Rate	Quality Assurance		16			$ 101.56	$ 1,625
		A/E Pool Rate	Nuclear Safety		16			$ 82.40	$ 1,318
		A/E Pool Rate	Project Manager		16			$ 101.15	$ 1,618
		A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
		A/E Pool Rate	electrical engineer		16			$ 100.07	$ 1,601
		A/E Pool Rate	Project Engineer		16			$ 81.67	$ 1,307
24	incorporate RCR comments	A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
		A/E Pool Rate	electrical engineer		24			$ 100.07	$ 2,402
		A/E Pool Rate	project engineer		24			$ 81.67	$ 1,960
		A/E Pool Rate	project manager		24			$ 101.15	$ 2,428
		A/E Pool Rate	nuclear safety		24			$ 82.40	$ 1,978
		A/E Pool Rate	clerk		24			$ 36.00	$ 864
25	reproduction, binders, assembly		repro shop						$ 2,000
26	letter, distribution	A/E Pool Rate	clerk		16			$ 36.00	$ 576
27	prep USQ evaluation	E130	Engineer		80			$ 62.09	$ 4,967
		E080	Nuclear Safety		80			$ 63.72	$ 5,098

Deployment of Saltcake Dissolution Retrieval

Conceptual Design Development (1.01.04.01.02.03.04.02.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: A/E Pool Rates include 17.1% G&S Adder

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
28	CHG support during design development	E040	Electrical Engineer		1000			$ 54.38	$ 54,380
		E040	I&C Engineer		1000			$ 54.38	$ 54,380
		E130	design authority		1000			$ 62.09	$ 62,090
		E130	Cog. Engineers (Qty 2)		2000			$ 62.09	$ 124,180
		M020	manager		1000			$ 68.99	$ 68,990
		E080	Nuclear Safety		200			$ 63.72	$ 12,744
		E120	Industrial Safety		200			$ 48.95	$ 9,790
TOTAL					8,888				$ 393,252

Saltcake Dissolution Retrieval Demonstrations
Detail Design (1.01.04.01.02.03.04.03)

January 24, 2001

Title	WBS	Total Hrs	Total Cost	Paid by Others
Detail Design Planning	1.01.04.01.02.03.04.03.01	1,106	$ 62,404	
Retrieval System Design	1.01.04.01.02.03.04.03.02	2,000	$ 170,358	
Water Distribution Design	1.01.04.01.02.03.04.03.03	4,100	$ 349,086	
Utilities Design	1.01.04.01.02.03.04.03.04	1,997	$ 167,615	
S Farm Transfer System Design	1.01.04.01.02.03.04.03.05	1,871	$ 141,833	
Monitoring Instrument and Control Design	1.01.04.01.02.03.04.03.06	2,960	$ 247,988	
Site Prep/Demolition Design	1.01.04.01.02.03.04.03.07	990	$ 83,152	
Acceptance Test Procedure	1.01.04.01.02.03.04.03.08	-	$ 50,000	
Cost Estimate and Schedule	1.01.04.01.02.03.04.03.09	624	$ 58,611	
Ventilation System Design	1.01.04.01.02.03.04.03.10	370	$ 30,318	
Final Design Report and Other Design Media	1.01.04.01.02.03.04.03.11	1,537	$ 130,887	$ -
LDMM System Design	1.01.04.01.02.03.04.03.12	-	$ 750,000	
Total Detailed Design		17,555	$ 2,242,254	$ -

Deployment of Salt[illegible]e Dissolution Retrieval

Detail Design Planning (1.01.04.01.02.03.04.03.01)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumption: The detailed design will be procured through the A/E pool, therefore; detailed design planning is assumed to be an RFP development effort.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prepare detail design spec and SOW	E130	Engineer (Qty 2)		320			$ 62.09	$ 19,869
		G020	clerk		8			$ 21.18	$ 169
		P030	buyer		10			$ 41.42	$ 414
2	Issue spec and SOW for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		40			$ 51.12	$ 2,045
		E130	Design Authority		40			$ 62.09	$ 2,484
		E080	nuclear safety		40			$ 63.72	$ 2,549
		E130	Engineer		40			$ 62.09	$ 2,484
		P030	buyer		40			$ 41.42	$ 1,657
		E130	System Cog Engineer		40			$ 62.09	$ 2,484
3	Incorporate RCR comments	E130	Engineer		80			$ 62.09	$ 4,967
4	Approve supporting document	G020	Clerk		24			$ 21.18	$ 508
		E130	Design Authority		2			$ 62.09	$ 124
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	nuclear safety		2			$ 63.72	$ 127
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
5	Release supporting document at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E130	Engineer		8			$ 62.09	$ 497
6	develop request for proposal (RFP)	P030	buyer		40			$ 41.42	$ 1,657
		E130	Engineer		8			$ 62.09	$ 497
7	issue RFP to A/E pool	P030	buyer		8			$ 41.42	$ 331
		E130	Engineer		8			$ 62.09	$ 497
8	evaluate proposal using SEB	P030	Buyer		60			$ 41.42	$ 2,485
		E130	Engineer		60			$ 62.09	$ 3,725
		E110	Quality Assurance		60			$ 51.12	$ 3,067
		E130	Design Authority		60			$ 62.09	$ 3,725
		E080	Nuclear Safety		60			$ 63.72	$ 3,823
9	award contract	P030	buyer		16			$ 41.42	$ 663
		E130	Engineer		16			$ 62.09	$ 993
TOTAL					1106				$ 62,404

Deployment of Salt Lake Dissolution Retrieval

Retrieval System Design (1.01.04.01.02.03.04.03.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

- Existing baseline designs assume 24 hrs/sht for designer and 8 hrs/sht for engineer. Checking at 4 hrs/sht for designer and engineer.
- New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
- Existing equipment and installation drawings will be prepared as project drawings in H-2 format by A/E support, but processed internally by CHG.
- Other miscellaneous drawings provided in A/E's drawing format. A/E Pool Rates include 17.1% G&S Adder.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Revise PIC skid dwg set (assume 10 of 39 baseline dwgs affected)	A/E Pool Rate	Mechanical Designer		240			$ 78.80	$ 18,911
		A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
2	check dwgs (10 shts)	A/E Pool Rate	electrical engineer		156			$ 100.07	$ 15,611
		A/E Pool Rate	Mechanical Designer		40			$ 78.80	$ 3,152
		A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	electrical engineer		40			$ 100.07	$ 4,003
3	Issue drawings for review	G020	Clerk		8			$ 21.18	$ 169
		M030	engineering manager		8			$ 68.95	$ 552
		M030	operations manager		8			$ 68.95	$ 552
		E080	Nuclear Safety		16			$ 63.72	$ 1,020
		E110	Quality Assurance		16			$ 51.12	$ 818
		E130	Design Authority		16			$ 62.09	$ 993
		E130	Project Engineer		16			$ 62.09	$ 993
		E130	System Cog Engineer		16			$ 62.09	$ 993
4	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
		A/E Pool Rate	Mechanical Designer		80			$ 78.80	$ 6,304
		A/E Pool Rate	electrical engineer		80			$ 100.07	$ 8,006
5	Approve drawing	G020	Clerk		4			$ 21.18	$ 85
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
6	Release drawing at LMSI	G020	Clerk		8			$ 21.18	$ 169
		E130	Project Engineer		2			$ 62.09	$ 124
7	Prep power tie-in/routing ECN for PIC skid	A/E Pool Rate	electrical engineer		80			$ 100.07	$ 8,006
8	check ECN	A/E Pool Rate	electrical engineer		8			$ 100.07	$ 801

Retrieval System Design (1.01.04.01.02.03.04.03.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Existing baseline designs assume 24 hrs/sht for designer and 8 hrs/sht for engineer. Checking at 4 hrs/sht for designer and engineer.
New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
Existing equipment and installation drawings will be prepared as project drawings in H-2 format by A/E support, but processed internally by CHG.
Other miscellaneous drawings provided in A/E's drawing format. A/E Pool Rates include 17.1% G&S Adder.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
9	Issue ECN for review	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		4			$ 51.12	$ 204
		E080	Nuclear Safety		4			$ 63.72	$ 255
		M030	operations manager		4			$ 68.95	$ 276
		M030	radcon manager		4			$ 68.95	$ 276
		M030	engineering manager		4			$ 68.95	$ 276
		E130	Design Authority		16			$ 62.09	$ 993
		E130	Project Engineer		4			$ 62.09	$ 248
		E130	System Cog Engineer		16			$ 62.09	$ 993
10	Incorporate RCR comments	A/E Pool Rate	electrical engineer		16			$ 100.07	$ 1,601
11	prepare USQ screen	E130	System Cog Engineer		8			$ 62.09	$ 497
12	Approve ECN	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	operations manager		1			$ 68.95	$ 69
		M030	engineering manager		1			$ 68.95	$ 69
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		2			$ 62.09	$ 124
13	Release ECN at LMSI	G020	Clerk		1			$ 21.18	$ 21
14	revise pump/jumper equip dwgs (assume 2 of 5 baseline dwgs affected)	A/E Pool Rate	Mechanical Designer		48			$ 78.80	$ 3,782
		A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
15	check dwgs (2 shts)	A/E Pool Rate	Mechanical Designer		8			$ 78.80	$ 630
		A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
16	Issue drawings for review	G020	Clerk		2			$ 21.18	$ 42
		M030	engineering manager		3			$ 68.95	$ 207
		M030	operations manager		3			$ 68.95	$ 207
		E080	Nuclear Safety		3			$ 63.72	$ 191
		E110	Quality Assurance		3			$ 51.12	$ 153
		E130	Design Authority		8			$ 62.09	$ 497
		E130	Project Engineer		3			$ 62.09	$ 186
		E130	System Cog Engineer		8			$ 62.09	$ 497
17	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		32			$ 100.07	$ 3,202
		A/E Pool Rate	Mechanical Designer		16			$ 78.80	$ 1,261

Retrieval System Design (1.01.04.01.02.03.04.03.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Existing baseline designs assume 24 hrs/sht for designer and 8 hrs/sht for engineer. Checking at 4 hrs/sht for designer and engineer.
New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
Existing equipment and installation drawings will be prepared as project drawings in H-2 format by A/E support, but processed internally by CHG.
Other miscellaneous drawings provided in A/E's drawing format. A/E Pool Rates include 17.1% G&S Adder.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
18	Approve drawing	G020	Clerk		4			$ 21.18	$ 85
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
19	Release drawing at LMSI	G020	Clerk		4			$ 21.18	$ 85
		E130	Project Engineer		2			$ 62.09	$ 124
20	prep pump/jumper installation dwg (1 sht) (new design drawing)	A/E Pool Rate	Mechanical Designer		110			$ 78.80	$ 8,668
		A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
21	check dwgs (1 shts)	A/E Pool Rate	Mechanical Designer		8			$ 78.80	$ 630
		A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
22	Issue drawings for review	G020	Clerk		2			$ 21.18	$ 42
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		2			$ 62.09	$ 124
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		2			$ 62.09	$ 124
23	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
		A/E Pool Rate	Mechanical Designer		8			$ 78.80	$ 630
24	Approve drawing	G020	Clerk		4			$ 21.18	$ 85
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
25	Release drawing at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E130	Project Engineer		1			$ 62.09	$ 62

Retrieval System Design (1.01.04.01.02.03.04.03.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Existing baseline designs assume 24 hrs/sht for designer and 8 hrs/sht for engineer. Checking at 4 hrs/sht for designer and engineer.
New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
Existing equipment and installation drawings will be prepared as project drawings in H-2 format by A/E support, but processed internally by CHG.
Other miscellaneous drawings provided in A/E's drawing format. A/E Pool Rates include 17.1% G&S Adder.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
26	rev cvr plate, strongback, dog house dwgs (assume 3 of 10 baseline dwgs shts affected	A/E Pool Rate	Mechanical Designer		72			$ 78.80	$ 5,673
		A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
27	check dwgs (3 shts)	A/E Pool Rate	Mechanical Designer		12			$ 78.80	$ 946
		A/E Pool Rate	mechanical engineer		12			$ 100.07	$ 1,201
28	Issue drawings for review	G020	Clerk		2			$ 21.18	$ 42
		M030	engineering manager		2			$ 68.95	$ 138
		M030	operations manager		2			$ 68.95	$ 138
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E110	Quality Assurance		2			$ 51.12	$ 102
		E130	Design Authority		5			$ 62.09	$ 310
		E130	Project Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		5			$ 62.09	$ 310
29	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
		A/E Pool Rate	Mechanical Designer		8			$ 78.80	$ 630
30	Approve drawing	G020	Clerk		4			$ 21.18	$ 85
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
31	Release drawing at LMSI	G020	Clerk		4			$ 21.18	$ 85
		E130	Project Engineer		2			$ 62.09	$ 124
32	Prepare PIC skid, exhauster, etc. dome load calcs.	A/E Pool Rate	mechanical engineer		120			$ 100.07	$ 12,009
		A/E Pool Rate	clerk		8			$ 36.00	$ 288
33	check calculation	A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
34	Issue calc for review	A/E Pool Rate	Clerk		2			$ 36.00	$ 72
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
		A/E Pool Rate	project engineer		4			$ 81.67	$ 327
		A/E Pool Rate	project manager		2			$ 101.15	$ 202

Deployment of Salt Lake Dissolution Retrieval

Retrieval System Design (1.01.04.01.02.03.04.03.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Existing baseline designs assume 24 hrs/sht for designer and 8 hrs/sht for engineer. Checking at 4 hrs/sht for designer and engineer.
New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
Existing equipment and installation drawings will be prepared as project drawings in H-2 format by A/E support, but processed internally by CHG.
Other miscellaneous drawings provided in A/E's drawing format. A/E Pool Rates include 17.1% G&S Adder.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
35	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		120			$ 100.07	$ 12,009
36	Approve and issue calc	A/E Pool Rate	clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	project engineer		2			$ 81.67	$ 163
		A/E Pool Rate	mechanical engineer		2			$ 100.07	$ 200
TOTAL					2000				$ 170,368

Deployment of Saltcake Dissolution Retrieval

Water Distribution Design (1.01.04.01.02.03.04.03.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:
- New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
- Assumes that water delivery point installed near demo tank by interim stabilization.
- A/E Pool Rates include 17.1% G&S Adder
- Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prepare water system details (10 shts)	A/E Pool Rate	Mechanical Designer		1100			$ 78.80	$ 86,678
	(P&ID, isometric, and layout details)	A/E Pool Rate	mechanical engineer		240			$ 100.07	$ 24,018
2	check drawings (10 shts)	A/E Pool Rate	Mechanical Designer		80			$ 78.80	$ 6,304
		A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
3	Issue drawings for internal review	A/E Pool Rate	Clerk		20			$ 36.00	$ 720
		A/E Pool Rate	Nuclear Safety		50			$ 82.40	$ 4,120
		A/E Pool Rate	Quality Assurance		50			$ 101.55	$ 5,077
		A/E Pool Rate	project engineer		50			$ 81.67	$ 4,083
		A/E Pool Rate	project manager		50			$ 101.15	$ 5,058
		A/E Pool Rate	mechanical engineer		50			$ 100.07	$ 5,004
4	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	Mechanical Designer		40			$ 78.80	$ 3,152
5	Approve and issue drawings	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	mechanical Engineer		1			$ 100.07	$ 100
		A/E Pool Rate	project engineer		1			$ 81.67	$ 82
6	prep chem injection skid detail dwgs (10 shts)	A/E Pool Rate	Mechanical Designer		1100			$ 78.80	$ 86,678
		A/E Pool Rate	mechanical engineer		240			$ 100.07	$ 24,018
7	check drawings (10 shts)	A/E Pool Rate	Mechanical Designer		80			$ 78.80	$ 6,304
		A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
8	Issue drawings for internal review	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Nuclear Safety		10			$ 82.40	$ 824
		A/E Pool Rate	Quality Assurance		10			$ 101.55	$ 1,015
		A/E Pool Rate	project engineer		10			$ 81.67	$ 817
		A/E Pool Rate	project manager		10			$ 101.15	$ 1,012
		A/E Pool Rate	mechanical engineer		10			$ 100.07	$ 1,001
9	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	Mechanical Designer		40			$ 78.80	$ 3,152
10	Approve and issue drawings	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	mechanical Engineer		1			$ 100.07	$ 100
		A/E Pool Rate	project engineer		1			$ 81.67	$ 82
11	Finalize sprinkler specification	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
		A/E Pool Rate	clerk		4			$ 36.00	$ 144

Water Distribution Design (1.01.04.01.02.03.04.03.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:
- New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
- Assumes that water delivery point installed near demo tank by interim stabilization.
- A/E Pool Rates include 17.1% G&S Adder
- Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
12	Issue specification for review	A/E Pool Rate	Clerk		2			$ 36.00	$ 72
		A/E Pool Rate	Project Manager		2			$ 101.15	$ 202
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
		A/E Pool Rate	mechanical engineer		2			$ 100.07	$ 200
13	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
14	Approve and issue specification	A/E Pool Rate	Clerk		2			$ 36.00	$ 72
		A/E Pool Rate	Project Manager		1			$ 101.15	$ 101
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Project Engineer		1			$ 81.67	$ 82
		A/E Pool Rate	mechanical engineer		1			$ 81.67	$ 82
15	Prep water system/riser tie-in ECN	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
16	check ECN	A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
17	Issue ECN for review	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		4			$ 51.12	$ 204
		E080	Nuclear Safety		4			$ 63.72	$ 255
		M030	operations manager		4			$ 68.95	$ 276
		M030	radcon manager		4			$ 68.95	$ 276
		M030	engineering manager		4			$ 68.95	$ 276
		E130	Design Authority		16			$ 62.09	$ 993
		E130	Project Engineer		4			$ 62.09	$ 248
		E130	System Cog Engineer		16			$ 62.09	$ 993
18	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
19	prepare USQ screen	E130	System Cog Engineer		8			$ 62.09	$ 497
20	Approve ECN	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	operations manager		1			$ 68.95	$ 69
		M030	engineering manager		1			$ 68.95	$ 69
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		2			$ 62.09	$ 124
21	Prepare raw water piping calcs	A/E Pool Rate	mechanical engineer		120			$ 100.07	$ 12,009
		A/E Pool Rate	clerk		8			$ 36.00	$ 288

Water Distribution Design (1.01.04.01.02.03.04.03.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:
- New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
- Assumes that water delivery point installed near demo tank by interim stabilization.
- A/E Pool Rates include 17.1% G&S Adder
- Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
22	check calculation	A/E Pool Rate	mechanical engineer		32			$ 100.07	$ 3,202
23	Issue calc for review	A/E Pool Rate	Clerk		2			$ 36.00	$ 72
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
		A/E Pool Rate	project engineer		4			$ 81.67	$ 327
		A/E Pool Rate	project manager		2			$ 101.15	$ 202
24	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	clerk		2			$ 36.00	$ 72
25	Approve and issue calc	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	project engineer		2			$ 81.67	$ 163
		A/E Pool Rate	mechanical engineer		2			$ 100.07	$ 200
TOTAL					4100				$ 349,086

Deployment of Saltcake Dissolution Retrieval

Utilities Design (1.01.04.01.02.03.04.03.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: New drawings assume 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
A/E Pool Rates include 17.1% G&S Adder
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prep one-line and termination dwgs (8 shts) (new design drawing)	A/E Pool Rate	Mechanical Designer		880			$ 78.80	$ 69,341
		A/E Pool Rate	mechanical engineer		192			$ 100.07	$ 19,214
2	check dwgs (8 shts)	A/E Pool Rate	Mechanical Designer		64			$ 78.80	$ 5,043
		A/E Pool Rate	mechanical engineer		64			$ 100.07	$ 6,405
3	Issue drawings for review	G020	Clerk		2			$ 21.18	$ 42
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		8			$ 62.09	$ 497
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		8			$ 62.09	$ 497
4	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		72			$ 100.07	$ 7,205
		A/E Pool Rate	Mechanical Designer		72			$ 78.80	$ 5,673
5	Approve drawing	G020	Clerk		4			$ 21.18	$ 85
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
6	Release drawing at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E130	Project Engineer		1			$ 62.09	$ 62
7	Prep main power tie-in ECN	A/E Pool Rate	electrical engineer		80			$ 100.07	$ 8,006
8	check ECN	A/E Pool Rate	electrical engineer		8			$ 100.07	$ 801
9	Issue ECN for review	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		4			$ 51.12	$ 204
		E080	Nuclear Safety		4			$ 63.72	$ 255
		M030	operations manager		4			$ 68.95	$ 276
		M030	radcon manager		4			$ 68.95	$ 276
		M030	engineering manager		4			$ 68.95	$ 276
		E130	Design Authority		16			$ 62.09	$ 993
		E130	Project Engineer		4			$ 62.09	$ 248
		E130	System Cog Engineer		16			$ 62.09	$ 993
10	Incorporate RCR comments	A/E Pool Rate	electrical engineer		16			$ 100.07	$ 1,601

Deployment of Saltcake Dissolution Retrieval

Utilities Design (1.01.04.01.02.03.04.03.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: New drawings assume 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
A/E Pool Rates include 17.1% G&S Adder
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
11	prepare USQ screen	E130	System Cog Engineer		8			$ 62.09	$ 497
12	Approve ECN	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	operations manager		1			$ 68.95	$ 69
		M030	engineering manager		1			$ 68.95	$ 69
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E130	Project Engineer		1			$ 62.09	$ 62
13	Release drawing at LMSI	E130	System Cog Engineer		2			$ 62.09	$ 124
		G020	Clerk		2			$ 21.18	$ 42
14	Prep raw water tie-in ECN	E130	Project Engineer		1			$ 62.09	$ 62
15	check ECN	A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
16	Issue ECN for review	A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
		G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		4			$ 51.12	$ 204
		E080	Nuclear Safety		4			$ 63.72	$ 255
		M030	operations manager		4			$ 68.95	$ 276
		M030	radcon manager		4			$ 68.95	$ 276
		M030	engineering manager		4			$ 68.95	$ 276
		E130	Design Authority		16			$ 62.09	$ 993
		E130	Project Engineer		4			$ 62.09	$ 248
17	Incorporate RCR comments	E130	System Cog Engineer		16			$ 62.09	$ 993
18	prepare USQ screen	A/E Pool Rate	mechanical engineer		48			$ 100.07	$ 4,804
19	Approve ECN	E130	System Cog Engineer		24			$ 62.09	$ 1,490
		G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	operations manager		1			$ 68.95	$ 69
		M030	engineering manager		1			$ 68.95	$ 69
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E130	Project Engineer		1			$ 62.09	$ 62
20	Release drawing at LMSI	E130	System Cog Engineer		2			$ 62.09	$ 124
		G020	Clerk		2			$ 21.18	$ 42
21	Prepare electrical load calcs	E130	Project Engineer		1			$ 62.09	$ 62
		A/E Pool Rate	electrical engineer		120			$ 100.07	$ 12,009
22	check calculation	A/E Pool Rate	clerk		8			$ 36.00	$ 288
		A/E Pool Rate	electrical engineer		32			$ 100.07	$ 3,202

Utilities Design (1.01.04.01.02.03.04.03.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:
New drawings assume 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
A/E Pool Rates include 17.1% G&S Adder
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
23	Issue calc for review	A/E Pool Rate	Clerk		2			$ 36.00	$ 72
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	electrical engineer		8			$ 100.07	$ 801
		A/E Pool Rate	project engineer		4			$ 81.67	$ 327
		A/E Pool Rate	project manager		2			$ 101.15	$ 202
24	Incorporate RCR comments	A/E Pool Rate	electrical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	clerk		2			$ 36.00	$ 72
25	Approve and issue calc	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	project engineer		2			$ 81.67	$ 163
		A/E Pool Rate	electrical engineer		2			$ 100.07	$ 200
TOTAL					1997				$ 167,615

S Farm Transfer System Design (1.01.04.01.03.04.03.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:
- Existing baseline designs assume 24 hrs/sht for designer and 8 hrs/sht for engineer. Checking at 4 hrs/sht for designer and engineer.
- New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
- Existing equipment and installation drawings will be prepared as project drawings in H-2 format by A/E support, but processed internally by CHG.
- Other miscellaneous drawings provided in A/E's drawing format. A/E Pool Rates include 17.1% G&S Adder.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prep OTG plate/escavate detail dwg (4 shts) (new design drawing)	A/E Pool Rate	Mechanical Designer		440			$ 78.80	$ 34,670
		A/E Pool Rate	mechanical engineer		96			$ 100.07	$ 9,607
2	check dwgs (4 shts)	A/E Pool Rate	Mechanical Designer		32			$ 78.80	$ 2,521
		A/E Pool Rate	mechanical engineer		32			$ 100.07	$ 3,202
3	Issue drawings for review	G020	Clerk		8			$ 21.18	$ 169
		M030	engineering manager		40			$ 68.95	$ 2,758
		M030	operations manager		40			$ 68.95	$ 2,758
		E080	Nuclear Safety		40			$ 63.72	$ 2,549
		E110	Quality Assurance		40			$ 51.12	$ 2,045
		E130	Design Authority		40			$ 62.09	$ 2,484
		E130	Project Engineer		40			$ 62.09	$ 2,484
		E130	System Cog Engineer		40			$ 62.09	$ 2,484
4	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
		A/E Pool Rate	Mechanical Designer		16			$ 78.80	$ 1,261
5	Approve drawing	G020	Clerk		4			$ 21.18	$ 85
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
6	Release drawing at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E130	Project Engineer		1			$ 62.09	$ 62
7	prep OTG hose-in-hose connect dwg (2 shts (existing baseline design)	A/E Pool Rate	Mechanical Designer		48			$ 78.80	$ 3,782
		A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
8	check dwgs (2 shts)	A/E Pool Rate	Mechanical Designer		8			$ 78.80	$ 630
		A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
9	Issue drawings for review	G020	Clerk		2			$ 21.18	$ 42
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		4			$ 62.09	$ 248
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		4			$ 62.09	$ 248

S Farm Transfer System Design (1.01.04.01.03.04.03.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Existing baseline designs assume 24 hrs/sht for designer and 8 hrs/sht for engineer. Checking at 4 hrs/sht for designer and engineer.
New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
Existing equipment and installation drawings will be prepared as project drawings in H-2 format by A/E support, but processed internally by CHG.
Other miscellaneous drawings provided in A/E's drawing format. A/E Pool Rates include 17.1% G&S Adder.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
10	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
		A/E Pool Rate	Mechanical Designer		16			$ 78.80	$ 1,261
11	Approve drawing	G020	Clerk		4			$ 21.18	$ 85
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
12	Release drawing at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E130	Project Engineer		1			$ 62.09	$ 62
13	Prep OTG install ECN (S-12A to SC plts) (routing and details)	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
14	check ECN	A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
15	Issue ECN for review	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		4			$ 51.12	$ 204
		E080	Nuclear Safety		4			$ 63.72	$ 255
		M030	operations manager		4			$ 68.95	$ 276
		M030	radcon manager		4			$ 68.95	$ 276
		M030	engineering manager		4			$ 68.95	$ 276
		E130	Design Authority		8			$ 62.09	$ 497
		E130	Project Engineer		4			$ 62.09	$ 248
		E130	System Cog Engineer		8			$ 62.09	$ 497
16	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
17	prepare USQ screen	E130	System Cog Engineer		8			$ 62.09	$ 497
18	Approve ECN	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	operations manager		1			$ 68.95	$ 69
		M030	engineering manager		1			$ 68.95	$ 69
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		2			$ 62.09	$ 124
19	Release ECN at LMSI	G020	Clerk		1			$ 21.18	$ 21

S Farm Transfer System Design (1.01.04.01.03.04.03.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Existing baseline designs assume 24 hrs/sht for designer and 8 hrs/sht for engineer. Checking at 4 hrs/sht for designer and engineer.
New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
Existing equipment and installation drawings will be prepared as project drawings in H-2 format by A/E support, but processed internally by CHG.
Other miscellaneous drawings provided in A/E's drawing format. A/E Pool Rates include 17.1% G&S Adder.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
20	finalize hose-in-hose specification	A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	clerk		4			$ 36.00	$ 144
21	issue specification for review	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Project Manager		2			$ 101.15	$ 202
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Design Authority		2			$ 100.07	$ 200
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
		A/E Pool Rate	System Cog Engineer		2			$ 81.67	$ 163
22	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
23	Approve specification	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Project Manager		1			$ 101.15	$ 101
		A/E Pool Rate	Design Authority		1			$ 100.07	$ 100
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Project Engineer		1			$ 81.67	$ 82
		A/E Pool Rate	System Cog Engineer		1			$ 81.67	$ 82
24	Release specification at LMSI	A/E Pool Rate	Clerk		1			$ 36.00	$ 36
		A/E Pool Rate	mechanical engineer		1			$ 100.07	$ 100
25	Finalize ESP Analytical Model	E010	chemical engineer		120			$ 56.68	$ 6,802
		G020	clerk		40			$ 21.18	$ 847
26	Issue supporting document for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		16			$ 62.09	$ 993
		E130	System Cog Engineer		16			$ 62.09	$ 993
27	Incorporate RCR comments	E010	chemical engineer		40			$ 56.68	$ 2,267
		G020	clerk		2			$ 21.18	$ 42
28	Approve support document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E130	Design Authority		24			$ 62.09	$ 1,490
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	System Cog Engineer		24			$ 62.09	$ 1,490

S Farm Transfer System Design (1.01.04.01.03.04.03.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Existing baseline designs assume 24 hrs/sht for designer and 8 hrs/sht for engineer. Checking at 4 hrs/sht for designer and engineer.
New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
Existing equipment and installation drawings will be prepared as project drawings in H-2 format by A/E support, but processed internally by CHG.
Other miscellaneous drawings provided in A/E's drawing format. A/E Pool Rates include 17.1% G&S Adder.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
29	Release SD at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E010	chemical engineer		2			$ 56.68	$ 113
30	Prepare OTG flow calcs	A/E Pool Rate	mechanical engineer		120			$ 100.07	$ 12,009
		A/E Pool Rate	clerk		8			$ 36.00	$ 288
31	check calculation	A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
32	Issue calc for review	A/E Pool Rate	Clerk		2			$ 36.00	$ 72
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
		A/E Pool Rate	project engineer		4			$ 81.67	$ 327
		A/E Pool Rate	project manager		2			$ 101.15	$ 202
33	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	clerk		2			$ 36.00	$ 72
34	Approve and issue calc	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	project engineer		2			$ 81.67	$ 163
		A/E Pool Rate	mechanical engineer		2			$ 100.07	$ 200
TOTAL					1871				$ 141,833

Monitoring Instrumentation & Control System Design (1.01.04.01.02.03.04.03.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
A/E Pool Rates include 17.1% G&S Adder.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prep monitoring/I&C dwgs (12 shts)	A/E Pool Rate	Electrical Designer		1320			$ 78.80	$ 104,011
	(leak detection, CCTV, P&ID's, install detail)	A/E Pool Rate	Electrical Engineer		288			$ 100.07	$ 28,821
2	check dwgs (12 dwg sht)	A/E Pool Rate	Electrical Designer		120			$ 78.80	$ 9,456
		A/E Pool Rate	Electrical Engineer		120			$ 100.07	$ 12,009
3	Issue drawings for review	A/E Pool Rate	Clerk		40			$ 36.00	$ 1,440
		A/E Pool Rate	Project Manager		40			$ 101.15	$ 4,046
		A/E Pool Rate	Nuclear Safety		40			$ 82.40	$ 3,296
		A/E Pool Rate	Quality Assurance		40			$ 101.55	$ 4,062
		A/E Pool Rate	Project Engineer		40			$ 81.67	$ 3,267
		A/E Pool Rate	Electrical Engineer		40			$ 100.07	$ 4,003
4	Incorporate RCR comments	A/E Pool Rate	Electrical Engineer		48			$ 100.07	$ 4,804
		A/E Pool Rate	Electrical Designer		48			$ 78.80	$ 3,782
5	Approve and issue drawing	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
		A/E Pool Rate	Electrical Engineer		2			$ 100.07	$ 200
6	prep camera installation details (4 shts)	A/E Pool Rate	Mechanical Designer		440			$ 78.80	$ 34,670
		A/E Pool Rate	Mechanical Engineer		96			$ 100.07	$ 9,607
7	check dwgs (4 dwg sht)	A/E Pool Rate	Mechanical Designer		32			$ 78.80	$ 2,521
		A/E Pool Rate	Mechanical Engineer		32			$ 100.07	$ 3,202
8	Issue drawings for review	A/E Pool Rate	Clerk		2			$ 36.00	$ 72
		A/E Pool Rate	Project Manager		1			$ 101.15	$ 101
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Electrical Engineer		1			$ 100.07	$ 100
		A/E Pool Rate	Project Engineer		1			$ 81.67	$ 82
		A/E Pool Rate	Mechanical Engineer		1			$ 100.07	$ 100
9	Incorporate RCR comments	A/E Pool Rate	Mechanical Designer		8			$ 78.80	$ 630
		A/E Pool Rate	Mechanical Engineer		8			$ 100.07	$ 801
10	Approve and issue drawing	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
		A/E Pool Rate	Mechanical Engineer		2			$ 100.07	$ 200
11	finalize CCTV/camera specification	A/E Pool Rate	electrical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	clerk		4			$ 36.00	$ 144

Deployment of Saltcake Dissolution Retrieval

Monitoring Instrumentation & Control System Design (1.01.04.01.02.03.04.03.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
A/E Pool Rates include 17.1% G&S Adder.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
12	Issue specification for review	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Project Manager		2			$ 101.15	$ 202
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Project Engineer		2			$ 81.67	$ 163
		A/E Pool Rate	Electrical Engineer		2			$ 100.07	$ 200
		A/E Pool Rate	mechanical engineer		2			$ 100.07	$ 200
13	Incorporate RCR comments	A/E Pool Rate	electrical engineer		48			$ 100.07	$ 4,804
		A/E Pool Rate	Clerk		2			$ 36.00	$ 72
14	Approve and issue specification	A/E Pool Rate	Clerk		2			$ 36.00	$ 72
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Project Engineer		1			$ 81.67	$ 82
		A/E Pool Rate	electrical engineer		1			$ 100.07	$ 100
TOTAL					2960				$ 247,988

Deployment of Salt Dome Dissolution Retrieval

Site Prep/Demolition Design (1.01.04.01.02.03.04.03.07)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Assumes that one ECN will be prepared to cancel other ECNs for riser and valve pit equipment installed for saltwell pumping, including any electrical/I&C controls for existing equipment. ECN is prepared by A/E support, but processed by CHG.
New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
Four site plan drawings sheets include OTG layout for site scanning, electrical/I&C, water, and mechanical equipment locations.
A/E Pool Rates include 17.1% G&A Adder.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Prepare site prep/demo ECN	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
		A/E Pool Rate	electrical engineer		80			$ 100.07	$ 8,006
2	check ECN	A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
		A/E Pool Rate	electrical engineer		8			$ 100.07	$ 801
3	Issue ECN for review	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		4			$ 51.12	$ 204
		E080	Nuclear Safety		4			$ 63.72	$ 255
		M030	operations manager		4			$ 68.95	$ 276
		M030	radcon manager		4			$ 68.95	$ 276
		M030	engineering manager		4			$ 68.95	$ 276
		E130	Design Authority		16			$ 62.09	$ 993
		E130	Project Engineer		4			$ 62.09	$ 248
		E130	System Cog Engineer		16			$ 62.09	$ 993
4	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
		A/E Pool Rate	electrical engineer		16			$ 100.07	$ 1,601
5	prepare USQ screen	E130	System Cog Engineer		8			$ 62.09	$ 497
6	Approve ECN	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	operations manager		1			$ 68.95	$ 69
		M030	engineering manager		1			$ 68.95	$ 69
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		2			$ 62.09	$ 124
7	Release ECN at LMSI	G020	Clerk		1			$ 21.18	$ 21
8	prep site plan dwgs (4 shts) (new design dwgs)	A/E Pool Rate	Mechanical Designer		440			$ 78.80	$ 34,670
		A/E Pool Rate	mechanical engineer		96			$ 100.07	$ 9,607
9	check dwgs (4 shts)	A/E Pool Rate	Mechanical Designer		32			$ 78.80	$ 2,521
		A/E Pool Rate	mechanical engineer		32			$ 100.07	$ 3,202
10	Issue drawings for review	G020	Clerk		2			$ 21.18	$ 42
		M030	engineering manager		2			$ 68.95	$ 138
		M030	operations manager		2			$ 68.95	$ 138
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E110	Quality Assurance		2			$ 51.12	$ 102
		E130	Design Authority		4			$ 62.09	$ 248
		E130	Project Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		4			$ 62.09	$ 248
11	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		32			$ 100.07	$ 3,202
		A/E Pool Rate	Mechanical Designer		32			$ 78.80	$ 2,521

Deployment of Salt Dissolution Retrieval

Site Prep/Demolition Design (1.01.04.01.02.03.04.03.07)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Assumes that one ECN will be prepared to cancel other ECNs for riser and valve pit equipment installed for saltwell pumping, including any electrical/I&C controls for existing equipment. ECN is prepared by A/E support, but processed by CHG.
New drawing preparation at 110 hrs/sht for designer and 24 hrs/sht for engineer. Checking at 8 hrs/sht for designer and engineer.
Four site plan drawings sheets include OTG layout for site scanning, electrical/I&C, water, and mechanical equipment locations.
A/E Pool Rates include 17.1% G&A Adder.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
12	Approve drawing	G020	Clerk		4			$ 21.18	$ 85
		M030	engineering manager		1			$ 68.95	$ 69
		M030	operations manager		1			$ 68.95	$ 69
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Project Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
13	Release drawing at LMSI	G020	Clerk		4			$ 21.18	$ 85
		E130	Project Engineer		1			$ 62.09	$ 62
					990				$ 83,152

Deployment of Salt Lake Dissolution Retrieval

Acceptance Test Procedures (1.01.04.01.02.03.04.03.08)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prep/review/approve ATP		allocation						$ 50,000
TOTAL					0				$ 50,000

Cost Estimate and Schedule (1.01.04.01.02.03.04.03.09)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: A/E Pool Rates include 17.1% G&S Adder

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prepare cost and schedule estimate for FDR	A/E Pool Rate	project engineer		80			$ 81.67	$ 6,533
		A/E Pool Rate	planner/scheduler		80			$ 95.18	$ 7,614
		A/E Pool Rate	estimator		80			$ 97.16	$ 7,773
		A/E Pool Rate	project manager		80			$ 101.15	$ 8,092
2	review cost and schedule estimate	A/E Pool Rate	project engineer		40			$ 81.67	$ 3,267
		A/E Pool Rate	planner/scheduler		16			$ 95.18	$ 1,523
		A/E Pool Rate	estimator		16			$ 97.16	$ 1,555
		A/E Pool Rate	project manager		40			$ 101.15	$ 4,046
		A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
		A/E Pool Rate	electrical engineer		16			$ 100.07	$ 1,601
3	review cost and schedule estimate	A/E Pool Rate	project engineer		40			$ 81.67	$ 3,267
		A/E Pool Rate	planner/scheduler		40			$ 95.18	$ 3,807
		A/E Pool Rate	estimator		40			$ 97.16	$ 3,886
		A/E Pool Rate	project manager		40			$ 101.15	$ 4,046
					624				$ 58,611

Deployment of Saltcake Dissolution Retrieval

Ventilation System Design (1.01.04.01.02.03.04.03.10)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:
- Existing exhauster will be used with new ductwork routing and connection changes.
- A/E Pool Rates include 17.1% G&S Adder.
- Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Prep vent duct/tank and electrical tie in ECN(s	A/E Pool Rate	mechanical engineer		160			$ 100.07	$ 16,012
2	check ECN	A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
3	issue ECN for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		M030	operations manager		8			$ 68.95	$ 552
		M030	radcon manager		8			$ 68.95	$ 552
		M030	engineering manager		8			$ 68.95	$ 552
		E130	Design Authority		32			$ 62.09	$ 1,987
		E130	Project Engineer		8			$ 62.09	$ 497
		E130	System Cog Engineer		32			$ 62.09	$ 1,987
4	incorporate RCR comments	A/E Pool Rate	mechanical engineer		32			$ 100.07	$ 3,202
5	prepare USQ screen	E130	System Cog Engineer		16			$ 62.09	$ 993
6	Approve ECN	G020	Clerk		8			$ 21.18	$ 169
		E130	Design Authority		4			$ 62.09	$ 248
		M030	operations manager		2			$ 68.95	$ 138
		M030	engineering manager		2			$ 68.95	$ 138
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E130	Project Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		4			$ 62.09	$ 248
TOTAL					370				$ 30,318

Final Design Report and Other Design Media (1.01.04.01.02.03.04.03.11)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: A/E Pool Rates include 17.1% G&S Adder.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	finalize IC drawings (3 dwg sht) (provided in A/E's own format)	A/E Pool Rate	Mechanical Designer		120			$ 78.80	$ 9,456
		A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
2	check IC drawings (3 dwg sht)	A/E Pool Rate	Mechanical Designer		24			$ 78.80	$ 1,891
		A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
3	Issue drawings for internal review	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Nuclear Safety		2			$ 82.40	$ 165
		A/E Pool Rate	Quality Assurance		2			$ 101.55	$ 203
		A/E Pool Rate	project engineer		2			$ 81.67	$ 163
		A/E Pool Rate	project manager		2			$ 101.15	$ 202
		A/E Pool Rate	electrical engineer		2			$ 100.07	$ 200
		A/E Pool Rate	mechanical engineer		2			$ 100.07	$ 200
4	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		8			$ 100.07	$ 801
		A/E Pool Rate	Mechanical Designer		8			$ 78.80	$ 630
5	Approve and issue drawings	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	mechanical Engineer		1			$ 100.07	$ 100
		A/E Pool Rate	project engineer		1			$ 81.67	$ 82
		A/E Pool Rate	electrical engineer		1			$ 100.07	$ 100
6	perpare construction specification	A/E Pool Rate	mechanical engineer		120			$ 100.07	$ 12,009
		A/E Pool Rate	clerk		4			$ 36.00	$ 144
7	Issue specification for review	A/E Pool Rate	Clerk		8			$ 36.00	$ 288
		A/E Pool Rate	Project Manager		4			$ 101.15	$ 406
		A/E Pool Rate	Quality Assurance		4			$ 101.55	$ 406
		A/E Pool Rate	Nuclear Safety		4			$ 82.40	$ 330
		A/E Pool Rate	Design Authority		4			$ 100.07	$ 400
		A/E Pool Rate	Project Engineer		4			$ 81.67	$ 327
		A/E Pool Rate	System Cog Engineer		4			$ 81.67	$ 327
8	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
9	Approve specification	A/E Pool Rate	Clerk		4			$ 36.00	$ 144
		A/E Pool Rate	Project Manager		1			$ 101.15	$ 101
		A/E Pool Rate	Design Authority		1			$ 100.07	$ 100
		A/E Pool Rate	Nuclear Safety		1			$ 82.40	$ 82
		A/E Pool Rate	Quality Assurance		1			$ 101.55	$ 102
		A/E Pool Rate	Project Engineer		1			$ 81.67	$ 82
		A/E Pool Rate	System Cog Engineer		1			$ 81.67	$ 82

Final Design Report and Other Design Media (1.01.04.01.02.03.04.03.11)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: A/E Pool Rates include 17.1% G&S Adder.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
10	Release specification at LMSI	A/E Pool Rate	Clerk		1			$ 36.00	$ 36
		A/E Pool Rate	mechanical engineer		1			$ 100.07	$ 100
11	prep ALARA checklists and dose estimates	A/E Pool Rate	Mechanical Engineer		120			$ 100.07	$ 12,008
		T050	HP tech		4			$ 39.71	$ 159
		P090	Industrial Hygienist		4			$ 46.63	$ 187
		C020	electrician		2			$ 42.06	$ 84
		C080	pipefitter		2			$ 39.52	$ 79
		A/E Pool Rate	clerk		4			$ 36.00	$ 144
12	issue and conduct review meeting	A/E Pool Rate	Clerk		16			$ 36.00	$ 576
		M030	Operations Manager		8			$ 68.95	$ 552
		M030	radcon manager		8			$ 68.95	$ 552
		E130	Design Authority		8			$ 62.09	$ 497
		A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
		T050	HP tech		8			$ 39.71	$ 318
		P090	Industrial Hygienist		8			$ 46.63	$ 373
		R050	operator		8			$ 42.16	$ 337
		E050	environmental engineer		8			$ 48.82	$ 391
		C020	electrician		8			$ 42.06	$ 336
		C080	pipefitter		8			$ 39.52	$ 316
		E130	System Cog Engineer		8			$ 62.09	$ 497
13	Incorporate comments	A/E Pool Rate	Mechanical Engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	clerk		8			$ 36.00	$ 288
14	update ALARA once during design effort	A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	Clerk		8			$ 36.00	$ 288
15	prepare final design report	A/E Pool Rate	mechanical engineer		80			$ 100.07	$ 8,006
		A/E Pool Rate	electrical engineer		80			$ 100.07	$ 8,006
		A/E Pool Rate	project engineer		80			$ 81.67	$ 6,533
		A/E Pool Rate	project manager		80			$ 101.15	$ 8,092
		A/E Pool Rate	nuclear safety		80			$ 82.40	$ 6,592
		A/E Pool Rate	clerk		80			$ 36.00	$ 2,880
16	Issue for internal review	A/E Pool Rate	Clerk		16			$ 36.00	$ 576
		A/E Pool Rate	Quality Assurance		16			$ 101.55	$ 1,625
		A/E Pool Rate	Nuclear Safety		16			$ 82.40	$ 1,318
		A/E Pool Rate	Project Manager		16			$ 101.15	$ 1,618
		A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
		A/E Pool Rate	electrical engineer		16			$ 100.07	$ 1,601
		A/E Pool Rate	Project Engineer		16			$ 81.67	$ 1,307

Final Design Report and Other Design Media (1.01.04.01.02.03.04.03.11)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: A/E Pool Rates include 17.1% G&S Adder.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
17	Incorporate RCR comments	A/E Pool Rate	mechanical engineer		24			$ 100.07	$ 2,402
		A/E Pool Rate	electrical engineer		24			$ 100.07	$ 2,402
		A/E Pool Rate	project engineer		24			$ 81.67	$ 1,960
		A/E Pool Rate	project manager		24			$ 101.15	$ 2,428
		A/E Pool Rate	nuclear safety		24			$ 82.40	$ 1,978
		A/E Pool Rate	clerk		24			$ 36.00	$ 864
18	reproduction, binders, assembly	A/E Pool Rate	repro shop						$ 2,000
19	letter, distribution	A/E Pool Rate	clerk		16			$ 36.00	$ 576
TOTAL					1537				$ 130,867

Deployment of Salt Lake Dissolution Retrieval

LDMM System Design (1.01.04.01.02.03.04.03.12)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	LDMM System Design								
			allocation						$ 750,000
TOTAL					0				$ 750,000

Deployment of Saltcake Dissolution Retrieval

Procurement (1.01.04.01.02.03.04.04)

: K. E. Ard	
Revision	0
Date	1/24/01

Estimate Basis Notes:
Cost are based on historical data gathered for past tank farm work.
Costs include major equipment spares and assumes that the existing 190 ft. of OTG from pit 241-S-C to pit 241-S-A is ready for use, including all S-A pit hardware, upto and including the PUREX nozzle on the S-C pit end of the OTG run between S-C and S-A pits.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
0.01	**PIC Skid**								
	Pump Instrument and Control (PIC) skid		RP Marshall (U-106 sch) (exempt hrs removed)			2		$ 359,000.00	$ 718,000
0.02	**Chemical Injection Skid**								
	chemical injection skid		RP Marshall (historical)			2		$ 175,000.00	$ 350,000
	caustic dil. addition system w/heat trace		KG Carothers (ROM)			2		$ 70,000.00	$ 140,000
	sprinklers		vendor quote			6	each	$ 50.00	$ 300
	misc pipe		allocation						$ 40,000
0.03	**Camera and Supplies (1 camera, 2 spares)**		W-521 estimate			3	each	$ 200,000.00	$ 600,000
0.04	**Saltwell Pumping System**								
	salt well pump, legs, dip tubes		U-106 baseline			2		$ 75,000.00	$ 150,000
	pump jumper		U-106 baseline			2		$ 36,500.00	$ 73,000
	pump motor and housing		U-106 baseline			2		$ 10,000.00	$ 20,000
0.05	**Combustible Gas Monitor**		RP Marshall (historical)						
	combustible gas monitor					2		$ 25,000.00	$ 50,000
0.06	**Over-Ground Transfer System**		J. R. Biggs (historical)						
	hose-in-hose (241-S-12A to 241-S-C)					150	1 ft	$ 250.00	$ 37,500
	hose end PUREX nozzles					2	each	$ 1,500.00	$ 3,000
	2 in. shield plate (241-S-12A to 241-S-C)					150	100 ft	$ 15,000.00	$ 22,500
	strongbacks					2	each	$ 3,500.00	$ 7,000
	dog houses					2	each	$ 21,000.00	$ 42,000
	flex jumpers (241-S-12A, 241-S-C, 241-S-A)					2	each	$ 5,000.00	$ 10,000
	valve manifolds (241-S-12A, 241-S-C, 241-S-					1	each	$ 55,000.00	$ 55,000
0.07	**Pit Cover Plates**								
	cover plates (241-S-12A, 241-S-C, 241-S-A)		J. R. Biggs (historical)			2	each	$ 55,000.00	$ 110,000
0.08	**Misc. Consumables**								
	4% of construction total		allocation						$ 80,000
0.09	**PPE**		allocation						$ 100,000
0.10	**DST Transfer Pump**		allocation						$ 130,000
0.11	**LDMM System Hardware**		allocation						$ 1,250,000
0.12	**Ventilation De-entrainment System** (covers procurement and installation)		allocation						$ 75,000
TOTAL					0				$ 4,063,300

Saltcake Dissolution Retrieval Demonstrations
Construction (1.01.04.01.02.03.04.05)

January 24, 2001

Title	WBS	Total Hrs	Total Cost	Paid by Others
Construction Management	1.01.04.01.02.03.04.05.01	4,730	$ 406,627	
Acceptance Inspection	1.01.04.01.02.03.04.05.02	522	$ 32,166	
Construction Mobilization	1.01.04.01.02.03.04.05.03	440	$ 22,000	
Retrieval System	1.01.04.01.02.03.04.05.04	-	$ 284,700	
Water Distribution System	1.01.04.01.02.03.04.05.05	-	$ 220,000	
Utilities	1.01.04.01.02.03.04.05.06	200	$ 61,268	
S Farm Transfer System	1.01.04.01.02.03.04.05.07	-	$ 593,000	
Monitoring Inst and Control System	1.01.04.01.02.03.04.05.08	-	$ 45,000	
Site Prep/Demolition & Disposal	1.01.04.01.02.03.04.05.09	344	$ 839,783	
Construction Demobilization	1.01.04.01.02.03.04.05.10	440	$ 22,000	
Engineering During Construction	1.01.04.01.02.03.04.05.11	-	$ 640,000	
Ventilation System	1.01.04.01.02.03.04.05.12	792	$ 118,747	-
LDMM System	1.01.04.01.02.03.04.05.13		$ 1,000,000	
Total Construction		7,468	$ 4,285,291	$ -

Deployment of Saltcake Dissolution Retrieval

Construction Management (1.01.04.01.02.03.04.05.01)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Although a plant forces work review has not been performed to date, work is assumed to be performed by interim stabilization personnel.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Person In Charge (PIC) Support (full time for 6 months)	E130	Engineer		901			$ 62.09	$ 55,943
2	JCS Planner (two full time planners for 6 months)	P070	Planner/Scheduler		1802			$ 43.40	$ 78,207
3	craft supervision (quarter time for 6 months)	M010	supervisor/mgr		225			$ 47.07	$ 10,591
4	Cog. Engineer (2 full time for 6 months)	E130	System Cog Engineer		1802			$ 62.09	$ 111,886
5	Weather delays during operation 30 days per yr. 15 days total for 6 months $10K per day					15	days	$ 10,000.00	$ 150,000
TOTAL					4730				$ 406,627

Deployment of Salt Lake Dissolution Retrieval

Acceptance Inspection (1.01.04.01.02.03.04.05.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	Prepare AI Plan	E130	Engineer		24			$ 62.09	$ 1,490
		G020	Clerk		4			$ 21.18	$ 85
2	Review/Incorp Comments/Approve AI Plan	E130	Engineer		2			$ 62.09	$ 124
		G020	clerk		2			$ 21.18	$ 42
3	AI Support and Interface	E130	Engineer (1/2 time for 6 mo)		450			$ 62.09	$ 27,941
		E130	Construction Engineering		40			$ 62.09	$ 2,484
TOTAL					522				$ 32,166

Deployment of Saltcake Dissolution Retrieval

Construction Mobilization (1.01.04.01.02.03.04.05.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	mobilization (moving men, stage materials and equipment)		W-521 Estimate (241-SY)		440				$ 22,000
TOTAL					440				$ 22,000

Deployment of Salt Lake Dissolution Retrieval

Retrieval System (1.01.04.01.02.03.04.05.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Labor (Inside Fence ONLY) Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	Install PIC Skid		U-106 baseline estimate			1			$ 77,000.00
			(less eng, QA, safe, env. hrs)						
2	Install chemical injection skid		allocation			1			$ 50,000
3	Install and test CGM		U-106 baseline estimate			1			$ 77,100.00
			(less eng, QA, safe, env. Hrs)						
4	mod pump recirc. line		U-106 baseline estimate			1			$ 16,400
5	pump run-in		U-106 baseline estimate			1			$ 10,200
6	Install S-103-03A jumper strongback, doghouse and cover plate, pump and pump jumper		U-106 baseline estimate			1			$ 54,000.00
TOTAL					0				$ 284,700

Deployment of Saltcake Dissolution Retrieval

Water Distribution System (1.01.04.01.020.03.05.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Raw water will already be installed with backflow preventor to S-112. Piping will include installation at perimeter point to sprinklers in Risers 11, 14, 16.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	three non pit riser entries @ $40,000/entry								$ 120,000
2	Install piping runs and sprinklers		allocation						$ 100,000
TOTAL					0				$ 220,000

Deployment of Saltcake Dissolution Retrieval

Utilities (1.01.04.01.02.03.04.05.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Based on saltwell pumping operations support, adequate power will be available at S-112 and will not require upgrade. Approx. 220 ft of 1" sch 40 pipe above grade due east over to S-12A will be installed. 3 watt per foot heat trace and insulated with Armaflex 1" thick with pipe support every 10 ft.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	power runs and tie-in for equipment		allocation						$ 25,000
2	install 220 ft. of 1" sch 40 pipe above grade, 3 watt/ft heat trace and insulated with Armaflex 1" thick. Pipe supts every 10 ft., replacing 3/4" valve with 1 valve	C080	Pipefitters (2)		80		Lot	$ 3,062.00	$ 3,062
		C120	Other Craft (2)		80			$ 39.52	$ 3,162
		M010	First Line Superviser		40			$ 39.52	$ 3,162
3	water runs and tie-in water distribution system		allocation					$ 47.07	$ 1,883
									$ 25,000
TOTAL					200				$ 61,268

Deployment of Saltcake Dissolution Retrieval

S Farm Transfer System (1.01.04.01.02.03.04.05.07)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Costs assume that 190 ft of OTG between S-C and S-A pit installed and ready to use, including S-A pit hardware upto and including PUREX nozzle on the S-C end of the OTG run between S-C and S-A pits.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	install 2 jumpers, 3 strongbacks, 2 doghouses, 1 manifold, 2 hose end PUREX nozzles, 2 cover plates.		U-106 baseline estimate (eng., QA, safety, env. Hrs and fab costs subtracted)						$ 58,000
2	trench and route hose-in-hose S-12A and S-C pits (includes heat trace)		J. R. Biggs (historical)			150	ft	$ 40.00	$ 6,000
3	install 2 inch shielding plate between S-12A and S-C pits		J. R. Biggs (historical)			150	ft	$ 50.00	$ 7,500
4	pit entry and hose tie-in work		J. R. Biggs (historical)			2	each	$ 25,000.00	$ 50,000
5	hydro test		U-106 baseline (eng. QA, safety, env. hours subtracted)						$ 71,500
6	Pit Inspections(2 pits @ $200K ea)								$ 400,000
TOTAL					0				$ 593,000

Deployment of Saltcake Dissolution Retrieval

Site Prep/Demolition and Disposal (1.01.04.01.02.03.04.05.09)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumes no long length items is Risers 6, 7, 11, 14, 16.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Labor (Inside Fence ONLY) Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	Prep, approve waste plan as supporting document		U-106 baseline schedule						$ 17,300
2	Pump pull TRU assay		J. R. Biggs (based on AW-104)						$ 50,000
3	Remove old pump and jumper, pump legs, dip tubes, cover plate cut up, packaging, and disposal		J. R. Biggs (based on AW-104)						$ 500,000
4	Pump Pull Mockup and Training		J. R. Biggs (based on AW-104)						$ 180,000
5	Qty 3 boxes mixed waste 4x4x8 waste box (128 cubic ft.) $115.00/cu. ft.		allocation for misc. materials disposal			cu. ft.	384	$ 115.00	$ 44,160
6	Qty 3 boxes low level waste 4x4x8 waste box (128 cubic ft.) $54.00/cu. ft.		allocation for misc. materials disposal			cu. ft.	384	$ 54.00	$ 20,736
7	prep ALARA checklists and dose estimates for pump pull	A/E Pool Rate	Mechanical Engineer		120			$ 100.07	$ 12,008
		T060	HP tech		4			$ 39.71	$ 159
		P090	Industrial Hygienist		4			$ 46.63	$ 187
		C020	electrician		2			$ 42.06	$ 84
		C080	pipefitter		2			$ 39.52	$ 79
		A/E Pool Rate	clerk		4			$ 36.00	$ 144
8	issue and conduct review meetings	A/E Pool Rate	Clerk		16			$ 36.00	$ 576
		M030	Operations Manager		8			$ 68.95	$ 552
		M030	radcon manager		8			$ 68.95	$ 552
		E130	Design Authority		8			$ 62.09	$ 497
		A/E Pool Rate	mechanical engineer		16			$ 100.07	$ 1,601
		T060	HP tech		8			$ 39.71	$ 318
		P090	Industrial Hygienist		8			$ 46.63	$ 373
		R050	operator		8			$ 42.16	$ 337
		E050	environmental engineer		8			$ 48.82	$ 391
		C020	electrician		8			$ 42.06	$ 336
		C080	pipefitter		8			$ 39.52	$ 316
		E130	System Cog Engineer		8			$ 62.09	$ 497
9	incorporate comments	A/E Pool Rate	Mechanical Engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	clerk		8			$ 36.00	$ 288
10	update ALARA once during mockup effort	A/E Pool Rate	mechanical engineer		40			$ 100.07	$ 4,003
		A/E Pool Rate	Clerk		8			$ 36.00	$ 288
TOTAL					344				$ 839,783

Deployment of Saltcake Dissolution Retrieval

Monitoring Instrumentation and Control System (1.01.04.01.02.03.04.05.08)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumes one camera installed in one riser. There is no existing equipment to be removed.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	non-pit riser entry @ $20,000/entry		historical						$ 20,000
2	Install CCTV camera in Riser 6		W-521 estimate (AW-101)						$ 25,000
TOTAL					0				$ 45,000

Deployment of Saltcake Dissolution Retrieval

Construction Demobilization (1.01.04.01.02.03.04.05.10)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	construction demobilization		W-521 Estimate (241-SY)		440				$ 22,000
TOTAL					440				$ 22,000

Deployment of Saltcake Dissolution Retrieval

Engineering During Construction (1.01.04.01.02.03.04.05.11)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Title III estimated at 8% of construction costs.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	8% of construction and procurement costs (8% of $8,000,000)								$ 640,000
TOTAL					0				$ 640,000

Deployment of Saltcake Dissolution Retrieval

Ventilation System (1.01.04.01.02.03.04.05.12)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:
Assumes that existing ventilations system will be used and will require update on periodic maintenance.
Disconnect and moving existing exhauster to S-112, placement and tie-in to electrical service and ductwork.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Remove old 8 in. duct and install new duct. (includes two non-pit riser entries at $20,000/riser)								$ 80,000
2	Install two stands/supports								
3	AJHA Session and Work Pkg Review (one 8 hr mtg with 20 people)				120			$ 40.00	$ 5,000
4	Disconnect and move exhauster to S-112	C060	Millwrights (2)		32			$ 42.06	$ 4,800
		C120	Instrument Techs (2)		32			$ 39.52	$ 1,346
		C020	Electricians (4)		64			$ 42.06	$ 1,266
		C090	Riggers (4)		64			$ 39.52	$ 2,692
		C120	Divers (2)		16			$ 39.52	$ 2,529
		P080	HPTs (2)		112			$ 49.99	$ 632
		P090	Industrial Hygienists (1)		16			$ 46.63	$ 5,599
		C080	Pipefitters		32			$ 39.52	$ 746
		M010	Supervisor		40			$ 47.07	$ 1,265
		M010	First Line Supervisor		56			$ 47.07	$ 1,883
		R040	Nuclear Plant Operators (3)		168			$ 40.52	$ 2,636
		C120	Material Coordinator		24			$ 39.52	$ 6,807
		R070	Utilities System Operators		16			$ 37.43	$ 948
TOTAL					792				$ 599
									$ 118,747

LDMM System (1.01.04.01.02.03.04.05.13)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Install LDMM System		allocation						$ 1,000,000
TOTAL					0				$ 1,000,000

Saltcake Dissolution Retrieval Demonstrations
Startup Testing and Turnover (1.01.04.01.02.03.04.06)

January 24, 2001

Title	WBS	Total Hrs	Total Cost	Paid by Others
Startup Administration	1.01.04.01.02.03.04.06.01	330	$ 18,932	
Test Planning	1.01.04.01.02.03.04.06.02	1,503	$ 87,443	
Startup Testing and Support	1.01.04.01.02.03.04.06.03	1,670	$ 87,209	
Readiness Review	1.01.04.01.02.03.04.06.04	-	$ 305,000	-
Total Startup Testing and Turnover		3,503	$ 498,583	$ -

Deployment of Salt Lake Dissolution Retrieval

Startup Administration (1.01.04.01.02.03.04.06.01)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	management support	M030	engineering manager		250			$ 68.95	$ 17,238
	clerical	G020	clerk		80			$ 21.18	$ 1,694
TOTAL					330				$ 18,932

Deployment of Salt .ke Dissolution Retrieval

Test Planning (1.01.04.01.02.03.04.06.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prepare startup test specification	E130	Engineer		160			$ 62.09	$ 9,934
		G020	clerk		8			$ 21.18	$ 169
2	Issue supporting document for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		M030	Operations Manager		8			$ 68.95	$ 552
		E130	Design Authority		8			$ 62.09	$ 497
		E130	Engineer		8			$ 62.09	$ 497
		E130	System Cog Engineer		8			$ 62.09	$ 497
3	Incorporate RCR comments	E130	Engineer		32			$ 62.09	$ 1,987
4	Approve support document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		4			$ 51.12	$ 204
		E080	Nuclear Safety		4			$ 63.72	$ 255
		E130	Design Authority		4			$ 62.09	$ 248
		M030	Operations Manager		4			$ 68.95	$ 276
		E130	Engineer		4		Hours	$ 62.09	$ 248
		E130	System Cog Engineer		4		Hours	$ 62.09	$ 248
5	Release supporting document at LMSI	G020	Clerk		4			$ 21.18	$ 85
		E130	Engineer		1		Hours	$ 62.09	$ 62
6	prep startup cal/grooming/alignment pkg								
	verification work completion pkg	E130	Engineer		120			$ 62.09	$ 7,451
	calibration pkg	E130	Engineer		120			$ 62.09	$ 7,451
	megering/continuity pkg	E130	Engineer		120			$ 62.09	$ 7,451
	OTG transfer piping hydro test pkg	E130	Engineer		120			$ 62.09	$ 7,451
	valve alignment pkg	E130	Engineer		120			$ 62.09	$ 7,451
	phase rotation pkg	E130	Engineer		120			$ 62.09	$ 7,451
		G020	clerk		80			$ 21.18	$ 1,694
7	Issue cal/grooming/alignment pkgs for review	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		4			$ 51.12	$ 204
		E080	Nuclear Safety		4			$ 63.72	$ 255
		E130	Design Authority		4			$ 62.09	$ 248
		M030	Operations Manager		4			$ 68.95	$ 276
		E130	Engineer		4			$ 62.09	$ 248
		E130	System Cog Engineer		4			$ 62.09	$ 248
8	Incorporate comments	E130	Engineer		80			$ 62.09	$ 4,967
		G020	clerk		8			$ 21.18	$ 169

Deployment of Salt[illegible]e Dissolution Retrieval

Test Planning (1.01.04.01.02.03.04.06.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
9	approve cal/grooming/alignment pkgs	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E130	Design Authority		2			$ 62.09	$ 124
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
10	prepare startup test procedure (ATP)	E130	Engineer		160		Hours	$ 62.09	$ 9,934
		G020	clerk		8			$ 21.18	$ 169
11	Issue supporting document for review	G020	Clerk		8		Hours	$ 21.18	$ 169
		E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		M030	Operations Manager		8			$ 68.95	$ 552
		E130	Design Authority		8			$ 62.09	$ 497
		E130	Engineer		8			$ 62.09	$ 497
		E130	System Cog Engineer		8			$ 62.09	$ 497
12	Incorporate RCR comments	E130	Engineer		40		Hours	$ 62.09	$ 2,484
13	Approve support document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E130	Design Authority		2			$ 62.09	$ 124
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Engineer		2		Hours	$ 62.09	$ 124
		E130	System Cog Engineer		2		Hours	$ 62.09	$ 124
14	Release supporting document at LMSI	G020	Clerk		2			$ 21.18	$ 42
TOTAL					1503				$ 87,443

Deployment of Saltcake Dissolution Retrieval

Startup Testing and Support (1.01.04.01.02.03.04.06.03)

Estimate Basis Notes:

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	Grooming and alignment (assume 30 days)	E130	Startup Engineer		240			$ 62.09	$ 14,902
		C020	Electrician		240			$ 42.06	$ 10,094
		C020	Electrician		240			$ 42.06	$ 10,094
		E130	Design Authority		24			$ 62.09	$ 1,490
2	Perform Startup Test (assume 20 days)	E130	Startup Engineer		160			$ 62.09	$ 9,934
		C020	Electrician		160			$ 42.06	$ 6,730
		C020	Electrician		160			$ 42.06	$ 6,730
		E130	Design Authority		16			$ 62.09	$ 993
3	Disposition and closeout of test exceptions	E130	Startup Engineer		80			$ 62.09	$ 4,967
		E130	System Cog Engineer		80			$ 62.09	$ 4,967
		E130	Design Authority		120			$ 62.09	$ 7,451
4	prepare starup test report (ATR)	E130	startup engineer		80			$ 62.09	$ 4,967
		G020	clerk		4			$ 21.18	$ 85
5	Issue supporting document for review	G020	Clerk		2			$ 21.18	$ 42
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		2			$ 62.09	$ 124
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		40			$ 62.09	$ 2,484
6	Incorporate RCR comments	E130	Startup Engineer		4			$ 21.18	$ 85
7	Approve support document	G020	Clerk		1			$ 51.12	$ 51
		E110	Quality Assurance		1			$ 63.72	$ 64
		E080	Nuclear Safety		1			$ 62.09	$ 62
		E130	Design Authority		1			$ 68.95	$ 69
		M030	Operations Manager		1			$ 62.09	$ 62
		E130	Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 21.18	$ 21
8	Release supporting document at LMSI	G020	Clerk		1			$ 62.09	$ 62
		E130	Engineer		1				
TOTAL					1670				$ 87,209

Deployment of Saltcake Dissolution Retrieval

Readiness Review (1.01.04.01.02.03.04.06.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumes that an ORR will be performed. Assumes that the operation is similar to a saltwell pumping operation with sprinklers added. The ORR will cover new operational aspects of a sprinkler system.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Management Self Assessments		U-106 baseline						$ 55,000
2	Operational Readiness Review		allocation						$ 250,000
TOTAL					0				$ 305,000

Saltcake Dissolution Retrieval Demonstrations
Other Project Costs (1.01.04.01.02.03.04.07)

January 24, 2001

Title	WBS	Total Hrs	Total Cost	Paid by Others
Quality Assurance	1.01.04.01.02.03.04.07.01	1,884	$ 131,614	
Environmental Permitting	1.01.04.01.02.03.04.07.02	2,370	$ 120,703	
Safety	1.01.04.01.02.03.04.07.03	1,000	$ 58,580	
Authorization Basis (AB) Support	1.01.04.01.02.03.04.07.04	1,220	$ 73,226	
Plant Engineering Support	1.01.04.01.02.03.04.07.05	5,406	$ 305,871	
Design Reviews	1.01.04.01.02.03.04.07.06	1,253	$ 71,458	-
Total Other Project Costs		13,133	$ 761,453	$ -

Deployment of Saltcake Dissolution Retrieval

Qu(/ Assurance (1.01.04.01.02.03.04.07.01)

Estimate by:	K. E.
Revision	0
Date	1/24/01

Estimate Basis Notes: Quality assurance hours are distrubuted across project deliverables in other portions of this estimate.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Prepare QA Plan	E110	Quality Engineer		160			$ 51.12	$ 8,179
		G020	Clerk		4			$ 21.18	$ 85
2	Issue supporting document for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		2			$ 62.09	$ 124
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
3	Incorporate RCR comments	E110	Quality Engineer		40			$ 51.12	$ 2,045
4	Approve support document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E130	Design Authority		2			$ 62.09	$ 124
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
5	Release supporting document at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E130	Engineer		2			$ 62.09	$ 124
6	Process surveillance reports, NCRs, audits								
	assume:								
	coordination of 10 NCRs @ 40 hrs/NCR	E110	Quality Engineer		400			$ 51.12	$ 20,448
	review 5 vendor eval. Reports @ 16 hr/report	E110	Quality Engineer		80			$ 51.12	$ 4,090
	review 10 surveillance Reports @ 16hr/report	E110	Quality Engineer		160			$ 51.12	$ 8,179
7	source evaluations (assume Qty 5)								
	prep checklist	E110	Quality Engineer		40			$ 51.12	$ 2,045
	desk review of QA program	E110	Quality Engineer		120			$ 51.12	$ 6,134
	vendor visit	E110	Quality Engineer		120			$ 51.12	$ 6,134
	reporting	E110	Quality Engineer		80			$ 51.12	$ 4,090
8	surveillances/inspections (assume Qty 10)								
	prep checklist	E110	Quality Engineer		80			$ 51.12	$ 4,090
	documentation review	E110	Quality Engineer		240			$ 51.12	$ 12,269
	field walkdown	E110	Quality Engineer		240			$ 51.12	$ 12,269
	reporting	E110	Quality Engineer		80			$ 51.12	$ 4,090
9	QC during construction	C120	Quality Control		900			$ 39.52	$ 35,568
	(assume full time QC inspector for 6 mo.)								
TOTAL					1884				$ 131,614

Deployment of Salt...e Dissolution Retrieval

Environmental and Permitting (1.01.04.01.02.03.04.07.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Basis: RPP-6666 (draft), Waste Retrieval System Environmental Permits and Approvals Plan (hours for deliverables only).

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Environmental Actions and Tasks	E050	environmental engineer		2370		Hours	$ 48.82	$ 115,703
2	other costs		other costs						$ 5,000
TOTAL					2370				$ 120,703

Deployment of Saltcake Dissolution Retrieval

Safety (1.01.04.01.02.03.04.07.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	prepare prelim hazards evaluation	E080	nuclear safety engineer		120			$ 63.72	$ 7,646
		G020	Clerk		8			$ 21.18	$ 169
2	issue and conduct review meeting	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		M030	Operations Manager		8			$ 68.95	$ 552
		M030	radcon manager		8			$ 68.95	$ 552
		E130	Design Authority		8			$ 62.09	$ 993
		E130	Engineer		16			$ 62.09	$ 497
		E130	System Cog Engineer		8			$ 62.09	$ 497
3	Incorporate RCR comments	E080	nuclear safety engineer		8			$ 63.72	$ 2,549
		G020	clerk		40			$ 21.18	$ 42
4	update during detailed design	E080	nuclear safety engineer		2			$ 63.72	$ 7,646
		G020	clerk		120			$ 21.18	$ 42
5	Approve support document	G020	Clerk		2			$ 21.18	$ 85
		E110	Quality Assurance		4			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E130	Design Authority		1			$ 62.09	$ 62
		M030	radcon manager		1			$ 68.95	$ 69
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
6	Release finalized report at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E130	Engineer		1			$ 62.09	$ 62
7	prepare prelim safety evaluation	E080	nuclear safety engineer		120			$ 63.72	$ 7,646
		G020	Clerk		4			$ 21.18	$ 85
8	issue and conduct review meetings	G020	Clerk		16			$ 21.18	$ 339
		E110	Quality Assurance		16			$ 51.12	$ 818
		E080	Nuclear Safety		16			$ 63.72	$ 1,020
		M030	Operations Manager		16			$ 68.95	$ 1,103
		M030	radcon manager		16			$ 68.95	$ 1,103
		E130	Design Authority		16			$ 62.09	$ 993
		E130	Engineer		16			$ 62.09	$ 993
		E130	System Cog Engineer		16			$ 62.09	$ 993
9	Incorporate RCR comments	E080	nuclear safety engineer		40			$ 63.72	$ 2,549
		G020	clerk		4			$ 21.18	$ 85
10	update during detailed design	E080	nuclear safety engineer		120			$ 63.72	$ 7,646
		G020	clerk		4			$ 21.18	$ 85

Deployment of Saltcake Dissolution Retrieval

Safety (1.01.04.01.02.03.04.07.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
11	Approve support document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E130	Design Authority		2			$ 62.09	$ 124
		M030	radcon manager		2			$ 68.95	$ 138
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
12	Release finalized report at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E130	Engineer		1			$ 62.09	$ 62
13	prepare human factors report	E070	mechanical engineer		80			$ 51.90	$ 4,152
		G020	Clerk		4			$ 21.18	$ 85
14	Issue supporting document for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		M030	radcon manager		2			$ 68.95	$ 138
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		2			$ 62.09	$ 124
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
15	Incorporate RCR comments	E110	Quality Engineer		24			$ 51.12	$ 1,227
16	Approve support document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E130	Design Authority		1			$ 62.09	$ 62
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
		M030	radcon manager		1			$ 68.95	$ 69
17	Release supporting document at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E130	Engineer		1			$ 62.09	$ 62
18	Review FHA and design documention	E070	mechanical engineer		40			$ 51.90	$ 2,076
TOTAL					1000				$ 58,580

Authorization Basis (AB) Support (1.01.04.01.02.03.04.07.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Other than minor descriptive changes in the SAR/TSR, no other authorization basis changes are anticipated.
A USQ evaluation will be performed during conceptual design to validate this assumption.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	review safety documentation and procedures	E080	nuclear safety engineer		120			$ 63.72	$ 7,646
2	prepare ECN to SAR/TSR	E080	nuclear safety engineer		80			$ 63.72	$ 5,098
		G020	clerk		2			$ 21.18	$ 42
3	issue supporting document for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		M030	environmental manager		8			$ 68.95	$ 552
		M030	radcon manager		8			$ 68.95	$ 552
		M030	Operations Manager		40			$ 68.95	$ 2,758
		E130	Design Authority		40			$ 62.09	$ 2,484
		E130	System Cog Engineer		8			$ 62.09	$ 497
4	Incorporate RCR comments	E080	nuclear safety engineer		40			$ 63.72	$ 2,549
5	Approve ECN\prepare xmittal letter letter	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	nuclear safety manager		8			$ 68.95	$ 552
		E110	quality assurance		2			$ 51.12	$ 102
		M030	environmental manager		2			$ 68.95	$ 138
		E080	nuclear safety engineer		40			$ 63.72	$ 2,549
		M030	Operations Manager		8			$ 68.95	$ 552
		E130	System Cog Engineer		2			$ 62.09	$ 124
6	Release ECN at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E130	Engineer		1			$ 62.09	$ 62
7	prepare process standards change	E080	nuclear safety engineer		80			$ 63.72	$ 5,098
9	Issue for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		M030	environmental manager		8			$ 68.95	$ 552
		M030	radcon manager		8			$ 68.95	$ 552
		M030	Operations Manager		40			$ 68.95	$ 2,758
		E130	Design Authority		40			$ 62.09	$ 2,484
		E130	System Cog Engineer		8			$ 62.09	$ 497
10	Incorporate RCR comments	E080	nuclear safety engineer		40			$ 63.72	$ 2,549
11	Approve process standards change	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	nuclear safety manager		8			$ 68.95	$ 552
		E110	quality assurance		2			$ 51.12	$ 102
		M030	environmental manager		2			$ 68.95	$ 138
		E080	nuclear safety engineer		40			$ 63.72	$ 2,549
		M030	Operations Manager		8			$ 68.95	$ 552
		E130	System Cog Engineer		2			$ 62.09	$ 124

Authorization Basis (AB) Support (1.01.04.01.02.03.04.07.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Other than minor descriptive changes in the SAR/TSR, no other authorization basis changes are anticipated.
A USQ evaluation will be performed during conceptual design to validate this assumption.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
12	Implement SAR/TSR changes	G020	Clerk		40			$ 21.18	$ 847
		E130	Design Authority		40			$ 62.09	$ 2,484
		M030	nuclear safety manager		40			$ 68.95	$ 2,758
		E110	quality assurance		40			$ 51.12	$ 2,045
		M030	environmental manager		40			$ 68.95	$ 2,758
		E060	nuclear safety engineer		40			$ 63.72	$ 2,549
		M030	Operations Manager		40			$ 68.95	$ 2,758
		E130	System Cog Engineer		40			$ 62.09	$ 2,484
13	prepare ECN to SEL	E070	mechanical engineer		80			$ 51.90	$ 4,152
		G020	clerk		4			$ 21.18	$ 85
14	Issue supporting document for review	G020	Clerk		8			$ 21.18	$ 169
		M030	Operations Manager		2			$ 68.95	$ 138
		E110	Quality Assurance		2			$ 51.12	$ 102
		E130	Design Authority		2			$ 62.09	$ 124
		E060	Nuclear Safety		4			$ 63.72	$ 255
		E130	System Cog Engineer		2			$ 62.09	$ 124
15	Incorporate RCR comments	E070	mechanical engineer		24			$ 51.90	$ 1,246
16	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		M030	Operations Manager		2			$ 68.95	$ 138
		E110	Quality Assurance		2			$ 51.12	$ 102
		E130	Design Authority		2			$ 62.09	$ 124
		E060	Nuclear Safety		2			$ 63.72	$ 127
		E130	System Cog Engineer		2			$ 62.09	$ 124
17	Release supporting document at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E070	mechanical engineer		1			$ 51.90	$ 52
TOTAL					1220				$ 73,226

Deployment of Saltcake Dissolution Retrieval

Plant Engineering Support (1.01.04.01.02.03.04.07.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Process Engineering Support Assume LOE for 3 yrs @ 1802 hr/yr	E010	chemical engineer		5406			$ 56.58	$ 305,871
TOTAL					5406				$ 305,871

Deployment of Salt Lake Dissolution Retrieval

Design Reviews (1.01.04.01.02.03.04.07.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumes that two formal design reviews will be sponsored by CHG to review the vendor supplied conceptual and final designs.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	conduct 5 day formal design review (concept)	G020	Clerk		40			$ 21.18	$ 847
		E110	Quality Assurance		40			$ 51.12	$ 2,045
		E080	Nuclear Safety		40			$ 63.72	$ 2,549
		M030	Operations Manager		40			$ 68.95	$ 2,758
		E130	Design Authority		40			$ 62.09	$ 2,484
		E130	Engineer		40			$ 62.09	$ 2,484
		M030	Radcon Manager		40			$ 68.95	$ 2,758
		E070	mechanical engineer		40			$ 51.90	$ 2,076
		E040	electrical I&C engineer		40			$ 54.38	$ 2,175
		E130	System Cog engineer		40			$ 62.09	$ 2,484
2	prepare concept design review report	E130	Engineer		80			$ 62.09	$ 4,967
		G020	clerk		8			$ 21.18	$ 169
3	issue supporting document for review	G020	Clerk		2			$ 21.18	$ 42
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		4			$ 62.09	$ 248
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		4			$ 62.09	$ 248
4	incorporate comments	E130	Engineer		32			$ 62.09	$ 1,987
5	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
6	release SD at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E130	Engineer		1			$ 62.09	$ 62
7	conduct 5 day formal design review (detailed)	G020	Clerk		40			$ 21.18	$ 847
		E110	Quality Assurance		40			$ 51.12	$ 2,045
		E080	Nuclear Safety		40			$ 63.72	$ 2,549
		M030	Operations Manager		40			$ 68.95	$ 2,758
		E130	Design Authority		40			$ 62.09	$ 2,484
		E130	Engineer		40			$ 62.09	$ 2,484
		M030	Radcon Manager		40			$ 68.95	$ 2,758
		E070	mechanical engineer		40			$ 51.90	$ 2,076
		E040	electrical I&C engineer		40			$ 54.38	$ 2,175
		E130	System Cog engineer		40			$ 62.09	$ 2,484
8	prepare final design review report (final design)	E130	Engineer		80			$ 62.09	$ 4,967
		G020	clerk		8			$ 21.18	$ 169

Deployment of Saltcake Dissolution Retrieval

Design Reviews (1.01.04.01.02.03.04.07.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumes that two formal design reviews will be sponsored by CHG to review the vendor supplied conceptual and final designs.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
9	Issue supporting document for review	G020	Clerk		2			$ 21.18	$ 42
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		4			$ 62.09	$ 248
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		4			$ 62.09	$ 248
10	Incorporate comments	E130	Engineer		32			$ 62.09	$ 1,987
11	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
12	release SD at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E130	Engineer		1			$ 62.09	$ 62
13	prepare final design completion report	E130	Engineer		80			$ 62.09	$ 4,967
		G020	clerk		8			$ 21.18	$ 169
14	Issue supporting document for review	G020	Clerk		2			$ 21.18	$ 42
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		4			$ 62.09	$ 248
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		4			$ 62.09	$ 248
15	Incorporate comments	E130	Engineer		32			$ 62.09	$ 1,987
16	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Design Authority		1			$ 62.09	$ 62
		E130	Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
17	release SD at LMSI	G020	Clerk		2			$ 21.18	$ 42
		E130	Engineer		1			$ 62.09	$ 62
TOTAL					1253				$ 71,458

Saltcake Dissolution Retrieval Demonstrations
Demonstration Closeout (1.01.04.01.02.03.04.08)

January 24, 2001

Title	WBS	Total Hrs	Total Cost	Paid by Others
System Deactivation	1.01.04.01.02.03.04.08.01	-	$ 43,264	$ 134,702
Test Data Analysis and Documentation	1.01.04.01.02.03.04.08.02	1,273	$ 71,476	
Performance Assessment	1.01.04.01.02.03.04.08.03	976	$ 54,021	
Final As-Builting	1.01.04.01.02.03.04.08.04	-	$ -	
Retrieval Performance Verification	1.01.04.01.02.03.04.08.05	-	$ 135,110	$ -
Total Demonstration Closeout		**2,249**	**$ 303,870**	**$ 134,702**

Deployment of Saltcake Dissolution Retrieval

Sy m Deactivation (1.01.04.01.02.03.04.08.

Estimate by:	. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: This work has been budgeted by Interim Stabilization and will not be paid for by the dissolution demonstration project.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	post stabilization equipment removal (see U106 saltwell baseline schedule for detail activities)	000	U-106 baseline estimate paid for by interim stabil.						$ 40,702
2	perform interim isolation	000	U-106 baseline estimate paid for by interim stabil.						$ 94,000
3	disposal costs for hose in hose Qty 2 boxes mixed waste 4x4x8 waste box (128 cubic ft.) $115.00/cu. ft.					cu. ft.	256	$ 115.00	$ 29,440
4	Qty 2 boxes low level waste 4x4x8 waste box (128 cubic ft.) $54.00/cu. ft.					cu. ft.	256	$ 54.00	$ 13,824
TOTAL					0				$ 177,966

Deployment of Saltcake Dissolution Retrieval

Test Data Analysis and Documents (1.01.04.01.02.03.04.08.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	Evaluate dissolution test results	E010	chemical engineer		240			$ 56.68	$ 13,603
2	prepare dissolution test report	E010	chemical engineer		500			$ 56.68	$ 28,340
		G020	clerk		40			$ 21.18	$ 847
3	Issue supporting document for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		100			$ 62.09	$ 6,209
		E130	System Cog Engineer		80			$ 62.09	$ 4,967
4	Incorporate RCR comments	E010	chemical engineer		240			$ 56.68	$ 13,603
		G020	clerk		2			$ 21.18	$ 42
5	Approve support document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		E130	Design Authority		24			$ 62.09	$ 1,490
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	System Cog Engineer		24			$ 62.09	$ 1,490
6	Release supporting document at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E010	chemical engineer		1			$ 56.68	$ 57
TOTAL					1273				$ 71,476

Performance Assessment (1.01.04.01.02.03.04.08.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Two lessons learned sessions will be held. The first during post construction closeout and the second following operations closeout. Reports will be issued in white paper format. A post operations technical assessment will also be performed and formally documented.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	conduct post construction lessons learned (assume one working session)	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		M030	Operations Manager		8			$ 68.95	$ 552
		E130	Design Authority		8			$ 62.09	$ 497
		E130	Engineer		8			$ 62.09	$ 497
		M030	Radcon manager		8			$ 68.95	$ 552
		E070	mechanical engineer		8			$ 51.90	$ 415
		E040	electrical I&C engineer		8			$ 54.38	$ 435
		C020	electrician		8			$ 42.06	$ 336
		C080	pipefitter		8			$ 39.52	$ 316
		C060	millwright		8			$ 39.52	$ 316
		C120	ironworker		8			$ 39.52	$ 316
		R050	operator		8			$ 42.16	$ 337
		T050	HP tech		8			$ 39.71	$ 318
		E130	System Cog engineer		8			$ 62.09	$ 497
		P090	Industrial Hygienist		8			$ 46.63	$ 373
2	prep post construction lessons learned report	E130	Engineer		16			$ 62.09	$ 993
		G020	clerk		2			$ 21.18	$ 42
3	conduct post operations lessons learned (assume one day work session)	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		M030	Operations Manager		8			$ 68.95	$ 552
		E130	Design Authority		8			$ 62.09	$ 497
		M030	Radcon manager		8			$ 68.95	$ 552
		R050	Operator		8			$ 42.16	$ 337
		R050	Operator		8			$ 42.16	$ 337
		T050	HP tech		8			$ 39.71	$ 318
		P090	Industrial Hygienist		8			$ 46.63	$ 373
		E130	System Cog engineer		8			$ 62.09	$ 497
4	prep post ops lessons learned report	E130	Engineer		16			$ 62.09	$ 993
		G020	clerk		2			$ 21.18	$ 42

Performance Assessment (1.01.04.01.02.03.04.08.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Two lessons learned sessions will be held. The first during post construction closeout and the second following operations closeout.
Reports will be issued in white paper format. A post operations technical assessment will also be performed and formally documented.
Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
5	conduct post ops tech evaluation (assume 3 work session)	E130	design authority		32			$ 62.09	$ 1,987
		M030	operations manager		32			$ 68.95	$ 2,206
		R050	operator		32			$ 42.16	$ 1,349
		T050	HP tech		32			$ 39.71	$ 1,271
		E130	system cog engineer		32			$ 62.09	$ 1,987
		G020	clerk		32			$ 21.18	$ 678
		M030	radcon manager		32			$ 68.95	$ 2,206
		P090	Industrial Hygienist		32			$ 46.63	$ 1,492
6	prepare report-tech eval of operations	E130	system cog engineer		160			$ 62.09	$ 9,934
		E130	design authority		160			$ 62.09	$ 9,934
		G020	clerk		16			$ 21.18	$ 339
7	issue SD report for review	E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		E130	Design Authority		8			$ 62.09	$ 497
		M030	Operations Manager		8			$ 68.95	$ 552
		M030	Radcon Manager		8			$ 68.95	$ 552
		E130	System Cog Engineer		8			$ 62.09	$ 497
		G020	clerk		4			$ 21.18	$ 85
8	incorporate RCR comments	E130	System Cog Engineer		40			$ 62.09	$ 2,484
		E130	Design Authority		8			$ 62.09	$ 497
		G020	clerk		4			$ 21.18	$ 85
9	approve SD report	E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E130	Design Authority		2			$ 62.09	$ 124
		M030	Operations Manager		2			$ 68.95	$ 138
		M030	Radcon Manager		2			$ 68.95	$ 138
		E130	System Cog Engineer		2			$ 62.09	$ 124
		G020	clerk		4			$ 21.18	$ 85
10	release report at LMSI	G020	clerk		2			$ 21.18	$ 42
		E130	Engineer		2			$ 62.09	$ 124
TOTAL					976				$ 54,021

Deployment of Saltcake Dissolution Retrieval

Final As-builting (1.01.04.01.02.03.04.08.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Paid for by others and covered under System Deativation (WBS 1.01.04.01.02.03.04.08.01)

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
	no workscope identified								
									$ -
TOTAL					0				$ -

Deployment of Saltcake Dissolution Retrieval

Retrieval Performance Verification (1.01.04.01.02.03.04.08.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Sampling costs provided by B. E. Brendel in a CHG schedule fragnet prepared by G. A. Stanton.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Plan, schedule, material for grab sample		G. A. Stanton fragnet						$ 12,060
2	Acquire 1 Liter Grab Sample		G. A. Stanton fragnet						$ 67,060
3	Grab Sample Analysis		G. A. Stanton fragnet						$ 25,000
4	Grab Sample Data Report		G. A. Stanton fragnet						$ 31,000
TOTAL					0				$ 135,110

Saltcake Dissolution Retrieval Demonstrations
Project Management (1.01.04.01.02.03.04.09)

January 24, 2001

Title	WBS	Total Hrs	Total Cost	Paid by Others
Project Management & Administration	1.01.04.01.02.03.04.09.01	12,287	$ 653,334	
Project Engineering Support	1.01.04.01.02.03.04.09.02	6,787	$ 421,405	
Contract Management	1.01.04.01.02.03.04.09.03	1,000	$ 31,300	
Project Documentation	1.01.04.01.02.03.04.09.04	561	$ 34,001	
Baseline Maintenance	1.01.04.01.02.03.04.09.06	858	$ 52,115	
Requirements Validation and Verification	1.01.04.01.02.03.04.09.07	1,788	$ 103,090	$ -
Total Project Management		23,281	$ 1,295,245	$ -

Deployment of Saltcake Dissolution Retrieval

Project Management and Administration (1.01.04.01.02.03.04.09.01)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Project Management	M030	Project Manager		6787			$ 68.95	$ 467,964
2	Clerical Support	G020	clerk		1500			$ 21.18	$ 31,770
3	Project Controls	P170	cost analyst		2000			$ 33.40	$ 66,800
		P070	scheduler		2000			$ 43.40	$ 86,800
TOTAL					12287				$ 653,334

Deployment of Saltcake Dissolution Retrieval

Project Engineering Support (1.01.04.01.02.03.04.09.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Project Engineering	E130	project engineer		6787		Hours	$ 62.09	$ 421,406
TOTAL					6787				$ 421,406

Deploymnet of Saltcake Dissolution Retrieval

Contract Management (1.01.04.01.02.03.04.09.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	purchasing and contract management	P030	buyer		500			$ 41.42	$ 20,710
		G020	clerk		500			$ 21.18	$ 10,590
TOTAL					1000				$ 31,300

Deployment of Saltcake Dissolution Retrieval

Project Documentation (1.01.04.01.02.03.04.09.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prepare project management plans	E130	Engineer		40			$ 62.09	$ 2,484
2	Issue supporting document for review	G020	Clerk		2			$ 21.18	$ 42
		E110	Quality Assurance		2			$ 51.12	$ 102
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		2			$ 62.09	$ 124
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
3	Incorporate RCR comments	E130	Engineer		8			$ 62.09	$ 497
4	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		1			$ 62.09	$ 62
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Engineer		1			$ 62.09	$ 62
5	Release supporting document at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E130	Engineer		1			$ 62.09	$ 62
6	prepare ABU	E130	Engineer		320			$ 62.09	$ 19,869
7	Issue supporting document for review	G020	Clerk		8			$ 21.18	$ 169
		E110	Quality Assurance		2			$ 51.12	$ 102
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		2			$ 62.09	$ 124
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
8	Incorporate RCR comments	E130	Engineer		24			$ 62.09	$ 1,490
9	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		1			$ 51.12	$ 51
		E130	Design Authority		1			$ 62.09	$ 62
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
10	Release supporting document at LMSI	G020	Clerk		1			$ 21.18	$ 21
11	maintain/update ABU	E130	Engineer		80			$ 62.09	$ 4,967
		E130	Design Authority		40			$ 62.09	$ 2,484
TOTAL					561				$ 34,001

Deployment of Saltcake Dissolution Retrieval

Baseline Maintenance (1.01.04.01.02.03.04.09.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	revise F&R document during project	E130	Engineer		600			$ 62.09	$ 37,254
2	Issue supporting document ECN for review	G020	Clerk		8			$ 21.18	$ 169
		E110	quality assurance		16			$ 51.12	$ 818
		M030	Operations Manager		16			$ 68.95	$ 1,103
		E130	Design Authority		16			$ 62.09	$ 993
		E130	Engineer		16			$ 62.09	$ 993
		E130	System Cog Engineer		16			$ 62.09	$ 993
3	Incorporate RCR comments	E130	Engineer		24			$ 62.09	$ 1,490
4	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
5	Release supporting document at LMSI	G020	Clerk		2			$ 21.18	$ 42
6	revise PMP document	E130	Engineer		80			$ 62.09	$ 4,967
7	Issue supporting document ECN for review	G020	Clerk		8			$ 21.18	$ 169
		E110	quality assurance		2			$ 51.12	$ 102
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		2			$ 62.09	$ 124
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
8	Incorporate RCR comments	E130	Engineer		24			$ 62.09	$ 1,490
9	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		1			$ 62.09	$ 62
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
10	Release supporting document at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E130	Engineer		1			$ 62.09	$ 62
TOTAL					858				$ 52,115

Requirements Validation and Verification (1.01.04.01.02.03.04.09.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	prepare design verification plan	E130	Engineer		200			$ 62.09	$ 12,418
2	Issue supporting document for review	G020	Clerk		4			$ 21.18	$ 85
		E110	quality assurance		8			$ 51.12	$ 409
		E130	Design Authority		8			$ 62.09	$ 497
		E130	Engineer		8			$ 62.09	$ 497
		E130	System Cog Engineer		8			$ 62.09	$ 497
3	Incorporate RCR comments	E130	Engineer		8			$ 62.09	$ 497
4	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		2			$ 62.09	$ 124
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
5	Release supporting document at LMSI	G020	Clerk		2			$ 21.18	$ 42
6	Perform conceptual design review (formal)	E130	Engineer		32			$ 62.09	$ 1,987
		E070	Mechanical Engineer		32			$ 51.90	$ 1,661
		E040	electrical/I&C engineer		32			$ 54.38	$ 1,740
		E110	Quality Assurance		32			$ 51.12	$ 1,636
		E080	Nuclear Safety		32			$ 63.72	$ 2,039
		E130	design authority		32			$ 62.09	$ 1,987
		E130	system cog engineer		32			$ 62.09	$ 1,987
		E050	environmental		32			$ 48.82	$ 1,562
		M030	radcon manager		32			$ 68.95	$ 2,206
		M030	operations manager		32			$ 68.95	$ 2,206
		M030	engineering manager		32			$ 68.95	$ 2,206
7	prepare preliminary design completion report	E070	mechanical engineer		32			$ 51.90	$ 1,661
		G020	clerk		4			$ 21.18	$ 85
8	Issue supporting document for review	E130	Engineer		2			$ 62.09	$ 124
		E070	Mechanical Engineer		2			$ 51.90	$ 104
		E040	electrical/I&C engineer		2			$ 54.38	$ 109
		E110	Quality Assurance		2			$ 51.12	$ 102
		E080	Nuclear Safety		2			$ 63.72	$ 127
		E130	design authority		2			$ 62.09	$ 124
		E130	system cog engineer		2			$ 62.09	$ 124
		E050	environmental		2			$ 48.82	$ 98
		M030	radcon manager		2			$ 68.95	$ 138
		M030	operations manager		2			$ 68.95	$ 138
9	Incorporate RCR comments	E070	mechanical engineer		8			$ 51.90	$ 415

Requirements Validation and Verification (1.01.04.01.02.03.04.09.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
10	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		1			$ 62.09	$ 62
		E110	quality assurance		1			$ 51.12	$ 51
		E080	Nuclear Safety		1			$ 63.72	$ 64
		M030	radcon manager		1			$ 68.95	$ 69
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Engineer		1			$ 62.09	$ 62
		E130	System Cog Engineer		1			$ 62.09	$ 62
11	Release supporting document at LMSI	G020	Clerk		1			$ 21.18	$ 21
12	Perform final design review (formal)	G020	Clerk		80			$ 21.18	$ 1,694
		E130	Engineer		64			$ 62.09	$ 3,974
		E070	Mechanical Engineer		64			$ 51.90	$ 3,322
		E040	electrical/I&C engineer		64			$ 54.38	$ 3,480
		E110	Quality Assurance		64			$ 51.12	$ 3,272
		E080	Nuclear Safety		64			$ 63.72	$ 4,078
		E130	design authority		64			$ 62.09	$ 3,974
		E130	system cog engineer		64			$ 62.09	$ 3,974
		E050	environmental		64			$ 48.82	$ 3,124
		M030	radcon manager		64			$ 68.95	$ 4,413
		M030	operations manager		64			$ 68.95	$ 4,413
		M030	engineering manager		64			$ 68.95	$ 4,413
13	prepare final design completion report	E070	mechanical engineer		80			$ 51.90	$ 4,152
		G020	clerk		4			$ 21.18	$ 85
14	Issue supporting document for review	E130	Engineer		8			$ 62.09	$ 497
		E070	Mechanical Engineer		8			$ 51.90	$ 415
		E040	electrical/I&C engineer		8			$ 54.38	$ 435
		E110	Quality Assurance		8			$ 51.12	$ 409
		E080	Nuclear Safety		8			$ 63.72	$ 510
		E130	design authority		8			$ 62.09	$ 497
		E130	system cog engineer		8			$ 62.09	$ 497
		E050	environmental		8			$ 48.82	$ 391
		M030	radcon manager		8			$ 68.95	$ 552
		M030	operations manager		8			$ 68.95	$ 552

Deployment of Saltcake Dissolution Retrieval

Requirements Validation and Verification (1.01.04.01.02.03.04.09.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
15	Incorporate RCR comments	E070	mechanical engineer		8			$ 51.90	$ 415
16	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		20			$ 62.09	$ 1,242
		E110	quality assurance		20			$ 51.12	$ 1,022
		E080	Nuclear Safety		20			$ 63.72	$ 1,274
		M030	radcon manager		20			$ 68.95	$ 1,379
		M030	Operations Manager		20			$ 68.95	$ 1,379
		E130	Engineer		20			$ 62.09	$ 1,242
		E130	System Cog Engineer		20			$ 62.09	$ 1,242
17	Release supporting document at LMSI	G020	Clerk		2			$ 21.18	$ 42
TOTAL					1788				$ 103,090

Saltcake Dissolution Cold Tests (1.01.04.01.02.05.07)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: This allocation is based on testing sprinkler coverage. This work is already budgeted and will be paid for by other.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Test Materials	000	allocation						$ 20,000
2	Facility Rental	000	allocation						$ 40,000
3	Engineering Planning Support (approx 600 hrs (600 hrs x $85/hr)	000	allocation						$ 50,000
4	Perform Saltcake Dissolution Cold Testing 8 FTE's for 4 months @ $10K per month	000	allocation						$ 320,000
TOTAL					0				$ 430,000

Hot Test Specification & Deployment Decision (1.01.04.01.02.03.04.08)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	no workscope identified								
									$ -
TOTAL					0				$ -

Saltcake Dissolution Retrieval Demonstrations
C-112 Demonstration Operations (1.01.04.01.02.09.05.07)

January 24, 2001

Title	WBS	Total Hrs		Total Cost	Paid by Others
Operations Management & Planning Support	1.01.04.01.02.09.05.07.01	1,200	$	56,765	
Operations Engineering Support	1.01.04.01.02.09.05.07.02	394	$	23,912	
Operations Construction Support	1.01.04.01.02.09.05.07.03	7,946	$	339,545	
OTP Development	1.01.04.01.02.09.05.07.04	206	$	312,397	
System Operating Procedures	1.01.04.01.02.09.05.07.05	656	$	30,466	
Operations Training	1.01.04.01.02.09.05.07.06	741	$	37,034	
System Hot Operations	1.01.04.01.02.09.05.07.07	26,880	$	1,707,806	
Process Control Plan - No workscope identified	1.01.04.01.02.09.05.07.08	-	$	-	
Intrusion Prevention & Isolation - No workscope identified	1.01.04.01.02.09.05.07.09	-	$	-	$ -
Total Operations		38,023	$	2,507,925	$ -

Deployment of Salt..e Dissolution Retrieval

Operations Management and Planning Support (1.01.04.01.02.09.05.07.01)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: assumes a 6 month operation

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	mgmt reporting, issues mgmt	M030	operations manager		100			$ 68.95	$ 6,895
		M030	radcon manager		100			$ 68.95	$ 6,895
2	JCS Planning	P070	Scheduler		250			$ 43.40	$ 10,850
3	routines	R050	operator		250			$ 42.16	$ 10,540
		T050	HP tech		250			$ 39.71	$ 9,928
		P090	Industrial Hygienist		250			$ 46.63	$ 11,658
TOTAL					1200				$ 56,765

Deployment of Saltcake Dissolution Retrieval

Operations Engineering Support (1.01.04.01.02.09.05.07.02)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Engineering Support During Operation	E040	electrical/I&C engineer		40			$ 54.38	$ 2,175
		E070	mechanical/I&C engineer		40			$ 51.90	$ 2,076
		E130	system cog. Eng.		250			$ 62.09	$ 15,523
		E130	design authority		40			$ 62.09	$ 2,484
		M030	engineering manager		24			$ 68.95	$ 1,655
TOTAL					394				$ 23,912

Deployment of Salt Lake Dissolution Retrieval

Operations Construction Support (1.01.04.01.02.09.05.07.03)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Assumes a 6 month construction duration.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	ops support during construction	R050	operator (2)		1802		Hours	$ 42.16	$ 75,972
		T050	HP Tech (2)		1802			$ 39.71	$ 71,557
		M030	operations manager (1)		900			$ 68.95	$ 62,055
		G020	clerk (1)		900			$ 21.18	$ 19,062
		T060	Industrial Health Tech (2)		1802			$ 39.85	$ 71,810
		P090	Industrial Hygienist (25%)		225			$ 46.63	$ 10,492
	rad engineering assume approx 200 hrs befor	M010	Radcon Supervisor (25%)		225			$ 47.07	$ 10,591
	construction begins and then 10% thereafter during construction for ALARA support	E130	Radcon Engineer		290			$ 62.09	$ 18,006
TOTAL					7946				$ 339,545

Operations Test Procedures (OTP) Development (1.01.04.01.02.09.05.07.04)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	prepare OTP	E130	System Cog Engineer		120			$ 62.09	$ 7,451
2	Issue supporting document for review	G020	Clerk		6			$ 21.18	$ 127
		E110	Quality Assurance		4			$ 51.12	$ 204
		M030	Operations Manager		4			$ 68.95	$ 276
		M030	radcon manager		4			$ 68.95	$ 276
		M030	engineering manager		4			$ 68.95	$ 276
		E080	nuclear safety		4			$ 63.72	$ 255
		E130	Design Authority		4			$ 62.09	$ 248
		E130	System Cog Engineer		4			$ 62.09	$ 248
3	Incorporate RCR comments	E130	System Cog Engineer		40			$ 62.09	$ 2,484
4	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		1			$ 51.12	$ 51
		E080	nuclear safety		1			$ 63.72	$ 64
		M030	radcon manager		1			$ 68.95	$ 69
		E130	Design Authority		1			$ 62.09	$ 62
		M030	engineering manager		1			$ 68.95	$ 69
		M030	Operations Manager		1			$ 68.95	$ 69
5	Release supporting document at LMSI	G020	Clerk		1			$ 21.18	$ 21
		E130	System Cog Engineer		1			$ 62.09	$ 62
6	Perform OTP		allocation						$ 300,000
TOTAL					206				$ 312,397

System Operating Procedures (1.01.04.01.02.09.05.07.05)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	prepare six new procedures	P160	technical writer		240			$ 42.14	$ 10,114
		E130	System Cog Engineer		40			$ 62.09	$ 2,484
2	issue for review	G020	Clerk		12			$ 21.18	$ 254
		E110	Quality Assurance		12			$ 51.12	$ 613
		E050	environmental engineer		12			$ 48.82	$ 586
		E080	nuclear safety		12			$ 63.72	$ 765
		M030	radcon manager		12			$ 68.95	$ 827
		M030	Operations Manager		12			$ 68.95	$ 827
		E130	Design Authority		12			$ 62.09	$ 745
		R050	operator		12			$ 42.18	$ 506
		T050	HP Tech		12			$ 39.71	$ 477
		P090	Industrial Hygienist		12			$ 46.63	$ 560
		E130	System Cog Engineer		12			$ 62.09	$ 745
3	incorporate RCR comments	P160	technical writer		80			$ 42.14	$ 3,371
		E130	System Cog Engineer		8			$ 62.09	$ 497
4	Approve procedures	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		1			$ 51.12	$ 51
		E050	environmental engineer		1			$ 48.82	$ 49
		E080	nuclear safety		1			$ 63.72	$ 64
		M030	radcon manager		1			$ 68.95	$ 69
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Design Authority		1			$ 62.09	$ 62
		R050	operator		1			$ 42.18	$ 42
		T050	HP Tech		1			$ 39.71	$ 40
		P090	Industrial Hygienist		1			$ 46.63	$ 47
		E130	System Cog Engineer		1			$ 62.09	$ 62
5	validate procedures	M030	Operations Manager		8			$ 68.95	$ 552
		R050	operators		24			$ 42.18	$ 1,012
		P090	Industrial Hygienist		24			$ 46.63	$ 1,119
		T050	HP Tech		24			$ 39.71	$ 953
6	update procedures	P160	technical writer		40			$ 42.14	$ 1,686
		E130	System Cog Engineer		8			$ 62.09	$ 497
7	Approve procedures	G020	Clerk		4			$ 21.18	$ 85
		E110	Quality Assurance		1			$ 51.12	$ 51
		E050	environmental engineer		1			$ 48.82	$ 49
		E080	nuclear safety		1			$ 63.72	$ 64
		M030	radcon manager		1			$ 68.95	$ 69
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	Design Authority		1			$ 62.09	$ 62
		R050	operator		1			$ 42.18	$ 42
		T050	HP Tech		1			$ 39.71	$ 40
		E130	System Cog Engineer		1			$ 62.09	$ 62
		P090	Industrial Hygienist		1			$ 46.63	$ 47
TOTAL					656				$ 30,486

Deployment of Saltcake Dissolution Retrieval

Operations Training (1.01.04.01.02.09.05.07.06)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes:

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY) Cost Center	Hours	Non-Labor (Includes all Outside Fence Costs) Quantity	Units	Unit Price	Quantity Value
1	prepare training plan	E130	engineer		40			$ 62.09	$ 2,484
		M030	training manager		4			$ 68.95	$ 276
2	Issue training plan for review	G020	Clerk		8			$ 21.18	$ 169
		E110	quality assurance		2			$ 51.12	$ 102
		M030	training manager		2			$ 68.95	$ 138
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		2			$ 62.09	$ 124
		E130	Engineer		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
3	Incorporate RCR comments	E130	Engineer		24			$ 62.09	$ 1,490
		M030	training manager		2			$ 68.95	$ 138
4	Approve supporting document	G020	Clerk		4			$ 21.18	$ 85
		E130	Design Authority		1			$ 62.09	$ 62
		M030	training manager		1			$ 68.95	$ 69
		M030	Operations Manager		1			$ 68.95	$ 69
		E130	System Cog Engineer		1			$ 62.09	$ 62
5	Release supporting document at LMSI	G020	Clerk		1			$ 21.18	$ 21
6	Prepare Training materials	E130	engineer		80			$ 62.09	$ 4,967
		M030	training manager		4			$ 68.95	$ 276
7	Issue training materials for review	G020	Clerk		8			$ 21.18	$ 169
		M030	Operations Manager		2			$ 68.95	$ 138
		E130	Design Authority		2			$ 62.09	$ 124
		E130	System Cog Engineer		2			$ 62.09	$ 124
8	Incorporate RCR comments	E130	engineer		24			$ 62.09	$ 1,490
		M030	training manager		2			$ 68.95	$ 138
9	Conduct Classroom/field training assume 12 operators, 8 HP techs 4 ops mgmt, 16 hours per person)	R050	12 operators		192			$ 42.16	$ 8,096
		T050	8 HP techs		128			$ 39.71	$ 5,083
		E130	Design Authority		2			$ 62.09	$ 124
		M030	4 Ops Manager		64			$ 68.95	$ 4,413
		E130	System Cog Engineer		4			$ 62.09	$ 248
		P090	8 Industrial Hygienists		128			$ 46.63	$ 5,969
TOTAL					741				$ 37,034

Deployment of Salt Lake Dissolution Retrieval

System Hot Operations (1.01.04.01.02.09.05.07.07)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: Assumes a 160 day test duration.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
1	Operations Support 160 day, 24 hrs/day	R050	operator (1)		3840		Hours	$ 42.16	$ 161,894
		T050	HP Tech (1)		3840			$ 39.71	$ 152,486
		M030	operations manager (1)		3840			$ 68.95	$ 264,768
		G020	clerk (1)		3840			$ 21.18	$ 81,331
		C020	electrician (1)		3840			$ 42.06	$ 161,510
		C080	fitter (1)		3840			$ 39.52	$ 151,757
		P090	Industrial Hygienist (1)		3840			$ 46.63	$ 179,059
2	Remove old DST pump and replace with new pump		Allocation						$ 500,000
3	Purchase chemical buffering agents								
4	Spec-gamma analysis ($50,000 for duration)		B. E. Brendel						$ 5,000
									$ 50,000
TOTAL					26880				$ 1,707,806

Deployment of Salt...e Dissolution Retrieval

Process Control Plan (1.01.04.01.02.09.05.07.08)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: No workscope identified.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
	No workscope identified.								
TOTAL					0				$ -
									$ -

Deployment of Saltcake Dissolution Retrieval

Intrusion Prevention and Isolation (1.01.04.01.02.09.05.07.09)

Estimate by:	K. E. Ard
Revision	0
Date	1/24/01

Estimate Basis Notes: No workscope identified.

Estimate Type: Study

Activity #	Activity Description	Resource Code	Resource Description	Labor (Inside Fence ONLY)		Non-Labor (Includes all Outside Fence Costs)			
				Cost Center	Hours	Quantity	Units	Unit Price	Quantity Value
	No workscope identified.								$ -
TOTAL					0				$ -

Draft Fluor Hanford Fiscal Year 2001 Multi-Year Work Plan Guidance

A. PURPOSE AND SCOPE

This document provides guidelines and establishes responsibilities and requirements for updating, approving, issuing, and controlling Multi-Year Work Plans (MYWPs). MYWPs apply to all direct-funded Fluor Hanford (FH) Mission Elements (formally called Mission Areas, was renamed in latest Budget Updating Guidance) managed for the U.S. Department of Energy (DOE), Richland Operations Office (RL).

All work for the prime contractor is to be included in the MYWP as well as the work subcontracted to others. In addition, all costs for work scope managed directly by RL, but associated with any Project Baseline Summaries (PBS) must be captured in this plan. The contractor with primary responsibility obtains the required MYWP input from those performing subcontracted work and is responsible for reporting performance of that effort. If more than one contractor has prime responsibilities on a particular PBS, each contractor should submit a separate MYWP. This requirement may be relaxed in the case where one contractor has a preponderance of the effort, and the RL Project Manager desire a combined MYWP. Concurrence and signature approval by all participating contractors is required. In this circumstance, the MYWP must clearly segregate the technical, schedule, cost baselines, and funding information for each contractor.

Any deviation from the Project Hanford Breakdown Structure (PHBS), which identifies all required Mission Elements and Project Baseline Summaries should be discussed with Site Planning and Integration (SP&I).

The FY 2001 MYWP is not required to be published in hard copy format as it will be available via desktop application for all Hanford Local Area Network (HLAN) users. Significant emphasis is placed on source system feeds of data housed in appropriate systems. Approval of the FY 2001 MYWP will be attained through approval of a bridge baseline change request.

The electronic copy of this guidance can be found on the PBS shared area AP014/MYWP/FY2001/Guidance/FH.

This year's guidance package is segregated into two sections for ease of use. The first section (I A-J) include conceptual discussions of portions of the MYWP (including funding assumptions, coding structures, etc.). The second section, the guidance includes an outline of the table of content requirements for the MYWP (II A-C), explaining each section of the MYWP and additional requirements.

E. COST ESTIMATE BASIS

Roger Sherman (373-2249)/Karl Tobler (376-8327)

General Information

Accurate, complete and well-documented cost estimates are essential to the credibility of the MYWP cost baselines. In addition, not only is it good management practice to have these detailed estimates in support of the published baseline, the U.S. Congress is requiring all DOE *lifecycle* baselines be validated. Therefore, this detail will be used to support several levels of review and validation, both internally with RL and externally with teams such as the independent cost estimate (ICE) team.

Detailed cost estimate data must be directly traceable to the MYWP (and P3) cost baseline information. Supporting cost estimate material must clearly display resources such as (but not limited to) direct cost for labor, materials, subcontractors, department overhead, and the G&A adder.

RL continues to endorse Activity Based Cost Estimating wherever applicable. It is also recognized that a graded approach to the level of detail provided in the basis of estimate is appropriate however, estimates for the lifecycle of the project are required. Detailed estimates, such as that demonstrated in Appendix F of *the Hanford Cost Estimating and Scheduling Guide*, DOE/RL-97-90, Revision 0, are maintained for a minimum of three years. The projects must ensure adequate cost estimate material is provided for the lifecycle of the project, but by no means are they expected to maintain the level of detail requested in the next three years for the life cycle of the project. HNF-PRO-585, *Cost Estimating*, specifies the requirements for FH cost estimates.

- FY 2001 Indirect Rates will be available on the Hanford WEB, PHMC Finance Web site, in late June and will be forwarded electronically to all contacts as soon as possible.

Essential Site Services (ESS)

The ESS Pool will be created and will contain costs of activities which benefit all FH work, but are unique to the Hanford Site. Activities which are moved into the ESS Pool are more fixed in nature and are less sensitive to usage volume changes. Activities where cost fluctuates with usage will remain Service Pools. Other Hanford Contractors usage of activities within G&A and ESS will still be assessed to them based on a percent of benefit of each activity, when their usage is considered significant.

Net ESS and G&A cost (after assessments to other contractors) will be distributed to FH projects as two, cumulative, total cost adders. ESS rate is applied first; G&A rate is applied on the total of cost including applied ESS.

Labor / Absence / Continuity of Service

FH labor will continue to be costed at actuals, with adders applied for absence and continuity of service (as applicable).

Overtime labor cost will not be burdened with absence adder and will receive a reduced continuity of service adder. Previously the full absence and COS adders were applied to overtime labor.

Table 2 and 2a. shows the escalation assumptions to be used for estimating costs and updating the cost baselines for operating and construction projects, respectively. These are consistent with the escalation assumptions provided in the FY 2002 UNICALL dated March 2000. For specific questions on escalation, contact Karl Tobler (376-8327)

Table 2. Escalation Assumptions for Operating & Maintenance Projects from UNICALL Fiscal Year 2002 Guidance

BUDGET YEAR	INFLATION FACTOR
FY 2002	2.0%
FY 2003	2.0%
FY 2004	2.0%
FY 2005	2.0%
FY 2006 (+)	2.0%

Table 2a. *Escalation Assumptions for Environmental Restoration and Waste Management Construction Projects from UNICALL Fiscal Year 2002 Guidance.*

Fiscal Year	Environmental Restoration	Waste Management
	% CHANGE	% CHANGE
2002	2.7	2.4
2003	2.7	2.5
2004	2.8	2.6
2005	2.8	2.5
2006 (+)	2.9	2.6

Contingency

Consistent development and application of contingencies in project baselines are essential to establishment of reliable project baselines, and a key element is the performance of a thorough analysis of project risks and uncertainties. This risk analysis provides essential information for making informed decisions concerning the level of risk that RL management is willing to accept for each project. If not already completed, an appropriate contingency risk analysis will be conducted for each PBS by November 15, 2000. This analysis will document the level of confidence in the base estimate and should be used as the basis for determining the appropriate contingency allowance to be included with each PBS baseline during the Phase II lifecycle update of the baselines.

FY 2 MYWP
ESCALATION RATES AND FACTORS

ESCALATION PER FY2002 UNICALL RATES

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
FOR ALL PBSs EXCEPT BELOW:															
FACTORS AT 100% + RATE															
ESCALATION - OPERATING %	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
ESCALATION - OPERATING RATE	1.020	1.040	1.061	1.082	1.104	1.126	1.149	1.172	1.195	1.219	1.243	1.268	1.294	1.319	1.346
FOR LINE ITEMS:															
FACTORS AT 100% + RATE															
ESCALATION - CONSTRUCTION %	0.024	0.025	0.026	0.025	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026
ESCALATION - CONSTRUCTION RA	1.024	1.050	1.077	1.104	1.133	1.162	1.192	1.223	1.255	1.288	1.321	1.355	1.391	1.427	1.464
FOR PBSs ER01-ER10:															
FACTORS AT 100% + RATE															
ESCALATION - OPERATING %	0.027	0.027	0.028	0.028	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
ESCALATION - OPERATING RATE	1.027	1.055	1.084	1.115	1.147	1.180	1.214	1.250	1.286	1.323	1.362	1.401	1.442	1.483	1.526

FY [illegible] MYWP
ESCALATION RATES AND FACTORS

ESCALATION PER FY2002

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
FOR ALL PBSs EXCEPT BELOW:															
FACTORS AT 100% + RATE															
ESCALATION - OPERATING %	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
ESCALATION - OPERATING RATE	1.373	1.400	1.428	1.457	1.486	1.516	1.546	1.577	1.608	1.641	1.673	1.707	1.741	1.776	1.811
FOR LINE ITEMS:															
FACTORS AT 100% + RATE															
ESCALATION - CONSTRUCTION %	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026
ESCALATION - CONSTRUCTION RA	1.502	1.541	1.581	1.622	1.664	1.708	1.752	1.798	1.844	1.892	1.941	1.992	2.044	2.097	2.151
FOR PBSs ER01-ER10:															
FACTORS AT 100% + RATE															
ESCALATION - OPERATING %	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
ESCALATION - OPERATING RATE	1.571	1.616	1.663	1.711	1.761	1.812	1.865	1.919	1.974	2.032	2.091	2.151	2.214	2.278	2.344

FY . MYWP
ESCALATION RATES AND FACTORS

ESCALATION PER FY2002

	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
FOR ALL PBSs EXCEPT BELOW:															
FACTORS AT 100% + RATE															
ESCALATION - OPERATING %	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
ESCALATION - OPERATING RATE	1.848	1.885	1.922	1.961	2.000	2.040	2.081	2.122	2.165	2.208	2.252	2.297	2.343	2.390	2.438
FOR LINE ITEMS:															
FACTORS AT 100% + RATE															
ESCALATION - CONSTRUCTION %	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026
ESCALATION - CONSTRUCTION RA	2.207	2.265	2.324	2.384	2.446	2.510	2.575	2.642	2.711	2.781	2.853	2.927	3.004	3.082	3.162
FOR PBSs ER01-ER10:															
FACTORS AT 100% + RATE															
ESCALATION - OPERATING %	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
ESCALATION - OPERATING RATE	2.412	2.482	2.554	2.628	2.704	2.782	2.863	2.946	3.032	3.119	3.210	3.303	3.399	3.497	3.599

bklages

From: John_A_Hunt@rl.gov
ent: Tuesday, August 01, 2000 3:31 PM
.o: bklages@mceng.com
Subject: FW: Info for FY 2001 MYWP

Importance: High

FYI

-----Original Message-----
From: Bove', Robert A
Sent: Tuesday, August 01, 2000 1:26 PM
To: Hunt, John A
Subject: FW: Info for FY 2001 MYWP
Importance: High

FYI

Robert A. Bove'
372-2463

-----Original Message-----
From: McIntosh, Kevin M
Sent: Tuesday, August 01, 2000 1:18 PM
To: McIntosh, Kevin M; Gamin, Marsha L; Blethen, James B; Lewis, Michael R (Mike); Sanborn, Stephen L; Bove', Robert A; Williamson, Jeffrey D; Jones, Mary E; Crigler, Jo A (Jo Ann); Weber, Clyde L; Brackett, Robert M (Bob); Cooley, Sonja M; Bradford, Sandra M; Rambo, Loydene A; Roberts, Johnnie R; ichardson, Tim P; Payne, James D; Dillon, Larry D; Agee, Robert B (Bruce); rg, Gaylinn M
Subject: Info for FY 2001 MYWP
Importance: High

Per Don Layfield:

1 - FTE for 2001 = 1802 hours

1 - FTE for 2002 & 2003 = 1808 hours.

Kevin
FDH SP&I
376-8849

bklages

From: Kevin Ard [keard@mceng.com]
ent: Thursday, September 07, 2000 10:56 AM
o: Barb Klages
Subject: FW: ROM Cost estimate for RPE

Importance: High

ROMEstimateforRPE.d

basis for the RPE.

Kevin Ard
Mid Columbia Engineering
943-6706, Ext. 224

-----Original Message-----
From: Boes, Kirk [mailto:boesk@hninc.com]
Sent: Thursday, September 07, 2000 10:50 AM
To: 'keard@MCEng.com'; 'Brian_E_Brendel@RL.gov'
Subject: FW: ROM Cost estimate for RPE
Importance: High

FYI, JEG cost estimate for RPE work associated with saltcake dissolution retrieval SST.

Kirk

----Original Message-----
'om: Henderson, Colin [mailto:Colin.Henderson@jacobs.com]
ent: Thursday, September 07, 2000 10:17 AM
To: Boes, Kirk
Cc: Nichols, Dave
Subject: ROM Cost estimate for RPE
Importance: High

the attached file has a ROM estimate of the cost for developing an RPE for the salt cake demonstration tank. It was assumed that this task would conducted as a stand alone actvity or ahead of other RPE analyses and would not benefit from any modeling or analysis of other S farm tanks.

<<ROMEstimateforRPE.doc>>

Colin Henderson

Email dated 9-7-00 from Kirk Boes, Re: ROM Cost Estimate-RPE

ROM Estimate for developing a Retrieval Performance Evaluation (RPE) for the Saltcake Retrieval Demonstration (S-112)

This estimate is developed for a single tank (S-112) based on an estimate developed in FY00 for developing an RPE for the Phase I SSTs. The cost estimated for this tank is approximately ¾ of the cost for doing the Phase I tanks because it was assumed that the S-112 RPE would be developed as a stand alone prior to conducting an RPE analysis for any of the other S farm tanks. As a result this task would involve development of new contaminant transport modeling for the S tank farm.

This activity would involve:

1. Coordination and integration with the vadose zone group to identify source terms, conceptual model, and groundwater impacts from past practice spills and releases.
2. Development of inventories/source terms for potential retrieval leakage losses and tank residuals.
3. New vadose zone contaminant transport model runs to assess the fate and transport of contaminants from retrieval leakage and tank residuals.
4. Evaluation of groundwater contamination with a local scale mixing model to develop contaminant concentrations in the groundwater at the tank farm fenceline.
5. Evaluation of health risks resulting from groundwater contamination.
6. Sensitivity studies to evaluate data uncertainties.
7. Development of a draft and final report.
8. Independent external peer review.

ROM cost estimate $650K (JEG cost)
ROM cost to A&E prime $683K (=650K + 5%)
ROM cost to CHG $820K burdened (=$683 +20%)

From Filename ROMEstimateforRPE.doc

FY 2001 Labor Rate Summary

Content POC: Don Layfield							
Effective: 10/01/2000 thru 09/30/2001							
Last Updated: 03/23/2000							
			CHG	DYN	FH	PTH	TOTAL
COCS	COCS	EMP	W/ABS	W/ABS	W/ABS	W/ABS	WT
CODE	TITLE	TYPE	COS	COS	COS	COS	AVG
C010	Carpenters	H	38.76	38.76	38.76	0.00	38.76
C020	Electricians	H	42.06	42.25	42.11	42.03	42.13
C030	HVAC-Heating/Refrigeration	H	0.00	0.00	0.00	0.00	0.00
C040	Machinists	H	0.00	41.17	41.27	0.00	41.18
C050	Masons	H	0.00	37.55	0.00	0.00	37.55
C060	Millwrights	H	39.52	39.52	39.75	0.00	39.67
C070	Painters	H	39.16	39.16	39.30	0.00	39.23
C080	Plumbers & Pipefitters	H	39.52	39.52	39.60	0.00	39.55
C090	Structural & Metal Workers	H	0.00	39.52	39.52	0.00	39.52
C100	Vehicle & Equip Mechanics	H	0.00	37.41	41.11	0.00	37.52
C110	Welders	H	0.00	39.52	0.00	0.00	39.52
C120	Other Crafts	H	39.52	39.58	40.30	39.91	39.86
wt avg			40.66	39.76	40.45	41.06	40.19
E010	Chemical Engineers	E	56.68	59.82	55.18	0.00	55.76
E020	Civil Engineers	E	59.62	62.99	57.62	0.00	58.33
E030	Computer Engineers	E	0.00	0.00	0.00	0.00	0.00
E040	Electrical Engineers	E	54.38	60.96	53.99	50.48	54.28
E050	Environmental Engineers	E	48.82	0.00	53.21	0.00	52.19
E060	Industrial Engineers	E	37.16	44.69	45.10	0.00	43.14
E070	Mechanical Engineers	E	51.90	52.02	56.67	0.00	55.34
E080	Nuclear Engineers	E	63.72	0.00	54.57	0.00	58.18
E090	Petroleum/Mining Engineers	E	51.44	0.00	73.92	0.00	57.06
E100	Plant Engineers	E	43.50	44.82	42.92	46.04	43.34
E110	Quality Control Engineers	E	51.12	50.31	51.51	0.00	51.34
E120	Safety Engineers	E	48.95	47.53	51.51	0.00	50.23
E130	Other Engineers	E	62.09	54.08	55.49	0.00	57.60
E140	Construction Engineers	E	0.00	0.00	0.00	0.00	0.00
wt avg			51.72	47.10	50.28	47.75	50.36
G010	Administrative Assistants	E	30.83	35.78	34.98	0.00	33.97
G020	Office Clerks(General)	C	0.00	0.00	23.60	0.00	23.60
G020	Office Clerks(General)	N	21.18	23.80	22.45	24.26	22.52
G030	Office Clerks(Specialized)	C	0.00	0.00	24.41	0.00	24.41
G030	Office Clerks(Specialized)	H	33.34	32.76	32.62	0.00	32.80
G040	Secretaries	C	0.00	0.00	24.41	0.00	24.41
G040	Secretaries	N	21.29	25.13	23.46	22.66	23.10
G050	Typists & Word Processors	N	0.00	0.00	0.00	0.00	0.00
G060	Other-General Administrative	N	0.00	0.00	0.00	0.00	0.00
wt avg			23.98	29.20	25.19	23.62	25.46

fy2001_labor_rate_sum_p3_lps.xls

FY 2001 Labor Rate Summary

COCS CODE	COCS TITLE	EMP TYPE	CHG W/ABS COS	DYN W/ABS COS	FH W/ABS COS	PTH W/ABS COS	TOTAL WT AVG
L010(40)	Firefighters	H	0.00	31.95	34.60	0.00	32.12
L010(56)	Firefighters(24 Hour Shift)	H	0.00	26.49	0.00	0.00	26.49
L020	Food Service Workers	H	0.00	0.00	0.00	0.00	0.00
L030	Janitors & Cleaners	H	0.00	26.25	0.00	0.00	26.25
L040	Laundry Workers	H	0.00	0.00	0.00	0.00	0.00
L050	Helpers & Laborers(General)	H	0.00	0.00	0.00	0.00	0.00
L060	Helpers, Laborers(Specialized)	H	0.00	0.00	0.00	0.00	0.00
L070	Light Vehicle Drivers	H	32.06	32.14	32.11	0.00	32.13
L080	Security Guards	G	0.00	0.00	0.00	32.87	32.87
L090	Other Laborers & Service Wkrs	H	0.00	33.38	0.00	0.00	33.38
wt avg			32.06	29.03	32.25	32.87	30.73
M010	First Line Supervisers	E	47.07	48.18	47.55	40.42	46.34
M010(56)	First Line Supervisers(24 Hr)	E	0.00	32.53	0.00	0.00	32.53
M020	Managers & Executives	E	68.99	68.37	68.89	67.73	68.83
M020(56)	Managers & Executives(24 Hr)	E	0.00	39.79	0.00	0.00	39.79
M030	Project and Program Managers	E	68.95	68.38	65.48	66.03	66.76
M040	Other Managers	E	0.00	0.00	0.00	0.00	0.00
wt avg			64.53	64.27	66.57	56.07	65.01
P010	Accountants and Auditors	E	43.66	39.86	41.27	39.66	41.78
P020	Architects	E	0.00	0.00	0.00	0.00	0.00
P030	Buyers/Procurement/Contracting	E	41.42	43.86	43.63	39.52	43.03
P040	Communications Specialists	E	39.80	0.00	35.54	0.00	36.60
P050	Compliance Inspectors	E	0.00	0.00	0.00	0.00	0.00
P060	Computer System Analysts	E	48.00	0.00	48.74	63.26	49.84
P070	Planner/Scheduler/Estimators	E	43.40	42.01	43.51	0.00	43.33
P080	Health Physicists	E	49.99	43.91	50.56	0.00	50.26
P090	Industrial Hygienists	E	46.63	40.98	49.69	0.00	47.55
P100	Lawyers	E	0.00	65.70	80.97	0.00	77.91
P110	Personnel & Labor Relations	E	46.33	45.10	42.29	41.83	43.01
P120	Physicians	E	0.00	0.00	0.00	0.00	0.00
P130	Physicians Assistants/Nurses	H	0.00	36.58	0.00	0.00	36.58
P140	Safeguards & Security Spec	E	33.18	42.22	36.91	42.41	40.80
P150	Trainers & Instructors	E	41.96	46.25	42.96	39.61	42.41
P160	Technical Writers & Editors	E	42.14	46.46	38.05	0.00	39.63
P170	Other Professionals	E	33.40	43.82	52.88	44.48	49.17
wt avg			43.37	42.99	45.50	43.07	44.68
R010	Chemical System Operator	H	0.00	0.00	0.00	0.00	0.00
R020	Drillers	H	0.00	0.00	0.00	0.00	0.00
R030	Material Moving Equip Operator	H	0.00	37.09	42.21	0.00	38.23
R040	Nuclear Plant Operators	H	0.00	40.52	41.54	0.00	41.51
R040	Nuclear Plant Operators	N	0.00	0.00	39.48	0.00	39.48
R050	Nuclear Waste Process Operator	H	42.16	41.14	37.78	0.00	39.49

fy2001_labor_rate_sum_p3_ips.xls

FY 2001 Labor Rate Summary

COCS CODE	COCS TITLE	EMP TYPE	CHG W/ABS COS	DYN W/ABS COS	FH W/ABS COS	PTH W/ABS COS	TOTAL WT AVG
R060	Production System Operators	H	0.00	0.00	0.00	0.00	0.00
R070	Utilities System Operators	H	37.43	38.68	37.62	0.00	37.89
R080	Other Operators	H	0.00	30.49	37.57	0.00	31.27
wt avg			41.77	37.30	38.20	0.00	39.22
S010	Chemists	E	54.54	0.00	52.87	0.00	53.14
S020	Environmental Scientists	E	49.59	43.29	47.23	0.00	47.20
S030	Geologists/Geophysicists/Hydro	E	60.42	0.00	54.13	0.00	56.65
S040	Life Scientists	E	0.00	0.00	47.40	0.00	47.40
S050	Materials Scientists	E	0.00	0.00	0.00	0.00	0.00
S060	Mathematicians	E	55.33	0.00	56.36	55.38	55.52
S070	Physicists	E	59.00	0.00	62.78	0.00	61.27
S080	Social Scientists	E	0.00	0.00	0.00	0.00	0.00
S090	Other Scientists	E	67.22	0.00	48.92	54.95	52.11
wt avg			56.29	43.29	51.01	55.21	51.91
T010	Computer Operators & Coders	H	0.00	0.00	34.45	0.00	34.45
T010	Computer Operators & Coders	N	0.00	0.00	0.00	29.53	29.53
T020	Drafters	N	0.00	0.00	45.56	0.00	45.56
T030	Engineer Technicians	N	25.65	0.00	33.26	0.00	33.02
T040	Environmental Sciences Tech		0.00	0.00	0.00	0.00	0.00
T050	Health Physics Technicians	H	39.71	39.58	39.75	0.00	39.73
T060	Industrial Health/Safety Tech	N	0.00	40.50	0.00	0.00	40.50
T060	Industrial Health/Safety Tech	H	39.85	0.00	0.00	0.00	39.85
T070	Instrument & Control Techs	H	42.17	42.03	42.16	42.03	42.15
T080	Laboratory Technicians	H	0.00	0.00	40.58	0.00	40.58
T090	Media Technicians		0.00	0.00	0.00	0.00	0.00
T100	Survey & Mapping Technicians		0.00	0.00	0.00	0.00	0.00
T110	Other Technicians	N	0.00	38.28	35.84	0.00	36.45
T110	Other Technicians	H	33.16	0.00	0.00	0.00	33.16
wt avg			39.99	39.86	39.77	38.90	39.82
	TOTAL HEAD COUNT/WT AVG		46.63	39.15	44.71	38.94	43.99

fy2001_labor_rate_sum_p3_ips.xls

EXHIBIT B - Attachment 1

Fully Burdened Fixed Hourly Rates For H&N Subcontractors

	Labor Category	FY 1999	FY 2000	FY 2001	FY 2002
1	Program Manager	N/A	N/A	N/A	N/A
2	Project Manager	$80.63	$83.05	$86.38	TBD
3	Sr. Clerk	$28.69	$29.55	$30.74	TBD
4	Clerk	$22.98	$23.68	$24.62	TBD
5	Engineering Manager	106.34	109.53	113.90	TBD
6	Sr. Design Engineer	$79.78	$82.17	$85.46	TBD
7	Design Engineer	$65.11	$67.06	$69.74	TBD
8	Sr. Designer	$62.81	$64.70	$67.29	TBD
9	Designer	$50.91	$52.43	$54.53	TBD
10	Sr. Estimator	$77.46	$79.78	$82.97	TBD
11	Estimator	$57.84	$59.57	$61.95	TBD
12	Sr. Project Controls Specialist	$75.88	$78.16	$81.28	TBD
13	Project Controls Specialist	$54.60	$56.23	$58.48	TBD
14	Sr. Quality Engineer	$80.96	$83.39	$86.72	TBD
15	Quality Assurance	$57.77	$59.50	$61.88	TBD
16	Sr. Safety Specialist	$65.69	$67.66	$70.37	TBD
17	Safety Specialist	$43.49	$44.80	$46.60	TBD
18	Technical Writer/Editor	$42.26	$43.53	$45.27	TBD
19	Sr. Technical Writer/Editor	$45.28	$46.64	$48.50	TBD
20	Sr. Architect	$68.46	$70.52	$73.34	TBD
21	Architect	$64.42	$66.34	$69.00	TBD

CHG Rates

- CHG will have one rate – G&S – General & Site Services
- G&S rate for FY 01 and FY 02 is 17.1%
- G&S will be applied as a % of total costs on:
  - Capital Items (CENRTC, GPP)
  - Line Items
  - WFO including work for FH, BHI, PNNL
- A rate will not be applied to operating expense funded work (EM30: TW01/2/3/4/5/6/8/9/10)

Resource Codes & Pools

INVALID – PHMC

- 2-21-CMM Copier Maintenance

- 3-56-COG Cogema GFS
- 3-56-FNW FFS GFS
- 3-56-WNW WMTS GFS

- 3-5P-PAT Patrol Pool
- 3-7C-PTH PTH PMA

SINGLE SHELL TANK INTERIM CLOSURE PROJECT

___ SY-101 Level Rise Remediation Project

___ SY-101 Cross-Site Transfer System

___ AW-104 Transfer Pump Replacement

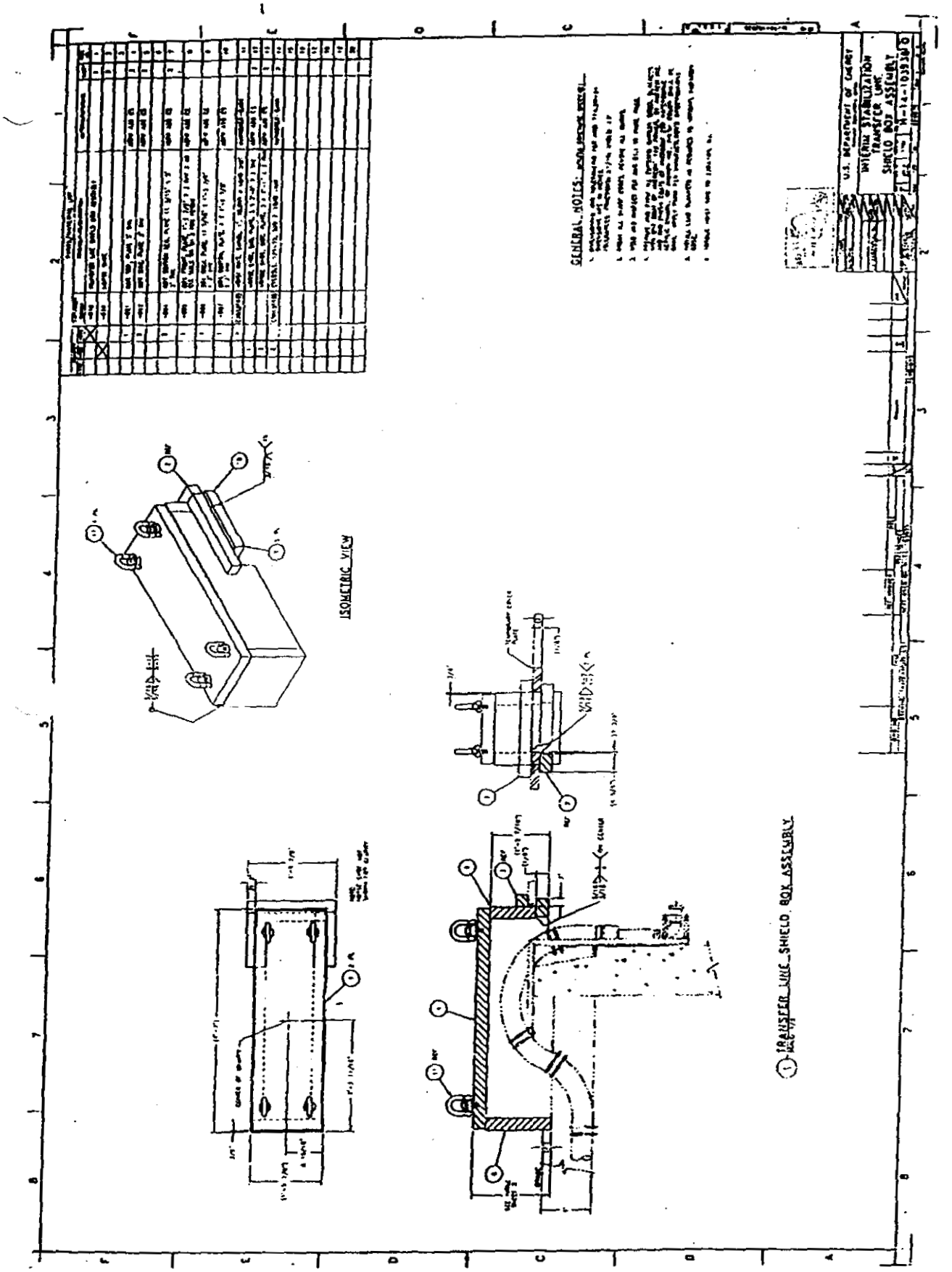
X Hose-In-Hose Transfer System for Interim Stabilization

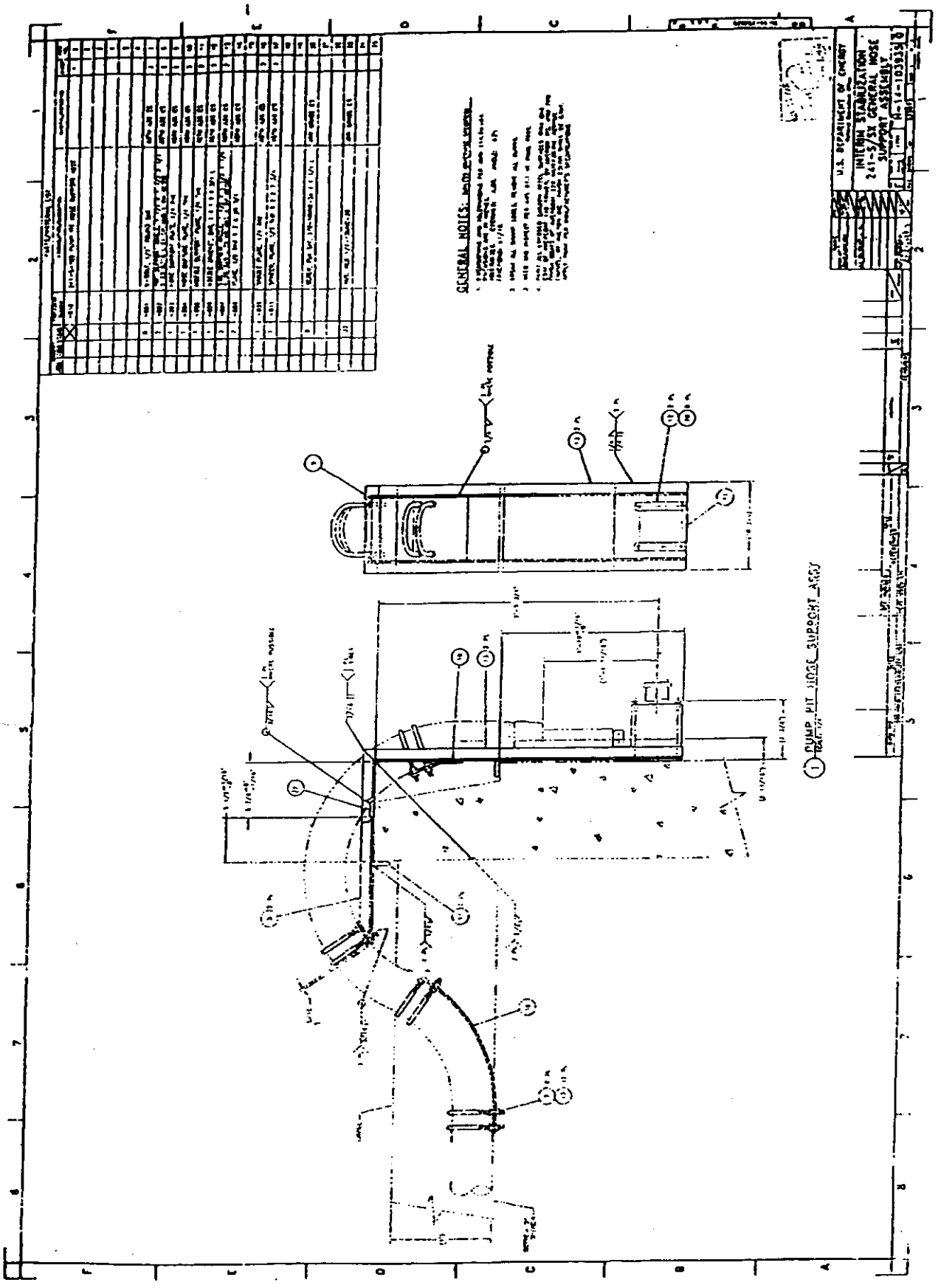
Fax

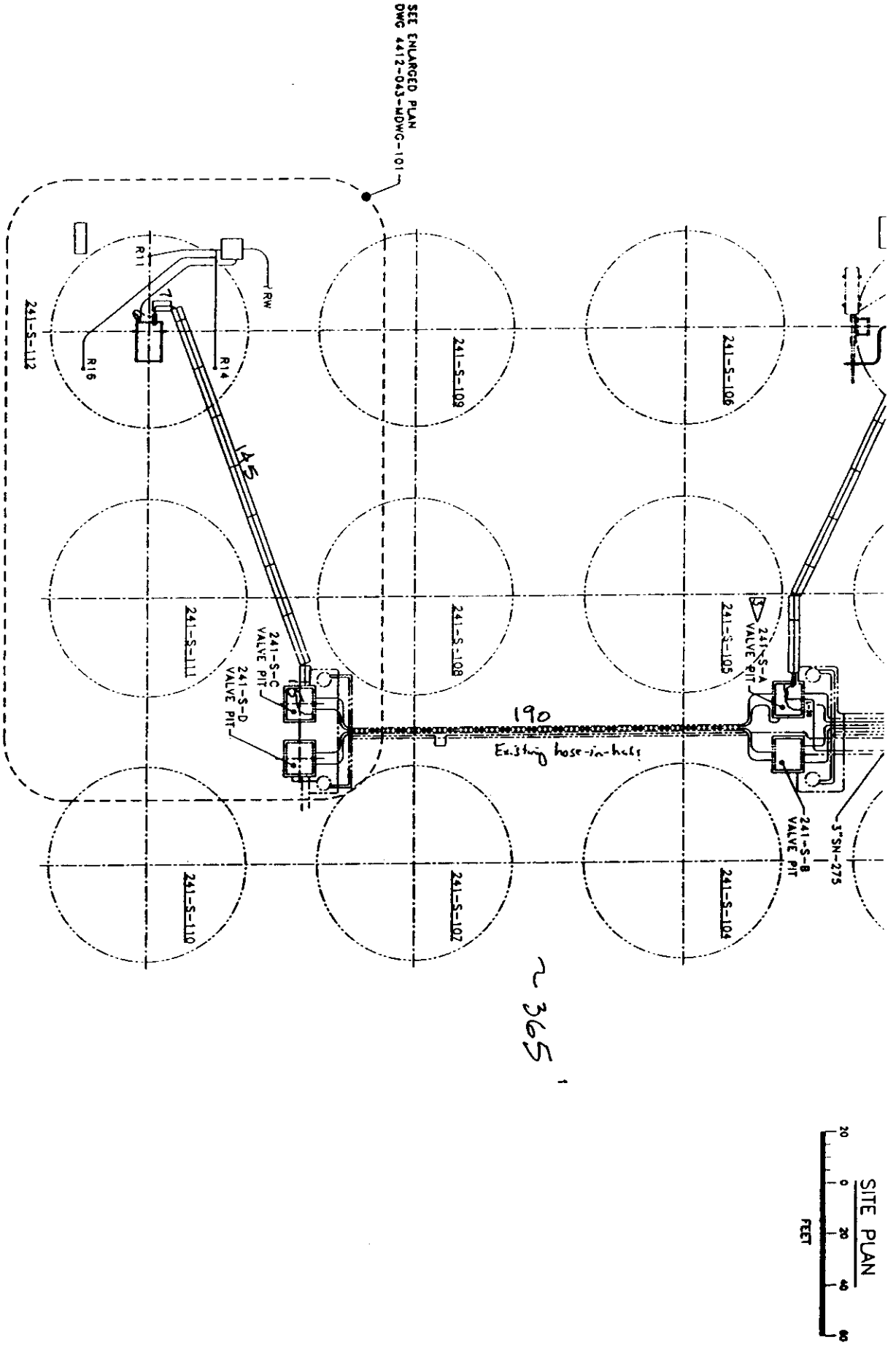
To:	LARS	**From:**	J.R. BIGGS
Fax:	946-4898	**Pages:**	4
Phone:		**Date:**	
Re:		**CC:**	

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply

- **Comments:**


GENERAL NOTES:
ISOMETRIC VIEW
TRANSFER LINE SHIELD BOX ASSEMBLY


GENERAL NOTES:
U.S. DEPARTMENT OF ENERGY
INTERIM STABILIZATION
241-S/SX GENERAL HOSE
SUPPORT ASSEMBLY
A-14-103933
1 PUMP PIT HOSE SUPPORT ASSY


SEE ENLARGED PLAN
DWG 4412-043-MDWG-101
241-S-106
241-S-105
241-S-104
241-S-109
241-S-108
241-S-107
241-S-112
241-S-111
241-S-110
241-S-A
VALVE PIT
241-S-B
VALVE PIT
241-S-C
VALVE PIT
241-S-D
VALVE PIT
3"SN-275
RW
R11
R14
R16
145
190
Existing hose-in-hole
~365
SITE PLAN
FEET
20
0
20
40
60

Cost's for Hose in Hose Installation:

Materials:

Shield Boxes: $21K/per (Labor and Materials)

Pit Cover Plates: $55K/per (Labor and Materials)

Hose Mounting Frames: $3.5K/per (Labor and Materials)

Valve Manifolds: $40K/per (Labor) (Est. $15K Materials)

Shield Plates for Route: $15K/100ft of 2" plate

Purex Nozzles: $1.5K/per (Labor and Materials)

Flex Jumpers: $5K/per (Labor and Materials)

Hose Procurement/Fab/Testing: $50K/hose (Cost varies with length, average is 180-200/foot)

Field Installation:

Costs depend on the number of pit entries, number of tanks involved and total length of route. (Typical length is 200ft)

.enching and routing hose: $8.2K/200ft

Pit entry and Hose tie-ins: $25K/end connector

Installation of steel shielding plate: $10K/200ft

The above totals do not include design or electrical installation for heat trace. The design work has largely been accomplished for a generic installation and only minor changes to specifications and drawings are needed for applications in other Farms. Electrical design and installation vary widely depending on power availability and heat trace requirements and would be the same regardless of the type piping used.

Discussions with Fluor Northwest personnel resulted in an estimated $10K per foot for standard pipe in pipe installation. This cost is based on excavation to at least 6ft, partial radiography of the primary pipe welds and full radiography on the encasement welds, materials, and installation to a pit. This estimate did not include design.

Kevin Ard

From: Boes, Kirk [boesk@hninc.com]
Sent: Thursday, July 27, 2000 11:53 AM
To: keard@MCEng.com
Subject: FW: CONFIRMATION OF COSTS FOR NEW SALT WELL PUMPING EQUIPMENT

-----Original Message-----
From: Robert_P_Jr_Marshall@RL.gov [mailto:Robert_P_Jr_Marshall@RL.gov]
Sent: Thursday, July 27, 2000 6:58 AM
To: Boes, Kirk
Cc: Brian_E_Brendel@rl.gov
Subject: RE: CONFIRMATION OF COSTS FOR NEW SALT WELL PUMPING EQUIPMENT

Kirk
You correctly captured all the info from our discussions yesterday. One addition I would make would be another jumper for the S-A pit where you will tie in. Assume another 40K. Also we talked about the OGT needs including 3" plate to cover route, 2 doghouses and 2 strongbacks.
thanks Rob

-----Original Message-----
From: Boes, Kirk [mailto:boesk@hninc.com]
Sent: Wednesday, July 26, 2000 4:15 PM
To: Robert_P_Jr_Marshall@rl.gov
Cc: Boes, Kirk; keard@MCEng.com; Brian_E_Brendel@rl.gov
Subject: CONFIRMATION OF COSTS FOR NEW SALT WELL PUMPING EQUIPMENT

Rob:

This message is provided to confirm the information we discussed over the phone this afternoon in relation to estimated costs for acquiring new salt well pumping equipment in support of the proposed S-103 saltcake dissolution retrieval project. HND is assuming that new equipment will be acquired based on the existing IS designs for use at Tank S-103 (unless and until firm information is available to indicate that existing reliable equipment will be available for use). Estimated costs for procurement/fabrication of the IS hardware will be as follows:

Salt well pump, legs and dip tubes - $50K

Pump jumper - $40K

Pump motor and housing assembly - $10K

Pumping Instrumentation and Control (PIC) skid - $225K

Dilution skid - $175K

Combustible Gas Monitor - $25K

Replacement cover plate for Pit 03A - $45K

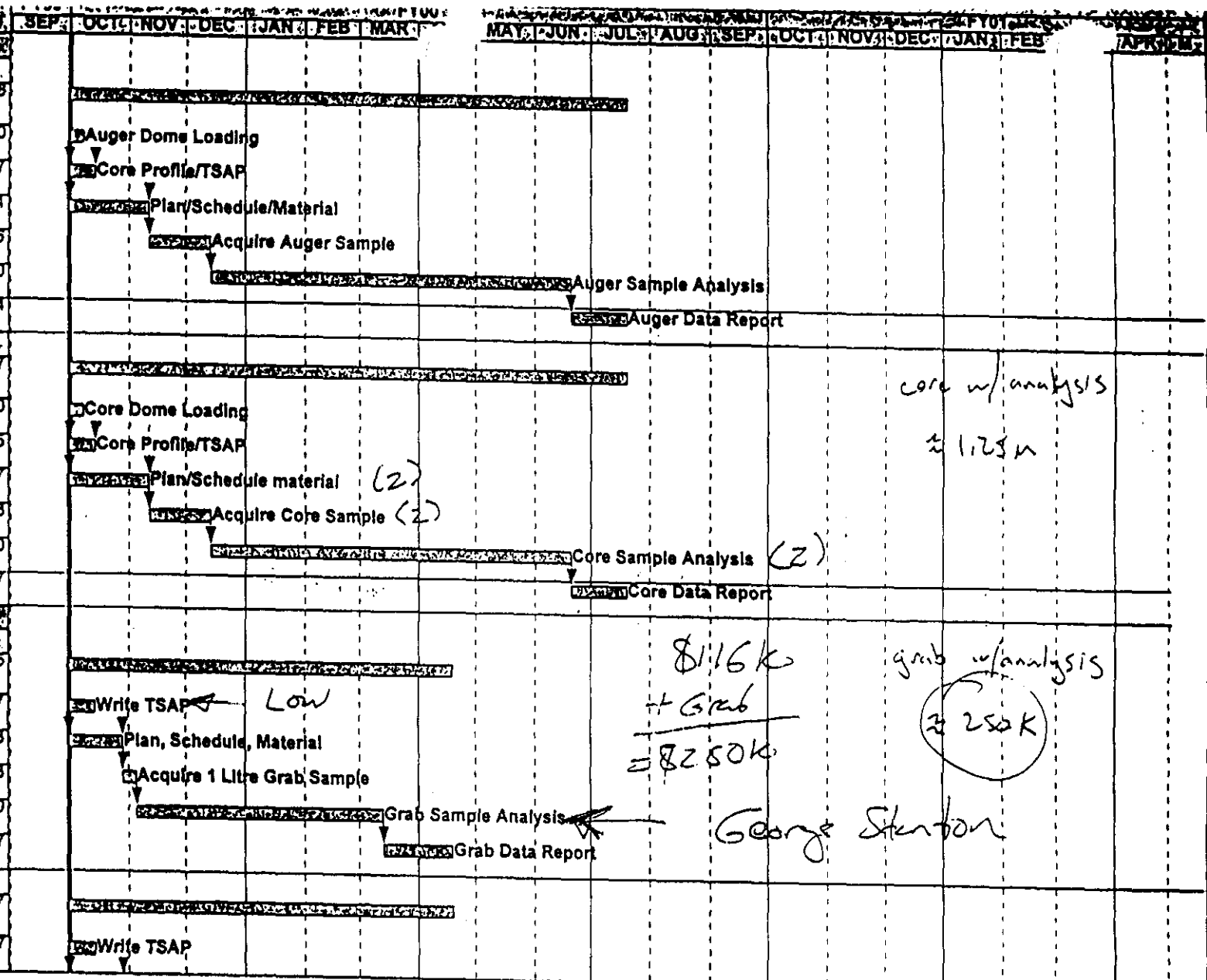
Please let me know if have any comments concerning this information. Also, if you can provide any additional details concerning this equipment, or additional equipment needing to be included in the S-103 estimate, please let me know. Thanks for your help.

From: Bogen, Greg [bogeng@hninc.com]
Sent: Tuesday, December 12, 2000 1:12 PM
To: 'Kevin Ard'
Cc: Boes, Kirk
Subject: raw water

Kevin-
The water supply that interim stabilization put in runs from SY Farm due south over the top of S-110 and on to SX Farm. There is a 3/4" Hansen quick disconnect and valve where we could tie in (above grade) over S-110. It is due West of the S-12A pit about 200-220 feet away. We will replace the 3/4" valve with a 1" valve and run 1" sch 40 pipe above
grade due East over to S-12A. 3 watt per foot heat trace and insulated with Armaflex 1" thick. Pipe supports every 10 feet.
At least that will make a good reasonable estimate. The ECN that shows the raw water piping is 660754.

<<...>>
Greg Bogen
Holmes & Narver

Activity	Dur	Cost
Auger Sample		
Subtotal	200	514,056.68
A0	5	2,870.80
A1	10	6,082.57
A2	30	33,424.81
A3	20	439,763.56
A4	130	0.00
A5	20	31,914.94
Core Sample		
Subtotal	200	803,395.27
C0	5	2,870.80
C1	10	6,744.45
C2	30	247,668.87
C3	20	515,166.58
C4	130	0.00
C5	20	30,944.57
Grab Sample		
1 Litre Grab Sample		
Subtotal	137	115,914.75
G11	10	5,865.37
G12	20	12,046.98
G13	5	67,057.83
G14	86	0.00
G15	26	30,944.57
2 Litre Grab Sample		
Subtotal	138	137,137.07
G21	10	5,865.37



Start Date	01OCT98
Finish Date	19JUL00
Data Date	01OCT99
Run Date	04APR00 13:17

Early Bar
Progress Bar
Critical Activity

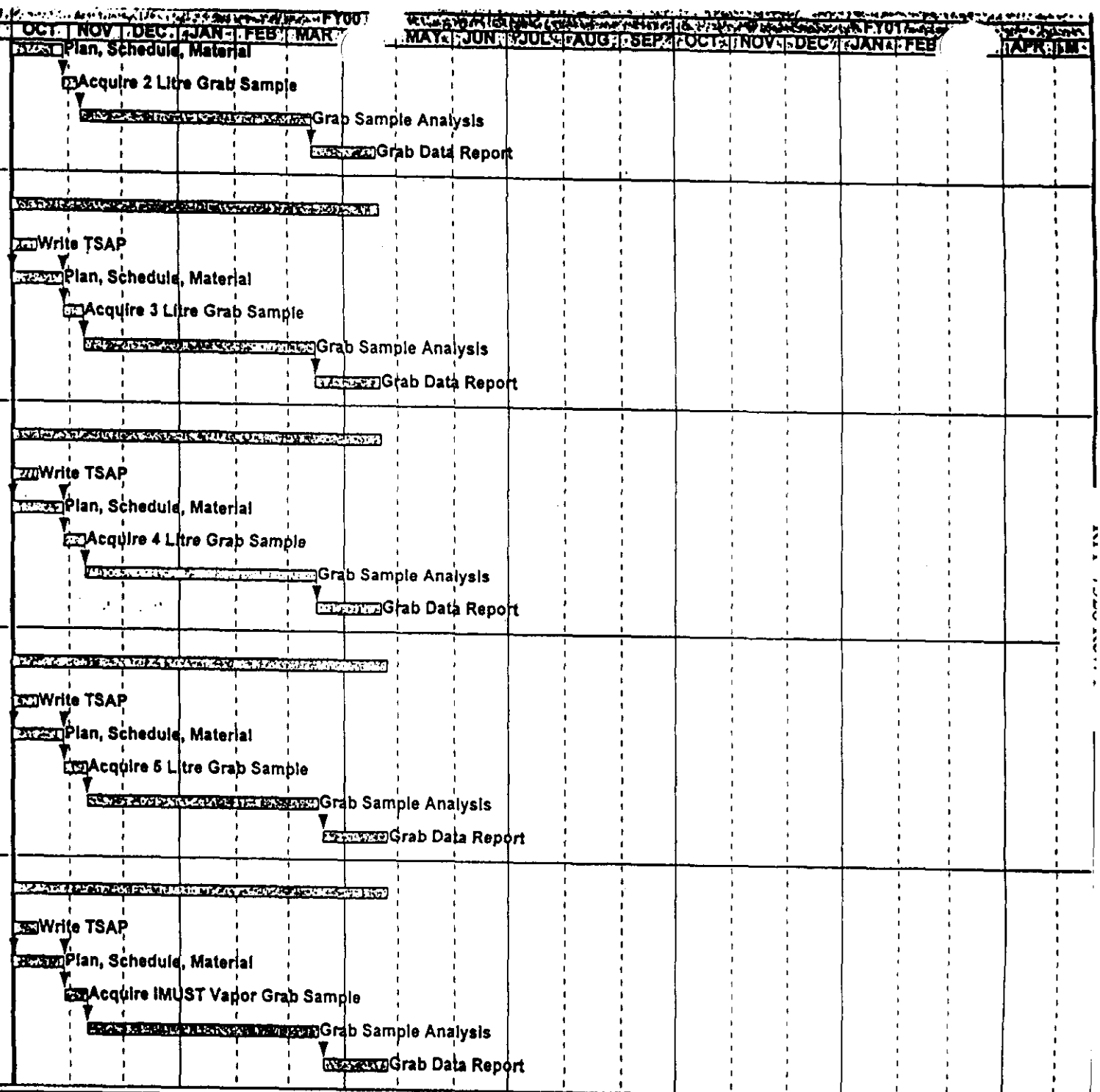
SAMP

Sample Fragnets

Sheet 1 of 3

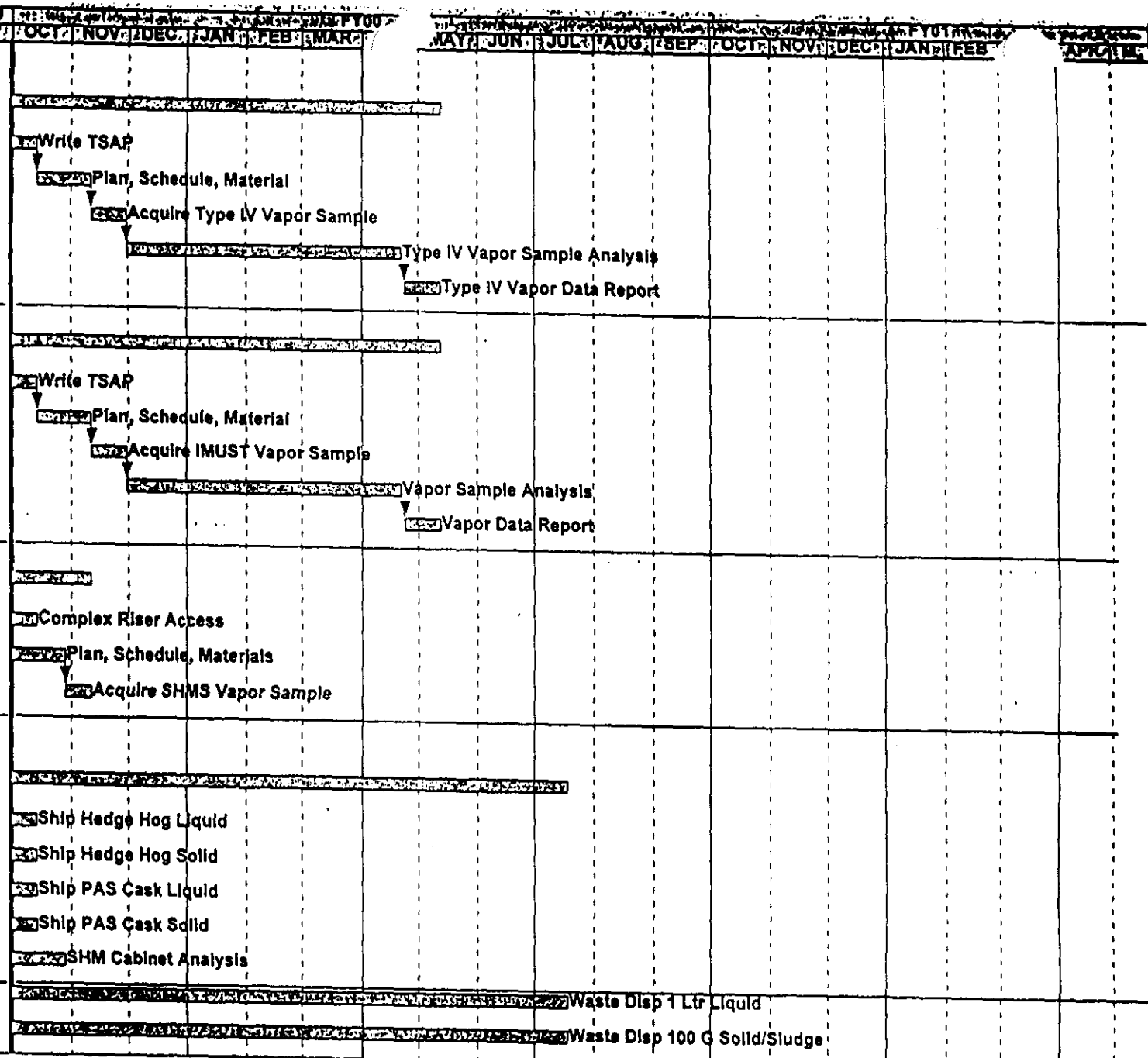
© Primavera Systems, Inc.

ID	Dur	Cost
G22		12,523.46
G23	6	87,803.67
G24	86	0.00
G25	26	30,944.57
3 Litre Grab Sample		
Subtotal	139	159,547.62
G31	10	5,865.37
G32	20	14,169.12
G33	7	108,568.56
G34	86	0.00
G35	26	30,944.57
4 Litre Grab Sample		
Subtotal	140	181,652.95
G41	10	5,865.37
G42	20	15,205.46
G43	8	129,637.55
G44	86	0.00
G45	26	30,944.57
5 Litre Grab Sample		
Subtotal	141	205,219.91
G51	10	5,865.37
G52	20	16,180.41
G53	9	152,229.56
G54	86	0.00
G55	26	30,944.57
IMUST Vapor Grab		
Subtotal	141	128,784.38
GV1	10	5,865.37
GV2	20	13,677.59
GV3	9	81,031.65
GV4	86	0.00
GV5	26	28,209.77



Sheet 2 of 3

	Dur	Cost
Type IV Vapor		
Subtotal	155	80,872.92
V41	10	5,865.37
V42	20	27,461.04
V43	10	38,795.15
V44	100	0.00
V45	15	8,751.36
IMUST Vapor		
Subtotal	155	59,592.27
VM1	10	5,865.37
VM2	20	17,947.46
VM3	10	31,442.68
VM4	100	0.00
VM5	15	4,336.76
Complex Riser Access		
Subtotal	30	194,033.07
VR3	10	14,707.59
VS2	20	34,680.60
VS3	10	144,644.88
Waste Disp		
Subtotal	198	95,549.18
HHL	10	2,690.54
HHS	10	6,857.20
PCL	10	32,162.14
PCS	10	32,162.14
SHM	20	0.00
WDL	198	18,106.09
WDS	198	3,371.07



K. E. Ard
September 6, 2000

Engineering/QA/Safety/Environmental Costs Extracted from U-106 Baseline Cost

The following engineering cost extracted from the U-106 baseline cost and schedule are covered elsewhere in the S-103 dissolution cost estimate.

Engineering	$318,764
QA	$41,213
Safety	$17,093
Environmental	$3,967
Total	$381,037

106 - Start by 12/29/00 (Now 6/21/00)

ACTIVITY ID	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGE COS
SS23V16C1	Perform Partial Screen Fabrication U-106	5	03APR00A	07APR00A	21L	79400	7.00	8173.9
					LE07E	74D00	4.00	262.8
					LE11E	7B400	4.00	257.3
					LM02E	74D00	4.00	337.6
					LP07E	79200	2.00	102.9
								9134.7
SS23V16D	Perform Saltwell Screen Install Design U-106	10	10APR00A	13APR00A	LM02E	74D00	4.00	337.6
					LE11E	7B400	24.00	1544.1
					LE07E	74D00	176.00	11566.7
					LR05B	79400	8.00	425.8
					LP07E	79200	40.00	2058.4
					LT05B	79700	8.00	394.8
					LE12E	7B100	8.00	484.7
					XC00B	7B100	8.00	389.8
								17202.1
SS23V16E1	Perform Saltwell Screen Install Planning U-106	12	03APR00A	11MAY00A	LM02E	74D00	2.00	168.8
					LG03B	79200	8.00	327.2
					LE11E	7B400	4.00	257.3
					LE05E	7B200	4.00	255.64
					LE10E	74D00	24.00	1281.36
					LP07E	79200	60.00	3087.60
					LM01E	79400	8.00	469.12
					LP08E	79700	24.00	1447.20
					LE12E	7B100	8.00	484.72
								7779.08
SS23V16E2	Perform Saltwell Screen Stage and Prep U-106	2	17APR00A	15MAY00A	44L	79400	0.38	471.88
					LM01E	79400	24.00	1407.36
					LT05B	79700	16.00	789.76
					44X	65200	1.97	2446.35
					44L	79400	0.60	745.08
					LC02B	79200	8.00	417.36
					LC08B	79200	24.00	1176.24
					LR05B	79400	56.00	2980.88
								10434.91
SS23V16E3	Install Saltwell Screen U-106	1	16MAY00A	16MAY00A	44L	79400	0.48	596.06
					LM01E	79400	20.00	1172.80
					LT05B	79700	30.00	1480.80
					XC00B	7B100	20.00	974.60
					10L	79400	3.10	3619.90
					44L	79400	0.80	993.44
					44X	65200	2.49	3092.08
					LC02B	79200	20.00	1043.40
					LC08B	79200	20.00	980.20
					LR05B	79400	60.00	3193.80
					LT11B	7B400	10.00	420.10
					LC00B	79200	20.00	1010.80
								18577.98
SS23V16E4	Perform Saltwell Screen Restoration U-106	1	17MAY00A	17MAY00A	44L	79400	0.48	596.06
					LM01E	79400	20.00	1172.80
					LT05B	79700	20.00	987.20
					44X	65200	2.45	3042.41
					44L	79400	0.75	931.35
					LR05B	79400	60.00	3193.80
					LC02B	79200	20.00	1043.40
					LC08B	79200	20.00	980.20
					LE11E	7B400	2.00	128.68
								12075.90
SS10U339B	Lab Anlys Rpt Tank U-106	90	03APR00A	20APR00A				

Post-it® Fax Note 7671

Date 9/6	# of pages ▸ 16
To Kevin Aid	From Rob Marshall
Co./Dept.	Co.
Phone #	Phone # 373-0663
Fax # 948-0707	Fax #

VITY J	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGET COS
SS23V54A	Review/Verify Profile Sht Compl Initial U-106	30	30MAY00A	02JUN00A	LG02N	74B00	16.00	413.7
					97L	79400	0.50	619.5
					LE01E	74B00	8.00	546.9
					LE01E	74B00	144.00	9845.2
					LE05E	7B200	16.00	1022.5
								12448.1
SS23V54B	Write Supporting Document Initial U-106	14	01JUN00A	08JUN00A	LG02N	74B00	4.00	103.4
					LM02E	74B00	4.00	337.6
					LE01E	74B00	60.00	4102.2
					LM01E	74B00	4.00	234.5
								4777.8
SS23V19B2	Prep J-10 to Fab Flex Valve Pit Jumper U-106	5	17APR00A	21APR00A	LE07E	7B200	8.00	525.7
					LE11E	7B400	4.00	257.3
					LM02E	74D00	4.00	337.6
								1120.72
SS23V19CF1	Fabricate Flex Valve Pit Jumper (1) U-106	5	19APR00A	21APR00A	21X	65100	10.00	12418.00
								12418.00
SS23V19D	Prep Install ECN for Valve Pit Jumpers U-106	10	03APR00A	06APR00A	LE04E	74D00	28.00	1946.00
					LE07E	74D00	160.00	10515.20
					LE11E	7B400	8.00	514.72
					LE12E	7B000	4.00	242.36
					LM02E	74D00	4.00	337.60
					LR05B	79400	4.00	212.92
					XC00B	7B100	4.00	194.92
								13963.72
J19E	Prep Work Pkg to Inst Valve Pit Jumpers U-106	15	08MAY00A	03JUL00A	LE00E	74D00	1.00	63.76
					LE05E	7B200	4.00	255.64
					LE10E	74D00	24.00	1281.36
					LE11E	7B400	8.00	514.72
					LE12E	7B000	12.00	727.08
					LG03B	79400	4.00	163.64
					LM01E	79400	8.00	469.12
					LM02E	74D00	2.00	168.80
					LP07E	72500	60.00	3087.60
					LP08E	79700	24.00	1447.20
								8178.92
SS23V19F1	Stage Equipment for Valve Pit Jumpers (1) U-106	2	03JUL00A	03JUL00A	44L	79400	0.30	372.54
					44L	79400	0.38	471.88
					44X	65200	1.42	1763.36
					LC02B	79200	16.00	834.72
					LM01E	79400	24.00	1407.36
					LR05B	79400	56.00	2980.88
					LT05B	79700	16.00	789.76
					LT11B	7B400	4.00	168.04
								8788.54
SS23V19F2	Prepare Valve Pit Heat Trace ECN U-106	2	10APR00A	11APR00A				

U-106 - Start by 12/29/00 (Now 6/21/00)

VITY	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGET COST
SS23V19G1	Instl Valve Jmpr in Pit & Connect Ht Trace U-106	1	03JUL00A	03JUL00A	10L	79400	3.80	4437.30
					44X	65200	4.42	5488.76
					44L	79400	0.50	620.90
					44L	79400	1.20	1490.16
					LC02B	79200	50.00	2608.50
					LC08B	79200	50.00	2450.50
					LM01E	79400	50.00	2932.00
					LR05B	79400	150.00	7984.50
					LT05B	79700	75.00	3702.00
					XC00B	7B100	25.00	1218.25
					LT11B	7B400	25.00	1050.25
								33983.12
SS23V19H1	Restore Valve Pit/Funct Test/Cal Ht Trace U-106	1	03JUL00A	03JUL00A	44L	79400	0.48	596.06
					44L	79400	0.40	496.72
					44X	65200	1.76	2185.57
					LM01E	79400	20.00	1172.80
					LR05B	79400	40.00	2129.20
					LT05B	79700	20.00	987.20
					LT11B	7B400	2.00	84.02
								7651.57
SS23V60A	Plan WP for Hydro (SL-110) U-106	20	10APR00A	05JUN00A	LG03B	79400	4.00	163.64
					LE11E	7B400	8.00	514.72
					LE05E	7B200	4.00	255.64
					LE10E	74D00	24.00	1281.36
					LP07E	72500	60.00	3087.60
					LE12E	7B100	4.00	242.36
					LE12E	7B000	4.00	242.36
					LM01E	79400	3.00	175.92
					LM02E	74D00	2.00	168.80
					LM02E	79400	8.00	675.20
					LP08E	79700	12.00	723.60
					LR05B	79400	2.00	106.46
								7637.66
SS23V60B	Stage Equipment for Hydro Test (SL-110) U-106	2	12JUN00A	19JUN00A	44L	79400	0.38	471.88
					LM01E	79400	16.00	938.24
					44X	65200	1.42	1763.36
					44L	79400	0.30	372.54
					LC02B	79200	12.00	626.04
					LC08B	79200	8.00	392.08
					LR05B	79400	40.00	2129.20
					LT05B	79700	8.00	394.88
								7088.22
SS23V60C1	Instal Jmprs/Set Up for Hydro Test(SL-110) U-106	5	20JUN00A	21JUN00A	44L	79400	0.96	1192.13
					LM01E	79400	40.00	2345.60
					LT05B	79700	60.00	2961.60
					XC00B	7B100	20.00	974.60
					10L	79400	3.80	4437.30
					44X	65200	3.54	4395.97
					44L	79400	0.80	993.44
					LC02B	79200	40.00	2086.80
					LC08B	79200	40.00	1960.40
					LR05B	79400	120.00	6387.60
					LT11B	7B400	20.00	840.20
								28575.64

U-106 - Start by 12/29/00 (Now 6/21/00)

VITY	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGET COST
SS23V60D1	Perform Hydro Test (SL-110) U-106	5	22JUN00A	23JUN00A	LM01E	79400	20.00	1172.80
					LT05B	79700	20.00	987.20
					XC00B	7B100	10.00	487.30
					44X	65200	0.32	397.38
					LC08B	79200	20.00	980.20
					LR05B	79400	40.00	2129.20
					LT11B	7B400	10.00	420.10
					LC02B	79200	10.00	521.70
								7095.88
SS23V60B1	Restore After Hydro Test (SL-110) U-106	5	23JUN00A	23JUN00A	44L	79400	0.96	1192.13
					LM01E	79400	40.00	2345.60
					LT05B	79700	60.00	2961.60
					XC00B	7B100	20.00	974.60
					44X	65200	3.54	4395.97
					44L	79400	0.40	496.72
					LC02B	79200	40.00	2086.80
					LC08B	79200	40.00	1960.40
					LR05B	79400	120.00	6387.60
					LT11B	7B400	20.00	840.20
								23641.62
SS23741A	Evaluate Heat Trace SL-110 (U-106)	1	08MAY00A	12MAY00A				
SS23V42A1	Dil Mtr Pmp ECN w/PWR Disconnect Upgrade U-106	1	10APR00A	02JUN00A				
SS23V42A2	Plan Dil Mtr Pmp WP w/PWR Discon Upgrade U-106	1	19APR00A	15JUN00A				
42A3	Install Dil Mtr Pmp w/PWR Discon Upgrade U-106	1	16JUN00A	22AUG00A				
SS23V90A1	ECN for Tnk Connect for Exh w/Inlet Filter U-106	1	10APR00A	11MAY00A				
SS23V90B1	Plan WP for Exhauster Tank Mods U-106	1	19APR00A	20JUL00A				
SS23V90C1	Perf Exh Tk Mods & Install Breather Filter U-106	1	24JUL00A	11AUG00A				
SS23V55D2	Prep ECN-FGM 4.0 on Riser & CGM on Pmp Pit U-106	15	10APR00A	01MAY00A	LG02N	79400	6.00	155.16
					LE11E	7B400	36.00	2316.24
					LE04E	74D00	384.00	26688.00
					LE07E	74D00	384.00	25236.48
					LR05B	79400	12.00	638.76
					LP07E	79200	24.00	1235.04
					LT05B	79700	12.00	592.32
					LE12E	7B000	12.00	727.08
					XC00B	7B100	12.00	584.76
								58173.84

PRIMAVERA PROJECT PLANNER

REPORT DATE 05SEP00 RUN NO. 79
13:32

DATA DATE 28AUG00
FIN DATE 30SEP0

SST IS REV.3 Res. by TBR by Activity ID

PAGE NO. 5

U-106 - Start by 12/29/00 (Now 6/21/00)

VITY ID	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGET COST
SS23V55B4	Prepare Work Package for FGM/CGM Install U-106	15	19APR00A	02JUN00A	LM02E	74D00	1.50	126.60
					LE11E	7B400	6.00	386.04
					LE00E	74D00	6.00	382.56
					LE10E	74D00	12.00	640.68
					LP07E	79200	66.00	3396.36
					LR05B	79400	3.00	159.69
					LM01E	79400	6.00	351.84
					LP08E	79700	1.50	90.45
					LE12E	7B000	6.00	363.54
					LE01E	74800	3.00	205.11
								6102.87
SS23V55E5	Install FGM & CGM U-106	20	26JUN00A	21AUG00A	44L	79400	0.77	956.19
					LM01E	79400	44.00	2580.16
					LT05B	79700	160.00	7897.60
					44X	65200	2.84	3526.71
					44L	79400	0.60	745.08
					LC02B	79200	160.00	8347.20
					LC08B	79200	160.00	7841.60
					LR05B	79400	160.00	8516.80
					LT11B	7B400	16.00	672.16
					LC00B	79700	48.00	2425.92
					LE04E	74D00	4.00	278.00
					LT07B	7B100	32.00	1673.92
								45461.34
SS23V55E6	Perform FGM/CGM Calibration U-106	4	05JUL00A	21AUG00A	LG02N	74D00	8.00	206.88
					LG02N	79400	16.00	413.76
					LP07E	79200	32.00	1646.72
					LP07E	72500	16.00	823.36
					LM01E	79400	16.00	938.24
					LE04E	74700	32.00	2224.00
					LE11E	7B400	16.00	1029.44
					LE12E	7B100	16.00	969.44
					LE04E	74D00	152.00	10564.00
					LT07B	7B100	16.00	836.96
								19652.80
SS23V55F2	Perf FGM/CGM Oper'l Test Procedure (OTP) U-106	6	05JUL00A	22AUG00A	LM01E	79400	52.00	3049.28
					LT05B	79700	48.00	2369.28
					LC02B	79200	48.00	2504.16
					LC08B	79200	96.00	4704.96
					LE04E	74D00	48.00	3336.00
					LR05B	79400	48.00	2555.04
					LT07B	7B100	48.00	2510.88
					LT11B	7B400	48.00	2016.48
					LE04E	7B400	16.00	1112.00
					LE11E	7B400	16.00	1029.44
								25187.52
SS23057C7	Fabricate New PIC Skid with CGM Mod (R) U-106	42	11JAN00A	02JUN00A	21L	74D00	296.00	345642.16
					44L	79400	0.30	372.54
					44X	65200	0.70	869.26
					44L	79400	0.19	235.94
					LE04E	74D00	80.00	5560.00
					LE07E	74D00	73.00	4797.56
					LE10E	74D00	48.00	2562.72
					LE11E	7B400	54.00	3474.36
					LE12E	7B100	12.00	727.08
					LG03B	79200	30.00	1227.30
					LM01E	79400	4.00	234.56
					LM02E	74D00	4.00	337.60
					LR05B	79400	44.00	2342.12
					LT07B	79200	80.00	4184.80
					LT11B	7B400	80.00	3360.80
								375928.80

U-106 - Start by 12/29/00 (Now 6/21/00)

IVITY D	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGE COS
SS23V57D	Prep PIC Skid Installation Design & LD COB U-106	45	10APR00A	01MAY00A	LE04E	74D00	276.00	19182.0
					LE07E	74D00	344.00	22607.6
					LE11E	7B400	24.00	1544.1
					LE12E	7B100	8.00	484.7
					LM02E	74D00	4.00	337.6
					LP07E	79200	40.00	2058.4
					LR05B	79400	8.00	425.8
					LT05B	79700	8.00	394.8
					XC00B	7B100	8.00	389.8
								47425.12
SS23V57E1	Prepare Work Package for Installation U-106	10	19APR00A	02JUN00A	LE05E	7B200	4.00	255.64
					LE10E	74D00	24.00	1281.36
					LE11E	7B400	4.00	257.36
					LE12E	7B100	12.00	727.08
					LG03B	79200	8.00	327.28
					LM01E	79400	12.00	703.68
					LM02E	79400	2.00	168.80
					LP07E	79200	60.00	3087.60
					LP08E	79700	12.00	723.60
					LR05B	79400	4.00	212.92
								7745.32
SS23V57E2	Install PIC Skid (R) for Tank U-106	20	03JUN00A	21AUG00A	44X	52100	0.68	844.42
					44X	65200	1.42	1763.36
					LC02B	79200	80.00	4173.60
					LC08B	79200	16.00	784.16
					LE07E	74D00	16.00	1051.52
					LE11E	7B400	2.00	128.68
					LM01E	79400	16.00	938.24
					LR05B	79400	40.00	2129.20
					LT05B	79700	40.00	1974.40
								13787.58
SS23V57E3	Calibrate Instruments on PICS U-106	5	26MAY00A	02JUN00A	LE04E	74D00	72.00	5004.00
					LE11E	7B000	16.00	1029.44
					LE12E	7B100	16.00	969.44
					LG02N	79400	40.00	1034.40
					LM01E	79400	4.00	234.56
					LP07E	79200	22.00	1132.12
					LT07B	79200	48.00	2510.88
								11914.84
SS23V57F1	Plan/Prepare Engineering Plan PICS OTP U-106	10	10APR00A	08JUN00A	LC02B	79200	2.00	104.34
					LC08B	79200	2.00	98.02
					LE00E	74D00	1.00	63.76
					LE10E	74D00	4.00	213.56
					LE11E	7B400	4.00	257.36
					LE12E	7B100	4.00	242.36
					LM01E	79400	2.00	117.28
					LM02E	74D00	4.00	337.60
					LP07E	79200	40.00	2058.40
					LP08E	79700	4.00	241.20
					LR05B	79400	2.00	106.46
								3840.34

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IVITY .D	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGE COS
SS23V57F2	Stage Equipment for OTP U-106	5	12JUN00A	13JUN00A	44L	79400	0.30	372.5
					44L	79400	0.38	471.8
					44X	65200	1.42	1763.3
					LC02B	79200	20.00	1043.4
					LC08B	79200	20.00	980.2
					LE04E	74D00	56.00	3892.0
					LE04E	7B200	48.00	3336.0
					LE07E	74D00	36.00	2365.9
					LE11E	74D00	16.00	1029.4
					LE12E	7B100	16.00	969.4
					LP07E	79200	2.00	102.9
					LR05B	79400	24.00	1277.52
					LT05B	79700	16.00	789.76
					LT07B	79200	12.00	627.72
								19022.10
SS23V57F21	Prep ECN for Temp Interlock Defeat for OTP U-106	5	17APR00A	03JUN00A				
SS23V57F3	Perform PIC Skid OTP U-106	15	14JUN00A	22JUN00A	LC02B	79200	80.00	4173.60
					LC08B	79200	16.00	784.16
					LE04E	74D00	120.00	8340.00
					LM01E	79400	80.00	4691.20
					LR05B	79400	240.00	12775.20
					LT05B	79200	40.00	1974.40
					LT07B	79200	80.00	4184.80
					LT11B	7B400	80.00	3360.80
								40284.16
SS23V57F4	Closeout PIC Skid OTP U-106	5	23JUN00A	23JUN00A	LC02B	79200	20.00	1043.40
					LC08B	79200	20.00	980.20
					LE04E	74D00	80.00	5560.00
					LE11E	7B400	12.00	772.08
					LE12E	7B100	16.00	969.44
					LM01E	74D00	16.00	938.24
					LM01E	79400	16.00	938.24
					LR05B	79400	40.00	2129.20
					LT07B	79200	40.00	2092.40
					LT11B	7B400	20.00	840.20
								16263.40
SS23V08A1	Perform Rad Screening on U-106	10	15MAY00A	19MAY00A				
SS23V08B	Prep Cover Plate Design Modifications ECN U-106	10	10APR00A	10MAY00A	LE12E	7B100	12.00	727.08
					LE04E	74D00	8.00	556.00
					LE11E	7B400	28.00	1801.52
					LE07E	74D00	160.00	10515.20
								13599.80
SS23V08B1	Issue J-10 for Shield Plate Fab U-106	10	08MAY00A	10MAY00A				
SS23V08D	Fab Shield Plate for Exstg Cvr Plates U-106	10	10MAY00A	01JUN00A	21L	79400	27.00	31528.17
					LC08B	79200	16.00	784.16
					LE07E	74D00	4.00	262.88
					LE11E	7B400	4.00	257.36
								32832.57

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IVITY D	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGE COS
SS23V27A	Design Installation ECN for Jet Pump U-106	35	08MAY00A	17MAY00A	LE04E	74D00	120.00	8340.0
					LE07E	74D00	184.00	12092.4
					LE11E	7B400	24.00	1544.1
					LE12E	7B000	8.00	484.7
					LM02E	74D00	4.00	337.6
					LR05B	79400	4.00	212.9
					XC00B	7B100	4.00	194.9
								23206.80
SS23V27B1	Prep J-10 for New Pump Assembly U-106	10	10APR00A	18APR00A	LE07E	74D00	16.00	1051.52
					LE11E	7B400	8.00	514.72
					LM02E	74D00	4.00	337.60
								1903.84
SS23V27B2	Fabricate New Pump Assembly U-106	3	08MAY00A	01JUN00A	21L	74D00	60.00	70062.60
					LE04E	74D00	24.00	1668.00
								71730.60
SS23V27C1	Prepare Work Package for Pump Recirc Mod U-106	15	03APR00A	01MAY00A	21L	74D00	8.50	9925.54
					LC08B	79200	2.00	98.02
					LE04E	74D00	4.00	278.00
					LE07E	74D00	12.00	788.64
					LE11E	7B400	16.00	1029.44
					LE12E	7B100	8.00	484.72
					LG03B	79200	4.00	163.64
					LM01E	79400	4.00	234.56
					LM02E	79400	4.00	337.60
					LP07E	79200	60.00	3087.60
					LT07B	79200	2.00	104.62
								16532.38
27C2	Modify Pump Recirc Line U-106	15	19APR00A	21APR00A	LC08B	79200	24.00	1176.24
					LE11E	74D00	4.00	257.36
					LM01E	79400	8.00	469.12
					LR05B	79400	4.00	212.92
					LT07B	79200	8.00	418.48
					LT11B	7B400	4.00	168.04
								2702.16
SS23V27D1	Prepare Work Package for Pump Run-In U-106	15	17APR00A	19APR00A	LC08B	79200	2.00	98.02
					LE10E	74D00	20.00	1067.80
					LE11E	7B400	2.00	128.68
					LE12E	7B000	2.00	121.18
					LM01E	79400	2.00	117.28
					LM02E	74D00	2.00	168.80
					LP07E	72500	40.00	2058.40
					LR05B	79400	2.00	106.46
					LT07B	79200	2.00	104.62
								3971.24
SS23V27D2	Pump Run-In U-106	3	19APR00A	22APR00A	44X	65200	1.27	1577.09
					LC02B	79200	20.00	1043.40
					LC08B	79200	26.00	1372.28
					LE07E	74D00	4.00	262.88
					LM01E	79400	20.00	1172.80
					LR05B	79400	24.00	1277.52
					LT07B	7B100	12.00	627.72
					LT11B	7B400	12.00	504.12
								7837.81
SS23V27E	Design Pump/Jumper U-106	35	10APR00A	24APR00A	LE04E	74D00	40.00	2780.00
					LE07E	74D00	40.00	2628.80
					LE11E	7B400	16.00	1029.44

IVITY D	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGET COST
								6438.24
SS23V27F1	Prepare J-10 for New Pump Jumper U-106	10	10APR00A	21APR00A	LE07E	74D00	16.00	1051.52
					LE11E	7B400	8.00	514.72
					LM02E	74D00	4.00	337.60
								1903.84
SS23V27F2	Fabricate New Pump Jumper U-106	20	08MAY00A	01JUN00A	21L	74D00	31.00	36199.01
					LE07E	74D00	16.00	1051.52
								37250.53
SS23V27F21	Perform Pump/Jumper OTP U-106	20	22MAY00A	26MAY00A				
SS23V27H	Prep Inst Wrk Pkg for Pmp/Jmpr/Cvr Plates U-106	20	08MAY00A	11AUG00A	10L	79400	2.00	2335.42
					LE05E	7B200	4.00	255.64
					LE10E	74D00	24.00	1281.36
					LE11E	7B400	8.00	514.72
					LE12E	7B000	12.00	727.08
					LG03B	79400	4.00	163.64
					LM01E	79400	8.00	469.12
					LM02E	74D00	2.00	168.80
					LP07E	79200	60.00	3087.60
					LP08E	79700	12.00	723.60
								9726.98
SS23V27J	Stage Pump, Cover Plate, Req Materials U-106	2	15JUN00A	15AUG00A	44X	52100	0.96	1192.13
					44X	65200	3.54	4395.97
					44L	79400	0.80	993.44
					LC02B	79200	18.00	939.06
					LC08B	79200	20.00	980.20
					LM01E	79400	18.00	1055.52
					LR05B	79400	66.00	3513.18
					LT05B	79700	20.00	987.20
								14056.70
SS23V27K	Inst Pump/Jumper/Cover Blocks Func Test U-106	4	15AUG00A	18AUG00A	44X	65200	4.25	5277.65
					44L	79400	1.20	1490.16
					44X	52100	0.96	1192.13
					LC02B	79200	60.00	3130.20
					LC08B	79200	60.00	2940.60
					LM01E	79400	20.00	1172.80
					LR05B	79400	166.00	8836.18
					LT05B	79700	90.00	4442.40
					XC00B	7B100	20.00	974.60
					LT07B	79200	20.00	1046.20
					LC00B	79200	40.00	2021.60
					LT11B	7B400	10.00	420.10
								32944.62
SS23V36A	Perform I8 Mgmt Self Assmt for Startup U-106	30	07AUG00A	23AUG00A	LC02B	79200	20.00	1043.40
					LC08B	79200	20.00	980.20
					LE04E	79400	20.00	1390.00
					LE04E	79400	40.00	2780.00
					LE07E	79400	20.00	1314.40
					LE07E	79400	40.00	2628.80
					LE11E	7B400	92.00	5919.28
					LE12E	7B100	12.00	727.08
					LG02N	79400	240.00	6206.40
					LM01E	79400	160.00	9382.40
					LM02E	79400	24.00	2025.60
					LM02E	74700	8.00	675.20
					LP07E	79400	240.00	12350.40
					LR05B	79400	80.00	4258.40
					LT05B	79700	40.00	1974.40
					LT07B	79200	20.00	1046.20

'IVITY ID	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGE COS
								54702.1
SS23V72D1	Pump Tank U-106	276	28AUG00	30MAY01				
SS23V72D12	Pump Tank U-106	28	31MAY01	27JUN01				
SS23V68A3	Perform Intrusive CM U-106	191	28AUG00	31MAY01	10L	79400	10.92	12695.5
					44L	79400	4.64	5754.9
					44L	79400	3.68	4564.2
					44X	65200	17.49	21760.3
					LC02B	79200	178.36	9319.0
					LC08B	79200	141.96	6967.3
					LE00E	74D00	3.64	232.4
					LE05E	7B200	10.92	698.9
					LE07E	74D00	87.36	5750.47
					LE10E	79200	7.28	389.25
					LE11E	7B400	14.56	938.32
					LE12E	7B100	25.48	1546.28
					LG03B	79200	65.52	2684.43
					LM01E	79400	207.48	12184.77
					LP07E	79200	182.00	9380.04
					LP08E	74D00	14.56	879.24
					LP08E	79700	29.12	1758.48
					LR05B	79400	465.92	24841.66
					LT05B	79700	178.36	8817.88
					XC00B	7B100	72.80	3578.10
					LT11B	7B400	65.52	2756.51
								137498.39
SS23V68A4	Perform Intrusive CM U-106	20	01JUN01	28JUN01	10L	79400	1.08	1254.81
					44L	79400	0.46	570.43
					44X	65200	1.73	2152.99
					44L	79400	0.37	458.83
					LC02B	79200	17.64	921.87
					LC08B	79200	14.04	689.22
					LE00E	74D00	0.36	22.99
					LE05E	7B200	1.08	69.14
					LE07E	74D00	8.64	568.86
					LE10E	79200	0.72	38.51
					LE11E	7B400	1.44	92.82
					LE12E	7B100	2.52	152.96
					LG03B	79200	6.48	265.55
					LM01E	79400	20.52	1205.34
					LP07E	79200	18.00	927.90
					LP08E	79700	2.88	173.95
					LP08E	74D00	1.44	86.98
					LR05B	79400	46.08	2457.45
					LT05B	79700	17.64	872.30
					XC00B	7B100	7.20	354.31
					LT11B	7B400	6.48	272.68
								13609.89

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IVITY .D	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGET COST
SS23V68C3	Perform Non Intrusive CM U-106	191	28AUG00	31MAY01	10L	79400	9.10	10579.62
					LC02B	79200	163.80	8558.34
					LC08B	79200	91.00	4466.28
					LE00E	79400	4.55	290.55
					LE07E	74D00	72.80	4792.05
					LE10E	79200	18.20	973.13
					LE11E	7B400	45.50	2932.24
					LE12E	7B100	9.10	552.24
					LG03B	79200	54.60	2237.03
					LM01E	79400	45.50	2672.10
					LP07E	79200	109.20	5628.03
					LP08E	79700	40.95	2472.87
					LR05B	79400	81.90	4366.70
					LT05B	79700	36.40	1799.57
					LT07B	79200	91.00	4768.17
					LT11B	7B400	36.40	1531.39
								58620.31
SS23V68C4	Perform Non Intrusive CM U-106	20	01JUN01	28JUN01	10L	79400	0.90	1045.67
					LC02B	79200	16.20	846.61
					LC08B	79200	9.00	441.81
					LE00E	79400	0.45	28.74
					LE07E	74D00	7.20	474.05
					LE10E	79200	1.80	96.26
					LE11E	7B400	4.50	290.07
					LE12E	7B100	0.90	54.63
					LG03B	79200	5.40	221.29
					LM01E	79400	4.50	264.33
					LP07E	79200	10.80	556.74
					LP08E	79700	4.05	244.62
					LR05B	79400	8.10	431.97
					LT05B	79700	3.60	178.02
					LT07B	79200	9.00	471.69
					LT11B	7B400	3.60	151.49
								5797.99
SS23V68E3	Perform Routine Work Request CM U-106	191	28AUG00	31MAY01	10L	79400	5.46	6347.77
					LC02B	79200	87.36	4564.45
					LC08B	79200	87.36	4287.62
					LE04E	74D00	87.36	6081.45
					LG03B	79200	65.52	2684.43
					LM01E	79400	38.22	2244.56
					LP08E	79700	76.44	4616.02
					LR05B	79400	87.36	4657.81
					LT05B	79700	87.36	4318.96
					LT07B	79200	54.60	2860.90
								42663.97
SS23V68E4	Perform Routine Work Request CM U-106	20	01JUN01	28JUN01	10L	79400	0.54	627.40
					LC02B	79200	8.64	451.53
					LC08B	79200	8.64	424.14
					LE04E	74D00	8.64	601.60
					LG03B	79200	6.48	265.55
					LM01E	79400	3.78	222.04
					LP08E	79700	7.56	456.62
					LR05B	79400	8.64	460.77
					LT05B	79700	8.64	427.25
					LT07B	79200	5.40	283.01
								4219.91

U-106 - Start by 12/29/00 (Now 6/21/00)

;IVITY ID	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGE COS
SS23V68G3	Perform Saltwell Systems PM U-106	191	28AUG00	31MAY01	LC02B	79200	75.00	3918.6
					LC08B	79200	56.00	2748.4
					LE04E	74D00	4.00	278.4
					LM01E	74D00	4.00	234.9
					LM01E	79400	70.00	4110.9
					LP07E	79200	150.00	7730.8
					LP08E	79700	4.00	241.5
					LR05B	79400	59.00	3145.7
					LT05B	79700	70.00	3460.7
					XC00B	7B100	4.00	196.6
					LT07B	79200	72.00	3772.6
								29839.42
SS23V68G4	Perform Saltwell Systems PM U-106	20	31MAY01	27JUN01	LC02B	79200	75.00	3919.50
					LC08B	79200	56.00	2749.04
					LE04E	74D00	4.00	278.52
					LM01E	74D00	4.00	234.96
					LM01E	79400	70.00	4111.80
					LP07E	79200	150.00	7732.50
					LP08E	79700	4.00	241.60
					LR05B	79400	59.00	3146.47
					LT05B	79700	70.00	3461.50
					XC00B	7B100	4.00	196.84
					LT07B	79200	72.00	3773.52
								29846.25
SS23V68J3	Perform Weekly Flushes U-106	191	28AUG00	31MAY01	LE10E	79400	189.28	10120.55
					LM01E	79400	189.28	11115.93
					LR05B	79400	189.28	10091.92
					LT05B	79700	189.28	9357.76
								40686.16
V68J4	Perform Weekly Flushes U-106	20	01JUN01	28JUN01	LE10E	79400	18.72	1001.15
					LM01E	79400	18.72	1099.61
					LR05B	79400	18.72	998.34
					LT05B	79700	18.72	925.70
								4024.80
SS23V74A1	Plan WP for 1st Annual Hydro U-106	15	10MAY01	31MAY01	LE05E	7B200	4.00	256.08
					LE10E	74D00	8.00	427.84
					LE11E	7B400	4.00	257.84
					LE12E	7B100	8.00	485.60
					LM01E	79400	4.00	234.96
					LM02E	79400	4.00	338.20
					LP07E	79200	60.00	3093.00
					LP08E	79700	4.00	241.60
					LR05B	79400	2.00	106.66
					LT05B	79700	24.00	1186.80
								6628.58
SS23V74A2	Stage Equip for 1st Annual Hydro U-106	2	10MAY01	11MAY01	44L	79400	0.37	458.83
					44X	65200	1.40	1742.30
					44L	74D00	0.30	372.02
					LC02B	79200	8.00	418.08
					LC08B	79200	8.00	392.72
					LM01E	79400	8.00	469.92
					LR05B	79400	40.00	2133.20
					LT05B	79700	16.00	791.20
								6778.27

IVITY D	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGE COS
SS23V74A3	Setup and Perform 1st Annual Hydro Test U-106	3	01JUN01	05JUN01	10L	79400	2.00	2323.7
					44L	79400	0.93	1153.2
					44L	79400	0.80	992.0
					44X	65200	3.50	4355.7
					LC02B	79200	60.00	3135.6
					LC08B	79200	60.00	2945.4
					LM01E	79400	40.00	2349.6
					LR05B	79400	120.00	6399.6
					LT05B	79700	60.00	2967.0
					XC00B	4H400	20.00	984.2
					LT11B	7B400	20.00	841.6
								28447.8
SS23V74A4	Clean-up After 1st Annual Hydro U-106	3	06JUN01	08JUN01	44X	65200	3.50	4355.75
					44L	79400	0.60	744.04
					44L	79400	0.93	1153.27
					LC02B	79200	30.00	1567.80
					LC08B	79200	40.00	1963.60
					LM01E	79400	40.00	2349.60
					LR05B	79400	120.00	6399.60
					LT05B	79700	60.00	2967.00
					XC00B	4H400	20.00	984.20
					LT11B	7B400	20.00	841.60
								23326.46
SS23V78A1	Walkdown for In-Tank Video/Prep Work Pkg U-106	10	28JUN01	12JUL01	LE11E	7B400	2.00	128.92
					LC08B	79200	4.00	196.36
					LE01E	79400	16.00	1095.84
					LE05E	7B200	4.00	256.08
					LE10E	79400	8.00	427.84
					LP07E	79200	8.00	412.40
					LR05B	79B00	4.00	213.32
					LM01E	79B00	6.00	352.44
					LP08E	79700	8.00	483.20
					LT05B	79700	4.00	197.80
					LE12E	7B100	6.00	364.20
								4128.40
SS23V78A2	Restore Riser/Perform In-Tank Video U-106	1	13JUL01	13JUL01	LM02E	79200	4.50	380.48
					LM01E	79B00	4.50	264.33
					LT05B	79700	9.00	445.05
					XC00B	7B100	4.50	221.45
					10L	79400	1.00	1161.86
					LC02B	79200	4.50	235.17
					LC08B	79200	4.50	220.91
					LR05B	79B00	7.50	399.98
								3329.23
SS23V78B1	Evaluate SW Pumping Data U-106	60	13JUL01	05OCT01	LE01E	74800	24.00	1643.76
					LE10E	74D00	8.00	427.84
					LM01E	74800	4.00	234.96
								2306.56
SS23V78B2	Evaluate In-Tank Video U-106	2	15JUL01	17JUL01	LE01E	74800	4.00	273.96
					LM01E	74800	4.00	234.96
								508.92
SS23V78B3	Prep/Appr Document & Update/Approve ECN U-106	15	08OCT01	26OCT01	LM02E	74D00	6.00	507.30
					LE01E	74800	16.00	1095.84
					LM01E	74D00	4.00	234.96
					LE07E	74D00	8.00	526.72
								2364.82

IVITY D	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGET COST
SS23V78C1	Prepare ECN for PICS/FGM Disconnect U-106	15	29OCT01	16NOV01	LC02B	79200	4.00	209.04
					LE04E	74D00	84.00	5848.92
					LE07E	74D00	68.00	4477.12
					LR05B	79400	8.00	426.64
					LT05B	79700	6.00	296.70
					LE11E	7B400	8.00	515.68
					LE12E	7B100	4.00	242.80
					LM02E	74D00	4.00	338.20
					LP07E	79200	4.00	206.20
					LP09E	7B100	4.00	186.44
								12747.74
SS23V78C2	Disconnect/Relocate PICS/FGM U-106	15	19NOV01	11DEC01	44X	52100	0.74	920.93
					44X	65200	3.94	4903.33
					44L	79400	0.30	372.02
					LC02B	79200	16.00	836.16
					LC08B	79200	16.00	785.44
					LE05B	7B200	2.00	128.04
					LE10E	74D00	8.00	427.84
					LE11E	7B400	4.00	257.84
					LE12E	7B100	4.00	242.80
					LG03B	79400	4.00	163.92
					LM01E	79400	26.00	1527.24
					LM02E	74D00	2.00	169.10
					LP07E	79200	30.00	1546.50
					LP08E	79700	4.00	241.60
					LR05B	79400	26.00	1386.58
					LT05B	79700	16.00	791.20
					XC00B	7B100	4.00	196.84
					LT07B	79200	8.00	419.28
								15316.66
SS23V85B1	Pit Isolation Design U-106	20	09JAN03	05FEB03	LM02E	74D00	4.00	338.20
					LE11E	7B400	12.00	773.52
					LE04E	74D00	94.00	6545.22
					LE07E	74D00	108.00	7110.72
					LR05B	79400	4.00	213.32
					LT05B	79700	4.00	197.80
					LE12E	7B000	4.00	242.80
					XC00B	7B100	4.00	196.84
								15618.42
SS23V85B2	Isolation Planning U-106	20	06FEB03	06MAR03	LM02E	74D00	1.00	84.55
					LM02E	79400	8.00	676.40
					LG03B	79400	4.00	163.92
					LE11E	7B400	2.00	128.92
					LE05E	7B200	4.00	256.08
					LE10E	74D00	4.00	213.92
					LP07E	72500	16.00	824.80
					LR05B	79400	2.00	106.66
					LM01E	79400	2.00	117.48
					LP08E	79700	4.00	241.60
					LE12E	7B100	4.00	242.80
					LE12E	7B000	2.00	121.40
								3178.53
SS23V85B3	Isolation Stage Equipment U-106	2	07MAR03	10MAR03	LM01E	79400	18.00	1057.32
					LC02B	79200	8.00	418.08
					LC08B	79200	80.00	3927.20
					LR05B	79400	36.00	1919.88
								7322.48

U-106 - Start by 12/29/00 (Now 6/21/00)

IVITY D	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGE COS
SS23V85B4	Isolation Work U-106	15	11MAR03	31MAR03	LE11E	7B400	50.00	3223.0
					44L	79400	1.39	1723.7
					LM01E	79400	125.00	7342.5
					LT05B	79700	125.00	6181.2
					XC00B	7B100	50.00	2460.5
					10L	79400	4.50	5228.3
					44X	65200	5.13	6384.2
					44L	79400	1.00	1240.0
					LC02B	79200	100.00	5226.0
					LC08B	79200	60.00	2945.4
					LR05B	79400	335.00	17865.5
					LT07B	79200	10.00	524.10
					LC00B	79200	90.00	4556.70
								64901.43
SS23V85B5	Isolation Complete Documentation U-106	20	01APR03	28APR03	LM01E	79400	4.00	234.96
					LE04E	74D00	20.00	1392.60
					LE07E	74D00	20.00	1316.80
								2944.36
SS23070N3H	Start IS of 1 SST, U-106	0	29DEC00					
SS23V00A	Tank Prep Tie Point U-106	0	28AUG00					
SS2383010	Prep ECN for Mod or New Cover Plate - U-106	1	26JUN00A	28JUL00A				
SS2383011	Fab & Diagram Mod or New Cover Plate - U-106	1	24JUL00A	11AUG00A				
3012	Prep ECN for New U-D Cover Plate - U-106	1	26JUN00A	28JUL00A				
SS2383013	Fab & Diagram New U-D Cover Plate - U-106	1	27JUL00A	11AUG00A				
SS2383014	Prep ECN for New U-D Flex - U-106	1	10JUL00A	28JUL00A				
SS2383014A	Prep J-10 for U-D Flex U-106	1	10JUL00A	28JUL00A				
SS2383014B	Fab U-D Flex - U-106	1	10JUL00A	11AUG00A				
SS2383015	Plan WP to Install New U-D Flex - U-106	1	17JUL00A	15AUG00A				
SS2383016	Install New U-D Flex - U-106	1	15AUG00A	17AUG00A				
SS2383020	Prep ECN for New Pump Jumper Flex - U-106	1	10JUL00A	10JUL00A				
SS2383021	Fab New Pump Jumper Flex - U-106	1	31JUL00A	07AUG00A				
SS2383030	Fab Strongbacks, Plate, & Dog houses - U-106	1	26JUN00A	18AUG00A				

U-106 - Start by 12/29/00 (Now 6/21/00)

'ITY	DESCRIPTION	ORIG DUR	EARLY START	EARLY FINISH	RESOURCE	PERF ORG	BUDGET QUANTITY	BUDGET COST
S82383031	Plan WP for U-106 OGT Excavation - U-106	1	10JUL00A	21JUL00A				
SS2383032	Excavate U-106 OGT - U-106	1	07AUG00A	09AUG00A				
SS2383035	Plan WP for OGT Install - U-106	1	10JUL00A	15AUG00A				
SS2383036	Install OGT - U-106	1	16AUG00A	20AUG00A				
SS2383037	Plan WP for Heat Trace Power - U-106	1	17JUL00A	11AUG00A				
SS2383038	Install Heat Trace Power - U-106	1	11AUG00A	22AUG00A				
								1841360.34
								1841360.34

bklages

From: Kevin Ard [keard@mceng.com]
Sent: Thursday, September 07, 2000 1:41 PM
To: Barb Klages
Subject: FW: S-103 cost estimate

Kevin Ard
Mid Columbia Engineering
943-6706, Ext. 224

-----Original Message-----
From: Boes, Kirk [mailto:boesk@hninc.com]
Sent: Thursday, September 07, 2000 1:35 PM
To: 'keard@MCEng.com'
Subject: S-103 cost estimate

Kevin:

Please include a small allowance ($5K) in the Hot Operations cost element for purchasing chemical buffering agents (used to neutralize the waste before sending it to the DST). Thanks.

Kirk

Table C-1. Estimated Levels Of Effort For Environmental Actions and Tasks to Support The Tank 241-S-103 Waste Retrieval System

Environmental Actions and Tasks	Estimated Level of Effort		
	Labor	Other Cost	Duration
National Environmental Policy Act			
Review/Approve Adequacy of Existing NEPA Documentation (Assume 1 review)	40 hours	—	1 month
Ecological Compliance Review			
Confirm/Document Coverage by Blanket Biological Review	6 hours	—	½ month
Define/Document Work Outside of Blanket Biological Review Areas	12 hours	—	½ month
Hanford Site Air Operating Permit			
Request/Support Minor Modification of AOP (Assume 1 Modifications)	60 hours	—	2 months
Radioactive Air Emissions, WDOH			
Prepare/Submit NOC; Support WDOH Approval (Assume 1 NOC)	650 hours	$2,000	6 months
Radioactive Air Emissions, EPA			
Prepare/Submit NOC; Support EPA Approval (Assume 1 NOC)	60 hours	—	2 months
Nonradioactive Air Emissions, Ecology			
Prepare PSD/NSR; Request/Document Ecology Concurrence	120 hours	—	2 months
Prepare/Submit NOC; Support Ecology Approval (Assume 1 NOC)	650 hours	$2,000	8 months
Water and Waste Water Management			
Review/Approve Drinking Water Supply System Changes (Assume 1 Review)	60 hours	—	3 months
Review/Include SWDP Conditions in Wastewater Disposal Procedures (Assume 1 Review)	60 hours	—	3 months
Dangerous Waste Final Status Permit			
Request/Support Class 1 Prime Permit Modification (Assume 1 Modification)	200 hours	$1,000	2 months
Environmental Compliance and Readiness Support			
Perform Update of Environmental Plan (Assume 2 Updates) (Moderately Complex)	160 hours	—	2 months
Provide Guidance/Issue Resolution During Conceptual Design	5 hours per week	—	*
Provide Guidance/Issue Resolution During Definitive Design	5 hours per week	—	*
Review Work Packages/ECNs During Construction	5 hours per week	—	*
Support Onsite Inspections During Construction	3 hours per week	—	*
Support Readiness Assessment/Operational Readiness Review	3 hours per week	—	*
Provide Interpretation/Issue Resolution During Operational Startup	3 hours per week	—	*

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• Depends on projection duration

AOP	= Air operating permit
Ecology	= Washington State Department of Ecology
ECN	= engineering change notice
EPA	= U.S. Environmental Protection Agency
NEPA	= *National Environmental Policy Act of 1969*
NOC	= notice of construction
NSR	= new source review
PSD	= prevention of significant deterioration
SWDP	= State Waste Discharge Permit
WDOH	= Washington State Department of Health

Notes:

Estimates are provided for initial planning purposes only. The estimates should be treated as approximations that must be refined further for detailed project- and activity-specific planning.

All labor estimates are provided in hours unless indicated otherwise. Labor estimates account for all staff time, including professional and administrative.

The hours/costs/duration are "per action or task"; total project effort would actually be each labor/cost estimate times the number of occurrences assumed for each action/task.

Other costs indicate estimated expenses for significant support that might need to be purchased to accomplish the particular task (e.g., facilities, equipment, materials, printing, travel, laboratory, and subcontractors).

From: Boes, Kirk [boesk@hninc.com]
Sent: Monday, August 07, 2000 5:26 AM
To: keard@MCEng.com
Subject: FW: Path Forward on Deentrainer Issue

-----Original Message-----
From: Scott R. Pierce [mailto:spierce@arescorporation.com]
Sent: Friday, August 04, 2000 1:45 PM
To: Boes, Kirk
Subject: Path Forward on Deentrainer Issue

Kirk,

Please forward this to Kevin.

I just sent Will my write-up on the deentrainer issue. In a nutshell -- the preconceptual design does not include a deentrainer -- our system should not need one -- however, the deentrainer issue should be reassessed at the conceptual design stage.

While we need not factor the deentrainer into our cost estimate; we should factor it into the contingency analysis (just in case, the need for a deentrainer surfaces at a later date). Please keep the following in mind as you develop the contingency analysis.

Estimated Cost of adding a Deentrainer:

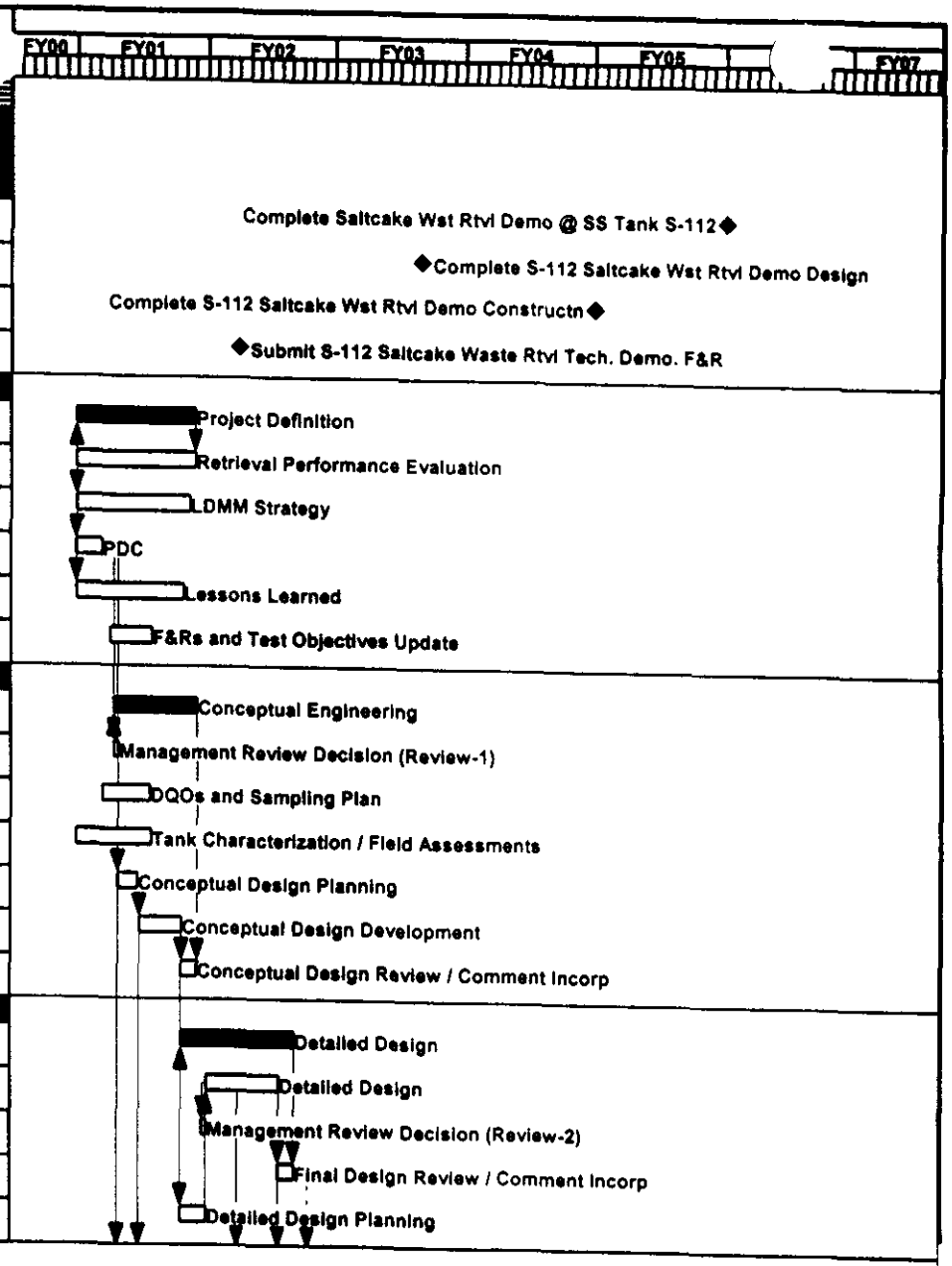
Materials:	$10,000	(rough estimate for deentrainer, piping, support pad, etc.)
Labor:	$50,000	(my swag)
Engineering:	$15,000	(30% of labor)
Total:	$75,000	

Dollars are raw costs; they do not include multipliers, adders, etc.

Scott Pierce

P.S., In case you haven't heard, the other issue -- the lack of electrical power for the vent system -- went away. The drawings Barb was using were in error. We have more than enough power to run the existing ventilation system.

Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
1 01 03 01 02 03 SST Retrieval Systems Demonstrations				
1 01 03 01 02 03 04 Saltcake Dissolution Retrieval Demonstrations				
1 01 03 01 02 03 04 00 TPA MILESTONES				
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1 01 03 01 02 03 04 01 Project Definition				
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1 01 03 01 02 03 04 02 Conceptual Engineering				
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
1 01 03 01 02 03 04 03 Detailed Design				
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 09:56

Early Bar
Progress Bar
Critical Activity

S-112 Saltcake Dissolution
Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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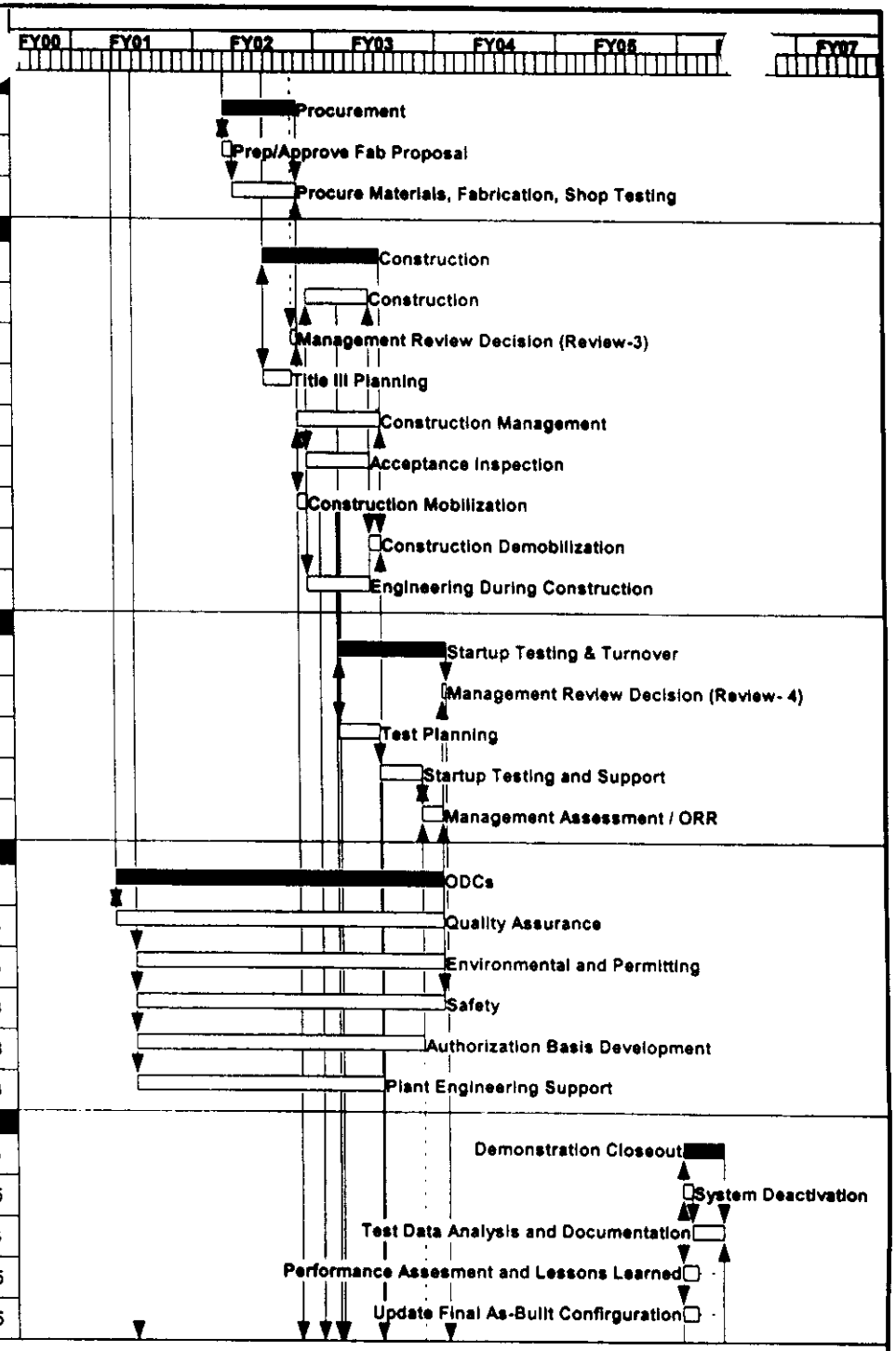
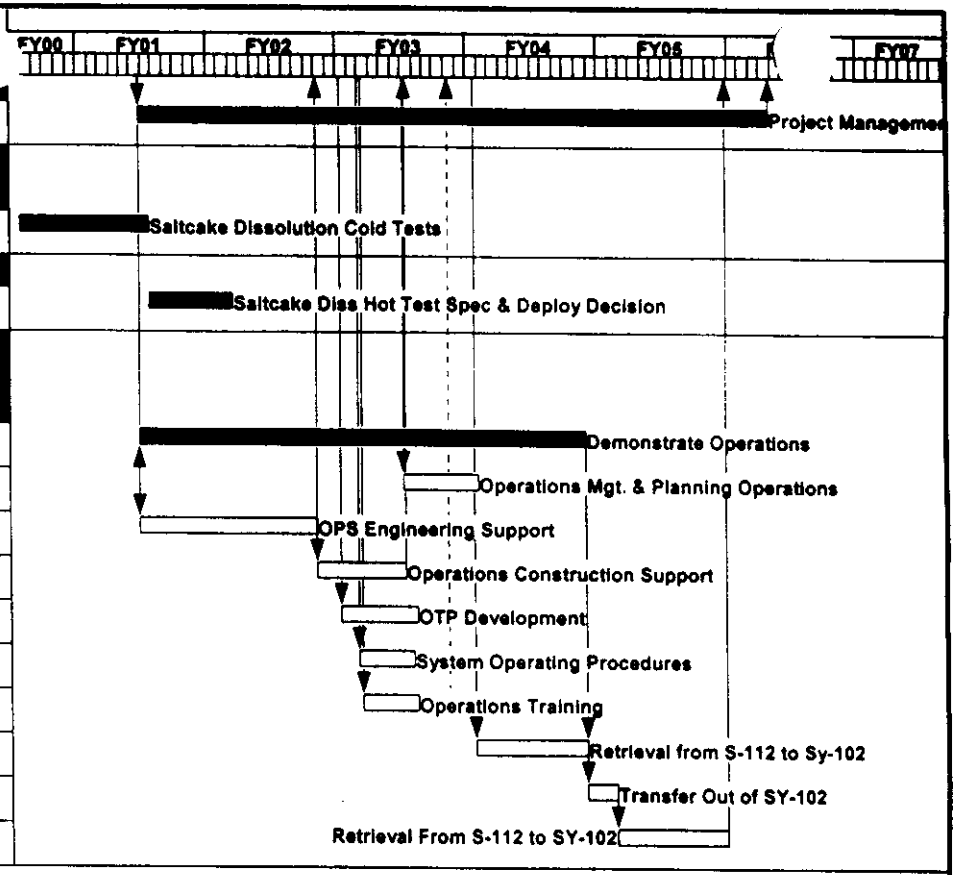
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1 01 04 01 02 03 04 04 Procurement				
44A	Procurement	151*	31DEC01	02AUG02
44A0100	Prep/Approve Fab Proposal	21	31DEC01	29JAN02
44A0200	Procure Materials, Fabrication, Shop Testing	130	30JAN02	02AUG02
1 01 04 01 02 03 04 05 Construction				
45A	Construction	241*	24APR02	08APR03
45A0000	Construction	127	04SEP02	07MAR03
45A0010	Management Review Decision (Review-3)	11	19JUL02	02AUG02
45A0020	Title III Planning	60	24APR02	18JUL02
45A0100	Construction Management	170*	05AUG02	08APR03
45A0200	Acceptance Inspection	127*	04SEP02	07MAR03
45A0300	Construction Mobilization	21	05AUG02	03SEP02
45A1000	Construction Demobilization	22	10MAR03	08APR03
45A1100	Engineering During Construction	127*	04SEP02	07MAR03
1 01 04 01 02 03 04 06 Startup Testing and Turnover				
46A	Startup Testing & Turnover	223*	05DEC02	22OCT03
46A0010	Management Review Decision (Review- 4)	7	14OCT03	22OCT03
46A0200	Test Planning	84	05DEC02	07APR03
46A0300	Startup Testing and Support	90	08APR03	13AUG03
46A0400	Management Assessment / ORR	42	14AUG03	13OCT03
1 01 04 01 02 03 04 07 Other Project Costs				
47A	ODCs	686*	25JAN01	13OCT03
47A0100	Quality Assurance	686*	25JAN01	13OCT03
47A0200	Environmental and Permitting	645*	26MAR01	13OCT03
47A0300	Safety	645*	26MAR01	13OCT03
47A0400	Authorization Basis Development	603*	26MAR01	13AUG03
47A0500	Plant Engineering Support	514*	26MAR01	08APR03
1 01 04 01 02 03 04 08 Demonstration Closeout				
48A	Demonstration Closeout	80*	30SEP05	26JAN06
48A0100	System Deactivation	20	30SEP05	27OCT05
48A0200	Test Data Analysis and Documentation	60	28OCT05	26JAN06
48A0300	Performance Assesment and Lessons Learned	30	30SEP05	10NOV05
48A0400	Update Final As-Built Confirguration	30	30SEP05	10NOV05

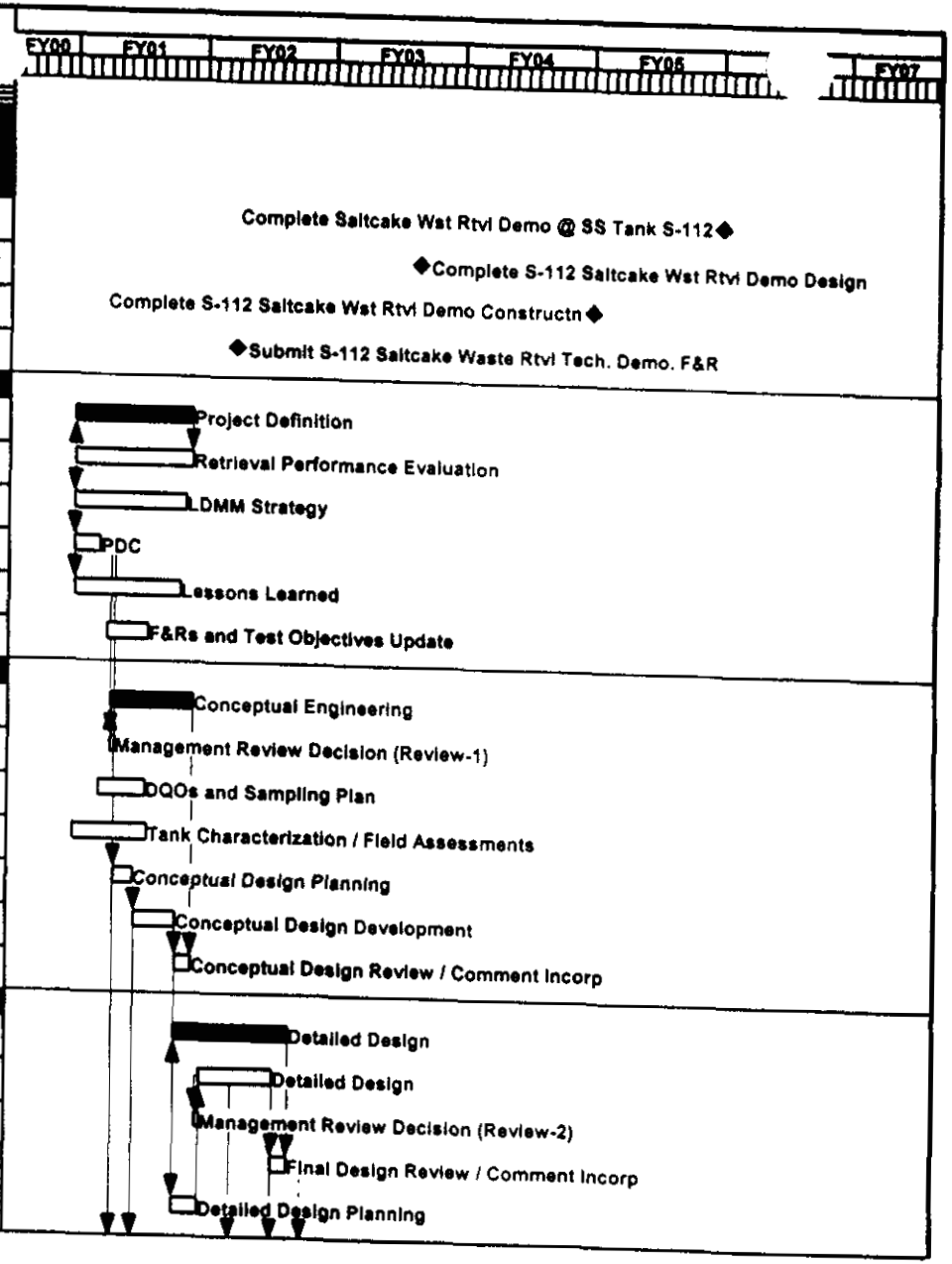


Sheet 2 of 3

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
[illegible] 04 09 Project Management				
40A0000	Project Management	1,220*	26MAR01	26JAN06
[illegible] 01 02 05				
[illegible] 01 02 05 07 Saltcake Dissolution Cold Tests				
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
[illegible] 01 02 05 03 Saltcake Diss Hot Test Spec & Deploy Decision				
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
[illegible] 01 02 09 Phase 1 SST Operations				
[illegible] 01 02 09 05				
[illegible] 01 02 09 05 07 S-103 Demonstration Operations				
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
	1 C2 03 SST Retrieval Systems Demonstrations			
	Saltcake Dissolution Retrieval Demonstrations			
	01 02 03 04 00 TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
	01 04 01 02 03 04 01 Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
	01 04 01 02 03 04 02 Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
	01 04 01 02 03 04 03 Detailed Design			
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 10:02

Early Bar
Progress Bar
Critical Activity

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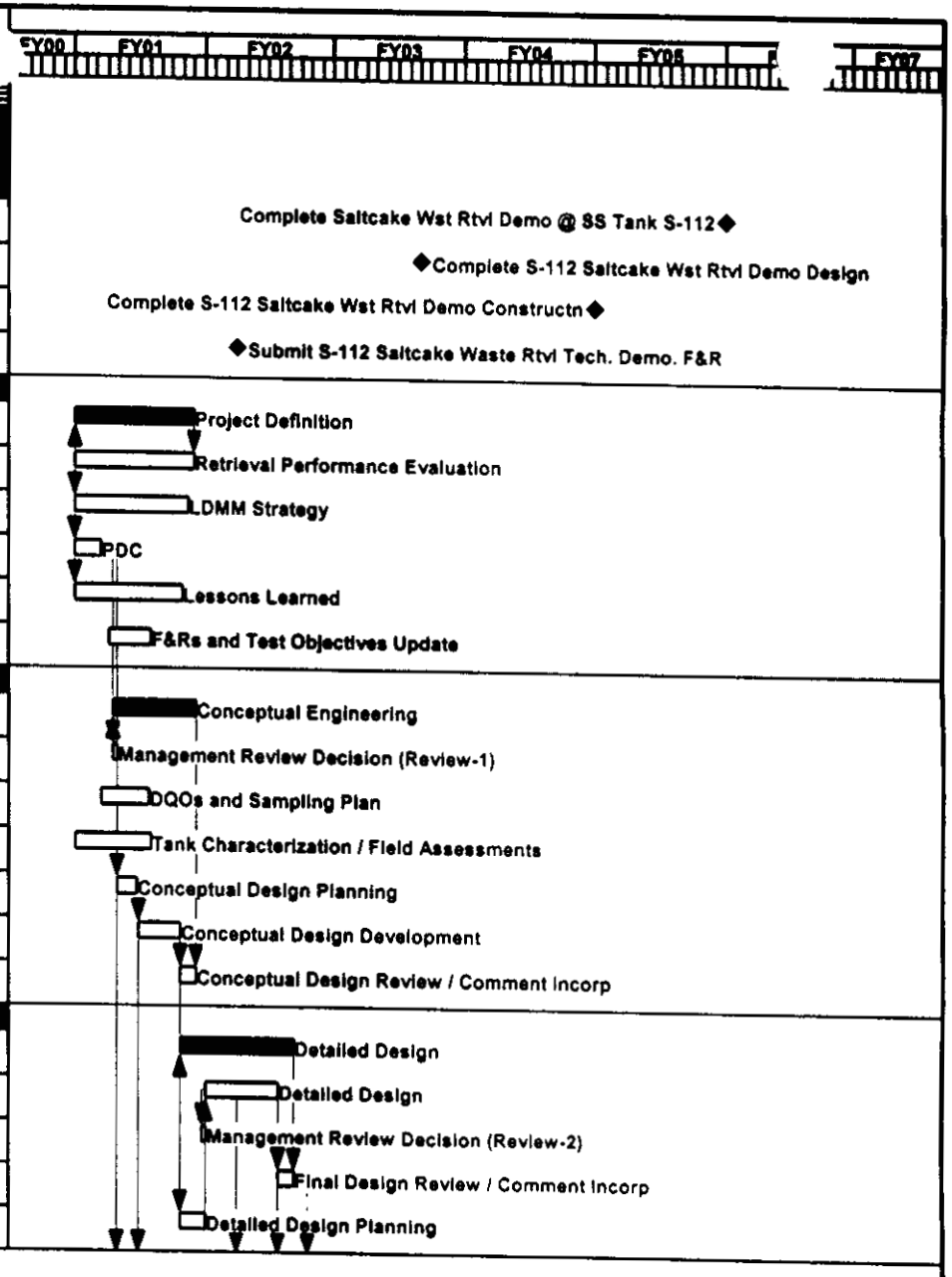
S-112 Saltcake Dissolution
Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1 02 03	SST Retrieval Systems Demonstrations			
1 02 03 04	Saltcake Dissolution Retrieval Demonstrations			
1 02 03 04 00	TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M46-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1 02 03 04 01	Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1 02 03 04 02	Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
1 02 03 04 03	Detailed Design			
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 10:02

Early Bar
Progress Bar
Critical Activity

S-112 Saltcake Dissolution
Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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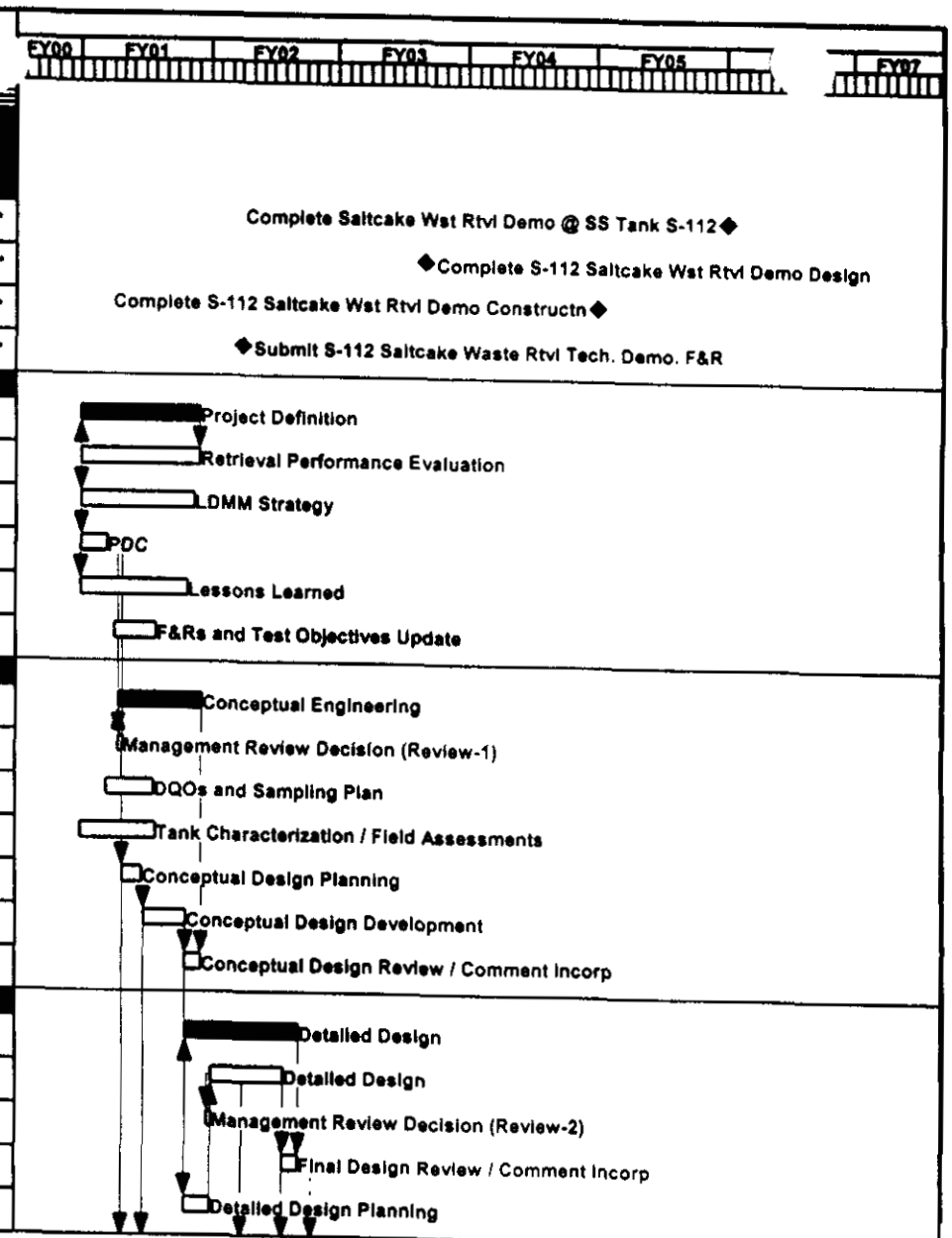
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.01.02.03 SST Retrieval Systems Demonstrations				
1.01.04.01.02.03.04 Saltcake Dissolution Retrieval Demonstrations				
1.01.04.01.02.03.04.00 TPA MILESTONES				
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1.01.04.01.02.03.04.01 Project Definition				
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1.01.04.01.02.03.04.02 Conceptual Engineering				
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	148*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
1.01.04.01.02.03.04.03 Detailed Design				
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 10:02

Early Bar
Progress Bar
Critical Activity

S-112 Saltcake Dissolution
Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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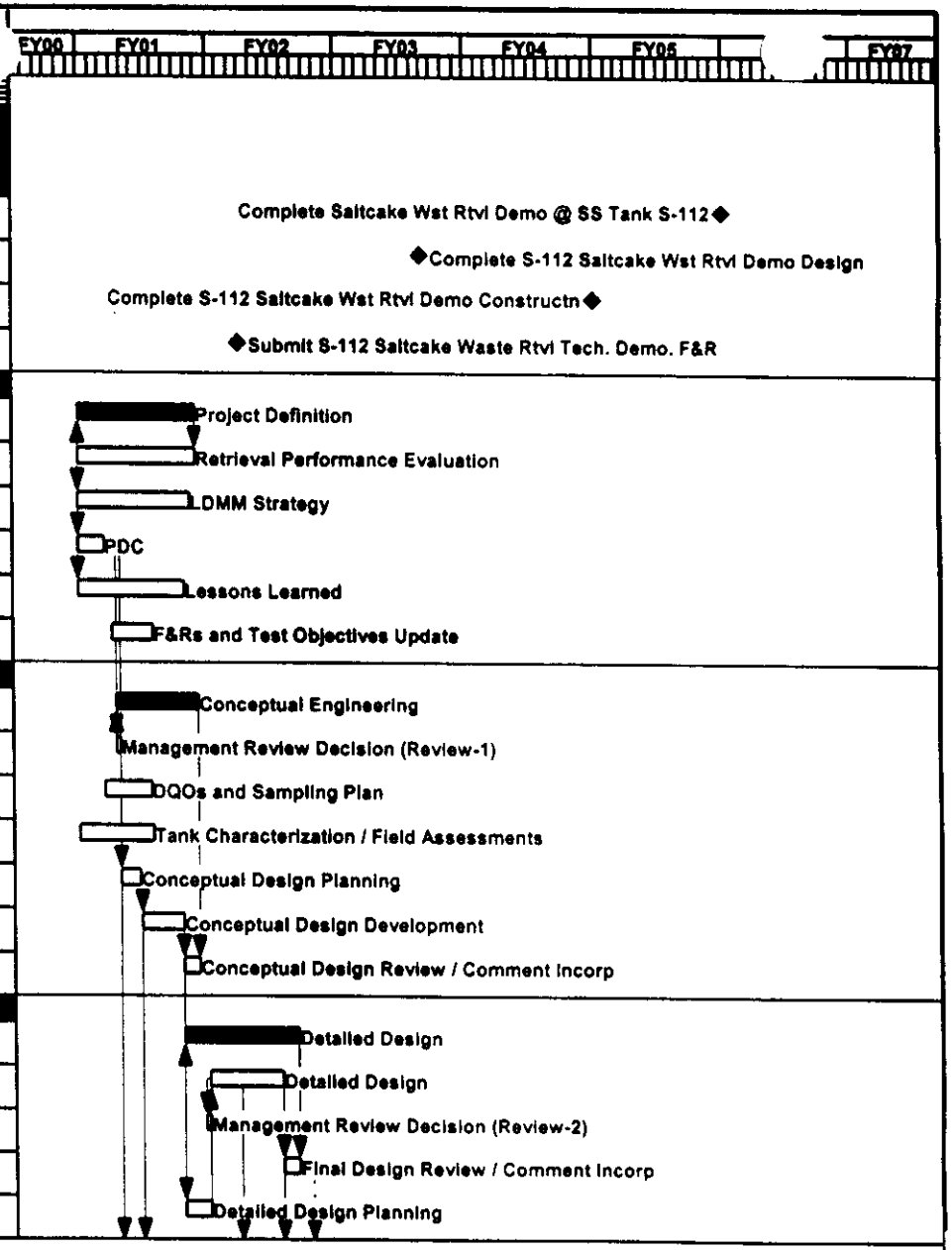
Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
1.1.4.01.02.03 SST Retrieval Systems Demonstrations				
1.1.4.01.02.03.04 Saltcake Dissolution Retrieval Demonstrations				
1.1.4.01.02.03.04.00 TPA MILESTONES				
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1.1.4.01.02.03.04.01 Project Definition				
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1.1.4.01.02.03.04.02 Conceptual Engineering				
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
1.1.4.01.02.03.04.03 Detailed Design				
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 10:02

Early Bar
Progress Bar
Critical Activity

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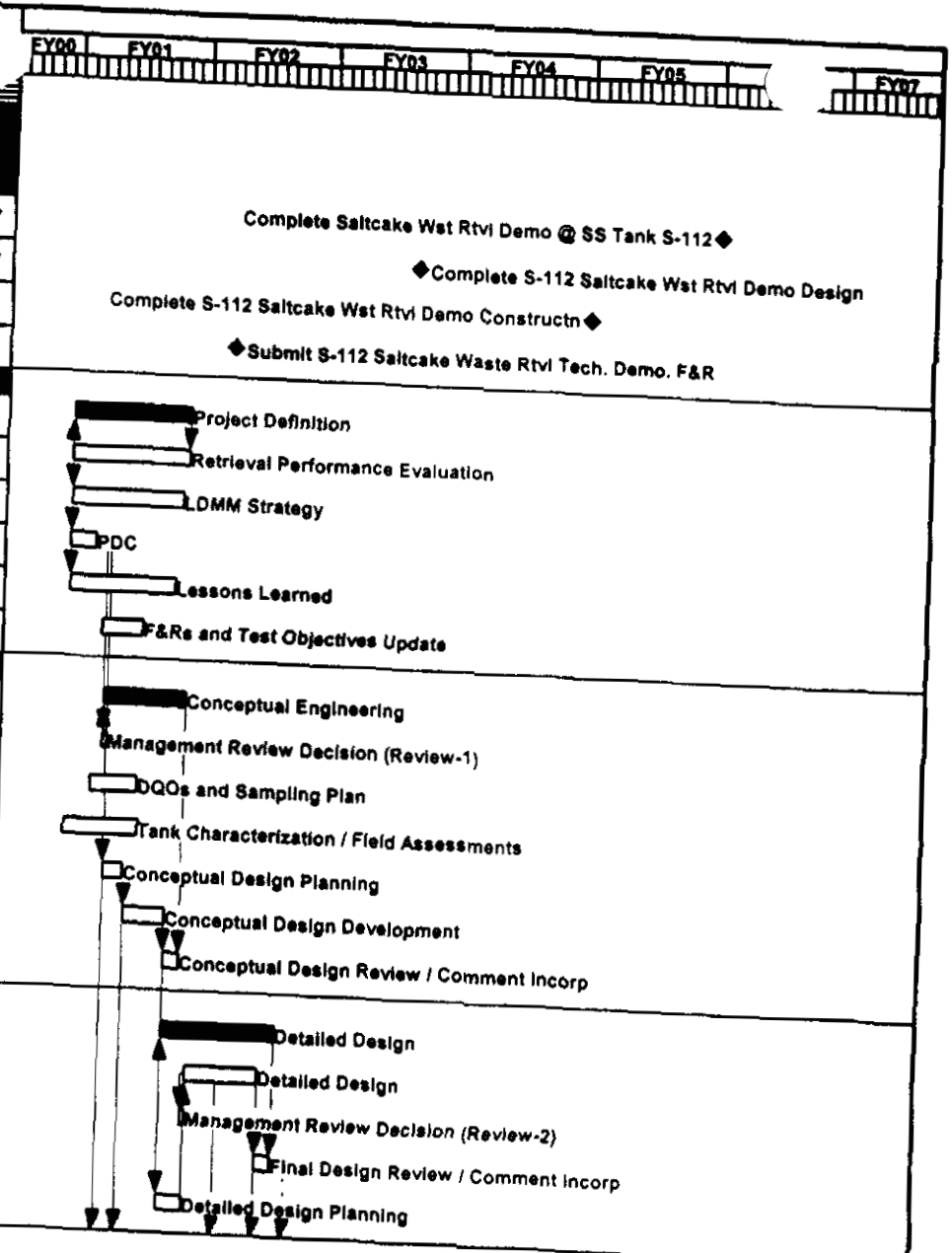
S-112 Saltcake Dissolution
Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
	SST Retrieval Systems Demonstrations			
	Saltcake Dissolution Retrieval Demonstrations			
	TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
	Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
	Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
	Detailed Design			
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
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S-112 Saltcake Dissolution Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
1 01 04 01 02 03 SST Retrieval Systems Demonstrations				
1 01 04 01 02 03 04 Saltcake Dissolution Retrieval Demonstrations				
1 01 04 01 02 03 04 00 TPA MILESTONES				
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1 01 04 01 02 03 04 01 Project Definition				
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1 01 04 01 02 03 04 02 Conceptual Engineering				
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
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42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
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43A0000	Detailed Design	140	02OCT01	23APR02
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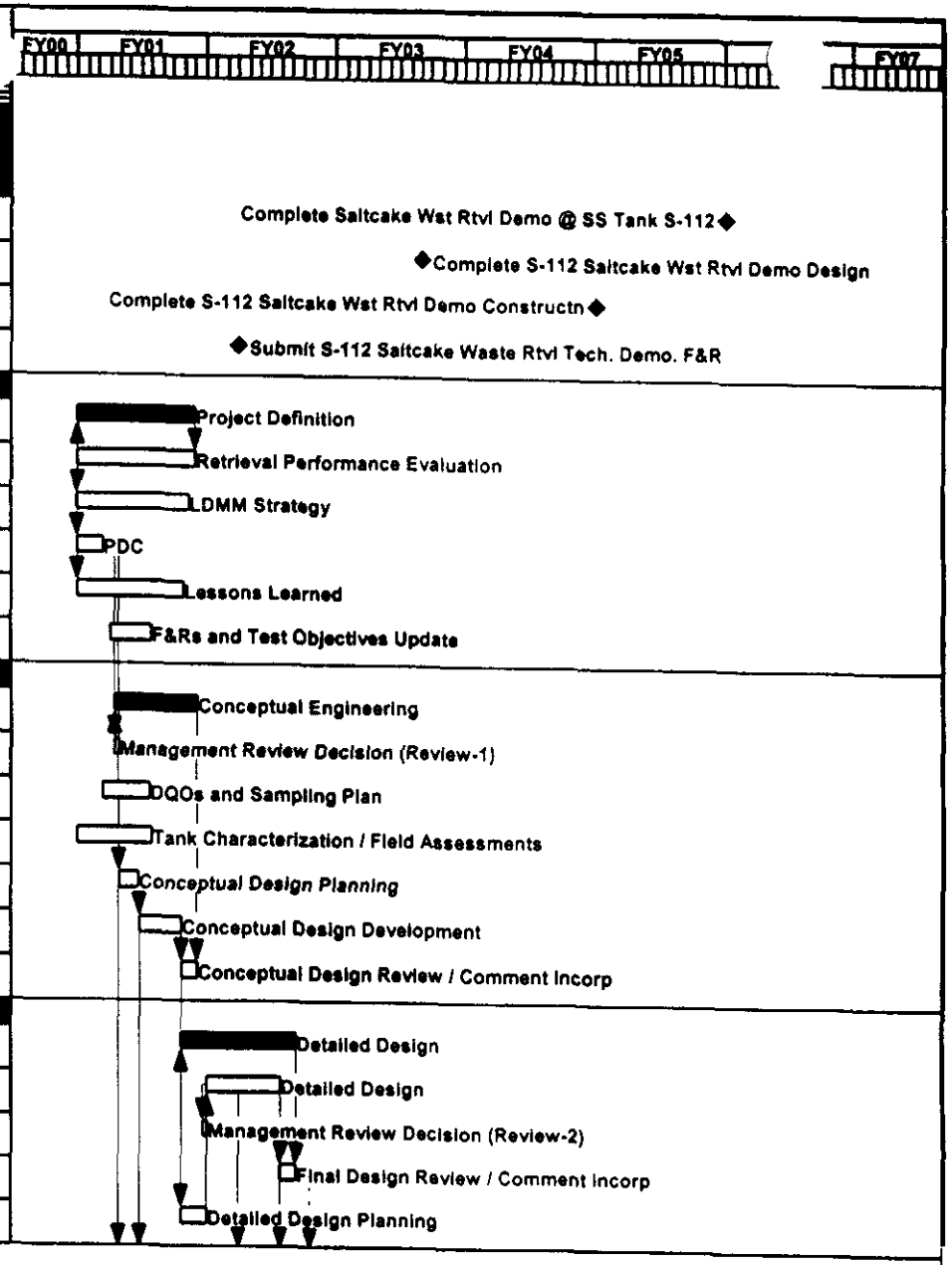

Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 10:02

Early Bar
Progress Bar
Critical Activity

S-112 Saltcake Dissolution Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.01.02.03	SST Retrieval Systems Demonstrations			
1.01.04.01.02.03.04	Saltcake Dissolution Retrieval Demonstrations			
1.01.04.01.02.03.04.00	TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1.01.04.01.02.03.04.01	Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1.01.04.01.02.03.04.02	Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
1.01.04.01.02.03.04.03	Detailed Design			
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
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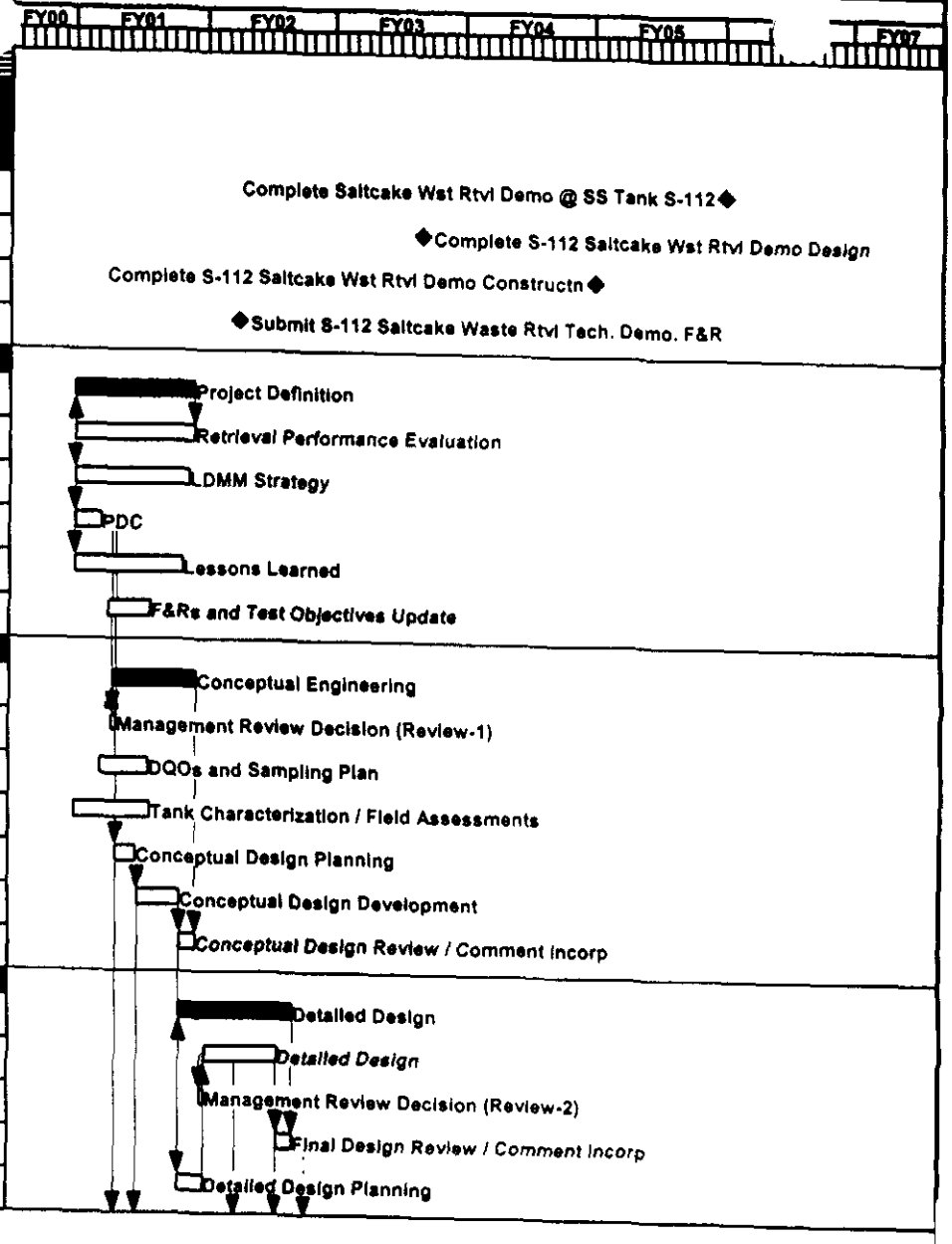

Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 10:02

Early Bar
Progress Bar
Critical Activity

S-112 Saltcake Dissolution Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
	01 02 03 SST Retrieval Systems Demonstrations			
	01 02 03 04 Saltcake Dissolution Retrieval Demonstrations			
	01 02 03 04 00 TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
	01 02 03 04 01 Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
	01 02 03 04 02 Conceptual Engineering			
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42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
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43A0000	Detailed Design	140	02OCT01	23APR02
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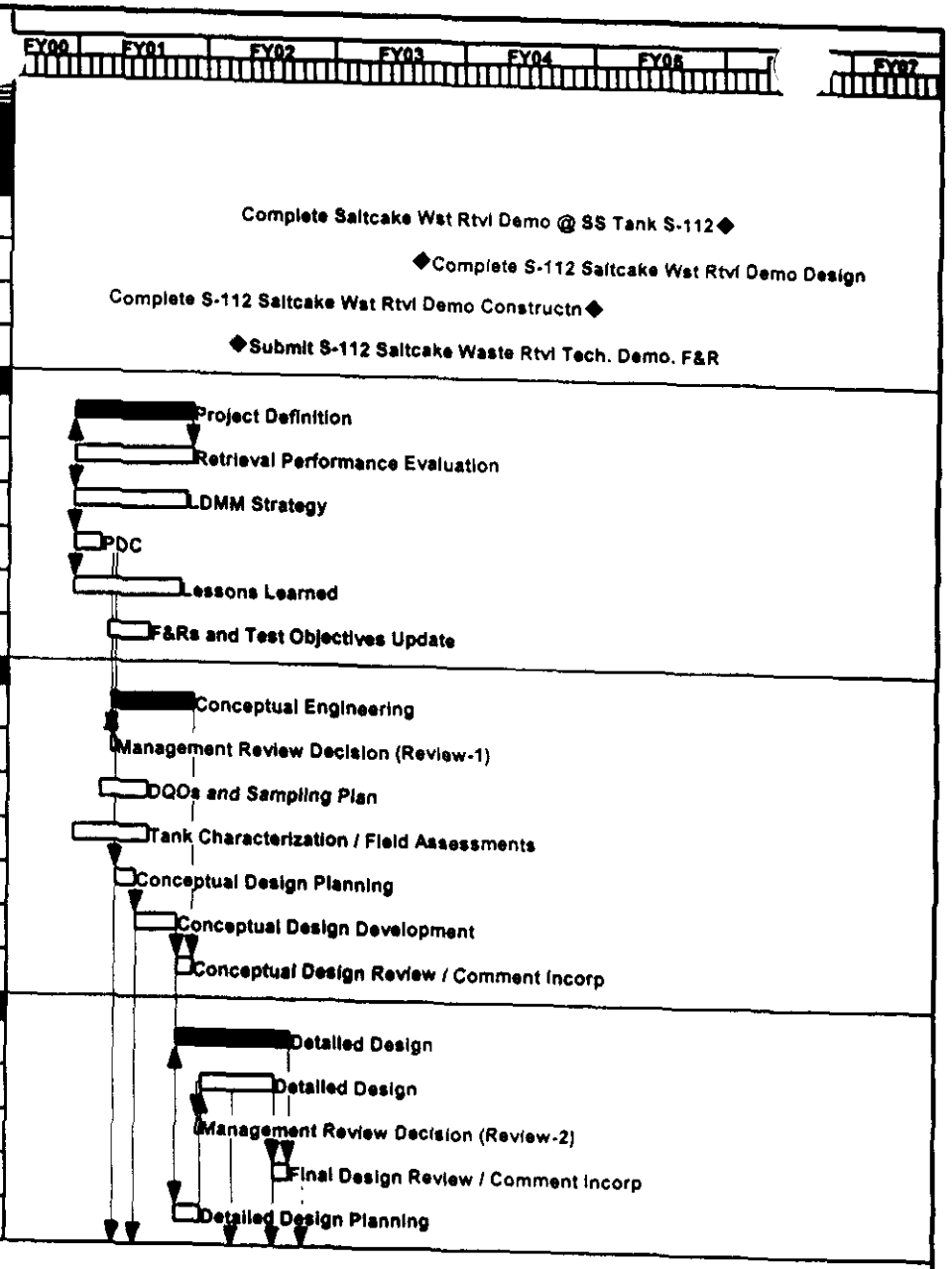

Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 10:02

Early Bar
Progress Bar
Critical Activity

S-112 Saltcake Dissolution
Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.01.02.03	SST Retrieval Systems Demonstrations			
1.01.04.01.02.03.04	Saltcake Dissolution Retrieval Demonstrations			
1.01.04.01.02.03.04.00	TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1.01.04.01.02.03.04.01	Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1.01.04.01.02.03.04.02	Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
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43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
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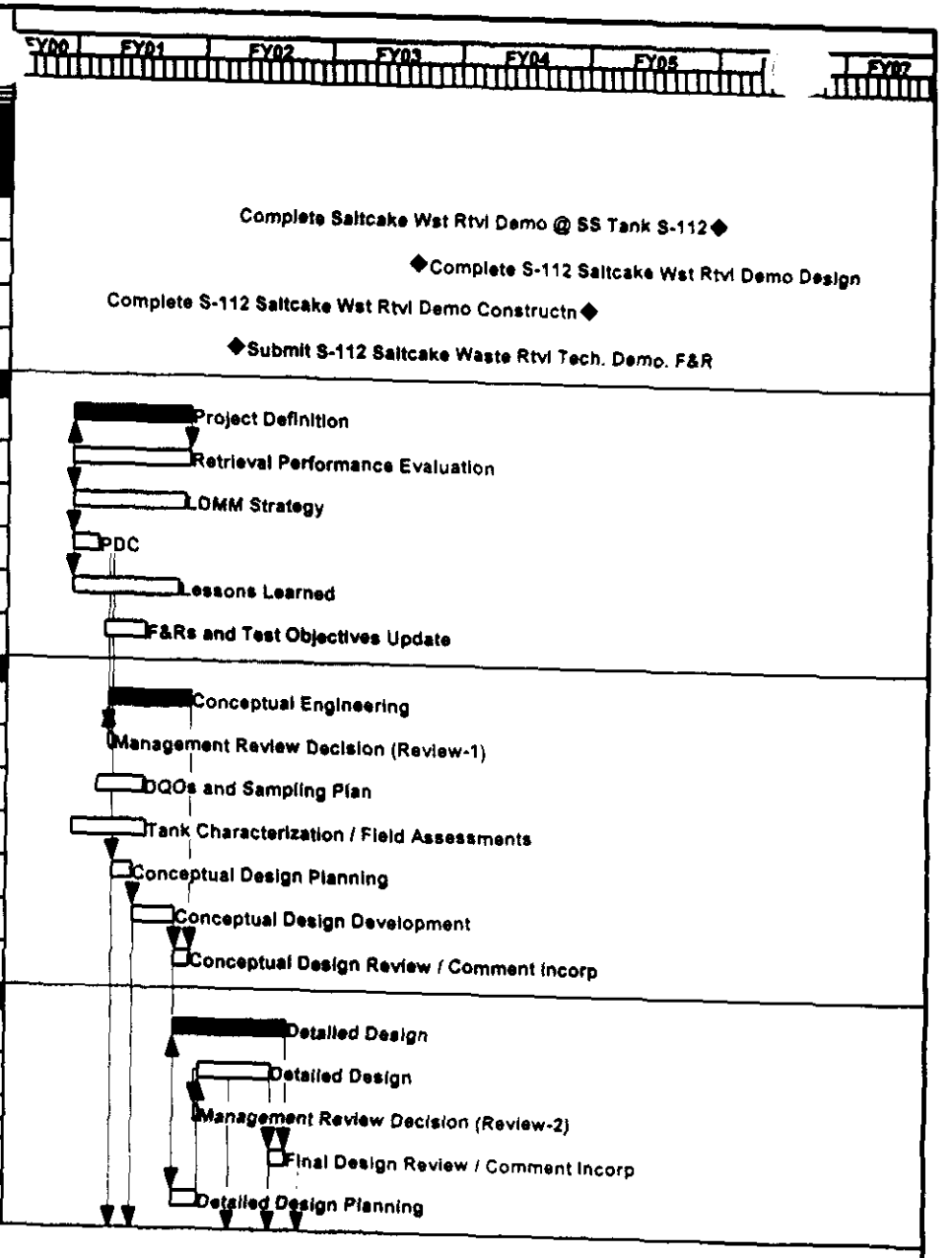

Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 10:02

Early Bar
Progress Bar
Critical Activity

S-112 Saltcake Dissolution Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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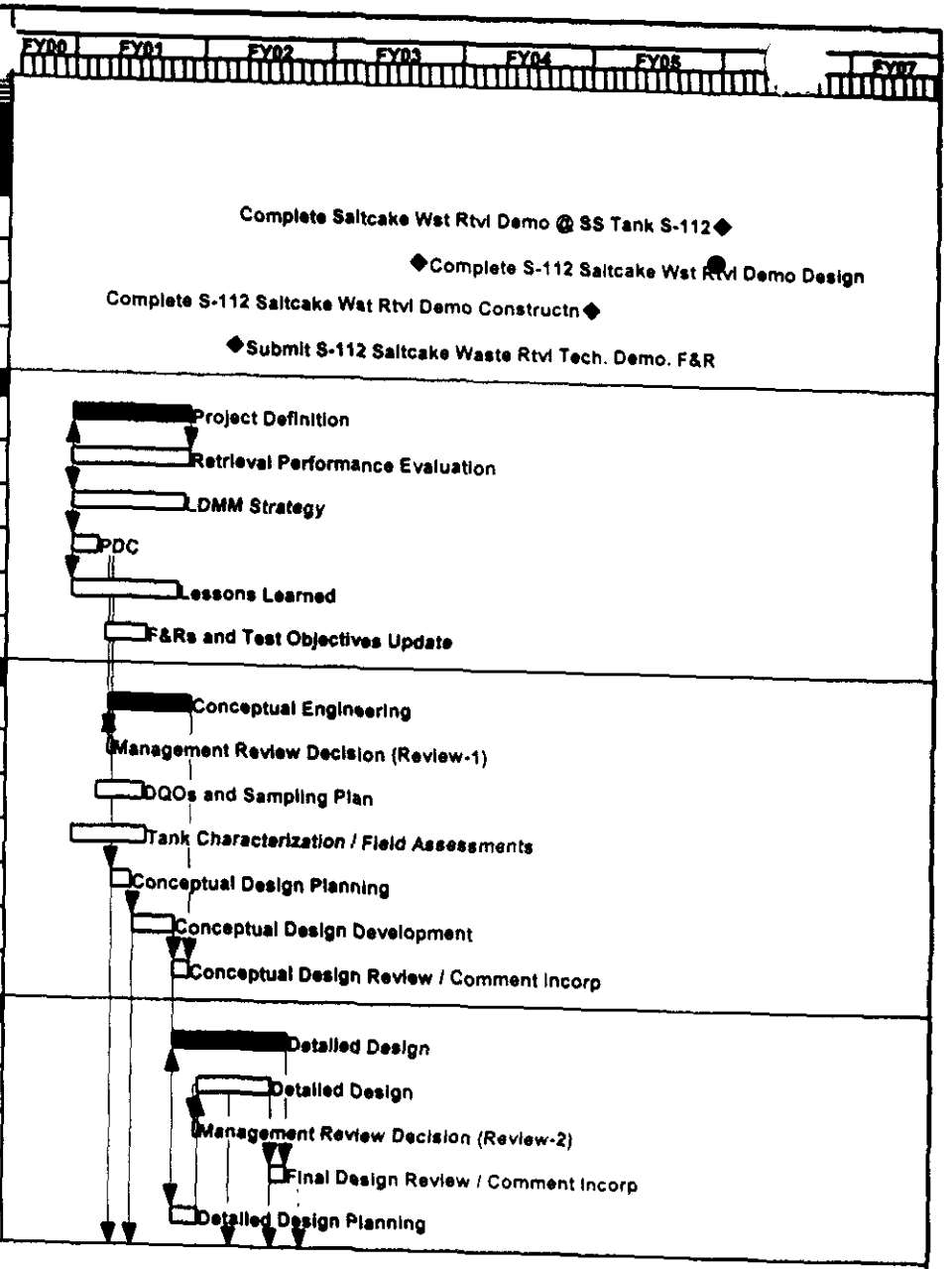
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.01.02.03	SST Retrieval Systems Demonstrations			
1.01.04.01.02.03.04	Saltcake Dissolution Retrieval Demonstrations			
1.01.04.01.02.03.04.00	TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1.01.04.01.02.03.04.01	Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1.01.04.01.02.03.04.02	Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	148*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
1.01.04.01.02.03.04.03	Detailed Design			
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
Run Date	29JAN01 10:02

Early Bar
Progress Bar
Critical Activity

S-112 Saltcake Dissolution
Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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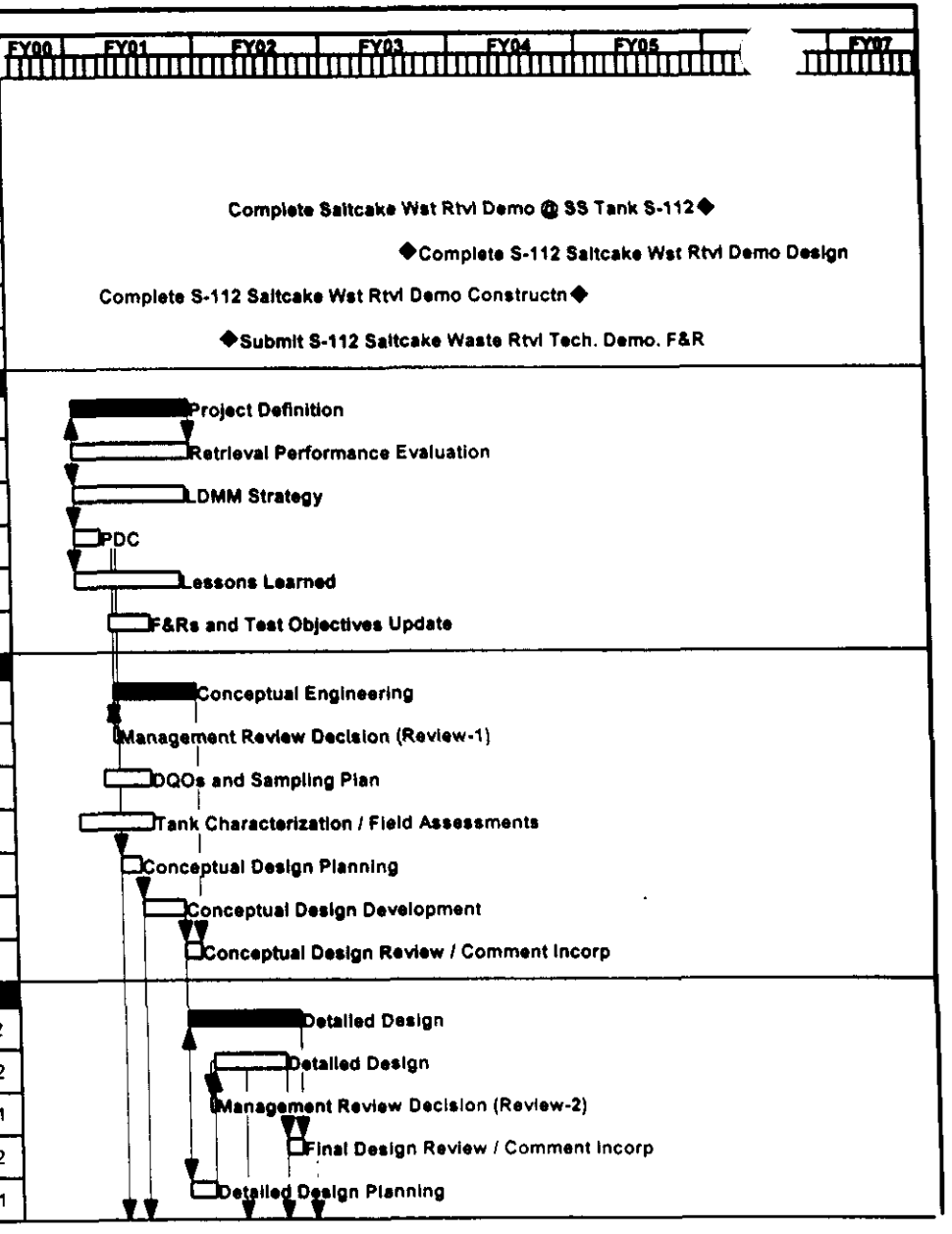
Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
	SST Retrieval Systems Demonstrations			
	Saltcake Dissolution Retrieval Demonstrations			
	TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
	Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
	Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
	Detailed Design			
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99	Early Bar
Finish Date	26JAN06	Progress Bar
Data Date	01MAY00	Critical Activity
Run Date	29JAN01 10:02	

S-112 Saltcake Dissolution Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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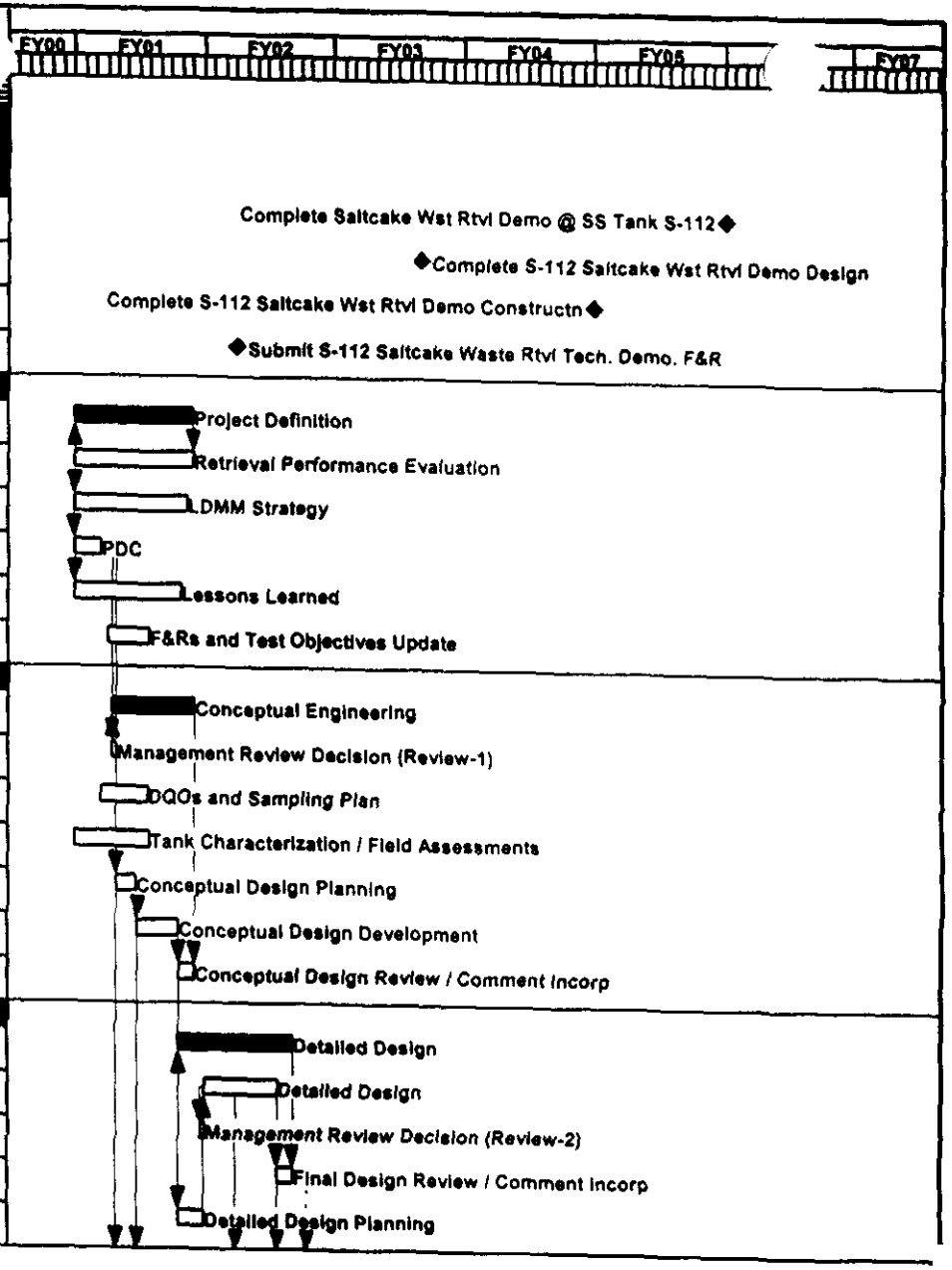
Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
	SST Retrieval Systems Demonstrations			
	Saltcake Dissolution Retrieval Demonstrations			
	TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
	Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
	Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
	Detailed Design			
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
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Early Bar
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S-112 Saltcake Dissolution Retrieval Demonstration
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Date	Revision	Checked	Approved

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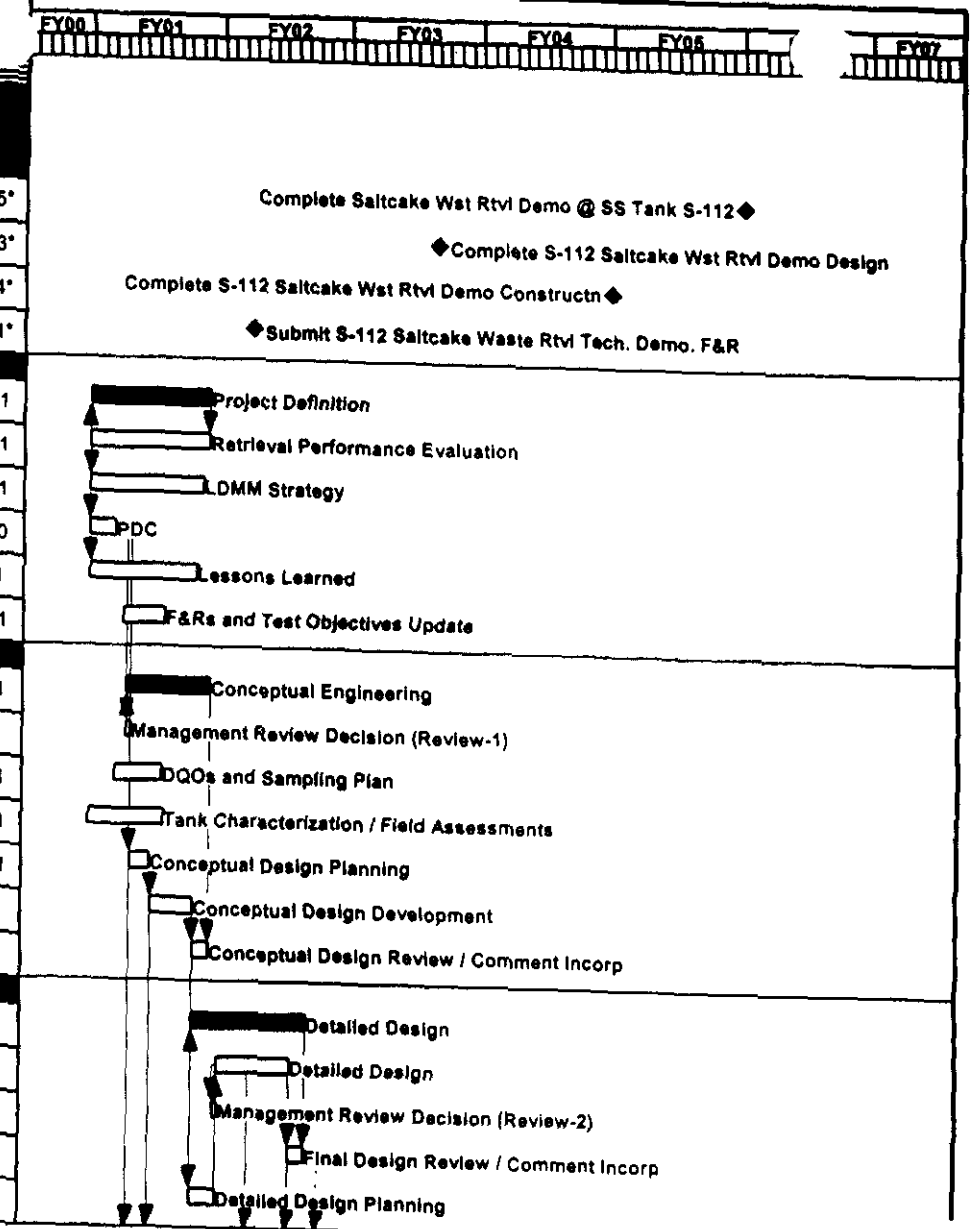
Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
	SST Retrieval Systems Demonstrations			
	Saltcake Dissolution Retrieval Demonstrations			
	TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
	Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
	Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
	Detailed Design			
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99	Early Bar	
Finish Date	26JAN06	Progress Bar	
Data Date	01MAY00	Critical Activity	
Run Date	29JAN01 10:02		

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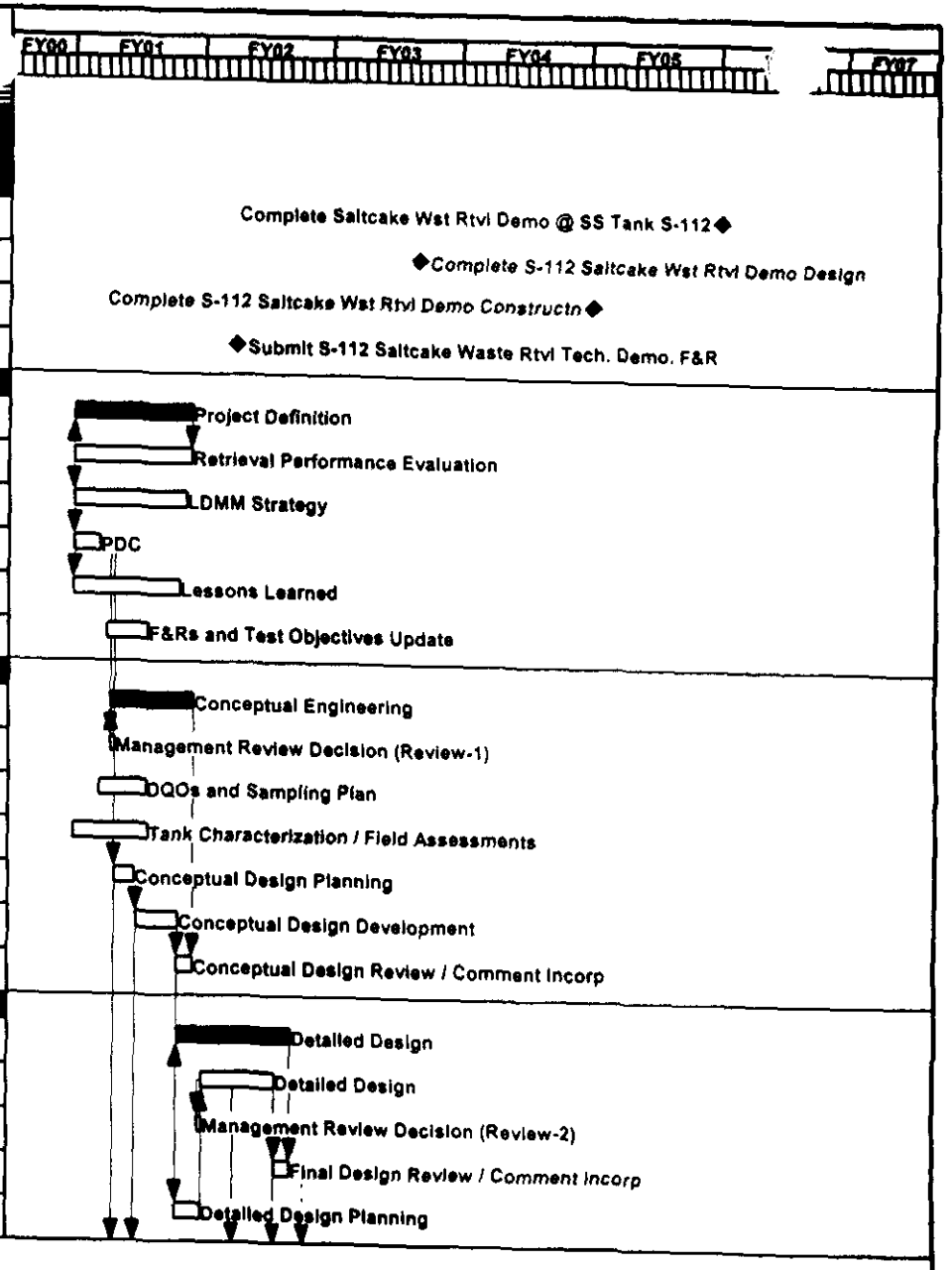
S-112 Saltcake Dissolution
Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1 01 04 01 02 03 SST Retrieval Systems Demonstrations				
1 01 04 01 02 03 04 Saltcake Dissolution Retrieval Demonstrations				
1 01 04 01 02 03 04 00 TPA MILESTONES				
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1 01 04 01 02 03 04 01 Project Definition				
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1 01 04 01 02 03 04 02 Conceptual Engineering				
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
1 01 04 01 02 03 04 03 Detailed Design				
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
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Run Date	29JAN01 10:02

Early Bar
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S-112 Saltcake Dissolution
Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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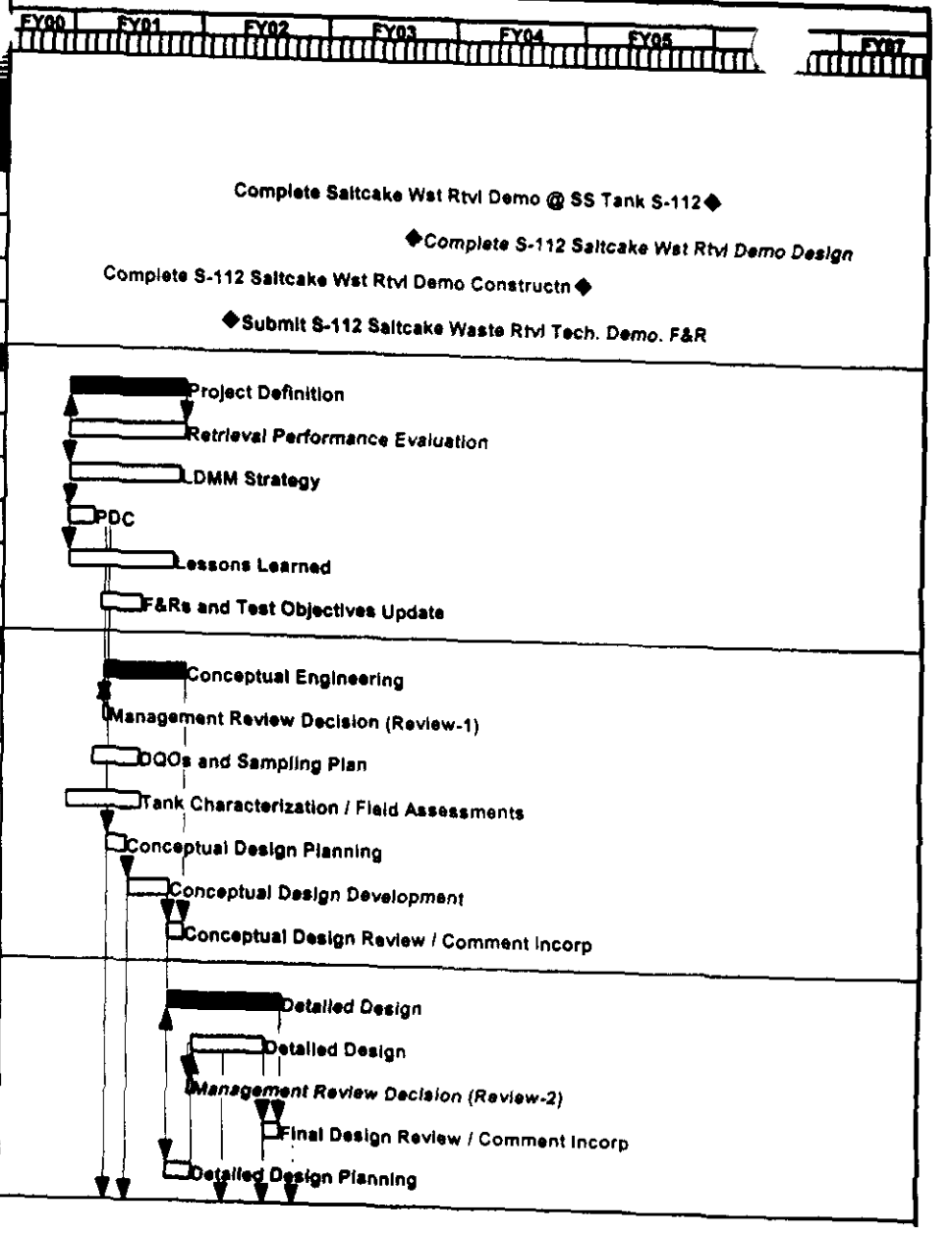
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1 01 02 03	SST Retrieval Systems Demonstrations			
1 01 02 03 04	Saltcake Dissolution Retrieval Demonstrations			
1 01 04 01 02 03 04 00	TPA MILESTONES			
M-45-03C	Complete Saltcake Wst Rtvl Demo @ SS Tank S-112	0		30SEP05*
M-45-03D	Complete S-112 Saltcake Wst Rtvl Demo Design	0		30MAY03*
M-45-03E	Complete S-112 Saltcake Wst Rtvl Demo Constructn	0		30SEP04*
M45-03-T03	Submit S-112 Saltcake Waste Rtvl Tech. Demo. F&R	0		28DEC01*
1 01 04 01 02 03 04 01	Project Definition			
41A	Project Definition	232*	02OCT00	31AUG01
41A0200	Retrieval Performance Evaluation	232	02OCT00*	31AUG01
41A0300	LDMM Strategy	220	02OCT00	15AUG01
41A0400	PDC	52	02OCT00	14DEC00
41A0500	Lessons Learned	208	02OCT00	30JUL01
41A10	F&Rs and Test Objectives Update	85	02JAN01*	01MAY01
1 01 04 01 02 03 04 02	Conceptual Engineering			
42A	Conceptual Engineering	164*	16JAN01	06SEP01
42A0010	Management Review Decision (Review-1)	7	16JAN01	24JAN01
42A0200	DQOs and Sampling Plan	90	15DEC00*	25APR01
42A0300	Tank Characterization / Field Assessments	146*	02OCT00	01MAY01
42A0400	Conceptual Design Planning	41	25JAN01*	23MAR01
42A0500	Conceptual Design Development	83	26MAR01	20JUL01
42A0510	Conceptual Design Review / Comment Incorp	33	23JUL01	06SEP01
1 01 04 01 02 03 04 03	Detailed Design			
43A	Detailed Design	222*	23JUL01	07JUN02
43A0000	Detailed Design	140	02OCT01	23APR02
43A0010	Management Review Decision (Review-2)	7	21SEP01*	01OCT01
43A0020	Final Design Review / Comment Incorp	32	24APR02	07JUN02
43A0100	Detailed Design Planning	50	23JUL01	01OCT01



Start Date	01OCT99
Finish Date	26JAN06
Data Date	01MAY00
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Early Bar
Progress Bar
Critical Activity

S-112 Saltcake Dissolution Retrieval Demonstration
Holmes & Narver

Date	Revision	Checked	Approved

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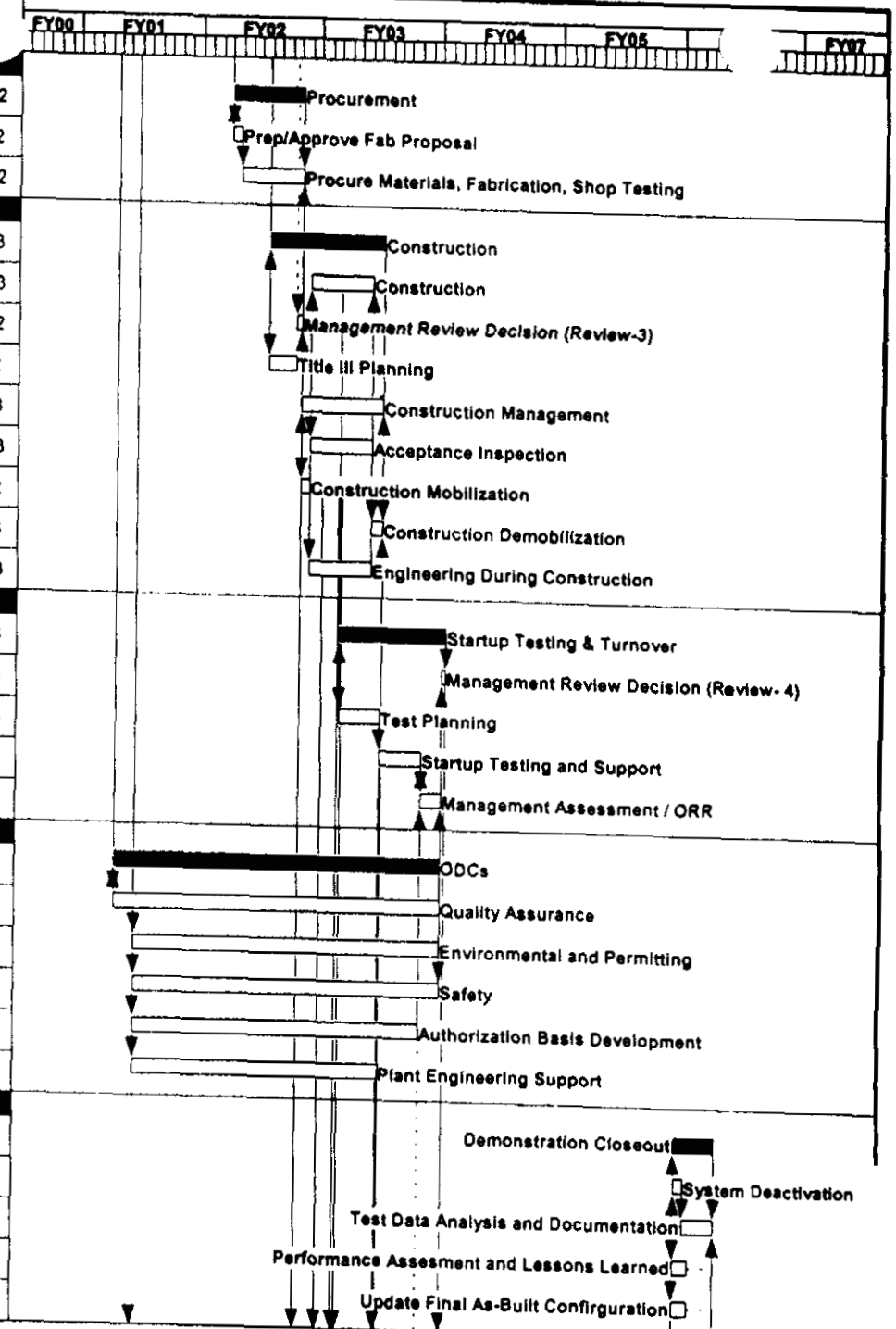
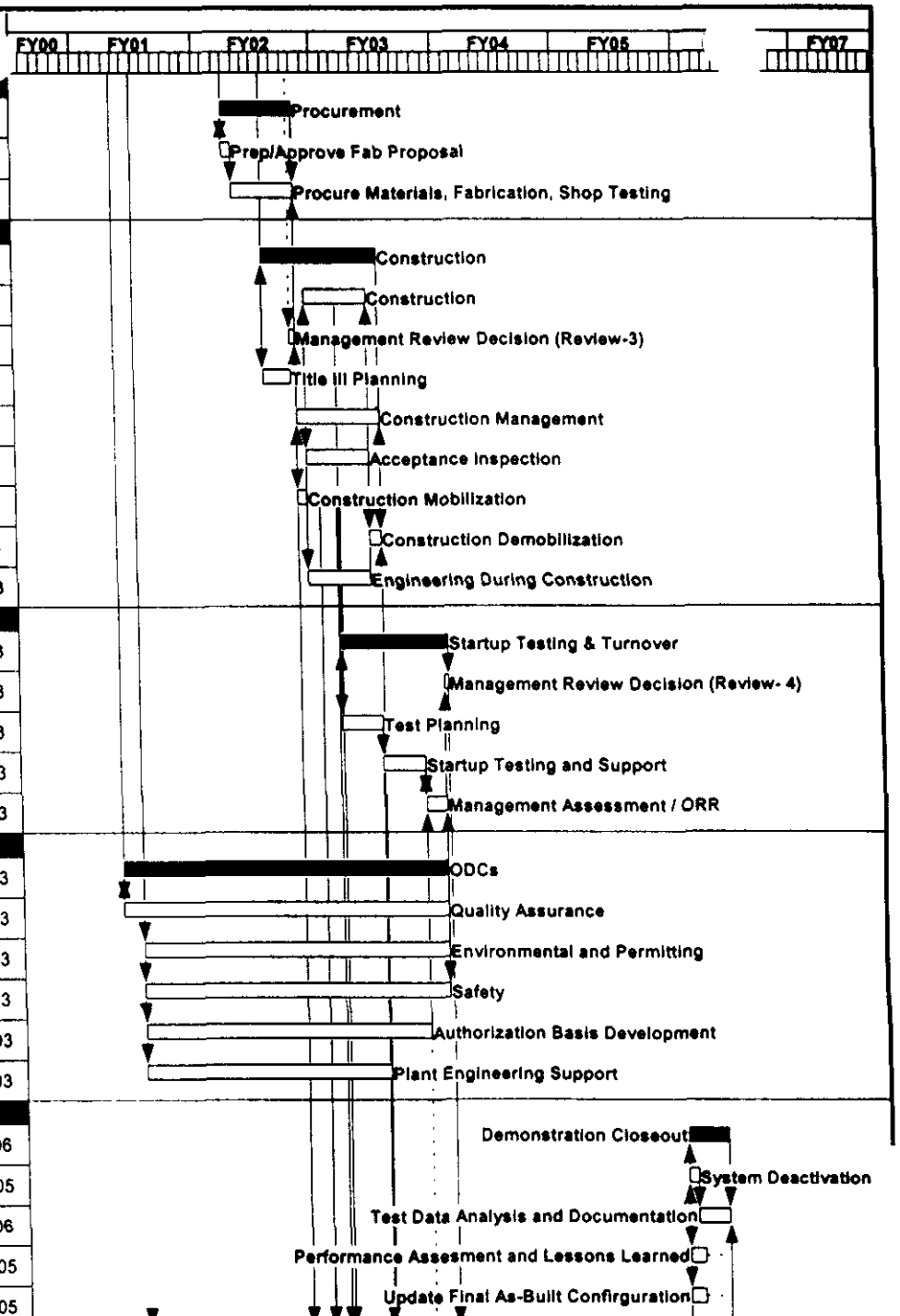
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1 01 04 01 02 03 04 04 Procurement				
44A	Procurement	151*	31DEC01	02AUG02
44A0100	Prep/Approve Fab Proposal	21	31DEC01	29JAN02
44A0200	Procure Materials, Fabrication, Shop Testing	130	30JAN02	02AUG02
1 01 04 01 02 03 04 05 Construction				
45A	Construction	241*	24APR02	08APR03
45A0000	Construction	127	04SEP02	07MAR03
45A0010	Management Review Decision (Review-3)	11	19JUL02	02AUG02
45A0020	Title III Planning	60	24APR02	18JUL02
45A0100	Construction Management	170*	05AUG02	08APR03
45A0200	Acceptance Inspection	127*	04SEP02	07MAR03
45A0300	Construction Mobilization	21	05AUG02	03SEP02
45A1000	Construction Demobilization	22	10MAR03	08APR03
45A1100	Engineering During Construction	127*	04SEP02	07MAR03
1 01 04 01 02 03 04 06 Startup Testing and Turnover				
46A	Startup Testing & Turnover	223*	05DEC02	22OCT03
46A0010	Management Review Decision (Review- 4)	7	14OCT03	22OCT03
46A0200	Test Planning	84	05DEC02	07APR03
46A0300	Startup Testing and Support	90	08APR03	13AUG03
46A0400	Management Assessment / ORR	42	14AUG03	13OCT03
1 01 04 01 02 03 04 07 Other Project Costs				
47A	ODCs	686*	25JAN01	13OCT03
47A0100	Quality Assurance	686*	25JAN01	13OCT03
47A0200	Environmental and Permitting	645*	26MAR01	13OCT03
47A0300	Safety	645*	26MAR01	13OCT03
47A0400	Authorization Basis Development	603*	26MAR01	13AUG03
47A0500	Plant Engineering Support	514*	26MAR01	08APR03
1 01 04 01 02 03 04 08 Demonstration Closeout				
48A	Demonstration Closeout	80*	30SEP05	26JAN06
48A0100	System Deactivation	20	30SEP05	27OCT05
48A0200	Test Data Analysis and Documentation	60	28OCT05	26JAN06
48A0300	Performance Assesment and Lessons Learned	30	30SEP05	10NOV05
48A0400	Update Final As-Built Confirguration	30	30SEP05	10NOV05



Sheet 2 of 3

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.01.02.03.04.04 Procurement				
44A	Procurement	151*	31DEC01	02AUG02
44A0100	Prep/Approve Fab Proposal	21	31DEC01	29JAN02
44A0200	Procure Materials, Fabrication, Shop Testing	130	30JAN02	02AUG02
1.01.04.01.02.03.04.05 Construction				
45A	Construction	241*	24APR02	08APR03
45A0000	Construction	127	04SEP02	07MAR03
45A0010	Management Review Decision (Review-3)	11	19JUL02	02AUG02
45A0020	Title III Planning	60	24APR02	18JUL02
45A0100	Construction Management	170*	05AUG02	08APR03
45A0200	Acceptance Inspection	127*	04SEP02	07MAR03
45A0300	Construction Mobilization	21	05AUG02	03SEP02
45A1000	Construction Demobilization	22	10MAR03	08APR03
45A1100	Engineering During Construction	127*	04SEP02	07MAR03
1.01.04.01.02.03.04.06 Startup Testing and Turnover				
46A	Startup Testing & Turnover	223*	05DEC02	22OCT03
46A0010	Management Review Decision (Review- 4)	7	14OCT03	22OCT03
46A0200	Test Planning	84	05DEC02	07APR03
46A0300	Startup Testing and Support	90	08APR03	13AUG03
46A0400	Management Assessment / ORR	42	14AUG03	13OCT03
1.01.04.01.02.03.04.07 Other Project Costs				
47A	ODCs	686*	25JAN01	13OCT03
47A0100	Quality Assurance	686*	25JAN01	13OCT03
47A0200	Environmental and Permitting	645*	26MAR01	13OCT03
47A0300	Safety	645*	26MAR01	13OCT03
47A0400	Authorization Basis Development	603*	26MAR01	13AUG03
47A0500	Plant Engineering Support	514*	26MAR01	08APR03
1.01.04.01.02.03.04.08 Demonstration Closeout				
48A	Demonstration Closeout	80*	30SEP05	26JAN06
48A0100	System Deactivation	20	30SEP05	27OCT05
48A0200	Test Data Analysis and Documentation	60	28OCT05	26JAN06
48A0300	Performance Assesment and Lessons Learned	30	30SEP05	10NOV05
48A0400	Update Final As-Built Confirguration	30	30SEP05	10NOV05



Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1 01 04 01 02 03 04 04 Procurement				
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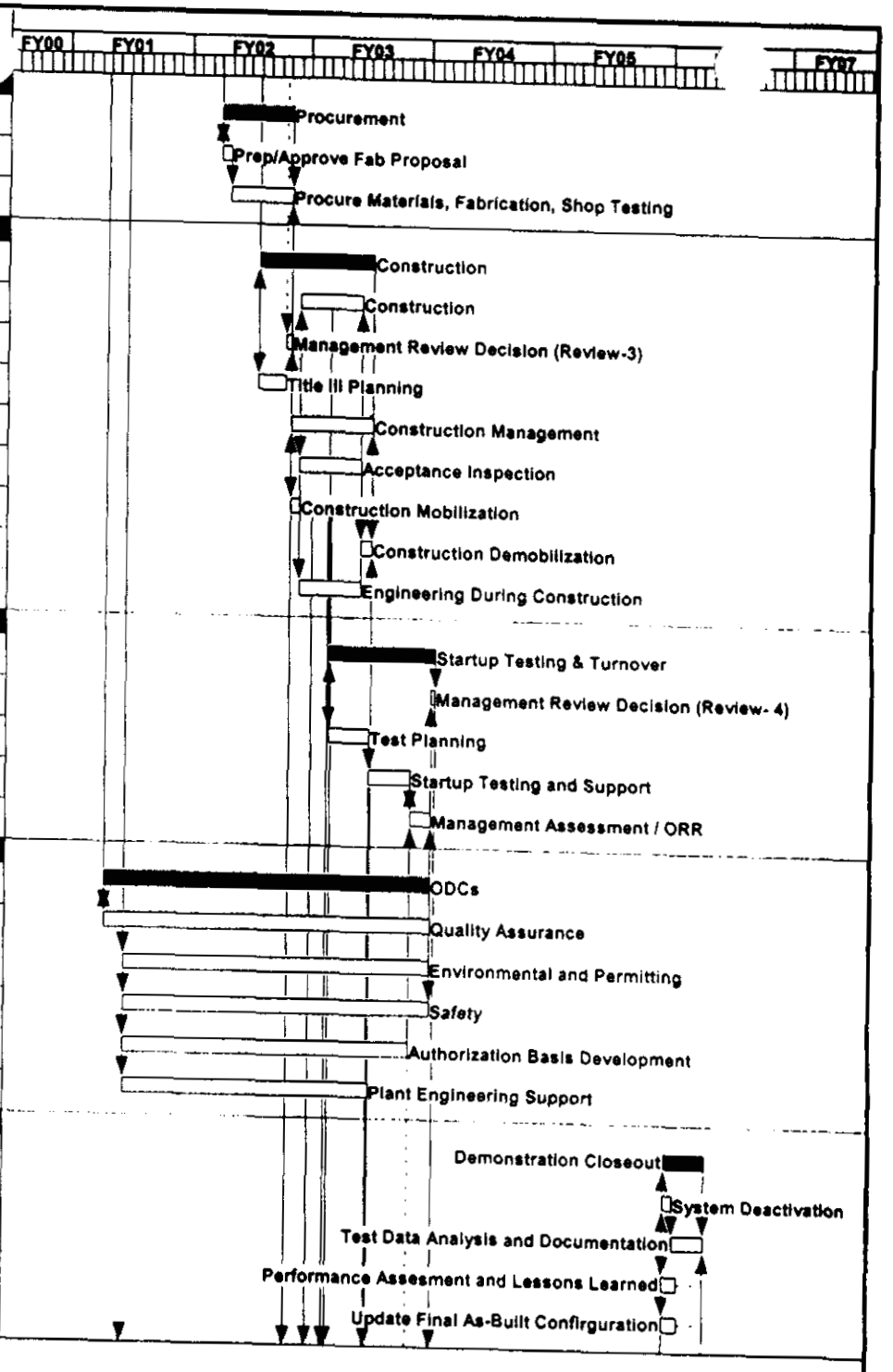
44A0100	Prep/Approve Fab Proposal	21	31DEC01	29JAN02
44A0200	Procure Materials, Fabrication, Shop Testing	130	30JAN02	02AUG02
1 01 04 01 02 03 04 05 Construction				
45A	Construction	241*	24APR02	08APR03
45A0000	Construction	127	04SEP02	07MAR03
45A0010	Management Review Decision (Review-3)	11	19JUL02	02AUG02
45A0020	Title III Planning	60	24APR02	18JUL02
45A0100	Construction Management	170*	05AUG02	08APR03
45A0200	Acceptance Inspection	127*	04SEP02	07MAR03
45A0300	Construction Mobilization	21	05AUG02	03SEP02
45A1000	Construction Demobilization	22	10MAR03	08APR03
45A1100	Engineering During Construction	127*	04SEP02	07MAR03
1 01 04 01 02 03 04 06 Startup Testing and Turnover				
46A	Startup Testing & Turnover	223*	05DEC02	22OCT03
46A0010	Management Review Decision (Review- 4)	7	14OCT03	22OCT03
46A0200	Test Planning	84	05DEC02	07APR03
46A0300	Startup Testing and Support	90	08APR03	13AUG03
46A0400	Management Assessment / ORR	42	14AUG03	13OCT03
1 01 04 01 02 03 04 07 Other Project Costs				
47A	ODCs	686*	25JAN01	13OCT03
47A0100	Quality Assurance	686*	25JAN01	13OCT03
47A0200	Environmental and Permitting	645*	26MAR01	13OCT03
47A0300	Safety	645*	26MAR01	13OCT03
47A0400	Authorization Basis Development	603*	26MAR01	13AUG03
47A0500	Plant Engineering Support	514*	26MAR01	08APR03
1 01 04 01 02 03 04 08 Demonstration Closeout				
48A	Demonstration Closeout	80*	30SEP05	26JAN06
48A0100	System Deactivation	20	30SEP05	27OCT05
48A0200	Test Data Analysis and Documentation	60	28OCT05	26JAN06
48A0300	Performance Assesment and Lessons Learned	30	30SEP05	10NOV05
48A0400	Update Final As-Built Confirguration	30	30SEP05	10NOV05



Sheet 2 of 3

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1 01 04 01 02 03 04 04 Procurement				
44A	Procurement	151*	31DEC01	02AUG02
44A0100	Prep/Approve Fab Proposal	21	31DEC01	29JAN02
44A0200	Procure Materials, Fabrication, Shop Testing	130	30JAN02	02AUG02
1 01 04 01 02 03 04 05 Construction				
45A	Construction	241*	24APR02	08APR03
45A0000	Construction	127	04SEP02	07MAR03
45A0010	Management Review Decision (Review-3)	11	19JUL02	02AUG02
45A0020	Title III Planning	60	24APR02	18JUL02
45A0100	Construction Management	170*	05AUG02	08APR03
45A0200	Acceptance Inspection	127*	04SEP02	07MAR03
45A0300	Construction Mobilization	21	05AUG02	03SEP02
45A1000	Construction Demobilization	22	10MAR03	08APR03
45A1100	Engineering During Construction	127*	04SEP02	07MAR03
1 01 04 01 02 03 04 06 Startup Testing and Turnover				
46A	Startup Testing & Turnover	223*	05DEC02	22OCT03
46A0010	Management Review Decision (Review- 4)	7	14OCT03	22OCT03
46A0200	Test Planning	84	05DEC02	07APR03
46A0300	Startup Testing and Support	90	08APR03	13AUG03
46A0400	Management Assessment / ORR	42	14AUG03	13OCT03
1 01 04 01 02 03 04 07 Other Project Costs				
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47A0100	Quality Assurance	686*	25JAN01	13OCT03
47A0200	Environmental and Permitting	645*	26MAR01	13OCT03
47A0300	Safety	645*	26MAR01	13OCT03
47A0400	Authorization Basis Development	603*	26MAR01	13AUG03
47A0500	Plant Engineering Support	514*	26MAR01	08APR03
1 01 04 01 02 03 04 08 Demonstration Closeout				
48A	Demonstration Closeout	80*	30SEP05	26JAN06
48A0100	System Deactivation	20	30SEP05	27OCT05
48A0200	Test Data Analysis and Documentation	60	28OCT05	26JAN06
48A0300	Performance Assesment and Lessons Learned	30	30SEP05	10NOV05
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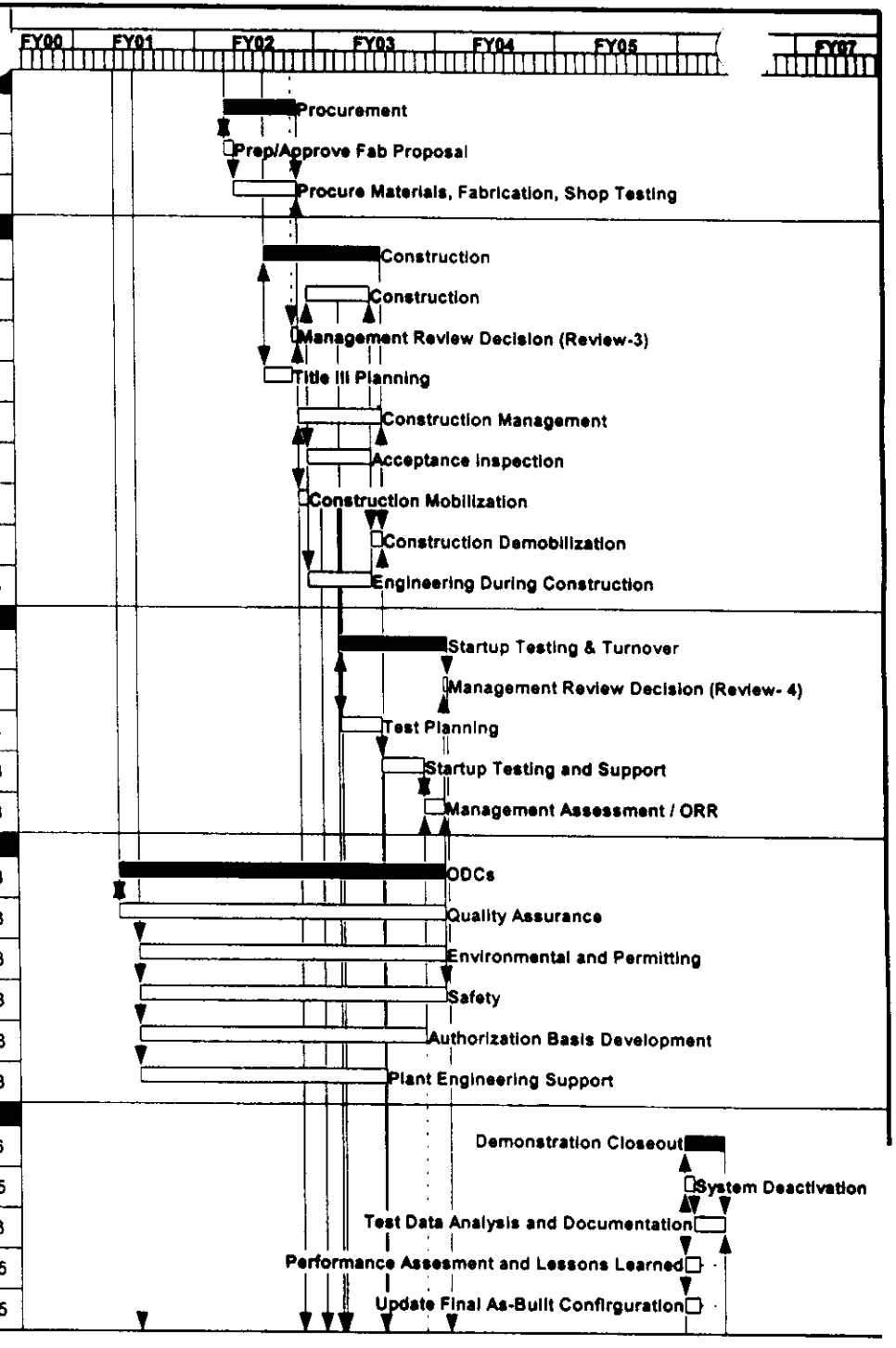

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
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44A0200	Procure Materials, Fabrication, Shop Testing	130	30JAN02	02AUG02
1 01 04 01 02 03 04 05 Construction				
45A	Construction	241*	24APR02	08APR03
45A0000	Construction	127	04SEP02	07MAR03
45A0010	Management Review Decision (Review-3)	11	19JUL02	02AUG02
45A0020	Title III Planning	60	24APR02	18JUL02
45A0100	Construction Management	170*	05AUG02	08APR03
45A0200	Acceptance Inspection	127*	04SEP02	07MAR03
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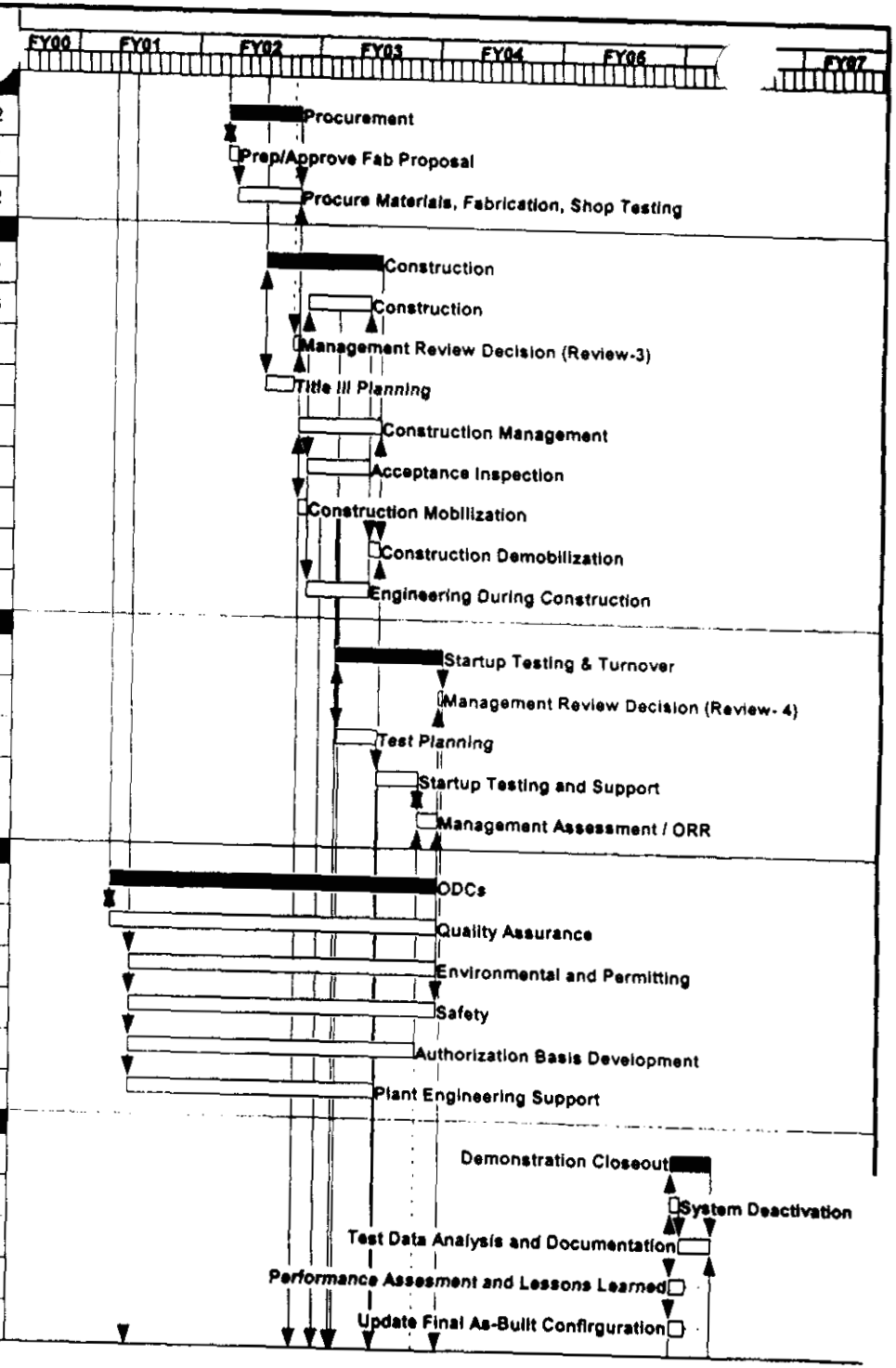

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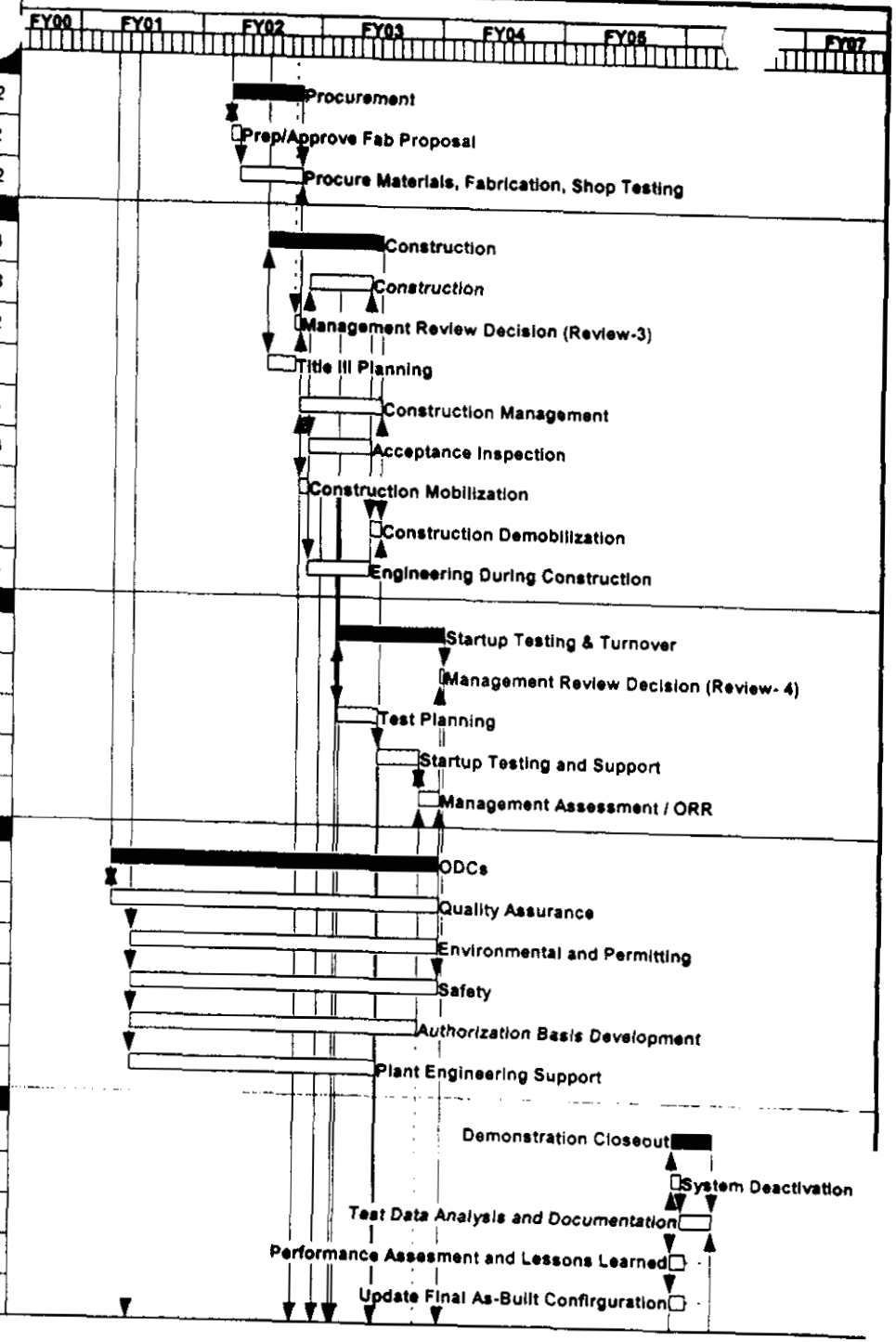

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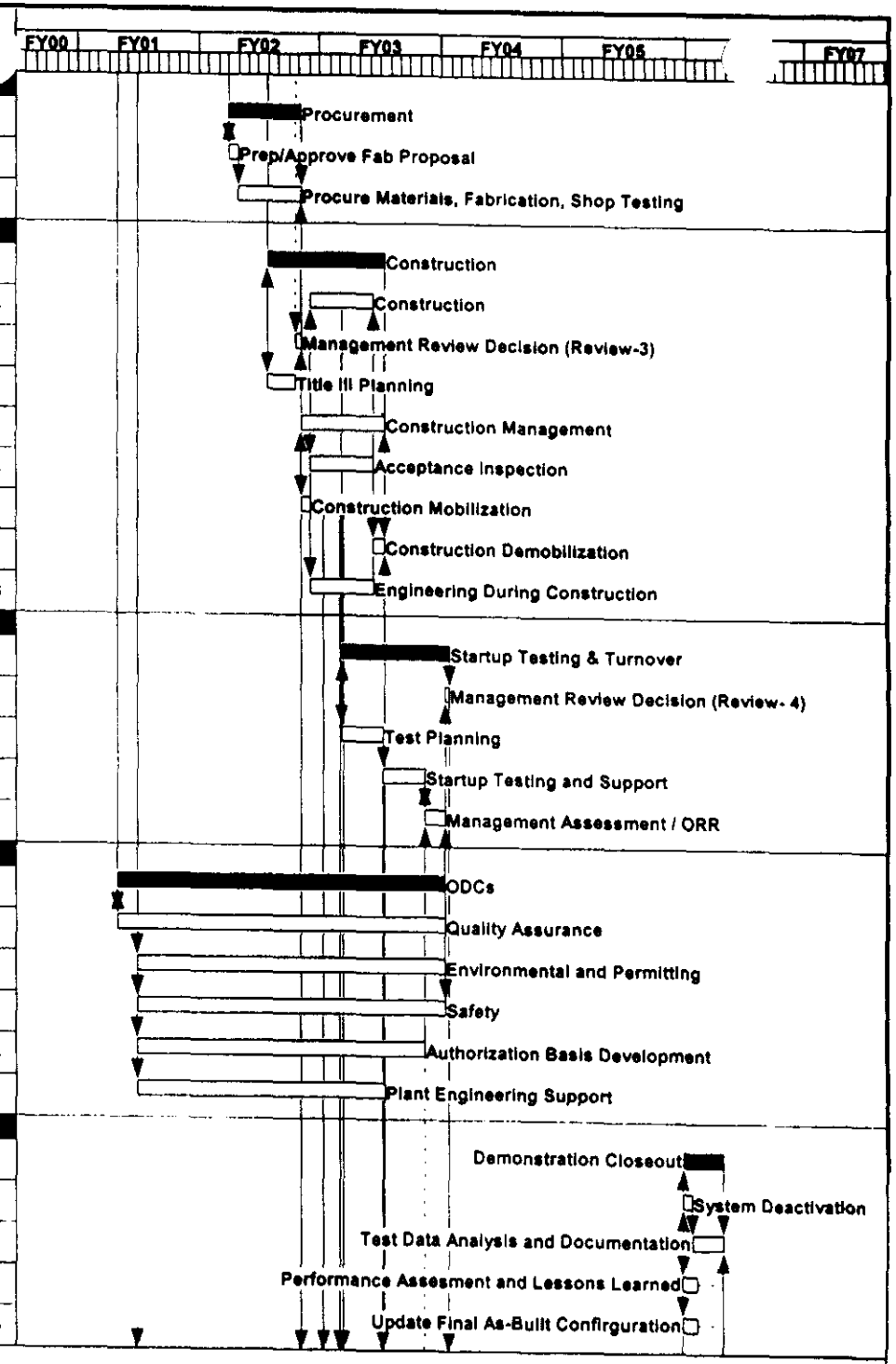

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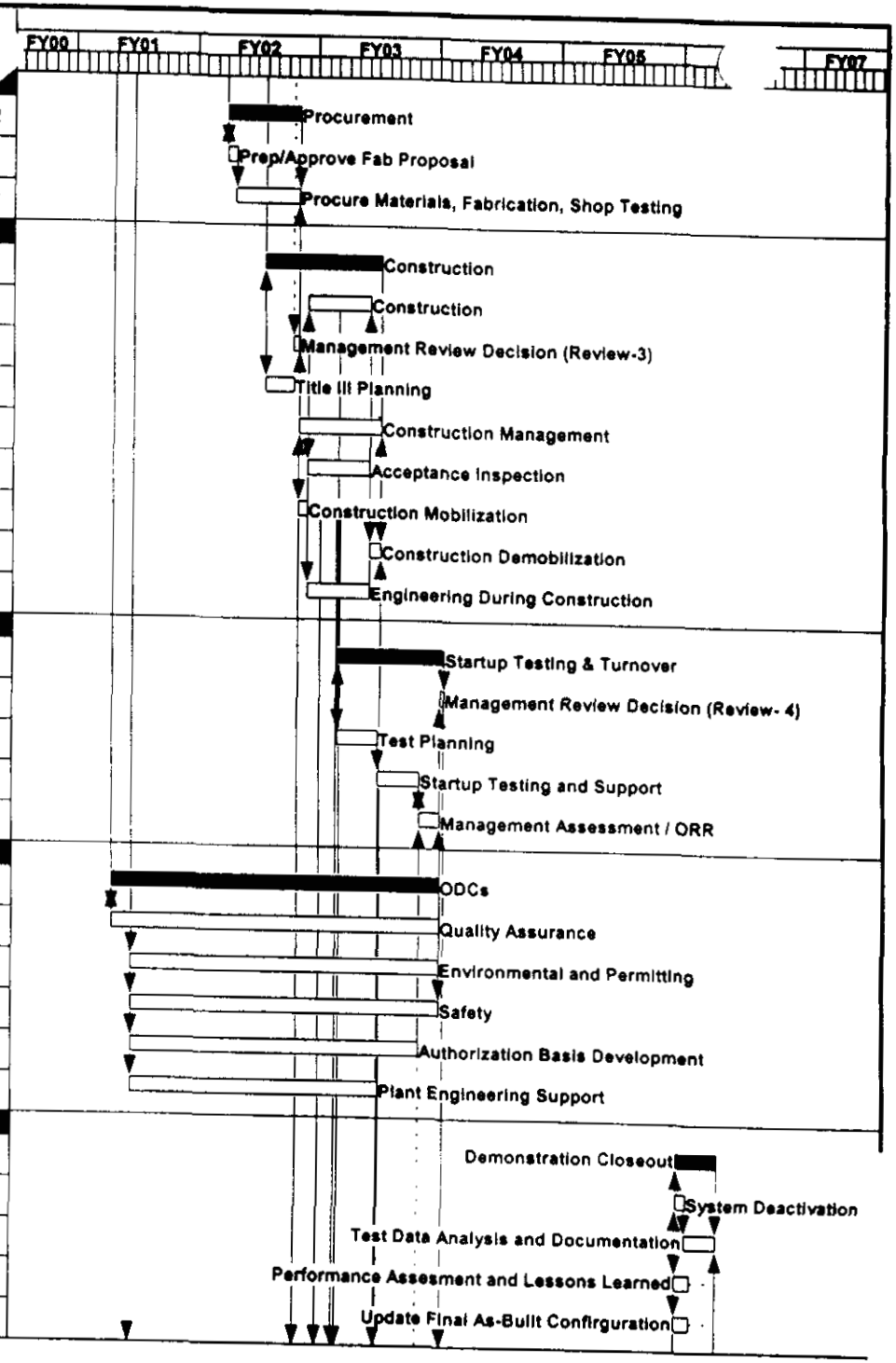

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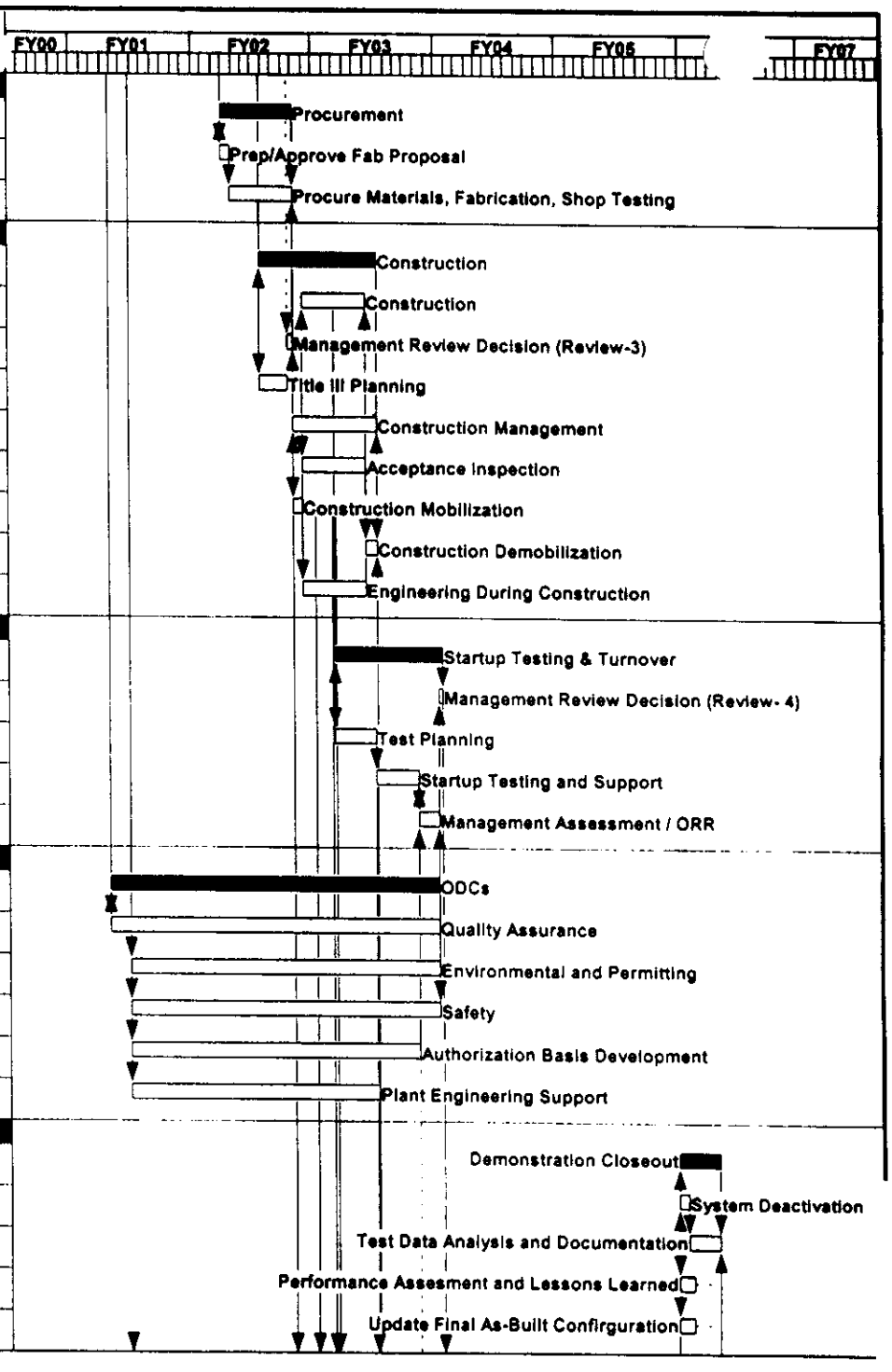

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
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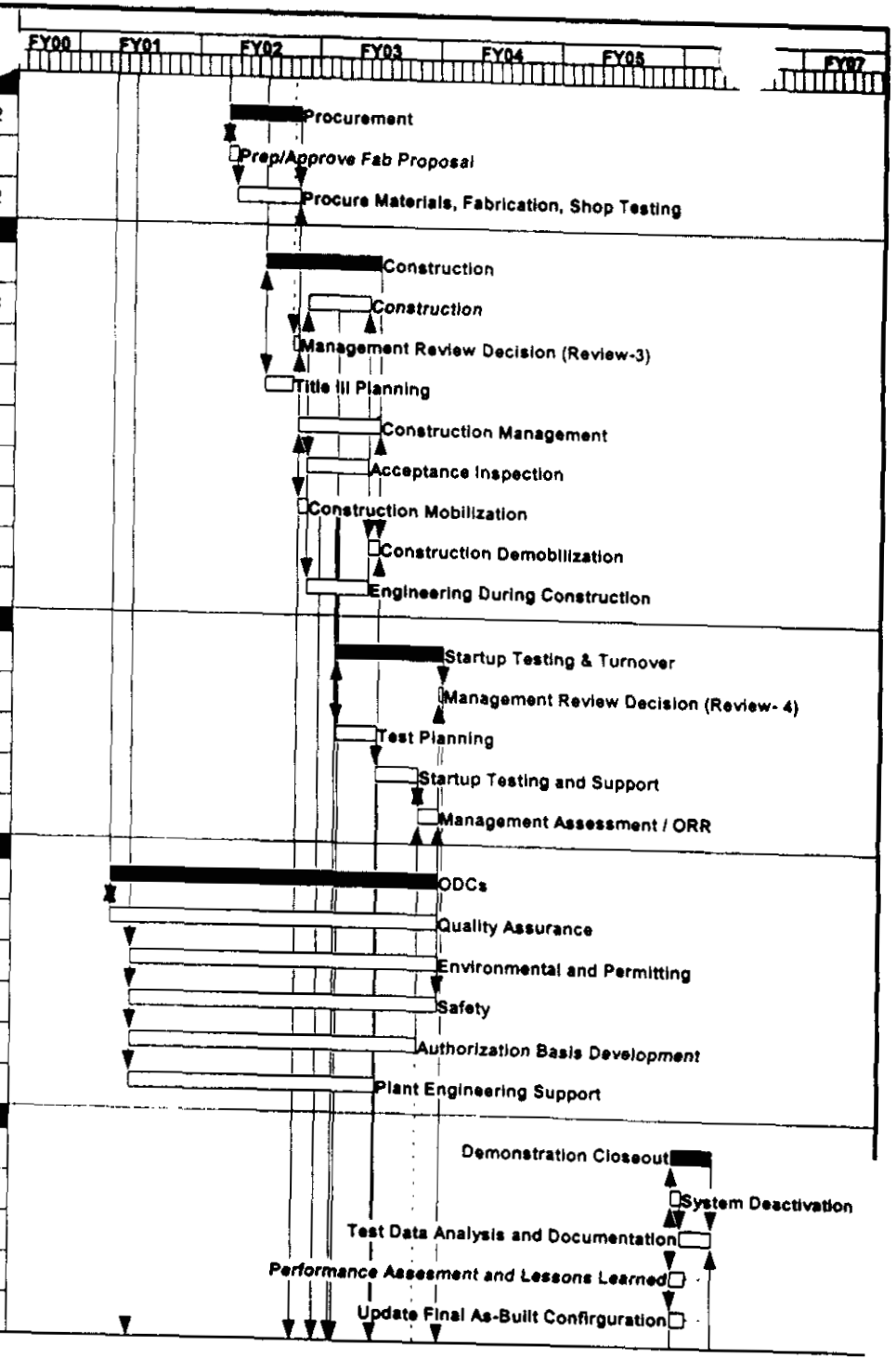

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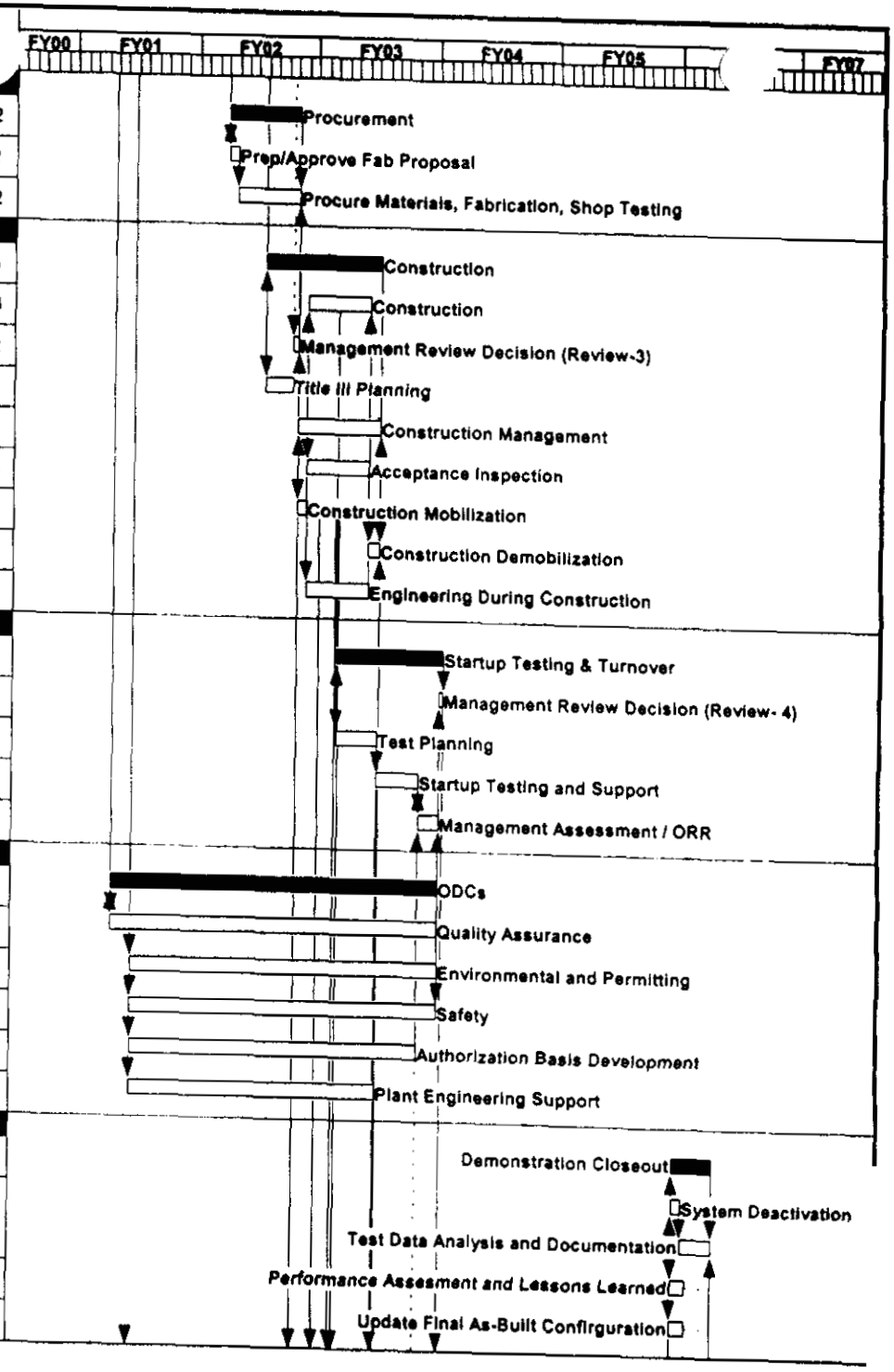

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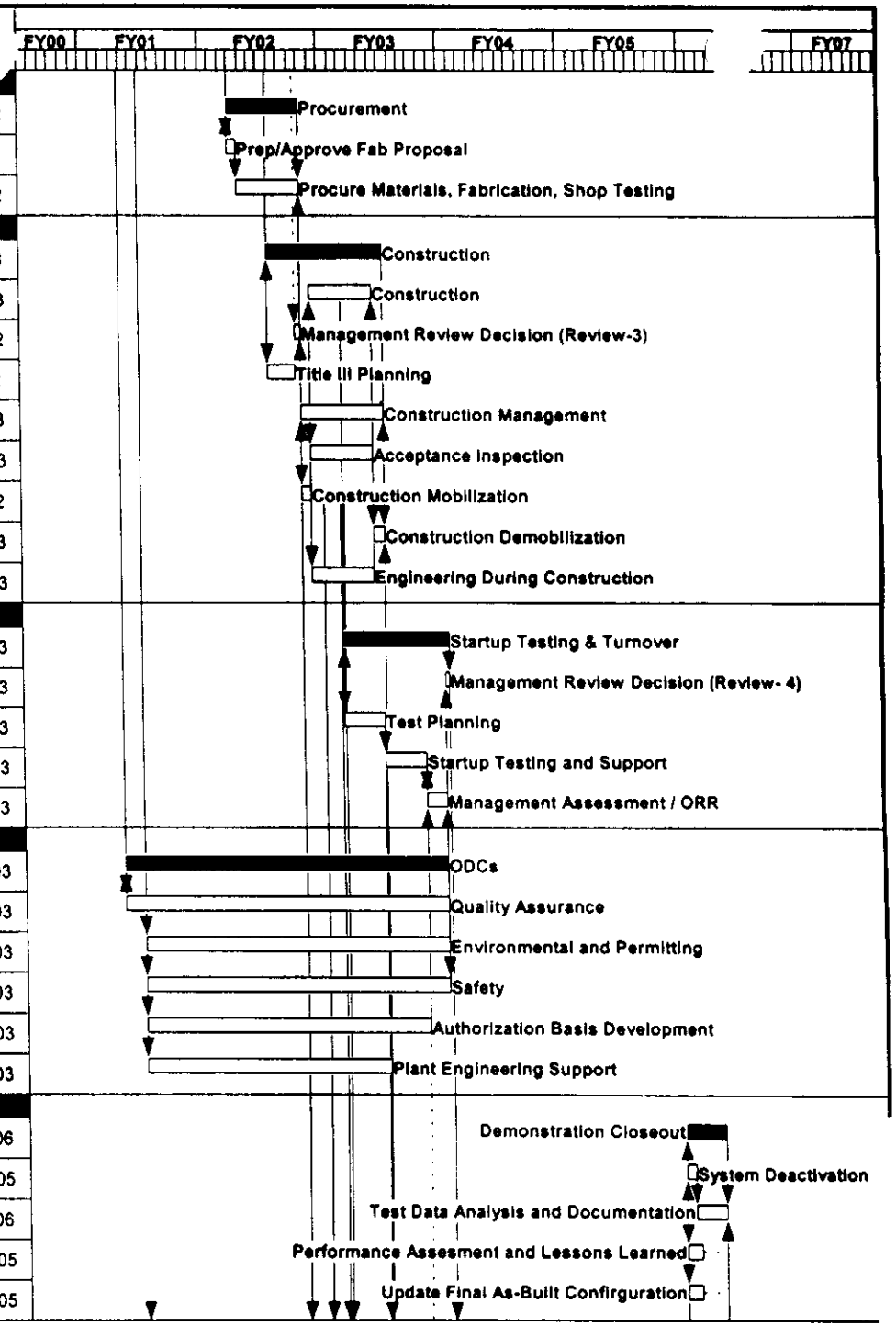

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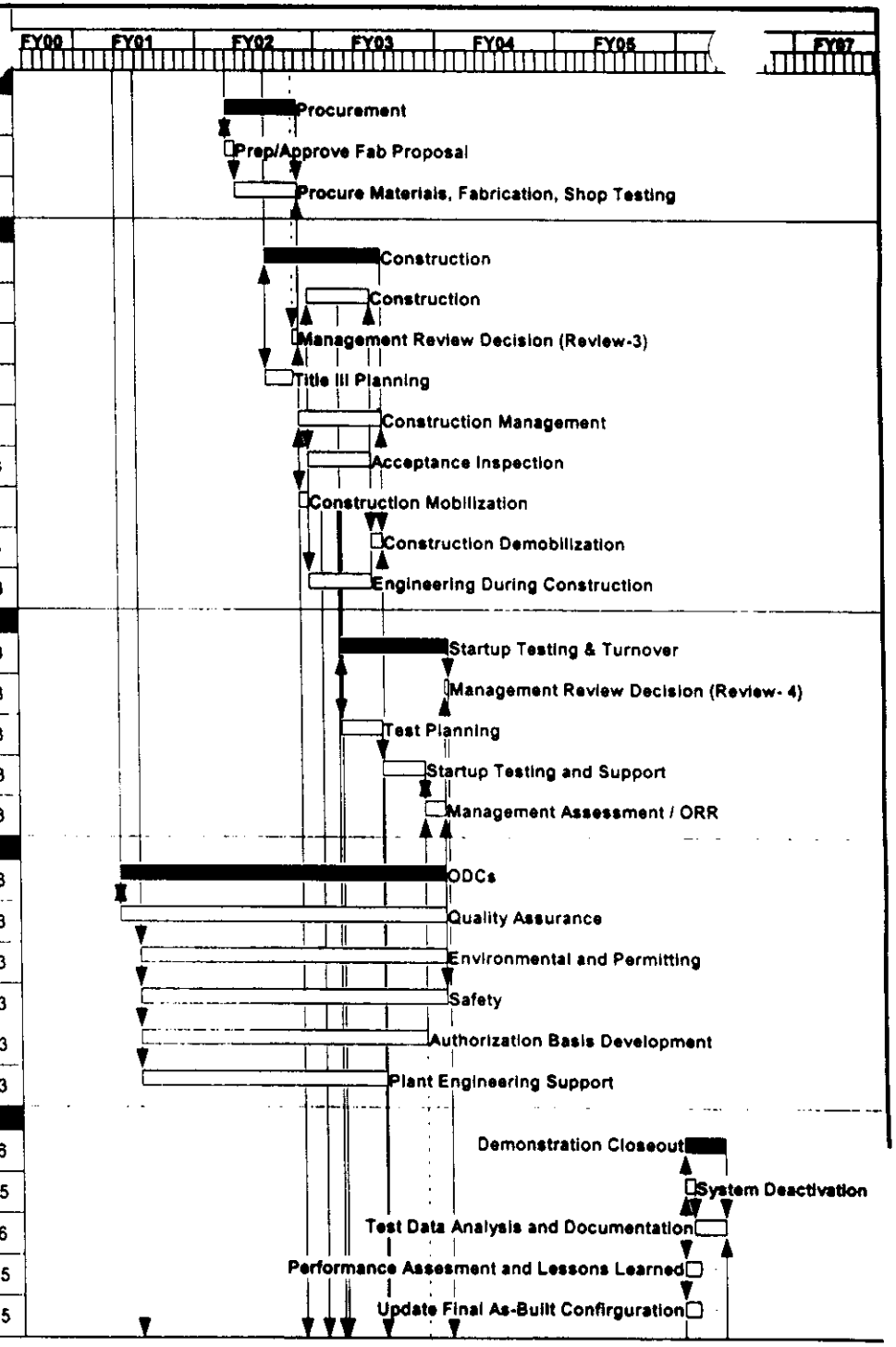
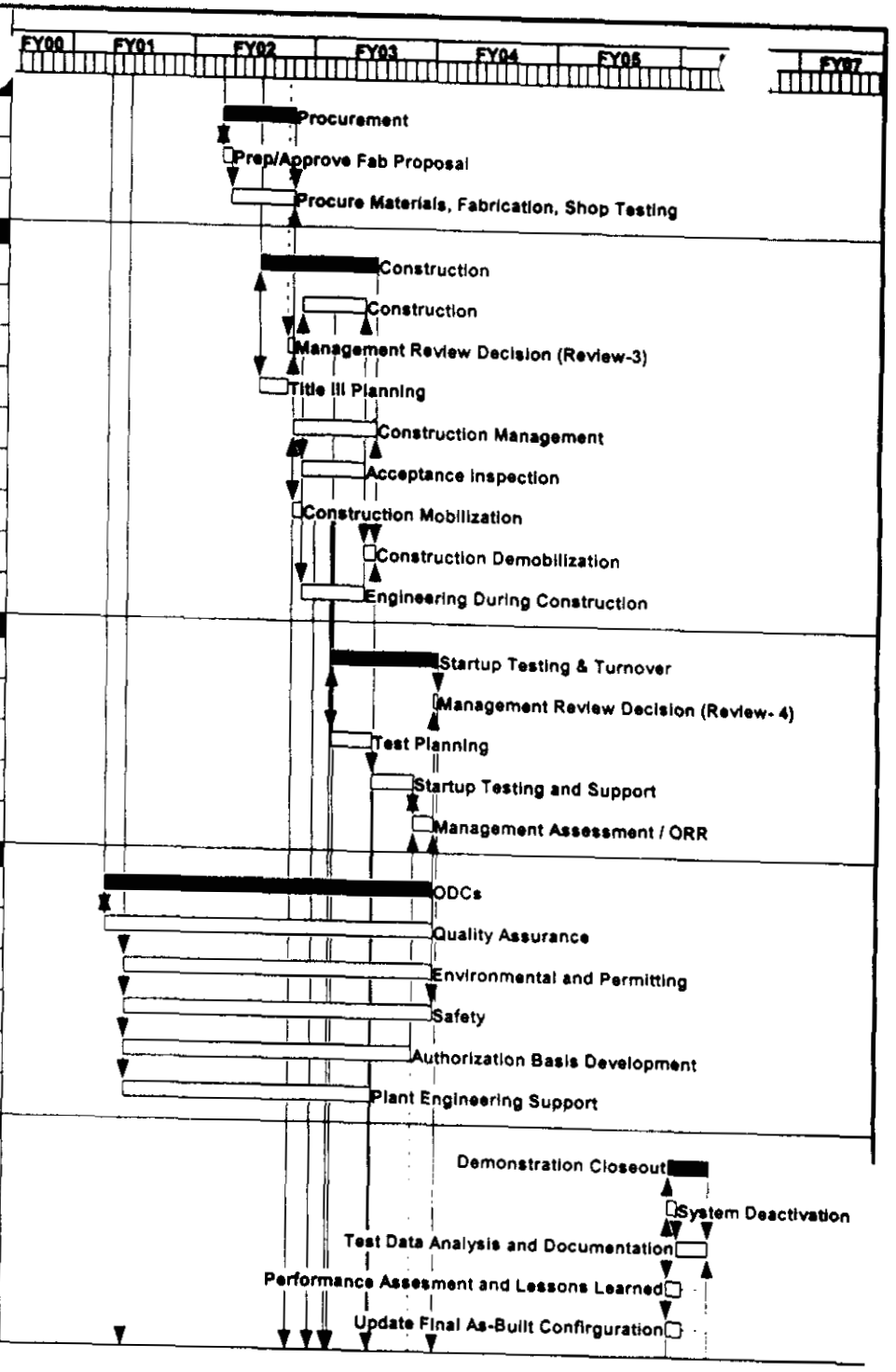
48A0300	Performance Assesment and Lessons Learned	30	30SEP05	10NOV05
48A0400	Update Final As-Built Confirguration	30	30SEP05	10NOV05



Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1 01 04 01 02 03 04 04 Procurement				
44A	Procurement	151*	31DEC01	02AUG02
44A0100	Prep/Approve Fab Proposal	21	31DEC01	29JAN02
44A0200	Procure Materials, Fabrication, Shop Testing	130	30JAN02	02AUG02
1 01 04 01 02 03 04 05 Construction				
45A	Construction	241*	24APR02	08APR03
45A0000	Construction	127	04SEP02	07MAR03
45A0010	Management Review Decision (Review-3)	11	19JUL02	02AUG02
45A0020	Title III Planning	60	24APR02	18JUL02
45A0100	Construction Management	170*	05AUG02	08APR03
45A0200	Acceptance Inspection	127*	04SEP02	07MAR03
45A0300	Construction Mobilization	21	05AUG02	03SEP02
45A1000	Construction Demobilization	22	10MAR03	08APR03
45A1100	Engineering During Construction	127*	04SEP02	07MAR03
1 01 04 01 02 03 04 06 Startup Testing and Turnover				
46A	Startup Testing & Turnover	223*	05DEC02	22OCT03
46A0010	Management Review Decision (Review- 4)	7	14OCT03	22OCT03
46A0200	Test Planning	84	05DEC02	07APR03
46A0300	Startup Testing and Support	90	08APR03	13AUG03
46A0400	Management Assessment / ORR	42	14AUG03	13OCT03
1 01 04 01 02 03 04 07 Other Project Costs				
47A	ODCs	686*	25JAN01	13OCT03
47A0100	Quality Assurance	686*	25JAN01	13OCT03
47A0200	Environmental and Permitting	645*	26MAR01	13OCT03
47A0300	Safety	645*	26MAR01	13OCT03
47A0400	Authorization Basis Development	603*	26MAR01	13AUG03
47A0500	Plant Engineering Support	514*	26MAR01	08APR03
1 01 04 01 02 03 04 08 Demonstration Closeout				
48A	Demonstration Closeout	80*	30SEP05	26JAN06
48A0100	System Deactivation	20	30SEP05	27OCT05
48A0200	Test Data Analysis and Documentation	60	28OCT05	26JAN06
48A0300	Performance Assesment and Lessons Learned	30	30SEP05	10NOV05
48A0400	Update Final As-Built Confirguration	30	30SEP05	10NOV05



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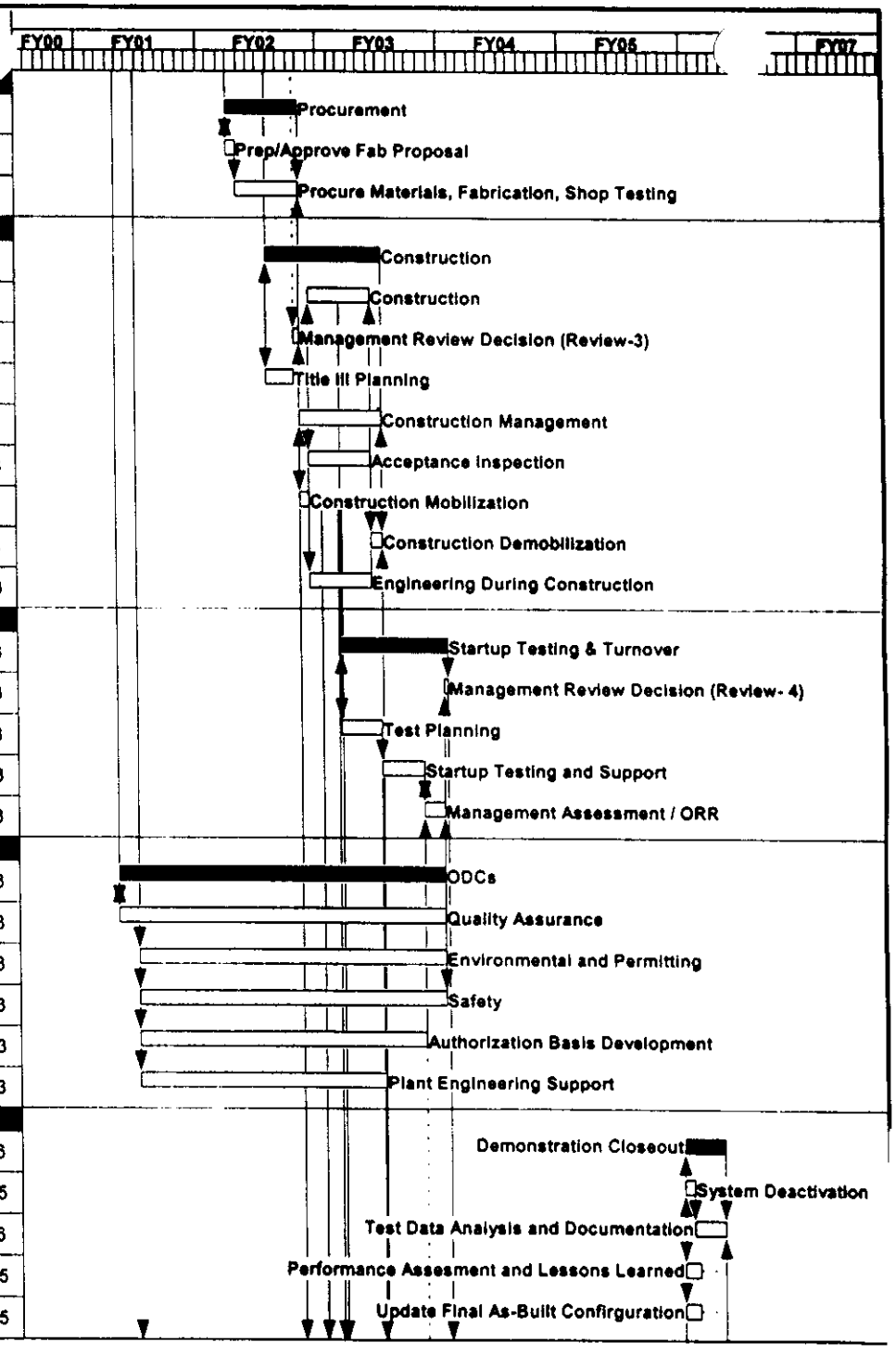
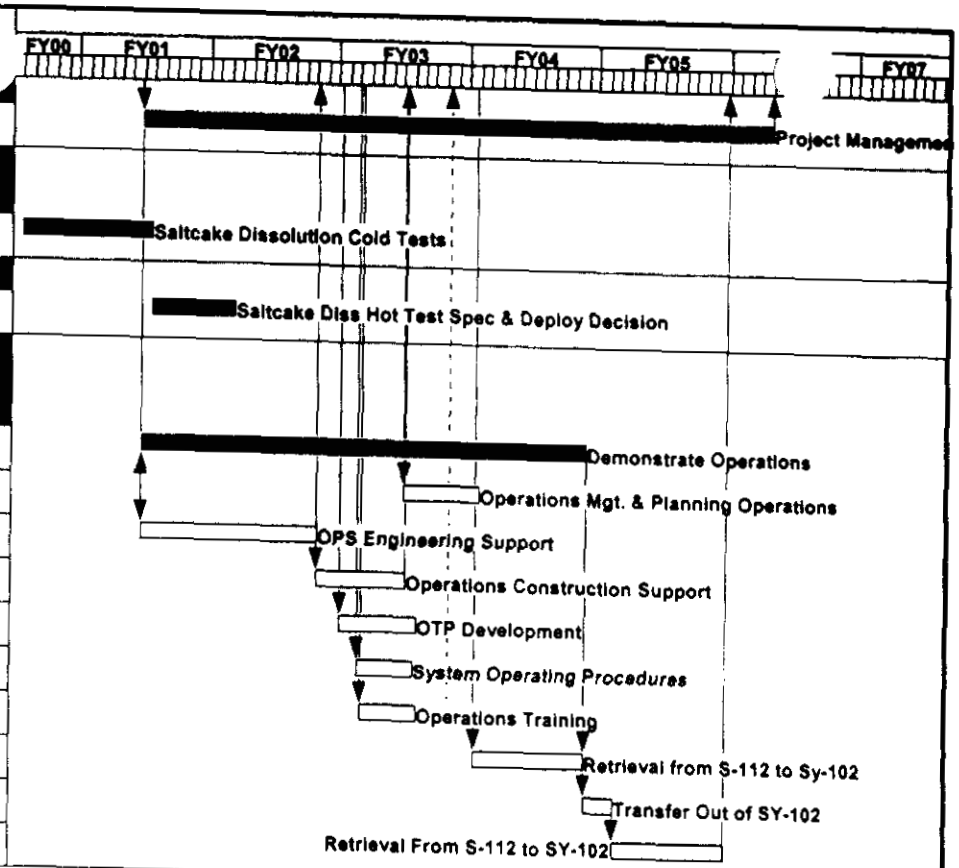
Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
1 01 04 01 02 03 04 04 Procurement				
44A	Procurement	151*	31DEC01	02AUG02
44A0100	Prep/Approve Fab Proposal	21	31DEC01	29JAN02
44A0200	Procure Materials, Fabrication, Shop Testing	130	30JAN02	02AUG02
1 01 04 01 02 03 04 05 Construction				
45A	Construction	241*	24APR02	08APR03
45A0000	Construction	127	04SEP02	07MAR03
45A0010	Management Review Decision (Review-3)	11	19JUL02	02AUG02
45A0020	Title III Planning	60	24APR02	18JUL02
45A0100	Construction Management	170*	05AUG02	08APR03
45A0200	Acceptance Inspection	127*	04SEP02	07MAR03
45A0300	Construction Mobilization	21	05AUG02	03SEP02
45A1000	Construction Demobilization	22	10MAR03	08APR03
45A1100	Engineering During Construction	127*	04SEP02	07MAR03
1 01 04 01 02 03 04 06 Startup Testing and Turnover				
46A	Startup Testing & Turnover	223*	05DEC02	22OCT03
46A0010	Management Review Decision (Review- 4)	7	14OCT03	22OCT03
46A0200	Test Planning	84	05DEC02	07APR03
46A0300	Startup Testing and Support	90	08APR03	13AUG03
46A0400	Management Assessment / ORR	42	14AUG03	13OCT03
1 01 04 01 02 03 04 07 Other Project Costs				
47A	ODCs	686*	25JAN01	13OCT03
47A0100	Quality Assurance	686*	25JAN01	13OCT03
47A0200	Environmental and Permitting	645*	26MAR01	13OCT03
47A0300	Safety	645*	26MAR01	13OCT03
47A0400	Authorization Basis Development	603*	26MAR01	13AUG03
47A0500	Plant Engineering Support	514*	26MAR01	08APR03
1 01 04 01 02 03 04 08 Demonstration Closeout				
48A	Demonstration Closeout	80*	30SEP05	26JAN06
48A0100	System Deactivation	20	30SEP05	27OCT05
48A0200	Test Data Analysis and Documentation	60	28OCT05	26JAN06
48A0300	Performance Assesment and Lessons Learned	30	30SEP05	10NOV05
48A0400	Update Final As-Built Confirguration	30	30SEP05	10NOV05



Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
[illegible]	[illegible] 04 09 Project Management			
49A0000	Project Management	1,220*	26MAR01	26JAN06
[illegible] 01.02 05				
[illegible] 01 02 05 07 Saltcake Dissolution Cold Tests				
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
[illegible] 01 02 05 08 Saltcake Diss Hot Test Spec & Deploy Decision				
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
[illegible] 01.02 09 Phase 1 SST Operations				
[illegible] 01 02 09 05				
[illegible] 01 02 09 05 07 S-103 Demonstration Operations				
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



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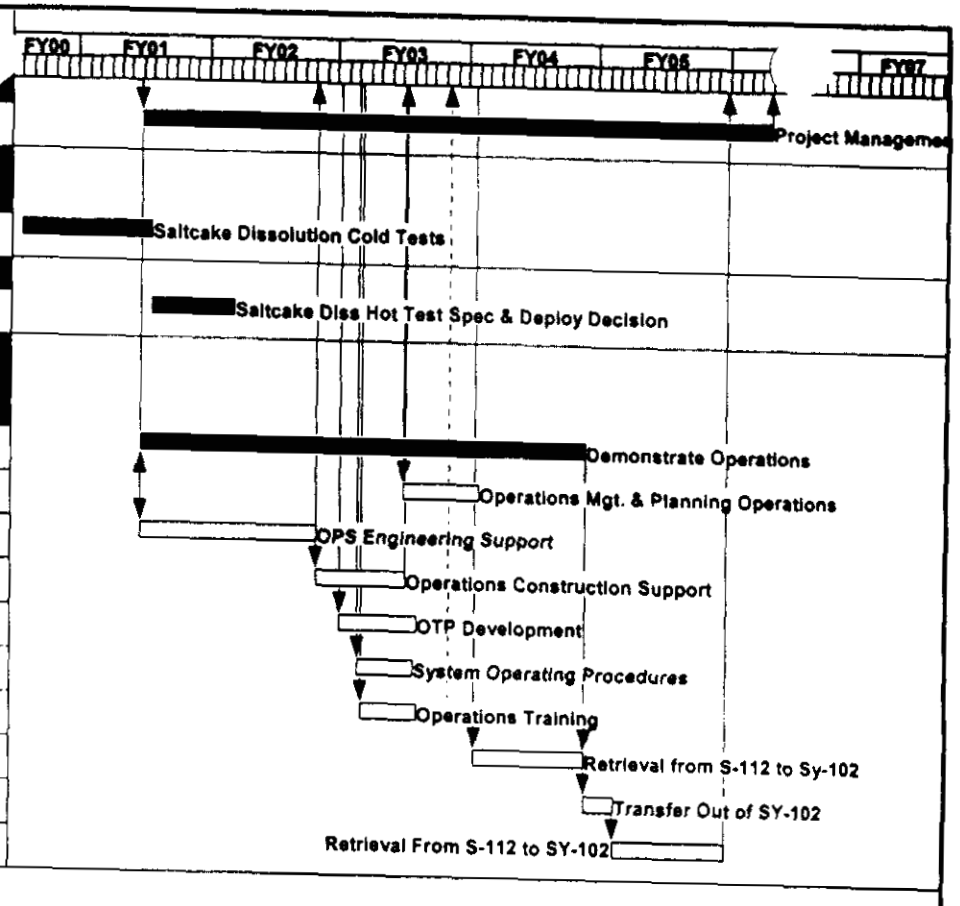
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
[illegible] 04.09 Project Management				
49A0000	Project Management	1,220*	26MAR01	26JAN06
[illegible] 01 02 05				
[illegible] 01 02 05 07 Saltcake Dissolution Cold Tests				
26215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
[illegible] 01 02 05 08 Saltcake Diss Hot Test Spec & Deploy Decision				
26220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
[illegible] 01 02 09 Phase 1 SST Operations				
[illegible]				
[illegible] 01 02 09 05 07 S-103 Demonstration Operations				
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



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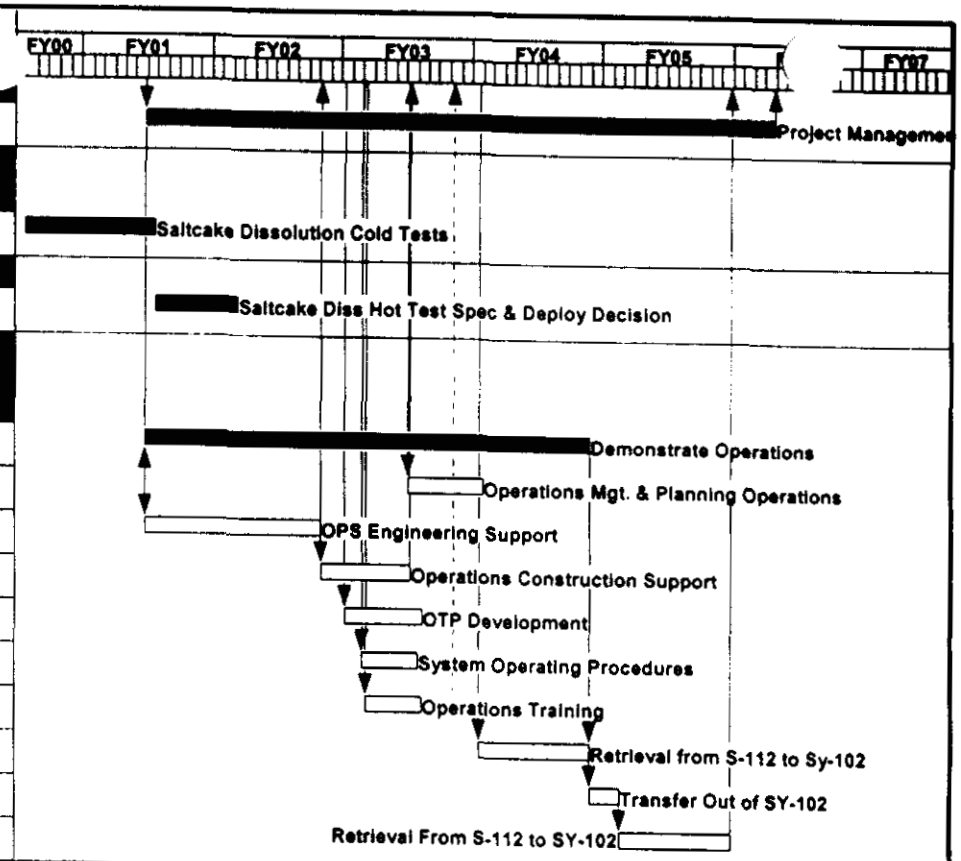
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.01	04.09 Project Management			
49A0000	Project Management	1,220*	26MAR01	26JAN06
1.01.04.01.02.05				
1.01.04.01.02.05.07	Saltcake Dissolution Cold Tests			
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
1.01.04.01.02.05.08	Saltcake Diss Hot Test Spec & Deploy Decision			
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
1.01.04.01.02.09	Phase 1 SST Operations			
1.01.04.01.02.09.05				
1.01.04.01.02.09.05.07	S-103 Demonstration Operations			
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



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Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
[illegible]	04.09 Project Management			
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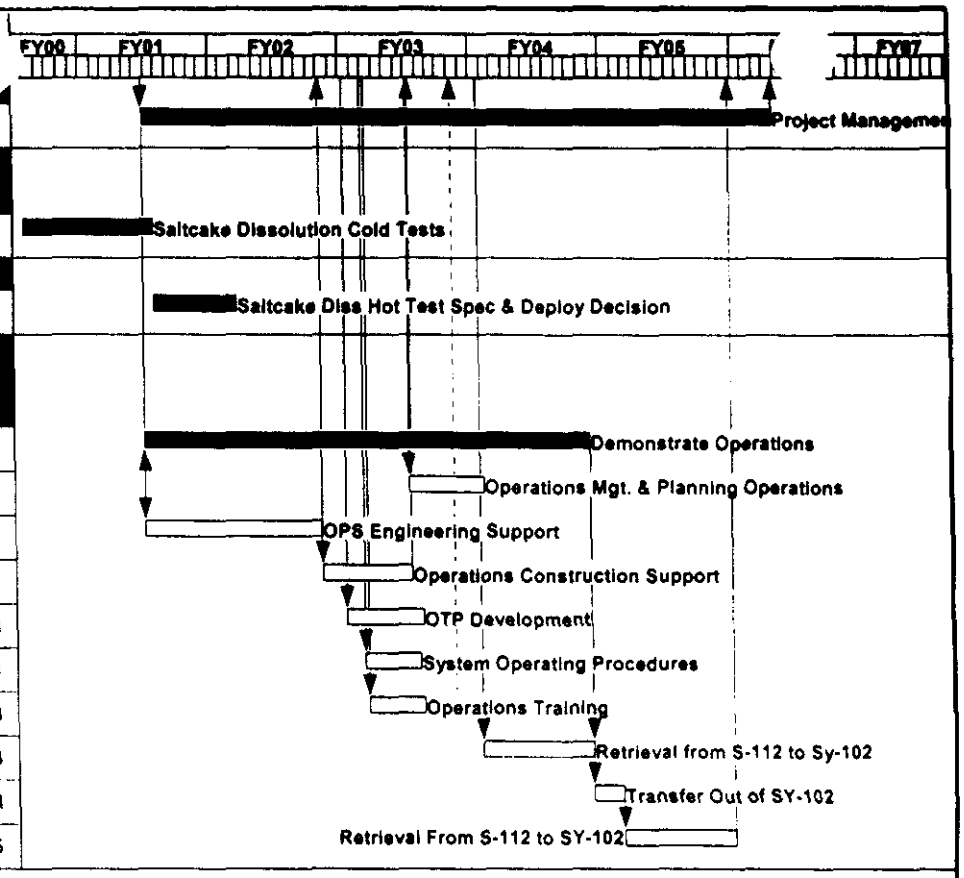
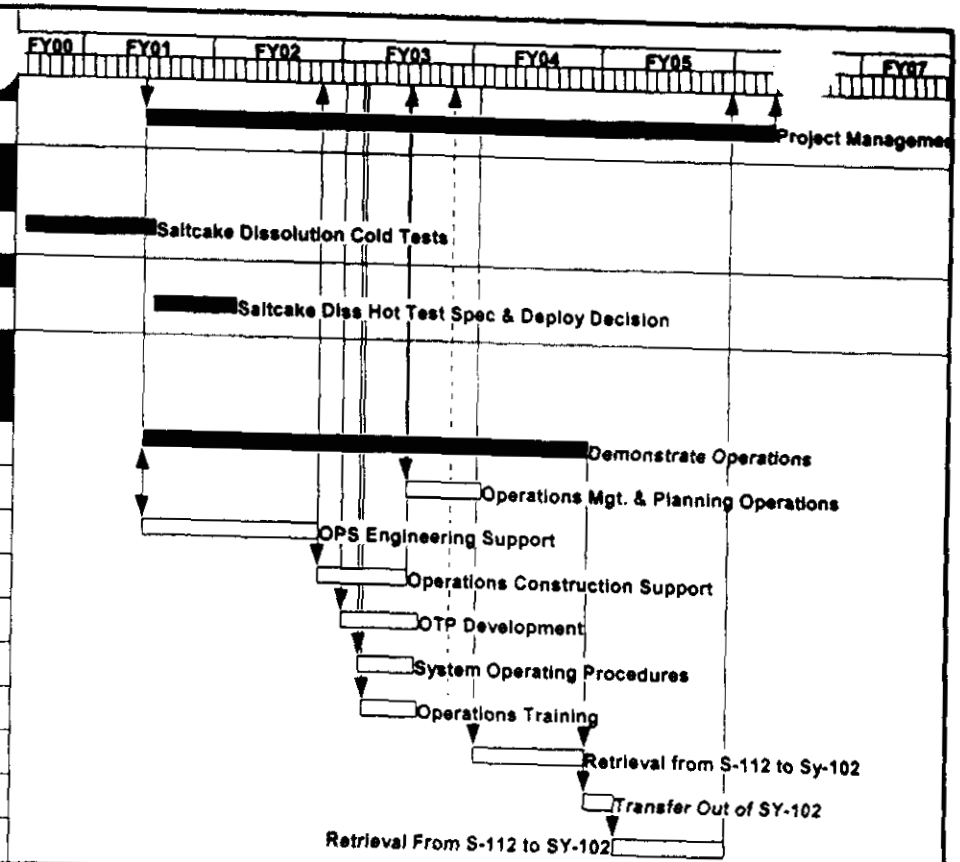
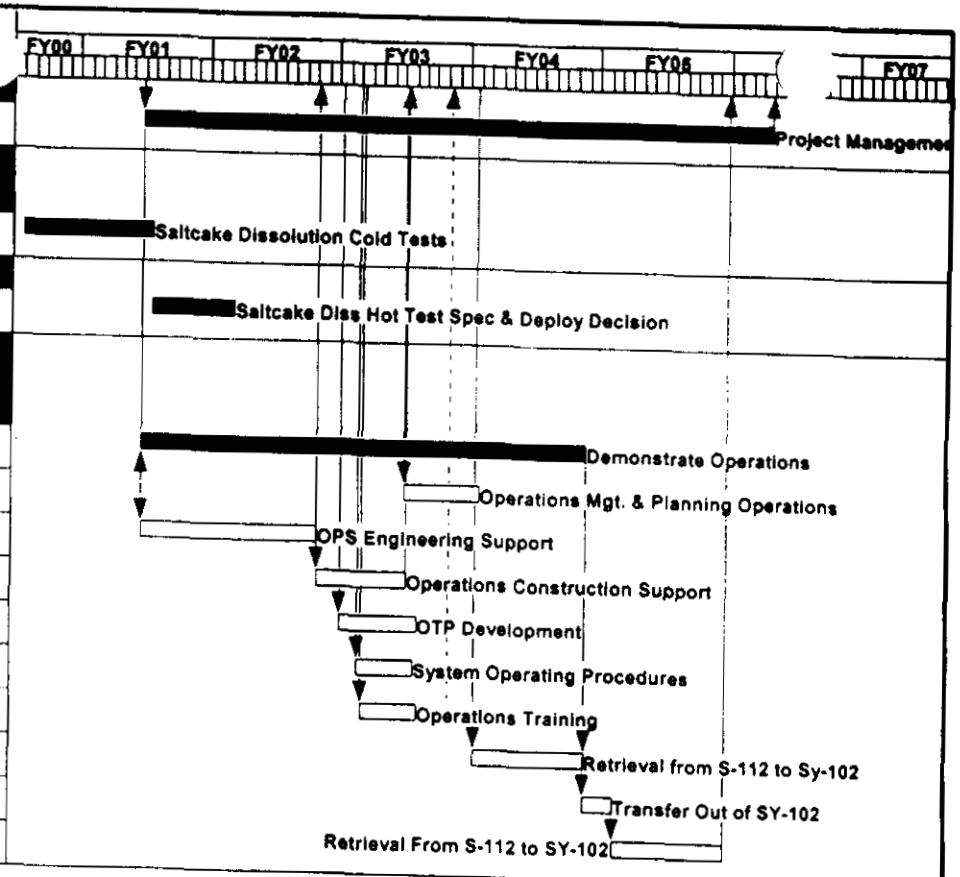
[illegible] 01 02 05				
[illegible] 01 02 05 07 Saltcake Dissolution Cold Tests				
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
[illegible] 01 02 05 08 Saltcake Diss Hot Test Spec & Deploy Decision				
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
[illegible] 01 02 09 Phase 1 SST Operations				
[illegible] 01 02 09 05				
[illegible] 01 02 09 05 07 S-103 Demonstration Operations				
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
101 04 01 02 05 04 09 Project Management				
49A0000	Project Management	1,220*	26MAR01	26JAN06
101 04 01 02 05				
101 04 01 02 05 07 Saltcake Dissolution Cold Tests				
26215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
101 04 01 02 05 08 Saltcake Diss Hot Test Spec & Deploy Decision				
26220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
101 04 01 02 09 Phase 1 SST Operations				
101 04 01 02 09 05				
101 04 01 02 09 05 07 S-103 Demonstration Operations				
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



Activity ID	Activity Description	Orig Dur	Early Start	Early Fin
1.01.04.0	04.09 Project Management			
49A0000	Project Management	1,220*	26MAR01	26JAN06
1.01.04.01.02.05				
1.01.04.01.02.05.07	Saltcake Dissolution Cold Tests			
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
1.01.04.01.02.05.08	Saltcake Diss Hot Test Spec & Deploy Decision			
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
1.01.04.01.02.09	Phase 1 SST Operations			
1.01.04.01.02.09.05				
1.01.04.01.02.09.05.07	S-103 Demonstration Operations			
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



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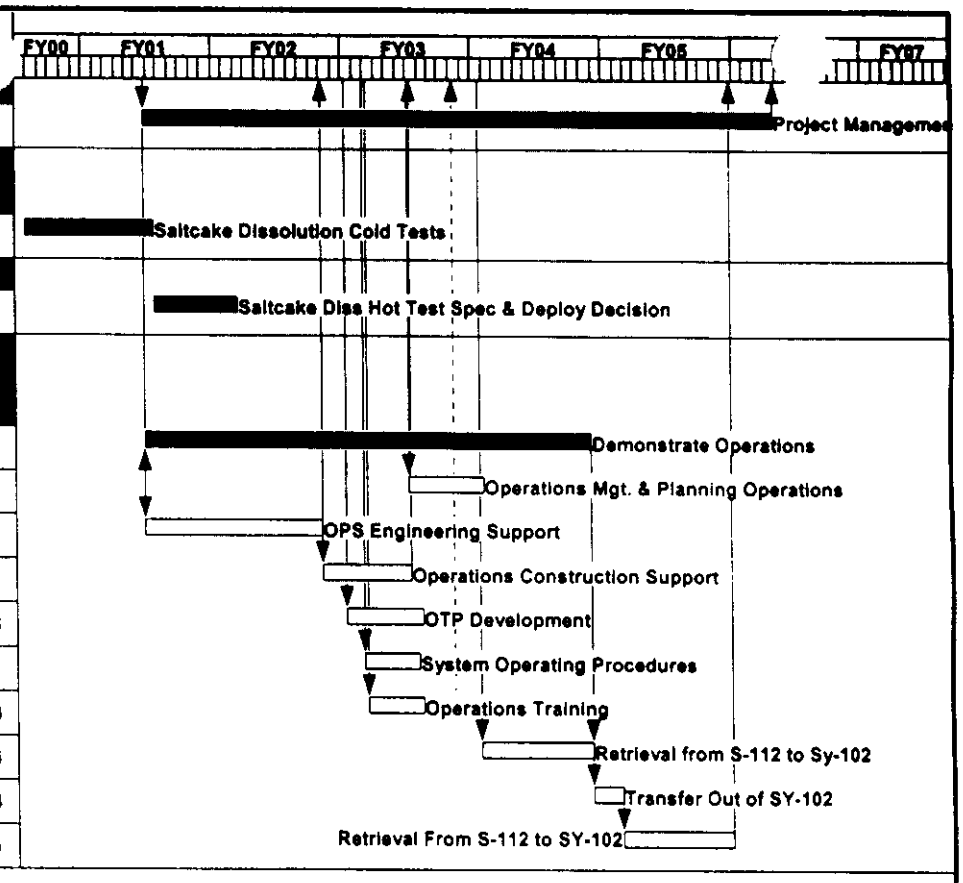
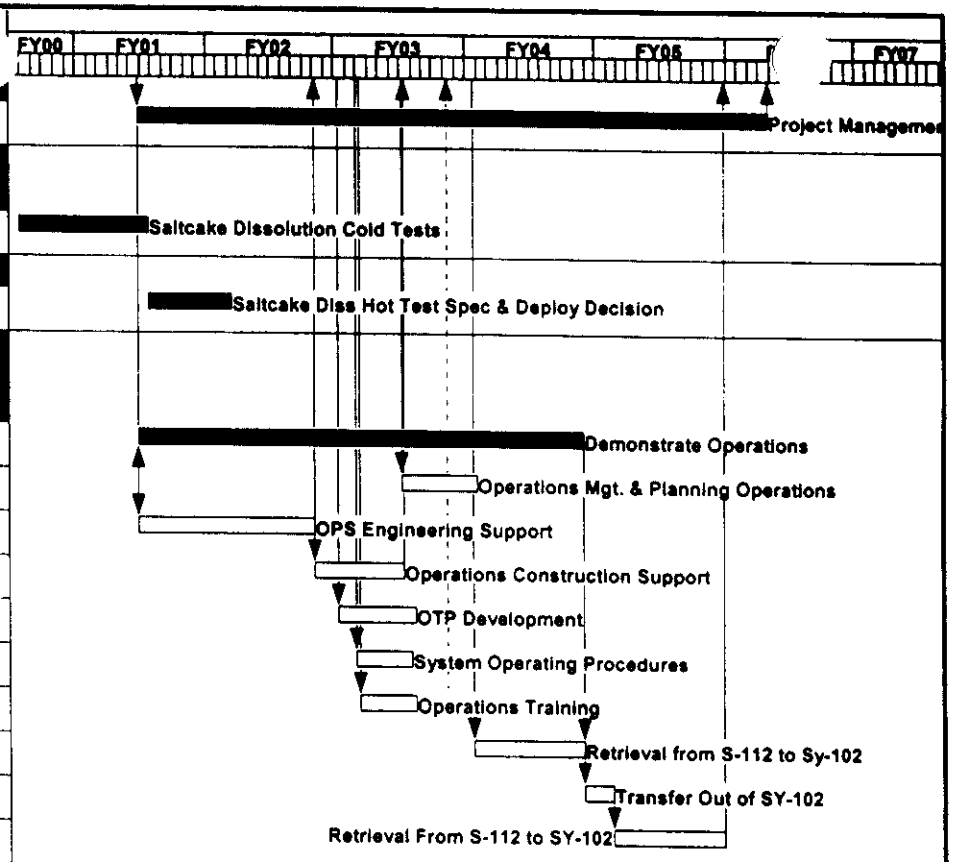
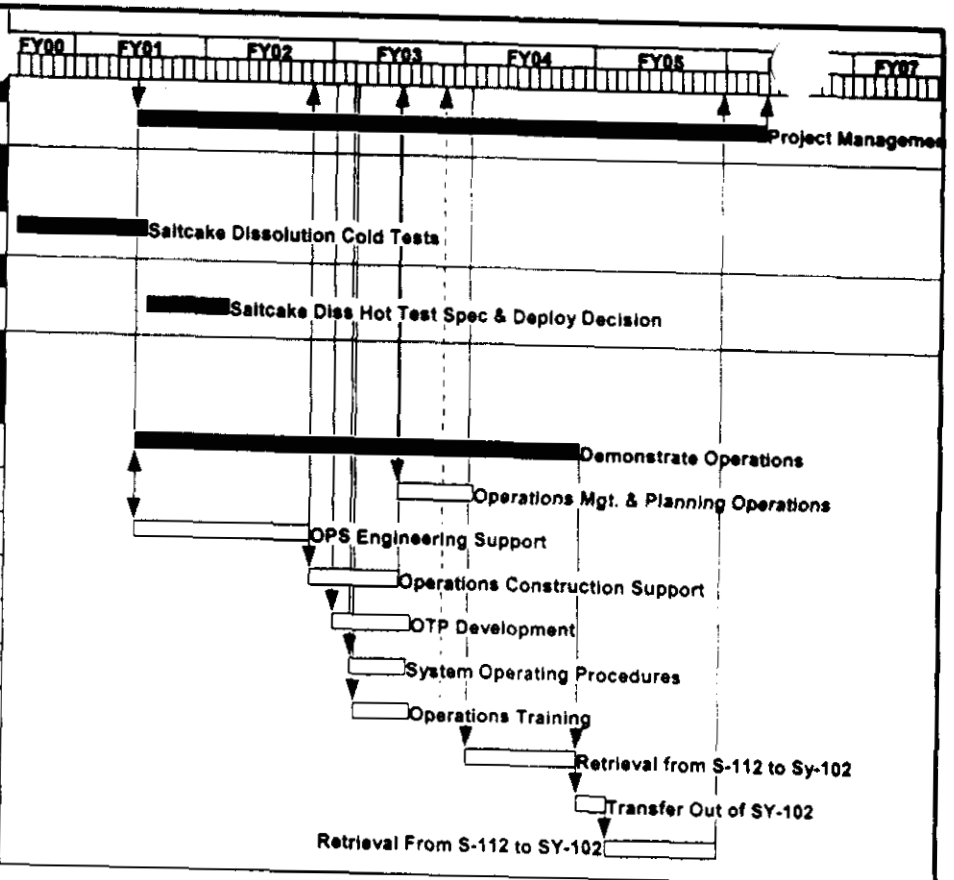
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.0[illegible]	[illegible].04.09 Project Management			
49A0000	Project Management	1,220*	26MAR01	26JAN06
1.01.04.01.02.05				
1.01.04.01.02.05.07	Saltcake Dissolution Cold Tests			
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
1.01.04.01.02.05.08	Saltcake Diss Hot Test Spec & Deploy Decision			
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
1.01.04.01.02.09	Phase 1 SST Operations			
1.01.04.01.02.09.05				
1.01.04.01.02.09.05.07	S-103 Demonstration Operations			
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.01.04.09 Project Management				
49A0000	Project Management	1,220*	26MAR01	26JAN06
1.01.04.01.02.05				
1.01.04.01.02.05.07 Saltcake Dissolution Cold Tests				
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
1.01.04.01.02.05.08 Saltcake Diss Hot Test Spec & Deploy Decision				
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
1.01.04.01.02.09 Phase 1 SST Operations				
1.01.04.01.02.09.05				
1.01.04.01.02.09.05.07 S-103 Demonstration Operations				
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.01.02.04.09 Project Management				
49A0000	Project Management	1,220*	26MAR01	26JAN06
1.01.04.01.02.05				
1.01.04.01.02.05.07 Saltcake Dissolution Cold Tests				
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
1.01.04.01.02.05.08 Saltcake Diss Hot Test Spec & Deploy Decision				
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
1.01.04.01.02.09 Phase 1 SST Operations				
1.01.04.01.02.09.05				
1.01.04.01.02.09.05.07 S-103 Demonstration Operations				
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



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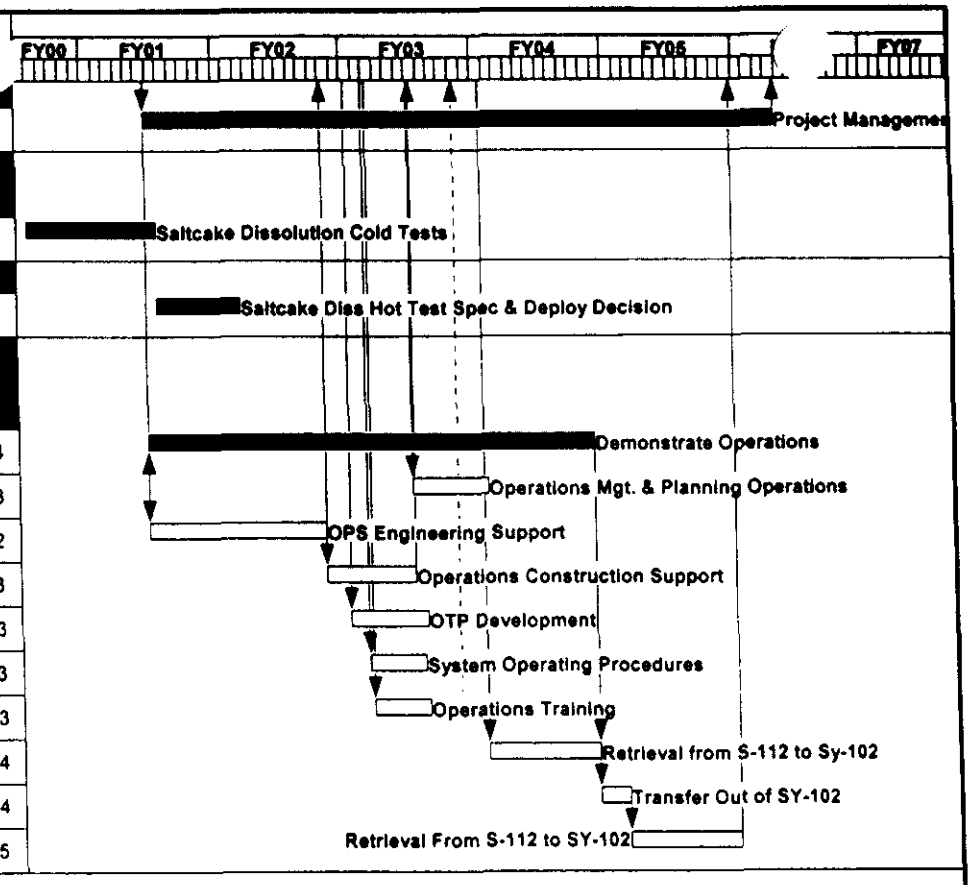
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.01.02.04.09 Project Management				
49A0000	Project Management	1,220*	26MAR01	26JAN06
1.01.04.01.02.05				
1.01.04.01.02.05.07 Saltcake Dissolution Cold Tests				
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
1.01.04.01.02.05.08 Saltcake Diss Hot Test Spec & Deploy Decision				
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
1.01.04.01.02.09 Phase 1 SST Operations				
1.01.04.01.02.09.05				
1.01.04.01.02.09.05.07 S-103 Demonstration Operations				
57A	Demonstrate Operations	866*	28MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



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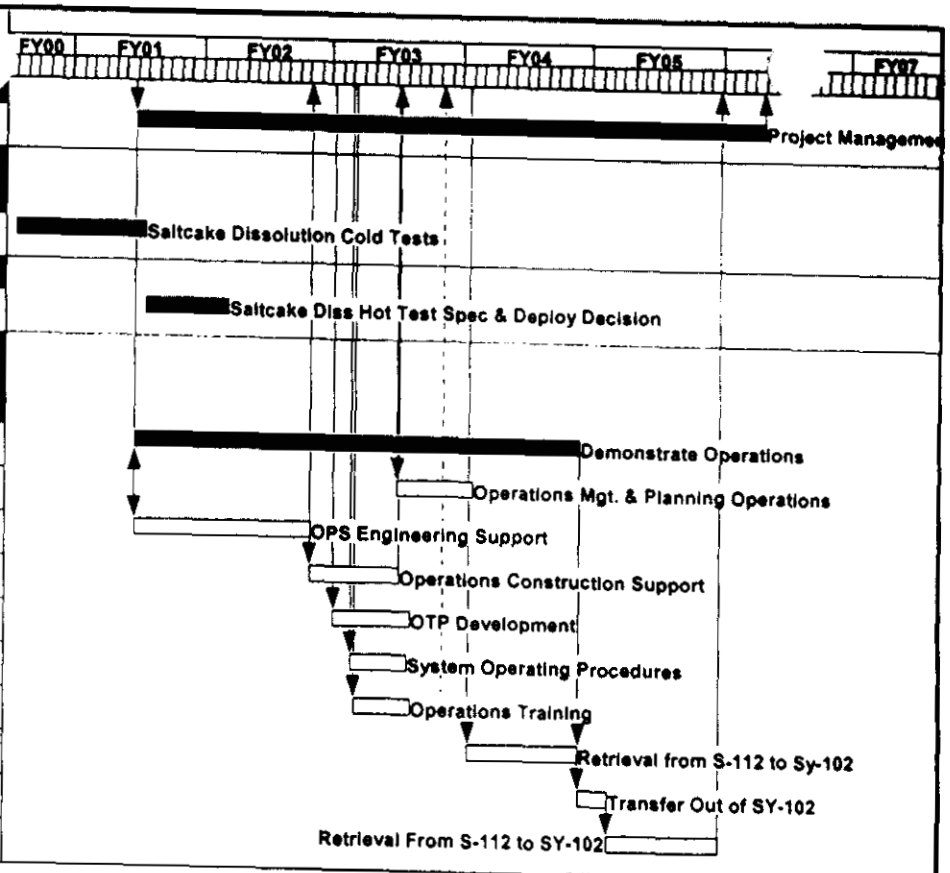
Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04.0	04.09 Project Management			
49A0000	Project Management	1,220*	26MAR01	26JAN06
1.01.04.01.02.05				
1.01.04.01.02.05.07	Saltcake Dissolution Cold Tests			
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
1.01.04.01.02.05.08	Saltcake Diss Hot Test Spec & Deploy Decision			
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
1.01.04.01.02.09	Phase 1 SST Operations			
1.01.04.01.02.09.05				
1.01.04.01.02.09.05.07	S-103 Demonstration Operations			
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
57A0400	OTP Development	148	11OCT02	14MAY03
57A0500	System Operating Procedures	105	27NOV02	30APR03
57A0600	Operations Training	106	12DEC02	14MAY03
57A0700	Retrieval from S-112 to Sy-102	214	23OCT03	27AUG04
57A0710	Transfer Out of SY-102	60	30AUG04	22NOV04
57A0720	Retrieval From S-112 to SY-102	214	23NOV04	29SEP05



Sheet 3 of 3

Activity	Activity Description	Orig Dur	Early Start	Early Finish
1.01.04 [illegible] 03.04.09 Project Management				
49A0000	Project Management	1,220*	26MAR01	26JAN06
1.01.04.01.02.05				
1.01.04.01.02.05.07 Saltcake Dissolution Cold Tests				
28215Q	Saltcake Dissolution Cold Tests	250*	01MAY00	26APR01
1.01.04.01.02.05.08 Saltcake Diss Hot Test Spec & Deploy Decision				
28220K	Saltcake Diss Hot Test Spec & Deploy Decision	160*	27APR01	13DEC01
1.01.04.01.02.09 Phase 1 SST Operations				
1.01.04.01.02.09.05				
1.01.04.01.02.09.05.07 S-103 Demonstration Operations				
57A	Demonstrate Operations	866*	26MAR01	27AUG04
57A0100	Operations Mgt. & Planning Operations	148	08APR03	04NOV03
57A0200	OPS Engineering Support	344*	26MAR01	02AUG02
57A0300	Operations Construction Support	170*	05AUG02	08APR03
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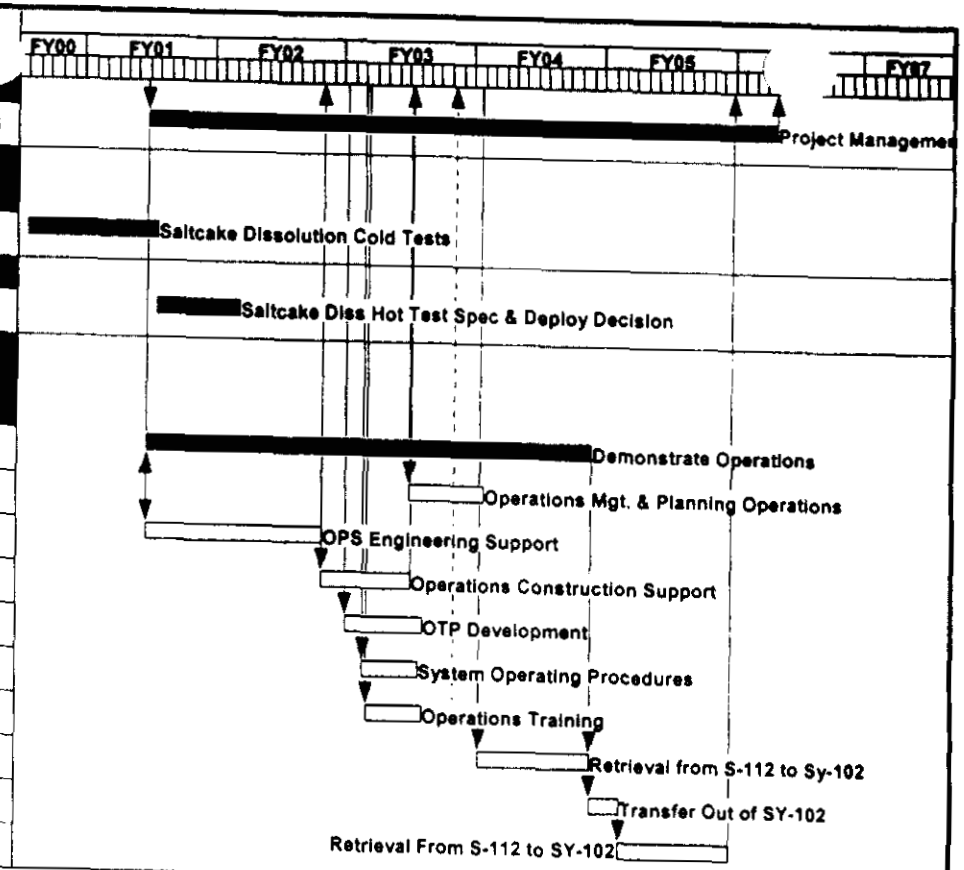

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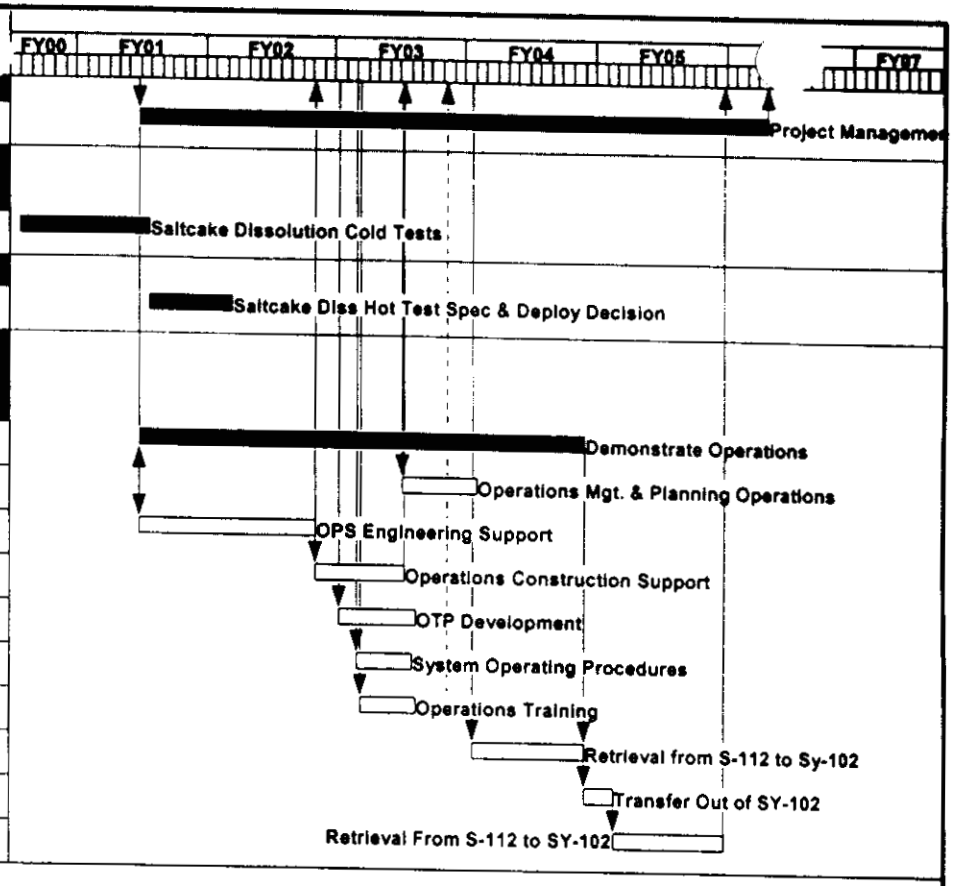

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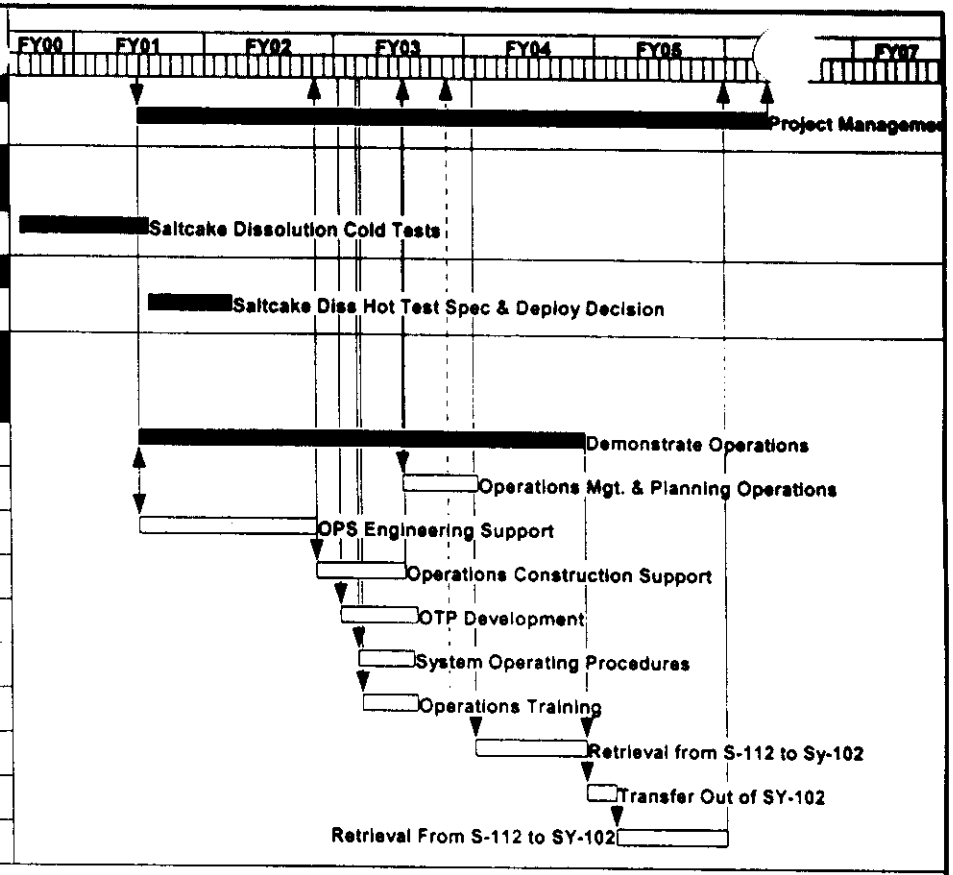

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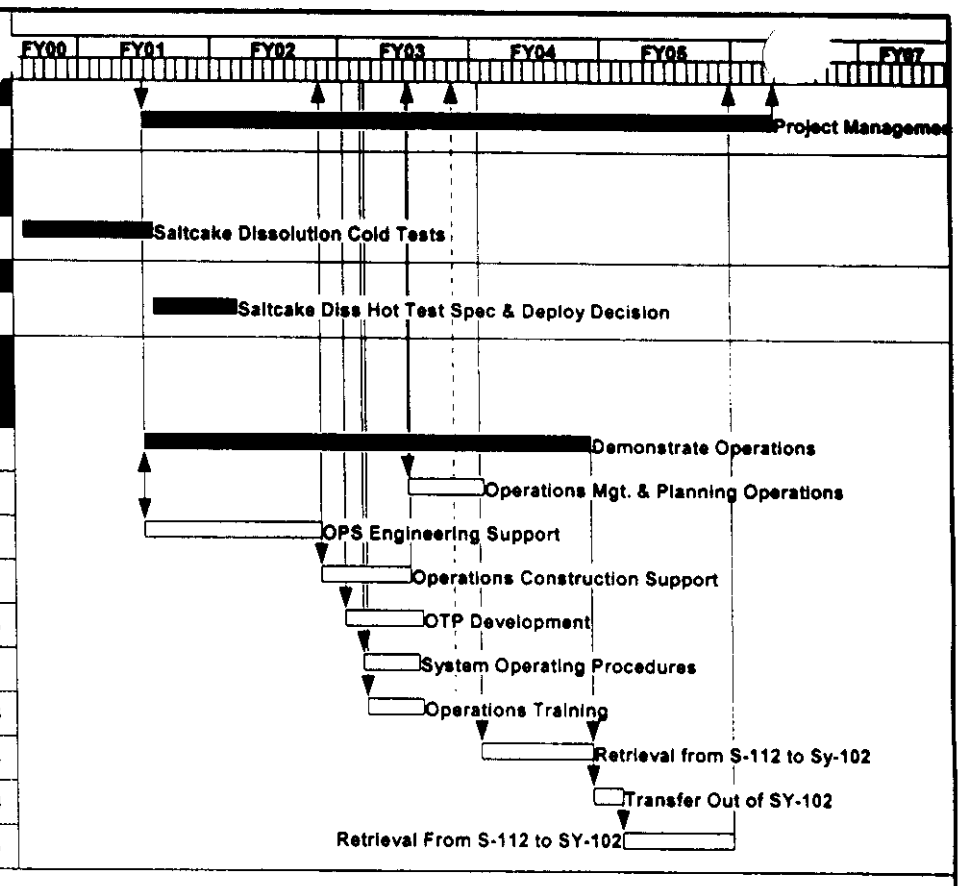

Appendix B
Construction Specification

241-S-112 SALTCAKE RETRIEVAL

OUTLINE SPECIFICATION

prepared for

CH2M HILL HANFORD GROUP, INC.

Contract No. 4412, Release 70
Report No. 990923201-001
Revision 0

December 2000

Prepared by

The HND Team

OUTLINE SPECIFICATION INDEX

Section - Specification Division	S-FARM	SY-FARM
DIVISION 2 SITEWORK		
Section 02050 Demolition	X	
Section 02200 Earthwork	X	
Section 02650 Pipe Utilities	X	
DIVISION 5 METAL		
Section 05120 Structural Steel	X	
Section 05500 Metal Fabrications	X	
Section 05555 Stainless Steel Pit Liner	X	
DIVISION 9 FINISHES		
Section 09805 Special Coatings	X	
Section 9800 Special Coatings	X	
Section 09900 Painting	X	

Section - Specification Division	S-FARM	SY-FARM
DIVISION 13 SPECIAL CONSTRUCTION		
Section 13440 Instrumentation	X	
DIVISION 15 MECHANICAL		
Section 15493 Chemical Process & Piping Systems	X	
Section 15499 Building Services Piping Systems	X	
Section 15500 Heating, Ventilating & Air Conditioning	X	
DIVISION 16 ELECTRICAL		
Section 16400 Service & Distribution	X	

OUTLINE SPECIFICATION

DIVISION 2 – SITEWORK

Section 02050 Demolition

General

Table CS-2-1 identifies equipment/components to be installed, removed/disposed of as part of the 241-S-112 (S-112) Saltcake Retrieval scope. Specific details of demolition (by tank farm) are identified below.

Table CS-2-1. Tank Equipment Removal/Installation.

TANK	RISER	SIZE (IN.)	EXISTING EQUIPMENT TO BE REMOVED	EQUIPMENT TO BE INSTALLED
S-112	002	4	Blind Flange	SHMS
S-112	006	12	Observation Port	Camera
S-112	007	12	Blind Flange	Breather Filter
S-112	011	4	None	Sprinkler
S-112	013	42	Existing Saltwell Pump	Saltwell Pump
S-112	014	4	Breather Filter, SHMS	Sprinkler
S-112	016	4	None	Sprinkler

S Farm

1. Remove saltwell pump from 241-S-112. Disposal per LLCE Program.

2. Remove breather filter. Dispose in standard burial box.

3. Relocate standard hydrogen monitoring system (SHMS).

SY Farm

1. None

Section 02200 Earthwork

S Farm

1. Excavation for underground piping and utility trenches.

2. Excavation for leveling of Chemical Injection/Sample Station Skid pad.

3. Excavation for leveling of PIC Skid pad.

4. Contaminated soil: Most soil displaced during excavation activities will be used as backfill in the general vicinity of the original excavation. ALARA concerns require the contaminated soil to be managed as any other waste generated on the Hanford Site.

5. Stabilization of disturbed areas: WSDOT M41-10, Section 9-09(3), top course.

SY Farm

1. None

Section 02650 Pipe Utilities

S Farm

1. None

SY Farm

1. None

DIVISION 5 – METALS

Section 05120 Structural Steel

S Farm

1. Rolled steel shapes and plates: ASTM A 36.
2. Steel tubing: ASTM A 500, Grade B.
3. Bolts
   a. General application: ASTM A 307, Grade A or B.
   b. Structural connections: ASTM A 325.
4. Nuts: ASTM A563, heavy hex.
5. Washers: ASTM F844, circular.
6. Welding electrode: E70XX.
7. Expansion anchors: Hilti Kwik-Bolt II.
8. General Fastening: AISC S326 and M011.
9. Deck Plating – diamond plate decking for temporary trench cover.

SY Farm

1. None

Section 05500 Metal Fabrications

S Farm

1. Steel pipe: ASTM A106, Grade B, Schedule 40.
2. Supports: Channels, nuts and bolts: Unistrut.
3. Weld studs: Nelson Type H4L.
4. Rolled steel shapes, plates, and bars: ASTM A 36.
5. Expansion Anchors: Hilti Fastening Systems Kwik-Bolt II.
6. Steel Plate Pit Cover: 3 Inch, Carbon Steel, ASTM A36.

SY Farm

1. None

DIVISION 9 – FINISHES

Section 09900 Painting

S Farm

1. Exterior metal surfaces
   a. Surface preparation: Power tools (SSPC SP 2) or commercial blast (SSPC SP 3).
   b. Application PDCA Architectural Specification Manual and manufacturer's instructions.
   c. Primer: Rust-inhibitive ferrous metal primer.
   d. Base and finish coats: Alkyd semi-gloss enamel.

SY Farm

1. None

Section 13440 Instrumentation

S Farm

1. Saltwell Skid Instrumentation – Saltwell skid instrumentation shall be specified in accordance with drawings H-14-104158 through H-14-104163.

SY Farm

1. None

DIVISION 15 – MECHANICAL

Section 15493 Chemical Process Piping Systems

S Farm

1. Materials

   a. Hose-in-hose transfer line: Specification RPP-6028, Rev. 0, *Specification for Hose in Hose Transfer Lines for Hanford's Interim Stabilization Program.*

   b. Jumper assemblies: Stainless steel, Hanford Standard HS-BS-0084 modified.

   c. Sprinkler supply hoses: 1 Inch, insulated, heat traced. O'Brien Corp., Helical Convoluted Stainless Steel, 625 psig, Type J thermocouple, or equal.

2. Equipment

   a. Saltwell Pumping System (screen, eductor, centrifugal pump, and associated piping). Reference drawing H-14-103084.

   b. Miscellaneous equipment

      i. Dunnage assembly: Tube steel with lifting attachments.

      ii. Spray Nozzles: nominal 4 gpm, <40 psig pressure drop, 90 degree spray cone, stainless steel. Spray Systems Co., Fulljet model 3/8 GANV-SS-23 or equal.

SY Farm

1. None

Section 15499 Building Services Piping Systems

S Farm

1. Materials

   a. Piping, tubing, and fittings

      i. Piping in contact with earth or concrete and not cathodically protected shall have a protective coating.

      ii. Raw Water (RW) piping: Carbon steel, Pipe Code M-5.

      iii. Piping systems fabricated and installed in accordance with ASME B31.9.

iv. Insulation: Above Grade, Flexible closed cell elastomeric thermal insulation with low-transmittance vapor barrier for -40 to +220°F temperature range. Weather resistant protective finish for outdoor applications. Armstrong "Armaflex II."

b. Equipment

i. Manual Valves

1. Ball valves: 3-piece brass body, stainless steel, Teflon seats and body seal, threaded ends (Worcester).

c. Pipe Codes

PIPE CODE M-5			
Service	Design Pressure Psig	Test Pressure psig	Design Temp °F
Filtered Water (RW)	200	300	200
Sizes	1-1/2 inch and smaller	2 – inch and larger	
Pipe	ASTM A 106, Grade B.		
Wall Thickness	Schedule 40		
Fittings (1)	ASTM A47, Grade 32510 or 35018, or ASTM A197, Class 150, threaded in accordance with ASME B16.3.	ASTM A234, Grade WPB, wrought steel, buttwelding in accordance with ASME B16.9. Wall thickness to match pipe.	

Section 15500 Heating, Ventilation, and Air Conditioning

S Farm

1. Materials

a. Duct: Stainless steel sheet: ASTM A 240, Type 304 or 304L.

b. Duct reinforcement: Stainless steel sheet: ASTM A 240, Type 304 or 304L.

Stainless steel shapes: ASTM A 276, Type 304 or 304L.

c. Duct supports and hangers

Channels and clamps: unistrut.

Carbon steel shapes: ASTM A 36.

Stainless steel shapes: ASTM A 276, Type 304 or 304L.

Carbon steel rods: ASTM A 108 with ASTM A 563 nuts and plain washers.

Fasteners: ASTM A 307, Grade A or B bolts, with ASTM A 563, heavy hex nuts, UNC threads. Finish to be cadmium plating.

d. Duct insulation: UL listed in the building materials directory, and carry UL Logo.

Insulation and adhesive shall have UL fire hazard classifications of 25 maximum for flame spread and 50 maximum for smoke developed.

Insulation for duct: 11/2" – inch thick glass fiberboard, 3 lb/ft^3 minimum density board type.

e. Insulation Jacket: Stainless steel jacket 0.010" thick.

2. Equipment

a. Ventilation Skid: Existing 500 CFM portable exhauster.

DIVISION 16 – ELECTRICAL

Section 16400 Service and Distribution

General

1. Installation of electrical components shall be per NFPA 70, National Electrical Code.

2. Heat Trace

a. Chromalox Self-regulating heating cable, Type SRL, 5 Watt per foot, 120 VAC, 150°F (65 °C) maximum maintenance temperature.

b. Local control for Heating Cable, Chromalox Type RTAS-1 22 AMP SPDT, 120 Vac.

c. Chromalox Splice and tee Kit, Catalog # RTST-1.

d. Chromalox End Seal Kit, Catalog # RTES-1.

S Farm

1. Materials

a. Conduit: PVC schedule 80 for buried applications, galvanized steel for exposed applications, liquid-tight flexible metal for interfaces with vibrating equipment and motors.

b. Conductors: Stranded copper with Type THWN/THHN or XHHW insulation.

c. Control/Signal Cable: Type TC, 600V, 90 °C copper, #14 minimum, number of conductors as required.

d. Power Cable: Type G, 600V, gauge and number of conductors as required.

e. 3-Phase Power Receptacles: 480V, 3-phase, 30A and 60A, 3-wire, cord connecting, with strain relief fitting.

f. Yellow Jacket cable / hose protection. Peterson Systems International.

3. Equipment

a. Equipment enclosures: NEMA ICS 6 Type 3R outside building.

b. Safety switches: Non-fused, 240 V AC, rated as noted on the Drawings.

SY Farm

a. None

Appendix C
Calculations

Holmes and Narver Inc.

CALCULATION COVER SHEET

Date: 8/30/01

Calculation No: 4412.070.PCAL.001
Calculation Title: 241-S-112 Saltcake Dissolution Mass Balance Calculation and Assumptions
Project No. & Title: 4412.070, 241-S-112 Saltcake Dissolution

ORIGINAL AND REVISED CALCULATION/ANALYSIS APPROVAL

	Rev. A Name/Signature/Date	Rev. ____ Name/Signature/Date	Rev. ____ Name/Signature/Date
Originator:	G.J. Bogen GJBogen 8/29/01		
Checked By:	J.J Elsen John Elsen 8/30/01		
Approved By:			
Other:			

AFFECTED DOCUMENTS

Document Number	Document Title	Rev. Number

RECORD OF REVISION

Rev.	*Reason for Revision*
A	Release

HNDTEAM DESIGN CALCULATION SHEET	Project No. 4412-070 Sheet 2 of 6
Calculation No. 4412.070.PCAL.001	PERFORMED BY : G. Bogen GB (Print & Sign) DATE 8/29/01
Rev. No. A	CHECKED BY: J. Elsen JE (Print & Sign) DATE 8/30/01
Calculation Title: 241-S-112 Saltcake Dissolution Mass Balance Calculation and Assumptions for the Lower Volume Density Gradient Method.	

INTRODUCTION

Purpose — *The purpose of the attached calculation is to estimate the following quantities for the Low Volume Density Gradient (LVDG) method:*

- *Time Required to Retrieve All Saltcake.*
- *Total Liquid Volume Sent to DST's.*

Scope — *The calculation is valid only for the retrieval method and assumptions specified.*

DESIGN BASIS

Design Inputs — This calculation provides design input for the 241-S-112 Lower Volume Density Gradient Saltcake Retrieval Method.

Criteria — Initial tank waste volume and Sodium inventory is per the 241-S-112 Best Basis Inventory Detail Report (7/31/00).

Assumptions

S-112 Initial Volumes	
Total Waste	523 Kgal
Saltcake	517 Kgal
Sludge	6 Kgal
Drainable Interstitial Liquid	81 Kgal
SY-102	
SY-102 Operating Capacity	500 Kgal
SY-102 Initial Space Available	500 Kgal
SY-102 Final Space Available	0 gal
Pump	
Waste Pump Flow Rate, Average	10 gpm
System reliability	50%
Na Inventory	
Total Na	5.84E+05 kg
Na in Saltcake	5.80E+05 kg
Na in Sludge	3.98E+03 kg
Waste Characteristics	
Saturation Pt.	10 molar Na
Interstitial Liguid initially saturated @	10 molar Na
Saturation of transferred solution	5 molar
Operations	
Line flush duration	0 gal
Sludge Removal	8 hrs
Cross-site transfer duration	60 days (to take place approximately ½ way through the dissolution process.)

241-S-112 Best Basis Inventory Calculation Detail Report

HNDTEAM DESIGN CALCULATION SHEET	Calc. #: 4412.070.PCAL.001 Rev: A Page: 3 of 6	
Design Calculation Title: 241-S-112 Saltcake Dissolution Mass Balance Calculation and Assumptions for the Lower Volume Density Gradient Method.	Orig: G Bogen Print & Initial AB	Date: 8/29/01
Project No. & Title: 4412-070, 241-S-112 Preliminary Engineering.	Checker: J Elsen Print & Initial JE	Date: 8/30/01

REFERENCES

These preliminary calculations are based on the mass balance of transfers into and out of Tank 241-S-112 for the Lower Volume Density Gradient method. For this method, water is pumped into tank 241-S-112 via 3 sprinklers located within the tank. It is assumed that the decant rate will equal the introduction rate.

METHODS

Sodium in the tank is in three phases initially, sludge, saltcake, and dissolved in liquid. The sludge will be assumed to remain in the tank after pumping is complete, thus, the Na contained in the sludge, which is negligible, can be ignored. The calculation is based on the assumption that there will only be a 50% efficiency in dissolving the salts (5 molar). This assumes that the removed solution will be diluted 1:1 from a fully saturated solution (10 molar). For less saturated solutions the dilution will be adjusted accordingly, such that the removed solution is always 5 molar Na. The Interstitial Liquid is assumed initially to be saturated to 10 molar Na.

Once each week, operations are suspended for eight hours to back flush the transfer lines into 241-S-112 to reduce the potential for future line pluggage. The back flush water is assumed to remain in the tank for a long enough period of time to become concentrated to minimum 5 molar Na and will therefore be counted as part of the total liquid volume sent to the DST.

RESULTS AND CONCLUSIONS

In conclusion, the following results address each required estimate stated in the "Purpose":

- Time Required to Retrieve All Saltcake
  <u>254 days</u>
- Total Liquid Volume Sent to DST's
  <u>1.34 million gallons</u>

HNDTEAM DESIGN CALCULATION SHEET	Calc. #: 4412.070.PCAL.001 Rev: A Page: 4 of 6	
Design Calculation Title: 241-S-112 Saltcake Dissolution Mass Balance Calculation and Assumptions for the Lower Volume Density Gradient Method.	Orig: G Bogen Print & Initial GB	Date: 8/29/01
Project No. & Title: 4412-070, 241-S-112 Preliminary Engineering.	Checker: J Elsen Print & Initial JE	Date: 8/30/01

Initial Waste Volumes and Sodium Content Calculations

Based on the current BBI there is 517 Kgal saltcake, 6 Kgal sludge, and 81 Kgal Interstitial Liquid located in tank 241-S-112. The saltcake contains 5.80E+05 kg Na and the sludge contains 3.98E+03 kg Na which accounts for a total of 5.84E+05 kg Na.

The Interstitial Liquid within 241-S-112 (81 Kgal) accounts for the following amount of sodium based on a 10 molar saturation:

(10 moles/L)*(81,000 gal.)*(3.785 L/gal.)*(23g Na/1 mole Na)*(1 kg/1000g) = **70,515 kg Na**

Determining the amount of Sodium (Na) contained in the saltcake can be performed by subtracting the amount of Na within the Interstitial Liquid and the Sludge from the total amount.

Na_{Total}-Na_{Sludge}-$Na_{Interstitial\ Liquid}$ = $Na_{Saltcake}$

(584,000 kg Na) – (3980 kg Na) – (70,515 kg Na) = **509,505 kg Na**

Salt Density and Dissolution Ratio Calculation

The "Na density" within the saltcake, excluding the Na in the interstitial liquid, can be determined by dividing the volume of the Na in the saltcake by the total amount of saltcake within 241-S-112.

509,505 kg Na / 517,000 gallons saltcake = **0.99 kg Na/gallon saltcake**

One gallon of 10 molar Na solution contains the following "Na density".

(3.785L/gal)*(10 mol Na/L)*(23 g Na/1 mol Na)*(1 kg/1000g) = **0.871 kg Na/gal solution**

As discussed previously, the solution removed is assumed a constant 5 molar Na, due to anticipated retrieval inefficiencies and dilution.

(0.871 kg Na/gal soln)*(5 molar Na)/(10 molar Na) = **0.435 kg Na/gal soln.** @ 5 molar Na concentration.

The dissolution ratio can now be calculated by determining the amount of saltcake that must be dissolved to obtain 1 gallon of 5 molar Na solution.

(1 gal 5 molar Na soln)*(0.435 kg Na/gal soln.)*(1 gal saltcake/0.99 kg Na) = **0.44 gal saltcake**

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Project No. & Title: 4412-070, 241-S-112 Preliminary Engineering.	Checker: J Elsen Print & Initial JE	Date: 8/30/01

Inversely (1/0.44), for every one gallon of saltcake from 241-S-112, 2.27 gallons of 5 molar Na solution will be obtained.

Therefore, the dissolution ratio is **2.30:1**. That is, for each gallon of waste recovered, 2.3 gallons of solution will be received into the DST system.

Time required to Retrieve All Saltcake Calculation

Assuming that 241-S-112 retrieval is based on out-put rate, interstitial liquid is counted as coming out, and sludge is counted as remaining in the tank, the duration required to retrieve all of the saltcake can be calculated as shown below:

$Na_{Total} - Na_{Sludge} = Na_{Total\ to\ be\ removed\ from\ S\text{-}112}$

(584,000 kg Na) – (3,980 kg Na) = **580,020 kg Na**

Based on an average pumpout rate of 10 gpm, the amount of Na/day removed from tank 241-S-112 can be calculated.

(10 gpm)*(60 min/hr)*(24 hr/day)*(0.435 kg Na/gal soln) = **6264 kg Na/day**

Thus, the time to retrieve all Na and saltcake from the tank can be calculated using the following equation:

$Na_{Total\ to\ be\ removed\ from\ S\text{-}112} / Na_{Amount\ removed\ per\ day}$ = Time duration to remove all Na and saltcake

(580,020 kg Na)/(6264 kg Na/day) = **92.6 days**

From past saltcake retrieval history, a 50% system reliability can be assumed. That is, the pump will be operable and removing liquids half of the time, resulting in an average removal rate of 5 gpm over the entire campaign. Thus, the actual time to retrieve all Na and saltcake from 241-S-112 is:

92.6 days * (10 gpm)/(5 gpm) = **185.2 days**

Once each week, the transfer lines are back flushed into 241-S-112 to reduce the potential for future line pluggage. It is anticipated that each flush will take 8 hours. The water added by flushing is assumed to become saturated and will not effect the total volume of water required or solution removed. The number of flushes required is calculated below:

HNDTEAM DESIGN CALCULATION SHEET	Calc. #: 4412.070.PCAL.001 Rev: A Page: 6 of 6	
Design Calculation Title: 241-S-112 Saltcake Dissolution Mass Balance Calculation and Assumptions for the Lower Volume Density Gradient Method.	Orig: G Bogen Print & Initial GB	Date: 8/29/01
Project No. & Title: 4412-070, 241-S-112 Preliminary Engineering.	Checker: J Elsen Print & Initial JE	Date: 8/30/01

(183 days/(7 days/wk)*(1 flush/wk) = **26 flushes total**

Assuming 8 hours per flush

(8 hours/flush)*(26 flushes)*(1 day/24 hours) = **8.7 days**

Thus, giving us the total duration to retrieve tank 241-S-112

185.2 days + 8.7 days = **194 days**

The current operable capacity for tank 241-SY-102 (intermediate receiver tank) is limited by the transfer pump design to approximately 5.0E+05 gallons. The anticipated solution recovery volume will exceed the available space. If the tank is initially emptied to the greatest extent possible, two transfers will be required from 241-SY-102 during the retrieval to accommodate the recovered solution. An additional transfer following the retrieval campaign will also be required, but has been excluded from the retrieval duration estimate. The time duration for a cross-site transfer is assumed to be 30 days thus giving us a new time duration shown below:

194 days + 2*(30) days = **254 days**

Total Liquid Volume Sent to DSTs Calculation

As calculated previously, the dissolution rate for the saltcake is 2.30:1. Further, the existing drainable interstitial is fully saturated, requiring dilution of 1:1. Excluding recovery of any sludge volume, the recovery will produce the following total volume of solution

[(517,000gal)*(2.30)] + [(81,000 gal)*(2)] = **1,335,590 gallons**

A simple cross check is performed below to validate this quantity.

(5.80E+05 kg Na)/(0.435 kg Na/gal soln) = **1,333,333 gallons (0.17% diff.)**

HNDTEAM

CALCULATION COVER SHEET
Form EP-3.3-1F

Date: 1/30/01

Calculation No: 4412.70.ECAL.001
Calculation Title: Electrical Power Calculations for the S-112 Saltcake Dissolution and Demonstration Project
Project No. & Title: 4412-70

ORIGINAL AND REVISED CALCULATION/ANALYSIS APPROVAL

	Rev. 0 Name/Signature/Date	Rev. _ Name/Signature/Date	Rev. _ Name/Signature/Date
Originator:	B.J. Hickman 1/30/00		
Checked By:	S.G. Romero A Bonger per telecon 1/30/01		
Approved By:			
Other:			

AFFECTED DOCUMENTS

Document Number	Document Title	Rev. Number

RECORD OF REVISION

Rev.	*Reason for Revision*
0	Release

HNDTEAM DESIGN CALCULATION SHEET	Project No. 4412-70 Sheet 2 of 5
Calculation No. 4412.70.ECAL.001	PERFORMED BY : B.J.Hickman DATE 1/30/00 Print & Sign
Rev. No. 0	CHECKED BY: S.G. Romero KAS per telecon DATE 1/30/01 Print & Sign
Calculation Title: Electrical Power Calculations for the S-112 Saltcake Dissolution and Demonstration Project	

INTRODUCTION

Purpose

The purpose of this calculation is to verify that there is adequate capacity in the 3-50 kVA transformer bank (transformers C6486P, C6487P, and C6488P) to continue to operate the S-Farm Dilution System equipment, the existing 500 cfm exhauster, new 120V heat trace for S-112, and the existing loads (see Drawing 4412-070-EDWG-102). According to the Tank Farm Cognizant Engineer, Paul Kison, the exhauster was not originally operated while the Dilution System was running (although it was designed to do so), and the connected load on the transformer bank appears to be quite substantial. As such, it was felt that a calculation was merited to determine whether the transformer bank would require upgrading to support the new loads and continued operation of the S-Farm Dilution System equipment.

Scope

The scope of this calculation is to estimate, using metering data and engineering judgment, the degree of loading expected at the subject transformer bank. Although the S-112 Saltcake Dissolution and Demonstration Project is also adding a new Saltwell Skid load to the 241-S Distribution Station (see Drawing 4412-070-EDWG-101), a calculation was not deemed necessary because the 241-S Distribution Station was specifically designed to support saltwell skid loads, and by the time this project is installed, Interim Stabilization activities are expected to be finished at S-Farm, thereby presenting no competing demand for the power supply at the 241-S Distribution Center.

DESIGN BASIS

Design Inputs

The design inputs for this calculation were:

1. One-line diagram for the 241-SX power rack (ECN 658899).
2. Drawing for the 244-S-271 Service Distribution Panelboard A and 302A Catch Tank (H-14-030053, Sh 1.)
3. Metering data for above loads (Items 1 and 2) from DynCorp Electrical Utilities. (Prior to ECN 658899, the source of power for these loads was a 2400V system that was metered

separately).

4. One-line diagram for the S-Farm Dilution System (Dwg H-14-030033, Sh1).

5. Metering data for the S-Farm Dilution System from DynCorp Electrical Utilities.

6. Conversations with Ray Merriman, CHG Equipment Engineering (372-2192), who did an informal load study on the same transformer bank to prepare ECN 658899.

7. Conversations with Jim Uecker, DynCorp Utilities (373-1930).

8. Conversations with Rich Larson, CHG Tank Farms Electrical Engineering (373-9100).

9. National Electrical Code, NFPA 70.

Criteria The primary criterion for this calculation is that the S-Farm Dilution System, with the additional loads of the exhauster and new heat trace, must be able to operate in conjunction with the normal duty cycle of the loads on the 241-SX power rack without overloading the 150kVA transformer bank.

Assumptions Assumptions for the calculation are as follows:

1. The exhauster and the heat trace will be considered new loads, and considered continuous duty. (The exhauster feeder will require voltage drop calculations during definitive design.)
2. The metering data represents all of the existing loads served by the subject transformer bank.

REFERENCES

1. ECN 658899 (241-SX Power Rack One-Line Diagram)
2. H-14-030033, Sh. 1, (Dilution Power System One-Line Diagram)
3. Drawing for the 244-S-271 Service Distribution Panelboard A and 302A Catch Tank (H-14-030053, Sh 1.)
4. Metering Data from meter number 78-803-820 (Dilution Power System

5. Metering Data from meter number 30-980-818 (old 2400V service to loads shown on ECN 658899 and H-14-030053, Sh1.).
6. National Electrical Code, NFPA 70.
7. Drawing 4412-070-EDWG-101.
8. Drawing 4412-070-EDWG-102.

METHODS

Metering Data

Month	Demand kW at 241-SX system meter	Average kW at 241 SX system meter	Demand kW at dilution system meter	Average kW at dilution system meter
Jun-98	11	9		
Aug-98	10	8		
Sep-98	11	9		
Oct-98	12	9		
Nov-98	19	15		
Dec-98	22	18		
Jan-99	24	19		
Feb-99	26	21		
Mar-99	23	18		
Apr-99	18	14	21	2
May-99	20	16	39	7
Jun-99	17	13	22	2
Jul-99	24	10	8	1
Aug-99	24	7	21	4
Sep-99	24	7	8	1
Oct-99	24	7	11	1
Nov-99	24	8	22	4
Dec-99	24	12	22	3
Jan-00	24	10	13	3
Feb-00	24	9	24	3
Mar-00	24	10	37	7
Apr-00	24	9	41	6
May-00	24	10	31	4
Jun-00	24	7	31	2
Max kW =	**26**	**21**	**41**	**7**

To be conservative, the maximum demand kW from both systems are added (according to Jim Uecker of DynCorp Utilities, these metering data represent ALL of the existing load on the transformer bank):

26kW + 41kW = 67kW

HNDTEAM DESIGN CALCULATION SHEET		Calc. #:4412.70.ECAL.001 Rev: 0 Page: 5 of 5
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Project No. & Title: 4412-70 - S-112 Saltcake Dissolution and Demonstration Project	Checker: S.G. Romero Print & Initial KAS per telecon	Date: 1/30/01

Assuming a conservative power factor of 0.80:

67kW / 0.80 = ~ 84kVA

In Article 220-35 of the National Electrical Code, metering data is allowed to be used for analysis as follows:

"For the purposes of allowing additional loads to be connected to existing feeders and services, its shall be permitted to use actual maximum kVA demand figures to determine the existing load on a service or feeder when all the following conditions are met:

1. *The maximum demand data is available in kVA for a minimum of a one-year period.*
2. *The existing demand at 125% plus the new load does not exceed the ampacity of the feeder or rating of the service.*
3. *The feeder has overcurrent protection in accordance with section 240-3 and service has overload protection in accordance with Section 230-90."*

Existing load × 125% = 84 kVA ×1.25 = 105 kVA

Exhauster load (based off of fuse size) ≅

$$(40A \times 80\%) \times 480V \times \sqrt{3} = 27 \text{ kVA}$$

The estimated amount of heat trace required for the S-112 project will be 400 feet at 10W per foot:

$$400 \times 10W = 4 \text{ kW } (4 \text{ kVA})$$

Existing load:	105 kVA
Exhauster:	27 kVA
New heat trace:	4 kVA
Total:	**136 kVA**

RESULTS AND CONCLUSIONS

Since the transformer is rated for 150 kVA, there is adequate capacity to handle the loads projected for this project. However, since this project is only in the conceptual phase, and the transformer bank appears to be quite heavily loaded, it would be wise to re-assess the existing loads during definitive design to determine the extent of any load growth at that time (October 2003).

Appendix D
Master Equipment List

241-S-112 SALT CAKE DISSOLUTION DEMO, MASTER EQUIPMENT LIST

COMPONENT DESCRIPTION / FUNCTION	LOCATION	SAFETY CATEGORY DESIGNATION (REF DOC)	SAFETY FUNCTION	P&ID / DWG	NPH & PER-FORM CAT	QA LVL
EXISTING WASTE TANKS	S-112 & SY-102	SC (SAR-067, Sec. 4.3.4), SS (SAR-067, 4.4.1)	ORGANIC SOLVENT FIRE, FLAMMABLE GAS DEFLAGRATION, & SEISMIC ACCIDENTS; TANK FAILURE	4412-070-CDWG-102, PDWG-102, MDWG-101	PC-3	1
EXISTING PRIMARY TANK LEAK DETECTION SYSTEM	S-112 & SY-102	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.3.7)	PREVENT FLAMMABLE GAS ACCUMULATION	4412-070-PDWG-102	PC-3	1
SST VENTILATION SYSTEM	241-S-112 POR-004 SKID	SC (SAR-067, Sec. 4.3.8)	PREVENT FLAMMABLE GAS ACCUMULATION	4412-070-PDWG-101	PC-3	1
NEW RAW WATER DISTRIBUTION SYSTEM, VALVES, HOSE AND HEAT TRACE	S-FARM, S-112	GS	NONE	4412-070-PDWG-102	PC-1	3
OVER GROUND TRANSFER SYSTEM: ENCASEMENTS	S-12A PUMP PIT TO S-C VALVE PIT	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.3)	DIRECT LEAKED WASTE TO STRUCTURE, PROTECT PRIMARY ENCASEMENT	4412-070-PDWG-102, MDWG-101	PC-3	1
OVER GROUND TRANSFER SYSTEM: PIT CONNECTIONS (DOGHOUSE AND STRONG BACK)	S-012A PUMP PIT & S-C VALVE PIT	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.3)	PREVENT AEROSOL RELEASE, PROVIDE SECURE HOSE TRANSITION INTO PIT	4412-070-PDWG-102, MDWG-101	PC-3	1
OVER GROUND TRANSFER SYSTEM: HEAT TRACE	S-12A PUMP PIT TO S-C VALVE PIT	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.3)	PROTECTION FROM FREEZING	4412-070-PDWG-102	PC-3	1
EXISTING OVER GROUND TRANSFER SYSTEM: ENCASEMENTS	S-C VALVE PIT TO S-A VALVE PIT	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.3)	DIRECT LEAKED WASTE TO STRUCTURE, PROTECT PRIMARY ENCASEMENT	4412-070-PDWG-102, MDWG-101	PC-3	1
EXISTING OVER GROUND TRANSFER SYSTEM: PIT CONNECTIONS (DOGHOUSE AND STRONG BACK)	S-C VALVE PIT TO S-A VALVE PIT	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.3)	PREVENT AEROSOL RELEASE, PROVIDE SECURE HOSE TRANSITION INTO PIT	4412-070-PDWG-102, MDWG-101	PC-3	1
EXISTING OVER GROUND TRANSFER SYSTEM: HEAT TRACE	S-C VALVE PIT TO S-A VALVE PIT	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.3)	PROTECTION FROM FREEZING	4412-070-PDWG-102	PC-3	1
PIPE ENCASEMENTS: EXISTING UNDERGROUND TRANSFER LINE PIPING	S-A VALVE PIT TO SY-A VALVE PIT, SY-A VALVE PIT TO SY-02A PUMP PIT	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.6)	DIRECT LEAKED WASTE TO STRUCTURE	4412-070-PDWG-102, MDWG-101	PC-3	1
EXISTING TANK LEVEL MONITORING SYSTEM	S-112 & SY-102	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.9)	SUPPORT TEMP MONITORING; PREVENT ORGANIC REACTION	4412-070-PDWG-101	PC-3	1
EXISTING TANK TEMPERATURE MONITORING SYSTEM	S-112 & SY-102	SS (SAR 067 R1-F, ECN 650166, Sec. 4.4.10)	TANK BUMP; PREVENT ORGANIC REACTION	4412-070-PDWG-101	PC-3	1
NEW PIT TRANSFER LEAK DETECTION SYSTEM(S)	S-C VALVE PIT, S 12A PUMP PIT	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.11)	MITIGATE WASTE TRANSFER ACCIDENT	4412-070-PDWG-102	PC-3	1
EXISTING PIT TRANSFER LEAK DETECTION SYSTEM(S)	S-A VALVE PIT, SY-A VALVE PIT, & SY-02A PUMP PIT	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.11)	MITIGATE WASTE TRANSFER ACCIDENT	4412-070-PDWG-102	PC-3	1

241-S-112 SALT CAKE DISSOLUTION DEMO, MASTER EQUIPMENT LIST

COMPONENT DESCRIPTION / FUNCTION	LOCATION	SAFETY CATEGORY DESIGNATION (REF DOC)	SAFETY FUNCTION	P&ID / DWG	NPH & PER-FORM CAT	QA LVL
VENT STACK CAM INTERLOCK	S-112	SS FOR HEPA FAILURE / HIGH TEMPERATURE (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.13)	LIMIT RAD RELEASE		PC-3	1
EXISTING VENT STACK CAM INTERLOCK	SY-102		LIMIT RAD RELEASE		PC-3	1
SERVICE WATER PRESSURE INTERLOCK / ALARM	S-112	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.15)	PREVENT WASTE LEAK INTO SERVICE WATER SYSTEM		PC-3	1
ISOLATION VALVES	S-FARM PITS & SY FARM PITS	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.18)	LIMIT WASTE MISROUTING	4412-070-PDWG-102	PC-3	1
MASTER PUMP SHUTDOWN AND ALARM	S-112 & SY-102	SS (SAR 067 REV. 1-F, ECN 650166, Sec. 4.4.19)	LIMIT WASTE LEAKED, LEAK DURATION AND EXPOSURE	4412-070-PDWG-102	PC-3	1
ELECTRICAL POWER	S-FARM & SY FARM	SC, SS OR GS AS REQUIRED	SUPPORT SYSTEM FUNCTION	4412-070-EDWG-101 & 102	PC-1	1
EXISTING RAW WATER SUPPLY SYSTEM, SERVICE WATER BACKFLOW PREVENTER	S-FARM	GS (SAR 067 REV. 1-F, ECN 650166)	NONE	ECN 660754	PC-1	3
SALTWELL PUMP SYSTEM, INSTRUMENTATION AND CONTROL	241-S-112 S-12A	GS (SAR 067 REV. 1-F, ECN 650166)	TSR-006, AC 5.9, IN TANK EQUIPMENT	4412-070-PDWG-102	PC-1	3
S-112 CAMERA SYSTEM	S-112	GS (HNF-SD-WM-TSR-006, AC 5.10, CLASS 1, DIV. 2)	TSR-006, AC 5.9, IN TANK EQUIPMENT	4412-070-PDWG-102	PC-1	3
IN-TANK SPRINKLERS	S-112	GS (HNF-SD-WM-TSR-006, AC 5.10, CLASS 1, DIV. 2)	TSR-006, AC 5.9, IN TANK EQUIPMENT	4412-070-PDWG-102	PC-1	3
PIT COVERS AND ABOVE GROUND STRUCTURES	S-FARM & SY FARM	GS (SAR 067 REV. 1-F, ECN 650166)	NO TRANSFER SAFETY FUNCTION	4412-070-PDWG-102 & MWDG 101	PC-1	3
PIC SKID, PROCESS INSTRUMENTATION, MONITORING AND CONTROL	S-FARM & SY FARM	GS (SAR 067 REV. 1-F, ECN 650166)	NO TRANSFER SAFETY FUNCTION	4412-070-PDWG-102	PC-1; PC-3 FOR PUMP S/D	3, 1 FOR PUMP S/D
CHEMICAL INJECTION	S-112 WATER DISTRIBUTION SYSTEM	GS (SAR 067 REV. 1-F, ECN 650166)	NO TRANSFER SAFETY FUNCTION	4412-070-PDWG-102	PC-1	3
NEW S-C-VALVE PIT JUMPERS	S-C VALVE PIT	GS (SAR 067 REV. 1-F, ECN 650166)	NO TRANSFER SAFETY FUNCTION	4412-070-PDWG-102	PC-1	3

APPENDIX E
COMPLIANCE MATRIX

COMPLIANCE MATRIX

Detailed technical Functions and Requirements (F&Rs) for the Saltcake Dissolution Retrieval Demonstration at Tank 241-S-112 are defined in RPP-7598, Rev. 0, *Tank 241-S-112 Waste Retrieval System Level 2 Specification.* The following table provides traceability of the 241-S-112 requirements to the current design for the 241-S-112.

Level 2 Specification Section	Requirement or Objective	Comments
3.1.2.1	The 241-S-112 WRS shall interface with new and existing utilities and infrastructure systems. The following utilities are currently available at the S and SY tank farms. The adequacy of these utilities for accomplishing retrieval will be determined and refined during preliminary engineering and conceptual design. • **SST/DST Electrical Power System**. The amount of three-phase 480 V and 60 Hz power available to the 241-S-112 WRS is documented on H-14-030033, Sheets 1-3. The electrical power needs of the 241-S-112 will be determined during preliminary engineering and conceptual design. • **DST Raw Water System**. The raw water available to the 241-S-112 WRS is a 10.1 cm (4 in.) diameter line outside the SY tank farm at the SY service water pit or at a main adjacent to the 242-S evaporator, at a pressure of 482 kPa (70 psig) (TBR). Raw water sources are documented on H-14-021831, Sheets 1 and 2. • **DST Confinement Subsystem**. For the combination of waste in tank 241-S-112 and the dilution fluids required for retrieval, the available space in the DST System is assumed to require a cross-site transfer for retrieval.	**This requirement is met at a conceptual level.** The 241-S-112 WRS Preliminary Engineering Report (PER) identifies the system interfaces with the SST/DST Electrical Power System, Raw Water System, and DST Confinement System. These interfaces will be re-examined and refined, as required, during the project's conceptual design phase.
3.1.2.1.1	The 241-S-112 WRS shall accept control signals from the Master Monitor & Control System to effect the safe shutdown of waste transfer, as appropriate (e.g., leak detection, service water pressure switch interlock). Note that these shutdown signals are designated safety significant.	**This requirement is met at a conceptual level.** The PIC skid will coordinate all necessary local alarms and functions (see drawing 4412-70-IDWG-101).

Level 2 Specification Section	Requirement or Objective	Comments
3.1.2.2.1	The 241-S-112 WRS shall interface with the existing tank 241-S-112 risers and pump pit shown in Drawing H-14-010633, sheet 2, Rev. 0 (see also drawing H-2-73191, Rev. 5). The interface point with the risers is either a flange located inside the pit or as otherwise defined in the applicable pit drawings. The WRS may interface with existing tank risers that are off vertical up to 5 degrees. The tank risers may be out of round.	**This requirement is met at a conceptual level.** See 4412-70-CDWG-102, and -PDWG-102 for riser usage and proposed routing.
3.1.2.2.2	The 241-S-112 WRS shall interface with the existing risers and pump pits in the DST SY receiver tanks shown in drawings H-14-010531, Sheets 1 & 2, Rev. 7.	**This requirement is met at a conceptual level.** See 4412-70-CDWG-102, and -PDWG-102 for riser usage and proposed routing.
3.2.1.1.a	The 241-S-112 WRS shall control structure and waste temperatures in tank 241-S-112 within the following specified design limits to prevent tank structural failure: Temperatures: Maximum 149 °C (300 °F) for waste Maximum 121 °C (250 °F) for dome Maximum change of 11 °C (20 °F) per day for bulk waste temperature in the tank. (Note: Operational limitations on in-tank temperatures will be established as part of pre-conceptual and conceptual design activities (TBD-RPP-8464); however, normal bulk waste temperature range for 241-S-112 is 27° to 29 °C [80° to 85 °F] based on data from the Surveillance Analysis Computer System and any raw water additions to the tank should be at least normal bulk waste temperature).	**This requirement is met at a conceptual level.** There is an existing T/C tree in riser 4 that is currently monitored by the TMACS system. Heat removal can be accomplished by adding more water and/or increasing the amount of airflow through the tank to achieve specified design limits.
3.2.1.2	The 241-S-112 WRS shall control the waste level in tank 241-S-112 to prevent waste overflow and limit the hydrostatic head-induced stresses in the tank. Control includes monitoring waste levels, comparing monitored values to set limits, and providing signals for transfer pump shutdown at the waste level set limits.	**This requirement is met at a conceptual level.** Dip tubes will be used to monitor level in the saltwell, and a leak detection element will be provided in the central pump pit of Tank S-112. The signals will be monitored at the PIC skid. Specific control and shutdown strategies will be addressed as a part of conceptual design.
3.2.1.2.a	The 241-S-112 WRS shall prevent the waste level in tank 241-S-112 from exceeding 7.11 m (275 in.).	**This requirement is met at a conceptual level.** Dip tubes will be used to monitor level in the saltwell as well as specific gravity. The signals will be monitored at the PIC skid. Specific control strategies will be addressed in conceptual design.
3.2.1.2.b	The 241-S-112 WRS shall limit the hydrostatic forces on tank 241-S-112 such that hydrostatic forces do not exceed the force equivalent to 275 in. of waste with a specific gravity of 2.0.	**This requirement is met at a conceptual level.** The design of the sprinkler system and associated dissolution process will be optimized in conceptual design such that the hydrostatic forces on the tank will not exceed the established limits.

Level 2 Specification Section	Requirement or Objective	Comments
3.2.1.2.c	The 241-S-112 WRS shall minimize, to the extent practical, the amount of standing liquids in tank 241-S-112 during retrieval.	**This requirement is met at a conceptual level.** The design of the sprinkler system and associated process will be optimized in conceptual design such that the amount of *liquid in the tank is minimized without* compromising the dissolution process.
3.2.1.3	The 241-S-112 WRS shall control the vapor space pressure in tank 241-S-112 to prevent structural damage to the tank and maintain vapor space pressure limits established by accident analysis. *Control includes monitoring vapor space pressure,* comparing monitored values to set limits, and maintaining the vapor space pressure to within set limits.	**This requirement is met at a conceptual level.** A pressure transmitter will be provided in the dome space of Tank S-112 to monitor vapor space pressure, and an exhauster will *assist in maintaining an appropriate negative* pressure with respect to atmosphere. Specific control strategies will be addressed in conceptual design.
3.2.1.3.a	The 241-S-112 WRS shall control the vapor space pressure in tank 241-S-112 within the following *specified design limits to prevent tank structural* failure: 1. If waste level is ≥ 38.1 cm (15 in.), then -38.1 cm (15 in.) w.g. ≤ **pressure** ≤ 1.5 m (60 in.) w.g. 2. If waste level is < 38.1 cm (15 in.), then - (waste level) ≤ **pressure** ≤ 1.5 m (60 in.) w.g. (Note: Operational limits on in-tank vapor space pressure will be established as part of conceptual design. If active ventilation is required for tank 241-S-112 during waste retrieval, then it is expected that a negative vapor space pressure with respect to atmosphere will be required at all times during retrieval system operation, as this is the preferred method for verifying that ventilation is operable (HNF-SD-WM-TSR-006, *Basis for Limiting Condition of Operation (LCO) 3.2.2, Section B3.2.2)* and ensures confinement.	**This requirement is met at a conceptual level.** A pressure transmitter will be provided in the dome space of Tank S-112 to monitor vapor space pressure, and an exhauster will assist in maintaining an appropriate negative pressure with respect to atmosphere. Specific control strategies will be addressed in conceptual design.
3.2.1.4	The 241-S-112 WRS shall control the vapor space pressure in tank 241-S-112 and filter the air exhaust to restrict emissions to the environment. Control includes monitoring gaseous discharges to the environment, comparing monitored values to set limits, and restricting gaseous discharges to the limits specified in Sections 3.3.6.3.3 and 3.3.6.3.4. Periodic confirmatory measurements are required and approved methods are specified in Table 2.1 of the Hanford Site Air Operating Permit issued on 7/2/01.	**This requirement is met *in part* at a conceptual level.** A pressure transmitter will be provided in the dome space of Tank S-112 to monitor vapor space pressure, and an exhauster will assist in maintaining an appropriate negative pressure with respect to atmosphere. *The exhauster HEPA filter will* restrict particulate emissions, and the existing flammable gas monitor will detect any dangerous buildup of hazardous gasses. Monitoring for non-flammable gasses and/or gas filtration/scrubbing has not been addressed *at this point in the design.* Detailed monitoring and permitting issues will be examined during conceptual design.

Level 2 Specification Section	Requirement or Objective	Comments
3.2.1.4.a	Limits on gaseous discharges to the environments are specified in Section 3.3.6.3.3, 3.3.6.3.4 and 3.3.6.3.6.	**This requirement is met at a conceptual level.** See comments on these sections.
3.2.1.5	The 241-S-112 WRS shall be capable of removing as much of the 241-S-112 waste inventory (BBI) as technically possible with a goal of removing 99 percent of the tank contents by volume. Waste removal includes retrieving the waste from 241-S-112 and transferring the retrieved waste to the DST receiver tank. Currently, tank 241-S-112 WRS will be optimized considering regulatory, scheduling and cost considerations.	**This requirement is met** *in part* **at a conceptual level.** Water will be applied to the saltcake using sprinklers, and the dissolved saltcake waste will be transferred from Tank S-112 to Tank SY-102 using a combination of new overground hose-in-hose and existing piping and valve pits. See drawing 4412-70-CDWG-102 and -MDWG-101. However, the current design based on the use of saltwell pumping system equipment will require modifications to support the retrieval of sludge waste from Tank S-112.
3.2.1.5.a	The 241-S-112 WRS shall be designed to include appropriate controls on heat tracing, on transferred waste velocity, solids content, temperature and chemistry to preclude transfer line plugging during normal and upset conditions.	**This requirement is met** ***in part*** **at a conceptual level.** Heat trace and weight factor control will be used to ensure that waste is appropriate for transfer. However, the retrieval rate is insufficient to maintain solids in suspension. This issue is being carried as an uncertainty into conceptual design (see Section 4.2).
3.2.1.5.b	The 241-S-112 WRS shall be designed to be capable of retrieving waste with the following waste properties: Liquid Density: 1.1 to 1.35 kg/L Liquid Viscosity: 0.005 to 0.1 g/cm-s (0.5 to 10 cP) Solids Density: 3.0 kg/L maximum Solids Diameter: 275 μm maximum Solids Volume Percent: 10% maximum Waste Temperature: 80 °C (176 °F) maximum	**This requirement is met** ***in part*** **at a conceptual level.** The proposed design is capable of retrieving liquids from Tank S-112 in accordance with the specified properties; however, the retrieval pump (saltwell pump) is insufficient to recover and transfer significant amounts of solids (sludge) from the tank. This issue is being carried as an uncertainty into conceptual design (see Section 4.2).
3.2.1.5.c	The 241-S-112 WRS shall not introduce more than 2.83 m^3 per minute (100 cfm) of air at standard conditions into the 241-SY-102/241-SY-101 ventilation system during waste transfer operations.	**This requirement is met at a conceptual level.** The transfer pump will not have mechanical seals with a potential to leak.
3.2.1.5.d	The 241-S-112 WRS shall be designed to operate around the existing 241-S-112 "in-tank-hardware" (as necessary (e.g., installed equipment, wires, 50-100 ft steel tapes, and other debris.	**This requirement is met at a conceptual level.** The water will be applied to the waste surface at a very low energy, and the spray pattern will be adjusted as required to reach around in-tank hardware. The saltwell pump is equipped with a screen to eliminate debris from being trapped by the pump.

Level 2 Specification Section	Requirement or Objective	Comments
3.2.1.6	The 241-S-112 WRS shall monitor and control the process for retrieving waste from tank 241-S-112.	**This requirement is met at a conceptual level.** The monitoring and control parameters will be monitored by the PIC skid and/or the existing system at the 242-S building, as appropriate. A link between monitoring systems will be established.
3.2.1.6.1	Waste removal process parameters (e.g., waste transfer line pressures, flow rates, waste densities), environmental safety parameters (e.g., leak detection), and pertinent equipment parameters shall be monitored and controlled for safe and effective operation of the 241-S-112 WRS.	**This requirement is met at a conceptual level.** The subject parameters will be monitored by the PIC skid and/or the existing system at the 242-S building, as appropriate. A link between monitoring systems will be established.
3.2.1.6.1.a	The 241-S-112 WRS shall be designed to provide the required output signals (e.g., temperature and level) to the Master Monitor and Control System (see Figure 3-2) in a protocol compatible with that system.	**This requirement is met at a conceptual level.** Signals from both Tanks S-112 (via the PIC skid) and SY-102 will be received at the MMCS.
3.2.1.6.1.b	The 241-S-112 WRS shall be operated and monitored from a control station outside the S farm fence or at the pumping instrumentation and control skid. Manually operated valves may be included in the 241-S-112 WRS design.	**This requirement is met *in part* at a conceptual level.** For convenience of operations and consistency with previous saltwell practices, the saltwell skid will be located inside the fence, near Tank S-112. However, monitoring will be done remotely via an interface with the MMCS.
3.2.1.6.1.c	The 241-S-112 WRS shall be capable of providing real time video monitoring of in-tank retrieval operations.	**This requirement is met at a conceptual level.** A CCTV camera will be located in riser 6.
3.2.1.6.1.d	The 241-S-112 WRS shall include features to shut down waste retrieval pumps and primary motive power on any failure of the primary containment of any out-of-tank waste handling, transfer, or storage facilities.	**This requirement is met *in part* at a conceptual level.** Existing transfer lines will drain to pits and follow pit drains back to the respective tank. This is not true for the section of temporary hose-in-hose pipe.
3.2.1.6.1.e	The 241-S-112 WRS shall have an emergency stop feature that will shut down waste retrieval pumps and primary motive power.	**This requirement is met at a conceptual level.** A shutdown of the waste retrieval system will be located at the PIC skid as well as the 242-S Evaporator.
3.2.1.6.1.f	If active ventilation is required,the 241-S-112 WRS shall include features to support shut down of the 241-S-112 ventilation upon detection of unfiltered releases from tank 241-S-112. See Sections 3.3.6.3.3 and 3.3.6.3.4.	**This requirement is met at a conceptual level.** The existing exhauster is equipped with safety shutdown interlocks that satisfy this requirement.
3.2.1.6.1.g	The 241-S-112 WRS design shall include provisions to allow logging or recording of parameters necessary for successful operation of the WRS. These parameters will defined during conceptual and detailed design (TBD-RPP-8465.)	**This requirement is met at a conceptual level.** All anticipated control and monitoring parameters have the capability to be recorded and/or logged.
3.2.1.6.2	The 241-S-112 WRS design shall be capable of detecting liquid waste releases from 241-S-112 during all waste removal operations	**This requirement is met at a conceptual level.**

Level 2 Specification Section	Requirement or Objective	Comments
3.2.1.6.2.a	The 241-S-112 WRS design shall have a probability of leak detection of 95% and a probability of false alarm less than or equal to 5%.	**This requirement is met at a conceptual level.**
3.2.6.1.2.b	The leak detection method or combination of methods shall be designed to be functional during all retrieval operations.	**This requirement is met at a conceptual level.**
3.2.1.6.3	The Leak Detection, Monitoring and Mitigation monitoring system shall quantify liquid waste release volumes from an SST if a release is detected during waste retrieval operations.	**This requirement is met at a conceptual level.**
3.2.1.7	The 241-S-112 WRS design shall allow for measuring and calculating the residual waste in 241-S-112 to evaluate the tank 241-S-112 WRS effectiveness. Waste on the walls of the tank, on and under the stiffening rings attached to the walls of the tank, on the exterior surfaces of in-tank debris, hardware, and components, and on the bottom of the tank shall be measured, as necessary. The method for measuring/calculating residual waste may be by volume, chemical constituents, or radionuclides.	**This requirement is met *in part* at a conceptual level.** A CCTV camera will be used to estimate the degree of retrieval effectiveness. Mass flow monitoring and initial tank waste volume information will increase the accuracy of this estimate.
3.2.1.8	The 241-S-112 WRS shall be designed to mitigate leaks as the primary means of minimizing environmental impact caused by releases during retrieval. If a leak occurs, the release shall be evaluated and the appropriate actions implemented.	**This requirement is met at a conceptual level.** The preliminary LDMM strategy described in the PER identifies steps to be taken during retrieval activities to mitigate tank leaks (e.g., minimizing the amount of liquids in the SST during retrieval).
3.2.2, 1st bullet	The 241-S-112 WRS may impose axial loads on 4 in. risers not to exceed 227 kg (500 lb), or impose moments not to exceed 339 N.m (250 ft-lbs) (TBR, see Appendix A remarks).	**This requirement is met at a conceptual level.** Detailed calculations will be performed in conceptual design, but engineering judgment indicates that these levels will not be exceeded.
3.2.2, 2nd bullet	The 241-S-112 WRS may impose axial loads on 12 in. or larger risers of no more than 1362 kg (3000 lb) or impose a moment of no more than 2034 N.m (1,500 ft-lbs) (TBR, see Appendix A remarks).	**This requirement is met at a conceptual level.** Detailed calculations will be performed in conceptual design, but engineering judgment indicates that these levels will not be exceeded.
3.2.2, 3rd bullet	The bottom surface of tank 241-S-112 may be used to support in-tank equipment. The maximum load imparted by the 241-S-112 WRS shall not exceed the value given by the formula: W = 2,190 x (load area diameter [cm.] + 10.8) (N) (W = 1,250 x (load area diameter [in.] + 4.25) (lbf.))	**This requirement is met at a conceptual level.** Detailed calculations will be performed in conceptual design, but engineering judgment indicates that these levels will not be exceeded.
3.2.2.1	The 241-S-112 WRS shall not exceed the maximum dome loading on existing SSTs and DSTs specified in HNF-IP-1266, Rev. 2.	**This requirement is met at a conceptual level.** Detailed calculations will be performed in conceptual design, but engineering judgment indicates that these levels will not be exceeded.
3.2.2.2	The 241-S-112 WRS shall not cause dome deflections greater than or equal to 0.61 cm (0.02 ft).	**This requirement is met at a conceptual level.** Detailed calculations will be performed in conceptual design, but engineering judgment indicates that these levels will not be exceeded.

Level 2 Specification Section	Requirement or Objective	Comments
3.2.3.1	241-S-112 WRS components shall consider the intended life of the component, if information is available, and its documented performance history in similar environments.	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.2.3.2	The 241-S-112 WRS design shall have the reliability and availability to meet the operational schedule.	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel. The majority of the equipment is familiar to saltwell operations personnel; the schedule of activities is understood.
3.2.3.3	The 241-S-112 WRS shall be operational (i.e., available) to perform pre-operational testing through the retrieval campaign, a total of which consists of (TBD-RPP-8466) days.	**This requirement is met at a conceptual level.** The equipment installed for Tank S-112 will be ready for operation in the time frame required.
3.2.3.4	In-tank, in-pit and critical components that cannot be repaired or replaced remotely shall be designed to achieve a minimum of 2 years between failures with no maintenance anticipated during the 2-year period.	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.2.3.5	The 241-S-112 WRS above-grade active components shall have a minimum design life of three years with or without preventative maintenance, regardless of operation.	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.2.4	The 241-S-112 WRS components, to the extent practical, shall be of modular design for removal, repair, or replacement.	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.2.5.1.a	The 241-S-112 WRS shall be designed for the natural environmental conditions specified in HNF-SD-GN-ER-501, Rev. 1. Guidance on the application of HNF-SD-GN-ER-501 to the 241-S-112 WRS will be provided to the architect and engineer under a separate cover.	**This requirement is met at a conceptual level.** Engineering judgment indicates that this requirement can be met. Detailed component selection will be performed in definitive design.

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3.2.5.1.b	The 241-S-112 WRS shall be designed to withstand the natural phenomena hazards as specified in HNF-IP-0842, Volume IV, Section 3.14. Guidance on the application of HNF-IP-0842, Volume IV, Section 3.14 to the 241-S-112 WRS will be provided to the architect and engineer under a separate cover.	**This requirement is met at a conceptual level.** Engineering judgment indicates that this requirement can be met. Detailed component selection will be performed in definitive design.
3.2.5.2.1	241-S-112 WRS equipment in contact with the tank waste shall be designed to perform its intended function in the chemical environment in the tanks. This environment and its context is described in HNF-SD-WM-SP-012, Rev. 2, Appendix B.	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel
3.2.5.2.2.a	The 241-S-103 WRS shall be designed for operating in the following 241-S-103 in-tank environmental conditions: In-tank radiation dose rate: defined in RPP-7515, Rev. 0 include: • The penetrating dose at the waste surface is estimated to be 83 rad/hr. • The nonpenetrating dose at the waste surface is estimated to be 765 rad/hr. • Dose rates to equipment submerged in the waste material would be roughly double the surface numbers. • The primary nuclide gamma energy is ^{137}Cs at 0.667 MeV.	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel
3.2.5.2.2.b	The 241-S-112 WRS shall be designed for operating in the following 241-S-112 in-tank environmental conditions: In-tank humidity range: 10 to 100 percent	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel
3.2.5.2.2.c	The 241-S-112 WRS shall be designed for operating in the following 241-S-112 in-tank environmental conditions: Liquid Waste pH range: 13.48 to 13.65. (prior to dilution)	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel
3.2.5.2.2.d	The 241-S-112 WRS shall be designed for operating in the following 241-S-112 in-tank environmental conditions: Temperature range: see 3.2.1.1.a	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel

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3.2.5.2.2.e	The 241-S-112 WRS shall be designed for operating in the following 241-S-112 in-tank environmental conditions: Vapor space Pressure: See Section 3.2.1.3 (Note that operation will not continue at positive tank pressures, but the system may be subjected to them).	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel
3.2.5.2.2.f	The 241-S-112 WRS shall be designed for operating in the following 241-S-112 in-tank environmental conditions: Flammable Gas: Detectable levels of ammonia, hydrogen, nitrogen dioxide, non-methane organic compounds, methanol, ethanol, acetone, toluene, and 3-methyl-hexane are contained in 241-S-112. Ammonia was the only analyte with a result greater than the notification level of 150 ppmv.	**This requirement is met at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.2.5.2.3	The system shall be designed to minimize degradation of components caused by aerosol generation during operation of the 241-S-112 WRS.	**This requirement is met at a conceptual level.** The only aerosols expected to be generated will be due to the sprinklers. Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.2.6	Upon delivery, the 241-S-112 WRS shall be designed to be transportable to and around the Hanford Site, to the extent possible, using existing Hanford rigging and transport equipment.	**This requirement is met at a conceptual level.** The modular design of WRS components will facilitate transportation to and around the Hanford Site using existing hoisting and rigging equipment.
3.2.7	The 241-S-112 WRS design shall consider features that allow for the operational flexibility to transfer tank 241-S-112 contents to any 241-SY Tank Farm DST receiver.	**This requirement is met at a conceptual level.** The destination DST for the S-112 waste can be modified by altering the jumper configuration in the SY-A Valve Pit.
3.2.8	The 241-S-112 WRS mobilization subsystem shall be designated to be capable of being relocated to another Hanford SST for waste retrieval operations with existing Hanford Site rigging and transport equipment.	**This requirement is met at a conceptual level.** The modular design of WRS components will facilitate relocation of these WRS to alternate locations as required.
3.3.1.1	The 241-S-112 WRS shall not add any material that will prohibit waste transfer from tank 241-S-112 to tank SY DST receiver tank in accordance with HNF-SD-WM-OCD-015, Rev. 3a.	**This requirement is met at a conceptual level.** Detailed mass balance calculations will be developed during definitive design.
3.3.1.2.1	241-S-112 WRS process piping shall be designed to preclude radioactive waste from being siphoned from tank the SY DST to 241-S-112.	**This requirement is not met.** Current saltwell pumping practices do not employ this design feature.

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3.3.1.2.2	241-S-112 WRS process piping shall conform, as a minimum, to the requirements of ASME B31.3, Chemical Plant Petroleum Refinery Piping, for normal service fluid.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.3.1.2.3	Flexible piping, if used, shall be designed to perform the safety functions and satisfy the requirements described in HNF-SD-WM-SAR-067, Section 4.4.1.	**This requirement is met at a conceptual level.** The existing OGT line design employed in this design has been evaluated previously for compliance to the SAR.
3.3.1.3	The 241-S-112 WRS shall have features that preclude contamination of the raw water system with tank contents.	**This requirement is met at a conceptual level.** The existing raw water supply employs double back flow prevention.
3.3.1.3.1	The 241-S-112 WRS raw water backflow prevention systems physically connected to active water transfer system components shall be designed to be operable during transfers.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.3.1.3.2	The 241-S-112 WRS backflow prevention devices shall be Washington State approved models and be accessible for inspection by a water purveyor in a non-radiation zone.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.3.1.4.a	Lead shall not be used in the 241-S-112 WRS unless fully encapsulated and identified with a permanent tag.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design, but to the extent possible, materials have been specified using standards and sources used by tank farms engineering and operations personnel. There is currently no plan to use lead in this design.
3.3.1.4.b	Materials regulated by 40 CFR Subchapter R shall not be used in the design of the 241-S-112 WRS.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design. This requirement will be satisfied when equipment is procured.
3.3.1.4.c	Hydraulic fluid used in the designed in-tank equipment shall be approved by CHG.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design, but to the extent possible, materials have been specified using standards and sources used by tank farms engineering and operations personnel. There is currently no plan to use hydraulic fluid in this design.

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3.3.1.4.d	The maximum credible loss of fluid in an accident scenario shall by design be less than 285 L (75 gal).	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design, but to the extent possible, materials have been specified using standards and sources used by tank farms engineering and operations personnel. There is currently no plan to use hydraulic fluid in this design.
3.3.1.5	The 241-S-112 WRS and its subsystems shall be designed in accordance with the performance and design requirements of ASME N509 and ASME AG-1.	**This requirement is met at a conceptual level.** More detailed implementation of this requirement will occur during conceptual and definitive design.
3.3.1.6	All electrical equipment used in the 241-S-112 WRS design shall be listed, or labeled, by a nationally recognized testing laboratory such as Underwriters' Laboratory. Equipment without a listing mark by a nationally recognized testing laboratory is not approved for use in a design unless a nationally recognized testing laboratory category for that type of equipment does not exist. If a category for that equipment does not exist, the equipment may be approved for use only if accepted by one of the designated National Electrical Code inspectors appointed by the Hanford Electrical Codes Board.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design, but to the extent possible, materials have been specified using standards and sources used by tank farms engineering and operations personnel.
3.3.2	The 241-S-112 WRS shall comply with electromagnetic radiation emission requirements set forth in HNF-2962, Rev. 0.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design.
3.3.3	The 241-S-112 WRS shall label new equipment and/or modifications to existing equipment in a standardized format in accordance with the tank farm labeling program as specified in HNF-IP-0842, Volume II, Section 6.1.	**This requirement is not met.** This requirement is not applicable to preliminary engineering.
3.3.4	The requirements for workmanship are to be addressed in lower level design documentation (drawings, procurement specifications, etc.) created by the project.	**This requirement is not met.** This requirement is not applicable to preliminary engineering.
3.3.5	The 241-S-112 WRS design shall incorporate standardization of like-function components, as practical.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design, but to the extent possible, equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.3.6.1.1	The 241-S-112 WRS shall be designed to protect workers from occupational radiation exposures in accordance with the requirements contained in HNF-5183, Rev. 0.	**This requirement is met at a conceptual level.** The equipment is capable of being monitored remotely, and the simple design will keep operator exposure to ALARA levels.
3.3.6.1.2	The 241-S-112 WRS design shall keep personnel exposures as low as reasonably achievable (ALARA).	**This requirement is met at a conceptual level.** The equipment is capable of being monitored remotely, and the simple design will keep operator exposure to ALARA levels.

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3.3.6.1.3	The 241-S-112 WRS shall incorporate design features that comply with the requirements of 29 CFR 1910, Subparts D, E, G, H, J, L, M, O and S , in accordance with HNF-IP-0842, Volume IX, Section 1.1, Rev. 3.	**This requirement is met at a conceptual level.** The latest saltwell PIC skid design is being used; the design is the culmination of several years of improvements made from operations' input. As such, the Integrated Safety Management System (ISMS) approach is implicitly integrated into a major portion the design.
3.3.6.2	The 241-S-112 WRS shall be designed to avoid damage to other components.	**This requirement is met at a conceptual level.** To the extent possible, the waste retrieval system will be a standalone system, having a minimum physical interface with other components. The system operates at very low flow and pressures and will not overstress in-tank hardware. There are very few moving parts in the retrieval system.
3.3.6.2.1	The 241-S-112 WRS design shall analyze resonant frequencies particular to such components as the pump installation. The design of sprinklers/nozzles, suspended through risers to preclude damage to the tank structure from resonant frequencies, will also be designed to eliminate vibration problems such as the harmonics in the pump's normal operating range.	**This requirement is met at a conceptual level.** Detailed material selection will be performed in conceptual design, but to the extent possible, equipment has been specified using standards and sources used by tank farms engineering and operations personnel. The analyses identified in this requirement are not required during the preliminary engineering stage of design.
3.3.6.2.2	The 241-S-112 WRS shall be designed to ensure proper structural strength, compatibility with waste and protection against corrosion in accordance with 40 CFR 265.192, WAC 173-303-640(3).	**This requirement is met *in part* at a conceptual level.** Some degree of cathodic protection exists already within the S-Farm and SY-Farm areas for underground lines. Overground lines do not need cathodic protection, since the piping is considered temporary and will be removed upon successful completion of waste transfer. Since the line between S-Farm and SY-Farm will become non-compliant after 2005, detailed permitting requirements will have to be examined as a part of conceptual design.
3.3.6.2.3	The 241-S-112 WRS shall meet fire protection design requirements as defined in HNF-IP-0842, Volume IX, Section 5.2 and DOE-STD-1066-99, where applicable.	**This requirement is met at a conceptual level.** Engineering judgment indicates that there will be sufficient instrumentation and controls to maintain the waste retrieval system within the subject standards' guidelines. In conceptual design, when complete cost information is available, an analysis will be performed to assess whether a fire suppression system is merited financially.
3.3.6.2.4	The 241-S-112 WRS shall not adversely affect the function of the DST System nor exceed the DST design limits specified in HNF-SD-WM-TRD-007, Rev. 0.	**This requirement is met at a conceptual level.**

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3.3.6.2.5	The 241-S-112 WRS design and operation shall consider the operational limits of the DST receiver tank specified in OSD-T-151-00007.	**This requirement is met at a conceptual level.**
3.3.6.3.1	The 241-S-112 WRS shall incorporate secondary containment and leak-detection design features in accordance with 40 CFR 264.193, WAC 173-303-640 (4), and DOE Order 5820.2A, Chapter 1, Section 3.B(2) and (3).	**This requirement is met *in part* at the conceptual level.** Hose-in-hose and leak detection systems will be employed as shown on drawings 4412-70-MDWG-101 and 4412-70-PDWG-102. However, the existing transfer line between S-Farm and SY-Farm will become non-compliant after 2005, and related specific permitting issues will be addressed in conceptual design.
3.3.6.3.2	The 241-S-112 WRS shall incorporate spill prevention and control design features in accordance with 40 CFR 264.193 and WAC 173-303-640 (5).	**This requirement is met *in part* at the conceptual level.** Hose-in-hose and leak detection systems will be employed as shown on drawings 4412-70-MDWG-101 and 4412-70-PDWG-102. However, the existing transfer line between S-Farm and SY-Farm will become non-compliant after 2005, and related specific permitting issues and control strategies will be addressed in conceptual design.
3.3.6.3.3	The 241-S-112 WRS shall be designed to comply with the nonradioactive airborne emissions requirements contained in WAC 173-400 and WAC 173-460. Also, non-radioactive airborne emissions from the 241-S Tank Farm, other tank farms, and other Hanford Site major facilities will be considered when designing the system to be compliant with WAC 173-400 and WAC 173-460.	**This requirement is met *in part* at the conceptual level.** The existing flammable gas monitors detect small quantities of flammable gasses, including flammable organic vapors. Upon detection, appropriate measures will be undertaken. Monitoring for non-flammable gasses and/or gas filtration/scrubbing has not been addressed at this point in the design. Detailed monitoring and permitting issues will be examined during conceptual design.
3.3.6.3.4	The 241-S-112 WRS shall be designed to comply with the radioactive airborne emissions requirements contained in HNF-IP-0842, Volume VI, Section 1.7, Air Quality – Radioactive Emissions." Also, radioactive airborne emissions from the 241-S Tank Farm, other tank farms, and other Hanford Site major facilities will be considered when designing the system to be compliant with HNF-IP-0842, Volume VI, Section 1.7.	**This requirement is met at a conceptual level.** The exhauster HEPA filter will restrict particulate emissions, and a CAM will alarm on detection of radioactive airborne particulate in the stack and initiate a shutdown of waste retrieval operations.
3.3.6.3.5	The system shall be designed in accordance with the radiation release limits specified in 10 CFR 20 and WAC 246-247.	**This requirement is met at a conceptual level.** The exhauster HEPA filter will restrict particulate emissions, and a CAM will alarm on detection of radioactive airborne particulate in the stack. Leak detection will be employed in pump and valve pits.

Level 2 Specification Section	Requirement or Objective	Comments
3.3.6.3.6	The design of the 241-S-112 WRS shall comply with HNF-SD-WM-TSR-006, Rev. 2 and HNF-IP-1266, Rev. 2, Administrative Control 5.10, or demonstrate safety requirements equivalent to those set forth in these requirements through evaluation by the Flammable Gas Equipment Advisory Board. Interpretation of applicability to the ignition set controls No. 1 and 2 shall be determined by the Flammable Gas Equipment Advisory Board.	**This requirement is met at a conceptual level.** The existing flammable gas monitors detect small quantities of flammable gasses in Tank S-112 and in the central pump pit. Detailed material and equipment selection will be performed in definitive design.
3.3.7	The 241-S-112 WRS shall be designed for compliance with DOE Order 6430.1A, Section 1300-12, "Human Factors Engineering."	**This requirement is met at a conceptual level.** The waste retrieval system is patterned after saltwell operations and associated equipment to assure familiarity and ease of operations.
3.3.8	The 241-S-112 WRS shall be designed for ease of decontamination during operation and for decommissioning at the end of system life in accordance with DOE Order 6430.1A, Sections 0110-99.0.1, 0205-2, and 1300-11. • Waste Pipe Gravity Drain. The 241-S-112 WRS process piping systems will minimize free standing liquids in the process piping. Gravity drains will be used where appropriate to avoid the presence of traps in radioactive waste lines. • WRS In-Tank Equipment Decontamination Fluid. The 241-S-112 WRS in-tank equipment will use water or CHG approved solution as the decontamination fluid.	**This requirement is met *in part* at a conceptual level.** All new equipment that is external to the tank is modular, above ground, and intended to be temporary for the life of the demonstration. All in-tank equipment is intended to be easily inserted and extracted from the tank risers. As such, the design does not preclude decommissioning or disposal of equipment. Other than the removal of temporary items, this project has not explicitly included decontamination options into the design, nor has it included cost estimates that included decontamination or decommissioning activities.
3.3.8.1	The 241-S-112 WRS shall be designed to be retrievable from the tank in the event of failure.	**This requirement is met *in part* at a conceptual level.** All in-tank equipment is intended to be easily inserted and extracted from the tank risers. As such, the design does not preclude decommissioning or disposal of equipment. Other than the removal of temporary items, this project has not explicitly included decontamination options into the design, nor has it included cost estimates that included decontamination or decommissioning activities.
3.3.8.2	The 241-S-103 WRS in-tank equipment shall be designed to be removed after waste retrieval operations are complete.	**This requirement is met *in part* at a conceptual level.** All in-tank equipment is intended to be easily inserted and extracted from the tank risers. As such, the design does not preclude decommissioning or disposal of equipment. Other than the removal of temporary items, this project has not explicitly included decontamination options into the design, nor has it included cost estimates that included decontamination or decommissioning activities.

Level 2 Specification Section	Requirement or Objective	Comments
3.3.9.1	The 241-S-112 WRS shall be designed to store, transfer, and transport radionuclides in a manner that prevents criticality in accordance with HNF-IP-1266, Rev. 2, Section 5.7	**Unknown whether this requirement is met.** The solid radionuclide inventory should be verified by analysis of S-112 solids prior to dilution and transfer. Of particular interest will be the *insoluble* radionuclide inventory, which include the transuranics that will be left behind in the sludge in a more concentrated form.
3.3.9.2	The 241-S-112 WRS and its components shall be designed in accordance with the safety classification for each.	**This requirement is met at a conceptual level.** A preliminary safety classification has been developed for cost estimating purposes and is included in Appendix D. A more rigorous Safety Equipment List will be developed as a part of definitive design.
3.3.9.3	The 241-S-112-WRS and its components safety classification shall be determined using the process described in HNF-IP-0842, Volume IV, Section 6.12; Section 6.11; Section 6.10; and Section 6.9. The sections of HNF-IP-0842 are based on the guidelines in HNF-SD-WM-SAR-067, Section 3.	**This requirement is met at a conceptual level.** A preliminary safety classification has been developed for cost estimating purposes and is included in Appendix D. A more rigorous Safety Equipment List will be developed as a part of definitive design.
3.4.1.1	Records, documents, and drawings pertinent to design functions shall be controlled in accordance with RPP-PRO-222.	**This requirement is met at a conceptual level.** Document Control is in accordance with the HND QA manual (QAM-HN-01, Section 6), and the associated implementing procedure (QIP 401). These contract-used documents comply with equivalent sections ASME NQA-1 (1994) as well as 10 CFR 830.120.
3.4.1.2	Engineering documents shall be developed in accordance with HNF-IP-0842, Volume IV, Section 3.5.	**This requirement is met at a conceptual level.**
3.4.2	All SSCs shall be incorporated into the master equipment list in accordance with <TBD>.	**This requirement is met at a conceptual level.** A preliminary master equipment list has been prepared, including major structures, systems, and components (SSCs).
3.5.1.1	The 241-S-112 WRS operation shall be remote, wherever practical, to minimize exposure and contamination.	**This requirement is met at a conceptual level.** Detailed maintenance requirements will be addressed in conceptual design, but to the extent possible, the systems and equipment used in this design have been patterned after saltwell pumping operations. As such, existing maintenance procedures may apply or be easily modified.
3.5.1.2	The 241-S-112 WRS remote, limited, or contact maintenance requirements shall be implemented with current regulatory requirements, policies, and procedures.	**This requirement is met at a conceptual level.** Detailed maintenance requirements will be addressed in conceptual and detailed design, but to the extent possible, the systems and equipment used in this design have been patterned after saltwell pumping operations. As such, existing maintenance procedures may apply or be easily modified.

Level 2 Specification Section	Requirement or Objective	Comments
3.5.1.3	The 241-S-112 WRS corrective and preventive maintenance shall be performed by Hanford Site Crafts personnel, unless special circumstances require specific vendor maintenance support.	**This requirement is met at a conceptual level.** Detailed maintenance requirements will be addressed in conceptual and detailed design, but to the extent possible, the systems and equipment used in this design have been patterned after saltwell pumping operations. As such, existing maintenance procedures may apply or be easily modified.
3.5.1.4	The 241-S-112 WRS shall be designed to allow periodic calibration.	**This requirement is met at a conceptual level.** Detailed maintenance requirements will be addressed in conceptual design, but to the extent possible, the systems and equipment used in this design have been patterned after saltwell pumping operations. As such, existing calibration procedures may apply or be easily modified.
3.5.1.4.1	Calibration cycles, methods, and equipment shall be established based on manufacturer's instructions, component and system reliability, expected environmental conditions, and site-specific historical data.	**This requirement is met at a conceptual level.** Detailed maintenance requirements will be addressed in conceptual design, but to the extent possible, the systems and equipment used in this design have been patterned after saltwell pumping operations. As such, existing calibration procedures may apply or be easily modified.
3.5.1.4.2	The 241-S-112 WRS equipment located inside the SST, DST, or transfer-associated structure shall be designed to require no calibration after installation.	**This requirement is met at a conceptual level.** Detailed maintenance requirements will be addressed in conceptual design, but to the extent possible, the systems and equipment used in this design have been patterned after saltwell pumping operations. As such, existing calibration procedures may apply or be easily modified.
3.5.2	The minimum number of spares for like components shall be determined during design of the 241-S-112 WRS. The minimum number of spares will be determined based on information such as the mean time between failures, availability of backups, vendor recommendations, procurement lead times, operational strategy, safety classification and the number of like components installed, as practical.	**This requirement is met *in part* at a conceptual level.** Detailed component selection will be performed in definitive design, but to the extent possible, major equipment has been specified using standards and sources used by tank farms engineering and operations personnel.
3.5.3	In-tank hardware preventing or interfering with the installation and operation of the 241-S-112 WRS shall be considered for removal prior to retrieval operations.	**This requirement is met at a conceptual level.** Some risers will require equipment removed prior to installation of the retrieval system. A list of equipment that must be removed is included in the Outline Specification (Appendix B).
3.5.4	The 241-S-112 WRS shall comply with the requirements of HNF-IP-0842, Volume XVIII, Section 2.4, for solid waste generated as a result of system operations and maintenance.	**This requirement is met at a conceptual level.** Since the retrieval system is patterned after saltwell pumping operations, standard solid waste disposal procedures will be adequate to support the system operation.

Level 2 Specification Section	Requirement or Objective	Comments
3.6	The 241-S-112 WRS shall be designed to be operated, maintained, and managed by qualified personnel, trained to levels of training described in HNF-IP-0842, Volume III, Section 10.	**This requirement is met at a conceptual level.** Since the retrieval system will be is patterned after saltwell pumping operations, and will be operated and maintained by Interim Stabilization personnel, it is anticipated that there will be no significant personnel qualifications or training issues associated with the project.
3.9	The 241-S-112 WRS shall be designed such that access controls to radiation and high-radiation areas meet the requirements of HNF-5183, Rev. 0.	**This requirement is met at a conceptual level.** Since the retrieval system is patterned after saltwell pumping operations, standard RWPs will be adequate to support the system operation.
4.1	Design verification shall be performed on the 241-S-112 WRS as represented in design drawings, prototypes, engineering models, etc., for the purpose of verifying that the design meets the requirements stated in Section 3.0 of this specification.	**This requirement is not applicable at the pre-conceptual design stage of development.** Formal design verification of the preliminary engineering (pre-conceptual design) documentation is not required. This matrix is intended to satisfy the requirement for verification that the Level 2 Specifications requirements have been met by the current design.
4.1.1	The 241-S-112 WRS design verifications shall be conducted and documented by the design agent in accordance with the statement of work.	**This requirement is not applicable at the pre-conceptual design stage of development.** Design verification of the preliminary engineering (pre-conceptual design) documentation is not required, per the contract documents.
4.1.2.1	Selected major components of the 241-S-112 WRS (as determined through addressing requirement 4.2.3) shall be the subject of a system qualification test.	**This requirement is not applicable at the pre-conceptual design stage of development.** Qualification testing is not required as part of the preliminary engineering (pre-conceptual design) effort.
4.1.2.2	Tests used as design verifications shall be conducted at CHG facilities (e.g., Cold Test, Training and Mock-up [CTTM]) or at other facilities subject to CHG approval.	**This requirement is not applicable at the pre-conceptual design stage of development.** Design verification testing is not required as part of the preliminary engineering (pre-conceptual design) effort.
4.2	The 241-S-112 WRS design verifications shall be conducted in accordance with HNF-IP-0842, Volume IV, Section 4.24 and assure compliance with the requirements of this specification.	**This requirement is not applicable at the pre-conceptual design stage of development.** Design verification of the preliminary engineering (pre-conceptual design) documentation is not required, per the contract documents. This matrix is intended to satisfy the requirement for verification that the Level 2 Specifications requirements have been met by the current design.

Level 2 Specification Section	Requirement or Objective	Comments
4.2.1	The verification method applied to each specification requirement, and the rigor to which it is applied, shall be appropriate for the risks and complexity associated with each component or requirement.	**This requirement is not applicable at the pre-conceptual design stage of development.** Design verification of the preliminary engineering (pre-conceptual design) documentation is not required, per the contract documents. Formal design verification will be initiated as part of the conceptual design.
4.2.2	Verification of the subsystem design shall be performed by one or more of the following methods • **Qualification Testing**. • **Review**. • **Alternate Calculations**. At least one verification method will be specified for each 241-S-112 WRS requirement called out in Section 3 of this Level 2 Specification in a requirements verification matrix, which will be included in this document at the conclusion of conceptual engineering activities or be included in a lower level document.	**This requirement is not applicable at the pre-conceptual design stage of development.** Design verification of the preliminary engineering (pre-conceptual design) documentation is not required, per the contract documents. Identification of design verification methods applicable for each of the WRS requirements will be developed during the project's conceptual design phase.

Appendix F deleted

Appendix G deleted

Appendix H
Sketches

PROJECT TITLE:

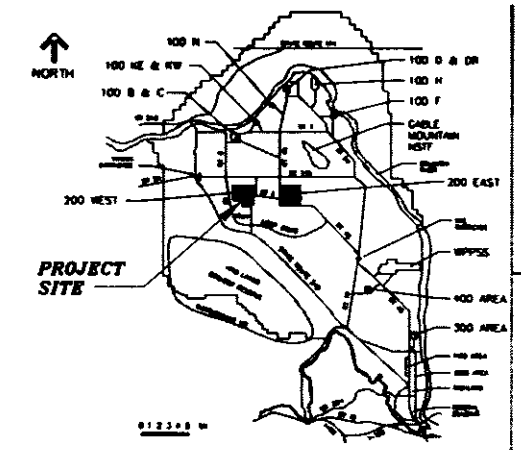
241-S-112 SALTCAKE DISSOLUTION DEMO.

FOR:

CH2M HILL HANFORD GROUP, INCORPORATED

BY:

HND TEAM



HANFORD AREA MAP

DRAWING LIST

CIVIL/STRUCTURAL

DRAWING NO.	TITLE
4412-070-CDWG-101	DRAWING LIST
4412-070-CDWG-102	SITE PLAN

MECHANICAL

DRAWING NO.	TITLE
4412-070-PDWG-101	SYMBOL LEGEND
4412-070-PDWG-102	PROCESS FLOW DIAGRAM
4412-070-PDWG-103	PROCESS & INSTRUMENTATION DIAGRAM
4412-070-MDWG-101	MECHANICAL/ELECTRICAL ENLARGED PLAN

ELECTRICAL

DRAWING NO.	TITLE
4412-070-EDWG-101	ELECTRICAL ONE LINE DIAGRAM PUMP & INSTRUMENT POWER SUPPLY
4412-070-EDWG-102	ELECTRICAL ONE LINE DIAGRAM PORTABLE EXHAUSTER POWER SUPPLY

INTERFACE CONTROL

DRAWING NO.	TITLE
4412-070-IDWG-101	INSTRUMENTATION INTERFACE CONTROL

PRECONCEPTUAL

NOT APPROVED FOR CONSTRUCTION

NO.	DATE	CLASS REV.	REVISIONS	DRWN	DES	CHKD	REL	SUB	REC	APP

HND TEAM
Holmes & Narver/DMJM

241-S-112 SALTCAKE DISSOLUTION DEMONSTRATION PROJECT

DRAWING LIST

BLDG. 241-S/SY

FOR CH2M HILL HANFORD GROUP, INC.

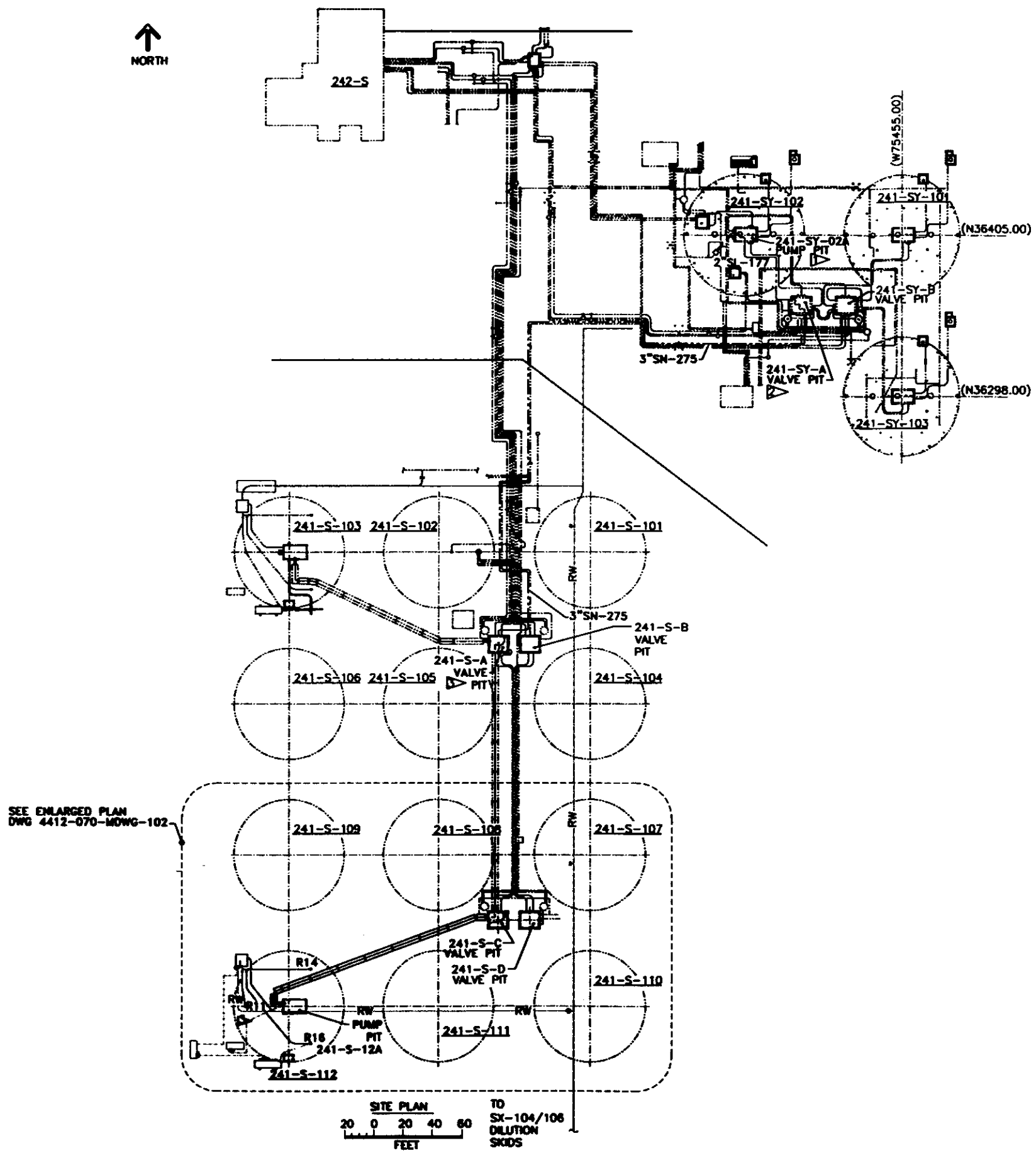
DRAWN ARES CORP
DESIGN
CHECKED
RELEASED
DATE

SHEET 1 OF 1

ARES PROJECT ID 9909232.01

DRAWING NO. 4412-070-CDWG-101

REV. 0



FLAG NOTES

1. USE EXISTING FLEX JUMPER CONNECTING WALL NOZZLE "B" TO EQUIPMENT NOZZLE "L" ON RISER 13.
2. USE EXISTING FLEX JUMPER CONNECTING WALL NOZZLE "L1" TO WALL NOZZLE "L9".
3. NEW FLEX JUMPER FROM NEW HOSE-IN-HOSE TO EXISTING MANIFOLD (SEE H-14-104150). EXISTING FLEX JUMPER FROM MANIFOLD TO EXISTING WALL NOZZLE "L-20".

PRECONCEPTUAL

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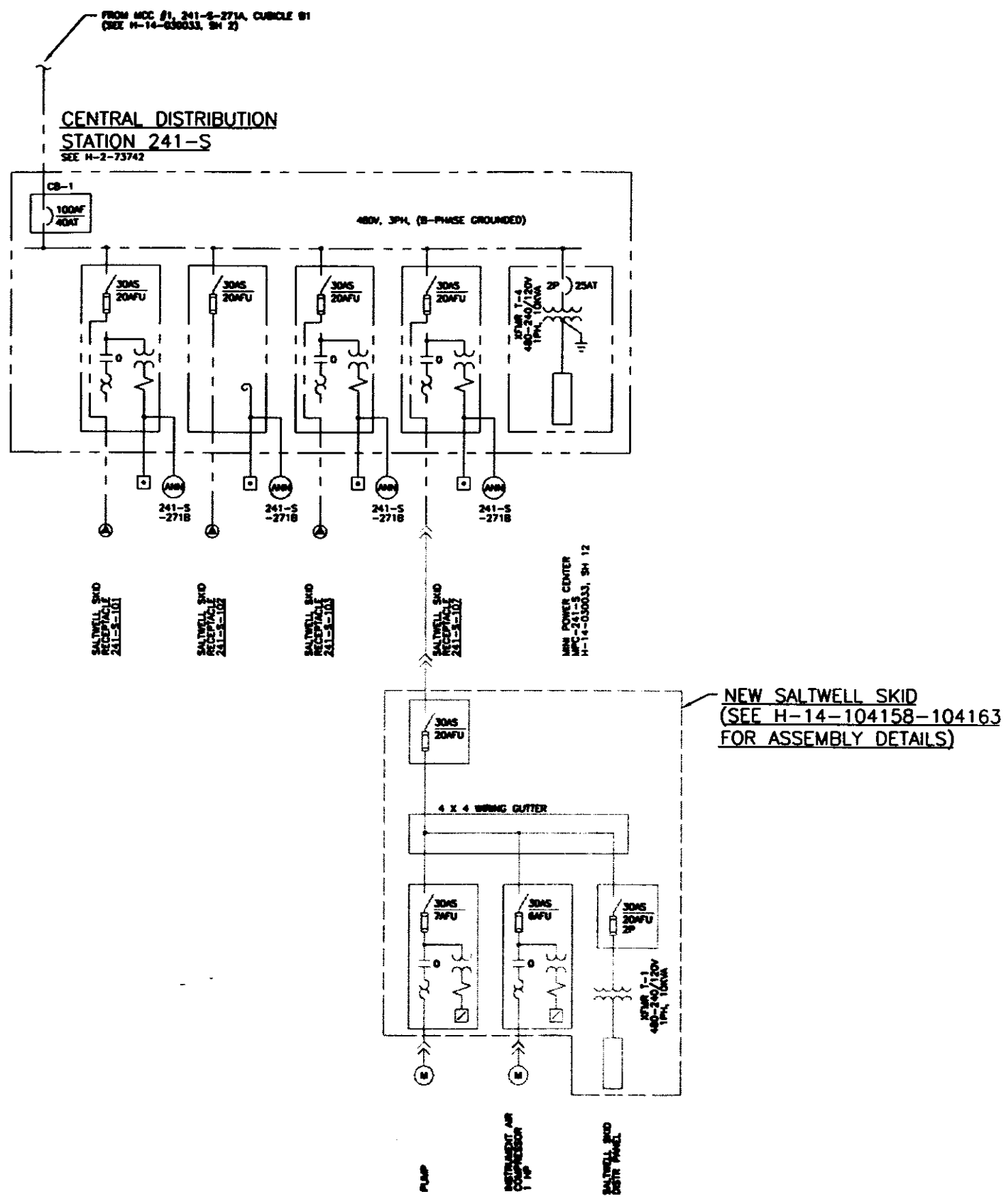
NO.	DATE	CLASS REV.	REVISIONS	DWN	DES	CHKD	REL	SUB	REC	APP

HMD TEAM
Holmes & Narver/DMJM

241-S-112 SALTCAKE DISSOLUTION DEMONSTRATION PROJECT SITE PLAN BLDG. 241-S/SY	DRAWN ARES CORP DESIGN CHECKED RELEASED DATE
FOR CH2M HILL HANFORD GROUP, INC.	SHEET 1 OF 1
ARES PROJECT ID 9909232.01	DRAWING NO. 4412-070-CDWG-102 REV. 0



ONE LINE DIAGRAM

NOTE:

1. SEE OUTLINE SPECIFICATION SECTION 16400

LEGEND

- XXAF / XXAT — CIRCUIT BREAKER AMP FRAME AMP TRIP
- TRANSFORMER
- MINI-POWER CENTER, COMBINATION TRANSFORMER PANEL UNIT, SIZE AS SHOWN
- 480V RECEPTACLE
- XXAS / XXAFU — FUSED SAFETY SWITCH, AMPERE SWITCH/AMPERE FUSE AS SHOWN
- EXISTING EQUIPMENT
- NEW EQUIPMENT
- 30AS / 7AFU — MOTOR CONTROL, FUSED COMBINATION
- M — MOTOR, HORSEPOWER AS SHOWN, WITH CABLE AND CONNECTOR
- ANN — ANNUNCIATOR

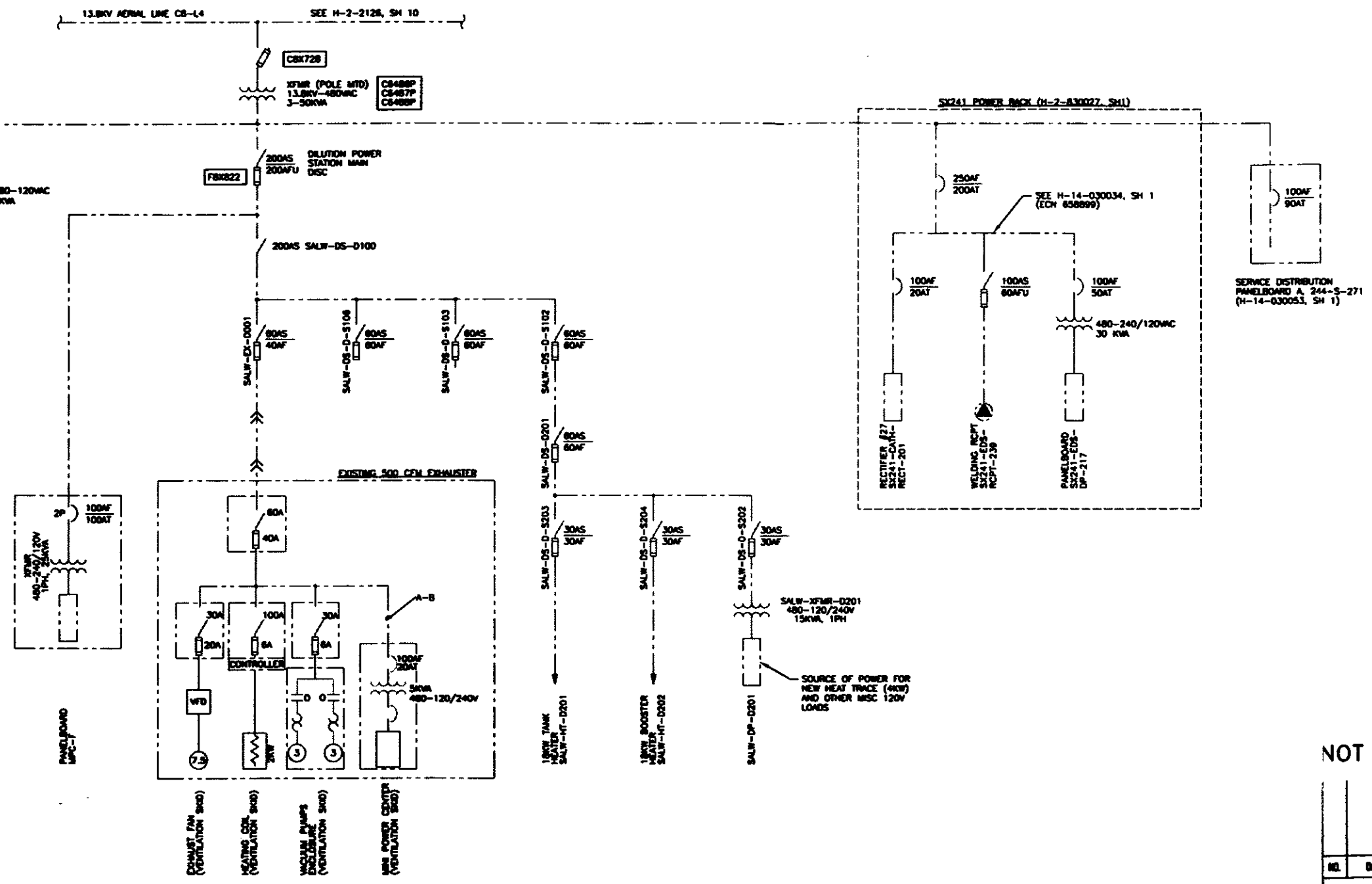
PRECONCEPTUAL

NOT APPROVED FOR CONSTRUCTION

NO.	DATE	CLASS REV.	REVISIONS	DRWN	DES	CHKD	REL	SUB	REC	APP

HND TEAM
Holmes & Narver/DMJM

241-S-112 SALTCAKE DISSOLUTION DEMONSTRATION PROJECT ELECTRICAL ONE LINE DIAGRAM PUMP & INSTRUMENT POWER SUPPLY BLDG. N/A	DRWN ARES CORP DESIGN CHECKED RELEASED DATE
FOR CH2M HILL HANFORD GROUP, INC.	SHEET 1 OF 1
ARES PROJECT ID 9909232.01	DRAWING NO. 4412-070-EDWG-101 — REV. 0



ONE LINE DIAGRAM

EXIST S-FARM DILUTION SYSTEM

PRECONCEPTUAL

NOT APPROVED FOR CONSTRUCTION

NO.	DATE	CLASS REV.	REVISIONS	DRWN	DES	CHKD	REL	SUB	REC	APP

HND TEAM
Holmes & Narver/DMJM

241-S-112 SALTCAKE DISSOLUTION DEMONSTRATION PROJECT

ELECTRICAL
ONE LINE DIAGRAM
PORTABLE EXHAUSTER POWER SUPPLY

BLDG. N/A

FOR CH2M HILL HANFORD GROUP, INC.

DRWN ARES CORP
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DATE

SHEET 1 OF 1

ARES PROJECT ID	DRAWING NO.	REV.
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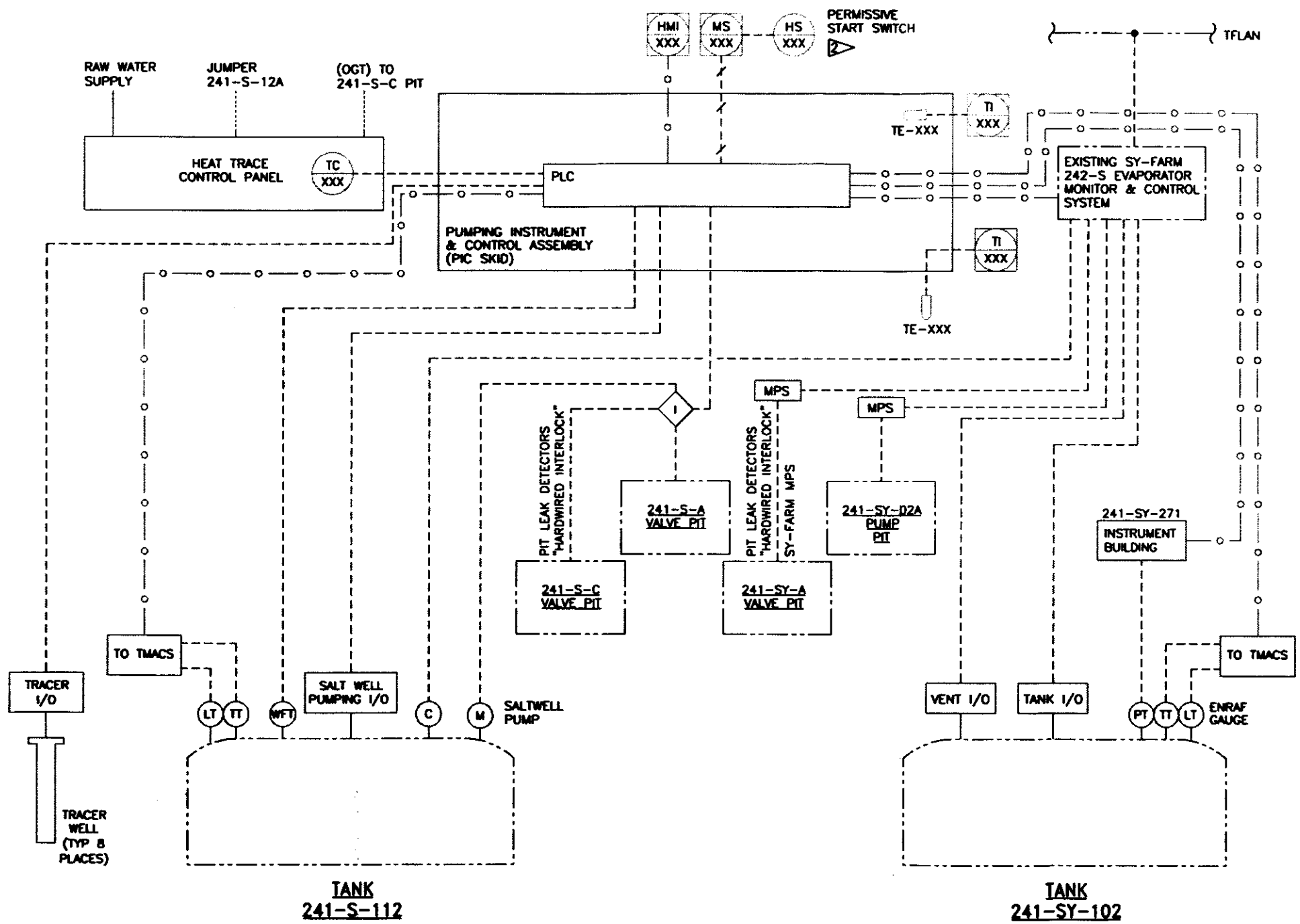

WASTE RETRIEVAL SYSTEM
MONITOR AND CONTROL SUBSYSTEM

NOTES:

1. SEE DRAWING 4412-070-PDWG-101 FOR SYMBOL LEGEND.

2. THE SELECTOR SWITCH, MODE "A-O-A" IS LOCATED ON THE MOTOR STARTER PANEL WHICH IS ONLY A PERMISSIVE START FOR THE JET PUMP.

PRECONCEPTUAL

NOT APPROVED FOR CONSTRUCTION

NO.	DATE	CLASS REV.	REVISIONS	DWN	DES	CHKD	REL	SUB	REC	APP

HND Holmes & Narver/DMUM TEAM

241-S-112 SALTCAKE DISSOLUTION DEMONSTRATION PROJECT

INSTRUMENTATION INTERFACE CONTROL

BLDG. 241-S & 241-SY

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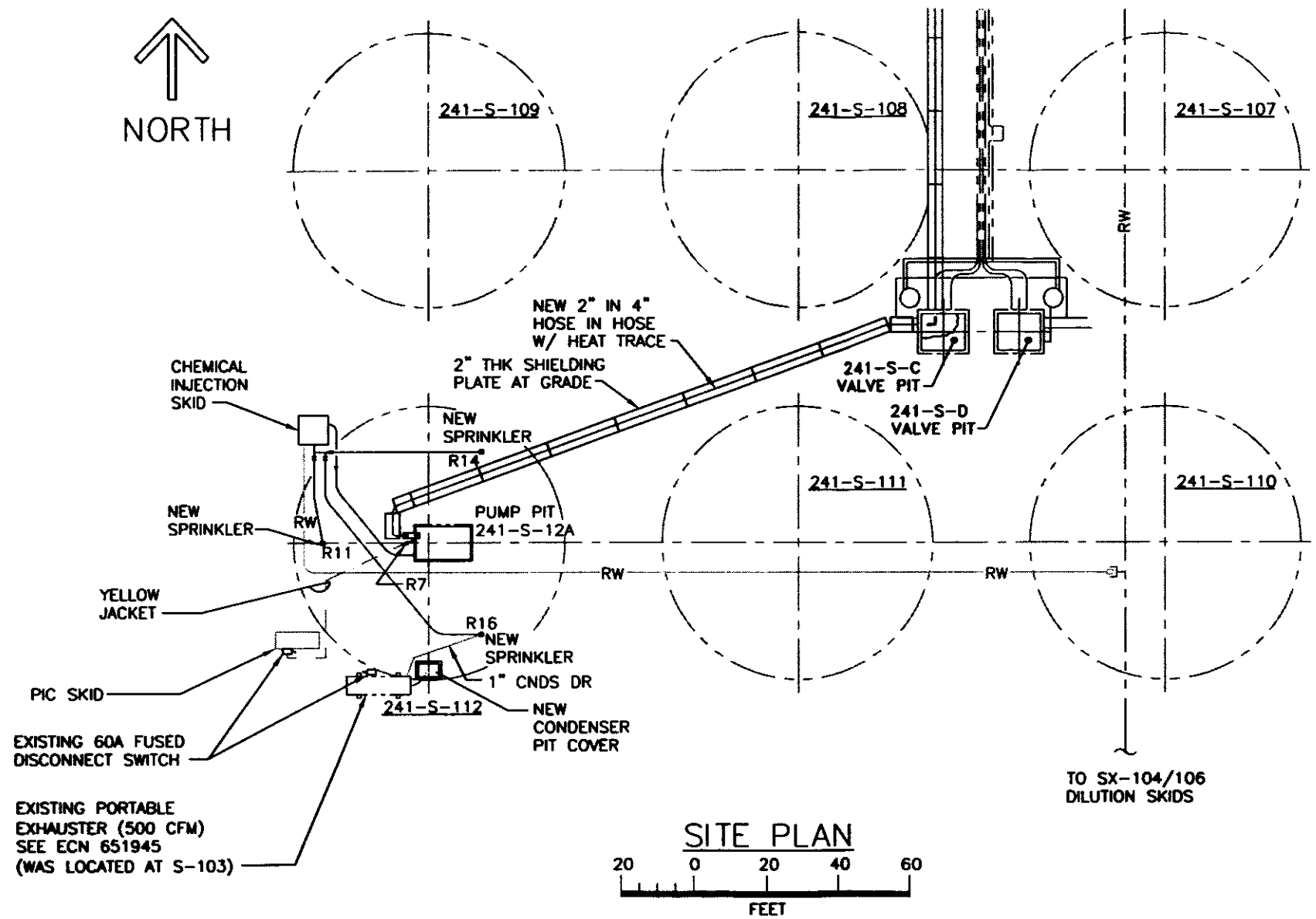
FOR CH2M HILL HANFORD GROUP, INC.

SHEET 1 OF 1

ARES PROJECT ID	DRAWING NO.	REV.
9909232.01	4412-070-IDWG-101	0



PRECONCEPTUAL

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NO.	DATE	CLASS REV.	REVISIONS	DRWN	DES	CHKD	REL	SUB	REC	APP

HND TEAM
Holmes & Narver/DMUM

241-S-112 SALTCAKE DISSOLUTION DEMONSTRATION PROJECT MECHANICAL/ELECTRICAL ENLARGED PLAN	DRWN: ARES CORP DESIGN CHECKED RELEASED DATE
AREA 241-S-112	
FOR CH2M HILL HANFORD GROUP, INC.	SHEET 1 OF 1
ARES PROJECT ID 9909232.01	DRAWING NO. 4412-070-MDWG-101 — REV. 0

SYMBOL LEGEND

LINES:

- NEW
- DISCRETE SIGNAL
- ELECTRICAL POWER OR SIGNAL
- DATA LINK
- EXISTING PIPING OR EQUIPMENT
- PNEUMATIC INSTRUMENT SIGNAL

VALVES:

- GATE
- GLOBE
- CHECK
- BALL

VALVE ACTUATORS:

- DIAPHRAGM OPERATED (DOV)
- MOTOR OPERATED (MOV)

MEASURING ELEMENTS:

TE	TEMPERATURE ELEMENT
FE	FLOW ELEMENT
WFT	WEIGHT FACTOR TRANSMITTER
LDE	LEAK DETECTION ELEMENT

INSTRUMENT SYMBOLS

- PRIMARY ELEMENT OR LOCALLY MOUNTED INSTRUMENT
- ANNUNCIATOR CABINET OR PANEL MOUNTED INSTRUMENT
- INSTRUMENT MOUNTED ON BACK OF PANEL
- INSTRUMENT MOUNTED AT AN AUXILIARY LOCATION
- INTERLOCK
- COMPUTER FUNCTION
- MONITOR AND CONTROL SYSTEM (MCS) SHARED DISPLAY (VIDEO SCREEN) IN CONTROL ROOM
- PROGRAMMABLE LOGIC CONTROLLER PRIMARY LOCATION
- PROGRAMMABLE LOGIC CONTROLLER FIELD MOUNTED

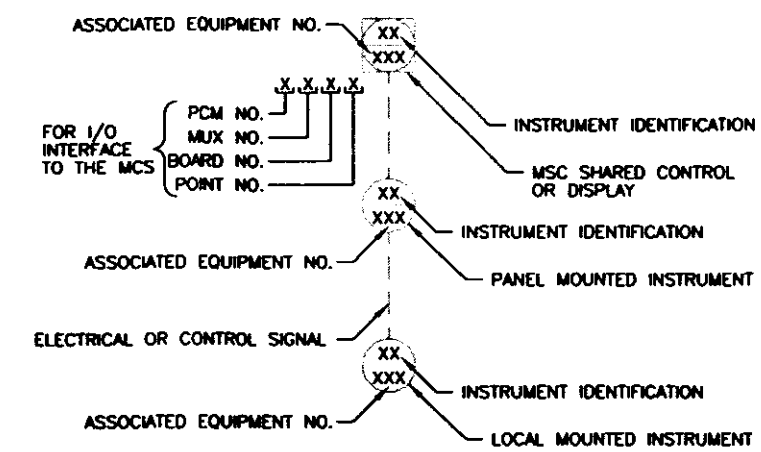
ABBREVIATIONS:

I/O	INSTRUMENTATION/CONTROLS INPUTS & OUTPUTS	HMI	HUMAN MACHINE INTERFACE
PLC	PROGRAMMABLE LOGIC CONTROLLER	SHMS	STANDARD HYDROGEN MONITORING SYSTEM
TFLAN	TANK FARM LOCAL AREA NETWORK	LDE	LEAK DETECTOR ELEMENT
TC	TEMPERATURE CONTROLLER	LDK	LEAK DETECTOR RELAY
HS	HAND SWITCH	TMACS	TANK MONITORING AND CONTROL SYSTEM
MS	MOTOR STARTER	MPS	MASTER PUMP SHUTDOWN

MISCELLANEOUS SYMBOLS:

- HEPA FILTER
- LEVEL ELEMENT
- REMOTE JUMPER CONNECTOR (PIPE) OR WALL NOZZLE
- MOTOR
- BLIND FLANGE
- FLANGED CONNECTION
- QUICK CONNECT
- HEAT TRACE
- TEMPERATURE SENSING ELEMENT
- SPRAY NOZZLE
- FLOOR DRAIN
- CCTV

INSTRUMENT IDENTIFICATION:



PUMPS AND BLOWERS:

- BLOWER
- PUMP

PRECONCEPTUAL

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NO.	DATE	CLASS REV.	REVISIONS	DRWN	DES	CHKD	REL	SUB	REC	APP

Hanscom & Harvey/DMJM TEAM

241-S-112 SALTCAKE DISSOLUTION DEMONSTRATION PROJECT	DRWN	ARES CORP
	DESIGN	
SYMBOL LEGEND	CHECKED	
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AREA 241-S-103, 241-SY-102	DATE	
FOR CH2M HILL HANFORD GROUP, INC.	SHEET 1 OF 1	

ARES PROJECT ID	DRAWING NO.	REV.
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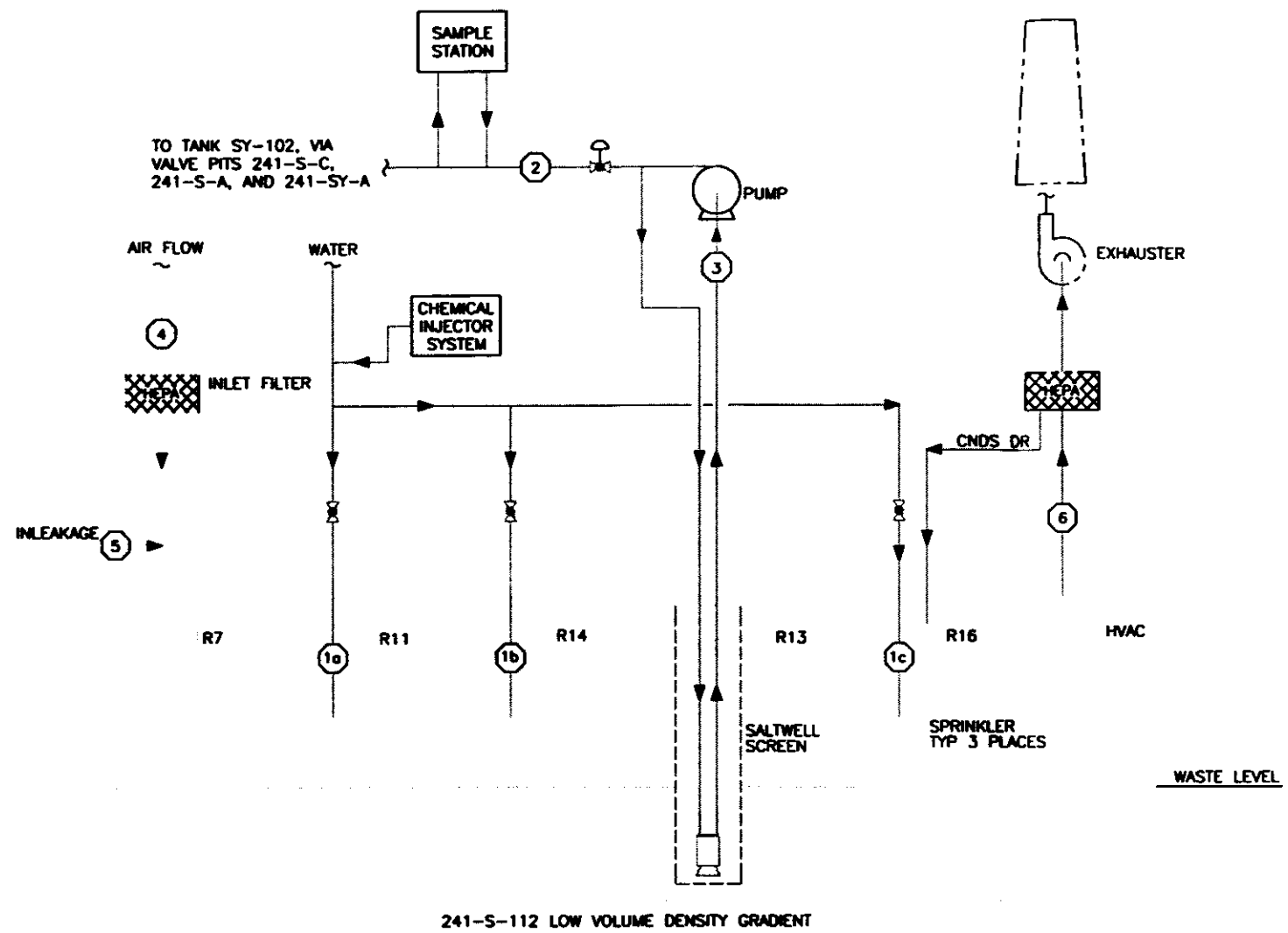

NOTE:

1. THIS DRAWING IS A SIMPLIFIED DIAGRAM IDENTIFYING MAJOR COMPONENTS AND NORMAL PROCESS FLOW. SOME COMPONENTS HAVE BEEN OMITTED FOR CLARITY
2. FOR SYMBOL LEGEND SEE DRAWING 4412-070-PDWG-101.

DESIGN MASS FLOWS: TANK S-112 DISSOLUTION								
STREAM NO.	1a	1b	1c	2	3	4	5	6
STREAM NAME	WATER	WATER	WATER	DISSOLVED SALT SOLUTION	DISSOLVED SALT SOLUTION	INLET AIR	INLEAKAGE	EXHAUST AIR
OPERATING PRESSURE (GAUGE)	80 PSI	80 PSI	80 PSI	70 PSI	20 PSI	~0 in H20	~0 in H20	~-1 in H20
FLOW RATE	3-4 GPM	3-4 GPM	3-4 GPM	4-6 GPM	25-30 GPM	325 CFM	125 CFM	500 CFM
SPECIFIC GRAVITY (H20 = 1.0)	1.0	1.0	1.0	1.21-1.46	1.21-1.46	N/A	N/A	N/A

PRECONCEPTUAL

NOT APPROVED FOR CONSTRUCTION

NO.	DATE	CLASS REV.	REVISIONS	DRW	DES	CHKD	REL	SUB	REC	APP

HND TEAM
Holmes & Narver/DMJM

241-S-112 SALTCAKE DISSOLUTION DEMONSTRATION PROJECT

PROCESS FLOW DIAGRAM

AREA 241-S-112, 241-SY-102

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RELEASED
DATE

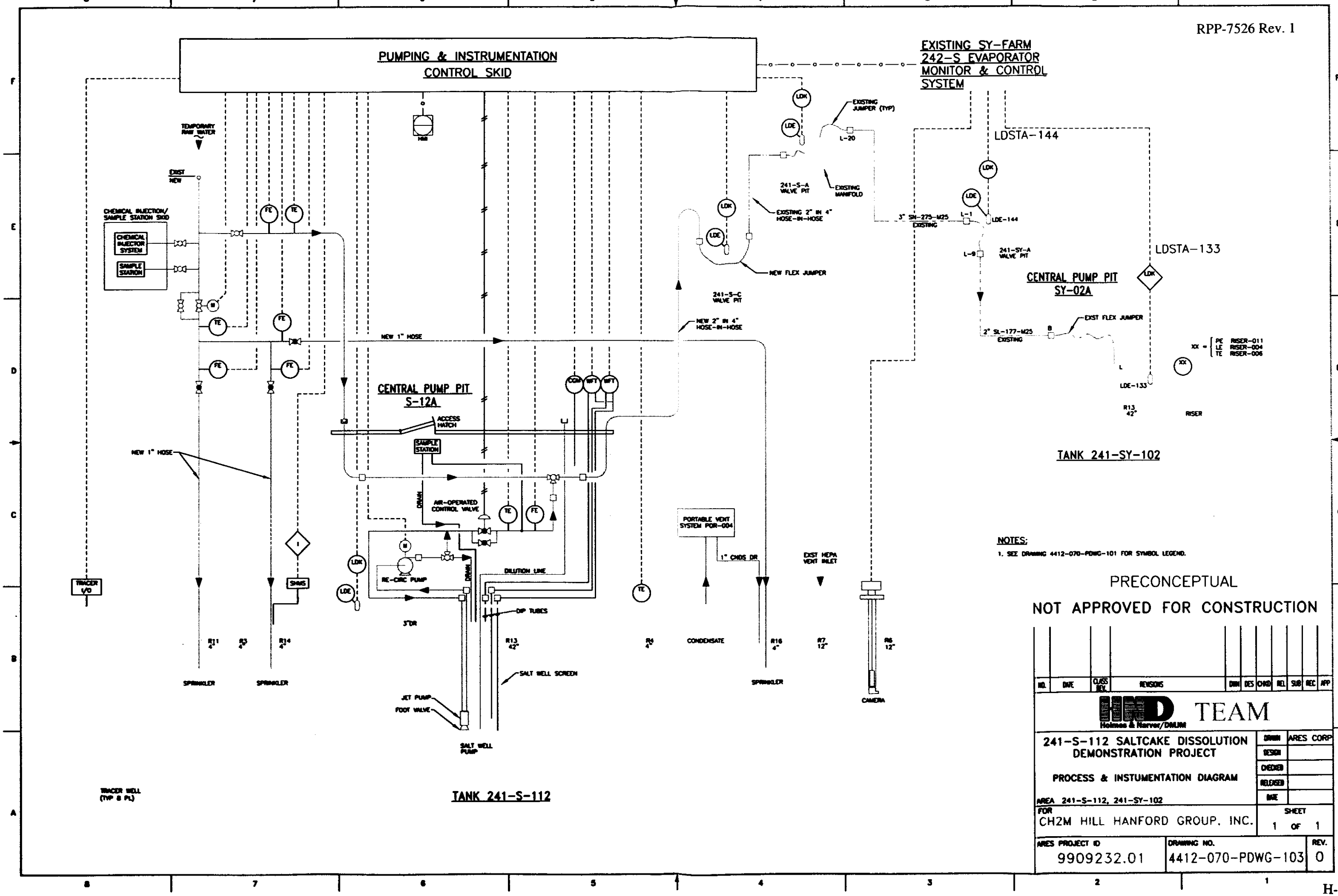
FOR CH2M HILL HANFORD GROUP, INC.

SHEET 1 OF 1

ARES PROJECT ID 9909232.01

DRAWING NO. 4412-070-PDWG-102

REV. 0



NOTES:

1. SEE DRAWING 4412-070-PDWG-101 FOR SYMBOL LEGEND.

PRECONCEPTUAL

NOT APPROVED FOR CONSTRUCTION

NO.	DATE	CLASS REV.	REVISIONS	DWN	DES	CHKD	REL	SUB	REC	APP

HND TEAM
Holmes & Narver/DMJM

241-S-112 SALTCAKE DISSOLUTION DEMONSTRATION PROJECT

PROCESS & INSTUMENTATION DIAGRAM

AREA 241-S-112, 241-SY-102

FOR CH2M HILL HANFORD GROUP, INC.

DRAWN ARES CORP
DESIGN
CHECKED
RELEASED
DATE

SHEET 1 OF 1

ARES PROJECT ID 9909232.01

DRAWING NO. 4412-070-PDWG-103

REV. 0

Appendix I
Ecology Interpretation of M-43 TPA Milestone

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

1315 W. 4th Avenue • Kennewick, Washington 99336-6018 • (509) 735-7581

October 16, 1996

Post-it® Fax Note 7671	Date 10/17	# of pages ▶ 2
To BRAD ERLANDSON	From M. A. McLAUGHLIN	
Co./Dept. LMHC	Co. FDH	
Phone #	Phone # 376-4094	
Fax # 373-6120	Fax #	

Mr. James K. McClusky
U.S. Department of Energy
P.O. Box 550
Richland, WA 99352

Dear Mr. James K. McClusky:

Re: Upgrade Milestone Requirements

The Washington State Department of Ecology (Ecology) has been in recent discussions with the U.S. Department of Energy (USDOE) to clarify the requirement for Tri-Party Agreement (TPA) Milestone 43 series completion. This letter reflects Ecology's interpretation of the milestone requirements. Ecology believes its interpretation is consistent with the rationale that supported development of these milestones during 1995 and is supportive of USDOE's path to priortize tank farm upgrades work.

It is Ecology's understanding, the W-314 project is being modified to prioritize the upgrade scope necessary to, (1) support privatization, and (2) to complete additional upgrades to bring the Double-Shell Tank system into compliance with the Dangerous Waste Regulations by 2005. USDOE intends to start construction in several tank farms, initially with work proceeding simultaneously. However, all necessary W-314 upgrades compliance work in each tank farm may not necessarily be complete until the year 2005. Ecology concurs these actions are consistent with completion of the M-43 series, listed below, provided "start construction" occurs on, or before, the date listed for each tank farm.

M-43-10	Start Definitive Design for Project W-314	1/31/97
M-43-11	Provide the W-314 Project Construction Schedule to Ecology	9/30/98
M-43-12	Start Consuction for Upgrades in the First Tank Farm	6/30/99
M-43-13	Start Constuction for Upgrades in the Second Tank Farm	6/30/00
M-43-14	Start Consuction for Upgrades in the Third Tank Farm	6/30/01
M-43-15	Start Constuction for Upgrades in the Fourth Tank Farm	6/30/02
M-43-16	Start Constuction for Upgrades in the Fifth Tank Farm	6/30/03

It is important for USDOE to develop a construction schedule by September 30, 1998, showing completion of all W-314 compliance upgrades scope by 2005. This construction schedule will be used by Ecology to determine if USDOE is progressing towards successfully completing its milestone commitments. It should be clearly understood that upgrades (ventilation, instrumentation, transfer, and electrical systems) required for compliance which are not part of W-314 project scope, and not otherwise specifically named in the TPA for

completion, are also required to be complete by the major M-43 date (M-43-00, Complete Tank Farm Upgrades, 6/30/05.)

If USDOE disagrees with Ecology's interpretation, please notify us in writing of your objections within seven days of receipt of this letter, as provided in Article VIII of the TPA.

If you have any questions or require additional information, please contact me at (509) 736-3048.

Sincerely,

Norman T. Hepper, PE
Nuclear Waste Program

NTH:sdb

cc: Jaime E. Navarro, USDOE
Mary Lou Blazek, ODOE