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T Plant Secondary Containment and Leak Detection - Project W-259.

**Abstract**

This document provides an advanced conceptual design concept that complies with the functional requirements for the "T Plant Secondary Containment and Leak Detection Upgrades".

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ADVANCED CONCEPTUAL DESIGN REPORT

T PLANT SECONDARY CONTAINMENT AND LEAK DETECTION UPGRADES

PROJECT W-259

Prepared for

Westinghouse Hanford Company

May 1995

For the U.S. Department of Energy
Contract DE-AC06-93RL12359

Prepared by

ICF Kaiser Hanford Company
Richland, Washington

W259ACDR
W259ACDR

ADVANCED CONCEPTUAL DESIGN REPORT

FOR

T PLANT SECONDARY CONTAINMENT AND LEAK DETECTION UPGRADES

PROJECT W-259

Prepared by

ICF Kaiser Hanford Company
Richland, Washington

for

Westinghouse Hanford Company

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5/1/95

U.S. Department of Energy

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# TABLE OF CONTENTS

I. INTRODUCTION ............................................................ 1

II. SUMMARY ................................................................. 1

III. JUSTIFICATION .......................................................... 2

IV. DESCRIPTION OF PROJECT SCOPE ...................................... 3
   A. IMPROVEMENTS TO LAND (460) ..................................... 4
   B. BUILDINGS (501) .................................................... 6
   C. OTHER STRUCTURES (550) ......................................... 7
   D. UTILITIES (600) ................................................... 12
   E. SPECIAL EQUIPMENT AND PROCESS SYSTEMS (700) ............. 15
   F. OTHER PROJECT COSTS (900) .................................... 24
   G. DESIGN COMPLIANCE ............................................. 25

V. METHODS OF PERFORMANCE ............................................. 27
   A. ONSITE ARCHITECT-ENGINEER WORK (WBS 1.1 and WBS 1.2) .... 27
   B. PROCUREMENT (WBS 2.0) .......................................... 28
   C. CONSTRUCTION WORK BY ONSITE CONTRACTOR (WBS 3.1) ...... 28
   D. WORK BY OPERATING CONTRACTOR (WBS 3.3 and WBS 4.0) .... 28

VI. REQUIREMENTS AND ASSESSMENTS .................................. 28
   A. SAFEGUARDS AND SECURITY ...................................... 28
   B. HEALTH AND SAFETY ............................................ 29
   C. DECONTAMINATION AND DECOMMISSIONING ....................... 30
   D. PROVISIONS FOR FALLOUT SHELTERS ............................ 30
   E. MAINTENANCE AND OPERATION REQUIREMENTS ................... 30
   F. AUTOMATED DATA PROCESSING EQUIPMENT ....................... 31
   G. QUALITY ASSURANCE/SAFETY CLASSIFICATION ................... 31
   H. ENVIRONMENTAL COMPLIANCE .................................. 32
   I. PERMITS ............................................................ 34

VII. IDENTIFICATION AND ANALYSIS OF UNCERTAINTIES ............... 35

VIII. REFERENCES .......................................................... 39
APPENDICES

Appendix A. Work Breakdown Structure
Appendix B. Budget Authorized/Budget Outlay Schedule
Appendix C. Cost Estimate Summary
Appendix D. Conceptual Project Schedule
Appendix E. Outline Specification
Appendix F. Energy Conservation Report and Analysis
Appendix G. Preliminary Safety Evaluation
Appendix H. Economic Analysis and Life Cycle Cost Analysis
Appendix I. Physically Handicapped Assessment
Appendix J. Plant Forces Work Review
Appendix K. Sketches
# ABBREVIATIONS

<table>
<thead>
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ADVANCED CONCEPTUAL DESIGN REPORT

T PLANT SECONDARY CONTAINMENT AND LEAK DETECTION UPGRADES

PROJECT W-259

I. INTRODUCTION

This ACDR supersedes the CDR for Project W-259, "T-Plant Secondary Containment and Leak Detection Upgrades," (ref 1). The ACDR specifically addresses and resolves recommended proposals that resulted from a value engineering study conducted after the CDR was released.

The T Plant facilities in the 200-West Area of the Hanford Site were constructed in the early 1940s to produce nuclear materials in support of national defense activities. The facilities have served a variety of missions including direct nuclear material production, waste management operations, and current decontamination support activities. T Plant includes the 271-T facility, the 221-T facility, and several support facilities (e.g., 2706-T), utilities, and tanks/piping systems.

T Plant has been recommended as the primary interim decontamination facility for the Hanford Site. The decontamination activities planned for T Plant support the environmental restoration mission and waste management operation for the Hanford Site. Project W-259 will provide capital upgrades to the T Plant facilities to comply with Federal and State of Washington environmental regulations for secondary containment and leak detection.

II. SUMMARY

T Plant has been recommended as the primary interim decontamination facility for the Hanford Site. Capital upgrades would be required for the T Plant facility to ensure that operations are in compliance with the regulatory standards for
secondary containment and leak detection. The decontamination activities
planned for the T Plant facilities support the environmental restoration mission
and waste management operations for the Hanford Site.

The functional design criteria for Project W-259, "T Plant Secondary
Containment and Leak Detection Upgrades," is the technical baseline for
providing the upgrades necessary to allow the T Plant facilities to perform these
decontamination activities.

The actual operation of the decontamination systems will be performed by
T Plant operations and is not within the scope of project W-259.

Project W-259 is a fiscal year 1996 Line Item. Total estimated construction
costs for the project are $17,200,000; other project costs are $3,400,000. The
total project cost is $20,600,000.

The existing T Plant configuration does not meet the requirements of secondary
containment and leak detection.

III. JUSTIFICATION

Project W-259 will provide T Plant upgrades to perform decontamination
activities in support of the waste management and environmental restoration
programs on the Hanford Site. The T Plant facilities must be upgraded to meet
EPA and Washington State Department of Ecology requirements for treatment
of hazardous liquid waste.

Failure to validate project W-259 will result in delays of a functional on-line
facility to support major decontamination activities and will jeopardize Tri-Party
Agreement milestones M-32-03, "Complete T Plant Tank Action," and
M-32-03-T06, "Complete Scheduled Upgrades to T Plant Tank System
(project W-259)."
IV. DESCRIPTION OF PROJECT SCOPE

Project W-259 includes the design, procurement, and installation of the following items as required for each particular decontamination/transfer system:

2706-T Facility

- Systems for collection, transfer, and storage of mixed decontamination waste at the 2706-T Facility which include one automotive pit liner and three railroad pit liners; mixed waste transfer piping to/from one storage tank, located adjacent to the 2706-T storage pad; and a liquid waste load-out facility above the railroad pit inside the 2706-T Facility.

- A concrete pad to support the radioactive decontamination waste storage tank required for decontamination activities at the 2706-T facility.

- Operator interface units to monitor, alarm, and control the level and transfer of waste for each tank location.

- Valve stations for connection to decontamination agents from the existing systems.

- New 13.8 kV electrical service, transformer, and metering at the 2706-T Facility.

- Site preparation and modifications for the installation of equipment and radioactive decontamination waste collection/storage system.

- A freeze protection system to maintain temperatures above freezing within the tank.

- Transfer pump and process piping flush capabilities.

- Leak detection systems for the transfer piping, storage tank, and pit liners.
221-T Facility

- Systems for collection, transfer, and storage of mixed decontamination waste at the 221-T railroad tunnel which include mixed waste transfer piping from the storage tank in cell 15L of the 221-T canyon to the 221-T railroad tunnel; and load-out transfer facilities in the 221-T railroad tunnel.

- Systems for collection, transfer, and storage of mixed decontamination waste at the 221-T canyon which include storage tanks in cells 11L, 12L, and 15L of the 221-T canyon; mixed waste transfer piping to and from storage tanks in cells 11L, 12L, and 15L of the 221-T canyon; and decontamination pads above cells 11L and 12L of the 221-T canyon.

- Operator interface units to monitor, alarm, and control the level and transfer of waste for each tank location.

- Valve stations for connection to decontamination agents from the existing systems.

- Cell modifications for the installation of equipment and radioactive decontamination waste collection/storage systems.

- Transfer pump and process piping flush capabilities.

- Leak detection systems for transfer piping, containment cabinets and storage tanks.

A. IMPROVEMENTS TO LAND (460)

Structural
Asphalt that is sufficient for pouring pads at the storage tank facility will be removed.
A 48- by 12-in. cut will be provided in the automotive pit wall and in the east wall of the railroad pit. The cuts will allow installation of pit duct work.

**2706-T Yard Storage Tank Pad**

A new storage tank pad will be located adjacent to the 2706-TA storage pad cover on the north side. The existing grading will be modified to allow drainage around the tank pad. A soil sample test will be required to determine soil design parameters. Excavation and backfill requirements will be determined after the soil is tested and the pad is designed. The storage pad will support the new storage tank. (See sketch ES-W259-M01. All sketches are in Appendix K.)

**Piping and Vessels**

**2706-T Facility**

Pumps and discharge piping inside the existing automotive and railroad pits will be removed and disposed of.

The existing pipeline that transfers waste from the railroad pit to the 211-T sludge sump will be plugged.

The existing transfer routes between the automotive pit and the railroad pit will be plugged.

Piping that is located in the pipe trenches will be removed and stored for reinstallation in the pipe trenches.

Decontamination thimbles located above the railroad pit will be removed and stored for reinstallation.
221-T Railroad Tunnel
A new core-drill will be provided adjacent to the existing loadout piping core-drill in the 221-T railroad tunnel. The concrete in the 221-T railroad tunnel will be cut to allow for the installation of a double-walled liner sump.

221-T Canyon
The coverblocks over cells 11L and 12L will be removed for storage and reuse. The nozzles in cells 11L, 12L, and 15L will be plugged. All materials located inside cells 11L, 12L, and 15L will be removed and disposed of.

Electrical

2706-T Facility
The main 2400-480 V transformer will be removed.

B. BUILDINGS (501)

Piping
Piping between the 2706-T Facility and the new 15,000-gal storage tank, will be above ground. The process piping will be encased in a secondary containment pipe as required. The piping will be supported at an elevation that will not interfere with normal operations of the facility.

Fire Protection
The existing automatic fire alarm system and automatic sprinkler systems for the 2706-T Facility provide adequate fire protection. Current and proposed changes within the scope of project W-259 will not impact fire protection for the facilities.
C. OTHER STRUCTURES (550)

2706-T Facility Decontamination Waste Collection System

Four double-walled stainless steel pit liners will be provided and installed in the 2706-T Facility for primary collection of waste solutions generated from decontamination operations above the pits. One pit liner will be located inside the existing automotive pit; the other three pit liners will be located inside the existing railroad pit. All four pit liners will be fabricated to match the general contour of the concrete pits. Leak detection will be provided in the annulus between the primary and secondary walls of the double-walled liners. The region between the double-walled liners and the concrete pits will allow for liner structural supporting elements where appropriate.

Liner structural supports will be designed and installed to provide drainage for liquids. No traps, pockets, or low points will be installed that might prevent the leak detection system from functioning properly.

The existing pipe trenches in the 2706-T Facility will be coated with a special protective coating to provide a secondary containment barrier. The trenches will be sloped to divert all liquids to the primary containment pit liner(s). The walls of the railroad and automotive pits will be grouted to provide a flat vertical surface. A polymer-type coating (e.g., epoxy) will be applied to all exposed interior surfaces of the automotive pit and railroad pits above the new double-walled pit liners (see Appendix E for special protective coating).

Two risers will be provided with each pit liner; one riser will allow access for inspection of the region between primary and secondary pit liners, and one riser will be provided for access to the space between the secondary liner and the existing concrete pit. Each riser will be a minimum diameter of 8 in. and will terminate at least 8 in. above the maximum liquid level.
An elastomeric seal will be provided between the double-walled liners and the concrete, as required. Splash shielding will be used to protect the seals.

The four pit liners in the 2706-T Facility will be designed to ventilate through the existing pit ventilation system.

The floor of the 2706-T Facility will be sloped resulting in diversion of all liquids to the primary containment pit liners. The floor will be sealed as necessary to prevent the absorption of liquids.

A new sloped pipe trench will be installed between the automotive pit and the existing pipe trench. The trench will be located to eliminate the existing pipe chase which is approximately 12 by 12 in. The pipe trench walls and floor will be sealed to prevent the absorption of liquids.

A new pad cover to prevent rainfall water runoff from entering the sumps and pits within the 2706-T facility has been installed over the 2706-TA concrete pad area by another project.

**2706-T Yard Storage Tank**

A new 15,000-gal double-walled storage tank will be located adjacent to the 2706-TA storage pad cover on the north side (see sketch ES-W259-M01).

The new tank (i.e., the primary tank) will be approximately 13 ft in diameter by 17 ft tall. The primary tank will provide 15,000 gal of storage. Primary and secondary tanks will be fabricated from stainless steel. The tank will be fabricated to accommodate the following features (see sketches ES-W259-M02 and ES-W259-M03):

- A low point drain at the center of the primary tank bottom.
- One vertical turbine-style pump mounted at the top of the tank.

- One agitator mounted at the top of the tank.

- Leak detection at the low point of the annular region.

- Access for sludge grab sampling.

- Air sparge capability.

- Heat tracing for freeze protection.

- Secondary containment sized for 110% of the primary tank volume.

- Primary and secondary tank vents to prevent overpressure or vacuum conditions from occurring within the tank.

- Level detection for the primary tank.

- Waste stream sample return connection.

- Waste stream inlet connection.

- Containment cabinet drain connection.

**2706-T Loadout Station**

The loadout station (i.e., rail car loading arm) for the 2706-T facility will be located inside the 2706-T Facility above the existing railroad pits (see sketch ES-W259-M02). The design and construction of the new 2706-T radioactive decontamination waste solution loadout station will comply with DOE Order 6430.1A.
221-T Railroad Tunnel Collection System

A sump will be provided in the 221-T railroad tunnel (see sketch ES-259-M3). The sump will consist of a double-walled stainless steel liner set in concrete. The stainless steel liner will have a holding capacity of 450 to 600 gal. The low point of the sump will be located at the existing vitrified clay drain. An acceptable expansion-type test plug will be used to seal the existing vitrified clay drain. Lightweight grout will be installed above the test plug. The existing floor coating systems in the 221-T railroad tunnel will be repaired or replaced as required only in the areas disturbed by the construction activities of this project (see sketch ES-259-M3 and Appendix E).

221-T Canyon Collection System

New decontamination pads will be located above cells 11L and 12L. The decontamination pads above cells 11L and 12L will be identical in design and fabrication and will match the dimensions of the current cell coverblocks. The decontamination pads will be fabricated from stainless steel grating. The load capacity of the stainless steel grating will be 100 lb/ft² and will be designed to carry foot traffic.

A stainless steel funnel-shaped structure will be installed below each decontamination pad to route decontamination wastes to the collection tank systems (see sketch ES-259-M2). An elastomeric seal will be provided between the funnel-shaped structure and the existing concrete cell. Splash shielding will be used to protect the seals.

A new 14,000-gal double-walled stainless steel tank system will be installed without coverblocks in cells 11L and 12L. The outer diameter of each tank system will be 11 ft. Each tank system will be mounted from the existing cell floor. Both tank systems will have an encased riser for mounting mechanical equipment, instrumentation, sludge sampling
capabilities, and acceptance of waste from the decontamination operations performed at floor grade.

One 15,500-gal double-walled stainless steel tank system will be installed inside cell 15L prior to placing a coverblock. The outer diameter of the tank system will be 11 ft. The tank system will be mounted from the existing cell floor. The tank system will be fabricated to include a riser for mounting mechanical equipment and instrumentation. An access riser, extending to the canyon floor grade level through the coverblock, will be provided for sludge sampling.

All tank systems in the 221-T canyon will be fabricated with access to the annular region. The access will be designed to provide a straight vertical route to the low point of the annular region. The access will be used for leak detection hardware and may be used for emergency pumping (see sketch ES-259-M2).

The existing coverblock for cell 15L will be core-drilled to accept transfer piping, sludge sampling equipment, and an annular access port. The coverblock section will have double-walled piping.

An 8- to 12-in. diameter cell access riser will be provided in cells 11L and 12L for visible inspection of the region between the secondary wall of the double-shell tank system and the existing concrete (see sketch ES-259-M2).

The decontamination pads and funnel-shaped structures at cells 11L and 12L will be fabricated to allow ventilation ducting to pass from the canyon into the cells (see sketch ES-259-M2).
The dimensions of the 221-T railroad tunnel and the maximum safe vertical lift of the 221-T gantry crane will be considered for all prefabricated tanks and components.

**Heating, Ventilating, and Air Conditioning**

HEPA filtration will be installed in the vents on the 15,000-gal storage tank, and the containment cabinet located next to the 2706-T facility. The HEPA filters will be self-contained, fire- and moisture-resistant, high temperature and high humidity nuclear grade filters, and will meet ANSI N509 and N510 requirements as appropriate.

The existing ventilation system that provides exhaust from the existing 2706-T automotive and railroad pits will be modified to ventilate the primary containment region of the new double-walled containment liners being installed in the pits. The existing underfloor exhaust ducts (i.e., one duct serving the automotive pit and three ducts serving the railroad pit) will be extended and connected to the double-walled containment liners (see sketch ES-259-M02). Demisters will be installed in the proposed additions.

**D. UTILITIES (600)**

**Electrical System Design**

Project W-259 will install equipment that requires 480 V, 3-phase; 208 V, 3-phase; 277 V, single-phase; and 120 V, single-phase power. All electrical systems will be fail-safe in the event of a power failure. Interlocks and alarms will be provided on systems or components to prevent operation in a manner that may affect safety or be detrimental to the equipment. The electrical system will be designed according to IEEE recommendations, the NEC, the NESC, and DOE Order 6430.1A requirements.
A new 13.8 kV service will be installed near the 2706-T facility. A new 13.8 kV-480/277 V, 500 kVA maximum, oil filled, pad-mounted transformer was used for estimating purposes to serve the 2706-T facility. Instrumentation and metering of the transformer will be installed. As directed by WHC, the actual size and type of transformer and metering specifications will be determined by the onsite electrical utilities group.

A new MCC with a minimum 25,000 A interrupting current bracing will be installed near the existing 1,200 A distribution panelboard. The MCC will have ground fault protection and space for metering and will be oversized approximately 20% to allow for additional expansion. The MCC will supply power to the new 2706-T loads proposed by this project and to a new 480-208V/120V transformer that will supply power for all the single-phase loads. Low-pressure sodium lights and convenience receptacles will be installed near the outdoor storage tank located by the 2706-T facility.

The proposed loads in the 221-T railroad tunnel and in cells 11L, 12L, and 15L will be supplied by individual motor starters. New single-phase loads in the 221-T facility will be supplied by new mini-power centers. The new loads will derive power from the existing electrical system within the 221-T facility.

Electrical power conductors and control conductors will not be routed in the same conduit. All 480 V, 3-phase power wiring will be routed in conduits separate from the 120 V, single-phase wiring. The design will evaluate the use of existing penetrations in the canyon wall for routing of all power and instrumentation conductors into the cells.

A one-line diagram and details and a site plan for the 2706-T facility have been included to illustrate the electrical system explained in this report (see sketch ES-W259-N01, sh 1).
Standby/Backup Power
An uninterruptible power supply source will be installed in the 221-T Facility electrical gallery to provide standby power to all VCPs, PLCs, and leak detectors in the canyon and railroad tunnel.

The need for standby and/or backup power for tank heaters, heating tracing, motorized valves, pumps, and agitators has been evaluated and is not required at this time.

Compressed Air
Compressed air will be used for decontamination processes and agitation inside storage vessels. The compressed air will be supplied through the existing compressed air system. New piping will be routed from the existing compressed air line to the decontamination supply station and tank sparge systems.

Steam
Steam will be supplied for decontamination processes.

2706-T Facility
Steam for decontamination activities will be supplied at the 2706-T facility through portable steam generators furnished by other projects.

221-T Canyon
Steam for decontamination activities will be supplied at the 221-T canyon through portable steam generators furnished by other projects.

Pressurized Water
Pressurized water will be used for decontamination processes.
2706-T Facility
Pressurized (service) water will be supplied through the existing service water system. New piping will be routed from the existing service water line to the decontamination supply station. Backflow protection will be installed as required.

221-T Canyon
Service water will be supplied to all decontamination operations from the existing service water supply at the south end of the 221-T canyon. Backflow protection will be installed as required.

E. SPECIAL EQUIPMENT AND PROCESS SYSTEMS (700)

Piping

2706-T Facility
One submersible sump pump will be installed at the low point of each double-walled liner within the 2706-T Facility. These pumps will be used to transfer decontamination waste from the pit liners to the new 15,000-gal storage tank located adjacent to the 2706-TA storage pad cover. No mechanical equipment will be installed in the secondary containment region.

One vertical turbine-style pump will be installed in the new 15,000-gal storage tank. The pump will be used to transfer decontamination waste from the tank to the loadout station in the 2706-T facility.

One agitator will be installed in the new 15,000-gal storage tank to provide sludge mixing capabilities. The agitator will be mounted at the top of the tank, and positioned so that the blade has appropriate clearance from the lower unit of the pump and other tank internals. Pumps and agitators will be provided with high-efficiency motors.
The storage tank will have a HEPA filter and flame arrestor on each primary and secondary tank vent.

Single-containment piping (i.e., primary piping) will be routed from each sump pump discharge through the pipe trench to the south end of the 2706-T facility. Primary (process) piping in the 2706-T facility will be minimum 1-1/2-in. stainless steel Schedule 40S. A common 2-in. header will be located inside the pipe trench at the south side of the facility. The 1-1/2-in. piping from the four primary containment pits will tie into the 2-in. common-header.

The process pipe will be routed from the pipe trench at the south side of the facility to the northeast corner of the 2706-T facility and will follow the inside perimeter of the facility. The route will exit the 2706-T facility and proceed towards the 15,000-gal storage tank (see sketches ES-W259-M01 and ES-W259-M02). The pipe will slope from the 2706-T facility towards the storage tank.

The 2-in. transfer (process) pipe will be designed for two-way flow between the 2706-T Facility and the new storage tank, thereby reducing the need for two separate transfer lines. The desired transfer routes, either from the pit liner to the storage tank or the storage tank to the loadout station, will be achieved using new motor-operated 3-way valves to divert the flow (see sketches ES-W259-I02 and ES-W259-I03).

Four-in. stainless steel secondary encasement piping will be provided on the 2-in. process piping. The encasement begins inside the 2706-T facility, just before the pipe leaves the 2706-T facility, and runs outside the building towards the storage tank. The encasement will be provided with low-point drains and a leak detection system as required. The encasement piping will terminate at the storage tank containment cabinet.
All outdoor process piping will be provided with low-point drain connections to facilitate system drainage and, thereby, reduce the potential for freezing the liquid accumulation in those regions.

Freeze protection will be provided and installed on the outdoor service water piping and the storage tank.

Flush connections will be provided between the shutoff valve and check valve at the discharge of each pump in the 2706-T facility.

Liquid sampling connections (i.e., valves and associated piping) will be provided at the 15,000-gal storage tank. The sampling station (connection) will be provided from a recirculation line within the containment cabinet (see sketch ES-W259-103).

All valves and associated non-encased piping located above the storage tank, will be inside of a cabinet enclosure that will serve as secondary containment. The cabinet vent will be provided with HEPA filtration, and the cabinet will drain to the storage tank, as well as have leak detection.

The loadout arm in the 2706-T facility, will be designed to include retraction capabilities (multiple swivel planes of rotation, as required), to facilitate continued normal operations of the crane within the building.

Portable stairs and a platform will be furnished as required to provide access for the loading arm and rail car connection.

221-T Railroad Tunnel
One submersible style sump pump will be installed in the railroad tunnel collection sump. The pump will be used to transfer waste from the 221-T railroad tunnel to cell 15L (see sketch ES-259-M3).
Primary piping will be minimum 1-1/2-in. stainless steel Schedule 40. Secondary containment piping will be stainless steel Schedule 40 sized accordingly.

The piping system (i.e., primary inside secondary) will run from the 221-T railroad sump to the 221-T canyon deck through a new core-drill adjacent to the core-drill of the existing loadout piping. Then the piping system will run along the south wall of the 221-T canyon to cell 15L and slope towards cell 15L (see sketches ES-259-M1, ES-259-M2, and ES-259-M3).

Flush connections will be provided between the shutoff valve and the check valve at the discharge of the sump pump.

221-T Canyon

One vertical turbine style pump and one agitator will be located in the double-walled tanks of cells 11L, 12L, and 15L. The pumps in cells 11L and 12L will be used to transfer decontamination waste from cells 11L and 12L to cell 15L. The pump in cell 15L will be used to transfer decontamination waste between cell 15L and the 221-T railroad tunnel loadout station. Tank agitators in cells 11L, 12L, and 15L will provide sludge mixing capabilities.

Overpressurization of the decontamination waste tanks in cells 11L and 12L will be prevented by venting up through the neck of the funnel-shaped structure and the open grating into the canyon atmosphere.

Overpressurization of the decontamination waste tank in cell 15L will be prevented by providing a minimum 1-in. diameter ventilation stack from the primary containment of the tank to a location on the canyon wall. The route of the ventilation stack from the primary containment of the tank to the canyon wall will follow the routing of the intake and discharge transfer
piping. The ventilation stack will terminate at a minimum distance of 10 ft above the canyon floor.

Flush connections will be provided between the shutoff valve and check valve at the discharge of each pump in the 221-T canyon.

Liquid sampling stations (i.e., valves and associated piping) will be provided between the check valve and the control valve. Sampling stations will be located inside a containment cabinet (see sketches ES-259-11 and ES-259-12).

Primary piping between cells 11L, 12L, and 15L will be minimum 1 1/2-in. stainless steel Schedule 40. Secondary piping will be stainless steel Schedule 40 sized accordingly.

A new pipeline will be fabricated and installed to transfer decontamination wastes from cell 15L to the 221-T railroad tunnel. Primary piping will be minimum 2-in. stainless steel Schedule 40, and secondary piping will be stainless steel Schedule 40 sized accordingly. The piping will be routed along the south wall of the 221-T canyon. A possible path would be to follow the existing discharge piping from cell 15R. The new piping will tie into the existing railroad loadout system and will slope towards the railroad tunnel. A three-way automatic control valve will be installed at the tie-in location. The tie-in location will be directly above the railroad tunnel at the 221-T canyon deck elevation.

All valves will be housed inside a cabinet enclosure that will serve as secondary containment. Pumps, piping, and valves will be compatible with the decontamination solutions and generated wastes.
Instrumentation

For information about instrumentation signals and control architecture, see sketches in Appendix K.

2706-T Instrumentation

(1) Operator Interface Unit

A new operator interface unit (i.e., control panel) will be installed in the 2706-T Facility. The control panel will include a PLC, local I/O modules, and a VCP. The PLC will provide output signals for data collection and monitoring in a proposed central control area (room 205) of the 271-T Building. The PLC will control all pumps, valves, and switches as necessary to maintain safe operating conditions. The VCP will be connected to the PLC and will provide audible and visual alarms, operator access to control functions, and the status of the following:

- Leak detection alarms
- Liquid level
- High liquid level alarms
- Pumping status
- MOV position

(2) Leak Detection

Leak detection systems will be installed in the following areas:

- Railroad and automotive pit secondary containment sumps.
- Railroad and automotive pit concrete sumps.
- Transfer piping secondary containment.
Secondary containment cabinet near the new storage tank.

Secondary containment annular region of the new storage tank.

The signals from these systems will be fed to the PLC at the new 2706-T control panel and will provide operator notification of leaks through visual and audible alarm annunciators at the VCP.

(3) Level Detection
Continuous level detection systems will be provided for the new 2706-T storage tank. Low-, middle-, and high-level detection will be provided for the automotive pit and railroad pits.

The signals from these systems will be fed to the PLC at the new 2706-T control panel and will provide operator notification of pit and tank levels and alarm conditions through visual and audible annunciators at the VCP.

(4) Transfer Pump Instrumentation
Various MOVs with valve position sensors, pump motor controls, and tank level and leak detection systems will provide input to the PLC for monitoring waste transfer operations at the VCP. The PLC will provide the necessary program logic and interlocks to maintain safe waste transfer pumping operations.

221-T Railroad Tunnel Instrumentation

(1) Operator Interface Unit
A new operator interface unit (i.e., control panel) will be installed in the 221-T railroad tunnel. The control panel will provide local control of loadout transfers. Signals from the railroad tunnel
instrumentation will be fed to I/O modules and a PLC in the 221-T operating gallery. The PLC will provide output signals for data collection and monitoring in a proposed central control area (room 205) in the 271-T Building. The PLC will be connected to a VCP in room 205 that will provide audible and visual alarms and operator access to control functions. The PLC will control all pumps, valves, and switches as necessary to maintain safe operating conditions.

(2) **Leak Detection**

A leak detection system will be installed in the railroad tunnel to detect leaks into the railroad tunnel secondary containment liner.

The signals from the leak detection system will be fed to the operating gallery PLC and will provide operator notification of leaks or spills through visual and audible alarm annunciators at the VCP.

(3) **Level Detection**

A low-, middle-, and high-level detection system will be provided for the railroad tunnel collection system.

The signals from the detection system will be fed to the PLC in the operating gallery and will provide level data and operator notification of alarm conditions through visual and audible annunciators at the VCP.

(4) **Transfer Pump Instrumentation**

Various MOVs with valve position sensors, pump motor controls, and level and leak detection systems will provide input to the PLC for monitoring waste transfer operations at the VCP. The PLC will provide the necessary program logic and interlocks to maintain safe waste transfer pumping operations.
221-T Process Facility Instrumentation

(1) Operator Interface Unit

New operator interface units (i.e., control panels) will be installed in the 221-T canyon. The control panels will provide local control of waste transfers from decontamination collection tanks to the canyon waste storage tank. Signals from canyon instrumentation will be fed to I/O modules and a PLC in the 221-T operating gallery. The PLC will provide output signals for data collection and monitoring in a proposed central control area (room 205) of the 271-T Building. The PLC will control all pumps, valves, and switches as necessary to maintain safe operating conditions. The VCP will be connected to the PLC and will provide audible and visual alarms, operator access to control functions, and status of the following:

- Leak detection alarms
- Liquid level
- High liquid level alarms
- Pumping status
- MOV position

(2) Leak Detection

Leak detection systems will be installed in the following 221-T canyon areas:

- Secondary containment cabinets for transfer piping.
- Secondary containment annular region of the decontamination pad.
- Secondary containment annular region of the new cell tanks.
• Secondary containment piping between the railroad tunnel and cell 15L.

• Secondary containment piping between cells 11L, 12L, and 15L and cabinet 15L.

The signals from these systems will be fed to the operating gallery PLC and will provide operator notification of leaks or spills through visual and audible alarm annunciators at the VCP.

(3) **Level Detection**
Continuous level detection systems will be provided for all three cell collection and storage tanks.

The signals from the level detection systems will be fed to the operating gallery PLC and will provide operator notification of tank levels and alarm conditions through visual and audible annunciators at the VCP.

(4) **Transfer Pump Instrumentation**
Various MOVs with valve position sensors, pump motor controls, and tank level and leak detection systems will provide input to the PLC for monitoring waste transfer operations at the VCP. The PLC will provide the necessary program logic and interlocks to maintain safe waste transfer pumping operations.

**F. OTHER PROJECT COSTS (900)**
Other project costs are the expense funded activities directly associated with the implementation of project W-259 that are not included with the capital costs encompassing the total estimated construction costs. The advanced conceptual design activities to be performed by the operating contractor include, but are not limited to, permitting; project
documentation and integration; design reviews; and operations planning, training, and support.

G. DESIGN COMPLIANCE

The design and construction of project W-259 will be performed in accordance with the following design criteria:

- **American Society of Mechanical Engineers**
  ASME B31.1, "Power Piping"
  ASME B31.3, "Chemical Plant and Petroleum Refinery Piping"

- **American National Standards Institute/American Water Works Association**
  ANSI/AWWA D100, "Welded Steel Tanks"

- **Washington Administrative Code**
  WAC 173-303, "Dangerous Waste Regulations"
  WAC 173-400, "Air Pollution Sources"
  WAC 173-802, "SEPA Procedures"
  WAC 246-221, "Radiation Protection Standards"
  WAC 246-247, "Radiation Protection - Air Emissions"

- **Code of Federal Regulations**
  10 CFR 830, "Nuclear Safety Management."
  10 CFR 835, "Occupational Radiation Protection."
40 CFR 260, "Hazardous Waste Management System: General."


40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities."

**U.S. Department of Energy Orders**

DOE 4700.1, "Project Management System."

DOE 5400.1, "General Environmental Protection Program."

DOE 5400.2A, "Environmental Compliance Issue Coordination."

DOE 5400.3, "Hazardous and Radioactive Mixed Waste Program."

DOE 5400.5, "Radiation Protection of the Public and the Environment."

DOE N5480.6, "Radiological Control Manual."

DOE 5480.7A, "Fire Protection."

DOE 5480.11, "Radiation Protection for Occupational Workers."

DOE 5484.1, "Environmental Protection, Safety, and Health Protection Information Reporting Requirements."

DOE 5820.2A, "Radioactive Waste Management."

DOE 6430.1A, "General Design Criteria."
V. METHODS OF PERFORMANCE

A. ONSITE ARCHITECT-ENGINEER WORK (WBS 1.1 and WBS 1.2)
The engineer/constructor contractor will provide the definitive design for the secondary containment and leak detection in accordance with the technical baseline. Definitive design drawings and specifications, and supporting engineering documentation are included in this WBS.

The engineer/constructor contractor will perform the engineering during construction and acceptance inspection, prepare as-built drawings, and perform project turnover for the secondary containment and leak detection design.
B. PROCUREMENT (WBS 2.0)
The engineer/constructor contractor will procure long-lead items such as engineered equipment, burial boxes, and instrumentation. The engineer/constructor contractor will procure and install the balance of equipment for this project.

C. CONSTRUCTION WORK BY ONSITE CONTRACTOR (WBS 3.1)
Construction of the secondary containment and leak detection will be within radiation zones. The engineer/constructor contractor will perform construction services for work that occurs within the T Plant boundaries, utility tie-ins, and contaminated areas.

D. WORK BY OPERATING CONTRACTOR (WBS 3.3 and WBS 4.0)
The operating contractor will support the project by providing input to the review of the design and by providing oversight of construction activities. Included in this WBS are input to design; review of design media for operability, maintainability, quality assurance, safety, and environmental compliance considerations; review of procurement and construction submittals for engineered items; operations, safety, and quality assurance support to the construction effort; and T Plant operator support to construction. The operating contractor will provide for the burial of contaminated soil, equipment, and debris removed during construction.

The operating contractor will provide overall project management during design, procurement, and construction.

VI. REQUIREMENTS AND ASSESSMENTS

A. SAFEGUARDS AND SECURITY
Project W-259 will take place within the 200-West Controlled Area and will require appropriate clearances and badging for access. Existing safeguards and security measures at the tank farm will not be impacted by
this project. No new measures beyond the current site practices will be required as a result of this project.

B. HEALTH AND SAFETY

Project W-259 will support remediation of safety concerns that exist at T Plant by providing storage of low- and high-level radioactive decontamination fluids for transport.

Project W-259 is not anticipated to add new safety requirements to the 2706-T facility for splash and spill prevention during load out operations.

Accommodations for the physically handicapped will not be provided (see Appendix I).

Radiation exposure hazards associated with the construction of project W-259 are significant because of the installation and removal of equipment from the 221-T cells. Exposures to the construction personnel will be kept ALARA with engineering controls and work practices.

Construction contractors will comply with State of Washington, ICF KH, and WHC standards in performance of work, and will ensure that all applicable OSHA standards are enforced during the project. These measures include providing continuous access to construction areas by emergency vehicles and personnel, and ensuring that emergency evacuation routes are unobstructed.

Engineered and administrative controls will be utilized to mitigate the increased risk that accompanies the removal and transfer of the cell contents to another location. No increase in the release of radiation from the area or site is anticipated by the construction or operation of this project. Exposure to personnel resulting from the operation of this project
will also be minimized through the use of engineered/administrative controls, and personal protective equipment.

C. DECONTAMINATION AND DECOMMISSIONING

The existing 221-T in-cell drains removed as part of the construction of this project will be decontaminated and decommissioned which includes, but is not limited to, removal of existing piping and drains to allow installation of new equipment.

Project W-259 will add a minimal amount of additional equipment to the 221-T and 2706-T facilities. This equipment has been reviewed against requirements for the ease of decontamination and decommissioning at the closure of T Plant in accordance with section 2.6 of the FDC. The additional equipment and facilities include the 2706-T storage tanks; the 221-T cells 11L, 12L, and 15L storage tanks; the decontamination fluid transfer system; the transfer pumps; miscellaneous piping connectors, valves, instrumentation, and controls; and the MCC with buckets, an uninterruptible power supply, a panelboard, motors, and transformers. Decontamination and decommissioning of the additional equipment and the closure of T Plant are not within the project scope. The new system components will be installed with lifting lugs as required. Lifting lug locations will be determined during definitive design.

D. PROVISIONS FOR FALLOUT SHELTERS

No provisions for fallout shelters will be made as part of this project. No additional manned facilities or permanent staffing is envisioned as a result of this project.

E. MAINTENANCE AND OPERATION REQUIREMENTS

Project W-259 will result in significant reductions in the maintenance requirements for T Plant due to reduction of the safety concern regarding
econtamination fluid accumulation. The successful completion of this project will result in the elimination of the current mitigation program.

All new facilities will be designed to allow access for maintenance. Equipment and instruments will be designed to operate in the environment in which they are located and will be maintained with standard tools whenever practical.

The operating contractor will verify the accuracy of existing facility drawings with current site conditions in support of design and construction.

The operating contractor will provide soil sampling and characterization to identify special requirements during construction and to classify waste for disposal.

F. AUTOMATED DATA PROCESSING EQUIPMENT
No automated data processing equipment will be provided for this project.

G. QUALITY ASSURANCE/SAFETY CLASSIFICATION

Quality Assurance Activities
Quality assurance activities for all contractors involved in the design, procurement, construction, inspection, and testing of the proposed project will be formulated and executed in accordance with the project specific QAP. Based upon a graded approach, the QAP will implement applicable quality assurance requirements identified in 10 CFR 830.120, "Quality Assurance Requirements." The QAP will provide a format for establishing the scope of the quality-related activities and the specific quality assurance requirements and responsibilities based upon assigned safety classifications.
For project W-259, the 2706-T loadout station storage tanks will be designed in accordance with DOE Order 6430.1A, Division 13. The radioactive waste decontamination solution storage tanks have been determined to meet applicable special requirements under Section 1323, "Radioactive Liquid Waste Facilities."

**Safety Classification**

The PSE for project W-259 has been completed (ref 7). The maximum safety class category due to direct exposure of the offsite public or the onsite worker is Safety Class 3. The maximum safety class category due to adverse environmental impact was determined to be Safety Class 3. The evaluation of the safety classification is provided in the PSE.

**H. ENVIRONMENTAL COMPLIANCE**

Decontamination activities at T Plant generate hazardous and radioactive waste. Project W-259 will provide the upgrades required by State and Federal regulations for containment of hazardous wastes and leak detection. The upgrade designs will provide containment of liquid waste spills during waste transfers or releases from tank systems.

The materials used for containment will be compatible with the mixtures and concentrations of wastes. The hazardous wastes expected from decontamination activities are caustics and acids. Calculations will support the choice of materials (e.g., type of stainless steel) for the primary and secondary containment. The coatings chosen to provide secondary containment will be tested physically prior to construction using nonradioactive simulated waste. If the actual waste differs appreciably from the simulated waste after construction, coupons from the installed coatings will be tested.

Double-walled stainless steel tanks will be the primary and secondary containment for the decontamination and storage areas of the
221-T facility and the storage area outside the 2706-T Facility. The concrete pits in the decontamination areas of the 2706-T Facility will have double-walled stainless steel liners as primary and secondary containment. The liners are considered as tank systems according to WAC 173-303-040. Secondary containment systems will have the following features:

- The secondary containment system will be capable of detecting and collecting spills and releases.
- The leak detection system will be designed to detect the failure of the primary containment structure within 24 hours.
- The secondary containment structure will be sloped to drain and remove the collected liquids within 24 hours, or in as timely a manner as possible, to protect human health and the environment.

All secondary containment systems will be tested and certified after installation.

Ancillary equipment such as piping and pumps will have secondary containment.

Before construction of each tank system, a certification of design integrity will be produced by a qualified, independent registered professional engineer. A qualified installation inspector will inspect the tank system prior to enclosing or placing the system in use. All tanks and ancillary equipment will be tested for tightness prior to being enclosed or placed in service.
Waste minimization and pollution prevention will be addressed during definitive design to ensure the minimization, proper control, and disposal of any hazardous construction materials.

A Construction Quality Assurance Plan will be prepared for this project following release of the PSE. The plan will require identification of a Construction Quality Assurance Officer.

I. PERMITS
The operating contractor will prepare all required permit applications for DOE submittals. The following environmental reviews, permits, and approvals will be required prior to construction and/or operation of the facilities included within the project.

**National Environmental Policy Act**
Federal agencies are required to assess the potential environmental impact associated with their projects. The DOE will determine what level of NEPA documentation is required for the project.

**State Environmental Policy Act**
A SEPA environmental checklist will be prepared if required by a State or local agency. Based on information in the checklist, the agency will determine if a State environmental impact statement is required or issue a determination of no significance.

**Dangerous Waste Permit - WAC 173-303**
Hanford facility units that treat, store, and dispose of dangerous waste are being permitted in accordance with the requirements of WAC 173-303 and the Resource Conservation and Recovery Act of 1976 as amended.
Permitting Strategy
Air permitting and proper notifications to the WSDOH for this project are estimated to take up to 52 weeks. Construction activities, including long-lead procurement, are not to proceed without all required permits. Permitting will be initiated by the operating contractor.

VII. IDENTIFICATION AND ANALYSIS OF UNCERTAINTIES

The following uncertainties were evaluated to determine the proper contingency to be used in the conceptual cost estimate. Each of the uncertainties has resulted in the inclusion of additional contingency on a percentage basis. However, the contingency allowance does not assume the worst case impact from all the uncertainties. Including the costs for all worst case impacts would not be economically feasible or justified based on the historical costs and contingency usage of other projects.

Interfaces
All interfaces with other projects and existing operations may not have been identified or resolved.

Penetrations from the piping gallery to the canyon have not been verified to have sufficient space for electrical conductors. Existing piping congestion on the canyon walls has not been verified to allow installation of new piping supports.

Coverblocks for cells 11L and 12L will be removed and stored for use on other cells in the 221-T canyon before construction of project W-259 begins.

Fire Protection
Upgrades for fire protection, fire detection, and fire alarm systems and exits within the 221-T Building railroad tunnel, operation gallery, and canyon are not within the scope of this project. A draft FHA prepared in 1993 by WHC identified deficiencies throughout T Plant including 221-T, 221-TA, and 271-T. Revisions to the FHA are in progress. Upgrades to fire protection systems within
the railroad tunnel, the canyon, and the operating gallery will require modifications to and replacement of significant portions of the entire T Plant fire protection systems. Exiting upgrades may require significant modifications to the railroad tunnel that are beyond the scope of this project.

**Decontamination Chemical Characteristics**

Certain design concept limitations have been assumed because of requirements to control tank temperatures, tank stresses, tank and piping life, and operating conditions. A major limitation is the material corrosion resistance requirement for the expected 20-year life of project W-259. The 1/16-in. total corrosion limitation over 20 years equates to a yearly average allowance of about 3 mils/yr in the stainless steel components of the piping, transfer, and storage system. The chemicals that could be used with Type 304L stainless steel and the corrosion rates at various temperature ranges are shown in Table 1. The corrosion rates are based on continual exposure of the stainless steel metal to the chemicals over a 20-year period and a maximum penetration allowance of 2 mils/yr.

Phosphoric acid and sulfuric acid should not be used as decontamination chemicals because of the corrosion effects they have on stainless steel. The corrosion rate will be kept below 1/16 in. and will be verified periodically to ensure the 20-year life of the project W-259 components. Changes in these requirements could cause significant changes in the design concept and construction sequencing. Common practice has been to apply more restrictive operating parameters as the systems progress in age and service.

In addition to the chemical resistivity requirements, the piping and equipment will accommodate silicate solids of 20% by volume.
# TABLE 1

### CHEMICAL CORROSION RATES VERSUS TEMPERATURES

**TYPE 304/347 STAINLESS STEEL (INCLUDING 304L)**

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Mils Penetration Per Year</th>
<th>Temperature Range (°F)</th>
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<td>&lt;2</td>
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</tr>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Nitric acid, 100%</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Nitric acid, 100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitric acid, fuming</td>
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<tr>
<td>Nitric acid, fuming</td>
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<td></td>
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<tr>
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<td>Sodium hydroxide, 30%</td>
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### TABLE 1 (Continued)

**CHEMICAL CORROSION RATES VERSUS TEMPERATURES**

**TYPE 304/304L STAINLESS STEEL (INCLUDING 304L)**

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<td>Sulfuric Acid, fuming</td>
<td>X</td>
<td>60 - 90</td>
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*Unsatisfactory
VIII. REFERENCES


APPENDIX A

Work Breakdown Structure
WORK BREAKDOWN STRUCTURE

1.0 ENGINEERING
   1.1 Definitive Design (Engineer/Constructor Contractor)
   1.2 Engineering and Inspection (Engineer/Constructor Contractor)

2.0 PROCUREMENT (Engineer/Constructor Contractor)

3.0 CONSTRUCTION
   3.1 Force Account Construction (Engineer/Constructor Contractor)
   3.3 Plant Forces Construction (Operating Contractor)

4.0 PROJECT INTEGRATION (Operating Contractor)

5.0 OTHER PROJECT COSTS
APPENDIX B

Budget Authorized/Budget Outlay Schedule
ICF KAISER HANFORD

PROJECT W-259

T PLANT CONTAINMENT AND LEAK DETECTION UPGRADES

BA/BO SCHEDULE

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<td>1800/1600</td>
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<td>3300/3000</td>
<td>6600/6600</td>
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<td>3.3 OC Construction</td>
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<td>4.0 OC Proj. Integration</td>
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<td>5100/5000</td>
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Dollars in Thousands (000)

Date: 4/14/95
ICF KH PM: W.A.Holstein
WHC PE: J.D.Hookfin
APPENDIX C

Cost Estimate Summary
** IEST - INTERACTIVE ESTIMATING **

** T-PLANT CONTAINMENT AND LEAK DETECTION UPGRADES **

CONCEPTUAL (REV 2)

DOE_R01 - PROJECT COST SUMMARY

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<th>TOTAL DOLLARS</th>
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<td>5,800,000</td>
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** TYPE OF ESTIMATE **

CONCEPTUAL REV. 2 APRIL 11, 1995

** REMARKS: **

REV 0 ESTIMATE DATED JANUARY 17, 1995

REV 1 ESTIMATE DATED MARCH 17, 1995

(ROUNDED/ADJUSTED TO THE NEAREST "$ 10,000 / 100,000 "$ - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING)
** IEST - INTERACTIVE ESTIMATING **

T-PLANT CONTAINMENT AND LEAK DETECTION UPGRADES

CONCEPTUAL (REV 2)

DOE_R02 - WORK BREAKDOWN STRUCTURE SUMMARY

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<th>SUB TOTAL</th>
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<th>SUB TOTAL</th>
<th>CONTINGENCY</th>
<th>TOTAL DOLLARS</th>
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### WORK BREAKDOWN STRUCTURE SUMMARY

#### Intercontinental Estimating

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<th>Contingency</th>
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1. DOCUMENTS AND DRAWINGS
Drawings: ES-259C1, M1, M2, M3, M4, M5, I1, I2, I3, I4, I5, N1, N2, N3 SH1 1-3.

2. MATERIAL PRICES
Unit costs represent current prices for specified material.

3. LABOR RATES
A. ICF-KH Hourly Rates are based on the 1995 Fiscal Year Budget Liquidation Rates as issued by KEH Finance (effective 10-01-94). See also the FY 1995 Planning Rates * (Report BGHB7012).
B. WHC Hourly Rates are based upon the FY 1995 Planning Rates * (Report BGHB2001).
C. IRM Hourly Rates are based upon the FY 1995 Planning Rates * (Report BGHB7008).
D. Base craft rates are as issued by KEH Finance (effective 10-01-94). Rates include fringe benefits, labor insurance, taxes and travel where applicable, per Hanford Site Stabilization Agreement, Appendix A Effective 09-04-94.


4. GENERAL REQUIREMENTS/TECHNICAL SERVICES/OVERHEADS
(WHC FUNDED CAPITAL)
A. Onsite construction forces general requirement and craft overhead costs are included as a composite percentage based on the ICF-KH estimating factors, revision 1, FY95 dated 10/18/94. The total composite percentage applied to onsite construction forces labor, for this project is 67% for shop work and 72.50% for field work, which is reflected in the "OH&P/B&I" column of the estimate detail. Technical service expenses have been funded in accordance with estimating CF field labor cost percentages in "capital out year (1995+), WHC funded work.

5. ESCALATION
Escalation percentages were calculated from the January 1994 Update of the Economic Escalation Price Change Indices for DOE construction projects as published by the "Office of Infrastructure Acquisition" FM-50.

6. Rounding
U.S. Department of Energy - DOE Order 5100.4 Page 1-32 Subparagraph (M), Requires rounding of all General Plant Projects (GPP's) and Line Item (LI) Cost Estimates. Reference: DOE 5100.4, Figure 1-11, Dated 10-31-84.
7. REMARKS

A.) ASSUMPTIONS - 2706 T YARD STORAGE TANK FACILITY:
   (1) 2706-T LOAD OUT/LOAD IN ABOVE GRADE TRANSFER PIPING WILL UTILIZE A SIMPLE BOX TRUSS PIPE SUPPORT SYSTEM.
   (2) ALL WORK WILL BE SWP.

B.) ASSUMPTIONS - 2706-T FACILITY:
   (1) NO ALLOWANCE INCLUDED FOR STRUCTURAL MODIFICATIONS.
   (2) FLOOR COATINGS COVER ALL FLOOR AND PIPE TRENCH SURFACES IN THE 2706-T BUILDING.
   (3) ALL CONCRETE DEMOLITION WILL BE ON MASK.
   (4) ALL WORK WILL BE SWP MINIMUM.
   (5) ALL WASTE WATER GENERATED DURING CLEAN AND PREP OPERATIONS WILL BE COLLECTED FOR DISPOSAL.

C. ASSUMPTIONS - 221-T RAILROAD TUNNEL:
   (1) ALL DEMOLITION WORK IN THE RAILROAD TUNNEL WILL BE ON MASK. OTHER WORK WILL BE SWP ONLY.
   (2) ALL WORK WILL BE SWP MINIMUM.
   (3) POLYMER COATINGS FOR THE SUMP WILL EXTEND 1 FOOT HORizontally AROUND THE PERIMETER OF THE SUMP.
   (4) NO ALLOWANCE FOR BURNOUT HAS BEEN INCLUDED. THE DOSE RATE IN THE TUNNEL IS ASSUMED TO BE LESS THAN 2 MR.
   (5) ALL WASTE WATER GENERATED DURING CLEAN AND PREP OPERATIONS WILL BE COLLECTED FOR DISPOSAL.

D. ASSUMPTIONS - 221-T CANYON:
   (1) THE EXISTING LOAD OUT PIPING FROM THE CANYON TO THE RAILROAD TUNNEL WILL BE UTILIZED.
   (2) ALL HEADERS FOR COMPRESSED AIR, CHEMICAL SOLUTIONS, AND HIGH PRESSURE WATER EXIST AND WILL REQUIRE ONLY
       A 15FT DROP FOR SUPPLY.
   (3) A NEW STEAM & WATER HEADER WILL BE REQUIRED TO BE INSTALLED THE LENGTH OF THE CANYON.
   (4) ALL CELL BLOCKS & EQUIPMENT CURRENTLY IN CELLS 11L, 12L AND 15L WILL BE REMOVED PRIOR TO THIS PROJECT. NO COSTS
       ARE INCLUDED FOR ON SITE E-C OR PLANT SUPPORT.
   (5) AIR SPARGE, ELECTRICAL CONTROL, AND TRANSFER PIPING EXITING THE CELLS WILL BE PLACED IN A FLOOR MOUNTED SST TRAY WITH
       RAMPS FROM THE CELLS TO THE WALL.
   (6) NO COSTS INCLUDED TO SUPPORT DECON OPERATIONS SUCH AS SPRAY SHIELDS, RADIATION SHIELDING, CELL TANK SHIELDING,
       RADIATION MONITORING INSTRUMENTATION, HOSES, NOZZLES, ETC.
   (7) NO POLYMER COATINGS WILL BE PROVIDED FOR SURFACES OF THE CELLS.
   (8) ALL WORK IN THE CANYON WILL BE ON MASK.
   (9) ALLOWANCE FOR BULLPEN HAS BEEN INCLUDED SINCE NO PROVISION HAS BEEN PROVIDED TO ROTATE BURNED OUT CRAFT TO COOL WORK.
   (10) BULL PEN MAN HOURS ARE BASED UPON 4500 MHS OF MECHANICAL (CSI 15) LABOR (NET BURNOUT), SIX MAN CREW, WHICH WOULD
       THEN REQUIRE 751 MHS OF SUPPORT BY A LABORER AND A TEAMSTER.
   (11) ASSUME THERE ARE 30 PUREX TYPE NOZZLES PER CELL WHICH ARE TO BE WELDED SHUT.
   (12) ALL WASTE WATER GENERATED DURING CLEAN AND PREP OPERATIONS WILL BE COLLECTED FOR DISPOSAL.
   (13) BURNOUT IS BASED UPON AN AVERAGE RATE OF 30MR. THE FORMULA FOR BURNOUT IS SHOWN IN THE ESTIMATE DETAIL.
   (14) A REGULATED VEHICLE TO TRANSPORT THE TANKS TO THE RAILROAD TUNNEL IS ASSUMED TO BE AVAILABLE FOR USE.
   (15) AN ALLOWANCE FOR SHIELDING HAS BEEN PROVIDED BY WHC PROJECT MANAGEMENT.
   (16) PRE JOB AND DAILY MEETING TIME HAS BEEN ALLOCATED TO ADDRESS ADDITIONAL TIME REQUIRED, OVER AND ABOVE WHAT WOULD
       NORMALLY BE REQUIRED, TO PERFORM PRE JOB PLANNING AND COORDINATION WITH THE PLANT MGMT. PRIOR TO ENTRY INTO T-PLANT.

E. ESTIMATE REVISED TO INCORPORATE ICE REVIEW COMMENTS AND REVISE NON-BARGAINING LABOR AND PROCUREMENT RATES. (REV 1)

F. ESTIMATE REVISED TO INCORPORATE DELETION OF ONE (1) STORAGE TANK. (REV. 2)
Kaiser Engineers Hanford Cost Estimating Guidelines for FY 1993 provides cost estimating benchmark percentages. A comparison to these percentages are as follows:

**NOTE:** All cost shown are escalated dollars.

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<td><strong>Category 1</strong></td>
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** IEST - INTERACTIVE ESTIMATING **

T-PLANT CONTAINMENT AND LEAK DETECTION UPGRADES

CONCEPTUAL (REV 2)

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PROJECT TOTAL

PAGE 11 OF 30

DATE 04/11/95 11:43:49

BY JPM / DKH
THE U.S. DEPARTMENT OF ENERGY - RICHLAND ORDER 5700.3 "COST ESTIMATING, ANALYSIS AND STANDARDIZATION" DATED 3-27-85, PROVIDES GUIDELINES FOR ESTIMATE CONTINGENCIES. THE GUIDELINE FOR A CONCEPTUAL ESTIMATE SHOULD HAVE AN OVERALL RANGE OF 10 TO 25%.

CONTINGENCY IS EVALUATED AT THE THIRD COST CODE LEVEL AND SUMMARIZED AT THE PRIMARY AND SECONDARY COST CODE LEVEL OF THE DETAILED COST ESTIMATE.

A CONTINGENCY OF 15 & 25% HAS BEEN APPLIED TO ALL ENGINEERING ACCOUNTS DUE TO THE LIMITED INFORMATION AVAILABLE CONCERNING ACTUAL FIELD CONDITIONS (IE., UTILITY CONNECTIONS, ROUTING, AND INTERFERENCES) WHICH MAY INFLUENCE THE QUANTITIES, LENGTHS AND SIZES OF MATERIALS AND EQUIPMENT.

AVERAGE ENGINEERING CONTINGENCY 15 %

A CONTINGENCY OF 25% HAS BEEN APPLIED DUE TO THE PRESENCE OF CONTAMINATED SOIL AND PRELIMINARY SITE INFORMATION.

A CONTINGENCY OF 25% HAS BEEN APPLIED DUE TO THE PRELIMINARY ELECTRICAL INFORMATION SITE INFORMATION.

A CONTINGENCY OF 25% HAS BEEN APPLIED DUE TO THE LIMITED INFORMATION AVAILABLE CONCERNING THE PLATFORM SIZE AND CONSTRUCTION METHODS.

A CONTINGENCY OF 15 & 25% HAS BEEN APPLIED DUE TO THE LIMITED INFORMATION AVAILABLE CONCERNING SITE AND BUILDING ELECTRICAL.

A CONTINGENCY OF 15% HAS BEEN APPLIED TO THE OC CONSTRUCTION DUE TO VARIATION IN BURIAL RATES.

A CONTINGENCY OF 15 & 25% HAS BEEN APPLIED TO ALL WBS ELEMENTS RELATED TO WORK OUTSIDE THE 221-T FACILITY DUE TO LIMITED INFORMATION CONCERNING LOCATIONS FOR UTILITY/PROCESS CONNECTIONS, ASSUMED PIPING DISTANCES, CONCEPTUAL CONSTRUCTION METHODS, & ASSUMED CONFIGURATIONS.

A CONTINGENCY OF 30% HAS BEEN APPLIED TO ALL WORK IN 221-T, SINCE THE MAJORITY OF WORK IS ON MASK AND EXISTING CONDITIONS WITHIN THE FACILITY ARE NOT WELL DOCUMENTED (IE., ASSUMED DISTANCES TO TRANSPORT UTILITIES, RADIATION LEVELS, BURNOUT & SHIELDING. THE AVERAGE FOR THIS COST CODE IS 26%.

A CONTINGENCY OF 10% HAS BEEN APPLIED TO OTHER PROJECT COST DUE TO THE MINOR COMPLEXITY OF THE WORK TO BE PERFORMED.

A CONTINGENCY OF 27% HAS BEEN APPLIED TO OTHER PROJECT COST DUE TO THE MINOR COMPLEXITY OF THE WORK TO BE PERFORMED.

AVERAGE CONSTRUCTION CONTINGENCY 27 %
AVERAGE PROJECT CONTINGENCY 20 %

PLEASE NOTE: THE AVERAGE CONTINGENCY FOR ENGINEERING AND CONSTRUCTION FOR THIS PROJECT MAY APPEAR LOW CONSIDERING THE UNCERTAINTIES LISTED ABOVE. A NUMBER OF THE UNCERTAINTIES WHICH HAVE BEEN IDENTIFIED, HAVE BEEN ADDRESSED BY ALLOWANCES PROVIDED DIRECTLY IN THE ESTIMATE, SUCH AS ADDITIONAL FIELD TIME, ALLOWANCES FOR CRAFT DELAYS, ETC.
** IEST - INTERACTIVE ESTIMATING **

T-PLANT CONTAINMENT AND LEAK DETECTION UPGRADES

CONCEPTUAL (REV 2)

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**PROJECT TOTAL**

| Estimate | 15,781,568 | 0 | 0 | 0 | 0 | 0 | 0 |
ENGINEERING STATEMENT OF WORK

PROJECT W-259

T PLANT SECONDARY CONTAINMENT AND LEAK DETECTION UPGRADES

CLIENT: WESTINGHOUSE HANFORD COMPANY  W.O. NO.: ER4235
PREPARED BY: W. A. HOLSTEIN  DATE: March 8, 1995

PROJECT SCOPE

Project W-259 will provide upgrades necessary to allow the T Plant facilities to perform decontamination activities in support of the Hanford Site's Waste Management and Environmental Restoration Programs. T Plant facilities must be upgraded to meet the State of Washington Department of Ecology and United States Environmental Protection Agency requirements for the treatment of hazardous liquid wastes to provide these decontamination services. In particular, the facility must conform to the secondary containment and leak detection requirements.

The upgrades which will be provided by this project are:

- Installation of a liquid waste collection, containment, leak detection, and transfer system for handling decontamination solutions in the 2706-T facility;
- Installation of a liquid waste collection containment, leak detection, and transfer system for handling decontamination solutions and/or any liquid leaks or spills within the 221-T Railroad Tunnel; and,
- Installation of a liquid waste collection, containment, leak detection system within the 221-T facility to accommodate the planned decontamination activities.

All work will be within radiation zones. Construction will be by onsite construction forces.

REFERENCES

1) WHC-SD-W259-FDC-001, Rev. 0, Functional design Criteria (FDC) T Plant Secondary Containment and Leak Detection Upgrades W-259.
2) WHC-ECN-197461, dated 9/29/93.
4) WHC-ECN-602041, dated 1/28/94.
5) WHC-ECN-197468, dated 3/2/94.

SOW-W-259.PM
Engineering Statement of Work
Project No. W-259
Page 2

6) WHC-SD-DD-ES-013, Rev. 0, T Plant Engineering Study, 2706-T System Upgrades.

7) WHC-SD-DD-ES-014, Rev. 0, T-Plant Engineering Study, 221-T System Upgrade.

8) WHC-SD-DD-ES-015, Rev. 0, Sludge Removal From Pits.


DETAILED SCOPE

DESIGN SUPPORT SERVICES:

Environmental Engineering (22)
- Provide input regarding environmental regulations as they affect design.
- Provide calculations to support material selection for primary and secondary containment.
- Review design documents to ensure compliance with environmental regulations.

Architectural (23)
- Provide input to Civil/Structural for development of 2706-T storage tank location.
- Provide input to the Construction Specification.
- Provide Procurement Specification for moveable loadout platform/stairs.

Civil/Structural
- One (1) Plot Plan for locating storage tank at building 2706-T.
- Provide three (3) Site Plan drawings.
- Provide input to the Construction Specification (Sections 02200, 03300, and 05120).
- Provide asphalt and concrete demolition drawing.
- Prepare calculations as required, for storage tank and transformer foundations.

SOW-W-259.PM
Engineering Statement of Work  
Project No. W-259  
Page 3

- Prepare calculations as required for 221-T storage tank supports.

Fire Protection (26.3)

- Provide input for Safety review to drawings, specifications, and Acceptance Test Procedures (ATPs).

Piping (27)

- Five (5) drawings for fabrication and installation of double walled liners inside 2706-T railroad pit.
- Three (3) drawings for fabrication and installation of double walled liner inside of automotive pit in 2706-T.
- Two (2) Piping Plans for 2706-T.
- Three (3) Piping Elevations for 2706-T.
- Four (4) Piping Isometrics for 2706-T.
- Four (4) Pipe Support drawings for 2706-T.
- Three (3) drawings for fabrication and installation of 15,000 gallon double walled tank (to be included in the Procurement Specification).
- Three (3) drawings for installation of pump and agitator.
- Three (3) drawings for load out station at 2706-T.
- Two (2) Demolition Plans to outline removal of equipment/piping within existing automotive and railroad pits and pipe trenches within 2706-T.
- One (1) drawing for the 2706-T tank sample station.
- Two (2) drawings for the double wall liner in the 221-T railroad tunnel.
- Five (5) drawings for the waste collection tanks in cells 11L and 12L.
- Three (3) drawings for the tank in cell 15L.
- Eight (8) Piping Plans for 221-T.
- Nine (9) Piping Elevations for 221-T.
- Four (4) Piping Isometrics for 221-T.
- Two (2) Pipe Support drawings.
- Four (4) demolition drawings for removal of equipment/piping existing within cells 11L, 12L, and 15L.
- Three (3) drawings for installation of pumps and agitators installation.
- One (1) Procurement Specification for pumps.
- One (1) Procurement Specification for agitators.
- One (1) Procurement Specification for double walled tank.
- Two (2) Procurement Specifications for double walled liners.
- One (1) Procurement Specification for valves.
- Provide input into the Construction Specification (Section 15493).
HVAC (28)

- Provide input to the Construction Specification.
- Three (3) HVAC drawings
- Provide three (3) ATPs. One (1) each for the 2706-T railroad and automotive pits ventilation, 2706-T storage tank ventilation, and 221-T cells 11L and 12L ventilation system.

Instrumentation (29)

- Ten (10) Piping and Instrumentation Diagrams for 221-T.
- Provide (6) Process and Instrumentation Diagrams for 2706-T.
- Provide input to the Wire Run List prepared by Electrical.
- Prepare two (2) Instrumentation Plan View drawings; one (1) for 2706-T and one (1) for 221-T.
- Six (6) Instrumentation Elevation/Detail drawings; three (3) for 2706-T and three (3) for 221-T.
- Four (4) Instrumentation Interconnection drawings; two (2) for 2706-T and two (2) for 221-T.
- Four (4) Instrument Panel Arrangement drawings; two (2) for 2706-T and two (2) for 221-T.
- Four (4) Rear Panel Wiring drawings.
- Provide twenty (20) Ladder Logic drawings; twelve (12) for 221-T and eight (8) for 2706-T.
- Provide input to the Construction Specification.
- Provide two (2) ATPs for monitoring and controls in 2706-T and 221-T.

Electrical (31)

- One (1) Electrical Site Plan drawing.
- One (1) Electrical Building Plan drawing.
- One (1) Electrical One-Line diagram, 208/120 volt panelboard schedules.
- One (1) drawing for Poleline Details and Elevations drawing.
- Two (2) Transformer Details drawings.
- One (1) Grounding Details drawing.
- One (1) Metering Details drawing.
- One (1) Lifting Details drawing.
- One (1) Duct Bank Details drawing.
- One (1) Wire Run List drawing.
- Provide input to the Construction Specification.
- Provide five (5) sets of calculations
- Provide two (2) Electrical Procurement Specifications.
Specifications (32)

- Construction Specification preparation
- Procurement Specification preparation
- ATP preparation

Design Administration (35)

- Provide design supervision and interdisciplinary coordination
- Coordinate design basis inputs with discipline lead engineers.
- Ensure that design tasks are completed in accordance with requirements and procedures.

Environmental/Safety/Quality Assurance

- Review design documents and provide input for Environmental, Safety, and Quality Assurance requirements.

Project Management (40.1)

- Provide overall management of project activities.
- Prepare monthly summary of project status, cost, and schedule.
- Provide single point of contact for interface with the customer.

Project Management (40.2)

- Provide secretarial services to project management.

Quality Engineering (42)

- Review drawings, documents, and specifications to assure compliance with appropriate criteria and procedures.

Acceptance Inspection (44)

- Prepare Construction Inspection Plan.
- Provide independent assessment overview plan (by third party) for satisfaction of Washington Administrative Codes.

Project Controls (45)

- Set up Chart of Accounts and budgets in KEMS.
- Prepare the project schedule.
- Provide weekly update of cost and schedule.
- Provide Monthly Reports, Progress Schedule, EACs, and Bar Chart "S" Curve.
- Track changes to the work plan basis.
Estimating (46)
- Prepare a Construction Cost Estimate upon completion of Definitive Design.

Procurement (49.1)
- Provide input during design for Procurement Specification.
- Prepare five (5) bid packages.
- Provide input into procurement schedule.

Submittal Document Control (49.4)
- Review Procurement Specifications (8).
- Prepare a Master Submittal List.

Construction Services (67)
- Provide constructibility review during the design process.
- Provide input into construction schedule.
- Perform review/comment on cost estimate.

ENGINEERING/INSPECTION DURING CONSTRUCTION:
During construction, Engineering will provide the following support services:
- Acceptance inspection of construction activity as required by the Inspection Plan.
- Review and approval of submittals as required by the specifications.
- Preparation, review, and approval of Engineering Change Notices (ECNs) required during construction.
- Review, disposition, and approval of Nonconformance Reports (NCRs) generated during construction.
- Prepare and witness an ATP for HVAC controls and Instrumentation.
- Safety, Environmental, and Quality Assurance support of engineering activities.
- Instrumentation to provide technical support to an offsite vendor. This vendor will supply the Programmable Logic Controller (PLC) programming (based on KEH supplied ladder logic) and a related ATP for field testing of equipment. Instrumentation will also provide support during execution of the ATP at T Plant.
Engineering Statement of Work
Project No. W-259
Page 7

- As-builting of project drawings at completion of construction.
- Direct ATPs developed during Definitive Design.

CONSTRUCTION

Construction Forces

- Prepare Project Control Package (PCP)
- Provide daily supervision of construction labor.
- Provide craft labor for performance of work.
- Provide Construction Engineering support for coordination of materials, drawings, and labor.
- Closeout and turnover of project files.

Project Management (40)

- Provide overall management of project activities.
- Prepare monthly summary of project status, cost, and schedule.
- Provide single point of contact for interface with the customer.

Project Controls (45)

- Set up Chart of Accounts and budgets in KEMS.
- Prepare the project schedule.
- Provide weekly update of cost and schedule.

Estimating (46)

- Provide estimating support as required for ECNs.

Procurement (49.1)

- Perform advance procurement.
- Perform expediting.
- Procure all construction materials.
STATEMENT OF WORK

OPERATING CONTRACTOR – PROJECT MANAGEMENT

PROJECT W-259

W.O. NO.: ER-4235

PREPARED BY: J. D. HOOKFIN

DATE: January 1994

I. OBJECTIVES

The Operating Contractor shall provide project management services to the U.S. Department of Energy-Richland Operations Office (DOE-RL) from definitive design through the completion of construction and project closeout. Project management will include, but is not limited to, overall planning, daily management and technical direction, coordination, control and status reporting for all phases of the project. Before the start of definitive design, the Operating Contractor responsibility and authority will be formally documented in a DOE-RL approved Project Management Plan.

II. TASKS

A. General

Provide liaison with the cognizant RL office during the life of the project. Furnish the project information necessary to facilitate surveillance and evaluation of project execution.

1. Provide copies of all project associated correspondence, reports, design drawings, Nonconformance Reports (NCRs), plans and schedules, cost estimates, Quality Assurance (QA) programs and related audits, Engineering Change Notices (ECNs), subcontracts, work orders and supplements, minutes of meetings, test procedures, photographs, etc. All items shall be identified with the project number (W-259).

2. Provide timely notification of meetings, acceptance tests, and final inspections (with agenda when applicable).

3. Provide immediate notification of accidents, incidents, significant problems, work stoppages, etc.


5. Provide responsibility and authority for daily
management of the project as provided in the Project Management Plan (PMP).

B. Design

1. Establish project files responsibilities and requirements and disseminate these to project participants.

2. Provide technical direction and assistance for design accomplished by the Architect/Engineer (A/E).

3. The Project Engineer coordinates and takes the lead technical role in the design review process. Involves the user, site services, operations, maintenance engineering, and process engineering, as necessary, in design reviews. Approves Definitive Design for compliance with the Functional Design Criteria (FDC), project baseline, safety, operability, reliability, energy conservation, and cost effectiveness. Assure optimum design in terms of cost, safety, reliability, maintainability, accuracy, and compliance with applicable codes, standards, criteria, regulations, and Department of Energy (DOE) Management Directives.

4. Approve design schedules consistent with project requirements.

5. Provide and/or concur with engineering reports as required.

6. Coordinate and integrate environmental, NEPA, permitting and safety assessment activities into the project.

7. Update all project documents, control media, reports, schedules, and cost summaries as new information becomes available.

8. Assure that cost effectiveness is stressed in the project design and construction, and that life cycle cost analysis (LCCA), as appropriate, is a basis for design selections and decisions.

9. Participates in the team effort of developing and implementing a comprehensive, integrated project QA and/or Quality control (QC) and/or inspection plan.

10. Provide information, data, records, and guidelines for the special conditions or requirements that
may impact project cost, i.e., radiation levels, escort requirements, etc.


12. Coordinate with the Onsite Construction Contractor to assure constructibility.

C. Procurement (Long Lead and Engineered Equipment)

1. Assure procurement plans and schedules are consistent with project schedule requirements.

2. Initiate documentation to procure long lead and engineered equipment.

3. Provide liaison between A/E, program/project coordinators, buyers, and vendors during procurement.

4. Coordinate participation of Quality Assurance, program/project coordinators, and other cognizant personnel during procurement and in-factory acceptance testing activities.

5. Assure that comprehensive vendor surveys have been performed within procurement guidelines.

6. Provide overall management of procurement for engineered equipment.

D. Construction

1. Provide technical direction and assistance, as applicable, on construction accomplished by the Fixed Price Contractor and Onsite Construction Contractor.

2. Approve construction schedules consistent with project requirements.

3. Approve and/or concur with construction reports as required.

4. Assure industrial and nuclear safety at the construction site.

5. Update all project documents, control media, reports, schedules, and cost summaries as new information becomes available.

6. Provide coordination between operational user and construction forces to minimize interference and facilitate the construction work. Assure user
submittal review as appropriate.

7. Issue excavation and/or drilling and/or tie-in-permits and welding and/or cutting permits to the Onsite Construction Contractor. Approve radiation work procedures, if required, initiated by Onsite Construction Contractor.

8. Review vendor submittal as required and provide comments to the A/E or buyers.

9. Participate and concur in final inspection, testing and acceptance of completed facilities for operation.

10. Support project startup readiness review as required.

11. Assure accurate completion of as-built drawings.

12. Prepare the project close-out documents, and obtain the required approvals.

13. Arrange for disposition and/or storage of project records.

E. Decontamination and Decommissioning (D&D)

1. Provide design and technical services for D&D work associated with the 221-T and 2706-T facilities, including relocation/removal of existing utilities.

2. Provide labor and materials for all D&D activities.

3. Coordinate D&D activities with Operating Contractor personnel, including plant operation, engineering, safety, and environmental organizations.
I. PROJECT SCOPE

Project W-259 will provide upgrades to the liquid waste collection and transfer systems for handling decontamination liquid waste solutions at the T Plant facility. In particular, the upgrades will be performed at and adjacent to the 2706-T facility, within the 221-T Railroad Tunnel, and within the 221-T Canyon facility.

Upgrades provided by this project are installation of a liquid waste collection, containment, leak detection, and transfer system for handling decontamination solutions in the 2706-T facility; installation of a liquid waste collection, containment, leak detection, and transfer system for handling decontamination solutions and/or any liquid spills within the 221-T Railroad Tunnel facility; and installation of new regulatory-compliant process pads, tanks, leak detection, and transfer equipment within the 221-T Canyon facility to accommodate the planned decontamination activities.

II. STATEMENT OF WORK

This statement of work (SOW) identifies expense funded activities that will be incurred and/or managed under the direction of the Operating Contractor (OC). These type of expense activities are identified as Other Project Costs (OPC). These expense funded activities are directly associated with the implementation of Project W-259 that are not capital costs included in the Total Estimated Construction Cost (TECC). This SOW is broken out by the performing organization.

III. DELIVERABLES - OTHER PROJECT COSTS

The deliverables for this section are identified by the performing organizations. Many of the items listed deal with the client review associated with design. These reviews are necessary to assure that the design properly interfaces with existing plant equipment, operating contractor procedures, and to assure that the user will be satisfied with the end product.

A. Westinghouse Hanford Company (WHC) - Programs

1. Prepare functional design criteria and revisions
2. Prepare program/budget plans
A. Westinghouse Hanford Company (WHC) - Programs (Cont)

3. Participate in value engineering sessions
4. Support document review of conceptual and definitive design media

B. Westinghouse Hanford Company (WHC) - Projects

1. Review functional design criteria
2. Manage conceptual design report preparation
3. Prepare construction project data sheet
4. Participate in value engineering sessions
5. Prepare letters of instruction
6. Coordinate site preparation, site planning
7. Contribute text and appendices as required
8. Coordinate review and approval of project document
9. Prepare project plan, project management plan and request for project authorization
10. Provide project management and other project costs statement of work for estimate
11. Support for project validation
   a. Validation reports
   b. Validation package preparation
   c. Presentations
12. Coordinate activities prior to authorization
   a. Deviation/Waiver request
   b. Soil characterizations
   c. Plant maintenance activities

C. Westinghouse Hanford Company (WHC) - Operations

1. Provide input for document review
   a. Conceptual design report
   b. Value engineering sessions
   c. Definitive design
   d. Operational test procedures
2. Support project activities
   a. Prepare safety analysis documentation
   b. Design/Construction job walks
   c. Equipment tagouts
   d. Support/Witness acceptance test procedures
   e. Perform operational test procedures
3. Revise operations procedures
4. Operator training for new waste collection systems
5. Provide initial chemical inventories for new waste collection systems
D. Westinghouse Hanford Company (WHC) - Maintenance

1. Provide input for document review
   a. Conceptual design report
   b. Value engineering sessions
   c. Definitive design
2. Provide general support of the project
3. Provide recommended spare parts list
4. Provide training for new waste collection systems
5. Development/Revise preventative maintenance procedures for equipment
6. Provide craft support for the operational test procedures

E. Westinghouse Hanford Company (WHC) - Environmental

1. Provide input for document review
   a. Functional design criteria
   b. Conceptual design report
   c. Value engineering sessions
   d. Definitive design
2. Perform regulatory analysis
3. Develop permitting plan
4. Coordinate permitting activities
5. Support development and approval of the national environmental policy act (NEPA) documentation

F. Westinghouse Hanford Company (WHC) - Quality Assurance

1. Provide input for document review
   a. Functional design criteria
   b. Conceptual design report
   c. Value engineering sessions
   d. Definitive design
   e. Letters of instruction and work orders
   f. Procurement specifications/requirement
   g. Project management plan
   h. Engineering change notices
   i. Acceptance test procedures, operation test procedures, and official acceptance of construction
2. Generate the quality assurance project plan (QAPP)
3. Participate in closeout of nonconformance and surveillance reports

G. Westinghouse Hanford Company (WHC) - Plant Engineering

1. Provide input for document review
   a. Functional design criteria
   b. Conceptual design report
c. Value engineering sessions
d. Definitive design

D. Westinghouse Hanford Company (WHC) - Plant Engineering (Cont)

   e. Engineering change notice submittal
   g. Acceptance test procedures
   h. Maintenance and operations procedures

2. Support acceptance testing/operational testing
3. Prepare new preventative maintenance procedures

H. Kaiser Engineers Hanford (KEH) - On Site Engineer/Constructor

1. Prepare conceptual design report
2. Support validation process
3. Participate in value engineering sessions

I. Westinghouse Hanford Company (WHC) - Safety Organizations

1. Provide input for document review
   a. Functional design criteria
   b. Conceptual design report
   c. Value engineering sessions
   d. Definitive design
   e. Engineering change notices
   f. Acceptance and operational test procedures
   g. Deviations and waivers

2. Conduct safety meetings and job walks
3. Prepare construction site surveillance
4. Review safety documentation and drawings

J. Westinghouse Hanford Company (WHC) - Health Physics Technicians

1. Support soil characterization prior to construction
2. Provide surveillance activities during construction
   a. Digging operations
   b. Equipment release
   c. Radiological surveys
   d. Demolition activities
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**TABLE 1 - PROJECT W-259 ACTIVITY FUNDING (CON'T)**

Other Project Costs Statement of Work
APPENDIX D

Conceptual Project Schedule
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<th>Project</th>
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APPENDIX E

Outline Specification
OUTLINE SPECIFICATION

DIVISION 2 - SITWORK

Section 02200 Earthwork

1. Loadbearing backfill, compacted.
3. Crushed gravel stabilization.

Section 02512 Hot-Laid Asphaltic Concrete Paving

1. Base course (ballast), leveling course, asphalt material, aggregates and mineral fiber, Class B proportioning, WSDOT M41-10.

DIVISION 3 - CONCRETE

Section 03300 Cast-In-Place Concrete

1. Minimum strength: 3000 lb/in² at 28 days.
2. Reinforcing steel bars: ASTM A 615, deformed, Grade 60.
4. Nonshrink grout, nonmetallic type.
5. Concrete forms: Wood, steel, plywood, or pressed fiberboard.

DIVISION 5 - METALS

Section 05500 Metal Fabrications

2. Steel plate: ASTM A 36 or A 283.
4. Bolts: ASTM A 307, Type A.
5. Steel grating: Hot-dip galvanized, FS RR-G-661, Type 1, pressure locked with end bars.
DIVISION 9 – FINISHES

Section 09805 Special Protective Coating


DIVISION 13 – SPECIAL CONSTRUCTION

Section 13440 Instrumentation

1. Level indicating transmitter: RF Admittance technology, Kynar insulated probe, flange-mounted probe, range 0 to 20 ft, electronics remote mount from sensor, 4-20 mA output, explosionproof housing; Drexelbrook Model 508-45-6. Power supply for transmitter; 120 Vac input, 24 Vdc output; Drexelbrook Model 401-13-24.

2. Leak detection switch: thermal dispersion type sensor, wetted material SST construction, MNPT process connection, NEMA 7 enclosure, SPDT output; Fluid Components, Inc. Model 8-66

3. Leak detection/location: Control unit, UL listed as intrinsically safe for Class I, Groups C and D hazardous locations; Permalert Environmental Specialty Products, Inc. PAL-AT Model AT40K. Quick drying, chemical resistant, coaxial sensor cable; Permalert Environmental Specialty Products, Inc. type AGW Gold.

4. Programmable logic controller system
   a. Programmable controller; Modicon 984-A120.
   b. Power supply module; Modicon P120.
   c. Video control panel; Modicon PanelMate Plus.
   d. Input/output modules.
      1) Discrete input; Modicon AS-BDEP-216.
      2) Discrete output; Modicon AS-BDAP-208.
      3) Analog input; Modicon AS-BADU-205.
DIVISION 15 - MECHANICAL

Section 15493 Chemical Process Piping Systems

1. Primary piping
   a. Pipe: Stainless steel, seamless, ASTM A 312, Grade TP304L, Schedule 40S.
   b. Fittings: Stainless steel, ASTM A 403, Grade WP304L; buttwelding, ASME B16.9; wall thickness to match pipe.
   c. Flanges: Class 150, forged stainless steel, ASTM A 182, Grade F 304L, raised face; weld neck, ASME B16.5. Bore to match pipe ID.
   d. Bolting: Alloy steel studs, ASTM A 193, Grade B7, and heavy hex nuts, ASTM A 194, Grade 7.
   e. Gaskets: Spiral wound gasket 1/8-inch thick, Type 304 or 316 stainless steel with graphite filler material, ASME B16.5, Appendix E; Flexitalic RC or Garlock Guardian, or compressed carbon fiber gasket 1/16 to 1/8 inch thick; Anchor Packing 15 or Garlock Graphlock.
   f. Valves
      1) Ball: 150 lb ASME flanged, stainless steel, with UHMW seals and packing.
      2) Two-way actuator: High-torque, integral, single-phase, reversible, 120 Vac electric motor; NEMA ICS 6 Type 7 enclosure; 90 degree travel with limit switches; two SPDT position switches; visual shaft position indicator; motor brake; spring return on power failure; with manual override.
      3) Three-way actuator: High-torque, integral, single-phase, reversible, 120 Vac electric motor; NEMA ICS 6 Type 7 enclosure; 180° travel with limit switches; three SPDT position switches; visual shaft position indicator; with manual override.
      4) Check: Standard 150 lb ASME flanged, stainless steel, ball.

2. Secondary Encasement Piping
   a. Pipe: Stainless steel, seamless, ASTM A 312, Grade TP304L, Schedule 40S.
   b. Fittings: Stainless steel, ASTM A 403, Grade WP304L; buttwelding, ASME B16.9; wall thickness to match pipe.
3. Pipe Code M-2; Steam Piping
   a. Pipe: Carbon steel, ASTM A 53 Type E or S, Grade B, Schedule 80.
   c. Valves: Ball, carbon steel, NPT.

4. Pipe Code M-5; Service Water
   a. Pipe: Galvanized or plain carbon steel, ASTM A 53, Type E or S or ASTM A 106, Grade B, Schedule 80.
   c. Valves: Ball, brass, NPT.

5. Pipe Code M-7; Process Air Piping
   a. Pipe: Carbon steel, ASTM A 53 Type E or S, Grade B, Schedule 80.
   b. Fittings: 150 lb malleable iron, ASTM A 197; screw connections, ASME B16.3.
   c. Valves: Ball, brass, NPT.

6. 2706-T Facility
   a. Sump pump: Submersible stainless steel, 2.0 hp.
   c. Agitator: 2.5 hp, top entering, bladed, axial flow, blade speed 100 rpm, stainless steel.
   d. Storage tanks: Vertical, double-walled, 15,000 gallon primary storage, (13 feet diameter by 17 feet high) stainless steel, secondary storage 110% of primary storage tank, stainless steel, ANSI/AWWA D100.

7. 221-T Railroad Tunnel
   a. Sump: 450 to 600 gallon primary capacity, double walled, stainless steel, Type 304L.
   b. Sump pump: Submersible stainless steel, 3.0 hp.
8. **221-T Canyon Cells 11L and 12L**
   
   a. **Collection tank:** Vertical, double walled, 14,000 gallon primary capacity, stainless steel, Type 304L, ANSI/AWWA D100.
   
   b. **Vertical turbine pump:** Axial flow vertical turbine, stainless steel Type 304L, 2.0 hp.
   
   c. **Agitator:** 2.5 hp, top entering, bladed, axial flow, blade speed 100 rpm, stainless steel.

9. **221-T Canyon Cell 15L**
   
   a. **Collection tank:** Vertical, double walled, 15,500 gallon primary capacity, stainless steel, Type 304L, ANSI/AWWA D100.
   
   b. **Vertical turbine pump:** Axial flow vertical turbine, stainless steel, Type 304L, 5.0 hp.
   
   c. **Agitator:** 2.5 hp, top entering, bladed, axial flow, blade speed 100 rpm, stainless steel.

**Section 15500  Heating, Ventilating, and Air Conditioning**

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

2. **Duct Reinforcement**
   
   a. **Stainless steel sheet:** ASTM A 240, Type 304 or 304L.
   
   b. **Stainless steel shapes:** ASTM A 276, Type 304 or 304L.

3. **Duct Supports and Hangers:** Stainless steel shapes, ASTM A 276, Type 304 or 304L.

4. **HEPA filters:** Rated at 99.97% DOP, self-contained, fire- and moisture-resistant, Type A fire resistive, and of size scheduled on the Drawing.

5. **Chevron-style Demisters:** Koch Style #1 stainless steel.

6. **Testing:** ASME N510.

7. **Balancing:** Adjusting existing 2706-T pit exhaust fan after equipment installation to match original air flow.

8. **Flame arrestor,** by VAREC.
Section 16300 Medium Voltage Distribution

1. Conduit
   a. Rigid steel.
   b. PVC, concrete encased.

2. Cable: 15 kV single conductor for both wet and dry conditions at normal operating temperature of 90°C maximum.
   a. Conductor: Copper, annealed, Class B concentric stranding.
   c. Insulation: Ethylene-propylene-rubber, 220-mils minimum thickness.
   d. Insulation shield: 30-mil minimum extruded nonmetallic covering over insulation with 5-mil minimum nonmagnetic metal component directly over or embedded in covering.

3. Wood poles: Western red cedar, cut from live timber, butt-treated, single top cut at 30 degree angle with normal to axis of pole and at right angles to sweep. Roofs and grains brush-treated with preservative.

4. Crossarms: Straight-grained douglas fir, free from twists to within 0.1 inch per foot of length, with bends and twists in only one direction. Apply preservative to crossarms.

5. Pole hardware: Hot-dipped galvanized after fabrication.

6. Fused cutout and lighting arrester combination.

7. Fused cutout: 15 kV, 150 A, extra-heavy-duty, 100,000 A symmetrical interrupting capacity. Fuses will be furnished and installed by Operating Contractor.


9. Equipment enclosures: NEMA ICS 6 Type 3R minimum.

10. Outdoor radial feed distribution transformers: 500 kVA, 3-phase, padmounted, compartment type in accordance with ANSI C57 standards. The transformer shall be designed for 60 Hz, 95 kV BIL primary, 30 kV BIL secondary, OA cooling and 65°C temperature rise above 40°C ambient. The transformer shall be radial feed. The transformer shall be filled with RTE less flammable fluid (no substitutions) with voltage ratings shown on the drawings. Universal bushing wells for use with ANSI/IEEE 386 bushing inserts shall be provided for the transformer high voltage connections. The transformer shall have 2 full capacity 2-1/2% taps above and
below 13.8 kV. Tap changing will be accomplished at no load. The
tap changer external operating mechanism shall have provisions for
padlocking. The transformer shall be equipped with the following
accessories:

a) External operable Kearney Bayonet fuse or approved substitute.
b) Internal, back up Kearney current limiting fuse or approved
substitute.
c) One inch drain valve in secondary compartment.
d) Dial type thermometer located in secondary compartment.
e) Liquid level gauge.
f) Pressure/Vacuum gauge.
g) Three insulated grounded bushing caps.

11. Lightning arresters: Distribution valve type rated 18 kV, 15.3 kV
MCOV, 95 BIL, for use on 13.8 kV electrical system. Porcelain
bodies, wet porcelain with uniform color glaze. Galvanized cap
and base hardware with bolted clamps for both line and ground
connections. Galvanized mounting bolts.

Section 16400 Service and Distribution

1. Conduit: PVC coated rigid, galvanized steel rigid, EMT and PVC.
2. Connectors: Stranded copper with Type THWN/THHN or XHHW.
3. Equipment enclosures: NEMA ICS 6 Type I minimum (inside), Type 3
   minimum (outside).
4. Motor Control Centers (MCC): 20 inch deep enclosure for control
equipment, assembled to provide dead-front unit, and meet the
requirements of the drawings. Incoming feeders shall enter from
top. Size feeder terminal lugs to accept conductors specified.
   a. Motor controllers: Horsepower rated with 2 NO and 2 NC
      auxiliary contacts.
   b. Locate master terminal boards in top of sections.
   c. Provide full rated neutral bus as shown on the Drawings.
   d. Feeder circuit breakers: Molded case, 3-phase, individually
      mounted in a drawout type cubicle, trip free, rated for use at
      480 V ac minimum. Interrupting rating; minimum 25,000 A.I.C.
      symmetrical at 480 V ac. For ampere frame and trip ratings
      for the individual breaker see one-line diagram drawings.
5. Mini-power center panelboards: 480V-240/120V surface mounted and UL listed.


7. Safety switches: NEMA KS 1, nonfusible heavy duty Type HD, horsepower rated for 600 V ac.

8. Exterior lighting fixtures: Aluminum housing, UL listed for outdoor use, pole mounted, U.V. stabilized clear prismatic lens, low pressure sodium lamp, photocell integrally mounted and prewired for automatic "on-off" dusk to dawn operations. 480 V ac, high power factor ballast suitable for high and low ambient temperature operation.

9. Receptacles: NEMA WD 1 Designation 5-20R, duplex, ivory, specification grade, rated 20 A, 120 V, 3-wire, grounding type, with screw terminals arranged for side wiring. Self-grounding receptacles may be used instead of ground requirements specified.

10. General Purpose Transformers: NEMA ST 20, floor mounted, 60 Hz, of kVA rating shown on the drawings, with two 2-1/2% taps above and two 2-1/2% taps below normal rated primary voltage minimum. Insulation system shall be rated 220°C with 150°C winding temperature rise above ambient.

11. Heat Trace: Self-regulating heating cable for freeze protection, 15 watts per foot, 120 V.


13. Uninterruptible Power Source: A 5.0 kVA UPS that is UL listed to produce a no break power sine wave output voltage of 120 V ac ±3% with RF noise isolation and lighting and surge protection. The unit shall be able to operate in an environment of 95% relative humidity and have an efficiency of 90%. The output neutral is to be bonded to ground.
APPENDIX F

Energy Conservation Report and Analysis
(Not Applicable)
APPENDIX G

Preliminary Safety Evaluation
(To be provided by Westinghouse Hanford Company under separate cover)
APPENDIX H

Economic Analysis and Life Cycle Cost Analysis
(Not Applicable)
APPENDIX I

Physically Handicapped Assessment
PROJECT NO. W-259

PROJECT TITLE: I-Plant Secondary Containment and Leak Detection Upgrades

LOCATION: 200-W BUILDING 221-T, 2706-T (area)

Prepared By: John D. Hookfin Jr. Title: Project Engineer

Date: 10/28/93

Type of Project:

- [ ] New Building (or Building Addition)
- [ ] Building Alteration
- [ ] Site Development (Grading, Walks, Parking Lots)
- [X] Other System Upgrade

Application of Regulations:


- [ ] All Regulations
- [ ] Limited Application (indicate in comments section)

Exceptions:


- [X] a. Not intended for occupancy or use by the handicapped
- [ ] b. Alteration not involving existing stairs, doors, elevators, toilets, etc.
- [ ] c. Not structurally possible

General Comments:

Modifications made by Project W-259 will be in access restricted areas. Modifications made by this project complies with 41 CFR, Public Contracts and Property Management, Subtitle C, 101-19604, (a), "Exceptions."

Signature: John D. Hookfin Jr. Date: 10/28/93
APPENDIX J

Plant Forces Work Review
Title: ELECTRICAL HOT TIE-IN FOR PROJECTS W-259 & C-077

Estimated Cost of Work:

1. Procured Equipment   $ 0
2. Materials or Equipment Purchased for Shop Fabrication  $ 0
3. Job-Site Material  $ 600
4. Shop Labor  $ 0
5. Job-Site Labor  $ 6,800
6. Other Costs (design, field inspection, and contingency allowance)  $ 0
7. General Overhead  $ 2,000

*Include estimated fair value of material or equipment acquired on site

Total Job  $ 9,400

Requester's Name and Phone No.  J. D. Hookfin, 373-0275  Date 3/15/94

Reviewed By:
Area Work Review Agent  W.S. Ayers  Date 3/15/94
Company Work Review Agent  Clinard V. Hill  Date 3/29/94

The following determination has been made regarding applicability of the Davis-Bacon Act, as amended, to the work described above:

Applicable  [ ]  Not Applicable  [XX]
Construction  Plant Forces  RL-Labor Standards Board
Chairman  Original Signed by Fred Rutt  Date 3/31/94

"DESCRIPTION OF WORK"

Briefly state the reason for this work activity:

As part of project W-259, a new 13.8 KV service will be installed near the 2706-T facility which will be coordinated with the overhead service for Project C-077.

Summarize job scope:

Make electrical "hot tie-in"; to include safety work on the pole where the "hot tie-in" is to be made.

Discuss all programmatic or physically associated work planned, underway, or recently completed in the work area:

This work is associated with Projects W-259 and C-077 being performed as work covered by the Davis-Bacon Act.

Describe entire work scope, fully describe complete job scope using a stepped work flow format. Describe and estimate the cost of labor and material on foundations, structures, utility systems, or other construction type activity. Provide sketches or measurements for all work:

Perform electrical hot tie-in.
March 31, 1994

John D. Wagoner, Manager

WHC PLANT FORCES WORK REVIEW NO. WHC-100-94 (FOR MANAGER'S APPROVAL)

In the enclosed Plant Forces Work Review, WHC proposes that its forces perform the "hot tie-in" of the electrical connections required to furnish power to the 2706-T facility in the 200 Area, which is being performed under Davis-Bacon conditions. Only the Manager, RL can approve performance of such work by an operating contractor's forces.

WHC asserts that use of its forces, and not the construction contractor, is necessary to insure continuity of Site operations and to avoid risk to life or property because the main electrical lines are those that provide power to the 200 Areas. These facilities cannot be shut down to allow the electrical connection to be made in a "cold" condition. The responsibility for maintaining the power supply belongs to WHC, and its forces have the requisite skills to perform the work.

The RL Labor Standards Board (LSB) concurs with the WHC request, as indicated on the attached LSB Action Report.

Please sign in the space provided below if you agree with the LSB findings.

Original Signed by Fred Rutt

Fred Rutt, Chairman
Labor Standards Board

APPROVED:

Original Signed By J. D. Wagoner
Manager, Richland Operations
Office
# APPENDIX K

**Sketches**

<table>
<thead>
<tr>
<th>Facility</th>
<th>Description</th>
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<tr>
<td>2706-T</td>
<td>ES-W259: C01 Civil Site Plan T Plant</td>
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<tr>
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<td>ES-W259: I01 P&amp;ID Waste Collection Legend</td>
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<td>ES-W259: I02 P&amp;ID Waste Collection 2706-T Facility</td>
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<tr>
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<td>ES-W259: I03 P&amp;ID Waste Collection 2706-T Facility</td>
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<td>ES-W259: M01 Piping Decon Collection Tank 2706-T Facility</td>
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<td>221-T</td>
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<td>ES-259: I2 P&amp;ID Waste Transfer 221-T Canyon</td>
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<td>ES-259: I3 P&amp;ID Waste Collection 221-T RR Tunnel</td>
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<td>ES-259: M1 Piping Plan 221-T Bldg Cells</td>
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<td>ES-259: M2 Piping Cell 11L, 12L, 15L Cntmnt 221-T Canyon</td>
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<td>ES-259: M3 Piping Plan and Section 221-T Railroad Tunnel</td>
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### VALVE POSITION VS OPERATIONAL MODE

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<tr>
<th>VALVE</th>
<th>P &amp; ID ORIENTATION</th>
<th>BC</th>
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<th>AB</th>
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<tr>
<td>FY-101</td>
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<td>POSITION BC - TRANSFER TO LOAD OUT STATION FROM TK 1</td>
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<td>POSITION CA - TRANSFER FROM PIT STACKS TO TK 1</td>
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<td>POSITION BA - SAMPLE/RECIRCULATION</td>
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<td>FY-102</td>
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<td>POSITION BC - TRANSFER FROM TK 1 TO TANKER LOADING ARM</td>
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<td>POSITION AC - TRANSFER FROM PIT STACKS TO TK 1</td>
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<td>POSITION C - N/A</td>
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</tbody>
</table>
NOTE:
1) SEE DGW ES-W259-101 FOR LEGEND
TO NEW TANKER LOADING ARM FROM 2706-T PIT SUMPS

NOTE:
13 SEE DWG ES-W259-101 FOR LEGEND
NOTES:
1. PRIMARY TANK CAPACITY: 15,000 GALLONS
2. SECONDARY TANK CAPACITY: 16,500 GALLONS
3. MATERIALS: STAINLESS STEEL
NORTH

NEW 13.8 kV OVERHEAD LINE

NEW UNDERGROUND DUCTBANK, TYP

CRIB AREA (UG RAD MATERIAL)

NEW 13.8 kV - 480/277 V 500 kVA TRANSFORMER

EXISTING SIDING SP

PAD COVER

2706-T BUILDING

DEMOLITION EXISTING 2.4 kV - 480 V TRANS
NOTE
1) SEE DWG ES-W259-101 FOR LEGEND
NOTE
1) SEE DWG ES-W259-101 FOR LEGEND
2706-T BUILDING

CHANGE TRAILER

214T BUILDING

RAILROAD TUNNEL

LOAD-OUT STATION

RAILROAD TUNNEL
SEE ES-259-M3

DIAGRAMATIC

CONCEPTUAL

SCALE IN FEET

0 25 50
2706-T BUILDING

CHANGE TRAILER

214-T BUILDING

RAILROAD TUNNEL

COLLECTION SUMP LINE

LOAD-OUT STATION

RAILROAD TUNNEL
SEE ES-259-M3

CONCEPTUAL

SCALE IN FEET

0 25 50
NOTES

1) 14000 GALLON STORAGE TANK AND DECONTAMINATION PAD.

2) ALL MATERIALS WILL BE STAINLESS STEEL. WEIGHT CAPACITY WILL BE 100 LB/SF FOR THE WORKING AREA OF THE DECONTAMINATION PAD.

CONCEPTUAL
NOTES
1) LIGHT WEIGHT GRC
2) SINGLE TEST PLUG RUBBER EXPANSION
I-PLANT FACILITY
RR TUNNEL PLAN - OURED
FLUSH W/ PIPE END.
CAST IRON BODY AND NATURAL G.

LOAD-OUT LINE FROM CELL 15L
221-T RR SUMP TO CELL 15L

RR TANKER CAR

COLLECTION SUMP

LOAD-OUT STATION

NEW CORE DRILL

T-PLANT FACILITY
RR TUNNEL PLAN
ES-259-M1

CONCEPTUAL