

# SYSTEM DESIGN DESCRIPTION FOR THE REPLACEMENT CROSS-SITE TRANSFER SYSTEM BETWEEN 200 WEST AND 200 EAST TANK FARMS

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**Abstract:** This SDD describes the cross-site transfer systems between 200 West and 200 East tank farms, identifies requirements associated with the SSCs, explains why these requirements exist, and describes the features of the system design provided to meet those requirements.

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## ABSTRACT

This system design description of the Replacement Cross-Site Transfer System between the 200 West and 200 East Area Tank Farms is intended to be a living compendium of design requirements, design bases, and system descriptions. The system design description includes references to relevant procedures, drawings, calculations, and supporting documents. It is written to the outline provided in DOE-STD-3024-2011, *Content of System Design Descriptions*. All section headings from DOE-STD-3024-2011 are included. If no information is available or relevant for a section heading, the heading is included as a place holder, and the statement “***Information not readily available***” is inserted. If the information becomes available or required at a later time, it will be included to the extent possible.

## CONTENTS

1.0	INTRODUCTION .....	1-1
1.1	SYSTEM IDENTIFICATION.....	1-1
1.2	LIMITATIONS OF THIS SYSTEM DESIGN DESCRIPTION .....	1-1
1.3	OWNERSHIP OF THIS SYSTEM DESIGN DESCRIPTION.....	1-2
1.4	DEFINITIONS/GLOSSARY .....	1-2
1.5	ACRONYMS.....	1-6
2.0	GENERAL OVERVIEW.....	2-1
2.1	SYSTEM FUNCTIONS/SAFETY FUNCTIONS.....	2-1
2.2	SYSTEM CLASSIFICATION .....	2-2
	2.2.1 Safety Classification .....	2-2
	2.2.2 Environmental Classification.....	2-3
2.3	BASIC OPERATIONAL OVERVIEW .....	2-3
3.0	REQUIREMENTS AND BASES.....	3-1
3.1	REQUIREMENTS.....	3-1
3.2	BASES .....	3-1
3.3	REFERENCES .....	3-2
3.4	GENERAL REQUIREMENTS .....	3-2
	3.4.1 System Functional Requirements .....	3-2
	3.4.2 Subsystems and Major Components .....	3-10
	3.4.3 Boundaries and Interfaces.....	3-12
	3.4.4 Codes, Standards, and Regulations .....	3-15
	3.4.5 Operability .....	3-17
	3.4.6 Performance Criteria.....	3-19
3.5	SPECIFIC REQUIREMENTS.....	3-19
	3.5.1 Radiation and Other Hazards .....	3-19
	3.5.2 As Low As Reasonably Achievable .....	3-20
	3.5.3 Nuclear Criticality Safety .....	3-21
	3.5.4 Industrial Hazards .....	3-21
	3.5.5 Operating Environment and Natural Phenomena .....	3-21
	3.5.6 Human Interface Requirements .....	3-23
	3.5.7 Specific Commitments.....	3-23
3.6	ENGINEERING DISCIPLINARY REQUIREMENTS.....	3-23
	3.6.1 Civil and Structural .....	3-23
	3.6.2 Mechanical and Materials .....	3-25
	3.6.3 Chemical and Process .....	3-28
	3.6.4 Electrical Power .....	3-29
	3.6.5 Instrumentation and Control .....	3-30
	3.6.6 Computer Hardware and Software.....	3-32
	3.6.7 Fire Protection.....	3-35
3.7	TESTING AND MAINTENANCE REQUIREMENTS .....	3-36
	3.7.1 Testability .....	3-36

3.7.2	TSR-Required Surveillances.....	3-36
3.7.3	Non-TSR Inspections and Testing.....	3-36
3.7.4	Maintenance.....	3-37
3.8	OTHER REQUIREMENTS .....	3-38
3.8.1	Security and Special Nuclear Material Protection.....	3-38
3.8.2	Special Installation Requirements.....	3-38
3.8.3	Reliability, Availability, and Preferred Failure Modes.....	3-38
3.8.4	Quality Assurance.....	3-39
3.8.5	Miscellaneous .....	3-39
4.0	SYSTEM DESCRIPTION.....	4-1
4.1	CONFIGURATION INFORMATION.....	4-1
4.1.1	Description of System, Subsystems, and Major Components .....	4-1
4.1.2	Boundaries and Interfaces.....	4-1
4.1.3	Physical Location and Layout.....	4-9
4.1.4	Principles of Operation .....	4-16
4.1.5	System Reliability Features .....	4-19
4.1.6	System Control Features .....	4-20
4.2	OPERATIONS.....	4-23
4.2.1	Initial Configuration (Prestartup).....	4-23
4.2.2	System Startup .....	4-23
4.2.3	Normal Operations.....	4-23
4.2.4	Off-Normal Operations .....	4-24
4.2.5	System Shutdown.....	4-24
4.2.6	Safety Management Programs and Administrative Controls.....	4-24
4.3	TESTING AND MAINTENANCE.....	4-24
4.3.1	Temporary Configurations.....	4-24
4.3.2	TSR-Required Surveillances.....	4-24
4.3.3	Non-TSR Inspections and Testing.....	4-25
4.3.4	Maintenance.....	4-25
4.4	SUPPLEMENTAL INFORMATION .....	4-25
5.0	REFERENCES .....	5-1

## APPENDICES

A	SOURCE DOCUMENTS .....	A-i
B	SYSTEM DRAWINGS AND LISTS .....	B-i
C	SYSTEM PROCEDURES.....	C-i
D	SYSTEM HISTORY .....	D-i

## FIGURES

Figure 1. Replacement Cross-Site Transfer System    Simplified System Diagram.....	2-5
Figure 2. Pipe-in-Pipe Configuration of the Buried Transfer Line.....	3-4
Figure 3. Replacement Cross-Site Transfer System Diagram. ....	4-3
Figure 4. Replacement Cross-Site Transfer System Interfaces at the 241-SY-A and 241-SY-B Valve Pits. ....	4-5
Figure 5. Replacement Cross-Site Transfer System Interfaces Near the 244-A Lift Station.....	4-7
Figure 6. Replacement Cross-Site Transfer System Transfer Route. ....	4-10
Figure 7. Diversion Box Layout. ....	4-11
Figure 8. Vent Station Layout.....	4-12
Figure 9. W-058 Cross-Site Transfer Overview .....	4-18

**TABLES**

Table 1. Safety Classifications.....	1-4
Table 2. Fluid Properties.....	3-11
Table 3. Hardware Interlock Setpoints. ....	3-31
Table 4. Software Interlocks.....	3-34
Table 5. Software Interlocks to Control Valve Operation. ....	3-35



## 1.0 INTRODUCTION

The Replacement Cross-Site Transfer System (RCSTS), previously known as Project W-058, was a fiscal-year 1993 capital-funded project with a completion date of fiscal year 1998. It replaced the old Hanford Site cross-site transfer lines (six lines in a concrete encasement) that were used to transfer high-level, radioactive waste streams between the 200 East Area and 200 West Area tank farms. The replacement was needed to provide a new transfer system that complies with current codes and regulations. An upgrade to the RCSTS pipelines was completed by project W-314 in June, 2005. This upgrade rerouted the transfer pipelines from the 244-A pump pit to the 241-AN Tank Farm. The primary purpose of the RCSTS is to support the overall mission of the River Protection Project to store, treat, and immobilize highly radioactive waste stored in Hanford Site tanks in an environmentally safe, sound, and cost-effective manner.

This system design description (SDD) describes the functions of the RCSTS, identifies the requirements and their bases to support the system functions, and discusses how the RCSTS was designed to fulfill those requirements.

### 1.1 SYSTEM IDENTIFICATION

The RCSTS extends from the 241-SY-A and 241-SY-B valve pits in the 200 West Area SY Tank Farm to the 241-AN-01A pump pit and directly into Tank 241-AN-104 via Riser 010 in the 200 East Area. This system includes the Electrical Utility, operational Monitor and Control System (MCS), instrument air supply, and heating, ventilation, and air conditioning (HVAC) system necessary to support the RCSTS operation. The flush water system provided by Project W-058 provides flush water to the SY Tank Farm and is connected to the RCSTS by SY Tank Farm waste transfer piping; therefore, the flush water system is not included as a subsystem of the RCSTS. Similar systems not directly connected to the RCSTS operation are not covered by this SDD.

### 1.2 LIMITATIONS OF THIS SYSTEM DESIGN DESCRIPTION

The SDD is a central coordinating link among the engineering design documents, the facility safety basis, and the implementing procedures. The SDD is a compilation of information intended primarily for use by facility operation, maintenance, and technical support personnel. This SDD is not part of the Tank Farm Safety Basis..

The SDD is formatted to be consistent with DOE-STD-3024-2011, *Content of System Design Descriptions*, and is based on the best available information, including interviews with knowledgeable personnel. This SDD was written after the system was designed and installed, and operations had begun. It necessarily relies on historic and design-basis information. Where information was not available or was judged too difficult or impossible to recover or recreate, the following statement is included in the standard format as a placeholder: ***“Information not***

***readily available.***” If future users of the SDD discover, recover, or recreate the missing information, they should forward that information to the SDD owner for incorporation.

Chapter 3 of this SDD addresses the system requirements and bases, and provides an assessment of how the design meets the requirements. A formal assessment of how the as-built structures, systems, and components (SSCs) in the field meet the requirements is not necessary for the SDD, even though some “walk-downs” were made during the preparation of the SDD. The RCSTS underwent functional and acceptance testing and a readiness review to ensure compliance with detailed requirements. All system modifications since the readiness review have been governed by the USQ process. Therefore, specific descriptions and assessments included are accurate, and field verification of all details was not required.

This SDD includes all SSCs for the system that are actually installed in the field, whether or not they are or ever were in operation. Designed or planned facility modifications and additions for ongoing projects were not included in the SDD. The intent is to update or replace this SDD with new project information as part of the project turnover to Operations personnel for beneficial use as required by DOE-STD-3024-2011.

### **1.3 OWNERSHIP OF THIS SYSTEM DESIGN DESCRIPTION**

The owner of this document is the Responsible Engineer for the system described herein who has been formally assigned responsibility by the Engineering Management organization of the Tank Operations Contractor. Any changes to this SDD document shall be approved by the assigned Responsible Engineer.

### **1.4 DEFINITIONS/GLOSSARY**

**Active.** An active component is one that is part of the “as-built” tank farms and has not been isolated and disconnected from all other tank farm components as part of an approved engineering change notice.

**As Low As Reasonably Achievable (ALARA).** The philosophy of making every reasonable effort to maintain exposures to radiation as low as reasonably achievable.

**Design Features.** As defined in Section 6.0 of HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements*, design features are passive design features that, if altered or modified, would have a significant effect on safe operation and that are not covered elsewhere in the Technical Safety Requirements (TSRs).

**Double-Shell Tank (DST).** A tank designed for storing highly radioactive and hazardous waste produced at the Hanford Site. The primary tank shell contains the waste and is surrounded by a secondary shell to provide waste containment if the primary shell develops a leak.

**Electrical Utility (when capitalized).** The Hanford Site Utility Contractor, who is responsible for electric utilities.

**Hanford Site.** A 1,518 km<sup>2</sup> (586 mi<sup>2</sup>) nuclear processing site located in south-central Washington State and operated by the U.S. Department of Energy (DOE). The current primary mission of the Hanford Site is environmental restoration and remediation.

**High-Efficiency Particulate Air (HEPA) Filters.** High-quality air filters used in nuclear air-cleaning systems with a factory tested removal efficiency of 99.97% of particles down to 0.3 µm aerodynamic diameter in size.

**Process Waste.** Waste from DSTs, SSTs, and miscellaneous underground storage tanks that contain high-level waste.

**Programmable Logic Controller (PLC).** A monitoring and control device capable of providing signal processing, data acquisition, and alarming and interlocking functions.

**Responsible Engineer.** Assigned person responsible to identify and approve vital safety system information (TFC-PLN-03, *Engineering Program Management Plan*).

**Safety Basis.** The DSA and hazard controls that provide reasonable assurance that a DOE nuclear facility can be operated safely in a manner that adequately protects workers, the public, and the environment (10 CFR 830.3). The tank farms Safety Basis is documented in RPP-13033, *Tank Farms Documented Safety Analysis* and HNF-SD-WM-TSR-006.

**Safety Classification.** A classification given to system elements to delineate their importance in providing specific system functions to protect operators, the public, or the environment.

Current safety classifications are applied to SSCs based on evaluation of various potential accidents as evaluated in RPP-13033. These safety classifications, as defined in DOE-STD-3009-94, *Preparation guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analysis*, are determined as follows:

- **Safety Class (SC) SSCs.** SSCs, including portions of process systems, whose preventive or mitigative function is necessary to limit radioactive hazardous material exposure to the public, as determined from safety analysis.
- **Safety Significant (SS) SSCs.** SSCs which are not designated as SC SSCs, but whose preventative or mitigative function is a major contributor to defense in depth and/or worker safety as determined from the safety analysis.
- **Defense-In-Depth (DID).** Equipment and administrative features providing preventative or mitigative functions so that multiple features are relied on for accident prevention or mitigation to a degree proportional to the hazard potential. See RPP-13033, Section 3.3.2.3.2, for more details.

- General Service (GS) SSCs. SSCs that are not relied on to prevent or mitigate accidents analyzed. Tank farm SSCs that are not designated as SC or SS are referred to as GS.

RPP-13033, Chapter 3, “Hazard and Accident Analyses,” designates SC and SS SSCs that provide safety controls for postulated accidents. RPP-13033, Chapter 4, “Safety Structures, Systems, and Components,” identifies safety functions, functional requirements, and performance criteria for tank farm safety systems.

The RCSTS was designed and constructed to safety classifications based on Hanford Plant Standard HPS-SDC-4.1, *Standard Arch-Civil Design Criteria, Design Loads for Facilities*. Cross-correlation of safety classifications used in DOE Order 6430.1A, *General Design Criteria*; UCRL-15910, *Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards*; and HPS-SDC-4.1 is provided in Table 1.

Table 1. Safety Classifications.

DOE Order 6430.1A	UCRL-15910	HPS-SDC-4.1
Safety Class	4 -- High Hazard	Safety Class 1
Non-safety Class	3 -- Moderate Hazard	Safety Class 2
	2 -- Important/Low Hazard	Safety Class 3
	1 -- General Use	Safety Class 4

- Safety Class 1. Safety-Class 1 items are SSCs, including portions of process systems, whose failure could adversely affect the environment or the safety and health of the public. Specifically, safety-class items are SSCs with the following characteristics:
  - Those whose failure would produce exposure consequences that would exceed the guidelines in DOE Order 6430.1A, Section 1300-1.4, “Guidance on Limiting Exposure to the Public,” at the Site boundary or nearest point of public access
  - Those required to maintain operating parameters within the safety limits specified in the operational safety requirements during normal operations and anticipated operational occurrences
  - Those required for nuclear criticality safety
  - Those required to monitor the release of radioactive materials to the environment during and after a design-basis accident
  - Those required to achieve and maintain the facility in a safe-shutdown condition
  - Those that control the safety class item above.
- Safety Classes (Other). Safety-Class 2, 3, and 4 SSCs and equipment are those other than Safety-Class 1.

In this document, the various SSCs are described based on their design safety classification. Following each classification description, the current safety classification is stated.

**Saltcake/Sludge.** A term used to describe the crystallized and precipitated solid waste and thick, high-viscosity waste left behind in underground storage tanks after the removal of the liquids in such tanks. Saltcake/sludge requires chemical conditioning and mobilization or mixing before it is transferred outside of the tanks.

**Slurry Waste.** Slurry waste is waste that is not supernatant or other liquid waste or a solid saltcake/sludge form. Slurry waste is liquid in form and possesses suspended solids; therefore, slurry's specific gravity is greater than 1. Slurry waste is transferable with little or no chemical conditioning; however, most slurry waste requires mixing before it is transferred so that the solids present are suspended throughout.

**Subsystem.** A subsystem resides within a system but performs an independent function.

**Supernatant.** The component of waste that is liquid in form and contains no appreciable suspended solids. The specific gravity of supernatant is approximately equal to or slightly greater than 1. The clear liquid floating on the surface of the waste in tanks is termed supernatant. Supernatant levels in tanks usually are derived by subtracting the solids-level measurement from the liquid-level measurement. In some cases, however, this includes any floating solid crusts that are present in the tank.

**Support System.** A system providing support to another system when that support is necessary for the entire complex system to function.

**System.** An interrelated set of structures, equipment, subsystems, modules, components, devices, parts, and/or interconnecting items that is capable of performing a specified function or set of functions to fulfill a purpose. Systems usually have defined boundaries and often depend on human interactions.

**Transfer-Associated Structure.** Pump pits, valve pits, or diversion boxes.

## 1.5 ACRONYMS

AB	Authorization Basis
AC	administrative control
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
AOV	air-operated valve
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
CFR	<i>Code of Federal Regulations</i>
DID	Defense-in-Depth
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
DST	Double-Shell Tank
EPDM	ethylene propylene diene monomer
GS	General Service
HEPA	high-efficiency particulate air (filter)
HVAC	heating, ventilation, and air conditioning
IEEE	Institute of Electrical and Electronics Engineers
IQRPE	Independent qualified registered professional engineer
ISA	Instrumentation, Systems and Automation
kVA	kilo volt ampere
KW	kilo-watt
LTG	lighting
MCS	monitor and control system
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OCS	operator control station
ORP	Office of River Protection
OSD	Operating Specifications Documents
P&ID	Piping and Instrumentation Diagram
PAC	Protective Action Criteria
PCU	process control unit
PLC	programmable logic controller
ppm	parts per million
PUREX	Plutonium-Uranium Extraction (Plant)
RCSTS	Replacement Cross-Site Transfer System
RPP	River Protection Project
SC	Safety Class
SDD	system design description
SS	Safety Significant
SSC	structure, system, and/or component

SST	single-shelled tank
TOC	Tank Operations Contractor
TSR	technical safety requirement
USQ	Unreviewed Safety Question
V	volts
VA	volt ampere
WAC	<i>Washington Administrative Code</i>
WRPS	Washington River Protection Solutions
WST	Waste Storage Tank
WTS	Waste Transfer System

## 2.0 GENERAL OVERVIEW

This chapter provides a general description of the functions that the RCSTS performs and a brief discussion of how the system operates to carry out these functions. A more detailed system description appears in Chapter 4.

### 2.1 SYSTEM FUNCTIONS/SAFETY FUNCTIONS

Requirements for the RCSTS are characterized by major system functions. The RCSTS performs the following major functions to accomplish its intended purpose.

#### Process Functions

- Transfer supernatant from the 200 West Area to the 200 East Area (transfer from the 200 East Area to the 200 West Area is an option, but currently is not planned)
- Transfer slurry from the 200 West to the 200 East Area (waste transfers through the RCSTS slurry line, WT-SLL-3160, are not authorized, as directed in letter 97-WSD-247, “Contract Number DE-AC06-96RL13200 – Approval of Authorization Basis (AB) Amendment Package for Project W-058, Replacement Cross-Site Transfer System”).

#### Safety Functions (Safety Basis)

Provide confinement of waste to decrease the frequency of a fine spray leak. In addition, providing confinement of waste protects the facility worker from wetting spray/jet/stream leak and from a flammable gas deflagration in a waste transfer-associated structure due to a waste transfer leak. (RPP-13033).

#### Design Features

Design Features are described in Section 6.0 of HNF-SD-WM-TSR-006. Design Features are passive design features that, if altered or modified, would have a significant effect on safe operation and that are not covered elsewhere in the TSRs. For each Design Feature, the applicability of the Design Feature and the in-service inspections/tests required for the Design Feature to be OPERABLE are provided. Also provided is a summary description of the Design Feature and its important attributes (i.e., safety function and functional/performance requirements). Below is a summary of each of the Design Features that apply to this SDD.

- Waste Transfer Primary Piping Systems – Waste transfer primary piping systems are required to be operable:
  1. When physically connected to an active waste transfer pump not under administrative lock, or physically connected to the 242-A Evaporator vessel when the vessel contains waste. (See Section 1.1 of HNF-SD-WM-TSR-006 for the definition of when the 242-A Evaporator vessel contains waste.)



2. When a compressed air source is connected to the waste transfer primary piping system's encasement for pneumatic testing of the encasement (i.e., the primary piping within the encasement).

### **Environmental Protection Functions**

- Detect leaks in the RCSTS, provide an alarm to alert operators to take mitigative actions, and provide a transfer pump trip signal
- Detect leaks in the 241-SY-A and B valve pits, 241-AN-01A pump pit and at the 241-AN-04D receiver pit and provide an alarm to alert operators to take mitigative actions
- Direct the flow of leaked waste from the primary line to a waste transfer-associated structure for detection
- Provide confinement of waste in primary piping to minimize the potential for leakage (passive)
- Contain materials (confinement) and prevent releases to the environment
- Mitigate the consequences of any accidental releases or leakage

### **Support Functions**

- Provide operational monitoring and control
- Provide utility distribution (i.e., instrument air; HVAC; electrical power; and the capability to flush, decontaminate, and remove leakage or decontamination solutions collected in RCSTS structures)
- Maintain the RCSTS components and equipment

## **2.2 SYSTEM CLASSIFICATION**

### **2.2.1 Safety Classification**

The RCSTS is classified as SS based on the safety function to provide confinement of waste. Some components of the RCSTS have specific safety related functional requirements and are expected to operate under conditions caused by postulated accidents. These components are safety classified and tabulated in Chapter 4 of RPP-13033.

Related historical documents which provide information on the original safety classification of the RCSTS include WHC-SD-W058-DRD-001, *Preliminary Design Requirements Document for Project W-058, Replacement of the Cross-Site Transfer System* and HNF-1956, *Project W-058 Master Equipment List*.

### **2.2.2 Environmental Classification**

The RCSTS is a portion of a *Resource Conservation and Recovery Act of 1976* treatment, storage, and disposal facility, and is subject to the *Clean Air Act of 1977*, *Toxic Substances Control Act of 1976*, *National Environmental Policy Act of 1969* and *Washington Administrative Code (WAC) 173-303*, “Dangerous Waste Regulations”.

## **2.3 BASIC OPERATIONAL OVERVIEW**

Figure 1 shows the waste transfer lines, leak-detection system, MCS, and major interfaces for the RCSTS when transferring supernatant from the SY Tank Farm to the 200 East Area. More detailed system diagrams are included in Chapter 4.

During the upgrade to the RCSTS pipelines that were completed by project W-314 in June, 2005, an attempt was made to place a nitrogen blanket in the encasement piping of SLL-3160 to prevent the formation of condensation (see W-314 Waste Transfer System Sub-Test Results Report W-314-STRR-1.2, Revision 0). It was found the encasement was incapable of holding pressure and PER-2006-0531 was written to document this anomaly. A visual and audible inspections were made at 6241-V and 241-AN-104, however, the encasement isolation valve, plunger and seat, at 241-AN-104 were not accessible. Prior to the use of SLL-3160, successful pressure testing of the encasement and readiness activities must be completed.

Because the DOE Office of River Protection has not authorized use of the slurry transfer line, and a readiness assessment of the slurry line has not been performed, the main focus of this SDD is on the operation of the supernatant transfer line (SNL-3150).

The following sections briefly describe how the various parts of the RCSTS operate to accomplish the system functions.

### **Process Function**

#### Transferring Waste Supernatant

The RCSTS consists of two separate transfer lines for slurry and supernatant, both constructed with the same materials in the same way. The buried pipeline is a 3-in. stainless steel primary pipe. The transfer operation is controlled by an MCS. The operator at the operator control station (OCS) in the 242-S Evaporator control room initiates the transfer by selecting the transfer scheme, which determines the type of liquid and the direction for the transfer. The selected valves then will be lined up (open or closed) correctly for the routing required by the transfer. During the transfer, the operator will use the OCS to monitor the system for safe operation.

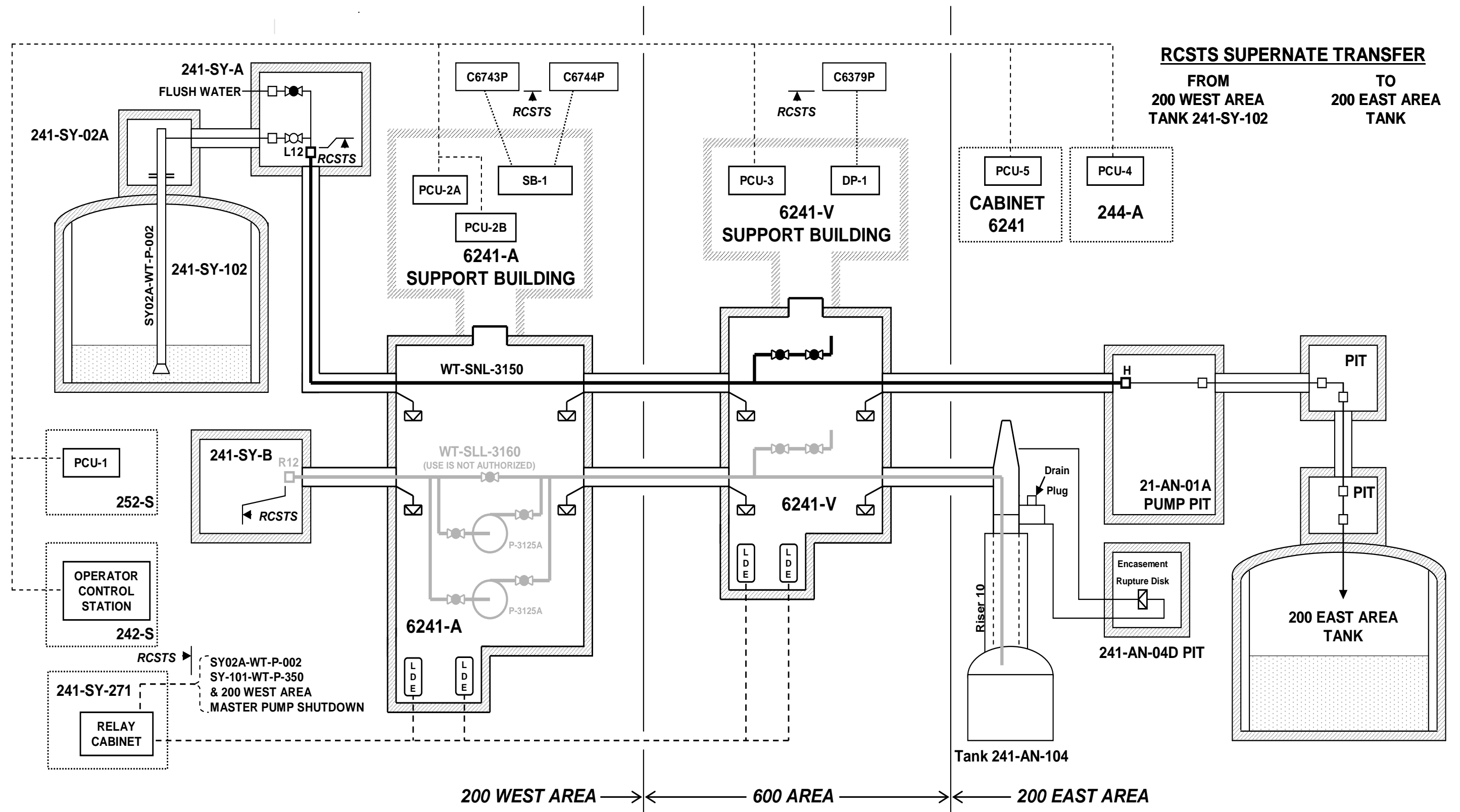
After completing the transfer, the operator will activate and monitor the flushing and draining of the pipeline and finally will reposition the valves to a non-transfer condition. In this condition, the transfer line will remain in the standby mode until another transfer is required.

When authorized for use, the slurry line also may be used for supernatant transfers.

#### Transferring Waste Slurry

Although provisions exist for the slurry transfer, current operation is limited to only the supernatant line for the reasons already stated.

Figure 1. Replacement Cross-Site Transfer System



## **Environmental Protection Function**

An objective of the RCSTS design is to minimize worker and public exposure to radiation and to meet ALARA requirements through remote operations and underground transfer. The system design also reduces the safety and environmental risks of a radiological release by providing a continuous leak-detection sensor—a sensing cable in the annular space between the primary pipe and the encasement pipe of the buried pipeline. The leak-detection cable identifies the presence of a liquid at any point along the buried pipeline and indicates the leak location within 5 ft. Should a leak occur in the transfer line, the leaked waste would be collected in the buried encasement piping, routed to the diversion box and/or vent station sump, and returned to the transfer line. Both above-ground structures include reinforced concrete enclosures to prevent unplanned radiological releases. The pipe encasements for portions of lines between the SY valve pits and the diversion box can be drained to the valve pits, and the lines between the vent station and the 241-AN pits can be drained to the 241-AN-01A pump pit (supernatant line) and directly into Tank 241-AN-104 (slurry line).

If a leak or a fault occurs in the transfer route during a waste transfer, an alarm signal is sent to the MCS, which initiates an output alarm contact wired directly to the 200 West Area master pump shutdown circuit for shutting off the transfer pumps in the SY Tank Farm. The output alarm contact also trips the operating booster pump during slurry transfers (slurry encasement currently not inerted with nitrogen gas). A visible display appears on the front of the leak-detection monitoring unit, indicating the type of fault and its location. Pull ports are provided approximately every 300 ft to permit the replacement of nonfunctioning cable.

To provide a dry atmosphere for the leak-detection cable, the encasement pipes are inerted with nitrogen. The 241-SY-A and 241-SY-B valve pits and the 241-AN-01A pump pit and 241-AN-04D slurry receiver pit are isolated from the encasement pipes by closed valves. At the diversion box and vent station, rupture disks are installed to isolate the encasement pipes from the structures. The slurry transfer line SLL-3160 encasement is not currently inerted with nitrogen gas.

## **Support Function**

### Operational Monitoring and Control

Waste transfer by the RCSTS is an automated operation using PLC to control and monitor the process. The MCS consists of two hierarchical portions, the OCS and the PLC. The OCS consists of two computers, allowing operator access to system parameters for control, status, intervention, alarm, and trending of the process system. The PLC, also called the process control unit (PCU), provides direct control of the field equipment. The MCS has five PCUs. The operator can use the MCS to acknowledge alarms and select the transfer mode and has output signals to request valve position changes and to start or stop pump operation by using graphical displays at the OCS. Field instrumentation provides input to the system (e.g., valve status position switches, pressure switches, pump indication and control, fluid temperature, primary pipe leaks).

### Utility Distribution

Packaged air compressors and dryer units at the diversion box and the vent station provide compressed air for operating air-operated valves (AOV) to facilitate waste transfer. The air is instrument quality, clean, dry, and oil free. In addition, the booster pumps located at the diversion box need this instrument-quality air for the pump seals during slurry transfers.

HEPA-filtered breather connections in the diversion box and the vent station help stabilize the pressure and temperature inside the structures. The diversion box and vent station support buildings are equipped with unit heaters, baseboard heaters, and exhaust fans. The diversion box control area also has an installed air-conditioning unit. Portable exhaust air can be provided for maintenance workers who need to access confined spaces in the diversion box and the vent station.

Existing Electrical Utility power lines in the vicinity provide electrical power to operate the diversion box and the vent station. Redundant transformers supply electrical power at the diversion box to a 480 V switchboard that distributes power to each component. In addition, a transformer supplies electrical power at the vent station to a 480 V switchboard that distributes power to major loads. Locally, 120 V distribution panels (fed by transformers) provide power to other electrical loads in the two structures.

The diversion box and vent station include exterior connections for connection of a water supply to an installed wash-down spray distribution system below the structure-shielded floors for flushing of the lined portion of the structure. The diversion box and vent station also include emergency pump-out connections to allow pump-out should the supernatant line be unavailable.

### Equipment Maintenance

Overhead hoists are provided in the diversion box and vent station. Equipment access areas are provided in the diversion box around the booster pumps. Laydown space is provided to accommodate removal of shield plates, booster pump spray shields, and breakdown of the booster pumps for maintenance. Inlet air is provided through the HEPA breather filter to the diversion box and the design includes provisions to connect a portable exhaust to provide air change in the diversion box and vent station to allow manned entry for maintenance. Compressed air system equipment, electrical distribution equipment, and MCS equipment are located in readily accessible locations to provide access for maintenance.

### 3.0 REQUIREMENTS AND BASES

The RCSTS contains various SSCs to fulfill its process, safety, environmental protection, and support functions. This chapter focuses on the requirements for the RCSTS components: the supernatant transfer line, the slurry transfer line, although not currently authorized for use, the diversion box and vent station, and the supporting systems, including the MCS, instrument air system, HVAC, and electrical distribution.

#### 3.1 REQUIREMENTS

Each SSC has five categories of system requirements: general, specific, engineering disciplinary, testing and maintenance, and other requirements. The specific requirements, their bases, and how the system design meets those specific requirements are described for each requirements category.

New design and construction work involving the RCSTS shall conform to current codes, standards, and regulations as defined in the specifications completed for DST systems and subsystems, sometimes referred to as Level-1 and Level-2 specifications. The requirements for new work will be derived from the authorization basis for that work, as well as from the following system and subsystem specifications.

##### Level 1:

- HNF-SD-WM-TRD-007, *Double-Shell Tank System Specification*

##### Level 2:

- HNF-4155, *Double-Shell Tank Monitor and Control Subsystem Specification*
- HNF-4157, *Double-Shell Tank Utilities Subsystem Specification* (including electric, raw and potable water, and service and instrument air subsystems)
- HNF-4159, *Double-Shell Tank Maintenance and Recovery Subsystem Specification*
- HNF-4160, *Double-Shell Tank Transfer Valving Subsystem Specification*
- HNF-4161, *Double-Shell Tank Transfer Piping Subsystem Specification*
- HNF-4162, *Double-Shell Tank Transfer Pump Subsystem Specification.*

The Level-1 specification establishes the functional, performance, design, development, interface, and test requirements for new DST systems. The remaining specifications are for Level-2 subsystems required by Level-1 system specification.

#### 3.2 BASES

A major function of this SDD is not only to state the engineering requirements of the system, but also to explain the basis for those requirements. The basis explains why a requirement exists and why it has been specified in a particular manner. Basis information is delineated in design input

information, design constraints, and intermediate outputs, such as design studies, analyses, and calculations.

### 3.3 REFERENCES

Specific references are essential to understanding and using the SDD. Reference to source documents from which requirements and basis information have been extracted adds traceability to the SDD and improves its credibility. To the extent that such reference documents are available, the source documents that contain the cited requirements or the bases information are referenced in the SDD. If the requirement or basis information is not recorded in a separate document, the documentation no longer exists, or retrieval of such a document is not feasible, the basis notes that a documented reference is not available.

### 3.4 GENERAL REQUIREMENTS

This section collects requirements, bases, and description of how requirements are met for work performed prior to implementation of the Level-1 and Level-2 subsystem specifications. Requirements and bases for new RCSTS equipment are contained within the Level-1 and Level-2 specifications, and are not repeated herein. Compliance matrices or other tools are used as necessary to ensure that new equipment meets requirements.

#### 3.4.1 System Functional Requirements

##### 3.4.1.1 Process Function Requirements

Requirement: The RCSTS shall be able to transfer supernatant from the 200 West Area to the 200 East Area (or transfer from the 200 East Area to the 200 West Area as an available option, currently not planned).

Basis: WHC-SD-W058-FDC-001, *Functional Design Criteria for Project W-058, Replacement of the Cross-Site Transfer System*, Section 1.3.

How Requirement is Met: The RCSTS provides a transfer line, WT-SNL-3150, between the 241-SY-A valve pit in the 200 West Area and the 241-AN-01A pump pit in the 200 East Area.

Requirement: The RCSTS shall be able to transfer slurry from the 200 West Area to the 200 East Area.

Basis: WHC-SD-W058-FDC-001, Section 1.3.

How Requirement is Met: The RCSTS provides a transfer line, WT-SLL-3160, between the 241-SY-B valve pit in the 200 West Area and Tank 241-AN-104 via Riser 010 in the 200 East Area.

Requirement: The high point of the RCSTS shall have air vents to facilitate draining of the primary pipe.

Basis: WHC-SD-W058-FDC-001, Section 3.5.



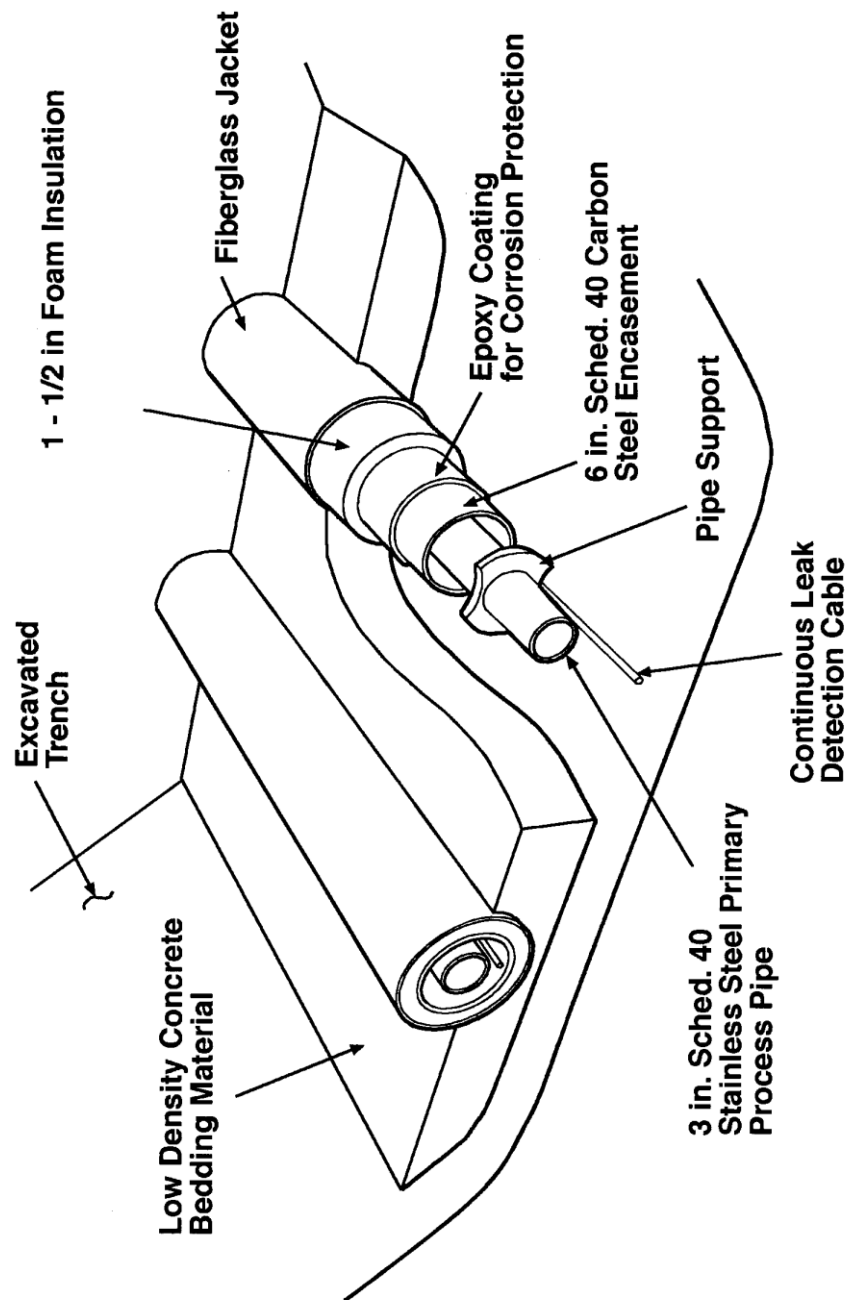
How Requirement is Met: The RCSTS provides a vent station at the high point of the system that contains valves to introduce air in WT-SNL-3150 and WT-SLL-3160.

Requirement: The RCSTS shall be designed to direct the flow of leaked waste from the primary line to a waste transfer-associated structure for detection.

Basis: DOE Order 420.1B, *Facility Safety* and 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosives safety Criteria Guide*, Section 5.2.2.2, *Process Equipment* (Previously DOE Order 6430.1A, Section 1300-3).

How Requirement is Met: Buried portions of the piping system between structures are designed with an encasement. Figure 2 shows the design for buried portions of the transfer lines. Encasement rupture disks are provided at the diversion box and vent station to allow leaked waste to enter the structure. Encasement piping and the encasement rupture disks were designed as Safety-Class components and are classified as General-Service components. Those portions of the transfer piping located within the diversion box and the vent station are not encased and leak directly to the structure.

Figure 2. Pipe-in-Pipe Configuration of the Buried Transfer Line.



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Requirement: The RCSTS shall be designed to provide confinement of waste in primary piping.

Basis: HNF-SD-WM-TSR-006, *Tank Farms Technical Safety Requirements*, Section 6.1, and DOE Order 420.1B, *Facility Safety*, and 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosives safety Criteria Guide*, Section 5.2.2.2, *Process Equipment* (Previously DOE Order 6430.1A, Section 1323-5.2).

How Requirement is Met: Transfer lines WT-SNL-3150 and WT-SLL-3160 provide a confinement barrier using welded piping to confine waste. The transfer lines were designed as Safety-Class components and are classified as safety-significant components.

Requirement: The RCSTS design shall provide shielding for worker protection.

Basis: DOE Order 420.1B, *Facility Safety*, Chapter I, Section 3b(5)(c), Nuclear Facility Design (Previously DOE Order 6430.1A, Section 1300-6.1).

How Requirement is Met: Transfer lines are buried for most of their length, with earth cover (or concrete shielding) provided based on radiation shielding analysis. Transfer lines within the diversion box are shielded for worker protection by the concrete structures, cover blocks, and entry doors during waste transfers. The transfer lines within the diversion box are located below shield floors for worker protection during system maintenance.

### **3.4.1.2 Safety Functional Requirements**

The basis for the SC and SS requirements is described in RPP-13033.

#### **3.4.1.2.1 Safety-Class Requirement**

No SC requirements are associated with the RCSTS..

#### **3.4.1.2.2 Safety-Significant Requirements**

##### Waste Transfer Primary Piping Systems

Requirement: Waste transfer primary piping systems shall prevent leaks and provide for confinement of waste in primary piping.

Basis: RPP-13033, Chapter 4, Section 4.4.1, “Waste Transfer Primary Piping Systems”, DOE Order 420.1b and DOE G 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosives Safety Criteria Guide*, Section 5.2.2.2, “Process Equipment” (Previously DOE Order 6430.1A, Section 1323-5.2).

How Met: Compliance to this functional/performance requirement is demonstrated by meeting the requirements of WAC 173-303-640, “Tank Systems”. WAC 173-303-640 requires a written assessment, reviewed and certified by an independent qualified registered professional engineer (IQRPE) that attests to the system’s integrity. The

assessments are required to address design standards which the system was constructed, dangerous characteristics of the waste handled, documented age of the system and results of a leak test, internal inspection, or other integrity examination to address cracks, leaks, corrosion and erosion. The integrity assessments are required over the life of the system to ensure that the system retains its structural integrity and will not collapse, rupture or fail. The system integrity assessment and IQRPE certifications for the RCSTS is documented in RPP-27591, *Volume 2: IQRPE DST System Integrity Assessment – Pipeline Integrity*.

In addition to the integrity assessment the primary piping systems have been evaluated for its ability to perform its safety function under general aging and postulated failure modes including structural loading, process conditions and environmental conditions. This evaluation is documented in RPP-RPT-42297, *Safety-Significant Waste Transfer Primary Piping Systems – Functions and Requirements Evaluation Document*.

Transfer lines WT-SNL-3150 and WT-SNL-3160 provide a confinement barrier using welded piping to confine waste. The transfer lines were designed as SC components and are classified as SS components.

### **3.4.1.2.3 Other Safety Requirements**

Some equipment, identified as DID features, provide non-credited support for the safety functions defined in RPP-13033, but are designated as GS.

#### Transfer Leak Detection/Alarm Response

Requirement: Transfer leak detection systems, in conjunction with subsequent alarm response actions, shall provide an additional layer of DID against a flammable gas deflagration in a waste transfer-associated structure due to a waste leak, which is a significant facility worker hazard.

Basis: RPP-13033, Chapter 3, Table 3.3.2.3.2-2.

How Requirement is Met: Permanently installed transfer leak detectors are installed as close to the structure floor as possible and typically actuate before accumulating waste reaches 5% of the structure volume. The detector placement is protected by configuration management. No periodic testing is required to verify permanently installed detector placement. Leak detectors at 6241-A, 6241-V, and the 241-AN-01A pump pit are set at 1.69%, 2.26%, and 4.76% of structure volume, respectively as evaluated in RPP-13909, *Transfer Leak Detection Alarm Activation Percent Volume Level*. This document supports configuration control for permanent transfer leak detector placement and is revised to accurately describe new installations or modifications to existing installations. When transfer leak detection is installed in an above-ground structure (such as a portable pump pit), the structure is verified (after installation or related maintenance) to not leak before accumulating waste actuates the leak detector.

Transfer leak detection systems are designed and installed to actuate alarms at local and/or remote stations. To satisfy this indication requirement, only one of the alarm

stations must be functional. When transfer leak detection is required to be operable, periodic testing is performed to verify that the transfer leak detection system alarms indicate at a location that can be monitored.

#### Vehicle Barriers

Requirement: Aboveground transfer system vehicle barriers shall provide an additional layer of DID against vehicle collisions with abovegrade portions of waste transfer primary piping systems in abovegrade structures.

Basis: RPP-13033, Chapter 3, Table 3.3.2.3.2-2.

How Met: Requirements for vehicle barriers are described in the procedure governing vehicle access to tank farms TFC-OPS-OPER-C-10, *Vehicle and Dome Load Control in Tank Farm Facilities*, with performance criteria and requirements for vehicle barriers provided in TFC-ENG-STD-27, *Above Ground Transfer System Vehicle Barriers*.

#### Design for Draining Transfer Systems

Requirement: The design of waste transfer piping systems (continuous sloping to support gravity drainage) shall provide an additional layer of DID against damage to waste transfer primary piping systems, and isolation valves for double valve isolation, from flammable gas deflagrations in the piping as a result of flammable gases generated by residual waste.

Basis: RPP-13033, Chapter 3, Table 3.3.2.3.2-2.

How Met: The RCSTS configuration (slope) is a passive control and is ensured through configuration control programs. The DID feature for draining after the transfer (and flush) is complete is documented in TFC-OPS-OPER-C-49.

#### Winterization/Freeze Protection

Requirement: Implementation of winterization/freeze protection shall provide an additional layer of DID against damage to waste transfer primary piping systems vulnerable to freezing.

Basis: RPP-13033, Chapter 3, Table 3.3.2.3.2-2.

How Met: The requirements for winterization/freeze protection are documented in TFC-ENG-STD-02, *Environmental/Seasonal Requirements for TOC Systems, Structures, and Components*, TFC-ENG-STD-22, *Piping Jumpers and Valves*, and TFC-BSM-FPM\_PR-C-13, *Winterization and Snow Removal Procedure for Tank Operations Contractor Facilities*.

### Waste Transfer Line Encasements

Requirement: Waste transfer line encasements shall provide an additional layer of DID against primary pipe leaks (from any cause) that could result in a fine spray leak or a significant facility worker hazard from chemical burns caused by exposure to waste if the transfer line is unburied or exposed.

Basis: RPP-13033, Chapter 3, Table 3.3.2.3.2-2.

How Met: Waste transfer line integrity is a passive control and is ensured through configuration control programs. Interpretations and agreements for implementation are documented in RPP-16922, *Environmental Specification Requirements*.

### Interfacing Water System Overpressure and Flow Transient Protection

Requirement: Interfacing water system overpressure and flow transient protection shall provide an additional layer of DID against damage to SS waste transfer primary piping systems, and isolation valves for double valve isolation from overpressure and flow transients (water hammer) by water systems connected to RCSTS for flushing, leak testing, etc.

Basis: RPP-13033, Chapter 3, Table 3.3.2.3.2-2.

How Met: The requirements for interfacing water system overpressure and flow transient protection are documented in TFC-ENG-FAC SUP-C-27, *Interfacing Water System Overpressure Protection*.

### Compressed Air System Overpressure Protection

Requirement: Compressed air system overpressure protection shall provide DID against exceeding the external allowable pressure of SS waste transfer primary piping systems during pneumatic testing of waste transfer primary piping system encasements. Compressed air system overpressure protection shall also provide DID against exceeding the design pressure of SS waste transfer primary piping systems, and SS isolation valves for double valve isolation during pneumatic testing of waste transfer primary piping system connections in tank farms.

Basis: RPP-13033, Chapter 3, Table 3.3.2.3.2-2.

How Met: Requirements for encasement pneumatic testing overpressure protection are documented in TO-140-170, *Pressure Testing of Process Pipelines and Pipe-In-Pipe Encasements*. Requirements for overpressure protection during pneumatic testing of waste transfer primary piping system connections in tank farms are documented in TFC-ENG-STD-22.

In addition to the equipment related DID features listed, RPP-13033, Chapter 3, Table 3.3.2.3.2-2, identifies several DID features that fall under various configuration control programs. These DID features include:

- Material Balance Monitoring
- Vehicle Restrictions
- Spotters
- Excavation Program
- Pre-Transfer Excavation Walk-down
- Pre-Transfer Verification of Valve Lineup
- Procedures for Draining Transfer Systems
- Transfer System Thermal Expansion Protection
- Fire Protection Requirements
- Flushing of Waste Transfer Lines
- Encasement Leak Detection and Waste Removal
- Interfacing Water System High Temperature Protection
- Compressed Air System High Temperature Protection

### **3.4.1.3 Environmental Protection Function**

Requirement: The RCSTS shall be designed to contain materials (confinement) and prevent releases to the environment.

Basis: WAC 173-303-400 and WAC-173-303-640 (WAC 173-303, “Dangerous Waste Regulations”).

How Requirement is Met: Buried portions of the piping system are designed with an encasement between structures. Portions of the transfer piping located within the diversion box and the vent station are fully contained within a confinement structure. This design provides two barriers to contain materials and prevent releases to the environment. The diversion box and vent station include a stainless steel liner in the sumps and up to the shield floors.

Requirement: The RCSTS shall be designed to mitigate the consequences of any accidental releases/leakage.

Basis: WAC 173-303 and DOE Order 420.1B, Chapter I, Section 3b (2) (e)3, Nuclear Facility Design (Previously DOE Order 6430.1A, Section 1300-7).

How Requirement is Met: Continuous leak-detection cables are provided in the annular region between the primary piping and the encasement piping. Detection of a leak in the system provides a shutdown signal to the transfer pumps to terminate the leakage source. Leakage in the pipe annulus is channeled to the diversion box for collection and transfer to the double-shell tanks or channeled directly to the double-shell tank. The diversion box and vent station are provided with leak detection, sump pumps, a wash-down system, and an emergency pump-out connection to mitigate accidental releases/leakage. The diversion box and vent station are closed structures equipped with HEPA breather filters to mitigate airborne release of leakage.

Requirement: The RCSTS shall be designed to direct the flow of leaked waste from the primary line to a waste transfer-associated structure for detection.

Basis: DOE Order 420.1B, *Facility Safety* and DOE G 420.1-1.

How Requirement is Met: Buried portions of the piping system between structures are designed with an encasement. Figure 2 shows the design for buried portions of the transfer lines. Encasement rupture disks are provided at the diversion box and vent station to allow leaked waste to enter the structure. Encasement piping and the encasement rupture disks were designed as SC components and are classified as GS components. Those portions of the transfer piping located within the diversion box and the vent station are not encased and leak directly to the structure.

Requirement: The RCSTS shall be designed to detect leaks from the primary piping.

Basis: WAC 173-303-640 and DOE Order 420.1B, Chapter I, Section 3b(2)(d), Nuclear Facility Design, and RPP-16922 (Previously DOE Order 6430.1A, Section 1300-7).

How Requirement is Met: In addition to the transfer leak detection system in waste transfer-associated structures described in Section 3.4.1.2.3, encased portions of the RCSTS piping include a continuous leak-detection cable to detect leakage from the transfer lines.

#### **3.4.1.4 Support Function**

Requirement: The RCSTS design shall provide operation and control and ancillary components necessary to operate the RCSTS.

Basis: WHC-SD-W058-FDC-001, Section 1.3

How Requirement is Met: The RCSTS design includes electrical distribution systems, a control system, instrument-quality air systems, a diversion box and vent station to house equipment, and HVAC systems to establish controlled environments in the diversion box and vent station.

### **3.4.2 Subsystems and Major Components**

#### **3.4.2.1 Process Function**

Requirement: Booster pumps shall be provided as required to achieve a transfer velocity of 4.5 ft/sec and 6.0 ft/sec based on the fluid properties listed in Table 2.



Table 2. Fluid Properties.

Fluid Property	Achievable Design Velocity (ft/s)	
	4.5	6.0
Specific gravity (mixture)	1.5	1.25
Viscosity (centipoises)	30	10
Miller number	<100	<100
Minimum pH	11.0	11.0
Fluid temperature (°F)	35 to 200	35 to 100
Solid content (volume %)	30	20
Particle size (µm)	0.5 to 4,000	0.5 to 4,000
0 to 50 µm, % of total	≈ 95	≈ 95
50 to 500 µm, % of total	<5	<5
500 to 4000 µm, % of total	<1	<1
Friction factor	0.404 (non-Newtonian)	Newtonian flow

Basis: WHC-SD-W058-FDC-001, Sections 3.4 and 3.6.

How Requirement is Met: Two booster pumps with variable-speed drives are installed at the diversion box for slurry transfer through WT-SLL-3160. The pumps provide a head of 2,500 ft of fluid at 140 gal/min flow and have a shut-off head of 2,900 ft of fluid.

Requirement: A diversion box shall be provided to facilitate waste transfers and support future Tank Farm Contractor projects.

Basis: WHC-SD-W058-FDC-001, Section 3.7.

How Requirement is Met: Diversion Box 6241-A is incorporated into the RCSTS design to house the booster pumps and provide tie-ins for future transfer lines.

Requirement: A vent station shall be provided at the high point of the transfer system.

Basis: WHC-SD-W058-FDC-001, Section 3.5.

How Requirement is Met: Vent Station 6241-V is incorporated into the RCSTS design at the high point of the transfer lines. High point vents are provided for both transfer lines, WT-SNL-3150 and WT-SLL-3160, in the vent station.

### 3.4.2.2 Environmental Protection Function

Requirement: The RCSTS shall be designed to detect leaks from the primary piping.

Basis: WAC 173-303-640 and DOE Order 420.1B, Chapter I, Section 3b(2)(d), Nuclear Facility Design, and RPP-16922 (Previously DOE Order 6430.1A, Section 1300-7).

How Requirement is Met: In addition to the transfer leak detection system in waste transfer-associated structures described in Section 3.4.1.2.3, encased portions of the RCSTS piping include a continuous leak-detection cable to detect leakage from the transfer lines.

### **3.4.2.3 Support Function**

Requirement: The RCSTS shall be designed to provide utility distribution for electrical power.

Basis: WHC-SD-W058-FDC-001, Section 4.3.

How Requirement is Met: Switchgear, distribution panels, and wiring are provided from Electrical Utility transformers to the diversion box and vent station.

Requirement: All components of the RCSTS shall be designed for exposure to the environmental conditions experienced on the 200 Area plateau of the Hanford Site.

Basis: WHC-SD-W058-FDC-001, Section 4.7.

How Requirement is Met: The diversion box support building and vent station support building are provided equipped with HVAC systems to provide controlled climate for equipment and personnel (when occupied).

Requirement: The diversion box and vent station shall be designed to function without personnel during waste transfer operations.

Basis: WHC-SD-W058-FDC-001, Section 4.4.

How Requirement is Met: Instrument-quality air systems (clean, oil-free, and dry) are provided to control process valves in the diversion box and vent station. Instrument-quality air is provided by 150 lbf/in.<sup>2</sup> compressed air systems in the diversion box and the vent station to allow remote valve operation. Each compressed air system is designed for a flow rate of 15 ft<sup>3</sup>/min to provide air during simultaneous operation of all pneumatic valves for the transfer system.

### **3.4.3 Boundaries and Interfaces**

Major boundaries of the RCSTS are shown in Figure 1. For detailed boundary locations see Section 4.1.

#### **3.4.3.1 Process Function**

Requirement: The RCSTS shall consist of a pipe-in-pipe transfer system connecting the 241-SY Tank Farm at the 241-SY-A and 241-SY-B valve pits to the 241-AN Tank Farm.

Basis: WHC-SD-W058-FDC-001, Section 1.3.

How Requirement is Met: The RCSTS provides nozzle connections at nozzle L12 (SNL-3150) in the 241-SY-A valve pit, nozzle R12 (SLL-3160) in the 241-SY-B valve pit, and nozzle H (SNL-3150) in the 241-AN-01A pump pit that are compatible with the three inch PUREX [Plutonium-Uranium Extraction (Plant)] connectors used for pit jumpers. The SLL-3160 transfer line connection to Riser 010 on Tank 241-AN-104 is welded pipe.

Requirement: Provision shall be made to safely contain or relieve any pressure to which the piping may be subjected.

Basis: ASME B31.3, Paragraph 3.1.2.2, *Chemical Plant and Petrochemical Refinery Piping*.

How Requirement is Met: Overpressure protection for 200 East Area transfer lines must be provided either upstream or downstream of the RCSTS piping if required to protect interconnected piping. Waste transfer pumps supplying waste feed to the RCSTS are limited by interface transfer lines to less than the 1,490 lbf/in.<sup>2</sup> gauge design pressure for the RCSTS piping.

Requirement: Connected systems shall provide motive power for waste transfers through the RCSTS.

Basis: WHC-SD-W058-FDC-001, Section 1.3.

How Requirement is Met: The RCSTS uses SY02A-WT-P-002 or SY-101-WT-P-350 to provide pumping power for supernatant transfers from the 200 West Area and provide 20 lbf/in.<sup>2</sup> gauge (HNF-1955, *W-058 Monitor and Control Alarm/Shutdown Setpoints*) to meet net positive suction head requirement (10 lbf/in.<sup>2</sup>) of the booster pumps for slurry transfers. Suction pressure sensors at the booster pumps are set to trip the associated booster pump if the pressure drops below the established setpoint (Section 3.6.6.1). The RCSTS uses existing transfer pumps in the 200 East Area for cross-site transfers from the 200 East Area.

### **3.4.3.2 Environmental Protection Function**

Requirement: The RCSTS shall contain materials and prevent releases to the environment at interfacing structures.

Basis: WAC 173-303-400 and WAC-173-303-640.

How Requirement is Met: The primary piping is completely contained in the encasement pipe except inside the following process pits. The RCSTS transfer line encasements penetrate the pit wall at the 241-SY-A and 241-SY-B valve pits, 6241-A diversion box, 6241-V vent station, 241-AN-01A pump pit and the 241-AN-04D receiver pit..

Requirement: Connected facilities shall provide drainage of the RCSTS for any accidental releases/leakage.

Basis: WAC 173-303 and DOE Order 420.1B, , Chapter I, Section 3b(2)(d), Nuclear Facility Design (Previously DOE Order 6430.1A, Sections 1300-7 and 1323-5.1).

How Requirement is Met: Low-point drains at nozzle L12A in the 241-SY-A valve pit, nozzle R12A in the 241-SY-B valve pit, and nozzle C in the 241-AN-01A Pump Pit and Riser 10 on Tank 241-AN-104 provide a path for removal of leaked RCSTS waste from the pipe encasements. Nozzle L12 in the 241-SY-A valve pit, nozzle R12 in the 241-SY-B valve pit, and nozzle C in the 241-AN-01A Pump Pit and Riser 10 on Tank 241-AN-104 provide drainage of waste retained in the RCSTS primary system or pumped from the diversion box or vent station. Various tank farms provide receivers for leaked waste, should a leak occur in the RCSTS.

### **3.4.3.3 Support Function**

Requirement: Connected electrical distribution systems shall provide sufficient electrical power for operational monitoring and control of the RCSTS.

Basis: WHC-SD-W058-FDC-001, Section 3.8.

How Requirement is Met: The RCSTS MCS requires power from the electrical distribution systems for the SY Tank Farm and miscellaneous tank farms systems.

- 100 VA of 120 V (ac) electrical power is provided for PCU-1 by panelboard MPC-E-001, circuit 8 at the 252-S substation.
- 360 VA of 120 V (ac) electrical power is provided for the RCSTS OCS and 242-S Evaporator Room 2 outlets by panelboard B, circuit 4 at the 242-S Evaporator.
- 100 VA of 120 V (ac) electrical power is provided for RCSTS leak-detection relays and SY Tank Farm pump interlock relays by panelboard SY271-EDS-DP-100, circuit 18 at the 241-SY-271 Instrument Control Building.
- 250 VA of 120 V (ac) electrical power is provided for RCSTS and SY Tank Farm leak-detection relays by panelboard SY271-EDS-DP-100, circuit 20 at the 241-SY-271 Instrument Control Building.
- 750 VA of 120 V (ac) electrical power is provided for PCU-5 and encasement leak detectors by panelboard A-1, circuit 5 at the 2712-B Electrical Instrumentation Building.
- 200 VA of 120 V (ac) electrical power is provided for PCU-4 by panelboard A, circuit 9 at the 244-A lift station.

Requirement: Electric Utility shall provide electrical power for operation of diversion box and vent station equipment.

Basis: WHC-SD-W058-FDC-001, Section 4.3.

How Requirement is Met: Electrical Utility provides 480 V (ac) power for operation of RCSTS equipment in the 6241-A diversion box and the 6241-V vent station (Calculation

W058-E-010, *PTW/CAPTOR Calculation for Distribution Analysis and Time Overcurrent Reporting*):

- 374.1 KVA of 480 V (ac) electrical power is provided for the diversion box connected loads by either Electrical Utility transformer C6743P or redundant Electrical Utility transformer C6744P. Either transformer has sufficient capacity to provide 72 KVA (ac) of electrical power for the portable HVAC receptacle in the support building and the portable exhauster and welding receptacles at the diversion box during maintenance activities with a slurry booster pump being tested at full load.
- 53.0 KVA of 480 V (ac) electrical power is provided for the vent station connected loads by Electrical Utility 225 KVA transformer C6379P. Note: The transformer also provides power for 241-EW-151 equipment and for Hanford Fire Department 609 facility equipment, lights, and receptacles.

Requirement: Normal power sources shall be metered for demand (average power).

Basis: WHC-SD-W058-FDC-001, Section 4.3.2.

How Requirement is Met: A pulse signal from the kilowatt-hour meter is sent remotely to the Electrical Utility. Each pulse measured and sent represents a quantity of energy that, when divided by the number of pulses over a time period, represents demand (average power).

Requirement: The SY Tank Farm waste transfer system shall provide RCSTS system water flushing capability at 6 ft/sec velocity at 140 °F.

Basis: WHC-SD-W058-FDC-001, Section 2 and Section 3.11.

How Requirement is Met: Flush water is provided by the SY Tank Farm waste transfer system to the RCSTS via nozzle L12 in the 241-SY-A valve pit and nozzle R12 in the 241-SY-B valve pit. Flush water available at nozzle L14 in the 241-SY-A valve pit is provided by a 140-gal/min pump that can be temperature controlled utilizing one or two installed 500 KW heaters.

### **3.4.4 Codes, Standards, and Regulations**

The safety basis for the RCSTS is the same as that for all other facilities associated with RPP activities and is given in RPP-13033. At the time the RCSTS was designed, the applicable codes, standards, regulations, and DOE orders required for establishing the safety basis were the latest revision of the following:

- 10 CFR 830.120, “Quality Assurance Requirements”
- 10 CFR 835, “Occupational Radiation Protection”
- DOE Order 5400.5, *Radiation Protection of the Public and the Environment*
- DOE Order 5480.7A, *Fire Protection*

- DOE Order 5480.11, *Radiation Protection for Occupational Workers*
- DOE Order 5480.28, *Natural Phenomena Hazards Mitigation*
- DOE Order 5700.6C, *Quality Assurance*
- DOE Order 5820.2A, *Radioactive Waste Management*
- DOE Order 6430.1A, *General Design Criteria*
- DOE O 414.1A, *Quality Assurance*
- DOE O 420.1B, *Facility Safety*
- DOE-STD-1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*
- DOE-STD-1021-93, *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components*
- DOE-STD-1022-94, *Natural Phenomena Hazards Characterization Criteria*
- DOE-STD-1023-95, *Natural Phenomena Hazards Assessment Criteria*.

Additional codes, standards, and regulations applicable to the RCSTS are as follows:

- 40 CFR 264, “Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities”
- 40 CFR 265, “Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities”
- 1997 *ASHRAE Handbook—Fundamentals*
- ACI 318, *Building Code Requirements for Reinforced Concrete*
- ACI 349, 1995, *Code Requirements for Nuclear Safety Related Concrete Structures*
- AISC M021, *ASD Manual of Steel Construction*
- AISC N690, *Nuclear Facilities: Steel Safety-Related Structures for Design, Fabrication and Erection*
- ANSI/ASHRAE-62a, *Ventilation for Acceptable Indoor Air Quality*
- ANSI/ASME AG-1, 2000, *Code on Nuclear Air and Gas Treatment*
- ANSI/ASME VIII, *ASME Boiler and Pressure Vessel Code*, Section VIII, “Unfired Pressure Vessels”
- ANSI C2 (1993), *National Electrical Safety Code* (R1997)
- ANSI C84.1, *Voltage Ratings for Electric Power Systems and Equipment* (60 Hz)
- ANSI/ISA S5.5-1985, *Graphic Symbols for Process Displays*
- ANSI/ISA S50.1-1982 (R1992), *Compatibility of Analog Signals for Electronic Industrial Process Instruments*

- ANSI/NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*
- ASME B31.3, *Process Piping Guide*

NOTE: Code in effect includes the 1993 edition and Addenda A and B. The waste transfer piping system is designed and installed to the requirements for “normal fluid service.” The instrument air system piping is designed and installed to the requirements for “normal fluid service.”

- HPS-SDC-4.1, 1974, *Standard Arch-Civil Design Criteria Design Loads For Structures*
- HPS-SDC-7.5, *Standard Electrical Design Criteria for Interior Power and Lighting Systems*
- HNF-SD-GN-ER-501, *Natural Phenomena Hazards, Hanford Site, Washington*
- IEEE 142-1991, *Recommended Practice for Grounding of Industrial and Commercial Power Systems*
- IEEE 379-1988, *Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems*
- IEEE 384-1992, *Criteria for Independence of Class 1E Equipment and Circuits*
- ISA RP55.1-1975 (R1983), *Hardware Testing of Digital Process Computers*
- NEMA ICS 6-1993, *Industrial Controls and Systems*
- NFPA 70, 1993, *National Electric Code*
- *Uniform Building Code*
- WAC 173-303, “Dangerous Waste Regulations”
- WAC 173-400, “General Regulations for Air Pollution Sources”
- WAC 246-247, “Radiation Protection – Air Emissions”
- WHC-SD-GN-DGS-303, *Backup Electrical Power System Definitions and Design Criteria.*

### 3.4.5 Operability

System Operability is based on the facility authorization basis, including RPP-13033, HNF-SD-WM-TSR-006, and other documents. The TSRs define operability as when a system, subsystem, train, component, or device is capable of performing its specified safety function(s) and (a) setpoints are within limits; (b) operating parameters necessary for operability are within limits; and (c) when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication, or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its safety function(s) also are capable of performing their related safety support function(s).

The TSRs ensure that the RCSTS is configured properly and operating to meet the SS functional requirements identified in Section 3.4.1.2.2. The RCSTS has Operability requirements specified in these authorization basis documents as follows.

### **3.4.5.1 Waste Transfer Primary Piping Systems**

Waste transfer primary piping systems are required to be operable:

- When physically connected to an active waste transfer pump not under administrative lock.
- When a compressed air source is connected to the waste transfer primary piping system's encasement for pneumatic testing of the encasement (i.e., the primary piping within the encasement).

Requirement: Waste transfer primary piping system ethylene-propylene-diene monomer (EPDM) non-metallic flexible hoses shall be within their shelf life and service life.

Basis: HNF-SD-WM-TSR-006, Chapter 6, Section 6.1.1, "In-Service Inspections/Tests."

How Requirement is Met: RPP-RPT-42297 establishes a shelf life of 7 years from the date of manufacture and a service life of 3 years from the date of first use for transfer of waste is established for EPDM non-metallic flexible hose jumpers. The manufacture dates, in-service dates and expiration dates for each of the EPDM non-metallic flexible hose jumpers is recorded and tracked. During field preparations, prior to initiating waste transfers, the technical authority verifies adequate service life remains to accomplish the transfer and records such verification in the transfer procedure documentation.

Requirement: Waste transfer primary piping system connections (e.g., PUREX head/nozzle connections, Chemjoint connections, process blank/nozzle connections) on the planned waste transfer route shall be leak tested.

Basis: HNF-SD-WM-TSR-006, Chapter 6, Section 6.1.2, "In-Service Inspections/Tests."

How Requirement is Met: Waste transfer primary piping system connection leak tests are performed to detect leakage from misaligned or disconnected piping system connections on the planned waste transfer route. The leak testing is performed by visual observation of the connections using water; or if leak testing using water is not practical, the leak testing is performed at the beginning of the initial waste transfer through the connection. Any leakage observed at the connections is eliminated. The methods for visual observation include direct visual observation or visual observation using cameras or borescopes.

Requirement: Scheduled integrity assessments shall be performed as required to maintain compliance with WAC 173-303-640, "Tank Systems". The required schedules or intervals are as described in the integrity assessments.

Basis: HNF-SD-WM-TSR-006, Chapter 6, Section 6.1.3, "In-Service Inspections/Tests."



How Requirement is Met: Integrity assessments, which address design standards which the system was constructed, dangerous characteristics of the waste handled, documented age of the system and results of a leak test, internal inspection, or other integrity examination to address cracks, leaks, corrosion and erosion, are performed to ensure that the system retains its structural integrity and will not collapse, rupture or fail. The system integrity assessment and IQRPE certifications for the RCSTS is documented in RPP-27591, *Volume 2: IQRPE DST System Integrity Assessment – Pipeline Integrity*.

Requirement: Inspections for waste leaks shall be performed as follows.

For waste transfer-associated structures physically connected to an active waste transfer pump not under administrative lock, verify the waste level is  $\leq 10\%$  of the structure volume:

- Within 2 days after removing the administrative lock from the active waste transfer pump, and
- Once per 2 days thereafter until the administrative lock is installed on the active waste transfer pump, and
- Once within 2 days after installing the administrative lock on the active waste transfer pump.

Basis: HNF-SD-WM-TSR-006, Chapter 6, Section 6.1.4, “In-Service Inspections/Tests.”

How Requirement is Met: Inspections for waste leaks from the waste transfer primary piping system are performed by installed waste transfer leak detection systems, zip cords or cameras/borosscopes.

### **3.4.6 Performance Criteria**

The performance requirements for new work are derived from the authorization basis for that work, as well as from the Level 1 and Level 2 subsystem specifications (See Section 3.1).

## **3.5 SPECIFIC REQUIREMENTS**

### **3.5.1 Radiation and Other Hazards**

Requirement: The design dose rate shall not exceed 0.1 rem/yr at the ground surface above all buried process piping.

Basis: WHC-SD-W058-FDC-001, Section 4.12.

How Requirement is Met: A minimum of 3 ft of soil cover is provided for shielding outside the SY Tank Farm. In the SY Tank Farm, 10.5 in. of concrete and 5 in. of steel shielding material are provided.

Requirement: The design dose rate shall not exceed 0.1 rem/yr on the exposed exterior surface of the RCSTS structures.

Basis: WHC-SD-W058-FDC-001, Section 4.12, and 10 CFR 835.

How Requirement is Met: The diversion box and vent station walls are 18-in.-thick concrete to provide adequate shielding. The diversion box and vent station roofs are 30-in.-thick concrete with equivalently shielded cover blocks.

Requirement: Equipment and systems shall be capable of in-place preventive maintenance with minimal exposure of workers.

Basis: DOE Order 420.1B, , Chapter I, Section 3b (5) (b), Nuclear Facility Design (Previously DOE Order 6430.1A, Section 1300-6.1).

How Requirement is Met: The monitoring and control OCS and PCUs, instrument air system active components, support building HVAC components, and electrical distribution switchboards and panelboards are located remote from radiation and contamination sources to facilitate maintenance. The diversion box and vent station breather filters are located outside the structures to facilitate maintenance. Workers are protected from contamination for maintenance activities in the vent station by the inclusion in design of high point HEPA filters in both the supernatant and slurry transfer lines.

Requirement: The RCSTS design shall provide shielding for worker protection.

Basis: DOE Order 420.1B, Chapter I, Section 3b (5) (c), Nuclear Facility Design (Previously DOE Order 6430.1A, Section 1300-6.1).

How Requirement is Met: Transfer lines are buried for most of their length, with earth cover (or concrete shielding) provided based on radiation shielding analysis. Transfer lines within the diversion box are shielded for worker protection by the concrete structures, cover blocks, and entry doors during waste transfers. The transfer lines within the diversion box are located below shield floors for worker protection during system maintenance.

### **3.5.2 As Low As Reasonably Achievable**

Requirement: Control stations for transfer operation shall be located remote from sources of radiological exposure.

Basis: DOE Order 420.1B, Chapter I, Section 3b (5) (c), Nuclear Facility Design (Previously DOE Order 6430.1A, Section 1300-6.1).

How Requirement is Met: The RCSTS OCS is in a remote location (242-S Evaporator) that does not normally receive radiological or chemical exposure. The diversion box and vent station are not normally manned. Process control units are located in the diversion

box and vent station support buildings and at the 252-S substation, the 244-A lift station, and near B plant in the 200 East Area, remote from the transfer line.

### 3.5.3 Nuclear Criticality Safety

The focus of nuclear criticality safety limits and controls at the Tank Farms is to maintain the form and distribution of the fissile materials currently stored in tank waste. Control of incoming waste receipts from non-Tank Farm facilities is key to maintaining criticality safety in the Tank Farms.

The facility nuclear criticality safety policy states that work involving the handling, transporting, and storage of fissionable materials at Tank Farms shall be conducted in a manner to ensure the safe protection of workers, the public, and the environment. In addition, a program shall be maintained to ensure that fissionable materials within the facility remain sub-critical under all normal and credible abnormal conditions and configurations. The Tank Operations Contractor Nuclear Criticality Safety Policy is documented in TFC-PLN-49, *Tank Farm Contractor Nuclear Criticality Safety Program*.

In accordance with TFC-ENG-CHEM-P-04, *Criticality Safety Evaluations*, Project Managers or Facility Managers must request the facility Criticality Safety Representative to formally determine whether existing criticality limits and controls are adequate or if a new or revised criticality safety evaluation report is required before beginning a new or revised activity involving fissile material or accepting waste from a new source.

Nuclear criticality safety limits and controls for waste transfers into and between waste tanks are implemented through The Waste Transfer Compatibility Safety Management Program as described in HNF-SD-WM-OCD-015, *Tank Farms Waste Transfer Compatibility Program*.

### 3.5.4 Industrial Hazards

The functional design criteria for the DST tank farms that are part of the RCSTS indicate that the tank farms should be designed to 29 CFR 1910, "Occupational Safety and Health Standards." Industrial hazard requirements for any new subsystems and components will be derived from the safety review for that work, along with the DST system and subsystem specifications already described. The Integrated Environment, Safety and Health Management System requirements also govern tank farm work activities.

### 3.5.5 Operating Environment and Natural Phenomena

Requirement: The transfer system primary and secondary piping shall be designed for a Safety Class 1 seismic event.

Basis: WHC-SD-W058-FDC-001, Section 3.4.

How Requirement is Met: The RCSTS transfer lines WT-SNL-3150 and WT-SLL-3160 and their encasements are designed for 0.20 g ground motion loads.

Requirement: The design shall protect the RCSTS from corrosion of system components.

Basis: WHC-SD-W058-FDC-001, Section 4.11, and WAC-173-303.

How Requirement is Met: In lieu of cathodic protection, the exterior surface of the carbon steel encasement is epoxy coated and is provided with closed-cell insulation and an exterior fiber-reinforced jacket.

Requirement: The diversion box and vent station shall be designed for a Safety Class 1 seismic event.

Basis: WHC-SD-W058-FDC-001, Section 3.5 and Section 3.7.

How Requirement is Met: The diversion box structure is designed for 0.20 g ground motion loads.

Requirement: Those features required to mitigate the consequences of an accidental spray release to the environment shall retain their mitigative function following a Safety Class 1 seismic event.

Basis: WHC-SD-W058-FDC-001, Section 3.7.

How Requirement is Met: Booster pump spray shields and the diversion box and vent station shield floors are designed for 0.20 g ground motion loads.

Requirement: The diversion box and vent station shall be designed for severe wind and wind-driven missiles.

Basis: DOE Guide 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosives Safety Criteria Guide*, Section 3.3, Natural Phenomena Hazards (Previously DOE Order 6430.1A, Section 0111-99.0.1).

How Requirement is Met: The diversion box and vent station structures are designed to withstand 80 mi/h wind speed and a wind-driven 15-lb 2-in. by 4-in. timber plank traveling at 50 mi/h. The diversion box and vent station support buildings are designed to withstand 70 mi/h wind speed.

Requirement: The RCSTS shall be operable in the temperature, pressure, wind, and precipitation conditions and daily and seasonal cycles at the Hanford Site.

Basis: WHC-SD-W058-FDC-001, Section 4.7.

How Requirement is Met: The design outdoor temperature range is from –20 °F to 115 °F, modifications are required to be designed to a temperature range of –25 °F to 115 °F as defined in HNF-SD-GN-ER-501. The design soil pressure was determined by site-

specific geotechnical investigation. The design wind speeds are discussed earlier in this section for severe wind and wind-driven missiles.. The diversion box and vent station structures are designed for a roof live load of 150 lbf/ft<sup>2</sup>. The diversion box and vent station support buildings are designed for a roof load of 20 lbf/ft<sup>2</sup>. RCSTS facilities are located on the 200 Area plateau and are not subject to design for floods.

A detailed list of the structural loadings used in the design of each structure and component appears in Hanford Drawing H-2-822265, *Structural Concrete Reinforcement Details*.

### **3.5.6 Human Interface Requirements**

Requirement: Human dimensions and display devices shall be considered.

Basis: DOE Guide 420.1-1, Section 3.6, Human Factors Engineering (Previously DOE Order 6430.1A, Section 1300-12).

How Requirement is Met: Compliance with human factors criteria is noted in Hanford Plant Calculation W058-P-015, *Checklist for DOE Order 6430.1A*.

### **3.5.7 Specific Commitments**

No specific requirements have been identified.

## **3.6 ENGINEERING DISCIPLINARY REQUIREMENTS**

### **3.6.1 Civil and Structural**

Requirement: The system shall be designed such that the vent station is the high point of the system and the pipe shall have a continuous slope of at least 0.25%.

Basis: WHC-SD-W058-FDC-001, Section 3.4.

How Requirement is Met: Transfer lines are routed between structures to provide adequate slope. Within the SY Tank Farm line slope is maintained at 0.25%. From the SY Tank Farm to the diversion box, the slope varies from 0.257% to 0.353%. From the diversion box to the vent station, the slope varies from 0.256% to 2.26%. From the vent station to near the 244-A lift station, the slope varies between 0.245% and 1.63%. From the new tie-in point near 244-A a reverse slope of +0.22% exists (see discussion below). From the new tie-in point into 241-AN Tank Farm the slope varies from 0.27% to 4.52%.

Reverse Slope Discussion near 244-A: Elevation differences were discovered at the new tie-in points for the cross-site routing to 241-AN Tank Farm. Survey results conclude that a reverse slope exists between the W-058 and the W-314 Project tie-in points, resulting in

a 60 foot section of pipe that will trap liquid. The negative slope was measured at approximately 1-5/8 inch for SLL-3160 and 1-1/8 inch for SNL-3150. The negative slope in the pipe will result in approximately 6.49 and 9.62 gallons of liquid hold-up in the primary and encasement piping, respectively as documented by Flour Government Group calculation W-314-P-039 Revision 1. Accumulated waste liquid in the primary pipe is a potential long-term corrosion concern. The transfer line elevations are documented on Hanford Site Drawing H-14-103234 *Civil SNL-3150 & SLL-3160 STA 0+00 To STA 5+50*.

Appendix D of HNF-4161 (ECN-723344) documents a requirement that flushing of the cross-site stainless steel primary pipe with raw water containing <50ppm of chloride is acceptable if the time interval between waste transfer is less than or equal to one year. If the time interval between transfers exceeds one year, it is required that the cross-site line be flushed with waste inhibited with 0.01M hydroxide (pH=12) and 0.011M (500ppm) nitrite to ensure appropriate corrosion control.

Requirement: At least one confinement system shall be designed to withstand the effects of human-caused events.

Basis: DOE Order 420.1B, Chapter I, Section 3a (2) (c), Integration of Design with Safety Analysis (Previously DOE Order 6430.1A, Section 1323-5.2).

How Requirement is Met: Road crossings are designed to protect the transfer lines from external loading to HS-20<sup>1</sup> truck loading limits. Railroad crossings use a pipe casing to isolate the transfer line and encasement from external loads.

Requirement: The diversion box shall be designed to prevent intrusion of rain or snow melt.

Basis: WHC-SD-W058-FDC-001, Section 3.7.

How Requirement is Met: The diversion box and vent station roofs are designed with hot asphalt bitumen roofing applied at a slope of 0.25 in/ft for drainage.

Requirement: The diversion box and vent station shall be designed to accommodate in-place repair.

Basis: WHC-SD-W058-FDC-001, Section 4.4.

How Requirement is Met: The diversion box and vent station floors are designed for a 350 lbf/ft<sup>2</sup> live load. The diversion box and vent station support building floors are designed for 100 lbf/ft<sup>2</sup> live load.

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<sup>1</sup> HS-20 = a maximum of 32,000 pounds on the axle of a standard Highway Semi (HS) truck, according to the American Association of State Highway and Transportation Officials.

Requirement: All air supply equipment and interconnection piping shall be mounted on a common base and shall be mounted to withstand General-Service seismic loads.

Basis: HNF-2563, *Project W-058 System Overviews*, Chapter 2.

How Requirement is Met: Procurement Specification (W-058-P8, *Procurement Specification for Compressed Air System for Replacement of the Cross Site Transfer System*, Section 3.1.8) imposes this requirement on the system provider. All equipment is mounted on the air receiver. Mounting loads (including seismic loading) are included in Hanford Plant Calculation W058-C-010, *Equipment Anchorage*.

### **3.6.2 Mechanical and Materials**

#### **3.6.2.1 Process Function**

Requirement: The transfer system primary piping shall be designed to withstand a minimum of 400 lbf/in<sup>2</sup>.

Basis: WHC-SD-W058-FDC-001, Section 3.2.3.

How Requirement is Met: Transfer lines WT-SNL-3150 and WT-SLL-3160 are designed for a pressure of 1,490 lbf/in<sup>2</sup> and tested to 2,235 lbf/in<sup>2</sup>.

Requirement: The transfer system primary piping shall be designed for process fluid temperatures from 80 °F to 200 °F and flush water temperatures from 35 °F to 200 °F.

Basis: WHC-SD-W058-FDC-001, Section 3.2.1.

How Requirement is Met: A combination of expansion loops (23 ft x 12 ft x 23 ft or 25 ft x 20 ft x 25 ft) and anchor points has been provided to control movement of the primary line caused by thermal expansion and contraction. At the expansion loops, the encasement pipes are enlarged from 6-in. nominal diameter to 12-in. nominal diameter to provide adequate clearance for thermal expansion of the primary piping.

Requirement: The secondary containment pipe shall be insulated to prevent temperature loss in the waste greater than 20 °F.

Basis: WHC-SD-W058-FDC-001, Section 3.8.4.

How Requirement is Met: The RCSTS transfer line encasements for WT-SNL-3150 and WT-SLL-3160 are insulated with 2 in. of rigid polyurethane insulation.

Requirement: The piping components shall be chemically compatible with alkaline radioactive mixed waste.

Basis: WHC-SD-W058-FDC-001, Section 3.4 and WAC 173-303.

How Requirement is Met: Transfer lines and piping components are Type 304 or Type 304L stainless steel resistant to alkaline corrosion. The encasement pipes and pipe restraints and support are constructed of carbon steel sufficiently resistant to alkaline corrosion should a primary leak occur.

Requirement: The diversion box shall allow for future tie-ins.

Basis: WHC-SD-W058-FDC-001, Section 3.7.

How Requirement is Met: Four 10-in. penetrations are provided for future tie-in of new transfer lines.

Requirement: Provision shall be made to safely contain or relieve any pressure to which the piping may be subjected.

Basis: ASME B31.3, Paragraph 3.1.2.2.

How Requirement is Met: Transfer lines WT-SNL-3150 and WT-SLL-3160 have a design pressure of 1,490 lbf/in.<sup>2</sup> gauge that exceeds the maximum discharge pressure of all waste transfer pumps installed. Downstream of the slurry booster pumps, PT-3125C and PT-3125D provide a signal to a software interlock to trip the booster pumps, should the pressure exceed 1,250 lbf/in.<sup>2</sup> gauge (HNF-1955). Transfer line WT-SNL-3150 and WT-SLL-3160 encasements have a design pressure of 50 lbf/in.<sup>2</sup> gauge and are provided with rupture disks set at 50 lbf/in.<sup>2</sup> in the diversion box and vent station to limit encasement pressure, should a transfer line leak occur.

### **3.6.2.2 Environmental Protection Function**

Requirement: Capability to transfer collected liquid from the encasement pipes to a suitable storage location shall be provided.

Basis: DOE Guide 420.1-1, Section 4.4.2, Special Considerations and Good Engineering Practices (Previously DOE Order 6430.1A, Section 1323-5.1).

How Requirement is Met: Encasement low-point drains are incorporated in the piping system at the diversion box for the transfer line segments between the diversion box and vent station. The drains are equipped with motor-operated drain valves to drain the encasement remotely, should the encasement rupture disks at the diversion box not burst.

Requirement: The diversion box and vent station shall be equipped with the capability to remove accumulated liquids.

Basis: WHC-SD-W058-FDC-001, Section 3.5 and Section 3.7.

How Requirement is Met: The diversion box and vent station include a sump pump with discharge routed to WT-SNL-3150. The pumps have a 70-ft discharge head at 50 gal/min flow and a shut-off head of 85 ft. The diversion box includes a 2-in.-diameter pump-out line with a 2-in. Class 125 flange connection outside of the structure, located



18.75 ft above the bottom of the diversion box sump floor. The vent station includes a 2-in.-diameter pump-out line with a 2-in. Class 125 flange connection outside of the structure located 10 ft above the bottom of the vent station sump floor.

Requirement: The diversion box and vent station shall be equipped with wash-down decontamination capability.

Basis: WHC-SD-W058-FDC-001, Sections 3.5 and 3.7.

How Requirement is Met: The diversion box is equipped with a wash-down spray system with spray nozzles arranged to provide full coverage of the building liner. The connection point has a 1.5-in. male pipe thread connection for attachment to an external wash-down fluid supply. The piping is stainless steel with design pressure of 80 gal/min at 60 lbf/in.<sup>2</sup>.

### **3.6.2.3 Support Function**

Requirement: The design shall provide compressed air for valve operation and booster pumps gas seal operation.

Basis: Procurement Specification W-058-P1, *Procurement Specification Slurry Transfer Pump*, Section 3.3.7.

How Requirement is Met: Instrument-quality air (clean, oil-free, and dry) is provided by the 150 lbf/in.<sup>2</sup> compressed air system in the diversion box to provide compressed air to valve actuators and booster pump seals. Instrument-quality air (clean, oil-free, and dry) is provided by the 150 lbf/in.<sup>2</sup> compressed air system in the vent station to valve actuators.

Requirement: Materials, fabrication, and testing of breather filters shall be per ANSI/ASME N509, *Nuclear Power Plant Air Cleaning Units and Components*, and ANSI/ASME N510, *Testing of Nuclear Air Treatment Systems*.

Basis: Contamination must be contained in the event of a waste release within the vent station or diversion box and during the process of waste pipe draining and flushing. Containment is in accordance with WAC-246-247.

How Requirement is Met: Flanders model G1-1R-GGD filters are installed in accordance with the project turnover status of Hanford Site Drawing H-2-822269, *Structural/HVAC Concrete HVAC Duct Sections & Dets*, Rev. 3 (see W-058-C3, *Construction Specification for Diversion Box/Vent Station*, Sec. 15493, and HNF-SD-W058-POTP-006, *Preoperational Testing, Vent Station and Diversion Box Ventilation*, for test information). The filter installations include air inlet and air outlet ducting and expansion joints; installed per Hanford Site Drawing H-2-822269. See HNF-SD-W058-POTP-006 for preoperational testing.

Requirement: The HVAC system shall provide adequate ventilation of the mechanical and electrical equipment spaces to allow operation during peak summer conditions.

Basis: DOE Guide 420.1-1, Section 5.2.2.1, Ventilation (Previously DOE Order 6430.1A, Sections 1550-1, -2, and -3, “Heating, Ventilating and Air Conditioning Systems.”)

How Requirement is Met: Ventilation and air conditioning systems have been installed in accordance with Hanford Site Drawings H-2-822390, *HVAC Support Building 6241-A Floor & Roof Plan*; H-2-822392, *HVAC Sections and Details 6241-A and 6241-V*; H-2-822393, *HVAC Schedules 6241-A and 6241-V*; H-6-13980, *HVAC Support Bldg. 6241-V Floor Plan*; and Construction Specification W-058-C3.

Requirement: The HVAC system shall provide adequate heating for personnel comfort in the support structures.

Basis: DOE Guide 420.1-1, Section 5.2.2.1, Ventilation (Previously DOE Order 6430.1A, Sections 1550-1, -2, and -3, “Heating, Ventilating and Air Conditioning Systems.”)

How Requirement is Met: Heating and ventilation systems have been installed in accordance with Hanford Site Drawings H-2-822390, H-2-822392, H-2-822393, H-6-13980, and Construction Specification W-058-C3.

### **3.6.3 Chemical and Process**

#### **3.6.3.1 Process Function**

Requirement: A bypass shall be provided around each booster pump. The bypass shall be designed to allow transfers of dilute solutions by bypassing the booster pumps when required.

Basis: WHC-SD-W058-FDC-001, Section 3.6.

How Requirement is Met: A bypass is provided for WT-SLL-3160 in the diversion box that allows transfer of dilute solutions without the use of the booster pumps.

#### **3.6.3.2 Environmental Protection Function**

Requirement: High-point vents shall be equipped with filters with materials, fabrication, and testing per ANSI/ASME N509, and ANSI/ASME N510.

Basis: Contamination must be contained during the process of waste pipe draining and flushing. Containment is in accordance with WAC-246-247, “Radiation Protection—Air Emissions.” WHC-SD-W058-FDC-001, Rev. 4, Section 3.5, paragraph 2.

How Requirement is Met: *Flanders* model G1-1R-CC-D<sup>2</sup> filters are installed at the vent station.

### 3.6.4 Electrical Power

Requirement: The diversion box shall be powered from two transformers. Each transformer shall be able to carry the electrical load of the facility.

Basis: WHC-SD-W058-FDC-001, Section 4.3.

How Requirement is Met: 480 V (ac) transmission lines bring power from Electrical Utility transformers C6743P and C6744P to the diversion box support building. Switchboard SB-1 is provided in the diversion box support building to receive power from either Electrical Utility transformer and distribute three-phase 480 V (ac) power within the diversion box. Panelboard PP-3 draws power from SB-1 via transformer T-3 and distributes single-phase 120 V (ac) and 240 V (ac) power within the diversion box.

Requirement: Transfer of the main power supply in the diversion box shall be key interlocked to permit only one power source to be energized at a time.

Basis: WHC-SD-W058-DRD-001, Section 4.3.

How Requirement is Met: Main circuit breakers FBX776 and FBX777 are key interlocked to permit only one breaker to be closed. See Hanford Site Drawing H-2-822505, *Electrical One-Line Diversion Box 6241-A*.

Requirement: The vent station shall be powered from one transformer.

Basis: WHC-SD-W058-FDC-001, Section 4.3.

How Requirement is Met: 480 V (ac) transmission lines bring power from Electrical Utility transformer C6379P to the vent station support building. Distribution panelboard DP-1 is provided in the vent station support building to receive power from the Electrical Utility transformer and distribute three-phase 480 V (ac) power within the diversion box. Panelboard PP-3 draws power from panelboard DP-1 via transformer T-1 and distributes single-phase 120 V (ac) and 240 V (ac) power within the diversion box.

Requirement: Polychlorinated biphenyls and mercury shall not be used.

Basis: WHC-SD-W058-FDC-001, Section 4.3.

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<sup>2</sup> Flanders is a trademark of Flanders/CSC Corporation, a wholly owned subsidiary of Flanders Precisionaire Corporation, a wholly owned subsidiary of Flanders Corporation, Washington, North Carolina.

How Requirement is Met: The design is specified for less than 1 p/M of polychlorinated biphenyls in transformer oil (Construction Specification W-058-C3, Section 16300, paragraph 2.3.2.7). Mercury-containing components are not used in the RCSTS.

Requirement: Electrical systems shall be sized for 20% excess capacity.

Basis: WHC-SD-W058-FDC-001, Section 4.3.

How Requirement is Met: Electrical distribution one-line and panelboard drawings show at least 20% spare capacity.

Requirement: Safety switches and circuit breakers shall be lockable.

Basis: WHC-SD-W058-FDC-001, Section 4.3.

How Requirement is Met: Electrical circuit breakers provided are of lockable design or are fitted with key interlock kits.

Requirement: Exit doors shall have lighted exit signs.

Basis: WHC-SD-W058-FDC-001, Section 4.3.1.

How Requirement is Met: Self-illuminating exit signs and emergency fixtures are specified (Construction Specification W-058-C3, Section 16400) and installed.

Requirement: Normal power sources shall be metered for amperage, volts, watt-hours, and demand (average power).

Basis: WHC-SD-W058-FDC-001, Section 4.3.2.

How Requirement is Met: Instruments to meter the incoming power are provided for each facility, including an ammeter, voltmeter, and kilowatt-hour meter with pulse output signal. The pulse signal is sent remotely to the Electrical Utility. Each pulse measured and sent represents a quantity of energy that, when divided by the number of pulses over a time period, represents demand (average power).

### **3.6.5 Instrumentation and Control**

#### **3.6.5.1 Process Function**

Requirement: Pipeline and pump instrumentation shall provide monitoring of temperature, pressure, flow, and valve positioning.

Basis: WHC-SD-W058-FDC-001, Section 3.8.1.

How Requirement is Met: Temperatures in WT-SNL-3150 and WT-SLL-3160 are monitored in the diversion box and in the vent station. Pressures in WT-SNL-3150 and the building sump pump discharge lines are monitored in the diversion box and vent

station. Pressures in WT-SLL-3160 are monitored at the pump suction and pump discharge in the diversion box and at the vent station. Pump discharge flow is monitored in the diversion box for WT-SLL-3160. All valves in the diversion box are power actuated and can be controlled via interlocks and position-indicating signals through the MCS. The MCS also has interconnections to provide interlock and monitoring of select valves (if installed) in the 241-SY-A and 241-SY-B valve pits..

**Requirement:** Transfer pumps shall be interlocked to shut down waste transfers in the event of a system failure.

**Basis:** WHC-SD-W058-FDC-001, Section 3.8.3.

**How Requirement is Met:** Protective hardware interlocks, shown in Table 3 are provided for various parameters (HNF-1955) to protect against system failures. See Section 3.6.6 for software shutdown interlocks.

Table 3. Hardware Interlock Setpoints.

Source Instrument	Software Setpoint	Purpose
FSH-3125A1 & FSH-3125A2	Shutdown 11 Std ft <sup>3</sup> /hr	Pump P-3125A seal failure
FSH-3125B1 & FSH-3125B2	Shutdown 11 Std ft <sup>3</sup> /hr	Pump P-3125B seal failure
PSL-3125A1 & PSL-3125A2	Shutdown 90 lbf/in. <sup>2</sup> gauge	Insufficient air pressure at pump P-3125A seals
PSL-3125B1 & PSL-3125B2	Shutdown 90 lbf/in. <sup>2</sup> gauge	Insufficient air pressure at pump P-3125B seals
TSH-3125A	Shutdown 175 °F	Overheating pump P-3125A bearing
TSH-3125B	Shutdown 175 °F	Overheating pump P-3125B bearing

**Requirement:** Instrument wiring shall be separated (physically) from power wiring.

**Basis:** WHC-SD-W058-FDC-001, Section 3.8.

**How Requirement is Met:** A separate raceway is provided for instrument wiring in the diversion box and vent station.

### 3.6.5.2 Environmental Protection Function

**Requirement:** Leak-detection devices shall be provided that are capable of detecting failure of the containment system within 24 hours.

Basis: WHC-SD-W058-FDC-001, Section 3.8.1, and WAC 173-303-640.

How Requirement is Met: The buried piping is equipped with continuous leak-detection cables that immediately sense the presence of moisture. The diversion box and vent station are equipped with redundant leak detectors in each building sump. The sump leak detectors are capable of detecting less than 15 gal of leakage.

Requirement: Encasement leak detection associated with liquid waste transfer route shall be interlocked to effect safe shutdown of the transfer pumps.

Basis: WHC-SD-W058-FDC-001, Section 3.8.1.

How Requirement is Met: Encasement leak detection is interlocked to the booster pump controls. In addition, the leak-detection signal is forwarded by the MCS to the 200 West Area master pump shutdown system.

Requirement: Encasement leak detection shall be capable of detecting the leak rate with a probability of detection of 0.95 and a probability of a false alarm of 0.05.

Basis: WHC-SD-W058-DRD-001, Section 3.7.6.

How Requirement is Met: Experience with the encasement leak-detection system during testing indicates that leaks can be effectively detected (water vapor was sufficient to provide a leak-detection signal). Nitrogen inerting of the encasement is necessary to provide an acceptable probability of false alarm.

### **3.6.6 Computer Hardware and Software**

#### **3.6.6.1 Process Function**

Requirement: All transfers and booster pumps shall be controlled from a process control station in the 200 West Area.

Basis: WHC-SD-W058-FDC-001, Section 3.8.5.

How Requirement is Met: A monitoring and control system has been included to provide monitoring, operator interface, and automatic control features. The MCS includes an OCS in the 242-S Evaporator building for control of the system. In addition, six PCUs are provided: PCU-1 located in the 252-S building, PCU-2A and PCU-2B in the diversion box, PCU-3 in the vent station, PCU-5 at Cabinet 6241 between the vent station and the 244-A Lift Station, and PCU-4 at the 244-A Lift Station.

Requirement: Transfer pumps shall be interlocked to shut down waste transfers in the event of a system failure.

Basis: WHC-SD-W058-FDC-001, Section 3.8.3.

How Requirement is Met: Protective software interlocks, shown in Table 4, are provided for various parameters (HNF-1955) to protect against system failures.

Table 4. Software Interlocks.

Source Instrument	Software Setpoint	Purpose
TAH-3125A1 & TAH-3125A2	Shutdown 200 °F	Prevent overheating of pump P-3125A bearing
TAH-3125B1 & TAH-3125B2	Shutdown 200 °F	Prevent overheating of pump P-3125B bearing
VAH-3125A1 & VAH-3125A2	Shutdown 0.6 in./sec	Prevent damage to pump P-3125A from vibration
VAH-3125B1 & VAH-3125B2	Shutdown 0.6 in./sec	Prevent damage to pump P-3125B from vibration
PAH-3125A	Shutdown 70 lbf/in. <sup>2</sup> gauge	Prevent pump P-3125A seal damage
PAH-3125A	Shutdown <10 lbf/in. <sup>2</sup> gauge	Prevent pump P-3125A cavitation
PAH-3125B	Shutdown 70 lbf/in. <sup>2</sup> gauge	Prevent pump P-3125B seal damage
PAH-3125B	Shutdown <10 lbf/in. <sup>2</sup> gauge	Prevent pump P-3125B cavitation
PAH-3125C & PAH-3125D	Shutdown 1250 lbf/in. <sup>2</sup> gauge	Prevent over pressurization of slurry line
PAH-3168	Shutdown 10 lbf/in. <sup>2</sup> gauge	Prevent waste flow from slurry line into vent station HEPA filter
PAH-3173	Shutdown 10 lbf/in. <sup>2</sup> gauge	Prevent leakage from supernatant line into diversion box sump
PAH-3183	Shutdown 10 lbf/in. <sup>2</sup> gauge	Limit leakage through slurry line block valves
PAH-3185	Shutdown 10 lbf/in. <sup>2</sup> gauge	Prevent leakage from supernatant line into vent station HEPA filter
PAH-3168	Shutdown 10 lbf/in. <sup>2</sup> gauge	Prevent waste flow from slurry line into vent station HEPA filter

**Requirement:** Appropriate valving shall be incorporated to prevent movement of waste into systems and components that were not intended to contain waste and minimize residual contamination.

**Basis:** WHC-SD-W058-FDC-001, Section 3.5.

**How Requirement is Met:** Protective software interlocks, shown in Table 5, are provided for various parameters (HNF-1955) to control valve operation:



Table 5. Software Interlocks to Control Valve Operation.

Source Instrument	Software Setpoint	Purpose
PI-3125E	Interlock >0 lbf/in. <sup>2</sup> gauge	Prevent opening slurry line vent valve with positive pressure
PI-3126A	Interlock >0 lbf/in. <sup>2</sup> gauge	Prevent opening supernatant line vent valve with positive pressure
PI-3126B	Interlock >0 lbf/in. <sup>2</sup> gauge	Prevent opening slurry line vent valve with positive pressure
PAH-3167	Shutdown 10 lbf/in. <sup>2</sup> gauge	Prevent leakage from supernatant line into vent station sump

### 3.6.6.2 Support Function

Requirement: The MCS shall be provided with a 1-hour uninterruptible power supply. The PCUs shall have a minimum 1-hour battery backup.

Basis: WHC-SD-W058-FDC-001, Section 3.8.5.

How Requirement is Met: The OCS and PCUs are provided with a 1-hour battery supply to allow system status and maintain programming following a loss of power.

### 3.6.7 Fire Protection

Requirement: The diversion box entry corridor/stairway shall be isolated from the diversion box support building by a 1-hour rated barrier.

Basis: HNF-SD-WM-FHA-020, *Tank Farms Fire Hazards Analysis*, Appendix A, and NFPA 101, *Life Safety Code*<sup>3</sup>.

How Requirement is Met: As documented in HNF-SD-WM-FHA-020, door 4 between the corridor/stairway and support building room 101 in both the diversion box and the vent station meet the 1.5-hour fire rating requirement; however, they are marked as 0.75-hour doors. Concrete walls between the corridor/stairway and support building rooms 101 (personnel access room) and 104 (compressor room) at both the diversion box and the vent station were designed and installed with a 1-hour fire rating.

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<sup>3</sup> Life Safety Code is a trademark of the National Fire Protection Association, Quincy, Massachusetts.

### **3.7 TESTING AND MAINTENANCE REQUIREMENTS**

#### **3.7.1 Testability**

Requirement: HEPA filters shall be equipped with test connections to test filter performance.

Basis: ANSI/ASME N509, Section 5.6.5.1.

How Requirement is Met: The diversion box and vent station HEPA filters are provided with monitoring ports for testing and were tested for leakage during the preoperational tests before startup (HNF-SD-W058-POTP-006). HEPA filters installed at the high points of the supernatant and slurry transfer lines in the vent station are also equipped with test connections and isolation valves to permit filter testing.

#### **3.7.2 TSR-Required Surveillances**

TSR-required surveillances are contained in HNF-SD-WM-TSR-006. There are no TSR-Required Surveillances associated with the RCSTS.

#### **3.7.3 Non-TSR Inspections and Testing**

Requirement: Diversion box and vent station leak detectors shall be calibrated once each 12 months or within 12 months prior to use.

Basis: Fluid Components International Document Number 06EN003209, *Installation, Operation, and Maintenance Manual – Model 8-66 Liquid Level/Interface Controller*.

How Requirement is Met: Calibration is performed to Technical Procedure 6-LDD-275, *Calibrate the Diversion Box and Vent Station Sump Pump Leak Detection Elements*.

Requirement: The functionality of the HEPA filter units shall be verified annually using a challenge aerosol.

Basis: WAC-246-247, ANSI/ASME N509, ANSI/ASME N510 and RPP-16922.

How Requirement is Met: The 6241-A Booster Pump Building Vent and the 6241-V Cross-site Vent Station are both designated as minor radioactive emission units per RPP-16922. HEPA filter testing is provided for under the operation and maintenance procedures for the RCSTS. The test result is acceptable if the differential pressure across the filter is less than 1-in. water gauge, the flow rate is greater than 35 ft<sup>3</sup>/min and less than 100 ft<sup>3</sup>/min and the aerosol penetration is less than 5%.

Requirement: The observable parts of the transfer line encasement conductivity probe leak detector alarm system shall be visually inspected and monitored daily during transfers.

Basis: RPP-16922.

How Requirement is Met: To be determined.

Requirement: The RCSTS transfer line encasement leak detection system shall have a system functional test annually.

Basis: RPP-16922, and OSD-T-151-00010, *Operating Specifications for Pressure Testing and Leak Detection For Tank Farm Transfer Systems and for Control and Use of Temporary Transfer Lines*.

How Requirement is Met: To be determined.

### **3.7.4 Maintenance**

Requirement: The diversion box shall have provision for storage of equipment removed during maintenance.

Basis: WHC-SD-W058-FDC-001, Section 3.7.

How Requirement is Met: Floor areas around the booster pump installations are provided for laydown of the pumps and the removable spray shields.

Requirement: Piping, equipment, and instrumentation located in the diversion box shall be capable of being remotely removed and replaced or the area shall be capable of being decontaminated such that hands-on maintenance is feasible.

Basis: WHC-SD-W058-FDC-001, Section 4.4.

How Requirement is Met: The diversion box is equipped with a liner and a spray wash-down system to permit decontamination for maintenance. The diversion box includes two cover block sections in the structure roof for removal or replacement of the booster pumps.

Requirement: The diversion box design shall facilitate access to, or removal of, equipment.

Basis: WHC-SD-W058-FDC-001, Section 4.4.

How Requirement is Met: The diversion box is equipped with overhead crane beams and hoists to facilitate movement of large components within the structure.

Requirement: The diversion box design shall include shielding for maintenance personnel.

Basis: WHC-SD-W058-FDC-001, Section 4.4.

How Requirement is Met: A shield floor is incorporated in the diversion box design to separate piping from those areas of the facility that are manned during maintenance. The floor is constructed with multiple panels to permit removal of only those panels that provide access for the specific maintenance activity being performed.

Requirement: The diversion box shall have connections for a portable ventilation system for maintenance.

Basis: WHC-SD-W058-FDC-001, Section 3.7.

How Requirement is Met: A 6-in.-diameter connection line fitted with an isolation valve is provided to the exterior of the diversion box for connection to a portable ventilation exhaust. The connection provides a Class 125 flange for attachment of the portable exhaust system.

Requirement: As many structures as possible shall be kept in clean areas.

Basis: WHC-SD-W058-FDC-001, Section 4.4.

How Requirement is Met: The diversion box and vent station include support buildings that house electrical and monitoring equipment, active portions of the compressed air system, and HVAC systems. The support structures include a personnel access room to allow a controlled entry and decontamination location for maintenance personnel entering the diversion box. The monitoring and control OCS, PCU-1, PCU-4, and PCU-5, and their electrical distribution switchboards and panelboards are located remote from radiation and contamination sources to facilitate maintenance. The diversion box and vent station breather filters are located outside the structures to facilitate maintenance.

### **3.8 OTHER REQUIREMENTS**

#### **3.8.1 Security and Special Nuclear Material Protection**

No specific requirements are applicable.

#### **3.8.2 Special Installation Requirements**

No specific requirements are applicable.

#### **3.8.3 Reliability, Availability, and Preferred Failure Modes**

Requirement: Installation of spare pipelines shall be considered.

Basis: DOE Order 420.1B, Chapter I Section 3b Nuclear Facility Design (Previously DOE Order 6430.1A, Section 1323-5.2).

How Requirement is Met: The RCSTS provides the capability to use transfer line WT-SLL-3160 for supernatant transfers between the 241-SY-B valve pit in the 200 West Area and Tank 241-AN-104 in the 200 East Area.

### 3.8.4 Quality Assurance

Design and construction of the RCSTS was performed under the auspices of WHC-SD-WM-QAPP-018, *Tank Waste Projects Quality Assurance Program Plan*. This plan describes quality assurance activities required for all personnel involved in Hanford Site tank waste projects including the RCSTS. This program plan complied with the quality assurance criteria of DOE Order 5700.6C, as issued in 1991 and revised in 1996. At the time of the RCSTS design, the basis for establishing quality assurance program requirements was WHC-CM-1-3, *Management Requirements and Procedures*. This document outlined a graded approach for assigning quality assurance requirements for activities involving each SSC based on its function. This reference citation is obsolete, cancelled, and no longer available, but was a requirement at the time of the design work.

The RCSTS design process meets the quality assurance requirements through developing and implementing HNF-SD-W058-QAPP-001, *Project Specific Quality Assurance Plan, Project W-058, Replacement Cross-Site Transfer System*.

Operation of the RCSTS is governed by TFC-PLN-02, *Quality Assurance Program Description*. This document meets the requirements of 10 CFR 830, and provides the graded approach applied to all activities performed on the RCSTS.

As a supplemental quality assurance measure, 100% radiographic examination is applied to circumferential butt welds in primary transfer piping for WT-SNL-3150 and WT-SLL-3160.

### 3.8.5 Miscellaneous

Due to the reverse slope of a section of the SLL-3160 and SNL-3150 transfer piping near 244-A a new requirement documented in HNF-4161 Appendix D exists. See section 3.6.1 for discussion.

Requirement: A requirement that flushing of the cross-site stainless steel primary pipe with raw water containing <50ppm of chloride is acceptable if the time interval between waste transfer is less than or equal to one year. If the time interval between transfers exceeds one year, it is required that the cross-site line be flushed with waste inhibited with 0.01M hydroxide (pH=12) and 0.011M (500ppm) nitrite to ensure appropriate corrosion control.

Basis: HNF-4161 Appendix D (ECN-723344)

How Requirement is Met: Analysis of the raw water used in flushing operations indicates that the chloride is sufficiently below the 50 ppm concentration. System Engineering will

maintain a record of the cross-site transfers intervals and initiate inhibited flushing as appropriate.

## **4.0 SYSTEM DESCRIPTION**

This chapter provides a comprehensive description of the RCSTS. The scope includes identifying the subsystems and components of the RCSTS; describing their layout and interconnection; explaining the system flow paths; identifying the indicators, controls, and alarms within the system; defining the acceptable ranges for system performance and set-points; and explaining how the system operates. This system description emphasizes those design features that meet the requirements presented in Chapter 3.

### **4.1 CONFIGURATION INFORMATION**

#### **4.1.1 Description of System, Subsystems, and Major Components**

Figures 3, 4 and 5 identify the subsystems (the transfer lines, diversion box, and vent station) and their interconnections. These diagrams also show the support systems (electrical distribution, HVAC, monitoring and control, instrument [compressed] air) and the boundaries between them and the subsystems. In addition, the diagrams identify major components that are required to fulfill the system functions, such as the booster pumps in the diversion box and leak detectors inside the concrete structures.

Figures 3, 4 and 5 contain the same subsystems and interfacing systems as Figure 1, but provide more details on interconnections and components. Lists of design basis, design baseline, and other design documents for the RCSTS are provided in Appendix B. In addition to identifying the documents, Appendix B also delineates engineering responsibility for those documents. Discussions on the functions of all subsystems/interfacing systems and major components and how their designs meet the requirements appear in Chapters 2 and 3, respectively. For a description on their physical layout and arrangements, see Section 4.1.3. For a walk-down on the flow paths of various subsystems and interfacing systems, see Section 4.1.4.

#### **4.1.2 Boundaries and Interfaces**

##### **4.1.2.1 Mechanical Boundaries**

The mechanical boundaries of the RCSTS are those for the transfer lines. The supernatant transfer line (WT-SNL-3150) boundary at the 241-SY-A valve pit is nozzle L12 and at the 241-AN-01A Pump Pit is nozzle H. The slurry transfer line (WT-SLL-3160) boundary at the 241-SY-B valve pit is nozzle R12 and at Tank 241-AN-104 is Riser 10. Figures 4 and 5 show the RCSTS mechanical boundaries and interfaces at the valve pits and the Pump Pit and Tank Riser, respectively.

##### **4.1.2.2 Instrumentation and Control Boundaries**

The MCS has external interfaces to the 200 West Area master pump shutdown system at the 241-SY-271 Instrument Control Building. This interface is provided by output contacts on

relay K-6241. The system also receives input signals from instrumentation in the 241-SY-A valve pit at PCU-1, and from the 200 East Area master pump shutdown system at PCU-4.

#### **4.1.2.3 Instrument Air System Boundaries**

The instrument air system for the RCSTS consists of two identical and independent subsystems, one in the diversion box and the other in the vent station. These two subsystems are self-contained and have no external interface with systems outside the RCSTS. At the diversion box, the instrument air subsystem is connected to the pump-seal control panels and pneumatic valve operators; at the vent station, the instrument air subsystem is connected to the pneumatic valve operators. These connecting points are the internal boundaries of the instrument air system.

#### **4.1.2.4 Heating, Ventilation, and Air Conditioning System Boundaries**

The HVAC systems are contained within the structures they serve with the exception of the external pad-mounted HEPA filters. Figure 3 shows the relative relationships of the equipment with the structures. The physical boundaries are the extremities of the equipment, ductwork, and valves and the associated accessories and electrical controls. Electrical power interface with the power-driven HVAC equipment (fans and air conditioning equipment) occurs at the equipment side of the nearest disconnect switch (or breaker) for the equipment served.

#### **4.1.2.5 Electrical Distribution Boundaries**

Electrical power for selected RCSTS components is provided by the electrical distribution system at boundary interfaces at the following facilities: 252-S substation, 242-S Evaporator, 2712-B Electrical Instrumentation Building, and 244-A lift station.

- 120 V (ac) electrical power is provided for PCU-1 by panelboard MPC-E-001, circuit 8 at the 252-S substation.
- 120 V (ac) electrical power is provided for OCS by panelboard B, circuit 4 at the 242-S Evaporator.
- 120 V (ac) electrical power is provided for leak-detection relays by panelboard SY271-EDS-DP-100, circuit 18 and circuit 20 at the 241-SY-271 Instrument Control Building.
- 120 V (ac) electrical power is provided for PCU-5 by panelboard A-1, circuit 5 at the 2712-B Electrical Instrumentation Building.
- 120 V (ac) electrical power is provided for PCU-4 by panelboard A, circuit 9 at the 244-A lift station.



Figure 3. Replacement Cross-SiteTransfer System Diagram.

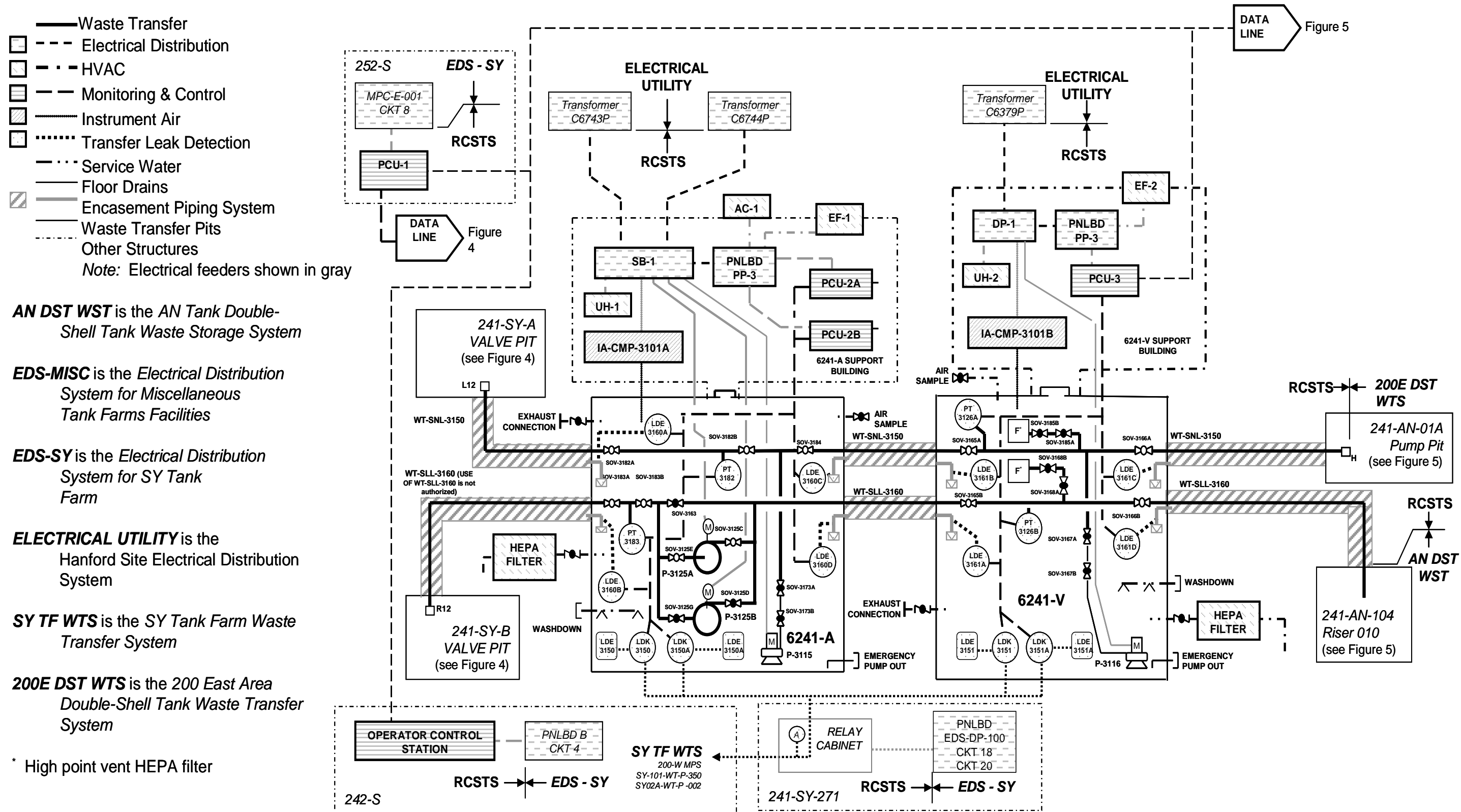


Figure 4. Replacement Cross-Site Transfer System  
Interfaces at the 241-SY-A and 241-SY-B Valve Pits.

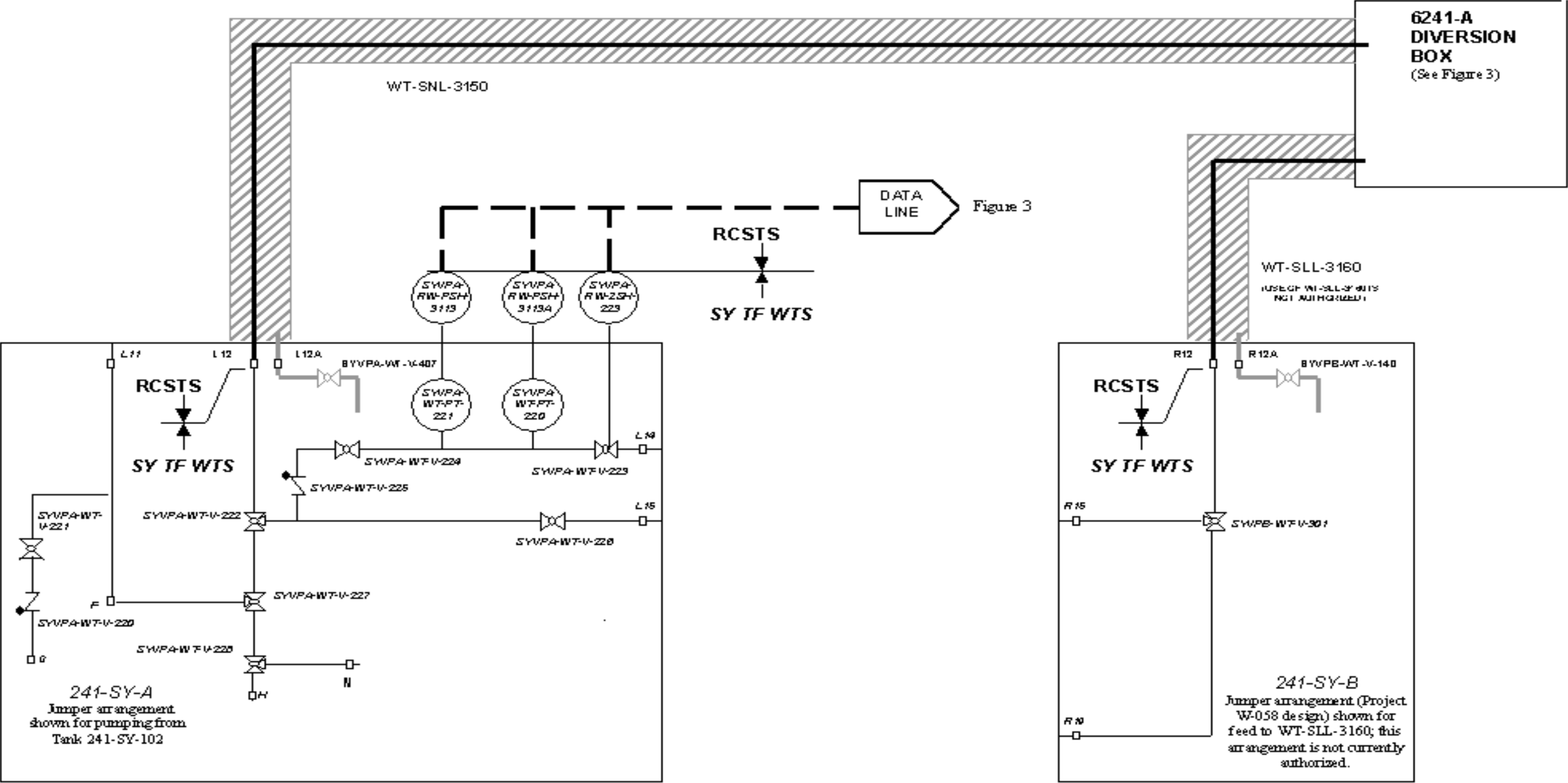
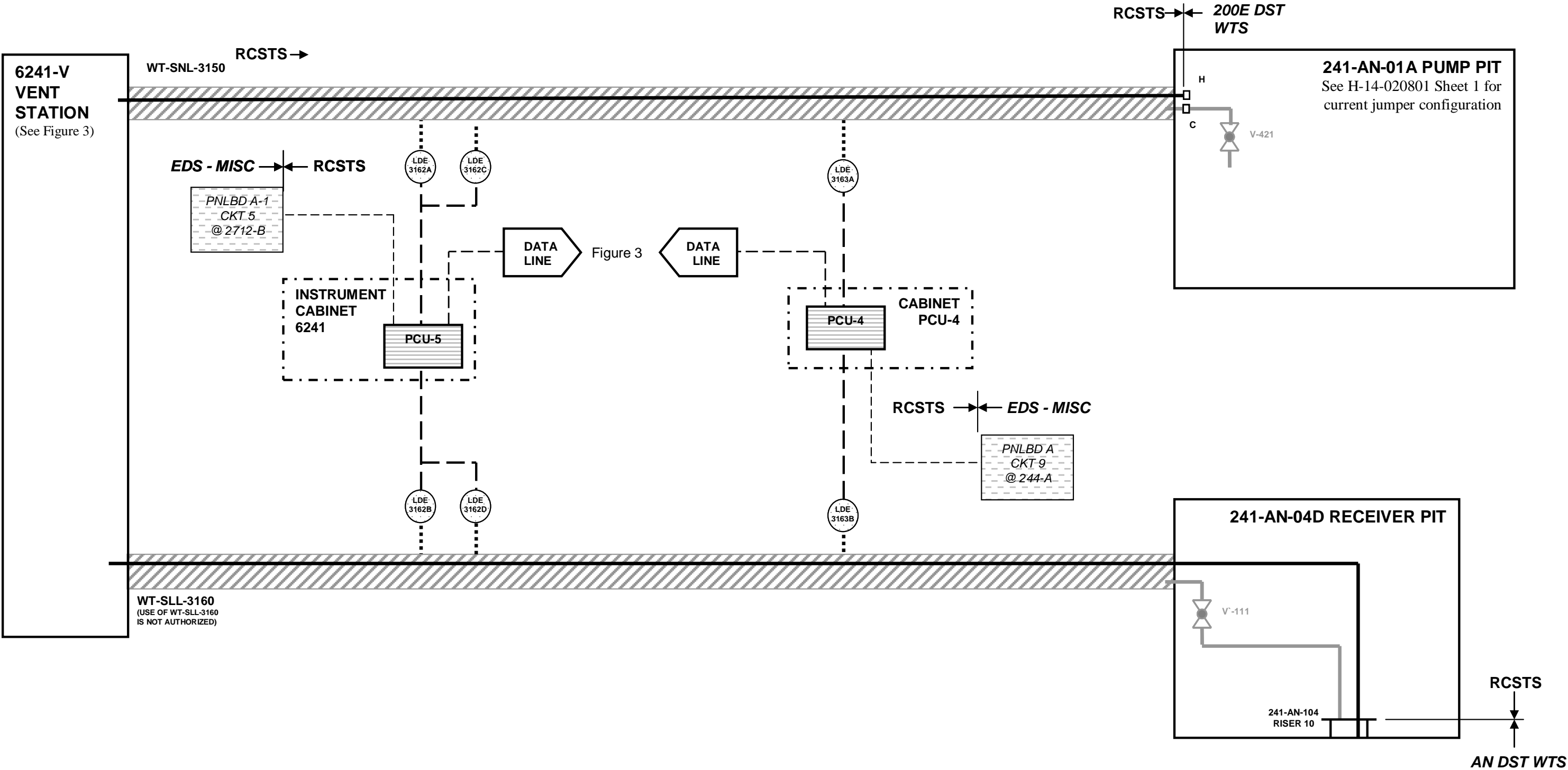


Figure 5. Replacement Cross-Site Transfer System  
Interfaces Near the 244-A Lift Station.



### 4.1.3 Physical Location and Layout

#### 4.1.3.1 Transfer Lines

The RCSTS consists of two pipelines (supernatant and slurry) running between the 241-SY valve pits (in SY Tank Farm) in the 200 West Area and the 241-AN-01A pump pit and tank 241-AN-104 (in AN Tank Farm) in the 200 East Area, at a distance of approximately 7.5 miles. The pipeline portion within concrete structures is accessible for maintenance, while the portion between structures is underground. The supernatant transfer line starts at the 241-SY-A valve pit, and the slurry transfer line starts at the 241-SY-B valve pit. From the valve pits, these buried pipelines travel in a single construction trench to the diversion box (6241-A) in the 200 West Area. Inside the diversion box are tie-ins for connecting the sump pump to the supernatant line (or slurry line) and connecting the two booster pumps to the slurry line. From the diversion box, the buried pipelines travel to their high point at the vent station (6241-V) between the 200 East and 200 West Areas. Inside the vent station, vent valves connect each transfer line to a vent line that introduces air to facilitate pipeline drainage after transfer and flushing. Tie-ins inside the vent station connect the sump pump to the supernatant or slurry line. From the vent station, the pipelines continue on to their destination, the 241-AN-01A Pump Pit and the 241-AN-104 Tank.

Figure 6 shows the layout and location of the RCSTS, including the pipelines and related structures.

#### 4.1.3.2 Diversion Box

The diversion box (6241-A) is in the 200 West Area on the east side of Beloit Avenue, between 13th and 16th Streets. The main structure (room 105) is an underground building with the top of the roof approximately 2.5 ft (0.75 m) above finish grade. This structure houses two booster pumps and is designed for maintenance access on an infrequent basis. It is cast-in-place concrete equipped with a stainless steel floor liner at the base floor level. A steel shield floor is located 3.5 ft (1 m) above the base floor with the process piping underneath.

Attached to the main structure is a support building providing a GS enclosure for normal operational activities and a controlled-access staging area to the transfer piping system via a connecting corridor. The support building includes an indoor controlled area for a step-off pad and clothing removal, plus rooms for the compressor (room 104) and electrical/ instrumentation equipment (room 102). The separating corridor (room 103) minimizes potential contamination of the support facility area from the process area. The support building is of precast concrete panel construction and houses electrical, instrumentation, and piping equipment necessary for the operation of the RCSTS; it also has an HVAC system to protect the equipment from temperature extremes. Access to the main structure is through the support building via a corridor and an airtight door. This door opens up to a shield wall labyrinth that leads to the shield floor level.

Figure 7 shows a schematic of the diversion box arrangements. For a more detailed drawing, see Hanford Site Drawing H-2-822231, Sheet 1, *Architectural Diversion Box 6241-A Floor Plan*. Discussions on physical locations and layouts of the support systems for the diversion box

Figure 6. Replacement Cross-Site Transfer System Transfer Route.

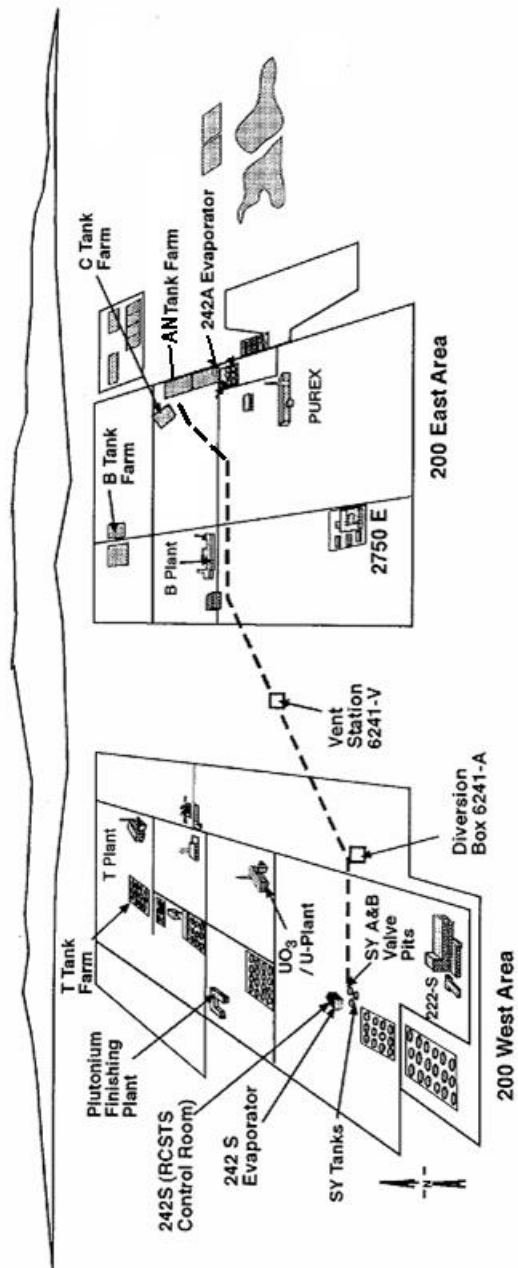
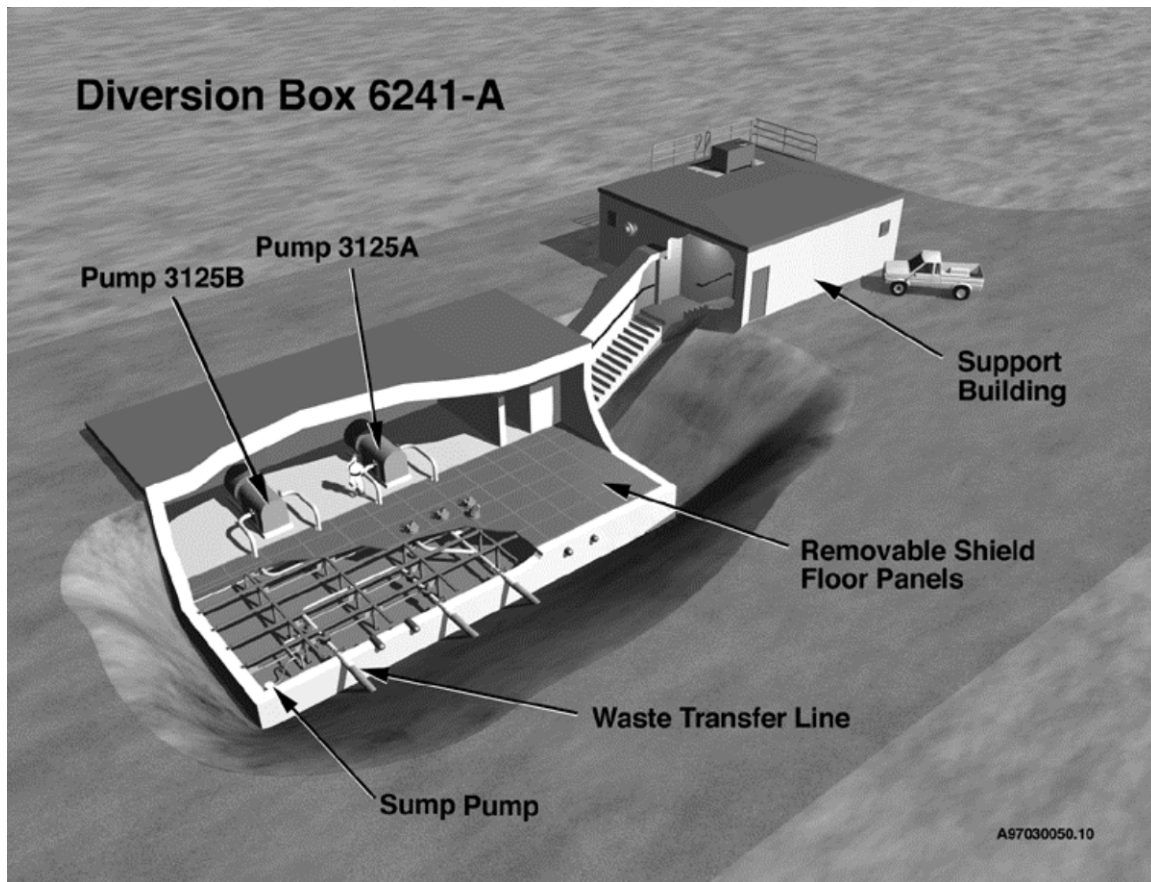


Figure 7. Diversion Box Layout.



including the instrument air system, HVAC, and the electrical distribution system appear in Sections 4.1.3.5, 4.1.3.6, and 4.1.3.7, respectively.

#### 4.1.3.3 Vent Station

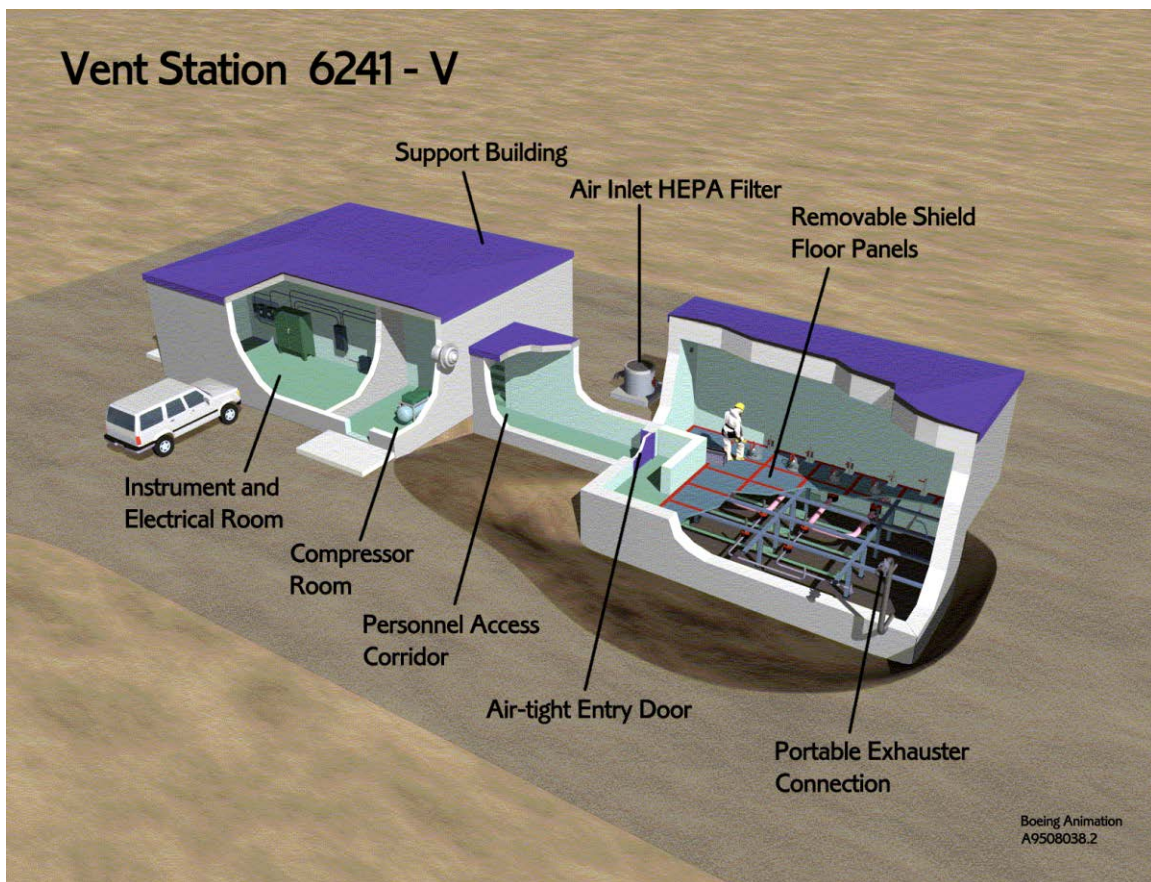
The 6241-V vent station is in the 600 Area, between the 200 West and 200 East Areas, approximately 0.3 mi (0.5 km) south of Route 3. It is located at the hydraulic high point of the RCSTS, and the pipeline slopes down continuously from this point to the two ends. The main structure (room 105) is an underground building with the lower half of the building below finish grade. It houses the transfer piping and other items that support operation of the RCSTS and is designed for maintenance access on an infrequent basis. The main structure is cast-in-place concrete equipped with a stainless steel floor liner and a carbon steel shielding floor located above the transfer piping.

Attached to the main structure is a support building providing a GS enclosure for normal operational activities and a controlled access staging area to the transfer piping system via a connecting corridor. The support building includes an indoor controlled area for a step-off pad and clothing removal, plus the compressor (room 104) and electrical/instrumentation equipment (room 102) rooms. The separating corridor (room 103) minimizes potential contamination of the

support facility area from the process area. The support building is of precast concrete panel construction and houses electrical, instrumentation, and piping equipment necessary for the operation of the RCSTS; it also has a heating unit to protect the equipment from low temperatures. Access to the main structure is through the support building via a corridor and an airtight door. This door opens up to a shield wall labyrinth that leads to the shield floor level.

Figure 8 shows a schematic of the vent station arrangements. For a more detailed drawing see Hanford Site Drawing H-6-13979, Sheet 1, *Architectural Vent Station 6241-V Floor Plan*. Discussions on physical locations and layouts of the support systems for the vent station, including the instrument air system, HVAC, and electrical distribution system appear in Sections 4.1.3.5, 4.1.3.6, and 4.1.3.7, respectively.

Figure 8. Vent Station Layout.



#### **4.1.3.4 Monitor and Control System**

The MCS is divided into numerous physical units that operate together logically.

##### **4.1.3.4.1 Operator Control Station**

The OCS is located in the former lunchroom (now called the W-058 control room) at the 242-S Evaporator in the 200 West Area. Refer to Hanford Site Drawing H-2-822422, *Elec/Inst Plan & Elevation Operator Control Station* for the arrangement.

##### **4.1.3.4.2 Process Control Units**

The PCUs are at various locations along the path of the replacement pipelines. Refer to Hanford Site Drawings H-2-822421, *Instm Plans & Elevations PCU-2 & Misc. Instruments*; H-2-822430, *Elec/Inst Location/Termination Diagram PCU-1*; H-2-822435, *Instrumentation Block Diagram*; H-2-822534, *Electrical Plan, Section & Detail*; and H-6-14034, *Instm Plans & Elevations PCU-3 & Misc. Instruments* for the exact locations.

- PCU-1 is located at the east wall inside the 252-S substation.
- PCU-2A & PCU-2B are located on the north wall of room 102 inside the 6241-A diversion box.
- PCU-3 is located on the north wall of room 102 inside the 6241-V vent station.
- PCU-5 is located in instrument cabinet CAB-6241 (just west of Atlanta Avenue at coordinates N41730/W54500), southeast of the 2712-B Electrical Instrumentation Building in the 200 East area.
- PCU-4 is located outside near the 244-A lift station, adjacent to the fence.

##### **4.1.3.4.3 Field Instrumentation**

Field instrumentation is located in the SY Tank Farm valve pit, the pits of the diversion box and vent station, and the 244-A lift station. The instruments are mounted on the transfer pipe or the floor sump, or at the associated equipment being monitored. Preferably, remote instruments are installed whenever possible to meet ALARA concerns near and around the pipes containing radioactive waste.

##### **4.1.3.4.4 Continuous Leak Detection**

Continuous leak detection is provided in the annulus space between the primary pipe and the encasement pipe of the buried pipeline. The leak-detection cable is divided into physical segments for monitoring. At the point of termination for each segment, a leak-detection relay monitoring unit that receives input is mounted accessibly on leak-detection panels inside the diversion box building, vent station building, and cabinet 6241.



#### 4.1.3.4.5 Low-Point Leak Detection

The diversion box and the vent station sump structures each contain a sump for collecting fluids. Redundant low-point leak detectors are installed in the sump of each building. Interposing relays to transmit the leak detection signal are located in the vent station support building for vent station leak detectors and in the diversion box support building and in the 241-SY-271 Instrument Control Building for both diversion box and vent station leak detectors.

The 241-AN-01A Central Pump pit has a sloped floor for collecting fluids. A low point leak detector is installed at the floor of the pump pit. Interposing relays to transmit the leak detection signal is located in the pit leak detection enclosure. The 241-AN-04D Receiver pit has a low point leak detector installed at the floor of the pit. Interposing relays to transmit the leak detection signal is located in the pit leak detection enclosure.

#### 4.1.3.4.6 Master Pump Shutdown

The 200 West Area master pump shutdown circuit is located at the 241-SY-271 Instrument Control Building. See Hanford Site Drawing H-2-822436, *Instrumentation Block Diagram Leak Det Sht Dn Relay*. The 200 East Area master pump shutdown circuit is located at the 242-A evaporator facility.

#### 4.1.3.5 Instrument Air System

The instrument air system consists of two identical subsystems, one each in the diversion box and the vent station. At the diversion box, all components of the subsystem are located in compressor room 104. The equipment using compressed air (booster pump seals and AOV actuators) is located in room 105. An instrument air piping header (1 in., 150 lb, code M7) runs underground between rooms 104 and 105. Instrument air piping (0.5 in., 150 lb, code M7) connects air from the header to each of four pump-seal control panels, providing seal to the booster pumps. PCV-3100A regulates air pressure for solenoid-operated valves to 110 lbf/in.<sup>2</sup> (gauge). Ethylene propylene diene monomer hose (0.25 in.) connects air from the 110 lbf/in.<sup>2</sup> (gauge) header to each solenoid-operated valve. This subsystem has a complete description in HNF-2563, Chapter 2, "Overview for the W-058 Instrument Air" and on Hanford Site Drawing H-2-822406, *P&ID Instrument Air System Diversion Box 6241-A*.

The layout of the instrument air subsystem at the vent station is almost identical to that at the diversion box. All components of the subsystem are located in compressor room 104. The equipment using compressed air (AOV actuators) is located in room 105. An instrument air piping header (1 in., 150 lb, code M7) runs underground between rooms 104 and 105. PCV-3100B regulates air pressure for solenoid-operated valves to 110 lbf/in.<sup>2</sup> (gauge). Ethylene propylene diene monomer hose (0.25 in.) connects air from the 110 lbf/in.<sup>2</sup> (gauge) header to each solenoid-operated valve. This subsystem has a complete description in HNF-2563, Chapter 2, and Hanford Site Drawing H-2-822407, *P&ID Instrument Air System Vent Station 6241-V*.

#### 4.1.3.6 Heating, Ventilation, and Air Conditioning

The HVAC support system includes HEPA breather filters for the diversion box and vent station air inlets, HEPA filters on the supernatant and slurry pipeline vents, and the comfort HVAC systems for the support buildings.

The two HEPA air inlet (breather) filters include a Flanders model G-1-1R-GGD HEPA filter with matching housing, 6-in. schedule 40 piping, 6-in. butterfly isolation valve, and 6-in. expansion joint. The filter is located on a concrete pad outside and adjacent to each structure. The piping connects the filter to the structure at an embedded wall penetration.

The two HEPA filters on the supernatant and slurry line vents are Flanders model G-1-1R-CC-D HEPA filters, bag-in/bag-out type, with matching housing, wall mounted. The filter assemblies, as included in this SDD, include the 1-in. piping and valve from the coupling, 12 in. above the floor to the vent intake. The continuing 1-in. vent connection piping is considered part of the waste transfer system.

The comfort HVAC systems in the two support buildings include the following:

- Electric baseboard radiation in all three rooms for personnel comfort, both buildings
- Roof-mounted packaged air conditioner for equipment cooling in the electrical/instrumentation room, diversion box support building only
- Wall-mounted exhaust fans for equipment heat removal in the compressor rooms, both buildings
- Louvered outside-air intakes in the personnel access rooms, both buildings
- Louvered outside-air intake in the compressor room, diversion box support building only
- Louvered outside-air intake in the electrical/instrumentation room, vent station support building only
- Louvered wall opening in wall between compressor room and the electrical/instrumentation room for ventilation air to cool compressor room equipment, vent station support building only.

The floor plans and sections on the Project W-058 construction drawings provide good detail showing the layouts of all the HVAC system components.

Suggested key drawings relating to the HVAC support systems are as follows:

- HEPA breather filters and temporary exhaust connections: H-2-822269, Sheet 1, *Structural / HVAC Concrete HVAC Duct Sections & Dets*

- HEPA vent filters: H-6-13995, Sheet 1, *Piping Sections Vent Station 6241-V*
- Comfort HVAC support structures:
  - H-2-822231, Sheets 1-3, *Architectural Diversion Box 6241-A Floor Plan, Roof Plan Section & Details*
  - H-6-13979, Sheets 1-3, *Architectural Vent Station 6241-V Floor Plan*
  - H-2-822393, Sheet 1, *HVAC Schedules 6241-A & 6241-V*.

#### **4.1.3.7 Electrical Distribution**

The electrical distribution system is a support system of the RCSTS, because it provides electrical power to meet the needs of other systems. It consists of transformers and distribution equipment, such as panelboards and switchboards, located at the diversion box and the vent station structures.

Two redundant Electrical Utility-owned transformers (C6743P and C6744P) each supply 500 kVA of electrical power at the diversion box to a 480 V switchboard (SB-1). SB-1 isolates power and provides over current protection to the downstream loads. Refer to the one-line diagram on Hanford Site Drawing H-2-822505. Power also is transformed to 120/240 V (ac) by a single-phase, 25 kVA transformer (T-3). T-3 provides power to panelboard PP-3, which isolates and provides over current protection to the downstream loads. Refer to the panelboard schedule on Hanford Site Drawing H-2-822509, *Electrical LTG Plan & Pnl Sched Diversion Box 6241-A*.

An Electrical Utility-owned transformer (C6865P) supplies 225 kVA of electrical power at the vent station to a 480-V distribution panelboard (DP-1). DP-1 isolates power and provides over current protection to the downstream loads. Refer to the one-line diagram on Hanford Site Drawing H-6-14009, *Electrical One-Line Diagram Ventilation Station*. Power also is transformed to 120/240 V (ac), by a single-phase, 15 kVA transformer (T-1). T-1 provides power to panelboard PP-3, which isolates and provides over current protection to the downstream loads. Refer to the panelboard schedule on Hanford Site Drawing H-6-14014, *Electrical LTG Plan & Pnl Sched Vent Station 6241-V*.

### **4.1.4 Principles of Operation**

#### **4.1.4.1 Transferring Waste**

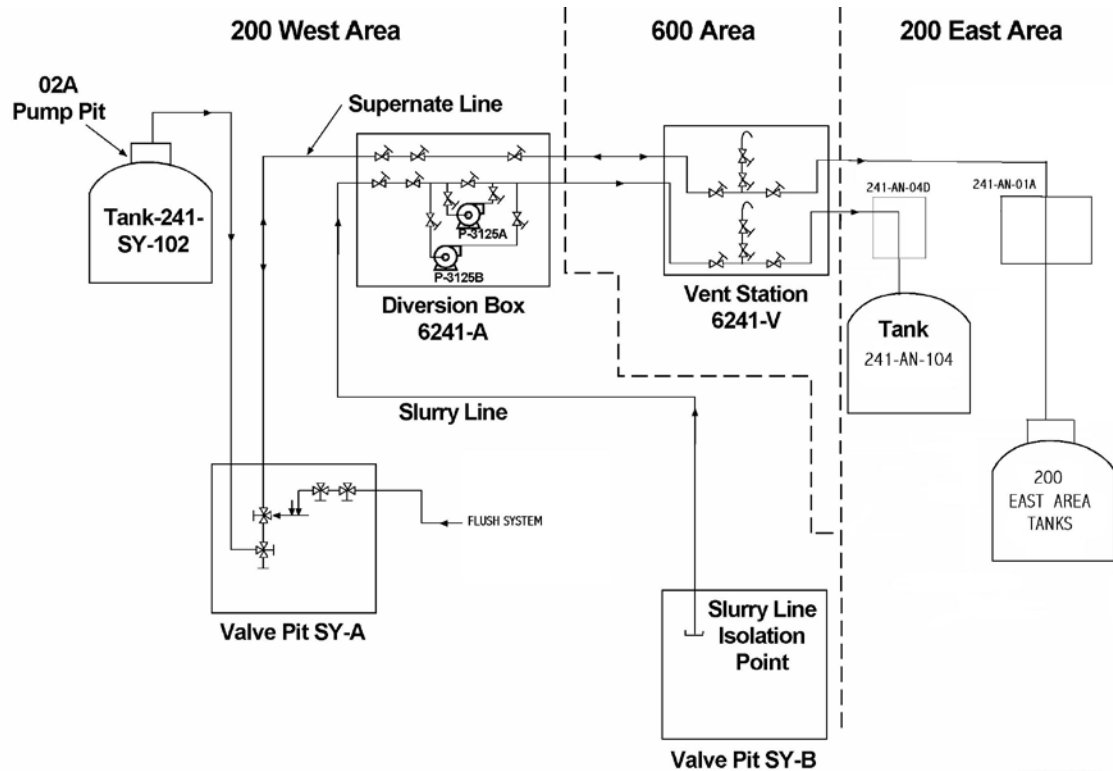
There are three transfer schemes: Supernatant transfer from the 200 West to the 200 East Area tank farms, supernatant transfer in the reverse direction, and slurry transfer from the 200 West to the 200 East Area tank farms. Transfers from the 200 East to the SY Tank Farm are not anticipated; however, in the event of a primary tank leak in the 200 East Area, it may be necessary to transfer waste cross-site to one of the SY tanks. In the planned scheme of transferring waste from the 200 West to the 200 East Area tank farms, a transfer pump in the sending tank will retrieve the waste and send it to the 241-SY-A or 241-SY-B valve pit. Depending on the type of waste (consistency of a supernatant or slurry), the capabilities of the transfer pump and the destination of the transfer, the waste will go into either the slurry (WT-SLL-3160) when authorized or the supernatant (WT-SNL-3150) line.

Once use of the slurry line is authorized, the line also may be used for waste transfers. If the operator selects the scheme for the waste to go through the slurry line, the valves will be lined up automatically for the waste to enter the slurry line. The valves can be lined up by the operator at the OCS either electronically or manually. Once in the slurry line, the required minimum transfer velocity is maintained by the booster pump at the diversion box to prevent settling of the solids. The booster pump has a variable-speed drive that uses a flow-indicating controller to maintain the desired flow rate. If the waste goes through the 241-SY-A valve pit, the valves will line up automatically for the waste to enter the supernatant line, which is not connected to the booster pump. If the supernatant line is not available, the slurry line can be used, once authorized, for a supernatant transfer, bypassing the booster pumps.

A transfer process is illustrated in Figure 9. Supernatant from Tank 241-SY-102 is pumped underground to the 241-SY-A valve pit. It passes through two properly aligned valves, exits the valve pit, and travels underground to the diversion box. In the diversion box, the supernatant passes through three properly aligned valves, then exits the building and travels to the vent station. After passing through two more valves, the supernatant travels to the 241-AN-01A Pump Pit (boundary of the transfer line) and subsequently travels to the receiving tank. Slurry transfer begins from a sending tank at the 200 West Area and travels to the 241-SY-B valve pit. From this point, the slurry transfer is similar to the supernatant transfer, except that it is boosted at the diversion box, as discussed earlier.

When the volume of the transferred liquid at the receiving tank reaches the prescribed level (determined before the transfer), the operator will shut down the transfer operation electronically. In the event of a leak during the transfer, the master pump shutdown circuit will automatically shut down, thereby terminating the transfer.

Figure 9. W-058 Cross-Site Transfer Overview



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#### 4.1.4.2 Detecting and Responding to Leaks

Seven segments of cable are in the annulus space between the primary pipe and the encasement pipe of the buried pipeline. Cables LDE-3160A and C, LDE-3161A and C, LDE-3162A and C and LDE-3163A provide continuous leak detection of the supernatant line during waste transfer. For a drawing of each cable, see Hanford Site Drawings H-2-822403, *P&ID Diversion Box 6241-A*; H-2-822404, *P&ID Vent Station 6241-V*; and H-14-020804 *Waste Transfer System P&ID*, respectively.

Cable LDE-3160A monitors the supernatant line from the 241-SY-A valve pit to the diversion box. Cable LDE-3160C monitors the supernatant line extending approximately 4,900 ft from the diversion box to the vent station. The cables are connected to monitoring unit LDK-3160 (PAL-AT, Panel #1) located in the electrical/instrumentation equipment room (room 102) of the diversion box (see Hanford Site Drawing H-2-822421). If a cable detects a leak, it sends a signal to activate the output alarm contact that is wired directly from LDK-3160 to PCU-2, located in the same room. The alarm signal travels via the MCS fiber optic communication network to PCU-1, which contains an output alarm contact that is wired directly to the transfer pump master pump shutdown circuit. The master pump shuts down automatically on receiving an alarm signal; it also can be shut down manually.

Cable LDE-3161A monitors the supernatant line extending approximately 4,900 ft from the vent station to the diversion box. Cable LDE-3161C monitors the supernatant line extending approximately 5,100 ft from the vent station toward Atlanta Avenue. These cables are connected to monitoring unit LDK-3161 (PAL-AT, Panel #2), located in the electrical/instrumentation equipment room (room 102) of the vent station (see Hanford Site Drawing H-6-14034). If a cable detects a leak, it sends a signal to activate the output alarm contact that is wired directly from LDK-3161 to PCU-3, located in the same room, and subsequently inputs a signal to the transfer pump shutdown circuit via PCU-1.

Cable LDE-3162A monitors the supernatant line extending approximately 5,000 ft from Atlanta Avenue to the vent station. Cable LDE-3162C monitors the supernatant line extending approximately 6,000 ft from Atlanta Avenue to the 244-A lift station. These cables are connected to monitoring unit LDK-3162 (PAL-AT, Panel #3), which is located in a climate-controlled NEMA 4X enclosure in the vicinity of Atlanta Avenue (see Hanford Site Drawing H-2-822533, *Electrical PCU-5 & Misc. Eqpt Wiring Diag*). If a cable detects a leak, it sends a signal to activate the output alarm contact that is wired directly from LDK-3162 to PCU-5, located in the same enclosure, and subsequently inputs a signal to the transfer pump shutdown circuit via PCU-1.

Cable LDE-3163A monitors the supernatant line extending approximately 2,000 feet from the 244-A lift station to the 241-AN-01A Central Pump pit (see Hanford site Drawing H-14-103267, *Piping Support Plan 3" SNL-3150-M9*). This cable is connected to monitoring unit LDK-3163 (PAL-AT, Panel #4)

Within the two concrete structures, the transfer lines have neither encasement piping nor leak-detection cables. Two low-point leak detectors are installed in the sump of each building to perform the leak-detection and response functions. See Section 4.1.6.2.3 for a description of their operation. Pressure transmitters between the isolation valves detect system pressure. In the diversion box, PT-3182, located between valves SOV-3182A and B, will indicate the pressure through the MCS. In the vent station, PT-3126A, located between SOV-3165A and SOV-3166A, will indicate the system pressure, alarms on high system pressure, and has a transfer pump shutdown signal (interlock) when the pressure limit is attained. For more details, see Hanford Site Drawings H-2-822402, *P&ID SY Valve Pits*; H-2-822403; H-2-822404; and H-2-822405.

Should a leak occur in either the diversion box or the vent station, the leakage liquid will be collected in the sump, then subsequently pumped back into the transfer line. Should a leak occur in either the 241-AN-01A central pump pit or the 241-AN-04D receiver pit the leak will drain directly into the associated DST 241-AN-101 or 241-AN-104.

#### **4.1.5 System Reliability Features**

Several design features in the RCSTS provide redundancy and enhance the reliability of the overall system.

- The pipe-in-pipe configuration of the transfer pipeline enhances the reliability to contain liquid and minimizes failures.
- Two booster pumps are available at the diversion box, although slurry transfer requires only one. The slurry transfer system currently is not authorized for use.

- The emergency pump-out connection at the diversion box and the vent station (see Section 2.3) is a backup to the sump pump to ensure the reliability of liquid removal.
- Two leak detectors are located in each of the diversion box and vent station main buildings, although one in each building is enough to carry out the leak-detection function.

#### **4.1.6 System Control Features**

##### **4.1.6.1 Control Capability and Locations**

The MCS is formed by a logical collection of components that operate together to control the slurry and supernatant waste transfer processes. Although physically separated, the various MCS components are logically connected together. A data link or data highway interconnects the components so that process information may be shared and communicated to remote locations, when needed.

##### **4.1.6.1.1 Operator Control Station and Maintenance Station**

The OCS and maintenance station are configured using standard programming tools to accomplish the typical tasks required of an automated process control system. The OCS and maintenance station graphical interface screens present a schematic representation of the process system to the operator, which facilitates easy operation and navigation. After password authentication, the operator has multiple choices available from the main menu system:

- Transfer schemes (a sequence of preselected pumps and valves for transferring waste)
- Operation of transfer valves (not part of a transfer scheme)
- Operation of booster pumps (not part of a transfer scheme)
- Backup flushing operation (a sequence for preparing flush water and flushing transfer lines)
- Draining operation (a vent valve sequence for allowing air into the pipeline for draining)
- System status and report generation.

These sequences have complete descriptions in HNF-2563, Chapter 1. The control system logic diagrams for the MCS are contained in HNF-2346, *Project W-058 Monitor and Control System Logic*.

##### **4.1.6.1.2 Process Control Units**

The PCUs provide direct control of the field equipment. They also retrieve data from field instruments for monitoring process variables. These signals are hardwired directly to the PCU input/output modules. Each PCU consists of modular hardware components (e.g., controller, signal conditioning, interface, input/output, power supply modules, termination panels), as well as computer software programming. In the event of failure of the OCS or the data

communications network that links OCS and PCU together, the PCU independently monitors and controls the processes directly connected to it. This system has a complete description in HNF-2563, Chapter 1.

#### **4.1.6.1.3 Field Instrumentation**

Field instrumentation provides input data, via the PCU, to the MCS for monitoring purposes.

- Valves are continuously monitored for positions.
- Pump motor status is monitored during operation.
- Rupture pressure disk status is monitored for activation (caused by pipe over pressurization).
- Pipeline pressure is monitored between isolation valves.
- Transfer pipeline pressure, temperature, and flow are monitored.
- Leak detection is discussed in the next section.

The MCS controls the equipment (e.g., pumps, valves, heaters) and provides pump interlock by signaling the equipment at the PCU output. This system is described in various sections of HNF-2563, Chapters 5 and 6. The instrumentation is shown on Hanford Site Drawings H-2-822400, *P&ID Legend*, through H-2-822408, *P&ID Water Flush System*.

#### **4.1.6.1.4 Continuous Leak Detection**

Continuous leak detection is provided in the annulus space between the primary pipe and the encasement pipe of the buried pipeline. The leak-detection system identifies the presence of a liquid at any point along its sensing cable. The leak-detection cable is divided into physical segments for monitoring, each representing a continuous leak-detection cable. At the point of termination for each segment, a leak-detection relay monitoring unit receives input. If a leak is detected in a segment, an output alarm contact of the relay is connected into a nearby PCU. The PCU performs logic operations within the MCS for annunciation and pump shutdown, if required. This subsystem has a partial description in HNF-2563, Chapters 5 and 6. The instrumentation is shown on Hanford Site Drawings H-2-822400 through H-2-822408.

### **4.1.6.2 Automatic and Manual Actions**

#### **4.1.6.2.1 Automatic Valve Line-Up**

Automatic valve line-up is provided for both the slurry and the supernatant lines located in the diversion box and the vent station. The automatic action enhances operations when other modes of the MCS are needed. For example, the automatic valves attached to the high-point vent of either pipeline, which normally are closed for the waste-transfer mode, are commanded to open during the line-drainage mode. Other automatic valves line up to desired positions when the flush, alternate booster pump, and sump pump modes are commanded from the OCS.



#### **4.1.6.2.2 Low-Point Leak Detection**

The diversion box and vent station sump structures each contain a sump for the collection of fluids. Redundant low-point leak detectors are installed in the sump of each building. The diversion box and vent station low-point leak detectors are designed and installed to work in the following manner. Leak detectors connect to the MCS and are independently hard wired to the master pump shutdown circuit for the 200 West Area. On detecting a leak or a failure, the PCU performs logic operations within the MCS for annunciation and pump shutdown, if required. Second, redundant, interposing relays send individual shutdown signals to the master pump shutdown, which operates independent from the MCS, to shut off all active transfer pumps. The 242-A Evaporator provides the 200 East Area master pump shutdown alarm via a data link. The instrumentation is shown on Hanford Site Drawings H-2-822403 and H-2-822404; interposing relays are shown on Hanford Site Drawing H-2-822436.

#### **4.1.6.2.3 Master Pump Shutdown**

During an active waste transfer, if a leak in the diversion box or vent station or high pressure in the 241-SY-A valve pit raw water pressure line is detected, or if a fault occurs in the transfer route, an alarm signal is sent to the MCS, which initiates an output alarm contact that is wired directly to the transfer pump shutdown circuit. The operating booster pump is also shut off for slurry transfers. In addition, the diversion box and vent station relays send a shutdown signal to the transfer pump shutdown, which operates independent of the MCS. The instrumentation and interposing relays are shown on Hanford Site Drawings H-2-822436 Sheet 1, H-2-37735 Sheet 2, *Electrical Elementary Diagrams*, and H-2-822440 Sheet 1, *Instrumentation Plan, Elev, Detail, & Elementary Diagram*.

#### **4.1.6.3 Setpoints and Ranges**

Instrument ranges and setpoints have been developed and documented, where applicable. See HNF-1955 for setpoints of both software tags and hardware instruments. See the W-058 instrument list report in HNF-1956 for instrument ranges and setpoints. Current setpoints and tolerances are identified by the work management system (data sheets and procedures).

#### **4.1.6.4 Interlocks, Bypasses, and Permissives**

System interlocks are designed to allow safe operation and to protect the equipment. The MCS provides permissive controls for critical aspects of the process. Interlocks may appear as software (logical, via the MCS) or as hardwire (direct) permissives. These interlocks are identified on piping and instrumentation diagrams (Hanford Site Drawings H-2-822400, Sheets 1 - 3; H-2-822402, Sheet 1; H-2-822403, Sheet 1; H-2-822404, Sheet 1; and H-2-822405, Sheet 1) and elementary diagrams (Hanford Site Drawings H-2-37735, Sheet 2; H-2-822440, Sheet 1; and H-2-822442, Sheet 1, *Electrical Elementary Diagram Pump P-102-SY-02A*). Furthermore, they are defined in detail in HNF-2563, Chapter 1, Section 3.1.5.

## **4.2 OPERATIONS**

The following discussions apply to the supernatant transfer line. However, slurry transfers are similar. Where distinguishing additional operations for the slurry transfer line is necessary, the key operations have been noted.

### **4.2.1 Initial Configuration (Prestartup)**

Prestartup conditions must be verified before either supernatant or slurry waste transfer is begun. The operating procedures listed in Appendix C provide the details of the following provisions:

- Verify the proper valve alignment for the waste transfer mode
- Verify the leak-detection functionality
- Ensure that the pit covers are in place and that the diversion box/vent station doors are secured closed
- Verify that the electrical distribution, instrument air, and MCS support systems are operable.

### **4.2.2 System Startup**

The MCS receives an enable signal from connected instrumentation, indicating that the initial configuration is complete. The enable signal alerts the operator and provides the permissive for the transfer pump to be started. If the transfer involves a booster pump, the pump also is permitted to run (slurry line only).

### **4.2.3 Normal Operations**

Normal operations for the supernatant transfer line proceed as follows.

- The waste transfer operation continues, monitored by a totalizing flow meter and tank levels, until the desired volume is reached. Pumping is stopped.
- The drain operation is performed immediately. It consists of the following key steps:
  - Transfer lines are flushed with flush water or backup flush water (by another interfacing system)
  - Then the lines are vented at the vent station to allow air to enter the line and to allow complete liquid drainage to occur, as required.

#### **4.2.4 Off-Normal Operations**

Two conditions are considered for off-normal operations:

- Recovery of liquids from the sump area of either the diversion box or the vent station after a leak is detected. The MCS assists the pumping operation for recovery of liquid into the supernatant line.
- For slurry transfers, the operations of a standby booster pump, should the primary booster pump malfunction.

#### **4.2.5 System Shutdown**

Shutdown has no special sequence of activities.

#### **4.2.6 Safety Management Programs and Administrative Controls**

The following safety management programs and ACs specified in HNF-SD-WM-TSR-006 may apply to the equipment described in this SDD.

- AC 5.6, "Safety Management Programs
- AC 5.7, "Waste Leak Evaluation Program"
- SAC 5.8.3, "Flammable Gas Controls for Inactive/Miscellaneous Tanks/Facilities"
- SAC 5.8.5, "Waste Transfer System Overpressure and flow transient Protection"
- AC 5.9.2, "Ignition Controls" (AC Key Element)
- AC 5.9.3, "Waste Transfer-Associated Structure Cover Installation and Door Closure (AC Key Element)
- AC 5.9.4, "Waste Characteristics Controls" (AC Key Element)

### **4.3 TESTING AND MAINTENANCE**

The testing and maintenance procedures for RCSTS can be found at URL: [WRPS Procedures - see list on web under Technical Procedures.](#)

#### **4.3.1 Temporary Configurations**

No temporary configurations, other than those specified in the maintenance procedures for installing test equipment to perform maintenance activities, are used in the RCSTS.

#### **4.3.2 TSR-Required Surveillances**

TSR-required surveillances are described in Section 3.7.2.

### **4.3.3 Non-TSR Inspections and Testing**

Non-TSR-required surveillances are described in Section 3.7.3.

### **4.3.4 Maintenance**

The River Protection Project Tank Farms Contractor (also the Operator of the RCSTS) has developed procedures for maintaining the leak-detection system and valves in the diversion box and vent station and for calibrating various key instruments. Procedures also are available for functional checks of many systems and components, including the booster pump shutdown interlock, switchboard/circuit breakers, and various software interlocks for leak-detection and shutdown mechanisms. A list of the preventive maintenance procedures appears in Appendix C.

## **4.4 SUPPLEMENTAL INFORMATION**

This Section is not applicable.

## 5.0 REFERENCES

- 06EN003209, 1993, *Installation, Operation, and Maintenance Manual – Model 8-66 Liquid Level/Interface Controller*, Rev. “n/c”, Fluid Components International, San Marcos, California.
- 6-LDD-275, *Calibrate the Diversion Box and Vent Station Sump Pump Leak Detection Element*, Washington River Protection Solutions, LLC., Richland, Washington.
- 10 CFR 830.3, “Nuclear Safety Management,” “Definitions,” Title 10, *Code of Federal Regulations*, Part 830.3, as amended.
- 10 CFR 830.120, “Nuclear Safety Management,” “Quality Assurance Requirements,” Title 10, *Code of Federal Regulations*, Part 830.120, as amended.
- 10 CFR 835, “Occupational Radiation Protection,” Title 10, *Code of Federal Regulations*, Part 835, as amended.
- 29 CFR 1910, *Occupational Safety and Health Standards*, Title 29, *Code of Federal Regulations*, Part 1910, as amended.
- 40 CFR 264, “Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities,” Title 40, *Code of Federal Regulations*, Part 264, as amended.
- 40 CFR 265, “Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities,” Title 40, *Code of Federal Regulations*, Part 265, as amended.
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- H-2-822402, *P&ID SY Valve Pits.*
- H-2-822403, *P&ID Diversion Box 6241-A.*
- H-2-822404, *P&ID Vent Station 6241-V.*
- H-2-822406, *P&ID Instrument Air System Diversion Box 6241-A.*
- H-2-822407, *P&ID Instrument Air System Vent Station 6241-V.*
- H-2-822408, *P&ID Water Flush System.*
- H-2-822421, *Instm Plans & Elevations PCU-2 & Misc. Instruments.*
- H-2-822422, *Elec/Inst Plan & Elevation Operator Control Station.*
- H-2-822430, *Elec/Inst Location/Termination Diagram PCU-1.*
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- H-2-822436, *Instrumentation Block Diagram Leak Det Sht Dn Relay.*
- H-2-822440, Sheet 1, *Instrumentation Plan, Elev, Detail, & Elementary Diagram.*
- H-2-822442, Sheet 1, *Electrical Elementary Diagram Pump P-102-SY-02A.*
- H-2-822505, *Electrical One-Line Diversion Box 6241-A.*
- H-2-822509, *Electrical LTG Plan & Pnl Sched Diversion Box 6241-A.*
- H-2-822533, *Electrical PCU-5 & Misc. Eqpt Wiring Diag.*
- H-2-822534, *Electrical Plan, Section & Detail.*



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- H-6-14009, *Electrical One-Line Diagram Ventilation Station*.
- H-6-14014, *Electrical LTG Plan & Pnl Sched Vent Station 6241-V*.
- H-6-14034, *Instm Plans & Elevations PCU-3 & Misc. Instruments*.
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**APPENDIX A**  
**SOURCE DOCUMENTS**

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**APPENDIX A**  
**SOURCE DOCUMENTS**

Refer to section 5.0 for a list of reference used in development of this SDD

## **APPENDIX B**

### **SYSTEM DRAWINGS AND LISTS**



## APPENDIX B

### SYSTEM DRAWINGS AND LISTS

The documents listed in Table B-1 are Essential drawings and critical documents that make up the design basis for the system. These documents shall be maintained under configuration control. Any changes to these documents must be approved by the Responsible Engineer responsible for the system. Drawings may be accessed via RILS, [RIM Information Locator System \(RILS\)](#) and EDMS, [Engineering Drawing Management System \(EDMS\)](#).

Table B-1. Essential Drawings and Design-Basis Documents.

Document Number	Title
<b>Drawings</b>	
H-2-822403 Sheet 1	<i>P&amp;ID Diversion Box 6241-A</i>
H-2-822404 Sheet 1	<i>P&amp;ID Vent Station 6241-V</i>
H-2-822406 Sheet 1	<i>P&amp;ID Instrument Air System Diversion Box 6241-A</i>
H-2-822407 Sheet 1	<i>P&amp;ID Instrument Air System Vent Station 6241-V</i>
H-2-822505 Sheet 1	<i>Electrical One-Line Diversion Box 6241-A</i>
H-6-14009 Sheet 1	<i>Electrical One-Line Diagram Ventilation Station</i>
H-6-14014 Sheet 1	<i>Electrical LTG Plan &amp; PNL SCHED Vent Station 6241-V</i>
H-14-103656 Sheet 1	<i>SY-101 Cross-Site Transfer System P&amp;ID</i>
H-14-107346	<i>DST Waste Transfer Piping Diagram</i>
<b>Calculations</b>	
W058-C-001	<i>Natural Phenomena Hazard Loads Design Criteria</i>
W058-C-003	<i>Pipeline Concrete Encasement</i>
W058-C-006	<i>Diversion Box Structural Design</i>
W058-C-007	<i>Diversion Box Shield Floor Design</i>
W058-C-008	<i>Support Building Foundation</i>
W058-C-009	<i>Corridor Design</i>
W058-C-010	<i>Equipment Anchorage</i>
W058-C-013	<i>Review SC-2 Penetration/Equipment Supports</i>
W058-C-015	<i>Evaluate Compliance of Specification – Used Codes for Concrete</i>
W058-C-018	<i>12" and 14" Water Line Crossings</i>
W058-E-002	<i>Lightning Protection Risk Assessment</i>
W058-E-004	<i>Vent Station Feeder Voltage Drop</i>
W058-E-006	<i>Lighting</i>
W058-E-007	<i>Overhead Line Sags</i>
W058-E-008	<i>Load Capacity of Exst Xfmr C6379P</i>
W058-E-010	<i>PTW/CAPTOR Calculation for Distribution Analysis and Time Overcurrent Reporting</i>

Table B-1. Essential Drawings and Design-Basis Documents.

<b>Document Number</b>	<b>Title</b>
W058-H-001	<i>Diversion Box Cooling Analysis</i>
W058-H-002	<i>Diversion Box Support Building HVAC</i>
W058-H-003	<i>Energy Conservation Certification Report</i>
W058-H-006	<i>Diversion Box Fire Thermal Analysis</i>
W058-P-003	<i>Instrument Air System Sizing</i>
W058-P-006	<i>Rupture Disk/Relief Valve Sizing</i>
W058-P-010	<i>Non-Newtonian Flow Comparison</i>
W058-P-011	<i>Buried Pipeline Heat Loss</i>
W058-P-012	<i>Booster Pumps TDH Determination</i>
W058-P-014	<i>SY Valve Pit to 107-AP TDH</i>
W058-P-017	<i>Pipeline Overpressure due to Water Hammer</i>
W058-P-018	<i>Buried Pipeline Stress Analysis</i>
W058-P-026	<i>Nozzle/Pipe Anchor Analysis</i>
W058-P-031	<i>DB #1/ VS Wall Anchor Plates</i>
W058-P-032	<i>Process/Encasement Pipe Pressure Design (ASME B31.3)</i>
W058-P-036	<i>Total Integrated Dose for 40 Year Design Life</i>
W058-P-037	<i>Expected Dose Rates during Transfer 6241-A</i>
W058-P-038	<i>Expected Dose Rates during Transfer 6241-V</i>
W058-P-039	<i>Expected Dose Rates for Maintenance 6241-A</i>
W058-P-040	<i>Expected Dose Rates for Maintenance 6241-V</i>
W058-P-041	<i>Buried Transfer Piping Expected Dose Rates during Transfer</i>
W058-P-043	<i>DB #1/ VS Piping Analysis</i>
W058-P-048	<i>Pump Curve vs. System Curve</i>
W314-P-034	<i>Hydraulic Analysis for Bypass Transfer System</i>
W314-P-041	<i>Hydraulic Analysis Summary Report</i>
W314-P-050	<i>Shielding Calculations for 241-AZ-VPA &amp; 241-AN-01A &amp; Riser 10 Pits</i>
W314-P-052	<i>Maximum Enclosure Pressure for WT-SLL-3160 &amp; WT-SNL-3150 Encasements</i>
W314-P-068	<i>SNL-3150 &amp; SLL-3160 Pipe Stress and Supports Analysis</i>
<b>Other Documents</b>	
HNF-1955	<i>W-058 Monitor and Control Alarm/Shutdown Setpoints</i>
HNF-2346	<i>Project W-058 Monitor and Control System Logic</i>

The documents listed in Table B-2 are Support drawings and important documents that make up the design bases for the system. These documents shall be maintained under configuration control. Any changes to these documents must be approved by the Responsible Engineer with primary responsibility for the shared system.

Table B-2. Support Drawings and Documents.

Document Number	Title	System*
<b>Drawings</b>		
H-2-71925 Sheet 16	<i>Electrical Power &amp; Control Plan 241-AN-04D</i>	WT (AN)
H-2-71998 Sheet 6	<i>Piping Pump Pit 241-AN-01A Modification Details</i>	WT (AN)
H-2-822200 Sheets 1, 2	<i>Drawing List</i>	WT (RCSTS)
H-2-822290 Sheet 1	<i>Jumper Arrangement Valve Pit 241-SY-A</i>	WT (SY)
H-2-822300 Sheet 1	<i>Jumper Arrangement Valve Pit 241-SY-B</i>	WT (SY)
H-2-822336 Sheets 1, 2	<i>Piping Plan Diversion Box 6241-A</i>	WT (RCSTS)
H-2-822337 Sheet 1	<i>Piping Sections &amp; Details Div Box 6241-A &amp; Vent Sta 6241-V</i>	WT (RCSTS)
H-2-822337 Sheet 2	<i>Piping Sections &amp; Details Diversion Box 6241-A</i>	WT (RCSTS)
H-2-822338 Sheet 1	<i>Piping Pipe Sprt &amp; Detail Div Box 6241-A &amp; Vent Sta 6241-V</i>	WT (RCSTS)
H-2-822340 Sheet 1	<i>Piping Diversion Box 6241-A Instrument Air Plan</i>	IA (RCSTS)
H-2-822400 Sheet 1	<i>P&amp;ID Legend</i>	WT (SY)
H-2-822400 Sheets 2, 3	<i>P&amp;ID</i>	WT (SY)
H-2-822402 Sheet 1	<i>P&amp;ID SY Valve Pits**</i>	WT (SY)
H-2-822430 Sheet 1	<i>Elec / Inst Location/Termination Diagram PCU-1</i>	(RCSTS)
H-2-822430 Sheet 2	<i>Elec / Inst Location/Termination Diagram PCU-1</i>	(RCSTS)
H-2-822431 Sheet 1	<i>Instrumentation Termination Diagram PCU-2A</i>	(RCSTS)
H-2-822431 Sheet 2	<i>Instrumentation Termination Diagram PCU-2A &amp; PCU-2B</i>	(RCSTS)
H-2-822432 Sheet 1, 2, 3	<i>Instrumentation Termination Diagram PCU-3</i>	(RCSTS)
H-2-822433 Sheet 1	<i>Instrumentation Termination Diagram PCU-4</i>	(RCSTS)
H-2-822440 Sheet 1	<i>Instrumentation Plan, Elev, Detail, &amp; Elementary Diagram</i>	(RCSTS)
H-2-822442 Sheet 1	<i>Electrical Elementary Diagram Pump P-102-SY-02A</i>	WT (SY)
H-2-822500 Sheet 1	<i>Electrical Partial Plan "SY" Tank Farm</i>	EDS (SY)
H-2-822500 Sheet 3	<i>Electrical Partial Plans &amp; Details "SY" Tank Farm</i>	EDS (SY)
H-2-822501 Sheet 1, 2, 3	<i>Electrical Plans &amp; Details Instrument House</i>	EDS (SY)
H-2-822509 Sheet 1	<i>Electrical Ltg Plan &amp; Pnl Sched Diversion Box 6241-A</i>	(RCSTS)
H-2-822513 Sheets 1 - 3	<i>Electrical Elementary Diagrams Diversion Box 6241-A</i>	(RCSTS)
H-6-14018 Sheets 1 - 3	<i>Electrical Elementary Diagrams Vent Station 6241-V</i>	(RCSTS)
H-6-14034 Sheet 1	<i>Instm Plans &amp; Elevations PCU-3 &amp; Misc Instruments</i>	(RCSTS)
H-14-103236 Sheet 1	<i>Civil SNL-3150 &amp; SLL-3160 STA 12 +00 to STA 17 + 00</i>	WT (AN)
H-14-103237 Sheet 1	<i>Civil SNL-3150 STA 17 + 00 to End</i>	WT (AN)

Table B-2. Support Drawings and Documents.

Document Number	Title	System*
H-14-103370	<i>Instm 241-AN Spare Loop Diagram</i>	WT (AN)
H-14-103371	<i>Instm Slurry RcvrPit Press Xmtr PT-101 Loop Diagram</i>	WT (AN)
H-14-103372	<i>Instm Slurry RcvrPit Press Xmtr PT-102 Loop Diagram</i>	WT (AN)
<b>Calculations</b>		
W058-C-017	<i>244-A Lift Station 241-SY-A &amp; 241-SY-B Valve Pit Core Drill Evaluation</i>	WT (SY)
W058-P-013	<i>SY Valve Pit to Diversion Box #1 TDH</i>	WT (SY)
W058-P-019	<i>Jumper Stress Analysis</i>	WT (SY)
W058-P-025	<i>Jumper Calculations 241-SY-A/B Valve Pits &amp; 244-A Lift Station</i>	WT (SY)
W058-P-028	<i>Jumper Design Pressure and Temperature</i>	WT (SY)
<b>Other Documents</b>		
HNF-SD-WM-FHA-020	<i>Tank Farms Fire Hazards Analysis</i>	Fire Protection

\* EDS = Electrical distribution system. SY = SY Tank Farm. WT = Waste transfer (system).

242-S = Evaporator. 244-A = lift station. 252-S = substation building.

\*\* Drawings provide RCSTS design interface by depiction of jumper connections provided by Project W-058. Jumpers depicted for SY-B valve pit are not installed. Current jumper configurations in the SY valve pits are to be taken from the current routing board configuration.

The documents listed in Table B-3 make up the Reference or Historical documents for the system.

Table B-3. Historical Drawings and Documents.

Document Number	Title	System*
<b>Drawings</b>		
H-2-822201 Sheet 1	<i>Civil Site Plan</i>	(RCSTS)
H-2-822201 Sheet 2	<i>Civil Site Reclamation Plan</i>	(RCSTS)
H-2-822202 Sheet 1	<i>Civil Site Plan Diversion Box 6241-A</i>	(RCSTS)
H-2-822209 Sheet 1	<i>Civil General Notes &amp; Details</i>	(RCSTS)
H-2-822209 Sheets 2, 3	<i>Civil Details</i>	(RCSTS)
H-2-822210 Sheet 1	<i>Civil 241-SY Tank Farm Piping Plan</i>	(RCSTS)
H-2-822211 Sheet 1	<i>Civil Plan &amp; Profile STA 1+92 to 18+</i>	(RCSTS)
H-2-822212 Sheet 1	<i>Civil Plan &amp; Profile STA 18+ to 36+</i>	(RCSTS)
H-2-822213 Sheet 1	<i>Civil Plan &amp; Profile STA 36+ to 54+</i>	(RCSTS)
H-2-822214 Sheet 1	<i>Civil Plan &amp; Profile STA 54+ to 72+</i>	(RCSTS)
H-2-822223 Sheet 1	<i>Civil Plan &amp; Profile STA 208+ to 216+</i>	(RCSTS)

Table B-3. Historical Drawings and Documents.

Document Number	Title	System*
H-2-822224 Sheet 1	<i>Civil Plan &amp; Profile STA 216+ to 234+</i>	(RCSTS)
H-2-822225 Sheet 1	<i>Civil Plan &amp; Profile STA 234+ to 252+</i>	(RCSTS)
H-2-822226 Sheet 1	<i>Civil Plan &amp; Profile STA 252+ to 270+</i>	(RCSTS)
H-2-822227 Sheet 1	<i>Civil Plan &amp; Profile STA 270+ to 286+</i>	(RCSTS)
H-2-822228 Sheet 1	<i>Civil Plan &amp; Profile STA 286+ to 244-A &amp; Yard Piping Plan</i>	(RCSTS)
H-2-822231 Sheet 1	<i>Architectural Diversion Box 6241-A Floor Plan</i>	(RCSTS)
H-2-822231 Sheet 2	<i>Architectural Diversion Box 6241-A Roof Plan</i>	(RCSTS)
H-2-822231 Sheet 3	<i>Architectural Diversion Box 6241-A Elevations and Sections</i>	(RCSTS)
H-2-822235 Sheet 1	<i>Architectural Schedules &amp; Details</i>	(RCSTS)
H-2-822236 Sheets 1, 2	<i>Architectural Details</i>	(RCSTS)
H-2-822238 Sheet 1	<i>Structural Diversion Box 6241-A Overall Plan</i>	(RCSTS)
H-2-822239 Sheet 1	<i>Structural Diversion Box 6241-A Concrete Floor Plan &amp; Sect</i>	(RCSTS)
H-2-822240 Sheet 1	<i>Structural Diversion Box 6241-A Roof Plan &amp; Sections</i>	(RCSTS)
H-2-822242 Sheet 1	<i>Structural Diversion Box 6241-A Wall Elevations</i>	(RCSTS)
H-2-822243 Sheet 1	<i>Structural Diversion Box 6241-A Support Framing Plans</i>	(RCSTS)
H-2-822244 Sheet 1	<i>Structural Diversion Box 6241-A Shield Floor Panel Plan</i>	(RCSTS)
H-2-822265 Sheet 1	<i>Structural Concrete Reinforcement Details</i>	(RCSTS)
H-2-822266 Sheet 1	<i>Structural Corridor Sections &amp; Details</i>	(RCSTS)
H-2-822267 Sheet 1	<i>Structural Concrete Sections &amp; Details</i>	(RCSTS)
H-2-822268 Sheet 1	<i>Structural / Piping Concrete Penetration Details</i>	(RCSTS)
H-2-822269 Sheet 1	<i>Structural / HVAC Concrete HVAC Duct Sections &amp; Dets</i>	(RCSTS)
H-2-822270 Sheet 1	<i>Structural Embedment Typical Details</i>	(RCSTS)
H-2-822271 Sheet 1	<i>Structural Support Connections Typical Details</i>	(RCSTS)
H-2-822273 Sheet 1	<i>Structural Misc Steel Sections &amp; Details</i>	(RCSTS)
H-2-822274 Sheet 1	<i>Structural Support Building Foundation Plan &amp; Details</i>	(RCSTS)
H-2-822275 Sheet 1	<i>Structural Support Building Railing/Ladder Details</i>	(RCSTS)
H2-822292 Sheet 1	<i>Jumper Assembly L11-F-G Valve Pit 241-SY-A</i>	WT (SY)
H2-822293 Sheets 1, 2	<i>Jumper Assembly L12-L14-L15-L16-F-H Valve Pit 241-SY-A</i>	WT (SY)
H2-822294 Sheet 1	<i>Jumper Assembly L12A Valve Pit 241-SY-A</i>	WT (RCSTS)
H-2-822302 Sheet 1	<i>Jumper Assembly R11-E Valve Pit 241-SY-B</i>	WT (SY)
H-2-822303 Sheet 1	<i>Jumper Assembly R12-R15-R19 Valve Pit 241-SY-B</i>	WT (SY)
H-2-822304 Sheet 1	<i>Jumper Assembly R12A Valve Pit 241-SY-B</i>	WT (RCSTS)
H-2-822370 Sheet 1	<i>Piping Liner Wash-Down Plan Div Box 6241-A &amp; Vent Sta 6241-V</i>	(RCSTS)
H-2-822371 Sheet 1	<i>Piping Liner Wash-Down Sect Div Box 6241-A &amp; Vent Sta 6241-V</i>	(RCSTS)
H-2-822390 Sheet 1	<i>HVAC Support Bldg 6241-A Floor &amp; Roof Plan</i>	(RCSTS)
H-2-822392 Sheet 1	<i>HVAC Sections and Details 6241-A and 6241-V</i>	(RCSTS)
H-2-822393 Sheet 1	<i>HVAC Schedules 6241-A &amp; 6241-V</i>	(RCSTS)
H-2-822403 Sheet 1	<i>P&amp;ID Diversion Box 6241-A</i>	(RCSTS)

Table B-3. Historical Drawings and Documents.

Document Number	Title	System*
H-2-822404 Sheet 1	<i>P&amp;ID Vent Station 6241-V</i>	(RCSTS)
H-2-822406 Sheet 1	<i>P&amp;ID Instrument Air System Diversion Box 6241-A</i>	(RCSTS)
H-2-822407 Sheet 1	<i>P&amp;ID Instrument Air System Vent Station 6241-V</i>	(RCSTS)
H-2-822420 Sheets 1 & 2	<i>Instm Installation Details</i>	EDS (244-A)
H-2-822421 Sheet 1	<i>Instm Plans &amp; Elevations PCU-2 &amp; Misc Instruments</i>	(RCSTS)
H-2-822421 Sheet 2	<i>Instm Plans &amp; Elevations PCU-2 &amp; Misc Instruments</i>	(RCSTS)
H-2-822422 Sheet 1	<i>Elec / Inst Plan &amp; Elevation Operator Control Station</i>	(RCSTS)
H-2-822435 Sheet 1	<i>Instrumentation Block Diagram</i>	(RCSTS)
H-2-822436 Sheet 1	<i>Instrumentation Block Diagram Leak Det Sht Dn Relay</i>	(RCSTS)
H-2-822441 Sheet 2	<i>Electrical Plan, Elev, Det, &amp; Elec Diag RC-1 &amp; TBX-1 Arrangements</i>	EDS (244-A)
H-2-822503 Sheet 1	<i>Electrical Wire Run List</i>	EDS (SY)
H-2-822505 Sheet 1	<i>Electrical One-Line Diversion Box 6241-A</i>	(RCSTS)
H-2-822506 Sheet 1	<i>Electrical Plans Diversion Box 6241-A</i>	(RCSTS)
H-2-822507 Sheets 1 & 2	<i>Electrical Plans &amp; Sections Diversion Box 6241-A</i>	(RCSTS)
H-2-822508 Sheet 1	<i>Electrical Grounding Plan &amp; Det Diversion Box 6241-A</i>	(RCSTS)
H-2-822510 Sheet 1	<i>Electrical Raceway Plan Diversion Box 6241-A</i>	(RCSTS)
H-2-822510 Sheet 2	<i>Electrical Raceway Sections &amp; Dets Diversion Box 6241-A</i>	(RCSTS)
H-2-822510 Sheet 3	<i>Electrical Raceway Support Details Diversion Box 6241-A</i>	(RCSTS)
H-2-822512 Sheet 1	<i>Electrical Wiring Diagrams Diversion Box 6241-A</i>	(RCSTS)
H-2-822512 Sheets 2	<i>Electrical Wiring Diagrams Diversion Box 6241-A</i>	(RCSTS)
H-2-822513 Sheets 4 - 9	<i>Electrical Elementary Diagrams Diversion Box 6241-A</i>	(RCSTS)
H-2-822522 Sheet 2	<i>Electrical Site Plan</i>	(RCSTS)
H-2-822524 Sheets 1 - 4	<i>Electrical Elevations and Details</i>	(RCSTS)
H-2-822534 Sheet 1	<i>Electrical Plan, Section &amp; Detail</i>	EDS (244-A)
H-2-822534 Sheet 2	<i>Electrical Wire Run &amp; Termination</i>	(RCSTS)
H-6-13969 Sheet 1	<i>Civil Plan &amp; Profile STA 72+ to 90+</i>	(RCSTS)
H-6-13970 Sheet 1	<i>Civil Plan &amp; Profile STA 90+ to 108+</i>	(RCSTS)
H-6-13971 Sheet 1	<i>Civil Plan &amp; Profile STA 108+ to 124+</i>	(RCSTS)
H-6-13972 Sheet 1	<i>Civil Plan &amp; Profile STA 124+ to 142+</i>	(RCSTS)
H-6-13973 Sheet 1	<i>Civil Plan &amp; Profile STA 142+ to 158+</i>	(RCSTS)
H-6-13974 Sheet 1	<i>Civil Plan &amp; Profile STA 158+ to 174+</i>	(RCSTS)
H-6-13975 Sheet 1	<i>Civil Plan &amp; Profile STA 174+ to 190+</i>	(RCSTS)
H-6-13976 Sheet 1	<i>Civil Plan &amp; Profile STA 190+ to 208+</i>	(RCSTS)
H-6-13978 Sheet 1	<i>Civil Site Plan Vent Station 6241-V</i>	(RCSTS)
H-6-13979 Sheet 1	<i>Architectural Vent Station 6241-V Floor Plan</i>	(RCSTS)
H-6-13979 Sheet 2	<i>Architectural Vent Station 6241-V Roof Plan</i>	(RCSTS)
H-6-13979 Sheet 3	<i>Architectural Vent Station 6241-V Elevations &amp; Sections</i>	(RCSTS)

Table B-3. Historical Drawings and Documents.

Document Number	Title	System*
H-6-13980 Sheet 1	<i>HVAC Support Bldg 6241-V Floor Plan</i>	(RCSTS)
H-6-13994 Sheets 1 & 2	<i>Piping Plan Vent Station 6241-V</i>	(RCSTS)
H-6-13995 Sheet 1	<i>Piping Sections Vent Station 6241-V</i>	(RCSTS)
H-6-13997 Sheet 1	<i>Piping Vent Station 6241-V Instrument Air Plan</i>	(RCSTS)
H-6-14009 Sheet 1	<i>Electrical One-Line Diagram Ventilation Station</i>	(RCSTS)
H-6-14010 Sheet 2	<i>Electrical Site Plan &amp; Details Ventilation Station</i>	(RCSTS)
H-6-14011 Sheet 1	<i>Electrical Plan &amp; Section Vent Station 6241-V</i>	(RCSTS)
H-6-14012 Sheet 1	<i>Electrical Plan Vent Station 6241-V</i>	(RCSTS)
H-6-14012 Sheet 2	<i>Electrical Plan &amp; Section Vent Station 6241-V</i>	(RCSTS)
H-6-14013 Sheet 1	<i>Electrical Grounding Plan &amp; Det Vent Station 6241-A</i>	(RCSTS)
H-6-14014 Sheet 1	<i>Electrical Ltg Plan &amp; Panel Sched Vent Station 6241-V</i>	(RCSTS)
H-6-14015 Sheet 1	<i>Electrical Raceway Plan &amp; Sec Vent Station 6241-V</i>	(RCSTS)
H-6-14015 Sheet 2	<i>Electrical Raceway Support Details Vent Station 6241-V</i>	(RCSTS)
H-6-14017 Sheet 1	<i>Electrical Wiring Diagram Vent Station 6241-V</i>	(RCSTS)
H-14-103306 Sheet 1, 2, 3	<i>Electrical Power &amp; Control Plan/Det 200-E WTS</i>	WT(AN)
H-14-103306 Sheet 4	<i>Electrical Power &amp; Control Plan/Det 200-E WTS</i>	WT(244-A)
H-14-103234 Sheet 1	<i>Civil SNL-3150 &amp; SLL-3160 STA 0 +00 to STA 5 + 50</i>	WT (AN)
H-14-103235 Sheet 1	<i>Civil SNL-3150 &amp; SLL-3160 STA 5 +50 to STA 12 + 00</i>	WT (AN)
H-14-103267 Sheet 1-14	<i>Piping Support Plan 3"SNL-3150-M9</i>	WT (AN)
H-14-103268 Sheet 1-13	<i>Piping Support Plan 3"SLL-3160-M9</i>	WT (AN)
H-14-103367 Sheet 1	<i>Instm 241-AN-04D Slurry Rcvr Pit Plan &amp; Details</i>	WT (AN)
H-14-103369 Sheet 1	<i>Instm Rupture Disk Alarm Monitor Plan &amp; Elevations</i>	WT (AN)
H-14-103373 Sheet 1	<i>Instm Slurry Rcvr Pit Rupture Disk PSE-103 Loop Diagram</i>	WT (AN)
H-14-103374 Sheet 1	<i>Instm Instrument List 241-AN-04D Slurry Rcvr Pit</i>	WT (AN)
H-14-103384 Sheet 2	<i>Electrical Cathodic protection 241-AN-04A &amp; 04D</i>	WT (AN)
<b>Calculations</b>		
W058-C-011	<i>Engineering Evaluation of Commercial Grade Items</i>	(RCSTS)
W058-C-016	<i>Engineering Evaluation of Commercial Grade Items</i>	(RCSTS)
W058-E-CGI	<i>Commercial Grade Items Engineering Evaluation</i>	(RCSTS)
<b>Specifications</b>		
W-058-C1	<i>Construction Specification for Technical Requirements Buried Pipeline for Replacement of the Cross-Site Transfer System</i>	
W-058-C2	<i>Construction Specification for Pipeline Tie-ins for Replacement of the Cross-Site Transfer System</i>	
W-058-C3	<i>Construction Specification for Diversion Box &amp; Vent Station for Replacement of the Cross-Site Transfer System</i>	
W-058-C4	<i>Construction Specification for Sagebrush Mitigation 600 Area</i>	
W-058-GEN1	<i>General Requirements Buried Pipeline for the Replacement Cross Site Transfer System</i>	

Table B-3. Historical Drawings and Documents.

Document Number	Title	System*
W-058-GEN3	<i>General Requirements for Diversion Box and Vent Station for Replacement of Cross Site Transfer System</i>	
W-058-P1	<i>Procurement Specification for Slurry Transfer Pump for Replacement of the Cross-Site Transfer System</i>	
W-058-P2	<i>Procurement Specification for Process Monitor and Control System for Replacement of the Cross-Site Transfer System</i>	
W-058-P5	<i>Procurement Specification for Process Instruments for Replacement of the Cross-Site Transfer System</i>	
W-058-P8	<i>Procurement Specification for Compressed Air System for Replacement of the Cross Site Transfer System</i>	
W-058-P9	<i>Procurement Specification for Air Operated Ball Valves for Replacement of the Cross-Site Transfer System</i>	
W-058-P10	<i>Procurement Specification for Rupture Disk &amp; Relief Valve for Replacement of the Cross-Site Transfer System</i>	
W-314-C5	<i>Construction Specification 241-AN to 200 East Waste Transfer System</i>	
W-314-C7	<i>Construction Specification 200 East Waste Transfer System Cross Site Transfer System Tie-In</i>	
Other Documents		
7F540-94-019	“Projects W-058W-028 Material of Construction Position Paper”, (internal memo 7F540-94-019 from G. L. Parsons to J. D. Thomson, June 10)	
HNF-2267	<i>Replacement Cross-Site Transfer System Project W-058 Safety Class Upgrade Summary Report</i> , Rev. 0, Prepared by Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.	
Letter, 1988	“U.S. Department of Energy, Richland Operations Office, Audit of the Cross-Country Transfer Facilities, August 25 through October 6, 1988,” (external letter from R. E. Gerton to J. E. Nolan, Westinghouse Hanford Company, December 14), U.S. Department of Energy, Richland Operations Office, Richland, Washington.	
SMA:TJC:94-005	“Project W-058, Replacement of Cross-Site Transfer System, Seismic Design Criteria,” (internal memo from T. J. Conrads to W. M. Brantley, February 7), Westinghouse Hanford Company, Richland, Washington.	
WHC-SD-W058-DRD-001	<i>Preliminary Design Requirements Document, Project W-058, Replacement of the Cross-Site Transfer System</i> , Westinghouse Hanford Company, Richland, Washington.	
WHC-SD-W058-ES-001	<i>Engineering Study Replacement of the Cross-Site Transfer System</i> , Rev. 0, Westinghouse Hanford Company, Richland, Washington.	



Table B-3. Historical Drawings and Documents.

Document Number	Title	System*
WHC-SD-W058-FDC-001	<i>Functional Design Criteria for Project W-058, Replacement of the Cross-Site Transfer System, Westinghouse Hanford Company, Richland, Washington.</i>	
WHC-SD-W058-FHA-001	<i>Fire Hazards Analysis for the Replacement cross-Site Transfer System, Project W-058, Westinghouse Hanford Company, Richland, Washington.</i>	
WHC-SD-W058-PHA-001	<i>Hazards and Operability Study for the Replacement Cross-Site Transfer System, Westinghouse Hanford Company, Richland, Washington.</i>	
WHC-SD-W058-PSAR-001	<i>Preliminary Safety Analysis Report for Replacement of the Cross-Site Transfer System, Rev. 0, Westinghouse Hanford Company, Richland, Washington.</i>	
WHC-SD-W058-RPT-002	<i>Baseline Comparison Report for Project W-058, Replacement of the Cross-Site Transfer System, Rev. 2, Westinghouse Hanford Company, Richland, Washington.</i>	
WHC-SD-W236A-DGS-001	<i>Structural Design Guidelines for Multi-Function Waste Tank Facility Underground Tanks and Piping for Project W-236A, Rev. 1, Westinghouse Hanford Company, Richland, Washington.</i>	
WHC-SD-WM-PSE-008	<i>Hazard Classification for 242-A Building, Rev. 0, Westinghouse Hanford Company, Richland, Washington.</i>	
WHC-SD-WM-RPT-205	<i>Replacement Cross-Site Transfer System Systems Engineering Summary Report, Rev. 0, Westinghouse Hanford Company, Richland, Washington.</i>	
WHC-SD-WM-SAR-039	<i>Operational Safety Analysis Report Cross-Country Waste Transfer System, Westinghouse Hanford Company, Richland, Washington.</i>	

\* EDS = Electrical distribution system. IA = Instrument air (system). RCSTS = Replacement cross-site transfer system. SY = SY Tank Farm. WT = Waste transfer (system). 244-A = lift station.

Table B-4 contains a list of certified vendor information and vendor information that may provide the reader with technical information regarding the design of the Replacement Cross-Site Transfer System. Information may be used when researching topics such as maintenance, testing, and spare parts. Certified vendor information records may be searched using the Insight database system, but the information is available only by hardcopy from document control. HNF-1956, *Project W-058 Master Equipment List*, also provides relevant information pertaining to manufacturer, model numbers, maintenance, calibration and set point for equipment, instruments, valves, and PCU input/output data points, where applicable.

Table B-4. Certified Vendor Information.

Certified Vendor Information Number	Description	Notes*
Certified Vendor Information		
#22798, Suppl 1	Electronic pressure transmitters (valve leakage); multiple tags	See construction spec. W-058-C2
#22798, Suppl 2	Leak detection panels; multiple tags	See construction spec. W-058-C1
#22798, Suppl 3	F/O cables	
#22798, Suppl 4	Pressure transmitters, data sheet Y-503, radioactive slurry service; multiple tags	See procurement spec. W-058-P5
#22798, Suppl 5	Electric unit heaters; UH-1, UH-2	See construction spec. W-058-C3
#22798, Suppl 6	Packaged air conditioner; AC-1	See construction spec. W-058-C3
#22798, Suppl 7	Backdraft damper	
#22798, Suppl 8	Grille, register, diffuser	
#22798, Suppl 9	Wall ventilator; EF-1, EF-2	See construction spec. W-058-C3
#22798, Suppl 10	Pressure gauge, data sheet Y-506, instrument air service; multiple tags	See procurement spec. W-058-P5
#22798, Suppl 11	Electronic pressure transmitters	
#22798, Suppl 12	Transformers; T-1, T-2	See construction spec. W-058-C3
#22798, Suppl 13	Leak detector, data sheet Y-301; LDE relays LDK; multiple tags	See construction spec. W-058-C3

Table B-4. Certified Vendor Information.

<b>Certified Vendor Information Number</b>	<b>Description</b>	<b>Notes*</b>
#22798, Suppl 14	Signal isolators, data sheet Y-507; multiple tags	See procurement spec. W-058-P5
#22798, Suppl 16	Electrical switchboard; SB-1	See construction spec. W-058-C3
#22798, Suppl 17	Moisture analyzer, compressed air system; compressors, filters, dryers, Press. switches, pressure indicators, drain valves, PRV	See procurement spec. W-058-P8
#22798, Suppl 19	Motor controller	
#22798, Suppl 21	Magnetic flowmeter; multiple tags	See procurement spec. W-058-P5
#22798, Suppl 26	Baseboard heaters	See construction spec. W-058-C3
#22798, Suppl 27	Transfer pumps	
#22798, Suppl 28	Slurry transfer pumps	
#22798, Suppl 29	Welding procedures/test records	
#22798, Suppl 30	NDE personnel certifications	
#22798, Suppl 31	Pump cleaning procedure	
#22798, Suppl 32	Pump inspection/exam documentation	
#22798, Suppl 33	Air operated ball valves, solenoids	See procurement spec. W-058-P9
#22798, Suppl 34	Pump inspection/exam documentation	
#22798, Suppl 36	Jumper valves; MOVs at 244-A and pit 241-SY-A	See construction spec. W-058-C2
#22798, Suppl 37	Slurry transfer pump	
#22798, Suppl 38	Motor controllers	
#22798, Suppl 39	Ultrasonic flowmeter; FE/FIT-3125	See procurement spec. W-058-P5

Table B-4. Certified Vendor Information.

<b>Certified Vendor Information Number</b>	<b>Description</b>	<b>Notes*</b>
#22798, Suppl 40	Slurry transfer pump, anchor bolt instructions, Accutrol** parameters, restriction orifice, pump seal control, motor, VSD, instruments, MOV, PCV; P-3125A and P-3125B	See procurement spec. W-058-P1
#22798, Suppl 46	Thermocouple, data sheet Y-502	See procurement spec. W-058-P5
#22798, Suppl 47	As-built (surveying) drawings	
#22798, Suppl 48	CVI operating and maintenance manuals PCU, OCS; A-B PLC5	See procurement spec. W-058-P2
#22798, Suppl 49	Pre-start up for pumps	
#22798, Suppl 50	Electrical panelboards; PP-3	See construction spec. W-058-C3
#22798, Suppl 53	Process monitor/control system	Rockwell software
#22798, Suppl 55	Hoist	
#22798, Suppl 56	Master equipment list	HNF-1956
#22798, Suppl 57	Lift analysis for hoist	
#22798, Suppl 58	Pumps finite analysis	
#22798, Suppl 60	Pump base plate	
#22798, Suppl 61	Level switch install OMM	
<b>Vendor Information</b>		
#22798, Supplement 48 (3 Volumes)	PCUs - Vendor drawings Logic documentation	Programmable control services

Table B-4. Certified Vendor Information.

Certified Vendor Information Number	Description	Notes*
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## \* Construction Specifications

W-058-C1, Technical Requirements Buried Pipeline (Fixed Price), Rev. 1.

W-058-C2, Pipeline Tie-in's (CF), Rev. 2.

W-058-C3, Diversion Box/Vent Station (Fixed Price), Rev. 2.

## Procurement Specifications

W-058-P1, Slurry Transfer Pump, Rev. 3.

W-058-P2, Process Monitor and Control System, Rev. 4.

W-058-P5, Process Instruments, Rev. 2.

W-058-P8, Compressed Air System, Rev. 2.

W-058-P9, Air Operated Ball Valve, Rev. 2.

W-058-P10, Rupture Disk/Relief Valve, Rev. 1.

HNF-1956, 1998, *Project W-058 Master Equipment List*, Rev. 1-B, prepared by Numatec Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

\*\* Accutrol is a trademark of Westinghouse Electric Company.

## **APPENDIX C**

### **SYSTEM PROCEDURES**

## APPENDIX C

### SYSTEM PROCEDURES

The following table contains relevant operating procedures (OP) for the Replacement Cross-Site Transfer System. Specific procedures for operations associated with slurry transfer are not issued, because use of the slurry line is not authorized. Other procedures developed for acceptance tests and preoperational tests, and those developed but not issued, appear in a checklist in HNF-SD-W058-ABU-001, Rev. 1, *Acceptance for Beneficial Use, Project W-058*, Lockheed Martin Hanford Corporation, Richland, Washington.

Table C-1. System Operating Procedures.

Type	Document Number	Title	Note
OP	TO-050-001	<i>Operate the 6241-A Diversion Box and 6241-V Vent Station Sump Pumps</i>	
OP	TO-050-002	<i>Operate Chain Hoist with Electromagnetic Lifting Device at 6241-A Diversion Box and 6241-V Vent Station</i>	
OP	TO-050-003	<i>Operational Check of Replacement Cross-site Transfer System Vent Valve and Sump Pump Valve Interlocks</i>	
OP	TO-050-004	<i>Quarterly Manipulation of Motor Operated Ball Valves for the Cross-site Transfer System</i>	Inactive <sup>1</sup>
OP	TO-050-005	<i>Quarterly Manipulation of Solenoid Operated Valves for the Cross Site Transfer System</i>	
OP	TO-050-007	<i>Operate Cross Site Transfer System Aeroflow Air Compressors and Pneumatech Air Dryers in Buildings 6241A and 6241V</i>	
OP	TO-430-502	<i>Cross-Site Transfer From 241-SY-102 to 241-AP-102</i>	Inactive <sup>2</sup>
OP	TO-430-506	<i>Cross Site Transfer From TK-102-SY to TK-107-AP</i>	Inactive <sup>2</sup>
OP	TO-430-508	<i>Cross-Site Transfer From TK-102-SY to TK-108-AP</i>	Inactive <sup>2</sup>
OP	ARP-T-059-00001	<i>Respond to Alarms for the Cross Site Transfer Line System (Supernate)</i>	

<sup>1</sup> Preventive maintenance procedures and functional test procedures identified as inactive are not currently being used. They are restored to active status before they are used.

<sup>2</sup> Operating procedures for waste transfers are prepared for an individual transfer route. These procedures are identified as active for the current or most recent transfer and inactive for earlier transfers. Inactive transfer procedures may be deleted or restored to active status if appropriate for a transfer.

The following table contains relevant preventive maintenance procedures (PMP), and functional test procedures (FTP) for the Replacement Cross-Site Transfer System. Specific procedures for maintenance, and testing associated with slurry transfer are not issued, because use of the slurry line is not authorized. Other procedures developed for acceptance tests and preoperational tests, and those developed but not issued, appear in a checklist in HNF-SD-W058-ABU-001, Rev. 1, *Acceptance for Beneficial Use, Project W-058*, Lockheed Martin Hanford Corporation, Richland, Washington.

Table C-2. System Maintenance Procedures.

Type	Document Number	Title	Note
PMP	5-EDS-278	<i>Inspect and Test Switchboard SB-1 480-Volt Power Circuit Breakers for the RCSTS</i>	Inactive <sup>1</sup>
PMP	2-LDD-293	<i>Setup Continuous Leak Detection System for Cross Site Transfer</i>	
PMP	3-LDD.042	<i>Testing of Liquid Detector (Liquid Level Element and Leak Detector Element)</i>	
PMP	6-LDD-275	<i>Calibrate the Diversion Box and Vent Station Sump Pump Leak Detection Elements</i>	
PMP	6-LID-283	<i>Foxboro IF10-1 Intelligent Flanged Level Transmitter Calibration</i>	
PMP	3-MISC-277	<i>Functional Check of Replacement Cross Site Transfer System (W-058) Transfer Pump Shutdown Software Isolation Valve Leak Interlocks</i>	
PMP	3-MISC-284	<i>Functional Check of the PAL-AT Backup Battery</i>	Inactive <sup>1</sup>
PMP	3-MISC-295	<i>Functional Check of Cross Site Transfer Line Leak Detection Computer Generated Interlock</i>	
PMP	3-MISC-296	<i>Functional Check of Replacement Cross Site Transfer System Booster Pump Shutdown Interlocks</i>	
PMP	3-MISC-478	<i>Functional check of the 244-A Cross-Site Over Pressurization Device Alarm Relay KCS-244-A</i>	
PMP	5-MISC-285	<i>Inspect Replacement Cross Site Transfer System Air Compressors and Dryers</i>	
PMP	6-MISC-281	<i>Calibrate Model DF868 Ultrasonic Flow Controller and Flow Element FE3125</i>	
PMP	6-PCD-280	<i>Calibration of Ametek Pressure Transmitters 88C Series</i>	
PMP	6-TF-157 VA	<i>Appendix VA, 6241-A Cross Site Facility Breather Filter Aerosol Test Data Sheets</i>	
PMP	6-TF-157 VV	<i>Appendix VV, 6241-V Cross Site Facility Breather Filter Aerosol Test Data Sheets</i>	
PMP	3-VBP-157	<i>Breather Filter In-Place Leak Test (Aerosol Test)</i>	
PMP	5-VT-076	<i>Breather Filter Repair and Replacement</i>	
PMP	2-WT-276	<i>Disassembly and Reassembly of the Solenoid Operated Valves in the Diversion Box and Vent Station</i>	
FTP	TF-FT-059-002	<i>Functional Test of Replacement Cross-Site Transfer System, Leak Detection System</i>	



Table C-2. System Maintenance Procedures.

Type	Document Number	Title	Note
FTP	TF-FT-059-003	<i>Functional Test of the Replacement Cross-site Transfer System High Pressure Shutdown Interlock in Valve Pit 241-SY-A</i>	

<sup>1</sup> Preventive maintenance procedures and functional test procedures identified as inactive are not currently being used. They are restored to active status before they are used.

## **APPENDIX D**

### **SYSTEM HISTORY**

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This optional Appendix is not used.