WASTE TREATMENT AND IMMOBILIZATION PLANT
APPENDIX 4D
PRETREATMENT FACILITY (PTF)

CHANGE CONTROL LOG

Change Control Logs ensure that changes to this unit are performed in a methodical, controlled, coordinated, and transparent manner. Each unit addendum will have its own change control log with a modification history table. The "**Modification Number**" represents Ecology's method for tracking the different versions of the permit. This log will serve as an up to date record of modifications and version history of the unit.

Modification History Table

Modification Date	Modification Number
10/01/2018	24590-WTP-PCN-ENV-18-003 (8C.2018.Q4)
12/15/2016	8C.2016.Q3

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APPENDIX 4D
PRETREATMENT FACILITY (PTF)

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APPENDIX 4D
PRETREATMENT FACILITY (PTF)

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4D PRETREATMENT FACILITY

The PTF is designed to receive mixed waste from the double shell tank (DST) system and separate and prepare the low-activity waste (LAW) and high-level waste (HLW) feed streams for vitrification. The main functions performed at the Pretreatment Facility (PTF) are as follows:

- Receive waste feeds from the Hanford Site DST system.
- Separate cesium, strontium, and transuranic (TRU) radionuclides from the waste feeds.
- Segregate solids into the HLW feed stream.
- Concentrate the separated radionuclides for incorporation into the HLW feed stream.
- Adjust the concentration of the waste for vitrification.
- Collect and monitor liquid effluents.
- Blend waste fractions to optimize treatment steps.

The purpose of this appendix is to describe the major systems associated with the PTF. Descriptions of process systems, ventilation systems, and mechanical support systems associated with the PTF are provided in Sections 4D.2 through 4D.4. Table 4D-1 lists current tank design information (capacity, materials of construction, and dimensions). Table 4D-2 lists the current miscellaneous unit design information. The tanks and miscellaneous units are grouped by process systems in these tables.

Tanks or miscellaneous units that manage liquid mixed or dangerous waste are provided with secondary containments. Table 4D-3 summarizes the secondary containment rooms/areas and calculated minimum liner heights. Sumps, leak detection boxes, and secondary containment drain systems are listed in Table 4D-4.

The following figures found in Appendix 4A and drawings, found in the *Hanford Facility Dangerous Waste Permit* (DWP), Operating Unit Group 10, Appendix 8, provide additional detail for the PTF:

- Simplified process flow diagrams for the Waste Treatment Plant (WTP).
- Process flow figures for pretreatment process information.
- Typical system figures depicting main features for each regulated system.
- General arrangement figures and drawings showing locations of regulated equipment.
- Waste management area figures showing facility locations to be permitted.

Vessels in black cells are designed for a 40-year life, and are of welded stainless steel construction. The black cells in the PTF are located adjacent to the hot cell. Hydraulic connections connect the black cells to each other and connect selected black cells to the hot cell. These hydraulic connections are used to cascade fluid flow between cells in the event that the black cell secondary containment hold-up volume is exceeded by the contents of a single leaking vessel in the black cell. As the liquid cascades from cell to cell it will reach the hot cell. The floors and lower portions of the black cells and hot cell walls are partially lined with stainless steel for secondary containment. This secondary containment will have a gradient designed to channel liquid to a low-point sump within each black cell and three sumps in the hot cell. Black cells and hot cells will be equipped with an instrumented sump or sumps for detecting loss of vessel or piping integrity. Liquids are removed from the black cell sumps by steam ejectors.

The radiation monitor and valves with potential exposure to elevated radiation are contained within a shielded bulge attached to the outside wall of the black cell. The bulge provides secondary containment for ancillary equipment and is equipped with decontamination sprays, liquid level instrumentation for leak detection, and a drain to the Ultimate Overflow Vessel (PWD-VSL-00033).

Liquid level in the vessels will be monitored and maintained within low and high operating limits. Regulated WTP plant tank systems processes and leak detection systems instruments and parameters will be provided in DWP Table III.10.E.E. Regulated miscellaneous treatment systems process and leak detection systems instruments and parameters will be provided in DWP Table III.10.G.C.

At times, internal decontamination of vessels may be required. The primary permanent process vessels are fitted with wash rings for decontamination by flushing. Wash systems will be able to introduce water, caustic solution, or acid. The stainless steel lined floor provides secondary containment.

Instrumentation, alarms, controls, and interlocks will be provided for the tank systems and miscellaneous treatment systems to indicate or prevent the following conditions, as appropriate:

- Overfilling: Plant items are protected against overfilling by liquid level indication, high level instrumentation interlocks to shut off feed sources, and process control system control functions backed up by hard wired trips as required.
- Loss of containment: Plant items are protected against containment loss by liquid level indication, and by process control system control and alarm functions as required, including shut off of feed sources. Tanks or miscellaneous units (MUs) that manage liquid mixed or dangerous waste is provided with secondary containment, and some tanks and MUs utilize daily visual inspection for leak detection. Tank and MU ancillary equipment is provided with secondary containment or visually inspected for leaks on a daily basis in accordance with WAC-173-303-640(4)(f). Sumps associated with the management of liquid mixed or dangerous waste are provided with liquid level instrumentation and an ejector or pump to empty the sump as needed.
- Inadvertent transfers of fluids: System sequential operations are properly interlocked to prevent inadvertent transfers at the wrong time or to the wrong location.
- Loss of mixing function: Tank systems are instrumented (air pressure/flow indication) to prevent hydrogen accumulation and solids settling. A forced air in-bleed is provided to dilute hydrogen generated through radiolysis.
- Loss of process function: System vessels using reverse flow diverters incorporated dual reverse flow diverter system redundancy into the design to prevent loss of process function and to maintain appropriate liquid levels in vessels if one of the reverse flow diverters should fail.
- Overheating: Temperature regulation with chilled water is provided for those plant items where heat may be generated due to radiolysis. Chilled water lines will be monitored for contamination.
- Overpressurization: Relief is provided by use of rupture disks.
- Vacuum in vessels: Relief is provided through the Pretreatment Vessel Vent Process (PVP) system during transfer of waste out of vessels.
- Loss of air flow: The plant ventilation system creates a pressure gradient which causes air to flow through engineered routes from an area of lower contamination potential to an area of higher contamination potential.

In addition to level control, temperature and pressure may be monitored for tank systems and miscellaneous treatment systems in some cases. Additional information may be found in the system logic descriptions located in DWP Operating Unit Group 10, Appendix 8.13.

4D.1 Containers

This section identifies the containers and container management practices that will be followed at the PTF. The term "container" is used as defined in Washington Administrative Code (WAC) 173-303-040. Note that in this appendix and throughout the permit, terms other than containers may be used, such as canisters, boxes, bins, flasks, casks, and overpacks.

The following sections address waste management containers:

- Description of Containers - Section 4D.1.1

- Container Management Practices - Section 4D.1.2
- Container Labeling - Section 4D.1.3
- Containment Requirements for Storing Waste - Section 4D.1.4
- Prevention of Ignitable, Reactive, and Incompatible Wastes in Containers - Section 4D.1.5

4D.1.1 Description of Containers

These types of waste will be managed in containers:

- Miscellaneous mixed waste (secondary waste)
- Miscellaneous nonradioactive dangerous waste (secondary waste)

The waste form dictates the type of containers used for waste management. The following paragraphs describe these types of containerized waste that are managed at the PTF.

Miscellaneous Mixed Waste

Generally, miscellaneous mixed wastes are secondary wastes that may include, but are not limited to, the following items:

- Spent or failed equipment
- Spent, dewatered ion exchange resins in the PTF
- Offgas high-efficiency particulate air (HEPA) filters

Spent equipment and offgas filters will typically be managed in commercially-available containers such as steel drums or steel boxes, of varying size. The containers for miscellaneous mixed waste will comply with transportation requirements, with receiving treatment, storage, and disposal (TSD) facility waste acceptance criteria, and will be compatible with the miscellaneous mixed waste. These containers may or may not include a liner. Final container selection, container and waste compatibility, and the need for liners, will be based on the physical, chemical, and radiological properties of the waste being managed.

Spent ion exchange resins will be dewatered and managed in high integrity containers (HICs). This waste will be generated and managed in the PTF, until it is transferred to a suitable TSD unit for further management.

Each miscellaneous mixed waste container will have associated documentation that describes the contents, such as waste type, physical and chemical characterization, and radiological characterization. This information will be retained within the plant information network.

Most miscellaneous secondary mixed wastes will be spent equipment and consumables such as pumps, air lances, HEPA filters, etc., and are not expected to contain liquids. If wastes are generated that contain liquids, these wastes may be treated to remove or absorb liquids, to comply with the receiving TSD facility waste acceptance criteria.

Miscellaneous Nonradioactive Dangerous Waste

Each nonradioactive dangerous waste container will have associated documentation that describes the contents, such as waste type and physical and chemical characterization. Typically, commercially available containers will be used. The types of containers used for packaging nonradioactive dangerous waste will comply with the receiving TSD facility waste acceptance criteria and transportation requirements. However, final container selection, container and waste compatibility, and the need for liners will be based on the physical and chemical properties of the waste being managed.

4D.1.2 Container Management Practices

The following paragraphs describe how each of the containers used at the PTF are managed.

4D.1.2.1 Miscellaneous Nonradioactive Dangerous Waste Containers

Miscellaneous dangerous waste containers will typically be managed in non-permitted waste management units (satellite accumulation areas and less-than-90-day storage areas) located throughout the PTF. Containers will be kept closed unless waste is being added, removed, or sampled. They will routinely be moved by forklift or drum cart, and will be managed in a manner that prevents ruptures and leaks.

4D.1.2.2 Waste Tracking

The plant information network interfaces with the integrated control network and is designed to collect and maintain plant information. The plant information network is currently planned to the following systems (all systems used at the plants/facilities and balance of facilities [BOF] are provided for information only):

- Plant data warehouse and reporting system
- Laboratory information management system
- Waste tracking and inventory system

Inventory and Batch Tracking

The waste tracking and inventory system will interface with the information system data historian to provide reporting information such as tank volumes, waste characteristics, and facility inventories of process waste. The waste tracking system will also be used to query operations parameters at any time information is needed, as specified by operations, to manage the process system.

Secondary Waste Stream Tracking

Containerized secondary waste streams and equipment will be tracked and managed through commercially available database management software. Containers will be mapped in each plant and updated during the inspection process using a commercially available drawing software application.

Laboratory Information Management System

The laboratory information management system (LIMS) will be an integral feature of the plant information network. The LIMS will serve as an essential tool for providing data management of regulatory and processing samples. The chosen LIMS will be a commercial off-the-shelf software package designed for performing laboratory information management tasks as described in American Society for Testing and Materials (ASTM) E1578-93, *Standard Guide for Laboratory Information Management Systems (LIMS)*.

The LIMS will track the flow of samples through the laboratory. Samples received in the laboratory will be identified with a unique identification label. The identification label provides details of the sample process stream. Baseline analyses are defined by the requesting plant. Additional analyses, as required, will be input into LIMS by laboratory analysts. Data will be input into LIMS manually or by data transfer using LIMS/instrument interface. Analyses will be performed using approved and validated analytical procedures.

Analytical results will be compiled by the LIMS and held pending checking and approval by appropriate staff. Approved results will be reported to the requesting plant.

4D.1.3 Container Labeling

Miscellaneous Mixed Waste Containers

The miscellaneous mixed waste containers will be labeled with the accumulation or generation start date, as appropriate, the major risk(s) associated with the waste, and the words “hazardous waste” or “dangerous waste.” A waste tracking and inventory system will be implemented. Labels and markings will be positioned so that required information is visible. The label will meet the WAC 173-303-630(3) requirements, and the dangerous waste number will be clearly identified.

A waste tracking and inventory system will be implemented. Labels and markings will be positioned so that required information is visible, and the dangerous waste number will be clearly identified.

Miscellaneous Dangerous Waste Containers

The miscellaneous dangerous waste drums will be labeled with the accumulation or generation start date, as appropriate, the major risk(s) associated with the waste, and the words “hazardous waste” or “dangerous waste”. A waste tracking and inventory system will be implemented. Labels and markings will be positioned so that required information is visible. The label will meet the WAC 173-303-630(3) requirements, and the dangerous waste number will be clearly identified.

4D.1.4 Containment Requirements for Storing Waste

Secondary containment requirements for the waste are discussed below.

4D.1.4.1 Secondary Containment System Design

Secondary containment is required for areas in which containers hold free liquids. It is also required for areas managing wastes exhibiting the characteristics of ignitability or reactivity as defined in WAC 173-303-090(5) and (7).

Miscellaneous Mixed Waste

Miscellaneous mixed waste storage areas may contain waste requiring secondary containment. If wastes containing liquids or wastes exhibiting the characteristics of ignitability or reactivity are generated, portable secondary containment that meets the requirements of WAC 173-303-630(7) will be provided.

Miscellaneous Dangerous Waste

Miscellaneous dangerous waste storage areas may contain waste requiring secondary containment. If wastes containing liquids or wastes exhibiting the characteristics of ignitability or reactivity are generated, portable secondary containment that meets the requirements of WAC 173-303-630(7) will be provided.

4D.1.4.2 System Design (Reserved)

Containers with liquids will be provided with portable secondary containment meeting the requirements of WAC 173-303-630(7).

4D.1.4.3 Structural Integrity of the Base

The storage areas will be constructed to support storage and transportation of containers within the container storage areas and will be designed with the following:

- Containment system capable of collecting and holding spills and leaks.
- Base will be free of cracks and gaps and sufficiently impervious to contain leaks.
- Positive drainage control.
- Sufficient containment volume.
- Sloped to drain or remove liquid, as necessary.

4D.1.4.4 Containment System Capacity

Miscellaneous Mixed Waste

Each container holding liquid dangerous waste will be placed into portable secondary containment that meets the requirements of WAC 173-303-630(7). The waste container will function as the primary containment while the portable containment device will function as the secondary containment.

Each portable secondary containment will have the capacity to contain 10% of the volume of all containers within the containment area, or the volume of the largest container, whichever is greater.

Miscellaneous Dangerous Waste

Each container holding liquid nonradioactive dangerous waste will be placed into portable secondary containment. The waste container will function as the primary containment while the portable sump will function as the secondary containment.

Each portable secondary containment will have the capacity to contain 10% of the volume of all containers within the containment area, or the volume of the largest container, whichever is greater. Typically, the waste containers will be steel drums.

4D.1.4.5 Control of Run-On

Miscellaneous Mixed Waste

Run-on will not reach the interior of the miscellaneous mixed waste storage areas, because they will be located within buildings, which will have roof gutters to remove precipitation.

Miscellaneous Dangerous Waste

Run-on will not reach the interior of the miscellaneous dangerous waste storage areas, because waste will be managed in buildings with walls and roof to remove precipitation.

4D.1.4.6 Removal of Liquids from Containment System

Miscellaneous Mixed Waste

Portable secondary containment sumps will be provided for individual containers that contain liquids. Hand pumps or similar devices will be used to remove liquid released to the portable secondary containments.

Miscellaneous Dangerous Waste

Portable secondary containment sumps will be provided for individual containers that contain liquids. Hand pumps or similar devices will be used to remove liquid released to the portable secondary containments.

4D.1.4.7 Demonstration that Containment is not Required because Containers do not Contain Free Liquids, Wastes that Exhibit Ignitability or Reactivity, or Wastes Designated F020-023, F026 or F027

Miscellaneous Mixed Waste

Secondary containment will be provided for individual containers that manage liquids. Wastes with the F020-F023, F026, and F027 numbers are not identified for the DST system. Therefore, these waste numbers will not be present at the PTF.

Miscellaneous Dangerous Waste

Wastes with the F020-F023, F026, and F027 numbers are not identified for the DST system. Therefore, these waste numbers will not be present at the PTF.

4D.1.5 Prevention of Reaction of Ignitable, Reactive, and Incompatible Wastes in Containers

Ignitable, Reactive, or Incompatible Miscellaneous Mixed Waste and Miscellaneous Dangerous Waste

Potentially incompatible wastes are not expected to be managed in the miscellaneous mixed waste storage areas. If such wastes are managed in one of these areas, the containers of incompatible waste or chemicals will not be stored in close proximity to each other. Acids and bases will be stored on separate portable secondary containment sumps; oxidizers will be stored in areas separate from combustible materials; and corrosive chemicals will be stored on a separate secondary containment sump. These separate storage areas within the unit will be clearly marked with signs indicating the appropriate waste to be stored in each area. Potentially incompatible waste will be stored at least one aisle width apart.

4D.2 Tank Systems

4D.2.1 Waste Feed Receipt Process System

Process flow diagram of the waste Feed Receipt Process (FRP) System is provided in DWP Operating Unit Group 10, Appendix 8.1. The primary function of the FRP is to receive batch transfers of waste feed from the DST system, and to store the waste pending processing through pretreatment.

The main components of the FRP system are:

- Waste transfer lines.
- Waste Feed Receipt Vessels (FRP-VSL-00002A/B/C/D).
- Vessel inlet and outlet valve headers.
- Pumps, piping, and instrumentation for waste transfers.
- Waste sampling equipment.

Waste feed will normally be transferred from the DST system in batches up to 1 million gallons into three of the four Waste Feed Receipt Vessels. The fourth vessel containing waste feed from the preceding transfer is used to sustain production while the current batch transfer is being mixed and sampled to verify waste characteristics.

The Waste Feed Receipt Vessels (FRP-VSL-00002A/B/C/D) can also receive concentrate from the Waste Feed Evaporation Process (FEP) System and off-specification treated LAW from the Treated LAW Concentrate Storage Process (TCP) System. The waste feed stored in the Waste Feed Receipt Vessels is batch-transferred forward for processing to either the FEP system or to the Ultrafiltration Process (UFP) System. The FRP system also has the capability to return stored waste to the DST system.

Waste feed is received from the DST system through the inner pipe of any one of three co-axial transfer lines. The inlet valve header routes the waste to the Waste Feed Receipt Vessels. The inlet and outlet valve headers and pumps are used in combination to facilitate the transfer of waste from one Waste Feed Receipt Vessel to another, forward transfer of waste to the pretreatment process, or the return of waste to the DST system using the transfer lines.

FRP system design features include:

- Capability to pressure-test both the inner and outer transfer lines for integrity.
- Transfer line leak detection system for integrity indication during transfer.
- Transfer line flushing and draining capability.
- Instrumentation for monitoring vessel liquid level.
- Vessel vent to the PVP System.

- Forced air purge and passive air purge of the vessel vapor space for mitigation of hydrogen gas buildup.
- Internal pulse jet mixers (PJMs) for solids suspension and slurry mixing.
- Remote sampling capability off the discharge of the transfer pump via autosampler ASX-SMPLR-00025.

4D.2.2 Waste Feed Evaporation Process System

Process flow diagrams of the FEP system are provided in DWP Operating Unit Group 10, Appendix 8.1. The primary process function of the FEP tanks and miscellaneous unit system is to concentrate waste streams from:

- The FRP system.
- The HLW Lag Storage and Feed Blending Process (HLP) System.
- The Plant Wash and Disposal Process (PWD) System.
- The Spent Resin Collection and Dewatering Process (RDP) System.

The main components of the FEP tank and miscellaneous unit system are as follows:

Tank systems

- Waste Feed Evaporator Feed Vessels (FEP-VSL-00017A/B).
- Waste Feed Evaporator Condensate Vessel (FEP-VSL-00005).
- Vessel outlet valve headers.
- Pumps, piping, and instrumentation for waste transfers.

Miscellaneous Unit systems

- Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B).
- Waste Feed Evaporator Primary Condensers (FEP-COND-00001A/B).
- Waste Feed Evaporator Intercondensers (FEP-COND-00002A/B).
- Waste Feed Evaporator Aftercondensers (FEP-COND-00003A/B).
- Waste Feed Evaporator Reboilers (FEP-RBLR-00001A/B).
- Pumps.

The Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) will deliver concentrate to the UFP system. Overhead vapors and noncondensables from the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) are routed to the Waste Feed Evaporator Primary Condensers (FEP-COND-00001A/B). Process condensate from the Waste Feed Evaporator Primary Condensers and steam condensate from the vacuum system are collected in the Waste Feed Evaporator Condensate Vessel (FEP-VSL-00005) and discharged to the Radioactive Liquid Waste Disposal Process (RLD) System. The noncondensables from the vacuum system are discharged to the PVP system.

During off-normal conditions, excess dilute recycles to the FEP Waste Feed Evaporator Feed Vessels (FEP-VSL-00017A/B), or excess concentrate from the FEP Waste Feed Evaporator Separator Vessels can be routed to the FRP system for interim storage. Fluids generated from solids washing in the UFP system that are collected in the HLP system and are too dilute for feed to HLW vitrification can also be concentrated in the FEP system.

The FEP system includes two Waste Feed Evaporator Feed Vessels (FEP-VSL-00017A/B) for managing feed makeup from multiple sources. One Waste Feed Evaporator Feed Vessel will be in a makeup mode while the alternate vessel is feeding the evaporator trains.

The design features of the FEP evaporator feed system include:

- Internal PJMs for solids suspension.
- Instrumentation for monitoring vessel liquid level.
- Vessel vent to the PVP system.
- Forced air purge and passive air purge of the vessel vapor space for mitigation of hydrogen gas buildup.
- Pump and line flushing capability.
- Transfer flow rate indication and transfer volume totalizer.
- Remote sampling capability off the discharge of the transfer pumps via autosampler ASX-SMPLR-00025.
- Vessel spray rings for vessel decontamination.

The FEP waste feed evaporator trains can be operated independently or at the same time depending on the evaporation needs. The Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) are forced-circulation units operating under vacuum to reduce the operating temperature. Recirculation pumps maintain a high flow rate from the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) to the Waste Feed Evaporator Reboilers (FEP-RBLR-00001A/B). Pumps maintain a high flow rate around the evaporation system. The pumps transfer the waste through the Waste Feed Evaporator Reboilers and back into the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B). The recirculating waste stream is prevented from boiling in the reboiler tubes by maintaining sufficient hydrostatic head (submergence) to increase the boiling point above the temperature of the liquor in the Reboiler tubes.

As the liquid travels out of the Reboilers (FEP-RBLR-00001A/B), the hydrostatic head diminishes and flash evaporation occurs as the flow enters the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B). The liquid continues to flash and the vapor and liquid streams are separated (liquid-vapor disengagement). The liquid stream circulates in this loop and becomes more concentrated, while the vapor stream passes through a demisting section to the evaporator condensers.

A portion of the concentrate is also pumped from the bottom of the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) at the controlled liquid density and is discharged to Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A/B) in the UFP system, or is recycled to the FRP system.

The vapor stream exiting the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) is condensed in a three-stage condenser system consisting of Waste Feed Evaporator Primary Condensers (FEP-COND-00001A/B), Waste Feed Evaporator Intercondensers (FEP-COND-00002A/B), and Waste Feed Evaporator Aftercondensers (FEP-COND-00003A/B). The noncondensables exiting the After-Condenser are routed to the PVP system for treatment.

Design features of the evaporator trains include:

- Operating pressure indication and control.
- Differential pressure indication across the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) demister section.
- Water sprays to the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) demister section.
- Process condensate radiation monitoring and recycle capability.
- Low-pressure steam supply for heating the Waste Feed Evaporator Reboilers (FEP-RBLR-00001A/B).

- Waste Feed Evaporator Reboilers (FEP-RBLR-00001A/B) tube leak detection and diversion capability.
- Waste Feed Evaporator Reboilers (FEP-RBLR-00001A/B) steam condensate collection.
- Instrumentation for monitoring and control of vessel liquid level.
- Forced air purge of the vessel vapor space for mitigation of hydrogen gas buildup (passive venting of purge air via the downstream vessels connected to the vent header).
- Capability to drain, flush, and chemically clean the system.

The condensed vapor from the FEP condensers is collected in the Waste Feed Evaporator Condensate Vessel (FEP-VSL-00005). One condensate vessel is used to collect condensate from both evaporator trains. A small fraction of the total condensate is recycled to the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) demister water sprays. The balance of the condensate is transferred to the RLD system. Off-specification condensate is recycled to the Waste Feed Evaporator Feed Vessels (FEP-VSL-00017A/B).

Design features include:

- Instrumentation for monitoring and control of vessel liquid level.
- Vessel vent to the PVP system.
- Outlet valve header.
- Remote sampling capability off the discharge of the transfer pumps.
- Dip legs in the vessel that maintain a liquid seal (pressure boundary) between the vessel and the condensers.
- Makeup recycle water as required for startup.

4D.2.3 Ultrafiltration Process System

Process flow diagrams of the UFP System are provided in DWP Operating Unit Group 10, Appendix 8.1.

The UFP tank system separates the waste feed from the HLW Lag Storage and Blending Process and the Waste Feed Receipt Process Systems and/or the Waste Feed Evaporation Process System into a high solids stream, referred to as the HLW feed stream, and a relatively solids-free stream, referred to as the LAW feed stream. In the UFP system, the separated solids may undergo additional treatment (washing and/or leaching operations) to reduce the quantity of Immobilized High Level Waste (IHLW) produced. In addition, the LAW feed stream may require Strontium/TRU precipitation (Envelope C only). This operation will be performed in the UFP system prior to solids separation.

The main components of the UFP tank system are:

- Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A/B).
- Ultrafiltration Feed Vessels (UFP-VSL-00002A/B).
- Two ultrafilter trains, each containing five individual ultrafilters (UFP-FILT-00001A/2A/3A/4A/5A and -00001B/2B/3B/4B/5B).
- Associated ultrafilter backpulsing equipment.
- Ultrafilter Permeate Collection Vessels (UFP-VSL-00062A/B/C).
- Pumps, piping, and instrumentation for waste transfers and control of unit operations.
- Heat exchangers (UFP-HX-00041A/B and -00001A/B) for cooling waste slurry.

Ultrafiltration is a filtration process in which the waste stream is processed axially through the Ultrafilters (UFP-FILT-00001A/2A/3A/4A/5A and -00001B/2B/3B/4B/5B), which are long bundles of permeable tubes. Solids-free liquids pass radially through the permeable ultrafilter tubes surface while the concentration of the solids in the recirculating stream continuously increases within the associated feed vessel. The resulting solids slurry may need treatment such as caustic leaching, oxidative leaching, and/or water washing to reduce the quantity of IHLW produced.

Waste is received from the HLP, FRP, and/or the FEP systems into the Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A/B) of the UFP system. The waste may be sampled here to determine the ultrafiltration parameters. The waste may undergo caustic leaching here for some envelope A/D feeds. Heat and agitation are applied for caustic leaching. For envelope C feeds, the capability exists for the addition of chemicals to the Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A/B) to precipitate strontium and TRU elements contained in the incoming waste stream prior to solids concentration by ultrafiltration. Heat (if required) and agitation can be applied to ensure that the precipitation process is completed.

The Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A/B) feed the Ultrafiltration Feed Vessels (UFP-VSL-00002A/B), which feed the ultrafilters themselves. During the initial solids concentration, the solids-free stream generated by ultrafiltration is designated as the LAW feed stream, which is then routed to one of the three Ultrafilter Permeate Collection Vessels (UFP-VSL-00062A/B/C). Here, the permeate is sampled for solids breakthrough (turbidity) and criticality (plutonium) prior to further processing, which includes cesium removal and additional evaporation prior to LAW vitrification.

The resulting concentrated slurry may then be caustic leached and/or oxidative leached to remove glass-limiting compounds, and washed in the Ultrafiltration Feed Vessels (UFP-VSL-00002A/B) with process water to remove interstitial liquid and soluble salts, while being further processed through the Ultrafilters (UFP-FILT-00001A/2A/3A/4A/5A and -00001B/2B/3B/4B/5B). The final concentrated HLW feed stream is transferred to the HLW Lag Storage Vessels currently planned to be HLP-VSL-00027B and HLP-VSL-00028 and then on to the HLW vitrification process. Permeate from solids washing is also collected in one of the Ultrafilter Permeate Collection Vessels (UFP-VSL-00062A/B/C), but a substantial fraction of this stream is normally routed to the facility PWD for recycle.

During waste processing, the permeability of the Ultrafilters (UFP-FILT-00001A/2A/3A/4A/5A and 00001B/2B/3B/4B/5B) is reduced over time. Re-establishing the ultrafilters' permeability can be accomplished using one of three different methods: 1) backpulsing one filter at any time with filter permeate or 2) backpulsing one filter at any time with nitric acid or caustic or 3) cleaning an entire filter train utilizing nitric acid or caustic. Backpulsing with permeate may be utilized while the filter train is in normal operation, but cleaning with nitric acid or caustic requires the filters to be out of operation. Filter performance will be monitored to determine when cleaning is required.

The primary design features of the UFP system are:

- PJMs in the Ultrafiltration Feed Preparation Vessels, the Ultrafiltration Feed Vessels, and in the Ultrafilter Permeate Collection Vessels, and mixing air spargers in the Ultrafiltration Feed Vessels.
- Cooling jackets on the Ultrafiltration Feed Preparation Vessels and on the Ultrafiltration Feed Vessels and external heat exchangers in recirculation loops associated with these vessels for cooling their contents.
- Passive vessel overflow routes for the Ultrafiltration Feed Preparation Vessels, the Ultrafiltration Feed Vessels, and in the Ultrafilter Permeate Collection Vessels to the Ultimate Overflow Vessel (PWD-VSL-00033).
- Steam spargers in the Ultrafiltration Feed Preparation Vessels and the Ultrafiltration Feed Vessels for heating waste slurry for certain treatment processes.
- UFP-PMP-00044A/B for emptying Ultrafiltration Feed Vessels.

- Sampling capabilities from recirculation loops associated with the Ultrafiltration Feed Preparation Vessels and Ultrafiltration Feed Vessels, and in the Ultrafilter Permeate Collection Vessels via autosamplers ASX-SMPLR-00019 and ASX-SMPLR-00020.
- Vessel wash rings for the Ultrafiltration Feed Preparation Vessels, the Ultrafiltration Feed Vessels, and in the Ultrafilter Permeate Collection Vessels Ventilation (both passive and forced) for the Ultrafiltration Feed Preparation Vessels, the Ultrafiltration Feed Vessels, and in the Ultrafilter Permeate Collection Vessels.

4D.2.4 High Level Waste Lag Storage and Feed Blending Process System

Process flow diagrams of the HLP system are provided in DWP Operating Unit Group 10, Appendix 8.1. The primary functions of the HLP system are to receive, blend, store, and transfer HLW feed. The HLP system receives for staging and blending the following waste streams: HLW feed from the Hanford Tank Farms, the HLW pretreated slurry from the UFP system, cesium concentrate from the Cesium Nitric Acid Recovery Process (CNP) System, and transfers from the FEP.

The main components of the HLP tank system are:

- HLW Feed Receipt Vessel (HLP-VSL-00022).
- HLW Lag Storage Vessels (HLP-VSL-00027A/B).
- HLW Feed Blend Vessel (HLP-VSL-00028).
- Pumps, breakpots, piping, and instrumentation for waste transfers.

All feeds within the HLP system contain solids; as a result, mixing with PJMs is required in all HLP vessels. In addition to PJMs, the HLW Lag Storage Vessels (HLP-VSL-00027A/B) and the HLW Feed Blend Vessel (HLP-VSL-00028) will be provided with air sparging capabilities.

High Level Waste Feed Receipt Vessel (HLP-VSL-00022)

HLW feed is received into the HLW Feed Receipt Vessel (HLP-VSL-00022).

The waste received in this vessel is sampled (via ASX-SMPLR-00020) and transferred to either the UFP vessels (UFP-VSL-00001A/B), the FEP vessels (FEP-VSL-00017A/B) or the FRP system.

High Level Waste Lag Storage Vessels (HLP-VSL-00027A/B)

Treated high solids waste (HLW feed stream) received from the UFP system is stored, segregated, and blended in the HLW Lag Storage Vessels (HLP-VSL-00027A/B). As needed, the waste stored in these vessels is sampled (via ASX-SMPLR-00020) to determine blending and to comply with vitrification parameters of IHLW.

The HLW feed stream is routed from the HLW Lag Storage Vessels (HLP-VSL-00027A/B) to the HLW Feed Blend Vessel (HLP-VSL-00028). For operational flexibility, there is an option to blend the HLW feed in the HLW Lag Storage Vessel HLP-VSL-00027B prior to transfer to the HLW Vitrification Facility. The HLW feed blending will occur primarily in the HLW Feed Blend Vessel HLP-VSL-00028).

The HLW treated solids may be blended with contents of:

- Strontium/TRU precipitate slurry from HLW Lag Storage Vessels (HLP-VSL-00027A/B).
- Un-neutralized cesium concentrate from the Cesium Evaporator Separator Vessel. (CNP-EVAP-00001) via the Cesium Evaporator Concentrate Lute Pot (CNP-VSL-00002).
- Neutralized cesium concentrate from the Eluate Contingency Storage Vessel (CNP-VSL-00003).

The amount of each of these waste streams will be coordinated. Sodium Hydroxide will be added as needed. The blended HLW feed stream is then transferred to the HLW Vitrification Facility for final treatment and immobilization. Before the blended HLW feed is transferred to the HLW Vitrification

Facility, it is sampled (via autosampler ASX-SMPLR-00020). The HLP system includes an option to return the blended HLW feed stream to the Hanford Tank Farms.

The primary design features of the HLP vessels are:

- Internal PJMs for solids suspension.
- External cooling jackets.
- Passive vessel overflow routes to the Ultimate Overflow Vessel (PWD-VSL-00033).
- Sampling capabilities via autosampler ASX-SMPLR-00020.
- Vessel wash rings.
- Vessel ventilation (both passive and forced) through the Pretreatment Vessel Vent Process System/Process Vessel Vent System (PVP/PVV).
- PJM ventilation through the Pulse Jet Ventilation System (PJV) system.

4D.2.5 Cesium Ion Exchange Process System

Process flow diagrams of the Cesium Ion Exchange Process (CXP) System are provided in DWP Operating Unit Group 10, Appendix 8.1. The primary function of the CXP system is to remove cesium-137 from the LAW feed stream. This is accomplished using a series of ion exchange columns containing a resin that preferentially extracts cesium-137. After caustic displacement of LAW feed in the ion exchange columns and a water rinse, elution of the cesium-loaded resin is accomplished using dilute nitric acid supplied by the CNP system. The cesium-loaded nitric acid is then routed to the CNP system with the cesium ultimately processed in the HLW melter.

The main components of the CXP system are:

- Cesium Ion Exchange Feed Vessel (CXP-VSL-00004).
- Cesium Ion Exchange Columns (CXP-IXC-00001/2/3/4).
- Cesium Ion Exchange Treated LAW Collection Vessels (CXP-VSL-00026A/B/C).
- Pumps, heat exchanger, filter, piping, and instrumentation for waste transfers.

The Cesium Ion Exchange Feed Vessel (CXP-VSL-00004) receives LAW feed from the UFP system and allows for continuous operation of the ion exchange system. The CXP system-contains four Cesium Ion Exchange Columns (CXP-IXC-00001/2/3/4). At any given time, three of the columns are used in series to remove cesium-137 from the LAW feed stream. The three columns are termed lead, lag, and polishing columns, depending on their position in the train. The fourth column is eluted and regenerated, and is then placed in a standby mode until the lead column reaches the desired cesium loading. At this point, the lead column is rotated out for elution and regeneration, the lag column becomes the lead, the polishing column becomes the lag, and the standby column is rotated into the polishing position.

The concentration of cesium-137 in the feed stream is monitored by sampling in the Ultrafilter Permeate Collection Vessels (UFP-VSL-00062A/B/C) prior to transfer to the lead Cesium Ion Exchange Column and by radiation monitors on the line between each Cesium Ion Exchange Column (CXP-IXC-00001/2/3/4). When cesium-137 is detected above an established set point following an ion exchange column, the lead column is taken out of the loading cycle, eluted, and the resin bed regenerated while the other columns are placed into the loading cycle.

Elution is part of a resin bed regeneration cycle that typically includes the following steps:

- Displacement of residual LAW feed stream in the column by displacement with dilute caustic solution to prevent the potential of precipitating aluminum hydroxide from the LAW feed stream at low pH values. This caustic rinse is provided from the Cesium Ion Exchange Reagent Vessel (CXP-VSL-00005).

- Displacement of residual dilute caustic solution from the column with demineralized water to prevent an acid-base reaction during elution.
- Elution of cesium-137 ions with dilute nitric acid from the CNP system.
- Displacement of residual acid from the column with demineralized water to prevent an acid-base reaction with the caustic solution.
- Regeneration of the resin bed with caustic solution from the Cesium Resin Addition Process (CRP) System.
- Displacement of residual caustic solution with treated LAW feed solution to prevent churning of the resin bed upon introduction of untreated LAW feed. This treated LAW feed is provided directly from the Cesium Ion Exchange Column functioning as the polishing column.

After a number of loading and regeneration cycles, the resin performance is expected to decrease to a set point, which is termed "spent". The number of cycles depends on LAW feed constituents, operating temperatures, properties of the resin, radiation exposure, and LAW feed throughput rates. The spent resin is slurried with recycled Ion Exchange resin flush solution and flushed out of the column into the RDP system for resin disposal. A slurry of fresh resin is prepared in the CRP system and then added to the column as an ion exchange column bed replacement.

An elution system is provided by three vessels; one containing nitric acid, another containing demineralized water, and a third vessel containing sodium hydroxide. Each vessel has a volume sufficient to fully elute one fully loaded column, and one partially loaded column. The vessels are located at an elevation sufficiently high above the Cesium Ion Exchange Columns (CXP-IXC-00001/2/3/4) to provide enough hydrostatic head to induce flow through the Cesium Ion Exchange Columns (CXP-IXC-00001/2/3/4) and associated piping to the destination vessel.

Following cesium ion exchange, the treated LAW feed is transferred to the Cesium Ion Exchange Treated LAW Collection Vessels (CXP-VSL-00026A/B/C) where the LAW feed is sampled then transferred for further treatment in the Treated LAW Evaporation Process (TLP) System and the TCP system.

The primary design features of the CXP system are:

- Instrumentation for monitoring and control of vessel liquid level.
- PJMs in the Cs Ion Exchange Feed Vessel (CXP-VSL-00004) and the Cesium Ion Exchange Treated LAW Collection Vessels (CXP-VSL-00026A/B).
- Passive vessel overflow routes from the Cs Ion Exchange Feed Vessel (CXP-VSL-00004), the Cs Ion Exchange Reagent Vessel (CXP-VSL-00005) and the Cesium Ion Exchange Treated LAW Collection Vessels (CXP-VSL-00026A/B).
- Remote sampling capabilities on the discharge of transfer pumps via autosampler ASX-SMPLR-00017.
- Connection of the vessel vapor space to the PVP system.

4D.2.6 Cesium Nitric Acid Recovery Process System

Process flow diagram of the CNP system is provided in DWP Operating Unit Group 10, Appendix 8.1. The CNP system supports the CXP system. Cesium is removed from LAW feed via resin in Cesium Ion Exchange Columns and is concentrated prior to transfer to the HLW Lag Storage and Feed Blending Process System (HLP) for incorporation into the HLW melter feeds. The CNP system also provides recovered nitric acid for reuse in the CXP system as eluant.

The CNP system is composed of tanks and miscellaneous unit systems with the following equipment.

Tank Systems

- Eluate Contingency Storage Vessel (CNP-VSL-00003).
- Cesium Evaporator Recovered Nitric Acid Vessel (CNP-VSL-00004).
- Cesium Evaporator Eluant Lute Pot (CNP-VSL-00001).
- Pumps, piping, and instrumentation for waste transfers.

Miscellaneous Unit Systems

- Cesium Evaporator Separator Vessel (CNP-EVAP-00001).
- Cesium Evaporator Concentrate Reboiler (CNP-HX-00001).
- Cesium Evaporator Nitric Acid Rectifier Column (CNP-DISTC-00001).
- Cesium Evaporator Primary Condenser (CNP-HX-00002).
- Cesium Evaporator Inter-Condenser (CNP-HX-00003).
- Cesium Evaporator After-Condenser (CNP-HX-00004).
- Pumps, piping, and instrumentation for waste transfers.

The CNP system receives the cesium rich eluate from the CXP system, concentrates the dissolved salts in the eluate, and transfers the concentrate to the HLP system. The CNP system also recovers dilute nitric acid from the evaporator overheads stream, at the correct acid concentration, for reuse as eluant in the CXP system.

The CNP system consists of the vacuum evaporator/separator vessel, a reboiler, a concentrate recirculation pump, an acid rectifier column, three condensers, two vacuum steam ejectors, a lute pot, two breakpots, a recovered acid receiver vessel and an eluate contingency storage vessel. Utility systems include steam supply, including a desuperheater, steam condensate, and a closed loop cooling water supply and return system. The necessary sample points and instrumentation and controls for completing system functions in a safe and efficient manner are included in the system.

During the process of regenerating the cesium ion exchange resin beds, eluate composed of cesium-bearing nitric acid will be fed to the Cesium Evaporator Separator Vessel (CNP-EVAP-00001) operating under reduced pressure. A closed-loop circulation stream is fed from the evaporator to the steam-heated Cesium Evaporator Concentrate Reboiler (CNP-HX-00001) and back to the Cesium Evaporator Separator Vessel (CNP-EVAP-00001).

Vapor from the Cesium Evaporator Separator Vessel (CNP-EVAP-00001), composed primarily of water and nitric acid, is sent to the Cesium Evaporator Nitric Acid Rectifier Column (CNP-DISTC-00001) where the nitric acid is recovered for reuse as eluant. Recovered nitric acid is collected in the Cesium Evaporator Recovered Nitric Acid Vessel (CNP-VSL-00004) for reuse in the elution of cesium ion exchange column resin beds. Condensed water vapor is recovered from the Cesium Evaporator Primary Condenser (CNP-HX-00002), Cesium Evaporator Inter-Condenser (CNP-HX-00003), and Cesium Evaporator After-Condenser (CNP-HX-00004), and sent to the PWD system. These condensers are water-cooled shell-and-tube heat exchangers. Uncondensed vapors exiting from the after-condenser are routed to the PVP system for further treatment.

The cesium concentrated in the evaporator is routed to the HLW Feed Blend Vessel (HLP-VSL-00028) for blending and incorporation into the HLW melter feed streams. This cesium concentrate may also be stored in the Eluate Contingency Storage Vessel (CNP-VSL-00003), which is equipped with a cooling jacket for heat removal.

The Cesium Evaporator Separator Vessel (CNP-EVAP-00001) is fed through a break pot and the Cesium Evaporator Eluant Lute Pot (CNP-VSL-00001) in order to create a hydraulic seal to maintain a vacuum in the Cesium Evaporator Separator Vessel (CNP-EVAP-00001).

The recovered nitric acid is periodically sampled and, depending on the acid concentration of the recovered acid sample, some pH adjustment may be necessary. Fresh 2 molar nitric acid is available to the Cesium Evaporator Recovered Nitric Acid Vessel (CNP-VSL-00004) along with process condensate to adjust the recovered acid concentration as required.

The CNP system operates when a Cesium Ion Exchange Column (CXP-IXC-00001/2/3/4) is in the process of having its resin bed regenerated through an elution process. When elution of a cesium ion exchange column is not taking place, the nitric acid recovery system is maintained in a standby mode. The major vessels of the CNP system are equipped with internal wash rings for decontamination of the system.

The primary design features of the CNP system are:

- Instrumentation for monitoring and control of vessel liquid level.
- PJMs in the Eluate Contingency Storage Vessel (CNP-VSL-00003) and the Cs Evaporator Recovered Nitric Acid Vessel (CNP-VSL-00004).
- Passive vessel overflow routes from the Eluate Contingency Storage Vessel, and the Cs Evaporator Recovered Nitric Acid Vessel.
- Connection of the vessel vapor space and condensers to the PVP system.
- Remote sampling capabilities via autosampler ASX-SMPLR-00017.

4D.2.7 Cesium Resin Addition Process System

Figure 4A-11 presents a simplified process flow diagram of the CRP system. The purpose of the CRP system is to provide a means to add fresh resin to the Cesium Ion Exchange Columns (CXP-IXC-00001/2/3/4), prevent backflow from R5/C5 areas into R3/C3 areas, and vent the ion exchange columns. The system provides for preparation of the fresh cesium resin by hydraulically removing fines from the bulk of the resin particles as well as chemically conditioning the fresh resin. After conditioning, the resin is transferred to the ion exchange columns as a slurry, by gravity flow.

The main components of the CRP system are:

- Cesium Resin Addition Vessel (CRP-VSL-00001).
- Cesium Resin Addition Bulge.
- Cesium Resin Addition Recycle Pump.
- Pumps, piping, and instrumentation for waste transfers.

Cesium is removed from the LAW feed using the ion exchange resin. Each batch of the resin has a limited useful operating life after which it must be removed from the ion exchange column and replaced with fresh resin.

Fresh resin is delivered per specification by the vendor. It is then transferred from bulk storage with the aid of handling equipment to the resin addition room. The resin is transferred from the shipping container to the Cesium Resin Addition Vessel (CRP-VSL-00001) with an eductor and demineralized water. After transfer, the cesium resin undergoes resin conditioning processes. The resin is then transferred via the CRP-BULGE-00001 to a Cesium Ion Exchange Column (CXP-IXC-00001/2/3/4) as a slurry by gravity flow.

The CRP system contains resin and reagent products. However, ancillary equipment, such as piping and valves, located in the Cesium Resin Addition Bulge (CRP-BULGE-00001) will contain resin flush liquor and can be used to recycle spent resin from the RDP system back to CXP-IXC-00001/2/3/4. The Cesium Resin Addition Bulge (CRP-BULGE-00001) provides secondary containment for the ancillary equipment located inside the bulge.

The Cesium Resin Addition Bulge (CRP-BULGE-00001), located on the 56’ elevation, contains piping and valves that connect the Cesium Resin Addition Vessel (CRP-VSL-00001) to the Cesium Ion Exchange Columns (CXP-IXC-00001/2/3/4). The function of the Cesium Resin Addition Bulge (CRP-BULGE-00001) is to contain the valves that prevent back-flow of contaminated gas, resin, or liquid, from entering the C3 area upstream of the bulge. In the unlikely event of back-flow into the Cesium Resin Addition (CRP-BULGE-00001), valves close and contain the contamination within the bulge. For hydrogen control, gas is vented to the PVP system and other constituents gravity flow into the Plant Wash Vessel (PWD-VSL-00044) of the PWD system.

The cesium resin must be conditioned before processing the LAW feed stream through the Cesium Ion Exchange Columns (CXP-IXC-00001/2/3/4). The purpose of conditioning is to fully expand the resin and convert the resin into the right ionic form for cesium removal.

The primary design features of the CRP system are:

- Instrumentation for monitoring and control of vessel liquid level.
- Passive vessel overflow routes from the Cesium Resin Addition Vessel (CRP-VSL-00001).
- Connection of the Vessel vapor space to the PVP system.

4D.2.8 Reserved

4D.2.9 Reserved

4D.2.10 Reserved

4D.2.11 Treated Low-Activity Waste Evaporation Process System

Process flow diagram of the TLP system is provided in DWP Operating Unit Group 10, Appendix 8.1. The primary function of the TLP tank and miscellaneous unit system is to concentrate the pretreated feed to the LAW melters. The TLP system also collects the offgas condensate from LAW vitrification, neutralizes the stream, and evaporates the recycle stream with the treated LAW feed.

The main processes of the TLP tank and miscellaneous unit system are as follows:

- Receive waste from the treated LAW collection vessels.
- Receive and neutralize submerged bed scrubber purge and wet electrostatic precipitator (WESP) condensate from LAW vitrification.
- Evaporate a portion of the feed (reducing the volume and increasing the sodium concentration).
- Transfer the waste to the TCP system.
- Condense the overhead vapors and transfer the condensate to the RLD system.
- Vent non-condensable gases to the PVP for treatment.

The main components of the TLP tank and miscellaneous unit system are as follows:

Tank Systems

- LAW Submerged Bed Scrubber (SBS) Condensate Receipt Vessels (TLP-VSL-00009A/B).
- Treated LAW Evaporator Condensate Vessel (TLP-VSL-00002).
- Pumps, piping, and instrumentation for waste transfers.

Miscellaneous Unit Systems

- Treated LAW Evaporator Separator Vessel (TLP-SEP-00001).
- Pumps, piping, and instrumentation for waste transfers.
- Treated LAW Evaporator Reboiler (TLP-RBLR-00001).

- Concentrate pumps with outlet valve header.
- Treated LAW Primary Condenser (TLP-COND-00001).
- Treated LAW Inter-Condenser (TLP-COND-00002).
- Treated LAW After-Condenser (TLP-COND-00003).
- Pumps, piping, and instrumentation for waste transfers.

Subsequent to sampling and analysis, the treated LAW is pumped from one of three Cesium Ion Exchange Treated LAW Collection Vessels (CXP-VSL-00026A/B/C) to the evaporator system. The Treated LAW Evaporator Separator Vessel (TLP-SEP-00001) will deliver treated LAW concentrate to the TCP system.

The TLP system also evaporates recycle streams from the TCP system and the RLD system, and submerged bed scrubbers in the LAW Facility. Overhead vapors from the Treated LAW Evaporator Separator Vessel (TLP-SEP-00001) are routed to the Treated LAW Primary Condenser (TLP-COND-00001).

Process condensate from the Treated LAW Primary Condenser (TLP-COND-00001), Inter-Condenser (TLP-COND-00002), and After-Condenser (TLP-COND-0003) are collected in the Treated LAW Evaporator Condensate Vessel (TLP-VSL-00002) and discharged to the RLD system. The noncondensables from the condenser train are discharged to the PVP system.

The TLP feed system includes two LAW SBS Condensate Receipt Vessels (TLP-VSL-00009A/B) for managing submerged bed scrubber recycles from LAW vitrification and pretreatment process recycles. One vessel will be in an accumulation mode while the alternate vessel is feeding the Treated LAW Evaporator Separator Vessel (TLP-SEP-00001).

The primary design features of the TLP feed components include:

- Internal PJMs that blend and maintain solids suspension in the waste.
- Instrumentation for monitoring of vessel liquid level.
- Vessel vent to the PVP system.
- Passive air purge of the vessel vapor space.
- Pump and line flushing capability.
- Transfer flow rate indication and transfer volume totalizer.
- Remote sampling capability off the discharge of the transfer pumps.
- Vessel spray rings for vessel decontamination.

The Treated LAW Evaporator Separator Vessel (TLP-SEP-00001) is a forced-circulation unit operating under vacuum to reduce the operating temperature. A recirculation pump maintains a high flow rate from the evaporator separator vessel to the Treated LAW Evaporator Reboiler (TLP-RBLR-00001). The pump transfers the waste through the Treated LAW Evaporator Reboiler (TLP-RBLR-00001) and back into the Treated LAW Evaporator Separator Vessel (TLP-SEP-00001). The recirculating waste stream is prevented from boiling in the reboiler tubes by maintaining sufficient hydrostatic head (submergence) above the reboiler tubes.

As the liquid travels out of the Treated LAW Evaporator Reboiler (TLP-RBLR-00001), the hydrostatic head diminishes and flash evaporation occurs as the flow enters the Treated LAW Evaporator Separator Vessel (TLP-SEP-00001). The liquid continues to flash and the vapor and liquid streams are separated (liquid-vapor disengagement). The liquid stream circulates in this loop and becomes more concentrated, while the vapor stream passes through a demisting section to the evaporator condensers. A portion of the concentrate is also pumped from the bottom of the Treated LAW Evaporator Separator Vessel

(TLP-SEP-00001) at the controlled liquid density and is discharged to the TCP system as feed to LAW vitrification.

The primary design features of the evaporator trains include:

- Operating pressure indication and control.
- Differential pressure indication across the Treated LAW Evaporator Separator Vessel (TLP-SEP-00001) demister section.
- Water sprays to the Treated LAW Evaporator Separator Vessel (TLP-SEP-00001) demister section.
- Process condensate radiation monitoring and recycle capability.
- Low-pressure steam supply for heating the Treated LAW Evaporator Reboiler (TLP-RBLR-00001).
- Treated LAW Evaporator Reboiler (TLP-RBLR-00001) tube leak detection and diversion capability.
- Treated LAW Evaporator Reboiler (TLP-RBLR-00001) steam condensate collection.
- Instrumentation for monitoring and control of vessel liquid level.
- Passive venting via the downstream vessels connected to the vent header.
- Capability to drain, flush, and chemically clean the system.

The vapor stream exiting the Treated LAW Evaporator Separator Vessel (TLP-SEP-00001) is condensed in a three-stage condenser system consisting of a Primary Condenser (TLP-COND-00001), an Inter-Condenser (TLP-COND-00002), and an After-Condenser (TLP-COND-00003). The noncondensable offgas exiting downstream of the After-Condenser (TLP-COND-00003) are routed to the PVP system for treatment.

The primary design features for vapor stream management include:

- Instrumentation for monitoring and control of vessel liquid level.
- Vessel vent to the PVP system to prevent pressurization of a vessel.
- Remote sampling capability of the transfer pump discharge via autosampler ASX-SMPLR-00017.
- Dip legs in the vessel that maintain a liquid seal (pressure boundary) between the vessel and the condensers.
- Makeup recycle water as required for startup.

The condensed vapor from the condensers is collected in the Treated LAW Evaporator Condensate Vessel (TLP-VSL-00002). A small fraction of the total condensate is recycled to the Treated LAW Evaporator Separator Vessel (TLP-SEP-00001) demister water sprays. The balance of the condensate is transferred to the RLD system.

Condensate from the primary condenser is monitored for radioactivity. In the event of radioactivity breakthrough being detected, a TLP system shutdown is initiated and the contents of the Treated LAW Evaporator Condensate Vessel (TLP-VSL-00002) are transferred to a LAW SBS Condensate Receipt Vessels (TLP-VSL-00009A/B).

4D.2.12 Treated LAW Concentrate Storage Process System

Process flow diagram of the TCP system is provided in DWP Operating Unit Group 10, Appendix 8.1. The primary function of the TCP system is to receive treated LAW concentrate from the TLP system and store the material for subsequent batch transfer to the LAW Vitrification Facility.

The main components of the TCP tank system are:

- Treated LAW Concentrate Storage Vessel (TCP-VSL-00001).
- Pumps for transferring treated LAW concentrate.
- Three waste transfer lines to LAW vitrification.
- Vessel inlet and outlet valve headers.
- Pumps, piping, and instrumentation for waste transfers.

Dilute treated LAW direct from the CXP system can also be received and stored in the TCP system (evaporator by-pass option). The Treated LAW Concentrate Storage Vessel (TCP-VSL-00001) provides lag storage to sustain Immobilized Low-Activity Waste (ILAW) glass production if the pretreatment processing is interrupted.

Out-of-specification treated LAW concentrate can be recycled to the waste FRP system for rework through pretreatment, or recycled to the TLP system for blending and additional evaporation.

Under strict administrative control (sampling and jumper installation), the Treated LAW Concentrate Storage Vessel (TCP-VSL-00001) can also receive treated LAW entrained solids directly from the Ultrafiltration Feed Vessels (UFP-VSL-00002A/B) if the solids meet treated LAW feed specification.

During commissioning, treated LAW concentrate may be stored in a dedicated FRP vessel for additional lag storage capacity. Transfers from and to the TCP and FRP systems will also be under strict administrative control (sampling and jumper installation).

Treated LAW concentrate is batch-transferred from the tank to LAW vitrification through the inner pipe of any one of three co-axial transfer lines (two connected, one unconnected spare). The inlet and outlet valve headers and pumps are used in combination to facilitate circulation and sampling, forward transfer to LAW vitrification, and recycle to the TLP system or FRP system.

The primary design features of the TCP system include:

- Capability to pressure test both the inner and outer transfer lines for integrity.
- Transfer line leak detection system for integrity indication during transfer.
- Transfer line flushing and draining capability.
- Instrumentation for monitoring vessel liquid level.
- Vessel vent to the PVP system.
- Direct steam injection to maintain the concentrate temperature above the saturation temperature to prevent precipitation.
- Internal PJMs for solids suspension and slurry mixing.
- Remote sampling capability off the discharge of the transfer pump via autosampler ASX-SMPLR-00017.
- Vessel spray rings for vessel decontamination.
- Administrative controls and radiation monitoring to ensure that treated LAW transferred into and from the vessel meets waste specification for LAW vitrification.

The TCP system pumps and valve headers exposed to low radiation potential are located in a C3/R3 area for ease of maintenance.

4D.2.13 Spent Resin Collection and Dewatering Process System

Process flow diagram of the RDP system is included in DWP Operating Unit Group 10, Appendix 8.1. The primary function of the RDP system to support the CXP system by providing equipment necessary for periodic removal of spent ion exchange resin. The RDP system has four main functions:

- Provide resin flush liquor to fluidize and transport the resin from the CXP columns to the RDP vessels.
- Temporarily store spent resin to allow sampling of spent resin.
- Transfer spent resin to the dewatering high integrity disposal container.
- Dewater spent resin to the required water content for transportation and disposal.

The primary components of the RDP system include:

- Spent Resin Slurry Vessels (RDP-VSL-00002A/B/C).
- Dewatering skid, containing the Spent Resin Dewatering Moisture Separation Vessel (RDP-VSL-00004), shielded dewatering cask with HIC inside, filters, blower, and pump.
- Pumps, piping, and instrumentation for waste transfers.

Spent resin is first eluted and then hydraulically discharged under pressure from the ion exchange column by fluidizing the bed of resin with transport liquid. The spent resin removal process is initiated by flushing an eluted Cesium and Ion Exchange Column (CXP-IXC-00001/2/3/4) and hydraulically discharging the contents into a Spent Resin Slurry Vessel (RDP-VSL-00002A/B/C). In these vessels, the resin slurry will be circulated, monitored for cesium content, and delivered to a sampling system (ASX-SMPLR-00015) to determine whether the resin is in compliance with the receiving TSD unit's waste acceptance criteria. Spent resins that meet the receiving TSD unit's waste acceptance criteria will be dewatered, containerized, and transferred to a TSD unit.

Spent Resin Slurry Vessels (RDP-VSL-00002A/B/C)

Spent resin is removed from each Cesium Ion Exchange Column (CXP-IXC-00001/2/3/4) independently as a batch operation. Spent resin slurry from the ion exchange columns is collected in the three Spent Resin Slurry Vessels (RDP-VSL-00002A/B/C), which are interchangeable and will be capable of storing transport liquid and resin slurry. Once in the Spent Resin Slurry Vessel (RDP-VSL-00002A/B/C), the resin slurry will be mixed by PJMs and monitored for radiation (gamma) content in a circulation loop to determine if elution has sufficiently removed radionuclides from the resin for disposal.

Spent resin that does not meet the predetermined treatment limits will be routed back through CRP-BULGE-00001 to the Cesium Ion Exchange Columns (CXP-IXC-00001/2/3/4) for additional elution. After completing the additional elution, the resin is transferred back to a Spent Resin Slurry Vessels (RDP-VSL-00002A/B/C) where it is processed again.

Spent Resin Dewatering Moisture Separation Vessel (RDP-VSL-00004)

Following assurance that the spent resin is in compliance with the receiving TSD unit's acceptance criteria, the resin is pumped to the disposable spent resin dewatering HIC located inside the transportable shielding cask.

There are three steps to resin dewatering. First, a gross dewatering removes excess water as the slurry is pumped to the shielded cask/HIC. Next, a dewatering pump is used to remove standing water above the resin bed. Finally, in order to remove the final few inches of water from the HIC, dry air is circulated from the dewatering blower into the dewatering HIC. The dry air becomes humidified and is then pumped into the dewatering moisture separator vessel (RDP-VSL-00004). Inside the moisture separator vessel are coils that remove the water from the air. The condensation collects inside the moisture separator vessel (RDP-VSL-00004) while the dry air is then circulated back into the dewatering HIC.

When the water content in the resin is reduced to an acceptable level, the dewatering operation is complete.

The primary design features of the RDP system are:

- Instrumentation for monitoring and control of vessel liquid level.
- PJMs in the Spent Resin Slurry Vessels (RDP-VSL-00002A/B/C).
- Passive vessel overflow routes from the Spent Resin Slurry Vessels (RDP-VSL-00002A/B/C).
- Remote sampling capabilities on the discharge transfer pumps.
- Connection of the vessel vapor spaces to the PVP system.

4D.2.14 Pretreatment Maintenance

The PTF will include maintenance facilities that will enable remote and hands-on maintenance of process equipment, and will consist of the following systems:

- Pretreatment In-Cell Handling System (PIH).
- Pretreatment Filter Cave Handling System (PFH).
- Radioactive Solid Waste Handling System (RWH).

The individual systems and their primary functions are described below:

Pretreatment In-Cell Handling System

The purpose of this system is to decontaminate and perform maintenance on equipment in the hot cell and/or dispose of hot cell equipment. The PIH system will perform the following functions:

- Decontaminate equipment using carbon dioxide pellets or an acid and steam mixture sprays to decontaminate equipment surfaces.
- Decontaminate equipment internals in the Decontamination Soak Tank (PIH-TK-00001).
- Collecting liquids in catch pans.
- Holding components while doing work using fixtures.
- Disassembling, repairing, and reassembling process equipment remotely.

Typical process equipment that the system will handle are pumps, valves, jumpers, small vessels, and other ancillary equipment and/or tools. Maintenance equipment requiring periodic servicing by this system will include cranes, manipulators, and decontamination and disassembly tools.

Equipment in this system will include:

- Overhead cranes
- Manipulators (powered and manual)
- Shield and airlock doors
- Size reduction equipment (cutters, shears, etc.)
- Crane deployed equipment, such as impact wrenches and spreader bars
- Fixtures
- Decontamination equipment (carbon dioxide, wash down, Decontamination Soak Tank [PIH-TK-00001])
- Manipulator-operated assembly/disassembly tools used in repair
- Turntables
- Pumps, piping, and instrumentation for waste transfers

Pretreatment Filter Cave Handling System

The purpose of this system is to provide a method for performing maintenance on ventilation equipment in the filter cave. The equipment in this system will provide the following functions:

- Lifting, holding, transporting, installing/uncoupling primarily filters, some process equipment, and failed in-cell cranes and powered manipulators.
- Providing fixtures for holding components while doing work.
- Operation of some manual valves.
- Decontamination and monitoring of contaminated equipment.

Typical ventilation equipment the PFH system will handle are High Efficiency Particulate Air Filter (HEPA) and High-Efficiency Mist Eliminators (HEMEs), and duct isolation valves, inside the cell. Maintenance equipment requiring periodic servicing by this system will include cranes, manipulators, and decontamination and disassembly tools.

Equipment in this system will include:

- Overhead cranes
- Manipulators (powered and manual)
- Shield and airlock doors
- Crane deployed equipment, such as impact wrenches and spreader bars
- Decontamination equipment (carbon dioxide, wash down)
- Manipulator-deployed assembly/disassembly tools used in repair

Radioactive Solid Waste Handling System

The purpose of this system is to provide a means to dispose of mixed waste contaminated equipment. This system interfaces with system PIH, system PFH, and the spent resin dewatering system. The main functions system RWH provides are:

- Lifting, holding, and transporting disposal containers.
- Packaging disposal containers and preparing the containers for shipping.
- Cleaning and remote monitoring of disposal containers.
- Temporary shielding and confinement barriers.

Typical process and ventilation equipment the system will handle are failed process equipment, such as pumps and valves, filters, jumpers, and maintenance equipment.

Equipment in this system will include:

- Overhead cranes.
- Manipulators (manual).
- Carts for transporting waste containers.
- Associated support equipment, like impact wrenches and spreader bars.
- Decontamination systems, such as carbon dioxide.
- Remote radioactive monitoring.
- Temporary shielding and confinement barriers used for packaging.
- Disposal containers.

The primary design features of the PIH, PFH, and RWH systems are:

- RESERVED

4D.2.15 Plant Wash and Disposal System

Process flow diagrams of the PWD system are provided in DWP Operating Unit Group 10, Appendix 8.1. The primary function of the PWD tank system is to receive, store, and transfer effluent. It will collect plant wash, drains, and acidic or alkaline effluent from the PTF.

The primary components of the PWD tank system include:

- Plant Wash Vessel (PWD-VSL-00044).
- Acidic/Alkaline Effluent Vessels (PWD-VSL-00015/16).
- HLW Effluent Transfer Vessel (PWD-VSL-00043).
- C3 Floor Drain Collection Vessel (PWD-VSL-00046).
- Ultimate Overflow Vessel (PWD-VSL-00033).
- Pumps, piping, and instrumentation for waste transfers.

Plant Wash Vessel (PWD-VSL-00044)

During operations, plant wash and drain effluents will be collected and mixed in with other effluents in the Plant Wash Vessel prior to transfer. The solution will be analyzed for pH and excess acidic effluent will be neutralized. Effluents will be recycled to the FEP system.

PJMs are used to provide a uniform mixture during neutralization within the Plant Wash Vessel. Excess acidic effluent is neutralized with sodium hydroxide supplied from a reagent header. Wash rings are used for vessel washing. Vessel-emptying ejectors may be used for transfers to the Acidic/Alkaline Effluent Vessel (PWD-VSL-00016).

A reverse flow diverter supplies a representative sample of the contents of the Plant Wash Vessel (PWD-VSL-00044) for analysis. If the pH is confirmed to be above a predetermined value, reverse flow diverter(s) transfer the effluent from the Plant Wash Vessel (PWD-VSL-00044) to the Waste Feed Evaporator Feed Vessels (FEP-VSL-00017A/B). Normally, the contents of the Plant Wash Vessel (PWD-VSL-00044) is blended with the contents of the Acidic/Alkaline Effluent Vessels (PWD-VSL-00015/16) in the Waste Feed Evaporator Feed Vessels to maintain a consistent evaporator feed.

Acidic/Alkaline Effluent Vessels (PWD-VSL-00015/16)

The Acidic/Alkaline Effluent Vessels (PWD-VSL-00015/16) primarily receive alkaline cleaning effluent from the UFP system, caustic rinse from the CXP system, and process condensate from the CNP system. The effluents are sampled to confirm that the pH is above a predetermined value, and reverse flow diverters transfer the high-activity effluents to the Waste Feed Evaporator Feed Vessels (FEP-VSL-00017A/B) for reprocessing.

High Level Waste Effluent Transfer Vessel (PWD-VSL-00043)

The HLW Effluent Transfer Vessel (PWD-VSL-00043) receives HLW acidic wastes from HLW vitrification line drains from HLW vitrification/PTF transfer lines, and laboratory drains. The vessel may also receive flush wastes from the HLW Facility. These effluents are transferred to the Plant Wash Vessel (PWD-VSL-00044) to recycle the effluents back into the process system.

C3 Floor Drain Collection Vessel (PWD-VSL-00046)

The C3 Floor Drain Collection Vessel (PWD-VSL-00046) receives effluents from miscellaneous floor drains in the C3 areas, and liquids from the sump in the local pit. Sampling capability has been provided but will not normally be used. This effluent will be transferred to the Alkaline Effluent Vessels (RLD-VSL-00017A/B). The C3 Floor Drain Collection Vessel (PWD-VSL-00046) is vented locally through a HEPA filtration system.

Ultimate Overflow Vessel (PWD-VSL-00033)

The Ultimate Overflow Vessel receives overflows from vessels in the PTF. Additionally, this vessel receives line drains and flushes. The vessel operating level is maintained below a predetermined level to allow the vessel to hold 30 minutes of overflow at the highest transfer rate within the facility.

The primary design features of the PWD system are:

- Instrumentation for monitoring and control of vessel liquid level.
- PJMs in the Ultimate Overflow Vessel (PWD-VSL-00033), the HLW Effluent Transfer Vessel (PWD-VSL-00043), the Acidic/Alkaline Effluent Vessels (PWD-VSL-00015/16), and the Plant Wash Vessel (PWD-VSL-00044).
- Passive vessel overflow routes from the Acidic/Alkaline Effluent Transfer Vessels, and the Plant Wash Vessel.
- Remote sampling capabilities on the discharge of transfer pumps via autosamplers ASX-SMPLR-00019 and ASX-SMPLR-00025.
- Connection of the vessel vapor spaces to the PVP system.

4D.2.16 Radioactive Liquid Waste Disposal System

Process flow diagrams of the RLD system are provided in DWP Operating Unit Group 10, Appendix 8.1. The primary function of the RLD tank system is to receive, store, and transfer contaminated liquid effluents. The RLD system will receive low-activity mixed waste effluents.

The primary components of the RLD tank system include:

- Process Condensate Tanks (RLD-TK-00006A/B).
- Alkaline Effluent Vessels (RLD-VSL-00017A/B).
- Pumps, piping, and instrumentation for waste transfers.

These RLD vessels primarily receive effluent from the caustic scrubber purges from the LAW Vitrification Facility and from the C3 Floor Drain Collection Vessel in PTF (PWD-VSL-00046).

When these vessels reach a predetermined level, they are sampled, and if the sample meets the Liquid Effluent Retention Facility/Effluent Treatment Facility (LERF/ETF) waste acceptance criteria, it will be transferred to the Process Condensate Tanks (RLD-TK-00006A/B). If the effluent does not meet LERF/ETF waste acceptance criteria, it will be returned to the TLP system for reprocessing.

Process Condensate Tanks (RLD-TK-00006A/B)

Process condensates are the effluent condensed vapors removed from the waste streams by the PTF evaporators. Waste FEP effluents and TLP condensates are normally received directly into the Process Condensate Tanks (RLD-TK-00006A). The effluents from the Process Condensate Tank (RLD-TK-00006A) are recycled into the process or discharged to the Process Condensate Tank (RLD-TK-00006B).

The effluent in the Process Condensate Tanks will be sampled, to demonstrate compliance with the LERF/ETF waste acceptance criteria. It may also be sampled should a process upset occur. If analysis determines that the effluent is outside the waste acceptance criteria, it will be returned to the TLP for reprocessing.

The Alkaline Effluent Vessels (RLD-VSL-00017A/B) and Process Condensate Tanks (RLD-TK-00006A/B) are vented to the PVP system.

The primary design features of the RLD system are:

- Instrumentation for monitoring and control of vessel liquid level.
- Passive vessel overflow routes from the Alkaline Effluent Vessels (RLD-VSL-00017A/B).
- Remote sampling capabilities on the discharge of transfer pumps via autosampler ASX-SMPLR-00017.
- Connection of the vessel vapor spaces to the PVP system.

4D.2.17 Sodium Hydroxide Reagent System

The PTF Sodium Hydroxide Reagent (SHR) System includes a vessel (SHR-VSL-00001), ancillary equipment, and instruments associated with its operation. Sodium hydroxide is stored in vessel SHR-VSL-00001for emergency elution of the CXP columns. The vessel SHR-VSL-00001 receives sodium hydroxide from the BOF sodium hydroxide reagent storage vessel after dilution to 0.1 M using ionized water. When the high temperature alarm is detected on the CXP columns, the sodium hydroxide is gravity transferred from the SHR-VSL-00001 to the CXP system.

The SHR system does not manage dangerous waste and is provided here for completeness of the PTF process description.

4D.3 Containment Buildings

This section describes how these units are designed and operated, in accordance with the requirements of WAC 173-303-695, which incorporates 40 Code of Federal Regulations (CFR) 264 Subpart DD, “Containment Buildings”, by reference. Regulatory citations in this section list the applicable section of the CFR to make it easier for readers to find the requirement. A typical containment building is illustrated in Appendix 4A, Figure 4A-59.

There are twenty-one containment buildings at the WTP: five located within the PTF; six in the LAW Vitrification Facility; and ten in the HLW Vitrification Facility. The regulated units in the PTF are:

- Pretreatment Hot Cell Containment Building (P-0123)
- Pretreatment Maintenance Containment Building (PM0124, P-0121A, P-0122A, P-0123A, P-0124, P-0124A, P-0125, P-0125A, P-0128, P-0128A)
- Pretreatment Spent Filter Drum Handling Area Containment Building (P-0223)
- Pretreatment Filter Cave Containment Building (P-0335)
- Pretreatment PJV Secondary HEPA Filter Room Containment Building (P-0431A)

Table 4D-5 summarizes the units within the PTF. The following figures and drawings found in DWP Operating Unit Group 10 provide further detail for the containment buildings:

- Figure 4A-59 depicting common features of containment buildings.
- General arrangement figures and drawings showing locations of containment buildings.
- Waste management area figures showing containment building locations to be permitted.

Control of fugitive emissions from containment buildings is described in Chapter 4 Process Information, Section 4.2.10 Air Emissions.

The following sections address each of the containment buildings.

4D.3.1 Pretreatment Hot Cell Containment Building (P-0123)

The Pretreatment Hot Cell Containment Building is situated between Feed Receipt Cell (Room P-0108B) and Remote Decontamination Maintenance Cave (Room P-0123A), in the central portion of the PTF. The room contains process equipment, which may require remote maintenance over the life of the plant. Typical waste management activities performed in the containment building include waste storage, the removal and staging of remote-handled process equipment prior to decontamination, repair, and/or packaging of waste for disposal. Equipment located in the Hot Cell Containment Building can be moved, using an overhead crane and a power manipulator, into the Remote Decontamination Maintenance Cave for decontamination and size reduction for waste packaging, or decontamination for maintenance.

Due to the radiation and contamination levels, personnel are prohibited from entering and working in Room P-0123. All activities within the room will be remotely controlled. The hot cell provides secondary containment for tank systems located in the room, and for tank systems located in adjacent black cells. The hot cell floor provides primary containment for spills that occur during associated maintenance activities.

The Pretreatment Hot Cell Containment Building contains two tank systems, three primary containment sumps and three miscellaneous units.

Cesium Ion Exchange Process System

Cesium Exchange Columns CXP-IXC-00001/2/3/4 remove cesium from permeate produced by the ultrafiltration system and are regulated as dangerous waste tanks.

Ultrafilter Process System

Ultrafilters UFP-FILT-00001A-5A and UFP-FILT-00001B-5B concentrate the waste feed for the HLW vitrification process and are regulated as dangerous waste tanks.

Primary Containment Sumps

The hot cell floor slopes to three primary containment sumps; PWD System Sumps PWD-SUMP-00026, PWD-SUMP-00028, and PWD-SUMP-00029. Design, construction, and operating requirements applicable to primary containment sumps are detailed in DWP III.10.E. Each primary containment sump will have a steam ejector for transferring liquids to PWD System Vessel PWD-VSL-00044. The sumps will be covered with stainless steel grating and/or screen mesh to protect the ejectors from debris. Figure 4A-128 in Appendix 4A contains a conceptual design for a typical, primary containment sump.

Low-Activity Waste Evaporator Reboiler Miscellaneous Unit

Waste is pumped through LAW Evaporator Reboiler TLP-RBLR-00001 and concentrated by flash evaporation. The concentrated waste is transferred to the Treated LAW Evaporator Separator Vessel TLP-SEP-00001.

Cesium Evaporator Concentrate Reboiler

Dilute acidic solution from Cesium Evaporator Separator Vessel CNP-EVAP-00001 is recirculated through Reboiler CNP-HX-00001 and concentrated by flash evaporation.

Waste Evaporator Reboilers Miscellaneous Unit

Dilute waste is pumped through Waste Feed Evaporator Reboilers FEP-RBLR-00001A/B and concentrated by flash evaporation. The concentrated waste is transferred to the Waste Feed Evaporator Separator Vessels FEP-VSL-00017A/B.

Hot Cell Floor Miscellaneous Unit

The Hot Cell Containment Building floor provides primary containment for spills that occur during maintenance activities. Remotely removable sections of flexible pipe called “jumpers” are used to connect equipment located in the Hot Cell Containment Building. A jumper may consist of a process, electrical or pneumatic line with remote connector heads at either end. As a precursor for maintenance or equipment change-out, jumpers (flexible pipes) may be used to transfer waste from one process component to another. After waste transfer, the jumper remains in place, and approximately three jumper-volumes of water will be flushed through the jumper to the receiving component. After the flush has been completed, the jumper will be disconnected from the upstream component. When the jumpers are disconnected, flush water from the jumper will spill onto the floor and flow into the room sump(s). The amount of flush water, which may spill onto the floor, depends on the length of the jumper and the location of the components involved in the transfer.

Maintenance activities, using jumpers, are expected to average two per week. The anticipated spill per maintenance activity will be approximately 30 to 150 gallons. About once in three years, an equipment changeout is expected to result in a spill of approximately 200 to 300 gallons.

Spills from maintenance activities will be managed in the Hot Cell Floor Miscellaneous Unit. Spills will flow down the sloped floor into a primary containment sump, for transfer to a PWD system tank. The room floor is lined with stainless steel plate, which is fully grouted. Objects will not be placed directly on the floor liner. Objects will be staged on a platform to protect the stainless steel floor liner from damage.

Hot Cell Containment Building Dangerous Waste Management Units

Equipment Number	Description/System	Purpose
Dangerous Waste Tank Systems		
CXP-IXC-00001/2/3/4	Cesium Ion Exchange Column/Cesium Ion Exchange Process	Remove cesium from permeate produced by the ultrafiltration system.
UFP-FILT-00001A-5A UFP-FILT-00001B-5B	Ultrafilter/Ultrafiltration Process	Concentrate the waste feed.
PWD-SUMP-00026	Primary Containment Sump/Plant Wash and Disposal System	Manage liquids.
PWD-SUMP-00028	Primary Containment Sump/Process Wash and Disposal System	Manage liquids.
PWD-SUMP-00029	Primary Containment Sump/Pretreatment In-Cell Handling System	Manage liquids.
Miscellaneous Units		
CNP-HX-00001	Evaporator Concentrate Reboiler/Cesium Nitric Acid Recovery Process System	Concentrate dilute acid solution for reuse.
TLP-RBLR-00001	LAW Evaporator Reboiler/Treated LAW Evaporation Process	Concentrate pretreated LAW feed prior to transfer from PTF to LAW.
FEP-RBLR-00001A/B	Waste Feed Evaporator Reboilers/Waste Feed Evaporation Process	Concentrate the dilute recycled waste streams.
Not Applicable	Hot Cell Floor/NA	Manage liquid waste.

Process equipment, such as pumps, valves, and jumpers, are located in the hot cell. Typical waste management activities performed in the hot cell include the removal and staging of remote-handled process equipment prior to decontamination, repair, and/or packaging of waste for disposal. Equipment located in the Hot Cell Containment Building can be moved, using an overhead crane and a power manipulator, into the Remote Decontamination Maintenance Cave for decontamination and size reduction for waste packaging, or decontamination for maintenance.

Pretreatment Hot Cell Containment Building Design

The Pretreatment Hot Cell Containment Building is designed as a completely enclosed area within the PTF.

It is designed to prevent the release of dangerous constituents and their exposure to the outside environment. The design and construction of the hot cell and the PTF exterior will prevent water from running into the facility. The approximate dimensions of the unit are summarized in Table 4D-5.

Pretreatment Hot Cell Containment Building Structure

The Pretreatment Hot Cell Containment Building will be a concrete-walled structure fully enclosed within the PTF. Therefore, structural requirements for the containment building will be met by the design standards of the PTF. The roof of the PTF will consist of metal roofing, roof insulation, and vapor barrier. Rainwater run-off will be collected by roof drains and drainage systems with overflow roof drains. The design will ensure that the unit has sufficient structural strength to prevent collapse or failure. DWP Operating Unit Group 10, Supplement 1 provides documentation that the seismic requirements for the PTF meet or exceed the Uniform Building Code Seismic Design Requirements.

Pretreatment Hot Cell Containment Building Materials

The Pretreatment Hot Cell Containment Building will be constructed of steel-reinforced concrete. The interior floor and portions of the lower walls will be lined with stainless steel plate. The balance of the walls will not have an impervious coating.

Use of Incompatible Materials in the Pretreatment Hot Cell Containment Building

A stainless steel liner will be provided on the floor and portions of the wall. Stainless steel will be compatible with the waste that will be generated and managed, in the room, such as failed pumps, ultrafilters, and valves. Activities in the unit may include, but are not be limited to, equipment changeout and maintenance.

Primary Barrier Integrity in the Pretreatment Hot Cell Containment Building

The Pretreatment Hot Cell Containment Building is designed to withstand loads from the movement of personnel, wastes, and handling equipment. The seismic design criteria identified in DWP Operating Unit Group 10, Supplement 1 ensures that appropriate design loads, load combinations, and structural acceptance criteria are employed at the WTP.

Certification of Design for the Pretreatment Hot Cell Containment Building

Prior to initial receipt of dangerous and mixed waste startup of operations, a certification by a Qualified Registered Professional Engineer that the Pretreatment Hot Cell Containment Building meets the design requirements of 40 CFR 264.1101(a), and (c) will be obtained.

Operation of the Pretreatment Hot Cell Containment Building

Operational and maintenance controls and practices will be established and followed to ensure containment of the waste within the Pretreatment Hot Cell Containment Building as required by 40 CFR 264.1101(c)(1).

Maintenance of the Pretreatment Hot Cell Containment Building

The partial stainless steel lining will be constructed and maintained in a manner that will be free of significant cracks, gaps, corrosion, or other deterioration. The partial stainless steel liner will remain free of corrosion or other deterioration because it is compatible with materials that will be managed in the containment building. The failed equipment and other objects that will be managed in the containment building unit will be staged on a platform to protect the floor from damage.

Measures to Prevent Tracking Wastes from the Pretreatment Hot Cell Containment Building

The Pretreatment Hot Cell Containment Building is designed to isolate failed equipment from the accessible environment and to prevent the spread of contaminated materials. Very little dust is expected to be generated in the unit. Personnel access to the unit, which is classified as a C5 contamination area, will be restricted. Waste leaving the unit may or may not be enclosed within containers. Equipment leaving the unit will be monitored for radioactive contamination and decontaminated if necessary, before being released for removal.

Procedures in the Event of Release or Potential for Release from the Pretreatment Hot Cell Containment Building

The design and operation of the unit makes it very unlikely that releases will occur. The design and operational measures will minimize the generation of dust and contain it within the unit. The ventilation system will also use negative air pressure to keep contamination from spreading to areas of lesser contamination. Offgas will be routed to the PTF C5 ventilation system.

Inspections will identify conditions that could lead to a release. Such conditions will be corrected on a schedule intended to preclude any releases that could be hazardous to public health or the environment. In the unlikely event that a release of dangerous wastes from the containment building is detected, actions required by 40 CFR 264.1101(c)(3)(i) through (iii) will be taken. Specific administrative and operating methods that will be used to satisfy this requirement will be developed prior to initial receipt of dangerous and mixed waste. These methods will be followed to repair conditions that could lead to a release.

Inspections of the Pretreatment Hot Cell Containment Building

An inspection program will be established to detect conditions that could lead to a release of wastes from the Pretreatment Hot Cell Containment Building. The inspection and monitoring schedule and methods that will be used to detect releases from the unit are included in DWP Operating Unit Group 10, Chapter 6.0.

4D.3.2 Pretreatment Maintenance Containment Building (PM0124, P-0121A, P-0122A, P-0123A, P-0124, P-0124A, P-0125, P-0125A, P-0128, P-0128A)

The second area that meets the definition of a containment building is the Pretreatment Maintenance Containment Building, which comprises the majority of the east end of the building. Typical waste management activities performed in this containment building include waste storage, equipment maintenance, including decontamination, size reduction, and packaging of spent equipment. This unit consists of the interim storage, lag storage, manipulator decontamination and repair, resin handling, waste packaging, tool cribs, and cask lidding room. The unit will include hatches to import or export spent equipment. An overhead crane will facilitate movement of equipment and removal or placement of the spent equipment in the waste containers. The floor and lower wall of Room P-0123A provide secondary containment for Process In-Cell handling, Decontamination Soak Tank PIH-TK-00001 and primary containment for decontamination activities.

Pretreatment Maintenance Containment Building Design

The Pretreatment Maintenance Containment Building is designed as a completely enclosed area within the PTF. The unit is designed to prevent the release and exposure of dangerous constituents to the outside environment. The design and construction of the PTF exterior will prevent water from running into the facility. The roof of the PTF will consist of metal roofing, roof insulation, and a vapor barrier. Rainwater run-off will be collected by roof drains and drainage system with overflow roof drains. The approximate dimensions of the unit are summarized in Table 4D-5.

Pretreatment Maintenance Containment Building Structure

The Pretreatment Maintenance Containment Building will consist of several rooms within the concrete-walled, fully enclosed PTF.

Therefore, structural requirements for the containment building will be met by the design standards of the PTF. The design will ensure that the unit has sufficient structural strength to prevent collapse or failure. DWP Operating Unit Group 10, Supplement 1 provides documentation that the seismic requirements for the PTF meet or exceed the Uniform Building Code Seismic Design Requirements.

Pretreatment Maintenance Containment Building Materials

The Pretreatment Maintenance Containment Building will be constructed of steel-reinforced concrete. In Room P-0123A, the floor and portions of the walls provide primary containment for decontamination activities. The floor and portions of the walls will be lined with stainless steel plate. The walls above the stainless steel liner to the bottom of the runway beam support (approximately 27-foot elevation) for the In-Cell Bridge Crane PIH-CRN-00004 will be coated during construction. Since the room is classified as a C5 area and is located in an unmanned portion of the facility, the wall coating will not be maintained.

Use of Incompatible Materials in the Pretreatment Maintenance Containment Building

In Room P-0123A, the floor and portions of the walls provide primary containment for decontamination activities. The floor and portions of the walls will be lined with stainless steel plate. The walls above the stainless steel liner to approximately 27-foot elevation will be coated during construction. The stainless steel liner and wall coating will be compatible with the wastes that will be managed and the decontamination solutions that will be used in the room. Activities in the Pretreatment Containment Building will be limited to decontamination, maintenance, size reduction, and waste packaging.

Primary Barrier Integrity in the Pretreatment Maintenance Containment Building

The Pretreatment Maintenance Containment Building is designed to withstand loads from the movement of personnel, wastes, and handling equipment. The seismic design criteria identified in DWP Operating Unit Group 10, Supplement 1 ensures that appropriate design loads, load combinations, and structural acceptance criteria are employed at the WTP.

Certification of Design for the Pretreatment Maintenance Containment Building

Prior to initial receipt of dangerous and mixed waste, certification by a Qualified Registered Professional Engineer that the pretreatment maintenance containment building meets the design requirements of 40 CFR 264.1101(a), and (c) will be obtained.

Operation of the Pretreatment Maintenance Containment Building

Operational and maintenance controls and practices will be followed to ensure containment of the waste within the Pretreatment Maintenance Containment Building as required by 40 CFR 264.1101(c)(1).

Maintenance of the Pretreatment Maintenance Containment Building

The stainless steel lining and coatings in Room P-0123A that provides primary containment will be constructed and maintained in a manner that will be free of significant cracks, gaps, corrosion, or other deterioration. The stainless steel liner in Room P-0123A will remain free of corrosion or other deterioration because it will be compatible with materials that will be managed in the containment building. Since Room P-0123A is located in an unmanned portion of the facility, any wall coatings above the stainless steel liner will not be maintained. Only decontamination solutions that are compatible with the primary containment liner material will be used.

Measures to Prevent Tracking Wastes from the Pretreatment Maintenance Containment Building

The Pretreatment Maintenance Containment Building is designed to isolate failed equipment from the accessible environment and to prevent the spread of contaminated materials.

The containment building will be classified as a C3/C5 contamination area and, therefore, personnel access will be limited, and may be restricted. Wastes leaving the unit may be enclosed within containers. If necessary, these containers will be decontaminated in the unit prior to transportation to a permitted storage area. Equipment leaving the unit will be monitored for radioactive contamination and decontaminated, as necessary, before being released for removal from the containment building.

Procedures in the Event of a Release or Potential Release from the Pretreatment Maintenance Containment Building

The design and operation of the unit makes it very unlikely that releases will occur. The design and operational measures that will be used will minimize the generation of dust and contain it within the unit. The ventilation system will also use negative air pressure to keep contamination from spreading to areas of lesser contamination.

In the unlikely event that a release of dangerous wastes from the containment building is detected, actions required by 40 CFR 264.1101(c)(3)(i) through (iii) will be taken. Specific administrative and operating methods to satisfy this requirement will be developed prior to initial receipt of dangerous and mixed waste. These methods will be followed to repair condition that could lead to a release.

Inspections of the Pretreatment Maintenance Containment Building

An inspection program will be established as required under WAC 173-303-695 to detect conditions that could lead to the release of wastes from the Pretreatment Maintenance Containment Building. Such conditions will be corrected on a schedule which prevents hazards to the public health and the environment. The inspection and monitoring schedule and methods that will be used to detect a release are included in DWP Operating Unit Group 10, Chapter 6.0.

4D.3.2.1 Remote Decontamination Maintenance Cave (Room P-0123A)

The Remote Decontamination Maintenance Cave (Room P-0123A) is situated between the hot cell (Room P-0123) and the hands-on, Crane Maintenance Area (Room P-0122A). Due to the radiation and contamination levels, personnel are prohibited from entering and working in Room P-0123A. All activities within the room will be remotely controlled. The entire floor and portions of the walls are lined with stainless steel. The stainless steel plate on the floor is 3/16 inch thick. On the west side of Room P-0123A, a stub wall, separates the Remote Decontamination Maintenance Cave from Room P-0123 hot cell. The stub wall is approximately 4 feet (ft) 8 inches (in) high on the north end of the room and approximately 10 ft high on the south end, adjacent to Spray Decontamination Turntable PIH-TTBL-00001. Typical waste management activities performed in the room includes waste storage, decontamination, sizing, and packaging. The Remote Decontamination Maintenance Cave contains four dangerous waste management units consisting of a tank system, two primary containment sumps, and a miscellaneous unit.

Primary Containment Sumps

Room P-0123A floor slopes to primary containment sump PWD-SUMP-00032 located near Spray Decontamination Turntable PIH-TTBL-00001 and to primary containment sump PWD-SUMP-00033 located near Remote Repair Turntable PIH-TTBL-00002. The stainless steel sumps will manage spent decontamination solution resulting from activities performed in the maintenance cave. Design, construction, and operating requirements applicable to primary containment sumps are detailed in DWP III.10.E. Each primary containment sump will have a steam ejector for transferring liquids to Plant Wash and Disposal System Vessel PWD-VSL-00044. The sumps will be covered with stainless steel grating and/or screen mesh to protect the ejectors from debris. Figure 4A-128 contains a typical, primary containment sump, conceptual design.

Decontamination Soak Tank PIH-TK-00001

For items that require a more robust decontamination process, the room is equipped with Decontamination Soak Tank PIH-TK-00001.

Using the overhead crane, items can be immersed in the soak tank before either being packaged or repaired. The decontamination solutions used in the soak tank will be non-combustible. Examples of decontamination solutions which may be used in the soak tank, are nitric acid and plant water with a surfactant. The room provides secondary containment for the Decontamination Soak Tank. Secondary containment consists of the room floor and the wall several inches above the floor. The secondary containment area is lined with fully grouted, stainless steel plate.

Spray Decontamination and Sizing System Miscellaneous Unit

The Spray Decontamination and Sizing System Miscellaneous Unit is comprised of the following equipment: Spray Decontamination Turntable PIH-TTBL-00001, Remote Repair Turntable PIH-TTBL-00002, Size Reduction Table PIH-BENCH-00003, other platforms located in the room, and various tools consisting of decontamination spray lances, cutting tools and a hydraulic shear. The floor provides primary containment for the unit. Objects will not be placed or staged directly on the floor. Equipment and bulk waste too large for the size reduction table will be placed on platforms or support frames. Equipment repair, waste storage, decontamination, and sizing activities may be performed at each of these stations. Decontamination activities may consist of any combination of swabs and sprays. Decontamination sprays will be, but not limited to: high pressure steam in conjunction with nitric acid, CO2 pellets, and low pressure water or water and surfactant. Items are moved to and from room P-0123A via the in-cell bridge crane. Items can be moved to various locations within the room using the two overhead cranes.

Spray Decontamination Turntable PIH-TTBL-00001 will primarily be used to stage items for decontamination. The turntable is approximately 2.5 ft high by 5 ft wide, and will support up to 5 tons. Spent decontamination fluid and other liquids generated at the turntable will drain to primary containment sump PWD-SUMP-00032.

Remote Repair Turntable PIH-TTBL-00002 will primarily be used to stage items for remote disassembly and repair. Various holding fixtures and remote operated tools to support repair activities will be staged at the turntable. The turntable, approximately 2.5 ft high by 11 ft wide, will support up to 30 tons. Spent decontamination fluid and other liquid wastes generated at the turntable will drain to primary containment sump PWD-SUMP-00033.

Size Reduction Table PIH-BENCH-00003, is located in the central portion of the room. The table, approximately 25 ft long by 15 ft wide, will be used as a staging and work area for items too large for the turntables. The table will support 30 tons and will protect the floor from damage. Spent decontamination solutions and other liquid wastes generated at the table will drain to the primary containment sumps.

The floor and walls provide primary containment for decontamination activities. The walls above the stainless steel liner to 27-foot elevation, will be initially coated with an imperious coating, compatible with the decontamination solutions which will be used in the room. The room is a C5 area, located in an unmanned portion of the facility. The wall coatings above the stainless steel liner plate will not be maintained. Administrative controls will be in place to minimize the over spray of decontamination solution to the walls above the stainless steel liner. Procedurally, a pressurized liquid source will not be introduced until the lance is positioned for use and under the control of a manipulator grip. Positioning will be verified visually or via camera. If over spray of decontamination solution to the wall, above the stainless steel liner occurs, spray decontamination will be stopped until the cause of the over-spray has been identified and corrected. Possible corrective actions include but are not limited to: additional training for the equipment operator, replacing the spray lance, and revising the operating procedure.

Remote Decontamination Maintenance Cave Dangerous Waste Management Units

Equipment Number	Description/System	Purpose
Dangerous Waste Tank Systems		
PWD-SUMP-00032	Primary Containment Sump/Plant Wash and Disposal System	Manage spent decontamination solution generated by room activities.
PWD-SUMP-00033	Primary Containment Sump/Plant Wash and Disposal System	Manage spent decontamination solution generated by room activities.
PIH-TK-00001	Decontamination Soak Tank/Plant Wash and Disposal System	Decontamination of items by soaking and spraying.
Spray Decontamination and Sizing System Miscellaneous Unit Equipment		
PIH-TTBL-00001	Spray Decontamination Turntable/Pretreatment In-Cell Handling System	Primarily for the decontamination of items prior to repair or sizing. Items maybe sized for packaging.
PIH-TTBL-00002	Remote Repair Turntable/Pretreatment In-Cell Handling System	Primarily for repair of items. Items may undergo further decontamination or be sized for packaging.
PIH-BENCH-00003	Size Reduction Table/Pretreatment In-Cell Handling System	Primarily for the decontamination and size reduction of items too large to stage on a turntable.

4D.3.3 Pretreatment Spent Filter Drum Handling Area Containment Building (P-0223)

The Pretreatment Spent Filter Drum Handling Area Containment Building is the third containment building within the PTF, located in the southeast portion of the facility. Typical waste management activities performed in this containment building include, waste storage, decontamination, and equipment repair. A crane transports spent HEPA and HEME filters and then places them inside a disposal container. The disposal container is then transported via cart, through an air lock and shield doors and to a load-out area for storage pending final disposal. The containment building also houses a hands-on crane decontamination and repair area.

Pretreatment Spent Filter Drum Handling Area Containment Building Design

The Pretreatment Spent Filter Drum Handling Area Containment Building will be completely enclosed within the PTF, and will be designed to prevent the release and exposure of dangerous constituents to the outside environment. The design and construction of the PTF exterior will prevent water from running into the facility. The roof of the PTF will consist of metal roofing, roof insulation, and a vapor barrier. Run-off will be collected by roof drains and a drainage system with overflow drains. The interior floor and a portion of the walls will be covered with epoxy coating to protect the concrete and facilitate decontamination. The approximate dimensions of the containment building are summarized in Table 4D-5.

Pretreatment Spent Drum Handling Area Containment Building Structure

Because the Pretreatment Spent Filter Drum Handling Area Containment Building will be a concrete-walled structure fully enclosed within the PTF, its requirements will be met by the design standards of the PTF. The design will ensure that the unit has sufficient structural strength to prevent collapse or failure. DWP Operating Unit Group 10, Supplement 1 provides documentation that the seismic requirements for the PTF meet or exceed the Uniform Building Code Seismic Design Requirements.

Pretreatment Spent Drum Handling Area Containment Building Materials

The Pretreatment Spent Filter Drum Handling Area Containment Building will be constructed of steel-reinforced concrete. The containment building floor and partial walls be covered with epoxy coating to protect the concrete and facilitate decontamination.

Use of Incompatible Materials for the Pretreatment Spent Drum Handling Area Containment Building

A protective coating on the floor will be compatible with the wastes that will be managed in the unit, which will include spent HEPA and HEME filters. Activities in the unit will be limited to waste packaging.

Primary Barrier Integrity in the Pretreatment Spent Drum Handling Area Containment Building

The Pretreatment Spent Filter Drum Handling Area Containment Building will be designed to withstand loads from the movement of personnel, wastes, and handling equipment.

The seismic design criteria found in DWP Operating Unit Group 10, Supplement 1 ensures that appropriate design loads, load combinations, and structural acceptance criteria are employed at the WTP.

Certification of Design for the Pretreatment Spent Drum Handling Area Containment Building

Prior to initial receipt of dangerous and mixed waste, certification by a Qualified Registered Professional Engineer that the Pretreatment Spent Filter Drum Handling Area Containment Building meets the design requirements of 40 CFR 264.1101(a) and (c) will be obtained. The requirements of 40 CFR 264.1101(b) do not apply to this design because any dangerous waste containing free liquids will be managed on portable secondary containment that meets the requirements of WAC 173-303-630(7).

Operation of the Pretreatment Spent Drum Handling Area Containment Building

Operational and maintenance controls and practices will be established to ensure containment of the waste within the Pretreatment Spent Filter Drum Handling Area Containment Building, as required by 40 CFR 264.1101(c)(1).

Maintenance of the Pretreatment Spent Drum Handling Area Containment Building

The protectively-coated concrete floor and walls of the unit will be constructed and maintained in a manner that will be free of significant cracks, gaps, corrosion, or other deterioration. The epoxy coating will be compatible with materials that will be managed in the containment building, which will include spent HEPA and HEME filters. Only decontamination solutions that are compatible with the protective coating will be used.

Measures to Prevent Tracking Wastes from the Pretreatment Spent Drum Handling Area Containment Building

The Pretreatment Spent Filter Drum Handling Area Containment Building is designed to manage spent HEPA and HEME filters. Conducting these activities in a C5 contamination zone will prevent the spread of contaminated materials. Restricted personnel access and controlled movement of equipment into and out of the unit will decrease the possibility that waste will be tracked from the unit.

Personnel access to the Pretreatment Spent Filter Drum Handling Area Containment Building, which is classified as a C5 contamination area, will be restricted. Access to the unit will be allowed only under limited circumstances, thereby limiting the potential for contacting the waste and tracking it from the unit.

Procedures in the Event of Release or Potential for Release from the Pretreatment Spent Drum Handling Area Containment Building

Conditions that could lead to a release from the Pretreatment Spent Filter Drum Handling Area Containment Building will be corrected on a schedule intended to preclude any release that could be hazardous to public health or the environment. In the unlikely event of a release of dangerous wastes from the containment building, actions required by 40 CFR 264.1101(c)(3)(i) through (iii) will be taken. Specific administrative and operating methods that will be used to satisfy this requirement will be developed prior to initial receipt of dangerous and mixed waste.

Inspections of the Pretreatment Spent Drum Handling Area Containment Building

An inspection program will be established to detect conditions that could lead to a release of wastes from the Pretreatment Spent Filter Drum Handling Area Containment Building. Such conditions will be corrected on a schedule which prevents hazards to the public health and environment. The inspection and monitoring schedule, and methods that will be used to detect releases from the unit, are included in DWP Operating Unit Group 10, Chapter 6.0.

4D.3.4 Pretreatment Filter Cave Containment Building (P-0335)

The Pretreatment Filter Cave Containment Building is the fourth containment building within the PTF, in the southeast portion of the facility.

Typical waste management activities performed in this containment building include waste storage, decontamination, and equipment repair. A crane transports the spent HEPA and HEME filters and places them inside a disposal container. The disposal container is then transported via cart through an air lock and shield doors to a load-out area for storage pending final disposal. The containment building also houses a dedicated crane maintenance area.

Pretreatment Filter Cave Containment Building Design

The Pretreatment Filter Cave Containment Building will be completely enclosed within the PTF, and will be designed to prevent the release and exposure of dangerous constituents to the outside environment. The design and construction of the PTF exterior will prevent water from running into the facility. The roof of the PTF will consist of metal roofing, roof insulation, and a vapor barrier. Run-off will be collected by roof drains and a drainage system with overflow drains. The approximate dimensions of the containment building are summarized in Table 4D-5.

Pretreatment Filter Cave Containment Building Structure

Because the Pretreatment Filter Cave Containment Building will be a concrete-walled structure fully enclosed within the PTF, its requirements will be met by the design standards of the PTF. The design will ensure that the unit has sufficient structural strength to prevent collapse or failure. DWP Operating Unit Group 10, Supplement 1 provides documentation that the seismic requirements for the PTF meet or exceed the Uniform Building Code Seismic Design Requirements.

Pretreatment Filter Cave Containment Building Unit Materials

The Pretreatment Filter Cave Containment Building will be constructed of steel-reinforced concrete. The floor, wall, and berm surrounding the PJV demisters and PVP HEMEs will be covered with a stainless steel liner.

Use of Incompatible Materials for the Pretreatment Filter Cave Containment Building

The liner will be compatible with the wastes that will be managed in the unit, which will include spent HEPA and HEME filters. Activities in the unit will be limited to waste packaging. Decontamination solutions will be compatible with the liner on the floor.

Primary Barrier Integrity in the Pretreatment Filter Cave Containment Building

The Pretreatment Filter Cave Containment Building will be designed to withstand loads from the movement of wastes and handling equipment. The seismic design criteria found in DWP Operating Unit Group 10, Supplement 1 ensures that appropriate design loads, load combinations, and structural acceptance criteria are employed at the WTP.

Certification of Design for the Pretreatment Filter Cave Containment Building

Prior to initial receipt of dangerous and mixed waste, certification by a Qualified Registered Professional Engineer that the Pretreatment Filter Cave Containment Building meets the design requirements of 40 CFR 264.1101(a) and (c) will be obtained. The requirements of 40 CFR 264.1101(b) do not apply to this design because any dangerous waste containing free liquids will be managed on portable secondary containment that meets the requirements of WAC 173-303-630(7).

Operations of the Pretreatment Filter Cave Containment Building

Operational and maintenance controls and practices will be established to ensure containment of the waste within the Pretreatment Filter Cave Containment Building, as required by 40 CFR 264.1101(c)(1).

Maintenance of the Pretreatment Filter Cave Containment Building

The stainless steel liner surrounding the demisters and HEMEs will be constructed and maintained in a manner that will be free of significant cracks, gaps, corrosion, or other deterioration. The liner on the floor will be compatible with materials that will be managed in the containment building, which will include spent HEPA and HEME filters. Only decontamination solutions that are compatible with the liner on the floor will be used.

Measures to Prevent Tracking Wastes from the Pretreatment Filter Cave Containment Building

The Pretreatment Filter Cave Containment Building is designed to manage spent HEPA and HEME filters. Conducting these activities in a C5 contamination zone will prevent the spread of contaminated materials. Restricted personnel access and controlled movement of equipment into and out of the unit will decrease the possibility that waste will be tracked from the unit.

Procedures in the Event of Release or Potential for Release from the Pretreatment Filter Cave Containment Building

Conditions that could lead to a release from the Pretreatment Filter Cave Containment Building will be corrected on a schedule intended to preclude any release that could be hazardous to public health or the environment. In the unlikely event of a release of dangerous wastes from the containment building, actions required by 40 CFR 264.1101(c)(3)(i) through (iii) will be taken. Specific administrative and operating methods that will be used to satisfy this requirement will be developed prior to initial receipt of dangerous and mixed waste.

Inspections of the Pretreatment Filter Cave Containment Building

An inspection program will be established to detect conditions that could lead to a release of waste from the Pretreatment Filter Cave Containment Building. Such conditions will be corrected on a schedule which prevents hazards to public health and the environment. The inspection and monitoring schedule and methods that will be used to detect releases from the unit are included in DWP Operating Unit Group 10, Chapter 6.0.

4D.3.5 Pretreatment PJV Secondary HEPA Filter Room Containment Building (P-0431A)

The Pretreatment PJV Secondary HEPA Filter Room Containment Building is the fifth containment building within the PTF, located in the center of the PTF at El. 77 ft. Typical waste management activities performed in this containment building include packaging and storage of spent PJV system HEPA filters.

Pretreatment PJV Secondary HEPA Filter Room Containment Building Design

The Pretreatment PJV Secondary HEPA Filter Room Containment Building will be completely enclosed within the PTF, and will be designed to prevent the release and exposure of dangerous constituents to the outside environment. The design and construction of the PTF exterior will prevent water from running into the facility. The roof of the PTF will consist of metal roofing, roof insulation, and a vapor barrier. Run-off will be collected by roof drains and a drainage system with overflow drains. The interior floor and a portion of the walls will be covered with epoxy coating to protect the concrete from contamination. The approximate dimensions of the containment building are summarized in Table 4D-5.

Pretreatment PJV Secondary HEPA Filter Room Containment Building Structure

Because the Pretreatment PJV Secondary HEPA Filter Room Containment Building will be a concrete-walled structure fully enclosed within the PTF, its requirements will be met by the design standards of the PTF. The design will ensure that the unit has sufficient structural strength to prevent collapse or failure.

DWP Operating Unit Group 10, Supplement 1 provides documentation that the seismic requirements for the PTF meet or exceed the Uniform Building Code Seismic Design Requirements.

Pretreatment PJV Secondary HEPA Filter Room Containment Building Materials

The Pretreatment PJV Secondary HEPA Filter Room Containment Building will be constructed of steel-reinforced concrete. The containment building floor and partial walls be covered with epoxy coating to protect the concrete and facilitate decontamination.

Use of Incompatible Materials for the Pretreatment PJV Secondary HEPA Filter Room Containment Building

The epoxy coating will be compatible with the wastes that will be managed in the unit, which will include spent HEPA filters. Activities in the unit will be limited to waste packaging and storage. Decontamination reagents that could cause the epoxy coating to leak, corrode, or otherwise fail will not be used within the unit.

Primary Barrier Integrity in the Pretreatment PJV Secondary HEPA Filter Room Containment Building

The Pretreatment PJV Secondary HEPA Filter Room Containment Building will be designed to withstand loads from the movement of personnel, wastes, and handling equipment. The seismic design criteria found in DWP Operating Unit Group 10, Supplement 1 ensures that appropriate design loads, load combinations, and structural acceptance criteria are employed at the WTP.

Certification of Design for the Pretreatment PJV Secondary HEPA Filter Room Containment Building

Prior to initial receipt of dangerous and mixed waste, certification by a Qualified Registered Professional Engineer that the Pretreatment PJV Secondary HEPA Filter Room Containment Building meets the design requirements of 40 CFR 264.1101(a) and (c) will be obtained.

The requirements of 40 CFR 264.1101(b) do not apply to this design because any dangerous waste containing free liquids will be managed on portable secondary containment that meets the requirements of WAC 173-303-630(7).

Operation of the Pretreatment PJV Secondary HEPA Filter Room Containment Building

Operational and maintenance controls and practices will be established to ensure containment of the waste within the Pretreatment Spent Filter Drum Handling Area Containment Building, as required by 40 CFR 264.1101(c)(1).

Maintenance of the Pretreatment PJV Secondary HEPA Filter Room Containment Building

The epoxy-coated concrete floor and walls will be compatible with materials that will be managed in the containment building, which will include spent HEPA filters. No decontamination chemicals that are incompatible with the coated concrete will be used.

Measures to Prevent Tracking Wastes from the Pretreatment PJV Secondary HEPA Filter Room Containment Building

The Pretreatment PJV Secondary HEPA Filter Room Containment Building is designed to manage spent HEPA filters. Conducting these activities in a C3 contamination zone will prevent the spread of contaminated materials. Limited personnel access and controlled movement of equipment into and out of the unit will decrease the possibility that waste will be tracked from the unit.

Procedures in the Event of Release or Potential for Release from the Pretreatment PJV Secondary HEPA Filter Room Containment Building

Conditions that could lead to a release from the Pretreatment PJV Secondary HEPA Filter Room Containment Building will be corrected on a schedule intended to preclude any release that could be hazardous to public health or the environment. In the unlikely event of a release of dangerous wastes from the containment building, actions required by 40 CFR 264.1101(c)(3)(i) through (iii) will be taken. Specific administrative and operating methods that will be used to satisfy this requirement will be developed prior to initial receipt of dangerous and mixed waste.

Inspections of the Pretreatment PJV Secondary HEPA Filter Room Containment Building

An inspection program will be established to detect conditions that could lead to a release of wastes from the Pretreatment PJV Secondary HEPA Filter Room Containment Building. The inspection and monitoring schedule, and methods that will be used to detect releases from the unit, are included in DWP Operating Unit Group 10, Chapter 6.0.

4D.4 Air Emission Control

4D.4.1 Pretreatment Facility Ventilation

PTF ventilation includes the following systems:

- C1 ventilation system (C1V)
- C2 ventilation system (C2V)
- C3 ventilation system (C3V)
- C5 ventilation system (C5V)

The primary consideration in the design of the ventilation systems is to confine airborne sources of contamination to protect human health and the environment from exposure to hazardous materials during normal and abnormal operating conditions. Physical barriers or structures supported by the ventilation systems will ensure air released to the environment and residual contamination is well below acceptable, safe levels for public exposure.

The PTF will be divided into four numbered zones, listed below, with the higher number indicating greater hazard potential that needs greater control or restriction. The ventilation system zoning is based on the classifications assigned to building areas for potential contamination. Zones classified as C5 are potentially the most contaminated, such as the pretreatment cells. Zones classified as C1 are uncontaminated areas.

The confinement provided by physical barriers is enhanced by the ventilation system, which creates a pressure gradient and causes air to flow through engineered routes from an area of lower contamination potential to an area of higher contamination potential. There will be no C4 areas in the PTF. The cascade system, in which air passes through more than one area, will reduce the number of separate ventilation streams and, hence, the amount of air requiring treatment.

C1 Ventilation System (C1V)

C1 areas are normally occupied. C1 areas will typically consist of administrative offices, control rooms, conference rooms, locker rooms, rest rooms, and equipment rooms. C1 areas will be operated slightly pressurized relative to atmosphere and other adjacent areas.

C2 Ventilation System (C2V)

C2 areas typically consist of nonprocess operating areas, access corridors, and control/instrumentation, and electrical rooms. Filtered air will be supplied to these areas by the C2 supply system and will be cascaded into adjacent C3 areas or HEPA filtered and exhausted by the C2 Exhaust system.

C3 Ventilation System (C3V)

C3 areas normally will be unoccupied, but operator access during maintenance will be allowed. C3 areas typically will consist of filter plant rooms, workshops, maintenance areas, and monitoring areas. Access from a C2 area to a C3 area will be via a C2/C3 subchange room. Air will generally be drawn from C2 areas and cascaded through the C3 areas into C5 areas. In general, air cascaded into the C3 areas will be from adjacent C2/C3 subchange rooms. In some areas, where higher flow may be required into C3 areas, a dedicated C2 supply will be provided with a backdraft damper on the C2 supply duct, which will be closed in the event of a loss of C3 extract. This system will shut down should there be a failure of the C5 exhaust system.

C5 Ventilation System (C5V)

The PTF C5 areas are designed with the cell or cave perimeter providing radiation shielding as well as a confinement zone for ventilation purposes. C5 areas typically consist of a series of process cells where waste will be stored and treated. The PTF hot cell will house major pumps and valves and other process equipment. Air will be cascaded into the C5 areas, generally from adjacent C3 areas, and extracted by the C5 extract system. The C5 exhaust system will be composed of primary and secondary HEPA Filters and variable speed exhaust fans. Fans designed to maintain continuous system operation will drive the airflow. This system will also be interlocked with the C3 HVAC system, to prevent backflow by shutting down the C3 system if the C5 HVAC system shuts down.

4D.4.2 Vessel Vent Process and Exhaust System

Process flow diagrams of the PTF PVP/PVV system are provided in DWP Operating Unit Group 10, Appendix 8.1.

The PVP/PVV system provide air purging of the head spaces of various process vessels for radiolytic hydrogen control, collection of vent exhausts from process vessels, and process treatment and filtration of the vessel vent exhaust gases before discharging to the PTF stack.

The PVP/PVV systems are composed of tanks and miscellaneous treatment systems, as follows:

Tank Systems

- Vessel Vent HEME Drain Collection Vessel (PVP-VSL-00001).
- Pumps, piping, and instrumentation for waste transfers.

Miscellaneous Unit Systems

- Vessel Vent Caustic Scrubber (PVP-SCB-00002).
- Vessel Vent HEME (Mist Eliminators) (PVP-HEME-00001A/B/C).
- Vessel Vent Primary HEPA Filters (PVV-HEPA-00001A/B).
- Vessel Vent Secondary HEPA (PVV-HEPA-00002A/B).
- Vessel Vent Volatile Organic Compound (VOC) Oxidizer Unit (PVP-OXID-00001).
- Vessel Vent After-Cooler (PVP-CLR-00001).
- Vessel Vent Carbon Bed Adsorbers (PVP-ADBR-00001A/B).
- Vessel Vent Adsorber Outlet Filter (PVP-FILT-00001).
- Pumps, piping, and instrumentation for waste transfers.
- Vessel Vent Exhaust Fans (PVV-FAN-00001A/B).

<u>Purge Air Supply</u>

Continuous air purge to process vessels is the primary control strategy for radiolytic produced hydrogen. Additional airflow above the minimum hydrogen control rate may be introduced to each vessel to help balance the system and ensure that vessels are obtaining the minimum required flow.

The purge air in-bleed to vessels in the pretreatment area is a passive feature. The process vessels located in the C5 ventilation area will draw passive purge air in-bleed from the C5 ventilation area near the vessels via subheaders. Other vessels located in the C3 ventilation area and Process Condensate Tanks (RLD-TK-00006A/B) located outside the Pretreatment Building will draw air in-bleed from the C3 ventilation area nearest to the vessels through the inlet HEPA filters. The exhaust fans provide the motive force for airflow through each vessel by maintaining a negative pressure.

Forced purge air to the selected process vessels is also provided from the plant service air supply header. Each of the selected process vessels is provided with the required airflow to control the hydrogen concentration below 1% in the vessel during normal operation and below 4% (lower flammability limit) during abnormal conditions. The supply line to each of these selected process vessels, which requires forced purge air during normal operation, is provided by two parallel trains of valves and flow elements to meet the high reliability requirements.

For the Waste Feed Evaporator Separator Vessels (FEP-SEP-00001A/B) and the Treated LAW Evaporator Separator Vessel (TLP-SEP-00001), which require forced purge air only during a shutdown or a loss of off-site power event, there are two separate trains of actuated valves and flow elements provided for each. The actuated valves for both of these trains are normally in closed position, but will fail open during the shutdown or loss of off-site power event.

<u>Collection of Vent Gases</u>

From the individual process vessel, a vent line routes exhaust gases to a subheader, usually one for each cell. The connection to the subheaders from the process vessels are arranged, where possible, to maintain airflow from normally lower activity vessels to (or past) normally higher activity level vessels. Vent exhaust gases from various process vessels are combined to flow via subheaders to the Vessel Vent Caustic Scrubber (PVP-SCB-00002). The vent gases from the vessels located in the C3 areas and the Process Condensate Tanks (RLD-TK-00006A/B), located outside the pretreatment building, will be collected via other subheaders that combine into the common exhaust header. Any condensate formed in the common exhaust header will flow by gravity into Plant Wash Vessel (PWD-VSL-00044).

Vessel Vent Caustic Scrubber (PVP-SCB-00002)

The vessel vent exhausts flow into the Vessel Vent Caustic Scrubber (PVP-SCB-00002). The Vessel Vent Caustic Scrubber (PVP-SCB-00002) is operated continuously to remove the nitrogen oxide and acid gases from the vessel vents. The vent gases flow to the inlet of the scrubber and flow upwards through a packed bed. Alkaline scrubbing liquid flows down through the packed bed. Contact between the gas and the scrubbing liquid in the bed causes part of the nitrogen oxide and acid gases present in the vent offgases to react with the caustic in the scrubbing liquid to adsorb and form sodium salts, which stay in solution. The scrubbing liquid solution is collected in the scrubber sump vessel located below the packed bed section of the scrubber.

Two scrubber recirculation pumps (one operating and one in standby) continuously recirculate the scrubbing liquid solution to the top of the packed bed section of the scrubber. The operating pump also directly recirculates part of the solution into the sump vessel located below the scrubber to provide adequate mixing of the liquid in the vessel. The scrubber pump also transfers the collected condensate and scrubbing liquid normally once a day or on high level to the Plant Wash Vessel (PWD-VSL-00044). A section of dry packing located above the main packed section removes any entrained liquid droplets from the exit gases. A wash-water ring is provided above each of the packed sections to wash off any accumulation of solids. Fresh five molar caustic solution is added intermittently from the sodium hydroxide reagent process system (SHR). The caustic solution is added intermittently to scrubber sump vessel to maintain the pH range for the scrubbing liquid recirculating to the top of the main packed section.

When needed, demineralized water is also added to the Vessel Vent Caustic Scrubber (PVP-SCB-00002) wash rings to clean the dry packing or for makeup requirements.

The outlet gases from the Vessel Vent Caustic Scrubber (PVP-SCB-00002) flow to the Vessel Vent HEME (Mist Eliminator). The inlet, outlet, and bypass valves are provided for the Caustic Scrubber. The valves will be remotely operated by a manipulator in the pretreatment filter cave area.

Vessel Vent HEME (Mist Eliminators) (PVP-HEME-00001A/B/C) (HEME)

The HEMEs will be composed of deep-bed fiber filter elements configured in an annular shape to remove fine aerosols. Vent gases from the scrubber flow into two HEMEs, with the third HEME available as standby. Gases flow from the outside to the hollow core. The treated gas exits at the top and the liquid collects at the sealed bottom in a drainpipe. The HEMEs are operated wet at all times to allow drainage of soluble liquid aerosols that accumulate in the fibers, form a liquid film, and drop to the drain line below to the Vessel Ventilation HEME Drain Collection Vessel (PVP-VSL-00001). Atomizing spray of demineralized water is provided at the gas inlet nozzle for each operating HEME. An intermittent wash spray of the filter elements will be used to remove any accumulated debris, thus extending the service life of the HEME elements. Intermittent washing will normally be carried out off-line.

Three separate HEMEs will treat the vessel vent offgas stream. This configuration will permit washing each HEME while it is offline.

The HEME effluent will be discharged to the Vessel Vent HEME Drain Collection Vessel (PVP-VSL-00001) and then to the Plant Wash Vessel (PWD-VSL-00044) in the PWD system.

After treatment in HEMEs, heated air is added from the inbleed HEPA filters to prevent condensation in the downstream PVV HEPA filters.

Vessel Vent Primary HEPA Filters (PVV-HEPA-00001A/B)

The preheated vent exhaust gases from the heaters flow into one of the two primary HEPA filter banks, which will be on line while the other one is available as standby. The HEPA filters will remove the particulates from the gas stream. The Vessel Vent Primary HEPA Filters will be located in the pretreatment filter cave area (room P-0335) for remote maintenance.

Vessel Vent Secondary HEPA Filters (PVV-HEPA-00002A/B)

The gases from the Vessel Vent Primary HEPA Filter flow into one of the two Vessel Vent Secondary HEPA Filter banks, which will be on line while the other one is available as standby. The Vessel Vent Secondary HEPA Filters will remove any remaining particulates from the exhaust gases.

After the Primary and Secondary HEPA Filters remove the particulates from the vessel vent exhaust stream in the PVV system, the filtered vent exhaust stream returns to the PVP system for abatement of VOC. The VOC abatement process removes vapor-phase organic compounds from the PVP vent gas. This abatement process takes place within an oxidation system followed by an adsorption system. The oxidation system includes a VOC Oxidizer Unit (PVP-OXID-00001) and an After-Cooler (PVP-CLR-00001). The adsorption system includes Carbon Bed Adsorbers (PVP-ADBR-00001A/B) and a medium efficiency Adsorber Outlet Filters (PVP-FILT-00001A/B).

Vessel Vent VOC Oxidizer Unit (PVP-OXID-00001)

To remove VOC from the vessel vent stream, a skid-mounted electric, noncatalyzed oxidizer unit will be used. In this unit, VOC in the offgas are oxidized to carbon dioxide and water vapor at high temperature in the presence of excess oxygen.

The offgas then enters the heat recovery unit to transfer the heat to the bed, which will then be used for preheating the incoming offgas. The cooled gas stream is then directed to the Vessel Vent Aftercooler (PVP-CLR-00001). The treated gases are cooled by the cooling water. Any condensate generated by cooling of the gases will flow to the C3 Floor Drain Collection Vessel (PWD-VSL-00046).

Vessel Vent Carbon Bed Adsorbers (PVP-ADBR-00001A/B)

Two parallel Vessel Vent Carbon Bed Adsorbers are provided for the final treatment of vent gases. The adsorbers are filled with activated carbon. The Vessel Vent Carbon Bed Adsorber will further reduce VOC from the vessel vent exhaust gases. The Vessel Vent VOC Oxidizer Unit (PVP-OXID-00001) will remove most of the VOC from the vessel vent gases, and the Vessel Vent Carbon Bed Adsorbers (PVP-ADBR-00001A/B) will remove the remaining VOC. Normal operation will be one unit online while the other is in maintenance mode.

Vessel Vent Adsorber Outlet Filter (PVP-FILT-00001)

The treated gases from the Vessel Vent Carbon Bed Adsorbers (PVP-ADBR-00001A/B) will flow into this filter, where fine carbon particles, if any are present in the vent gases, will be filtered. This filter is also provided with a bypass line and isolation valves to enable replacement of the filter.

Vessel Vent Exhaust Fans (PVV-FAN-00001A/B)

After the filtration in the Vessel Vent Adsorber Outlet Filter (PVP-FILT-00001), the vent gases will flow into the Vessel Vent Exhaust Fan (PVV-FAN-00001A/B) in the PVV system. Two Exhaust Fans are provided. One will be in operation while the second one will be on standby.

The Vessel Vent Exhaust Fans (PVV-FAN-00001A/B) provide the necessary motive force to extract the vent gases from the head spaces of various process vessels and provides for the required pressure drop through various treatment equipment in the PVP/PVV systems. The Vessel Vent Exhaust Fans (PVV-FAN-00001A/B) will maintain a constant suction pressure at the inlet to the Vessel Vent Caustic Scrubber (PVP-SCB-00002). The Vessel Vent Exhaust Fans (PVV-FAN-00001A/B) will have suitable speed control to accommodate variation in the vent gas flow rates from various vessels.

In addition to the instrumentation, alarms, controls, and interlocks addressed in Appendix 4D, the following will be provided for the PVP/PVV systems to indicate or prevent the following conditions:

- For purge air flow measurement:
  - Passive purge air flow rate will be measured for the process vessels including low flow alarm for each of these flow instruments.
  - Forced purge air flow rate will be measured and low flow alarmed for the process vessels that require the control of hydrogen concentration. These instruments will have important-to-safety instrument function.
- For the HEMEs:
  - The outlet pressure, pressure drop, and the flow rates will be monitored and controlled.
  - Demineralized water supply for HEMEs will have monitoring for the inlet pressure and flow rates.
- For the HEPA filters, the pressure drop will be monitored and controlled within the required limits.
- For the VOC Oxidizer Unit (PVP-OXID-00001):
  - The thermal oxidizer reaction zone, the outlet temperatures, and the pressure drop will be monitored and controlled.
  - The oxidizer bypass valve cannot be opened unless the reaction zone temperature has been attained.
- For the carbon bed adsorber:
  - The pressure drop through the bed will be monitored and controlled.
  - The differential temperature across the carbon bed will be monitored.
- For the adsorber outlet filter, the pressure drop will be monitored and controlled.

The PVP/PVV systems have the following design features:

- Provide the function of air purging of the head spaces of various process vessels for radiolytic hydrogen control.
- Collect vent exhausts from process vessels.
- Treat the combined exhaust gases to adsorb soluble nitrogen oxide(s) and acid gases, remove liquid droplets, condensate, mists, and solid particulates in the PVP system.
- Preheat vent gases to control relative humidity and then remove particulates with two stages of HEPA filters.
- Provide additional treatment for the oxidation and removal of VOC from the filtered exhaust gases in the PVP system. The filtered treated exhaust gases will then flow to the exhaust fans in the PVV system for venting to the atmosphere.
- Remote sampling capabilities via autosampler ASX-SMPLR-00019.

4D.4.3 Pulse Jet Ventilation (PJV) System

Process flow diagrams of the PJV System are provided in DWP Operating Unit Group 10, Appendix 8.1. The PJV system provides the safety function to treat the exhausts from reverse flow diverters and PJMs operating inside various process vessels before release to the atmosphere via the PTF stacks. The PJV system consists of process and HVAC equipment for removal of aerosols and particulates. The PJV system is composed of miscellaneous treatment systems, as follows:

Miscellaneous Unit Systems

- PJV Demisters (PJV-DMST-00002A/B/C).
- PJV Primary HEPA Filters (PJV-HEPA-00001A/B/C/D/E/F/G).

- PJV Secondary HEPA Filters (PJV-HEPA-00002A/B/C/D/E/F).
- PJV Exhaust Fans (PJV-FAN-00001A/B/C).
- Pumps, piping, and instrumentation for waste transfers.

The PJV system provides the containment and confinement of exhausts from various reverse flow diverters and PJMs operating inside the PTF process vessels. This system provides the removal of mists and aerosols from the combined PJV exhausts stream by demisters (medium-efficiency mist eliminators). The treated exhaust gases are mixed with hot air in-bleed from the C3 ventilation area to adjust their relative humidity followed by two stages of HEPA filtration to remove particulates. The filtered effluent gases are drawn by the PJV Exhaust Fans (PJV-FAN-00001A/B/C). The treated filtered exhaust stream will be monitored before it is discharged to the atmosphere.

Collection of Exhaust Gases (Exhaust Piping System)

The PJV system receives the exhaust via several subheaders from the reverse flow diverters and PJMs operating in various process vessels in the pretreatment area. The exhausts are combined from various subheaders to flow via the inlet header to the PJV Demisters (PJV-DMST-00002A/B/C). The low points of the inlet header and subheaders are provided with drain lines, which drain condensate collected in the header to the Ultimate Overflow Vessel (PWD-VSL-00033) in the PTF PWD system.

PJV Demisters (PJV-DMST-00002A/ B/ C)

The PJV system is provided with three PJV Demisters (PJV-DMST-00002A/B/C), which are medium-efficiency mist eliminators. Two of these demisters are in service at a given time and one is available as a standby off-line.

The PJV Demisters are used to remove fine aerosols and mist, and exhibit medium removal efficiencies for submicron aerosols. They are passive devices with low maintenance requirements and high reliability. The demisters will adequately protect the HEPA filters, located downstream in this system, from excessive activity buildup, and provide the desired HEPA filter life of 4 to 5 years.

All PJV Demisters (PJV-DMST-00002A/B/C) for this system are located, along with the HEPA filters, in the filter cave (room P-0335) in a C5 ventilation area due to the expected radionuclide loading. The PJV Demisters (PJV-DMST-00002A/B/C) are either isolated, or put into service, by opening or closing isolation valves provided at the inlet and outlet of each PJV Demister. These isolation valves are operated remotely by using the manipulator and the filter cave operating crane. The headers are designed without any bypass around the PJV Demisters (PJV-DMST-00002A/B/C) to prevent the downstream HEPAs from accelerated loading of particulates. Remote changeout capability for the Demister filter elements is provided.

The outlet gases from the Demisters (PJV-DMST-00002A/B/C) flow to the outlet header to the extract part of the PJV system, as described below.

Hot Air In-Bleed

Air in-bleed from a C3 ventilation area is filtered, heated, and then mixed with the exhaust gases from the Demister outlet to reduce the relative humidity of the stream flowing into the primary HEPA Filter banks. The in-bleed air is filtered with medium efficiency Air In-Bleed Filters (PJV-FLTH-00001A/B) and then heated to the temperature required to keep the humidity of the mixed gases below 70% and prevent the wetting of the primary HEPA Filters.

PJV Primary Exhaust HEPA Filters (PJV-HEPA-00001A/B/C/D/E/F/G)

There are seven PJV Primary HEPA Filter (PJV-HEPA-00001A/B/C/D/E/F/G) banks, arranged in parallel and configured in a running/standby arrangement to allow on-line filter change. There will be five PJV Primary HEPA Filter banks in operation, and two PJV Primary HEPA Filters will be on standby or in maintenance. The PJV Primary HEPA Filters (PJV-HEPA-00001A/B/C/D/E/F/G) will be remote change type located in the pretreatment filter cave area. Filter inserts are radial type. Inlet and outlet isolation valves for the PJV Primary HEPA Filters (PJV-HEPA-00001A/B/C/D/E/F/G) are remotely operated by a manipulator and maintenance crane in the pretreatment filter cave (room P-0335).

PJV Secondary Exhaust HEPA Filters (PJV-HEPA-00002A/B/C/D/E/F)

Exhaust gases from the PJV Primary Exhaust HEPA Filters (PJV-HEPA-00001A/B/C/D/E/F/G) are routed to the outlet header, then to the PJV Secondary Exhaust HEPA Filters (PJV-HEPA-00002A/B/C/D/E/F) located in a C3 ventilation area. There are six PJV Secondary Exhaust HEPA Filter (PJV-HEPA-00002A/B/C/D/E/F) banks, arranged in parallel and configured in a running/standby arrangement to allow on-line filter change. There will be four PJV Secondary Exhaust HEPA Filter (PJV-HEPA-00002A/B/C/D/E/F) banks in operation, and two Secondary HEPA Filter banks will be on standby or in maintenance. PJV Secondary Exhaust HEPA Filters (PJV-HEPA-00002A/B/C/D/E/F) will be the safe change type.

PJV Exhaust Fans (PJV-FAN-00001A/B/C)

The filtered exhaust from the PJV Secondary Exhaust HEPA Filters (PJV-HEPA-00002A/B/C/D/E/F) will be drawn by three PJV Exhaust Fans (PJV-FAN-00001A/B/C). Two fans will be in operation while the third fan will be on standby. The PJV Exhaust Fans (PJV-FAN-00001A/B/C) provide the necessary motive force to extract the vent gases from the fluidics discharge racks and provide for the required pressure drop through the treatment equipment in the PJV system. The PJV Exhaust Fans (PJV-FAN-00001A/B/C) will maintain a constant suction pressure condition for the inlet gas stream to the Demisters. The PJV Exhaust Fans will have suitable speed control to accommodate variation in the exhaust flow rates from reverse flow diverters and PJMs operating inside various vessels.

In the event of failure of one of the two PJV Exhaust Fans (PJV-FAN-00001A/B/C) in operation, the standby fan automatically starts. Each fan is provided with manual isolating dampers on the fan inlet and pneumatic actuated isolating dampers on the fan outlet. From the PJV Exhaust Fans (PJV-FAN-00001A/B/C), PJM and reverse flow diverter treated effluents flow via a dedicated, continuously monitored flue to the PTF stack.

The PJV system has the following design features:

- Instrumentation for monitoring process flows and equipment performance.
- Remote sampling system to confirm system performance.

In addition to the instrumentation, alarms, controls, and interlocks addressed in Appendix 4D, the following will be provided for the PJV system to indicate or prevent the following conditions:

- Flow rate for the combined exhaust gas entering the PJV Demisters (PJV-DMST-00002A/B/C) will be monitored. Suction pressure for the inlet gas will be maintained by varying the speed for the PJV Exhaust Fans (PJV-FAN-00001A/B/C).
- Pressure drop for the PJV Demisters (PJV-DMST-00002A/B/C) will be monitored.
- Each PJV HEPA filter bank will be monitored and alarmed on high differential pressure.

Table 4D-1 Pretreatment Facility Tank Systems

No.	System	Vessel Number/Location	Description	Material	Total Volume (US Gallons)	Approximate Dimensions (Inside Diameter) × Height or Length in feet and inches (tangent line/tangent line)
1.	FRP	FRP-VSL-00002A P-0108	Waste Feed Receipt Vessel	Stainless Steel	472,900	47’ x 26’ 10”
2.	FRP	FRP-VSL-00002B P-0108A	Waste Feed Receipt Vessel	Stainless Steel	472,900	47’ x 26’ 10”
3.	FRP	FRP-VSL-00002C P-0108B	Waste Feed Receipt Vessel	Stainless Steel	472,900	47’ x 26’ 10”
4.	FRP	FRP-VSL-00002D P-0108C	Waste Feed Receipt Vessel	Stainless Steel	472,900	47’ x 26’ 10”
5.	FEP	FEP-VSL-00017A P-0106	Waste Feed Evaporator Feed Vessel	Stainless Steel	85,496	22’ x 22’ 9”
6.	FEP	FEP-VSL-00017B P-0106	Waste Feed Evaporator Feed Vessel	Stainless Steel	85,496	22’ x 22’ 9”
7.	FEP	FEP-VSL-00005 P-0105B	Waste Feed Evaporator Condensate Vessel	Stainless Steel	5,022	8’ x 10’ 8”
8.	UFP	UFP-VSL-00062A P-0106	Ultrafilter Permeate Collection Vessel	Stainless Steel	34,700	15’ x 21’ 3”
9.	UFP	UFP-VSL-00062B P-0106	Ultrafilter Permeate Collection Vessel	Stainless Steel	34,700	15’ x 21’ 3”
10.	UFP	UFP-VSL-00062C P-0104	Ultrafilter Permeate Collection Vessel	Stainless Steel	34,700	15’ x 21’ 3”
11.	UFP	UFP-VSL-00001A P-0106	Ultrafiltration Feed Preparation Vessel	Stainless Steel	75,594	20’ x 25’ 9”
12.	UFP	UFP-VSL-00001B P-0104	Ultrafiltration Feed Preparation Vessel	Stainless Steel	75,594	20’ x 25’ 9”

Table 4D-1 Pretreatment Facility Tank Systems

No.	System	Vessel Number/Location	Description	Material	Total Volume (US Gallons)	Approximate Dimensions (Inside Diameter) × Height or Length in feet and inches (tangent line/tangent line)
13.	UFP	UFP-VSL-00002A P-0104	Ultrafiltration Feed Vessel	Stainless Steel	40,788	14’ x 30’ 9”
14.	UFP	UFP-VSL-00002B P-0104	Ultrafiltration Feed Vessel	Stainless Steel	40,788	14’ x 30’ 9”
15.	UFP	UFP-FILT-00001A P-0123	Ultrafilter	Stainless Steel	112	1’ 5” x 10’
16.	UFP	UFP-FILT-00001B P-0123	Ultrafilter	Stainless Steel	112	1’ 5” x 10’
17.	UFP	UFP-FILT-00002A P-0123	Ultrafilter	Stainless Steel	112	1’ 5” x 10’
18.	UFP	UFP-FILT-00002B P-0123	Ultrafilter	Stainless Steel	112	1’ 5” x 10’
19.	UFP	UFP-FILT-00003A P-0123	Ultrafilter	Stainless Steel	112	1’ 5” x 10’
20.	UFP	UFP-FILT-00003B P-0123	Ultrafilter	Stainless Steel	112	1’ 5” x 10’
21.	UFP	UFP-FILT-00004A P-0123	Ultrafilter	Stainless Steel	92	1’ 5” x 8’
22.	UFP	UFP-FILT-00004B P-0123	Ultrafilter	Stainless Steel	92	1’ 5” x 8’
23.	UFP	UFP-FILT-00005A P-0123	Ultrafilter	Stainless Steel	92	1’ 5” x 8’
24.	UFP	UFP-FILT-00005B P-0123	Ultrafilter	Stainless Steel	92	1’ 5” x 8’

Table 4D-1 Pretreatment Facility Tank Systems

No.	System	Vessel Number/Location	Description	Material	Total Volume (US Gallons)	Approximate Dimensions (Inside Diameter) × Height or Length in feet and inches (tangent line/tangent line)
25.	HLP	HLP-VSL-00028 P-0102A	HLW Feed Blend Vessel	Stainless Steel	142,200	26’ 6” x 29’
26.	HLP	HLP-VSL-00027A P-0102	HLW Lag Storage Vessel	Stainless Steel	127,260	25’ x 29’ 6”
27.	HLP	HLP-VSL-00027B P-0102	HLW Lag Storage Vessel	Stainless Steel	127,260	25’ x 29’ 6”
28.	HLP	HLP-VSL-00022 P-0102A	HLW Feed Receipt Vessel	Stainless Steel	268,800	38’ x 24’ 2”
29.	CXP	CXP-IXC-00001 P-0123	Cesium Ion Exchange Column	Stainless Steel	1024	4’ 5” x 9’
30.	CXP	CXP-IXC-00002 P-0123	Cesium Ion Exchange Column	Stainless Steel	1024	4’ 5” x 9’
31.	CXP	CXP-IXC-00003 P-0123	Cesium Ion Exchange Column	Stainless Steel	1024	4’ 5” x 9’
32.	CXP	CXP-IXC-00004 P-0123	Cesium Ion Exchange Column	Stainless Steel	1024	4’ 5” x 9’
33.	CXP	CXP-VSL-00004 P-0111	Cesium Ion Exchange Feed Vessel	Stainless Steel	10,633	10’ 6” x 14’ 3”
34.	CXP	CXP-VSL-00026A P-0114	Cesium Ion Exchange Treated LAW Collection Vessel	Stainless Steel	38,000	15’ x 24’ 6”
35.	CXP	CXP-VSL-00026B P-0114	Cesium Ion Exchange Treated LAW Collection Vessel	Stainless Steel	38,000	15’ x 24’ 6”
36.	CXP	CXP-VSL-00026C P-0114	Cesium Ion Exchange Treated LAW Collection Vessel	Stainless Steel	38,000	15’ x 24’ 6”

Table 4D-1 Pretreatment Facility Tank Systems

No.	System	Vessel Number/Location	Description	Material	Total Volume (US Gallons)	Approximate Dimensions (Inside Diameter) × Height or Length in feet and inches (tangent line/tangent line)
37.	CNP	CNP-VSL-00003 P-0111	Eluate Contingency Storage Vessel	Stainless Steel	21,713	14’ x 16’
38.	CNP	CNP-VSL-00004 P-0112	Cesium Evaporator Recovered Nitric Acid Vessel	Stainless Steel	11,115	9’ 6” x 19’
39.	CNP	CNP-VSL-00001 P-0112	Cesium Evaporator Eluant Lute Pot	Stainless Steel	109	4’ x 3’
40.	TLP	TLP-VSL-00002 P-0118	Treated LAW Evaporator Condensate Vessel	Stainless Steel	2,227	6’ x 9’ 3”
41.	TLP	TLP-VSL-00009A P-0117	LAW SBS Condensate Receipt Vessel	Stainless Steel	130,010	26’ x 27’ 4”
42.	TLP	TLP-VSL-00009B P-0117A	LAW SBS Condensate Receipt Vessel	Stainless Steel	130,010	26’ x 27’ 4”
43.	TCP	TCP-VSL-00001 P-0117A	Treated LAW Concentrate Storage Vessel	Stainless Steel	146,740	26’ 6” x 30’ 2”
44.	RDP	RDP-VSL-00002A P-0112	Spent Resin Slurry Vessel	Stainless Steel	15,230	12’ x 13’ 2”
45.	RDP	RDP-VSL-00002B P-0112	Spent Resin Slurry Vessel	Stainless Steel	15,230	12’ x 13’ 2”
46.	RDP	RDP-VSL-00002C P-0112	Spent Resin Slurry Vessel	Stainless Steel	15,230	12’ x 13’ 2”
47.	RDP	RDP-VSL-00004 P-0119	Spent Resin Dewatering Moisture Separation Vessel	Stainless Steel	101	2’ x 5’
48.	RLD	RLD-TK-00006A P-0150	Process Condensate Tank	Stainless Steel	343,734	42’ x 32’

Table 4D-1 Pretreatment Facility Tank Systems

No.	System	Vessel Number/Location	Description	Material	Total Volume (US Gallons)	Approximate Dimensions (Inside Diameter) × Height or Length in feet and inches (tangent line/tangent line)
49.	RLD	RLD-TK-00006B P-0150	Process Condensate Tank	Stainless Steel	343,734	42’ x 32’
50.	RLD	RLD-VSL-00017A P-0118	Alkaline Effluent Vessel	Stainless Steel	34,340	16’ x 17’ 6”
51.	RLD	RLD-VSL-00017B P-0118	Alkaline Effluent Vessel	Stainless Steel	34,340	16’ x 17’ 6”
52.	PWD	PWD-VSL-00033 P-B003	Ultimate Overflow Vessel	Stainless Steel	41,650	24’ x 7’ 5”
53.	PWD	PWD-VSL-00043 P-B003	HLW Effluent Transfer Vessel	Stainless Steel	41,650	24’ x 7’ 5”
54.	PWD	PWD-VSL-00015 P-0109	Acidic/Alkaline Effluent Vessel	Stainless Steel	119,150	22’ x 34’ 7”
55.	PWD	PWD-VSL-00044 P-0104	Plant Wash Vessel	Stainless Steel	103,024	23’ x 25’ 6”
56.	PWD	PWD-VSL-00046 P-B005	C3 Floor Drain Collection Vessel	Stainless Steel	4,982	8’ x 10’ 6”
57.	PWD	PWD-VSL-00016 P-0109	Acid/Alkaline Effluent Vessel	Stainless Steel	119,150	22’ x 34’ 7”
58.	PVP	PVP-VSL-00001 P-102A	Vessel Vent HEME Drain Collection Vessel	Stainless Steel	1,969	6’ x 7’ 4”
59.	PIH	PIH-TK-00001 P-0123A	Decontamination Soak Tank	Stainless Steel	TBD	8’x 4.1’

Table 4D-2 Pretreatment Facility Miscellaneous Units (Systems and Sub-Systems)

No.	System/ Subsystem	Component Number/Location	Description	Material	Total Volume (US Gallons)
Pretreatment Facility					
1	CNP	CNP-EVAP-00001 P-0112	Cesium Evaporator Separator Vessel	Hastelloy	RESERVED
2	CNP	CNP-HX-00001 P-0123	Cesium Evaporator Concentrate Reboiler	Stainless Steel	NA
3	CNP	CNP-DISTC-00001 P-0320	Cesium Evaporator Nitric Acid Rectifier Column	Stainless Steel	877
4	CNP	CNP-HX-00002 P-0430	Cesium Evaporator Primary Condenser	Stainless Steel	NA
5	CNP	CNP-HX-00003 P-0430	Cesium Evaporator Inter-Condenser	Stainless Steel	NA
6	CNP	CNP-HX-00004 P-0430	Cesium Evaporator After-Condenser	Stainless Steel	NA
7	FEP	FEP-SEP-00001A P-0106	Waste Feed Evaporator Separator Vessel	Stainless Steel	14,512
8	FEP	FEP-SEP-00001B P-0106	Waste Feed Evaporator Separator Vessel	Stainless Steel	14,512
9	FEP	FEP-RBLR-00001A P-0123	Waste Feed Evaporator Reboiler	Stainless Steel	NA
10	FEP	FEP-RBLR-00001B P-0123	Waste Feed Evaporator Reboiler	Stainless Steel	NA
11	FEP	FEP-COND-00001A P-0304	Waste Feed Evaporator Primary Condenser	Stainless Steel	NA
12	FEP	FEP-COND-00001B P-0304	Waste Feed Evaporator Primary Condenser	Stainless Steel	NA

Table 4D-2 Pretreatment Facility Miscellaneous Units (Systems and Sub-Systems)

No.	System/ Subsystem	Component Number/Location	Description	Material	Total Volume (US Gallons)
13	FEP	FEP-COND-00002A P-0304	Waste Feed Evaporator Intercondenser	Stainless Steel	NA
14	FEP	FEP-COND-00002B P-0304	Waste Feed Evaporator Intercondenser	Stainless Steel	NA
15	FEP	FEP-COND-00003A P-0304	Waste Feed Evaporator Aftercondenser	Stainless Steel	NA
16	FEP	FEP-COND-00003B P-0304	Waste Feed Evaporator Aftercondenser	Stainless Steel	NA
17	PIH	PIH-TTBL-00001 PIH-TTBL-00002 PIH-BENCH-00003	Spray Decontamination and Sizing System	Stainless Steel	NA
18	PIH	NA	Hot Cell Floor	Stainless Steel	NA
19	PJV	PJV-HEPA-00001A P-0335	PJV Primary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
20	PJV	PJV-HEPA-00001B P-0335	PJV Primary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
21	PJV	PJV-HEPA-00001C P-0335	PJV Primary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
22	PJV	PJV-HEPA-00001D P-0335	PJV Primary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
23	PJV	PJV-HEPA-00001E P-0335	PJV Primary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
24	PJV	PJV-HEPA-00001F P-0335	PJV Primary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
25	PJV	PJV-HEPA-00001G P-0335	PJV Primary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
26	PJV	PJV-HEPA-00002A P-0431A	PJV Second Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA

Table 4D-2 Pretreatment Facility Miscellaneous Units (Systems and Sub-Systems)

No.	System/ Subsystem	Component Number/Location	Description	Material	Total Volume (US Gallons)
27	PJV	PJV-HEPA-00002B P-0431A	PJV Secondary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
28	PJV	PJV-HEPA-00002C P-0431A	PJV Secondary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
29	PJV	PJV-HEPA-00002D P-0431A	PJV Secondary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
30	PJV	PJV-HEPA-00002E P-0431A	PJV Secondary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
31	PJV	PJV-HEPA-00002F P-0431A	PJV Secondary Exhaust HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
32	PJV	PJV-FAN-00001A P-0433	PJV Exhaust Fan	Stainless Steel	NA
33	PJV	PJV-FAN-00001B P-0433	PJV Exhaust Fan	Stainless Steel	NA
34	PJV	PJV-FAN-00001C P-0433	PJV Exhaust Fan	Stainless Steel	NA
35	PJV	PJV-DMST-00002A P-0335	PJV Demister	Mesh Pad/ Stainless Steel	NA
36	PJV	PJV-DMST-00002B P-0335	PJV Demister	Mesh Pad/ Stainless Steel	NA
37	PJV	PJV-DMST-00002C P-0335	PJV Demister	Mesh Pad/ Stainless Steel	NA
38	PVP	PVP-ADBR-00001A P-0328	Vessel Vent Carbon Bed Adsorber	TEDA/Stainless Steel	NA
39	PVP	PVP-ADBR-00001B P-0328	Vessel Vent Carbon Bed Adsorber	TEDA/Stainless Steel	NA
40	PVP	PVP-CLR-00001 P-0318	Vessel Vent Aftercooler	Stainless Steel	NA

Table 4D-2 Pretreatment Facility Miscellaneous Units (Systems and Sub-Systems)

No.	System/ Subsystem	Component Number/Location	Description	Material	Total Volume (US Gallons)
41	PVP	PVP-OXID-00001 P-0326	Vessel Vent VOC Oxidizer Unit	Stainless Steel	NA
42	PVP	PVP-FILT-00001 P-0318	Vessel Vent Adsorber Outlet Filter	Synthetic Fibrous Materials/Stainless Steel	NA
43	PVP	PVP-HEME-00001A P-0335	Vessel Vent HEME (Mist Eliminator)	Packed Fiber Bed/Stainless Steel	NA
44	PVP	PVP-HEME-00001B P-0335	Vessel Vent HEME (Mist Eliminator)	Packed Fiber Bed/Stainless Steel	NA
45	PVP	PVP-HEME-00001C P-0335	Vessel Vent HEME (Mist Eliminator)	Packed Fiber Bed/Stainless Steel	NA
46	PVP	PVP-HX-00002 P-0302	Vessel Vent Scrubbing Liquid Cooler	Stainless Steel	NA
47	PVP	PVP-SCB-00002 P-0104	Vessel Vent Caustic Scrubber	Metal Intalox Packing/Stainless Steel	3,237
48	PVV	PVV-HEPA-00001A P-0335	Vessel Vent Primary HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
49	PVV	PVV-HEPA-00001B P-0335	Vessel Vent Primary HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
50	PVV	PVV-HEPA-00002A P-0324	Vessel Vent Secondary HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
51	PVV	PVV-HEPA-00002B P-0324	Vessel Vent Secondary HEPA Filter	Synthetic Fibrous Materials/Stainless Steel	NA
52	PVV	PVV-FAN-00001A P-0418	Vessel Vent Exhaust Fan	Stainless Steel	NA
53	PVV	PVV-FAN-00001B P-0418	Vessel Vent Exhaust Fan	Stainless Steel	NA
54	TLP	TLP-SEP-00001 P-0117	Treated LAW Evaporator Separator Vessel	Stainless Steel	13,359

Table 4D-2 Pretreatment Facility Miscellaneous Units (Systems and Sub-Systems)

No.	System/ Subsystem	Component Number/Location	Description	Material	Total Volume (US Gallons)
55	TLP	TLP-RBLR-00001 P-0123	Treated LAW Evaporator Reboiler	Stainless Steel	NA
56	TLP	TLP-COND-00001 P-0325	Treated LAW Primary Condenser	Stainless Steel	NA
57	TLP	TLP-COND-00002 P-0325	Treated LAW Intercondenser	Stainless Steel	NA
58	TLP	TLP-COND-00003 P-0325	Treated LAW Aftercondenser	Stainless Steel	NA

Table 4D-3 Pretreatment Facility Secondary Containment Rooms/Areas

Room/Area	Approximate Room/Area Dimensions (L×W, in feet)	Miscellaneous Treatment Units or Tanks in Room/Area (Largest Plant Item)	Volume of Largest Plant Item in Room/Area (US Gallons)	Minimum Secondary Containment Height (feet)
Pretreatment Facility				
1. P-B005 C2/C3 Drain Tank Room	Minimum secondary containment for these cells/caves has been deleted and superceded by *Flooding Volume for Below Grade and 0 Ft Level in PT Facility*, 24590-PTF-PER-M-02-005 (DWP Operating Unit Group 10, Appendix 8.8)			
2. P-B001 Inter-Facility Transfer Line Tunnel				
3. P-B001A Inter-Facility Transfer Line Tunnel				
4. P-B002 HLW Drain Vessel Pit				
5. P-B003 Overflow Vessel Pit				
6. P-B004 Future LAW Transfer Line Tunnel				
7. P-0102 HLW Receipt/Storage/Blending Cell				
8. P-0102A HLW Receipt/Storage/Blending Cell				
9. P-0104 Ultrafiltration Cell				
10. P-0106 Feed Evaporator/Ultrafiltration Cell				
11. P-0108 Feed Receipt Cell				
12. P-0108A Feed Receipt Cell				
13. P-0108B Feed Receipt Cell				
14. P-0108C Feed Receipt Cell				
15. P-0109 Acidic/Alkaline Effluent Collection Cell				
16. P-0111 Cesium Ion Exchange Cell				

Table 4D-3 Pretreatment Facility Secondary Containment Rooms/Areas

Room/Area	Approximate Room/Area Dimensions (L×W, in feet)	Miscellaneous Treatment Units or Tanks in Room/Area (Largest Plant Item)	Volume of Largest Plant Item in Room/Area (US Gallons)	Minimum Secondary Containment Height (feet)
17. P-0112 Cesium Eluant Collection Cell				
18. P-0113 Reserved Space				
19. P-0114 Treated LAW Collection Cell				
20. P-0117 Treated LAW Feed Cell				
21. P-0117A Treated LAW Feed Cell				
22. P-0118 Alkaline Effluent Collection Cell				
23. P-0123 Hot Cell				
24. P-0105, P-0105A, P-0105B, P-0105C Process Bulge Areas				
25. P-0119 Spent Resin Dewatering Equipment Room	See *Flooding Volume for Room P-0119 in PT Facility*, 24590-PTF-PER-M-04-005 (DWP Operating Unit Group, Appendix 8.8)			
26. P-0123A Remote Decon Maintenance Cell	See *Flooding Volume for Room P-0123A in PT Facility*, 24590-PTF-PER-M-04-007 (DWP Operating Unit Group, Appendix 8.8)			
27. P-0150 Radioactive Liquid Waste Disposal Area	See *Flooding Volume for Room P-0150 in PT Facility*, 24590-PTF-PER-M-04-008 (DWP Operating Unit Group, Appendix 8.8)			
27. P-0304 Waste Feed Evaporator Condenser Room	See *Flooding Volume for 56 Ft Level in PT Facility*, 24590-PTF-PER-M-04-001 (DWP Operating Unit Group, Appendix 8.8)			
28. P-0320 CNP Evaporator Rectifier Process Area				
29. P-0325 Treated LAW Evaporator Condenser Room				
30. P-0430 CNP Evaporator Condenser Room	See *Flooding Volume for 77 Ft Level for PT Facility*, 24590-PTF-PER-M-04-005 (DWP Operating Unit Group, Appendix 8.8)			

Table 4D-3 Pretreatment Facility Secondary Containment Rooms/Areas

Room/Area	Approximate Room/Area Dimensions (L×W, in feet)	Miscellaneous Treatment Units or Tanks in Room/Area (Largest Plant Item)	Volume of Largest Plant Item in Room/Area (US Gallons)	Minimum Secondary Containment Height (feet)
31. ASX Sampler Cabinets • ASX-SMPLR-00015 (P-0311C) • ASX-SMPLR-00017 (P-0311B) • ASX-SMPLR-00019 (P-0302) • ASX-SMPLR-00020 (P-0301) • ASX-SMPLR-00025 (P-0307)	Secondary containment liners for Isolok flush tubing, no minimum liner height required. The PTF ASX sampler upper secondary containment area liner dimensions are approximately 33” X 34”. The lower containment area liner dimensions are approximately 39” X 68”			
32. Bulges • CRP-BULGE-00001 (P-0317) • CXP-BULGE-00004 (P-0317) • DIW-BULGE-00001 (P-0320) • DIW-BULGE-00002 (P-0430) • PVP-BULGE-00001 (P-0105) • PVP-BULGE-00002 (P-0101A) • PVP-BULGE-00014 (P-0302) • PVP-BULGE-00019 (P-0430) • PVP-BULGE-00020 (P-0303C) • PVP-BULGE-00021 (P-0303B) • TCP-BULGE-00004 (P-0116) • UFP-BULGE-00001 (P-0301) • UFP-BULGE-00002 (P-0301) • UFP-BULGE-00005 (P-0311) • UFP-BULGE-00006 (P-0311A)	Secondary containment for ancillary equipment, no minimum liner height required			

Table 4D-4 Pretreatment Facility Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (US Gallons)	Sump/Leak Detection Box Level Detection Type	Sump/Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
Pretreatment Facility				
Sumps				
PWD-SUMP-00071 P-B005 (C2/C3 Floor Drain Collection Vessel Room, El. -19’)	60	Radar	30” Dia x 18” Deep Epoxy Coating	**24590-PTF** -M6-PWD-00041
PWD-SUMP-00040 P-B002 (Pit-45, El. -45’)	210	Bubbler	60”x 30”x 30” Stainless Steel	**24590-PTF** -M6-PWD-00012
PWD-SUMP-00001 P-0108B (Feed Receipt Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00008
PWD-SUMP-00001A P-0108C (Feed Receipt Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00010
PWD-SUMP-00002 P-0108A (Feed Receipt Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00008
PWD-SUMP-00002A P-0108 (Feed Receipt Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00010
PWD-SUMP-00003 P-0106 (Feed Evaporator/Ultra Filtration Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00008
PWD-SUMP-00004 P-0104 (Ultra Filtration Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00008
PWD-SUMP-00005 P-0102A (HLW Receipt/Blending Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00008

Table 4D-4 Pretreatment Facility Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (US Gallons)	Sump/Leak Detection Box Level Detection Type	Sump/Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
PWD-SUMP-00006 P-0102 (HLW Storage Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00008
PWD-SUMP-00007 P-0109 (Acidic/Alkaline Effluent Collection Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00009
PWD-SUMP-00008 P-0111 (Cs Ion Exchange Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00009
PWD-SUMP-00009 P-0112 (Resin Disposal/CNP Evaporated Process Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00009
PWD-SUMP-00010 P-0113 (Reserved Space, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00009
PWD-SUMP-00011 P-0114 (Treated LAW Collection Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00009
PWD-SUMP-00012 P-0117 (Treated LAW Evaporator Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00009
PWD-SUMP-00013 P-0117A (Treated LAW Concentrated Storage Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00010
PWD-SUMP-00026 P-0123 (Hot Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00014
PWD-SUMP-00028 P-0123 (Hot Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**<u>24590-PTF</u>** -M6-PWD-00014

Table 4D-4 Pretreatment Facility Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (US Gallons)	Sump/Leak Detection Box Level Detection Type	Sump/Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
PWD-SUMP-00029 P-0123 (Hot Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00014
PWD-SUMP-00031 P-0119 (Spent Resin Dewatering Equipment Room, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00010
PWD-SUMP-00032 P-0123A (Remote Decon Maint Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00010
PWD-SUMP-00033 P-0123A (Remote Decon Maint Cell, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00010
PWD-SUMP-00034 P-0121A (Spent Resin Dewatering, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00012
PWD-SUMP-00035 P-0122A (Waste Packaging Area, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00012
PWD-SUMP-00036 P-0118 (Alkaline Effluent Collection, El. 0’)	75	Radar	30” Dia. x 27” Deep Stainless Steel	**24590-PTF** -M6-PWD-00012
PWD-SUMP-00037 P-0124A (Decon Booth Sump, El. 0”)	7.5	Radar	72” x 12” x 2” Deep Stainless Steel	**24590-PTF** -M6-PWD-00012
RLD-SUMP-00003 P-0150 (Radioactive Liquid Waste Disposal Area, El. 0’, outdoor)	583	Radar	78” x 48” x 36” Deep Epoxy coating	**24590-PTF** -M6-RLD-00002003
PWD-LDB-00001 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050

Table 4D-4 Pretreatment Facility Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (US Gallons)	Sump/Leak Detection Box Level Detection Type	Sump/Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
PWD-LDB-00002 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00003 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00004 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00005 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00006 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00007 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00008 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00009 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00010 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00011 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00050
PWD-LDB-00012 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00051

Table 4D-4 Pretreatment Facility Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (US Gallons)	Sump/Leak Detection Box Level Detection Type	Sump/Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
PWD-LDB-00013 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00051
PWD-LDB-00014 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00051
PWD-LDB-00015 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00051
PWD-LDB-00016 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00051
PWD-LDB-00017 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00051
PWD-LDB-00018 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00051
PWD-LDB-00019 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	6	Thermal Dispersion	8” Dia. x 24” Length Stainless Steel	**24590-PTF** -M6-PWD-00051
RLD-LDB-00012 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	9	Thermal Dispersion	8” Dia. x 34” Length Stainless Steel	**24590-PTF** -M6-PWD-00058
RLD-LDB-00013 P-B001 (Inter Facility Transfer Line Tunnel, El. - 45’)	9	Thermal Dispersion	8” Dia. x 34” Length Stainless Steel	**24590-PTF** -M6-PWD-00058
PVP-ZY-00037-S11B-03, PVP-BULGE-00001 Drain Line P-0105 (El. 0’)	N/A	N/A	3” Dia. Stainless Steel	**24590-PTF** -M6-PVP-00017002

Table 4D-4 Pretreatment Facility Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (US Gallons)	Sump/Leak Detection Box Level Detection Type	Sump/Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
PVP-ZY-00036-S11B-03, PVP-BULGE-00002 Drain Line P-0101A (El. 0’)	N/A	N/A	3” Dia. Stainless Steel	**<u>24590-PTF</u>** -M6-PVP-00018002
TCP-ZF-00032-S11B-03, TCP-BULGE-00004 Drain Line P-0116 (El. 0’)	N/A	N/A	3” Dia. Stainless Steel	**<u>24590-PTF</u>** -M6-TCP-00001002
DIW-ZF-01511-S11B-03, DIW-BULGE-00001 Drain Line P-0320 (El. 56’)	N/A	N/A	3” Dia. Stainless Steel	**<u>24590-PTF</u>** -M6-DIW-00004001
DIW-ZF-01511-S11B-03, DIW-BULGE-00002 Drain Line P-0320 (El. 56’)	N/A	N/A	3” Dia. Stainless Steel	**<u>24590-PTF</u>** -M6-DIW-00004001
CRP-ZF-00002-S11B-03, CRP-BULGE-00001 Drain Line P-0317 (El. 56’)	N/A	N/A	3” Dia. Stainless Steel	**<u>24590-PTF</u>** -M6-CXP-00003001
CXP-ZF-00012-S11B-03, CXP-BULGE-00004 Drain Line P-0317 (El. 56’)	N/A	N/A	3” Dia. Stainless Steel	**<u>24590-PTF</u>** -M6-CXP-00003003
UFP-ZF-00043-S11B-03, UFP-BULGE-00001 Drain Line P-0301 (El. 56’)	N/A	N/A	3” Dia. Stainless Steel	**<u>24590-PTF</u>** -M6-UFP-00016001
UFP-ZF-00042-S11B-03, UFP-BULGE-00002 Drain Line P-0301 (El. 56’)	N/A	N/A	3” Dia. Stainless Steel	**<u>24590-PTF</u>** -M6-UFP-00017001

Table 4D-4 Pretreatment Facility Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (US Gallons)	Sump/Leak Detection Box Level Detection Type	Sump/Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
UFP-ZY-00002-S11B-03, UFP-BULGE-00005 Drain Line P-0311 (El. 56')	N/A	N/A	3" Dia. Stainless Steel	**24590-PTF** -M6-UFP-00031001
UFP-ZY-00001-S11B-03, UFP-BULGE-00006 Drain Line P-0311A (El. 56')	N/A	N/A	3" Dia. Stainless Steel	**24590-PTF** -M6-UFP-00032001
Floor Drains/Lines				
PWD-FD-00005/PWD-ZF-03000-S11B-06 Floor Drain Line P-0123 (Hot Cell, El. 0')	N/A	N/A	6" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00011
PWD-FD-00006/PWD-ZF-03001-S11B-06 Floor Drain Line P-0123 (Hot Cell, El. 0')	N/A	N/A	6" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00011
PWD-FD-00435 Floor Drain P-0105 (Ultra Filtration Process Area, El. 0')	N/A	NA	3" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044
PWD-FD-00349 Floor Drain P-0105 (Ultra Filtration Process Area, El. 0')	N/A	NA	6" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044
PWD-FD-00436 Floor Drain P-0105 (Ultra Filtration Process Area, El. 0')	N/A	NA	3" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044
PWD-FD-00438 Floor Drain P-0105A (Feed Evaporation Ultra Filtration Process Area, El. 0')	N/A	NA	6" Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044

Table 4D-4 Pretreatment Facility Sumps, Leak Detection Boxes, and Floor Drains/Lines

Sump/Leak Detection Box or Floor Drain/Line I.D.#, Room, and Elevation	Maximum Sump/Leak Detection Box Capacity (US Gallons)	Sump/Leak Detection Box Level Detection Type	Sump/Leak Detection Box or Floor Drain/Line Dimensions (approximate) and Materials of Construction	Piping and Instrumentation Diagram Number
PWD-FD-00348 Floor Drain P-0105A (Feed Evaporation Ultra Filtration Process Area, El. 0’)	N/A	N/A	6” Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044
PWD-FD-00437 Floor Drain P-0105B (Feed Receipt Process Area, El. 0’)	N/A	N/A	3” Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044
PWD-FD-347 Floor Drain P-0105B (Feed Receipt Process Area, El. 0’)	N/A	N/A	6” Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044
PWD-FD-346 Floor Drain P-0105C (Feed Receipt Process Area, El. 0’)	N/A	N/A	4” Dia. Stainless Steel	**24590-PTF** -M6-PWD-00044
Autosampler Drain Lines				
ASX-ZF-00013-S11B-03 ASX Sampler 00017 Lower Containment Drain Line (P-0311B, El. 56’)	N/A	Thermal Dispersion	3” Dia. Stainless Steel	**24590-PTF** -M6-PWD-00007001
ASX-ZF-00015-S11B-03 ASX Sampler 00019 Lower Containment Drain Line (P-0302, El. 56’)	N/A	Thermal Dispersion	3” Dia. Stainless Steel	**24590-PTF** -M6-PWD-00007001
ASX-ZF-00016-S11B-03 ASX Sampler 00020 Lower Containment Drain Line (P-0301, El. 56’)	N/A	Thermal Dispersion	3” Dia. Stainless Steel	**24590-PTF** -M6-PWD-00007001
ASX-ZF-00027-S11B-03 ASX Sampler 00025 Lower Containment Drain Line (P-0307, El. 56’)	N/A	Thermal Dispersion	3” Dia. Stainless Steel	**24590-PTF** -M6-PWD-00007001

Table 4D-5 Pretreatment Facility Containment Buildings Summary

Location	Approximate Room Dimensions (L × W × H in feet)
Pretreatment Facility	
1. P-0123 Hot Cell	350 × 51 × 52
2. Pretreatment Maintenance Containment Building:	
PM0124 Hot Cell Crane Maintenance Mezzanine	27 × 51 × 33
P-0121A Spent Resin Dewatering	28 × 18 × 28
P-0122A Waste Packaging Area	26 × 51 × 28
P-0123A Remote Decontamination Maintenance Cell	55 × 51 × 52
P-0124 C3 Workshop	34 × 24 × 15
P-0124A C3 Workshop	(73 × 15 × 15) + (16 × 15 × 15)
P-0125 Cask Lidding Airlock & Equipment Chase	24 × 20 × 28
P-0125A Cask Lidding Room	28 × 18 × 25
P-0128A MSM Repair Area	24 × 18 × 28
P-0128 MSM Testing Room	24 × 17 × 27
3. P-0223 Spent Filter Drum Handling Area	54 × 18 × 26
4. P-0335 Filter Cave	198 × 51 × 52
5. P-0431A PJV Secondary HEPA Filter Room Containment Building	93 × 35 × 20