WASTE TREATMENT AND IMMOBILIZATION PLANT
CHAPTER 4I
BALANCE OF FACILITIES

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
07/01/2019	8C.2019.2F
09/05/2017	8C.2017.6F
12/15/2016	8C.2016.Q3

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CHAPTER 4I
BALANCE OF FACILITIES

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CHAPTER 4I
BALANCE OF FACILITIES

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4I Balance of Facilities

The Balance of Facilities (BOF) provides support systems and utilities required for the waste treatment processes within the Pretreatment (PT) Facility, Low-Activity Waste (LAW) Vitrification Facility, High-Level Waste (HLW) Vitrification Facility, Analytical Laboratory (Lab), and the Effluent Management Facility (EMF). These ~~will~~ include, but are not limited to, heating and cooling, process steam, process ventilation, chilled water, primary and secondary power supplies, and compressed air. The primary BOF process support systems are:

- Plant service air (PSA).
- Plant cooling water (PCW).
- Low-pressure steam (LPS).
- High-pressure steam (HPS).
- Demineralized water (DIW).
- Process service water (PSW).
- Chilled water (CHW).
- Glass former reagent (GFR).
- Cathodic protection (CPE).

The BOF systems are described in Sections 4I.1 through 4I.10. The BOF support and utility systems described in S~~s~~ections 4I.2 through 4I.9 do~~will~~ not manage dangerous waste, and are described below for informational purposes only. Section 4I.1 addresses BOF dangerous waste container management areas, and Section 4I.10 addresses the BOF CPE system. The majority of the ~~of~~ underground piping systems within the CPE system are not dangerous/mixed waste lines, however, a segment of dangerous/mixed waste underground transfer lines between the PT Facility, and the HLW Vitrification Facility, the LAW Vitrification Facility, and the Lab are cathodically protected. Underground waste transfer lines to support the Direct Feed Low Activity Waste (DFLAW) configuration are isolated from the soil environment with insulation and a high density polyethylene (HDPE) jacket, and are not part of the CPE system.

4I.1 Containers

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

The container storage areas located within the BOF include:

- Waste Treatment Plant (WTP) Waste Storage Area.
- HLW Failed Melter Storage Facility.
- Transportation Staging Area.

Container storage area dimensions at the BOF are summarized in Table 4I-1.

The following sections address waste management containers:

- Description of Containers - Section 4I.1.1.
- Container Management Practices - Section 4I.1.2.
- Container Labeling - Section 4I.1.3.
- Containment Requirements for Storing Waste - Section 4I.1.4.
- Prevention of Ignitable, Reactive, and Incompatible Wastes in Containers - Section 4I.1.5.

4I.1.1 Description of Containers

The types of waste managed in containers include:

- Miscellaneous mixed waste (secondary waste).
- Miscellaneous nonradioactive dangerous waste (secondary waste).
- Immobilized Low-Activity Waste (ILAW) Containers (Transportation Staging Area).

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 BOF.

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.
- Offgas High Efficiency Particulate Air (HEPA) filters.
- Melter consumables.
- Spent melters.

Spent equipment and offgas filters are~~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 are~~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, is~~will be~~ based on the physical, chemical, and radiological properties of the waste being managed.

Melter consumables are routinely generated wastes and include spent feed tubes, pressure transducers, bubblers, thermocouples, and discharge risers. LAW melter consumables are~~will be~~ placed into approved disposal containers of varying size.

HLW melter consumables will be remotely size reduced, if necessary, and placed into steel baskets with lids. The baskets will be placed into drums and the drums placed into shielded casks for export from the facility.

The LAW Locally Shielded Melter (LSM) is~~will be~~ classified as hazardous debris for land disposal restrictions purposes. After a spent HLW melter is deemed to meet criteria and regulations for onsite disposal, it will be placed in a welded carbon steel container (overpack) or other acceptable packaging in accordance with waste acceptance criteria for the receiving TSD facility. The design of the Failed Melter Storage Facility is addressed in interim compliance schedule, Dangerous Waste Permit (DWP) Operating Unit Group 10, Appendix 1.0.

Each miscellaneous mixed waste container has~~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 is~~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, absorbents may be added in order to comply with the receiving TSD facility waste acceptance criteria.

Miscellaneous Nonradioactive Dangerous Waste

Each nonradioactive dangerous waste container hashas~~will have~~ associated documentation that describes the contents, such as waste type and physical and chemical characterization. Commercially available containers arewill 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 iswill be based on the physical and chemical properties of the waste being managed.

4I.1.2 Container Management Practices

The following paragraphs describe how containers are managed in the BOF container management areas.

4I.1.2.1 Miscellaneous Mixed Waste and Miscellaneous Nonradioactive Dangerous Waste Containers

Waste Treatment Plant Waste Storage Area

The WTP Waste Storage Area will consist of a sloped concrete pad approximately 100 feet (ft.) by 145 ft. Containers on the pad will be kept closed unless waste is being added, removed, or sampled. They will routinely be moved by a forklift, crane, or drum cart, and will be managed in a manner that prevents ruptures and leaks. The storage capacity for the WTP Waste Storage Area is listed in Table 4I-1. The containers stored in the waste storage area may be stacked two high and aisle spacing will be at least 30 inches (in.) between rows of containers. Containers stored in this area will be placed on pallets, or otherwise elevated using skids or runners to prevent contact with liquid, if present. An example of container configuration in the waste storage area is provided in Figure 4I-1. The WTP Waste Storage Area will be designed with positive drainage control and sloped to drain or remove liquid, as necessary. Containers managed in these areas containing liquid will be placed in portable secondary containment systems meeting requirements of WAC 173-303-630(7). Portable secondary containment system materials will be compatible with all waste stored. The waste storage area is not designed nor intended to provide secondary containment; therefore, no structural integrity assessment is required.

Miscellaneous mixed and nonradioactive dangerous waste (secondary waste) iswill be managed in the WTP Waste Storage Area. Containers arewill be kept closed unless waste is being added, removed, or sampled while in the container storage area. Containers stored in this area arewill be placed on pallets, or otherwise elevated to prevent contact with liquid, if present. Table 4I-1 summarizes the dimensions and maximum capacity of the container storage area. Containers arewill be managed in the container storage area, and then transferred to a suitable TSD facility.

The HLW Failed Melter Storage Facility will be a stand-alone building available during the baseline configuration as described in Chapter 4.0, Section 4.1. It will be used primarily to manage HLW melters that have completed their useful service life. The HLW Failed Melter Storage Facility may also receive containerized miscellaneous mixed waste, if needed.

Miscellaneous dangerous waste containers arewill typically be managed in the WTP Waste Storage Area, or in non-permitted waste management units (satellite accumulation areas and less-than-90-day storage areas) located throughout the BOF. Containers arewill be kept closed unless waste is being added, removed, or sampled. They will routinely be moved by forklift or drum cart, and arewill being managed in a manner that prevents ruptures and leaks. The storage capacity is listed in Table 4I-1. The containers in that area may be stacked two high and aisle spacing will be at least 30 inches (in.) between rows of containers. Containers stored in this area arewill be placed on pallets, or otherwise elevated using skids or runners to prevent contact with liquid, if present.

Transportation Staging Area

The Transportation Staging Area is permitted for the staging (storage) of ILAW transporters with full ILAW containers ready to ship to the Integrated Disposal Facility (IDF) for disposal. This staging area supports the uninterrupted operations of the LAW Facility. The staging area is sized to hold three ILAW transporters, and will be comprised of a gravel area, which is surrounded by a perimeter fence with appropriate signage to delineate it as a permitted storage area. During a WTP outage, it may be necessary to stage large pieces of failed equipment loaded on transporters while awaiting approval for shipment to a TSD facility. When transporters enter or leave the staging area, shipping documentation will be required such as a staging area log and/or a checklist to ensure compliance with storage requirements. This information will be available in the transport vehicles and a shift manager will have access to this documentation. Waste in this area will be on a transport vehicle, tied down, and in closed containers at all times. All transports will be Department of Transportation (DOT) compliant or equivalent. The storage capacity for the Transportation Staging Area is listed in Table 4I-1. An example of container configuration for the transporter system is provided in Figure 4I-3.

4I.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 support the following systems (all systems used at the plants/facilities and 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~~ interfaces 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 is~~will~~ also ~~be~~ used to query operations parameters ~~at any time~~ when 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.~~The Hanford Solid Waste Information Tracking System (SWITS) is used to inventory and track waste containers within the WTP Waste Storage Area, HLW failed melter storage area, and non-permitted waste management units. SWITS is used by waste management personnel to track waste containers for the following purposes:

- Provides waste container inventory information and locations for each storage area that facilitates weekly and regular inspections.
- Provides characterization data for each waste stream and container.
- Provides a complete history (cradle-to-grave) of the treatment and disposal of each individual waste container.

The SWITS contains the information necessary to:

- Track each container by location and by waste type.
- Identify each container by unique identification number.
- Track the date of generation, days in storage and ship date.

- Provide reporting at multiple levels (e.g., WTP management, U.S. Department of Energy, regulators).
- Maintain a history of all container movement by date.
- Identify container size and type.
- Identify the type of waste (dangerous, radioactive, mixed, universal, non-regulated).
- Identify and consolidate information on stored waste containers.

Records generated as part of waste management activities are managed in accordance with WAC 173-303-380 and WTP procedures. Records are generated either as hard copies or electronically.

~~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 Standard Test Method (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.~~

4I.1.3 Container Labeling

~~Miscellaneous Mixed Waste Containers~~

The miscellaneous dangerous and mixed waste containers are~~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 labels ~~will~~ meet the WAC 173-303-630(3) requirements.~~, 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.~~

4I.1.4 Containment Requirements for Storing Waste

~~Secondary containment requirements for the waste are discussed below.~~

~~4I.1.4.1 Secondary Containment System Design~~

Secondary containment is required for areas in which containers hold free liquids. In the Baseline Configuration, ~~I~~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) and WAC 173-303-630(7) or incompatible waste as defined in WAC 173-303-040. Container Storage Areas managing secondary waste and/or

miscellaneous mixed wastes, such as the WTP Waste Storage Area, are inspected at least weekly. Inspections of container storage areas include verifying major risk labels are present and legible, that all containers are closed, and area aisle space is free of liquid and debris. Additional inspection criteria are included in the container storage inspection tables found in Chapter 6A.

~~Miscellaneous Mixed Waste~~

Miscellaneous dangerous and mixed waste storage areas may contain waste requiring secondary containment. If wastes containing liquids or wastes exhibiting the characteristics of ignitability or reactivity, or wastes that are incompatible, are generated, portable secondary containment that meets the requirements of WAC 173-303-630(7) will be provided. The portable secondary containment provided is~~will be~~ capable of collecting and holding spills and leaks. It ~~will have~~has the capacity to contain ten percent of the volume of all containers or the entire volume of the largest container, whichever is greater.

~~Miscellaneous Dangerous Waste~~

~~The WTP Waste Storage Area 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. The portable secondary containment provided will be capable of collecting and holding spills and leaks. It will have the capacity to contain ten percent of the volume of all containers or the entire volume of the largest container, whichever is greater.~~

~~4I.1.4.2 System Design~~

There will be two miscellaneous mixed and/or dangerous waste (secondary waste) container storage areas at the BOF, as follows:

- WTP Waste Storage Area.
- HLW Failed Melter Storage Facility.

The HLW Failed Melter Storage Facility will be used primarily to manage HLW melters that have completed their useful service life. These units will be received in carbon steel overpack containers allowing limited hands-on contact. These overpacks will not be opened while the waste melters are located in this storage facility. The facility is capable of storing up to three waste melters at any given time. The spent HLW melters will not be stacked.

The HLW Failed Melter Storage Facility may also receive containerized miscellaneous mixed waste, if needed. These waste containers will be sealed prior to transport to the HLW Failed Melter Storage Facility. The containers will not be opened while at this storage facility. The waste containers will not be stacked more than two containers high. The HLW Failed Melter Storage Facility will be a stand-alone building located in the southern portion of the WTP and available during baseline operations.

~~Waste containing liquid may be present in the WTP Waste Storage Area. Containers with liquids will be provided with portable secondary containment meeting the requirements of WAC 173-303-630(7).~~

~~4I.1.4.3~~4I.1.4.1 Structural Integrity of the Base

The storage areas are~~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 is~~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.

~~4I.1.4.44~~I.1.4.2 Containment System Capacity

~~Miscellaneous Mixed Waste~~

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

Each portable secondary containment has~~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~~

~~Waste containing liquid may be present in the WTP Waste Storage Area. 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 secondary 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. Typically, the waste containers will be steel drums.~~

~~4I.1.4.54~~I.1.4.3 Control of Run-On

The WTP Waste Storage Area will be designed with positive drainage control and sloped to drain or remove liquid, as necessary. Containers managed in these areas containing liquid will be placed in portable secondary containment systems meeting requirements of WAC 173-303-630(7). Portable secondary containment system materials will be compatible with all waste stored. The Waste Storage Area is not designed nor intended to provide secondary containment; therefore, no structural integrity assessment is required.

~~4I.1.4.64~~I.1.4.4 Removal of Liquids from Containment System

~~Miscellaneous Mixed Waste~~

Portable secondary containment devices are~~will be~~ provided for individual containers that contain liquids. Hand pumps or similar devices are~~will be~~ used to remove liquid released to the portable secondary containments. Spilled, leaked, or other accumulated liquids such as precipitation are removed from portable containment systems in a timely manner necessary to prevent overflow in accordance with WAC 173-303-630(7)(a)(ii).

~~Miscellaneous Dangerous Waste~~

~~Portable secondary containment devices 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.~~

~~4I.1.4.74~~I.1.4.5 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~~

Portable ~~S~~secondary containment systems are~~will be~~ provided for individual containers that manage liquids, and D001 and D003 wastes. Wastes with the F020-F023, F026, and F027 numbers are not identified for the double shell tank (DST) system. Therefore, these waste numbers are~~will~~ not ~~be~~ present at the BOF.

~~Miscellaneous Dangerous Waste~~

~~The WTP Waste Storage Area may manage liquids and D001 and D003 waste; therefore, secondary containment will be provided. 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 BOF.~~

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

In the Baseline Configuration, ~~P~~potentially incompatible wastes are not expected to be managed in the BOF container storage areas. Personnel inspect containers for proper packaging, marking, labeling, and waste information before transferring waste to the BOF waste storage areas. Any areas managing D001 and D003 waste will follow special requirements of WAC 173-303-630(8) and 173-303-395, including annual Fire Code inspections. If such wastes are managed in these areas, the containers of incompatible wastes or chemicals will not be stored in close proximity to each other. Acids and bases will be stored on separate portable secondary containment devices; oxidizers will be stored in areas separate from combustible materials; and corrosive chemicals will be stored on a separate portable secondary containment devices. 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.~~

4I.2 Plant Service Air / Instrument Service Air Systems

The BOF PSA system ~~will~~ provide<u>s</u> a continuous supply of clean, dry air for the process systems in the PT Facility, Lab, LAW Vitrification Facility, EMF, and HLW Vitrification Facility. Each facility ~~will~~ maintain<u>s</u> a reservoir of PSA to accommodate load fluctuations and distributes the compressed air to the designated end users. The air distributed from the BOF PSA system to each facility is the source of the PSA and the Instrument Service Air (ISA) within each facility.

The PSA system components ~~will~~ consist of compressors, dryers, air receiver vessels, distribution piping, pressure control stations, air amplifiers, valves, vents, drains, utility racks, filters, and monitoring instruments.

The ISA system is a distribution piping network that ~~will~~ reduce<u>s</u> and control<u>s</u> downstream air pressure and supplies compressed air to designated equipment, instruments, and other end users located throughout the facility. It ~~will~~ maintain<u>s</u> a reservoir of compressed air received from the BOF PSA system, and in doing so, dampen pressure fluctuations caused by variations in the supplied airflow or in end-user demands. In addition, the PT Facility and LAW Vitrification Facility are designed to use ISA stored air as a short-term supply of backup air in the event that services from the BOF PSA are interrupted.

The air supplied by PSA and ISA systems within each facility supports operation of tanks and miscellaneous unit systems, instruments and ancillary equipment.

4I.3 Plant Cooling Water System

The BOF PCW system ~~will~~ provide<u>s</u> a continuous supply of cooling water to selected plant equipment for heat removal. The BOF PCW ~~will~~ receive<u>s</u> potable make-up water from the Domestic Water System (DOW) at the cooling tower. A backup source <u>is</u>~~will be~~ provided from the Raw Water System (RWW). The PCW system ~~will~~ suppli<u>es</u>~~y~~ cooling water to the chiller /compressor plant, steam plant and process areas. The system ~~will~~ remove<u>s</u> heat from active process equipment and cooling coils in process buildings and <u>transfers</u>~~conducts~~ this heat to the atmosphere ~~or local environment~~ through evaporation at the cooling tower. In the PT Facility, the PCW is used in the waste Feed Evaporation Process (FEP), Treated LAW Evaporation Process (TLP), Cesium Nitric Acid Recovery Process (CNP), and Pretreatment Vessel Vent Process (PVP) systems.

Cooling water for the HLW Vitrification Facility supports the HLW Melter Feed Process (HFP), HLW Melter Process (HMP), HLW Melter Offgas Treatment system (HOP), and melter power supplies. For the LAW Vitrification Facility, the major user is the LAW Melter Process system (LMP), pour cave cooling panels, and LAW melter power supplies.

The BOF PCW system ~~will~~ includes, but is not limited to, the cooling tower, cooling tower basin, the primary cooling water circulation pumps, filter pumps, chemical injection tanks, and associated piping. The cooling water system is designed with primary and secondary loops to remain uncontaminated by mixed waste constituents. The primary loop circulates cooling water~~ste~~ through heat exchangers within the HLW Vitrification Facility, LAW Vitrification Facility, and PT Facility and through equipment in the BOF chiller compressor plant. The system also provides cooling water to quench the steam plant blow down. The HLW Vitrification Facility, LAW Vitrification Facility, and PT Facility ~~will~~ also has~~ve~~ve closed secondary loops that distribute cooling water to process equipment. Cooling water is~~will be~~ chemically treated to promote system operability and service life of 40 years.

4I.4 Low-Pressure Steam System

The LPS ~~will~~ provides a continuous supply of low-pressure steam for various users in the PT Facility, Lab, LAW Vitrification Facility, EMF, and HLW Vitrification Facility. The process facilities main use of steam is~~will be~~ for tank heating for the evaporation process, and for heating, ventilation, and air conditioning (HVAC) heating coils.

The LPS is~~will be~~ supplied from the high-pressure steam system through pressure-reducing stations. The low pressure applications ~~will~~ consists of air handling units, humidifiers, and booster heaters. The steam condensate and feed system ~~will~~ collects condensate from the low-pressure steam users, monitor for mixed waste contamination, and return it to the steam plant for re-use.

4I.5 High-Pressure Steam System

The HPS ~~will~~ provides a continuous supply of high-pressure steam to the PT Facility, Lab, LAW Vitrification Facility, EMF, and HLW Vitrification Facility. The high pressure saturated steam is generated in the BOF Steam Plant Facility, which consists of six fire tube boiler packages (five continuously operating at peak conditions, and one in standby), and associated supporting equipment. The HPS distributes steam through above ground piping to process equipment, ejectors for transfer of fluids, and hot water heaters in the PT Facility, Lab, LAW Vitrification Facility, EMF, and HLW Vitrification Facility.

4I.6 Demineralized Water System

The DIW ~~will~~ treats process service water, and produces, stores, and distributes the treated water through an underground piping distribution system to users in BOF, PT Facility, Lab, LAW Vitrification Facility, EMF, and HLW Vitrification Facility. Demineralized water ~~will be~~is produced in the BOF water treatment building by pumping process service water through a series of cartridge filters and reverse osmosis units. The treated water is~~will be~~ stored in the BOF demineralized storage tank. Demineralized water is~~will be~~ pumped from the storage tank through an ultraviolet sterilization system to decontaminate biological organisms then sent through a final cartridge filter before it is fed into the distribution system.

Demineralized water is~~will~~ primarily ~~be~~ used for boiler makeup, chemical reagent makeup, equipment decontamination, process pipeline flushes, sampling pipeline flushes, vessel and bulge rinses, pump priming, Wet Electrostatic Precipitator misting, and instrumentation rinses.

4I.7 Process Service Water System

The PSW ~~will~~ provides filtered water for operations and maintenance purposes. The water is~~will be~~ stored and distributed to the PT Facility, LAW Vitrification Facility, EMF, HLW Vitrification Facility, and Lab. The system ~~will~~ consists of two storage tanks, filters, pumps, and distribution piping and supply filtered water to end users for various systems, such as offgas treatment, plant wash, and make-up to

chilled water. The PSW ~~will~~ receives water directly from the Hanford site potable DOW. Equipment for the PSW is located in the water treatment building, except for the tanks, which are located outside.

4I.8 Chilled Water System

The CHW system ~~will~~ supplies~~y~~ chilled water to selected equipment in the HLW Vitrification Facility, EMF, Lab, LAW Vitrification Facility, and PT Facility. The CHW system ~~will~~ consists of chillers, fixed-speed distribution pumps, adjustable-speed drive booster pumps, an expansion vessel, a chemical feed vessel, an air separator, piping, valves, in-line components, instruments, and controls.

Each of these facilities ~~will be~~is equipped with a secondary CHW loop that draws from the primary distribution. The HLW Vitrification Facility, Lab, EMF, and LAW Vitrification Facility secondary loops ~~will~~ supplies~~y~~ water to air handling units, fan coil units, in-bleed cooling coils, and breathing service air system compressors. Both the LAW Vitrification Facility and PT Facility secondary loops ~~will~~ supply water to heat exchangers used by the process cooling loops.

The chilled water system is designed to remain uncontaminated by mixed waste constituents. The process cooling loops are closed loops systems and do not share circulating water with the secondary or primary loops. The process cooling loops in the LAW Vitrification Facility and PT Facility are used for cooling both process vessel cooling coils and process vessel cooling jackets. Secondary chilled water returns from the HLW Vitrification Facility, Lab, LAW Vitrification Facility, EMF, and PT Facility and cascades through the PSA dryer coolers before it is cooled and once again returns to the end users.

The CHW system primary and secondary loops, as well as the LAW and PT Facility CHW process cooling loops, ~~will~~ receives corrosion inhibitors and pH adjustment chemicals, as needed, to limit deterioration of the materials that are in contact with the cooling medium and the fouling of heat transfer surfaces.

4I.9 Glass Former Reagent System

The GFR ~~will~~ provides glass formers reagents and sucrose to the LAW Vitrification Facility and HLW Vitrification Facility. The system will also provide silica to the LAW Container Finishing Handling system (LFH) for inert void fill for Immobilized LAW containers. Sucrose may also be mixed with the glass formers prior to addition of the radioactive waste (in the Melter Feed Preparation Vessels). Addition of sucrose mitigates the generation of nitrogen oxides in the off-gases generated in the melters.~~and added to the radioactive waste to enhance melter performance.~~ The GFR system is comprised of the equipment needed to receive, store, blend, and transport glass formers to the LAW Vitrification Facility and HLW Vitrification Facility. The GFR system includes the glass former handling equipment in BOF, the glass former mixers ~~located~~ in HLW Vitrification Facility and LAW, ~~vitrification facility~~ and the inert fill hoppers in the LAW ~~facility vitrification facility~~. The LAW Vitrification Facility and HLW Vitrification Facility portions of the GFR system are described in WTP DWP Permit Sections 4E.2.1 and 4F.2.1, respectively.

4I.10 Cathodic Protection System

An impressed current cathodic protection system is~~will be~~ used for eliminating or mitigating corrosion on interplant underground piping as well as the interior surfaces and bottoms of most field erected tanks. The cathodic protection system ~~will~~ maintains a negative polarized potential between the protected pipe or tank and a saturated copper/copper sulfate~~ide~~ reference electrode. The impressed current cathodic protection system ~~will~~ uses direct current provided by a rectifier that is powered from the plant's normal 480 volts alternating current power system. The direct current from the rectifier is~~will be~~ connected across the buried anode wire and the protected pipe or tank bottom. The current flows from the anode wire, which is positive, through the electrolyte, to the protected surface, which is negative, and back to the rectifier completing the electrical circuit.

BOF non-dangerous/mixed waste containing pipelines and equipment that is~~will be~~ cathodically protected include:

- Plant service air main headers.
- Diesel fuel oil pipelines (between the diesel fuel oil tank and the steam plant facility).
- Anhydrous ammonia reagent pipeline.
- PSA-integral transportation system compressed air pipeline.
- Metallic piping and fittings that are within the zone of influence of the cathodic protection system.

BOF non-dangerous/mixed waste field erected tanks that are cathodically protected include:

- Fuel oil tank.
- Domestic potable water tank.
- ~~Demineralized water tank.~~
- Process service water feed tank.
- Process service water supply tank.
- Non-rad effluent tank.
- Fire water tanks.

Additionally, various underground waste transfer pipelines that manage mixed waste are cathodically protected. Underground mixed waste transfer pipelines within WTP that ~~will be~~are cathodically protected include:

- Transfer lines between the PT Facility and the HLW Vitrification Facility.
- Transfer lines between the PT Facility and the LAW Vitrification Facility.
- Transfer lines between the Lab and the PT Facility.

The underground waste transfer lines installed to support the DFLAW configuration are coaxial lines that are constructed of stainless steel primary pipe, with a carbon steel encasement pipe that is coated with Fusion Bonded Epoxy (FBE). The coating system and water barrier consist of the FBE, polyurethane insulation, and a jacket or thermoplastic outer water barrier made of HDPE. To protect against corrosion, the ~~C~~cathodic protection system will remain operational for the intra-facility waste transfer lines even though wastes are not managed in these lines during DFLAW operations. ~~is not needed for the underground waste transfer lines installed to support the DFLAW configuration as the pipe system is made of corrosion resistant materials, providing water resistant construction. Additional information on the cathodic protection system for the underground waste transfer lines that manage mixed waste for all facilities can be found in Chapter 4, Process Information.~~

Table 4I-1 Balance of Facility Container Storage Areas

Container Storage Area	Maximum Waste Volume (US Gallons)[1]	Approximate Dimensions (L × W × H, in feet)[2]
1. WTP Waste Storage Area (located on the Part A Figures)	253,440[3]	145’ × 100’ × 10’
2. HLW Failed Melter Storage Facility (located on the Part A Figures)	403,947	75’ × 45’ × 16’
3. Transportation Staging Area	18,095	136’ x 60’

[1]The conversion factor used to convert from cubic feet to gallons is 7.4805 gal/ft^3.

[2]The dimension for height (H) is based on the height of the largest waste container stored in the area (i.e., LAW container is 7.5 ft, HLW canister is 15 ft, melters are assumed to be 16 ft, and a B-25 box is 5 ft - stacked a maximum of two high is 10 ft).

[3]Based on 4608 drum equivalents spaced two wide and stacked 2 high and including 30 inch aisle space, 33,880 ft^3

1

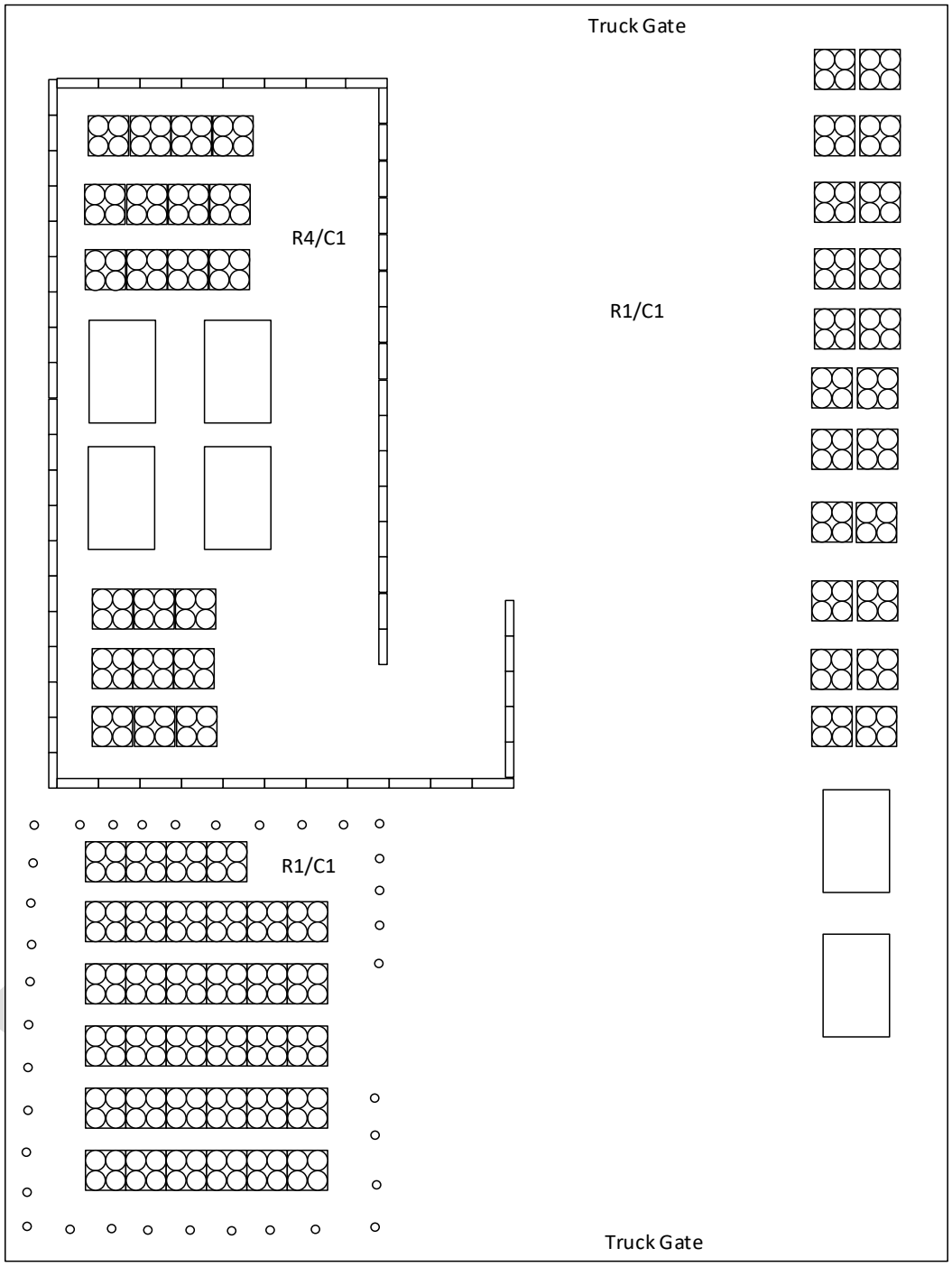

Figure 4I-1 Example of Container Configuration in Waste Management Area

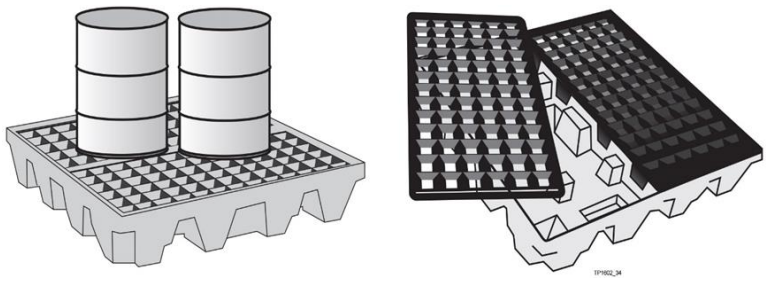

Figure 4I-2 Example of Typical Secondary Containment Pallets

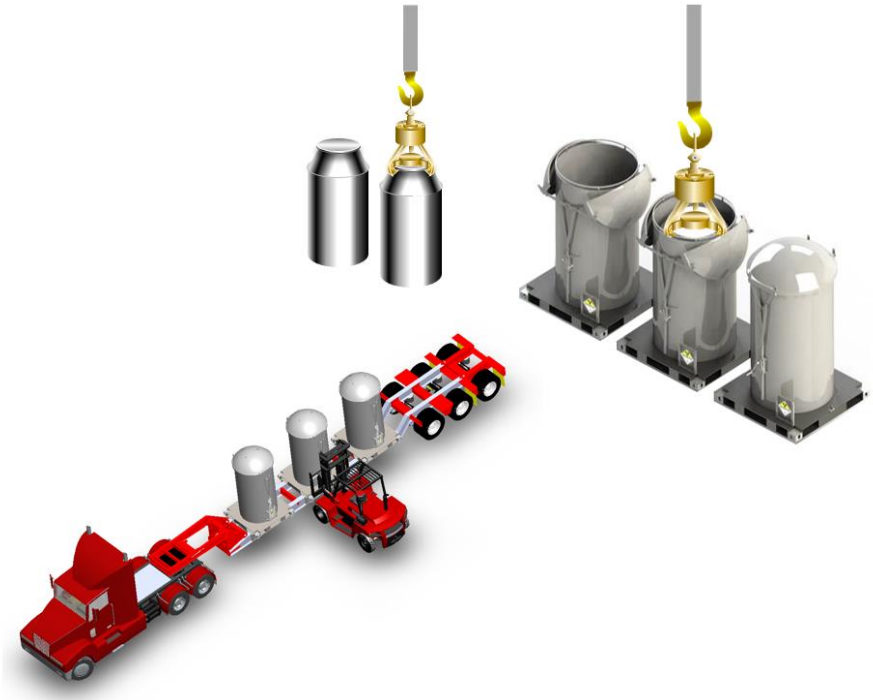

Figure 4I-3 Example of a Transporter Container Configuration