WASTE TREATMENT AND IMMOBILIZATION PLANT
CHAPTER 4H
ANALYTICAL LABORATORY (LAB)

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
11/29/2017	8C.2017.4D
09/05/2017	8C.2017.6F
12/15/2016	8C.2016.Q3

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ANALYTICAL LABORATORY (LAB)

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4H Analytical Laboratory (Lab)

The Analytical Laboratory (Lab) is designed to incorporate the features and capability necessary to ensure efficient Hanford Tank Waste Treatment and Immobilization Plant (WTP) operations and meet permitting, process control, authorization basis, and waste form qualification requirements. The Lab is a process support facility designed for "24/7" - 365 days per year operation to support peak throughput for each WTP facility. ~~The Lab is a process support facility.~~

–The Resource Conservation and Recovery Act (RCRA) permitted portions of the Lab include the Radioactive Liquid Waste Disposal (RLD) tank system (tank and ancillary equipment) and the container storage areas also known as the Waste Management Area (WMA).

Figure 4H-1 shows the locations of the Lab permitted areas. The Lab ~~will~~ also includes satellite accumulation areas and 90-day accumulation areas for the accumulation of secondary wastes generated by Lab~~laboratory~~ activities.

In addition, to support sample management with the Lab, b~~B~~arcode readers and computer workstations are provided in designated areas to input and retrieve data from the laboratory information management system (LIMS). LIMS is a laboratory information management software product. The intended use is to capture, process, store, manage, and report laboratory information generated in support of the WTP waste treatment process.

~~The workstations will be logically segregated to provide a degree of isolation from possible cross contamination that could reduce the validity of the analytical results. This isolation will be a design consideration. Isolation is also provided to enhance the ability of the laboratory to function even when a room or workstation is nonfunctioning. Redundant capabilities will be provided, as appropriate, to mitigate contamination incidents to maintain required support to the processes when one system fails.~~

~~Samples prepared within the Lab may be sent to off-site facilities for analysis. The sample(s) are packaged according to the dose rate and destination in "strong tight containers" or shielded shipping containers. The day the shipment is scheduled to be made, the packaged sample will be surveyed for final radiological release, shipping papers including chain-of-custody forms will be verified for completion, and transferred with the shipment package.~~

~~The laboratory design will be validated with information from tank utilization modeling of the process tanks and operational research modeling of the treatment process, as appropriate. General arrangement drawings 24590-LAB-P1-60-00007 and -00008 in Dangerous Waste Permit (DWP) Operating Group 10, Appendix 11.4 provide a general layout of the 0' 0" and -19' 2" elevations of the Lab where analytical, maintenance, administrative, and waste management activities take place. The following attributes are outlined in the facility design figures described above:~~

- ~~Workstations have been defined as required by the sampling and analysis plan for WTP process control and waste form qualification.~~
- ~~Capability to provide limited process technology will be provided.~~
- ~~Contamination controls have been incorporated for reliability of laboratory service to the WTP processes.~~
- ~~Management of samples for off-site analysis by an outsource laboratory including feed receipt samples.~~

~~Drawings and other documents, found in DWP Operating Group10, Appendix 11.0 provide additional detail for the Lab:General arrangement drawings showing locations of tank systems, secondary waste management, and analytical laboratory activities.~~

~~Process flow diagrams for process information.~~

~~Piping and instrumentation diagrams (P&IDs), mechanical drawings, typical system figures depicting the analytical laboratory tank system and ancillary equipment.~~ The Lab contains both high-activity and low-activity laboratories. High-activity samples are ~~will be~~ managed in the analytical hotcell laboratory (AHL). The AHL will only operate in the Baseline Configuration. Associated hotcell laboratories, hotcell drain collection vessel (RLD-VSL-00165), and associated components are not operational, but will maintain ventilation, in the Direct Feed LAW (DFLAW) configuration.

Low-activity samples are ~~will be~~ managed and analyzed in the analytical radiological laboratory (ARL). The ARL also includes a sample receiving/shipping area designed to manage the inflow of manually transported samples.

~~The AHL will operate in the Baseline configuration. Associated hotcell laboratories, tank systems, and ventilation systems, will be isolated in the Direct Feed Low-Activity Waste (DFLAW) configuration, and will not operate until Pretreatment operations begin.~~ In addition, the first floor of the Lab includes waste drum management, maintenance, and support areas for facility operation.

The second floor of the Lab is dedicated to the mechanical room, which contains the C1 and C2 air handling units.

The facility is ~~also being~~ designed to coordinate the management of samples that are~~will be~~ outsourced and analyzed at off-site laboratories. Outsource laboratories are~~will be~~ used to analyze the majority of very low-activity samples such as water quality and air emission samples. Outsource laboratories will also be used to analyze double shell tank (DST) system unit characterization samples. ~~Analytical methods and equipment selected to support laboratory analyses will be in accordance with applicable requirements. A LIMS network is provided to track and maintain an inventory of samples, reagents, and materials in the Lab area including sample analyses and data collection. In addition, the Lab includes waste drum management, maintenance, and support areas for facility operation.~~

~~The second floor of the Lab will be dedicated to the mechanical room, which will contain the C1 and C2 air handling units.~~

~~The RLD system vessels are located at approximately 19 ft below grade. Table 4H-1 lists current tank design information (capacity, materials of construction, and dimensions). Tank systems that manage liquid mixed or dangerous waste are provided with secondary containments. Table 4H-2 summarizes the secondary containment rooms/areas and calculated minimum liner heights. Sumps, leak detection boxes, and secondary containment drain systems are listed in Table 4H-3.~~

Samples are ~~will be~~ transported to the Lab in two ways. The majority of samples are~~will be~~ collected and transported from the processing facilities via the autosampling system (ASX). The ASX collects samples and transfers them from the requesting facility to the Lab via a pneumatic transfer system (PTS) to a hotcell or fume hood sample receipt area. Samples are~~will be~~ collected in a sample bottle or vial and transferred into a sample carrier. High-activity samples from the Pretreatment Facility (PTF) and High-Level Waste (HLW) vitrification facility are~~will be~~ pneumatically transferred to the hotcell sample receipt area through a dedicated transfer system for high-activity samples while ~~. L~~low-activity samples from the Low-Activity Waste (LAW) vitrification facility are ~~will be~~ transferred directly to the sample receipt ~~laboratory~~ area through a dedicated low-activity transfer system. Effluent M~~m~~anagement Facility (EMF) samples and a small percentage of samples from other facilities ~~will be~~are transported to the Lab~~laboratory~~ manually in appropriately shielded transportation casks or containers.

General Description of the Analytical Areas ~~Radiological Laboratory (ARL)~~

The ARL is one of the two analytical areas contained within the Lab. The ARL consists of thirteen laboratories commonly referred to as Rad Labs and is designed to operate during both the Baseline and DFLAW configurations. The other area is the AHL. The AHL consists of 14 hotcells, one hood assembly, and three glovebox assemblies adjoining the hotcell structure. The facility includes equipment in Hotcells 1 through 14 with the Hotcell 14 functioning as the secondary waste management area. A trolley is provided for inter-cell transfers of samples and smaller equipment items. A monorail is provided to move large equipment. Each hotcell is provided with an appropriate number of master slave manipulators (MSMs) to accomplish in-cell tasks remotely. The AHL will only operates in the Baseline configuration.

Laboratory areas manage dangerous and/or mixed waste in Satellite Accumulation Areas (SAAs) and 90-Day Accumulation Areas pursuant to the generator requirements [WAC 173-303-200]. Organic liquids will be segregated and managed as Lab Packs WAC 173-303-161; other liquid wastes will be transferred to RLD Vessels to be returned back into the WTP process.

The ARL is designed to support the preparation and analysis of low-activity mixed waste samples. The Labs also support the analyses of samples diluted, digested, and prepared in the hotcell facility. Table 4H-1 lists the ARL and AHL analytical areas, their functions and waste management processes. Samples will be manually transferred from the hotcell facility to the ARL. The ARL will be capable of receiving these low-activity samples transferred from the process facilities via the ASX as well as manually transported low-activity samples from the process facilities. Equipment used in the preparation of samples for analyses will be located inside the fume hoods vented to the C3 ventilation system. All analyses except counting will be completed with equipment located in ventilation hoods. Barcode readers and computer workstations are provided in designated areas to input and retrieve data from the LIMS.The ARL includes utilities and equipment required to support activities such as:

- Sample receipt and (manual) transport
- Dissolution/dilution
- Distillation/titration
- Standard/reagent preparation
- X-ray fluorescence spectrometry (XRF)
- Fourier transformation infrared spectrometry (FT-IR)
- Total Inorganic Carbon/Total Organic Carbon analyses (TIC/TOC)
- Analyses of elements and anions
- Ultraviolet and visible spectroscopy
- Preparation of samples for elemental analysis
- General physical properties analysis
- Radionuclide separation and counting
- Management of outsourced samples
- Satellite accumulation areas for secondary wastes

Sample Receipt Laboratory (RL-1)

The Sample Receipt Laboratory will serve as the sample receipt and staging area for the ARL. This laboratory will be provided with hoods for sample receipt, inspection/evaluation, sample staging, and transfers. RL-1 will also contain four shielded cabinets each ventilated to the C3 ventilation system, and refrigerators for storage of samples requiring sample preservation. Sample preparations are completed with equipment located in hoods vented to the C3 ventilation system.

Dissolution/Dilution Lab (RL-2)

The Dissolution/Dilution Lab supports general wet chemistry activities including the preparation of samples for analyses that will be performed in the other Rad Labs. RL-2 will house instrumentation and supplies to support a variety of sample preparation techniques. The two primary sample preparation methods to be performed in RL-2 are microwave-assisted acid dissolution and fusion dissolution. Sample preparations are completed with equipment located in hoods vented to the C3 ventilation system.

Distillation/Titration Lab (RL-3)

The Distillation/Titration Lab provides sample preparation including distillation, titration, and physical measurements of samples. Sample preparation performed in this laboratory involves determining the aliquot or sub-sample weight, measurement of the specific gravity/density of sample solutions, and acid and base titrations. Sample preparations are completed with equipment located in hoods vented to the C3 ventilation system.

Standard/Reagent Preparation Laboratory (RL-4)

The Standard/Reagent Preparation Laboratory provides for prepared standards and reagents prior to their distribution to the other laboratories. Sources used for infrequent calibration of counting equipment will be stored in this laboratory. Sample preparations are completed with equipment located in hoods vented to the C3 ventilation system.

X-ray Laboratory (RL-5)

The X-ray Laboratory is used for quantifying elemental concentrations utilizing the X-ray Fluorescence (XRF) system. Optical microscopes are used for qualitatively identifying crystals as needed during process troubleshooting. Analyses are completed with equipment located in hoods vented to the C3 ventilation system.

Instrument Laboratory (RL-6)

The Instrument Laboratory supports unique functions associated with non-routine analyses. These functions include sample preparation and analysis functions such as the preparation of KBr pellets, preparation of dilutions and reagents for Ultraviolet-visible spectrophotometry, FT-IR Spectrometry for the quantitation of compounds in liquid, gas, or solid phases, and UV/VIS spectrometry for quantitation of compounds in liquids. Analyses and sample preparations are completed with equipment located in hoods vented to the C3 ventilation system.

Process Technology Laboratory (RL-7)

The Process Technology Laboratory provides non-routine measurement of physical characteristics of low-activity process samples and process tests. This laboratory is used for differential scanning calorimeter/thermal gravimetric analysis (DSC/TGA), particle size analysis, and rheology and pH measurements. Analysis and testing are completed with equipment located in hoods vented to the C3 ventilation system.

Process Technology Laboratory (RL-8)

The Process Technology Laboratory provides testing on laboratory scale equipment to observe the behavior of low-activity materials during processing through a process unit operation and to define anomalies to routine processing. All analyses are completed with equipment located in hoods vented to the C3 ventilation system.

Elemental Analysis Laboratories (RL-9 and RL-9A)

The Elemental Analysis Laboratories are used for the preparation and analysis of medium level radioactive samples using an inductively coupled plasma/atomic emission spectrometer (ICP/AES) instrument for the analysis of elements, inductively coupled plasma/mass spectrometer (ICP/MS) instrument for the analysis of elements and specific radionuclides, and mercury analyzer for the analysis of mercury. The Elemental Analysis Laboratory RL-9A is a duplicate of Elemental Analysis Laboratory RL-9; RL-9A is a backup to RL-9. The space is available for the setup of process development evaluations. All analyses are completed with equipment located in hoods vented to the C3 ventilation system.

General Chemistry Lab (RL-10)

The General Chemistry Lab is used to prepare and analyze samples using the Ion Chromatography (IC) for analysis of selected anions and organic acids, and the Total Carbon analyzer for total inorganic carbon, and total organic carbon (TIC/TOC) analysis. RL-10 equipment is split such that instrument electronics are on benches adjacent to fume hoods and the components for sample contact are inside hoods vented to the C3 ventilation system.

Rad Preparation Laboratories (RL-11 and RL-12)

The Rad Preparation Laboratories are used for sample preparation and separation of various radionuclides for analysis by nuclear spectroscopy (counting). Both of the laboratories will be identical in size and will have the capability to provide limited redundancy or both labs can be used to provide additional capacity. All analyses are completed with equipment located in hoods vented to the C3 ventilation system.

Rad Counting Laboratory (RL-13)

The Rad Counting Laboratory is used for analyzing prepared samples, standards, and control sources. This laboratory will accommodate instrumentation for measurements of alpha, beta, and gamma radiation in samples transferred from the Rad Preparation Laboratories RL-11 and RL-12. There will be no hoods, water distribution, or sinks in this room. Samples will be manually transported on a cart from the Rad Preparation Laboratories. Shielded storage areas will be provided for temporary staging of samples, calibration and control check sources. Analyses will be completed using gamma spectrometer systems, gas-flow proportional counters for gross alpha/beta analysis, alpha spectroscopy multi-detector systems, and liquid scintillation counting systems for beta analysis.

Sample Shipping and Receiving Area (Rm A-0141F)

The Sample Shipping and Receiving Area is located adjacent to the primary airlock and is used for receiving manually delivered samples. This room will provide space for loading casks for off-site transport of samples as required. This room will also provide an area with low contamination potential and reduces the need for decontamination of casks and containers for off-site radiological release. This area provides equipment to receive and transfer samples, chain of custody, staging for shipment to off-site facilities, and transfer to RL-1 or into the Sample Receipt Hotcell (HC-1) if the radioactivity level is determined to require shielding. A fume hood is provided to support sample receipt, packaging, and preparation for shipment.

If the sample is to be shipped to another facility, the sample will be placed on shelving or in the refrigerator awaiting shipping. If a sample originating in the Lab is to be shipped to another laboratory, the exterior of the sample container will be decontaminated and brought to this location for staging for shipment.

General Description of the Analytical Hotcell Laboratory (AHL)

In the Baseline configuration process samples from the WTP PTF and HLW facility taken by the ASX are delivered to the Hotcell Receipt Station (HCRS) by a pneumatic transfer system. Samples from outside the WTP that require shielding are delivered to the hotcell in shielded sample carriers called pigs. Barcode readers are provided in each hotcell and a computer workstation is provided to input and retrieve data from the LIMS. A trolley is provided for inter-cell transfers of samples and smaller equipment items. A monorail is provided to move large equipment. Each hotcell is provided with an appropriate number of master slave manipulators (MSMs) to accomplish in-cell tasks remotely. The equipment used to perform the functions described in the following sections is representative of typical activities for safely performing operations on highly radioactive samples.

The AHL consists of 14 hotcells (HC), one hood assembly, and three glovebox assemblies adjoining the hotcell structure. The facility includes equipment in Hotcells 1 through 14 with the Hotcell 14 functioning as the secondary waste management area, and a more detailed description of Hotcell 14 waste management activities is provided in Section 4H.5, Solid Waste Management. Gloveboxes adjoining HC-12 and HC-13 will house the ICP/AES and ICP/MS instruments.

Samples will be moved into and between the hotcells using the trolley or monorail. Ventilation flow from the hotcell area, including the waste cell, will be routed to the C5 High Efficiency Particulate Air (HEPA) filtration system.

Sample Receipt (HC-1)

The Sample Receipt Hotcell is located at the north end of the series of analytical hotcells. One glovebox assembly on HC-1 will be used to transfer samples and material out of the hotcells. One hood assembly on HC-1 will be used to introduce manually drawn samples into HC-1. This hotcell is outfitted with four MSM arms (two pairs) on the east and west sides to provide full floor coverage. The HCRS on top of HC-1 provides for the delivery of samples from the ASX. The mechanical de-capping of sample bottles, transferring samples to transparent container, and capping with a screw-type lid is performed in HC-1. HC-1 also provides radiation dose rate probe and meter to estimate the radiation level of both incoming and outgoing samples, pH meter for measurement of samples, and a barcode reader (or similar device) to identify and track sample containers.

The ASX HCRS is located on top of HC-1. The sample carrier will be delivered from an HLW or PTF ASX sampler to the HCRS. The HCRS will remove the sample bottle from the carrier utilizing robotics and place it in a chute attached to HC-1.

Sample Preparation (HC-2 and HC-3)

The Sample Preparation Hotcells are located south of the sample receiving hotcell and each hotcell will be outfitted with two MSMs. Activities carried out in these hotcells include the generation of individual sample aliquots using sample homogenizer, electronic scales, centrifuge, filtration, stirring, and desiccators. Individual sample aliquots are then transferred to other hotcells for further analysis.

Limited Process Technology (HC-4)

The limited process technology hotcell provides space for the evaluation of anomalies occurring in the processing facilities such as potential plugging of ultrafilters, ion exchange malfunction and material foaming, etc. This hotcell may also be used to prepare coupons for analyses in hotcells 12 and 13. This cell has one pair of MSMs and necessary sample preparation equipment (furnaces, drying ovens, balances, etc.) to complete process testing.

Physical Properties (HC-5)

The physical properties hotcell provides space for measurements such as rheology, solids, and particle size measurements to support process operations. This hotcell is provided with a pair of MSMs, and necessary sample preparation equipment (furnaces, drying ovens, balances, etc.) to complete process testing.

Dissolution and Dilution Hotcells (HC-6 and HC-7)

The dissolution and dilution hotcells will be used to perform thermal-assisted acid digestion and alkali fusion dissolutions of WTP process samples. Each hotcell contains a pair of MSMs and work surface for dissolving slurry feed samples (such as from the melter feed preparation vessels) and glass shards. The equipment used to prepare samples in the dissolution/dilution hotcells includes microwave and/or convection ovens and accessories for heating and testing sample mixtures such as furnaces, drying ovens, balances, pH meters.

Radionuclide Preparation Hotcells (HC-8 and HC-9)

The radionuclide preparation hotcells will be used to separate radionuclides for further isolation and also to reduce the radiological dose rate of samples for export from the hotcells for counting and analyses in ARL. The equipment required to prepare samples consists of small pre-packed ion exchange columns and other support equipment such as balances and glassware.

Ion Chromatography (IC) and Total Inorganic Carbon (TIC)/Total Organic Carbon (TOC) Preparation (HC-10)

The Ion Chromatography and Total Inorganic and Organic Carbon Preparation hotcell is used to prepare samples for IC or TIC/TOC analyses in the ARL. Liquid samples for anion and TIC/TOC analyses are diluted and transferred to the Rad Lab. Solids are digested, diluted, and transferred to the Rad Lab for analyses. This preparation is needed to reduce dose rates to an acceptable level for analysis in Rad Labs. The equipment required to prepare samples consists of containers for performing water digestions, volumetric flasks and pipettes for diluting the samples and addition of control reagents, and filtration apparatus and vacuums for assisting in sample filtration.

Boildown and Physical Properties (HC-11)

This hotcell will provide the capability to determine the volume reduction of sample material achievable before solids form, to test the compatibility of different waste types and to develop analytical methods. The hotcell will be outfitted with the general equipment capabilities. Equipment required to prepare and/or test samples will include stirrers to homogenize sample materials, vessels to composite samples, and filtration systems to separate solids from liquids.

ICP Preparation and Analyses (HC-12 and HC-13)

The ICP Preparation and Analysis hotcell receives samples prepared in hotcells 2, 3, 4, 6 & 7. These hotcells will receive samples previously diluted in the sample preparation hotcells (HC-2 and HC-3) or made into coupons in Limited Process Technology hotcell (HC-4) or from the dissolution/dilution hotcells (HC-6 and HC-7). A glovebox approximately 4 feet (ft) by 4 ft will be attached perpendicular to the exterior of each hotcell. An ICP/AES and an ICP/MS will be integrated with the gloveboxes at hotcells 13 and 14. Equipment necessary to prepare and/or analyze samples in HC-12 and HC-13 will include:

- ~~Volumetric glassware to perform sample dilutions.~~
- ~~Pipettes to add spikes and reagents to samples.~~
- ~~Stirrers to homogenize solutions.~~
- ~~Analytical balance to perform dilutions by weight.~~
- ~~Attached glovebox exterior to the hotcell.~~
- ~~ICP/AES instrument integrated with the glovebox.~~
- ~~ICP/MS instrument integrated with the glovebox.~~
- ~~Laser system to ablate particulates from the surface of a prepared glass coupon.~~
- ~~Sample positioning and focusing system to properly ablate glass particulates.~~
- ~~Optical viewing system to observe and align area of the glass coupon for ablation.~~

~~Hotcell Solid Waste Management (HC-14)~~

~~Mixed and dangerous solid waste will be accumulated within the hotcells in SAAs and periodically placed in waste drums. Solid waste management in the hotcell will require remote handling. Waste from the SAAs which is ready to be removed from the hotcells is transferred to HC-14 where it can be removed from the hotcells into awaiting waste drum(s). Details about secondary waste management in the Hotcell Solid Waste Management area is provided in Section 4H.5.1. Liquid waste along with unused sample portions can be disposed of directly to the RLD system via hotcell drains.~~

4H.1 Containers

This section identifies the containers and container management practices that are~~will be~~ followed at the Lab. The term "container" is used as defined in Washington Administrative Code (WAC) 173-303-040. Container management occurs to store and treat dangerous and/or mixed wastes generated from the performance of analytical procedures, test plans, and developmental procedures in support of WTP operations. Containers are then prepared for shipment to other on-site units or off-site Treatment Storage and Disposal (TSD) facilities for further treatment, as required, and compliant disposal. ~~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 area (secondary waste) located within the Lab consists of the following rooms:~~

- ~~Waste Drum Management Room (A-0139)~~
- ~~Lab Pack Room (A-0139A)~~
- ~~Airlock (A-0139B)~~
- ~~Volume Reduction Room (A-0139C)~~
- ~~Airlock/Clean Drum Export Room (A-0139D)~~

~~Container storage area dimensions at the Lab are summarized in Table 4H-4.~~

~~The following sections address waste management containers:Description of Containers – Section 4H.1.1~~

~~Container Management Practices – Section 4H.1.2~~

~~Container Labeling – Section 4H.1.3~~

~~Containment Requirements for Storing Waste – Section 4H.1.4~~

~~Prevention of Ignitable, Reactive, and Incompatible Wastes in Containers – Section 4H.1.5~~

4H.1.1 Description of Containers

All containers of dangerous and/or mixed wastes are compatible with the contained waste and are labeled to describe the contents of the container and the major risks of the waste as required under WAC 173-303-395 and WAC 173-303-630(3). Each container is assigned a unique identifying number. All containers are labeled according to WAC 173-303-190.

4H.1.2 These types of waste will be managed in containers:

4H.1.3 Miscellaneous mixed waste (secondary waste)

4H.1.4 Miscellaneous nonradioactive dangerous waste (secondary waste)

4H.1.5 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 Lab.

4H.1.6 Miscellaneous Mixed Waste

4H.1.7 Generally, miscellaneous mixed wastes are secondary wastes that may include, but are not limited to, the following items:

4H.1.8 Spent or failed equipment

4H.1.9 HVAC HEPA filters

4H.1.10 Analytical laboratory waste

4H.1.11 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.

4H.1.12 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.

4H.1.13 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 small quantities of liquids, absorbent products will be added to absorb liquids, to comply with the receiving TSD facility waste acceptance criteria. In addition, the analytical laboratory will generate containerized liquid waste (Lab Packs).

4H.1.14 Miscellaneous Nonradioactive Dangerous Waste

4H.1.15 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.

4H.1.164H.1.2 Container Management Practices

The following paragraphs describe how each of the containers used at the Lab are managed.Waste accumulated in the WMA are generated during Lab operations and analytical processes. Examples of waste streams that are accumulated in the Lab include the following:

- Analytical glassware
- Plastic containers
- Failed small equipment
- Maintenance waste
- Debris and PPE
- Liquid organic waste streams

Most miscellaneous secondary dangerous and/or mixed wastes are spent equipment and consumables such as pumps, air lances, HEPA filters, etc., and do not contain liquids. Compatible absorbent products may be added to absorb liquids for wastes that contain small quantities of liquids. In addition, some wastes are segregated and managed as Lab Packs.

4H.1.16.14H.1.2.1 Waste Management Area (WMA) Miscellaneous Mixed Waste and Miscellaneous Nonradioactive Dangerous Waste Containers

The WMA, consists of five rooms:

- A-0139, Room A-0139 is the primary dangerous and/or mixed wastes storage room. The waste containers are segregated and arranged by waste type to meet the waste compatibility and separation distances provided in the Uniform Fire Code and applicable sections of WAC 173-303-630. An example of drum configuration in the WMA is provided in Figure 4H-2.
- A-0139A, Room A-0139A is equipped with a walk-in fume hood to facilitate the lab packing of liquid waste and packaging/management of other types of waste generated within the Lab.
- A-0139B, Room A-0139B is an airlock space between the main room A-0139 and A-0139A and A-0139C.
- A-0139C, Room A-0139C contains an in-drum compactor that will not be used for treatment of hazardous waste. The in-drum compactor will only be used for the mechanical compaction of compactible waste.
- A-0139D, Room A-0139D is used for the staging of empty waste containers and for the storage of waste containers prior to shipping.

Container storage area dimensions at the Lab are summarized in Table 4H-2.

Container management practices include storage, packaging, repackaging, or sampling waste in containers, transferring containers to and from the WMA and methods for handling and storage. The following list discusses these practices:

- Employees working within the WMA while the facility is operating, will have immediate access to a device, such as a telephone or a hand-held, two-way radio, capable of summoning external emergency assistance. [WAC 173-303-340]

- If a container holding dangerous waste is not in good condition (e.g. severe rusting, apparent structural defects) or if it begins to leak, the waste will be transferred to a container that is in good condition or managed in another way that complies with WAC 173-303 and this Permit.
- All containers in storage are labeled to identify the major risk of the waste in the container.
- Waste is maintained in containers that are compatible with the waste stored. [WAC 173-303-630(4)]
- Waste containers are kept closed except when adding or removing waste, or when performing visual verification or sampling. [WAC 173-303-630(5)(a), WAC 173-303-300(5)]
- Containers will not be opened, handled, and/or stored in a manner which may rupture the container or cause it to leak. [WAC 173-303-630(5)(b)]
- Aisles between rows of containers greater than 10-gallon capacity are at least thirty inches wide, or to meet other applicable requirements, whichever is greater. No row of containers greater than 10-gallon capacity will be more than two containers wide. [WAC 173-303-630(5)(c)]
- A system of weekly container inspections is used as described in Chapter 6.0.
- Use of secondary containment is described in Section 4H.1.4.
- Proper management of ignitable or reactive waste is performed in accordance with Section 4H.1.5.
- Proper management of incompatible wastes is performed in accordance with Section 4H.1.5.

Department of Transportation (DOT) approved containers holding only wastes that do not contain free liquids, do not exhibit either the characteristics of ignitability or reactivity as described in WAC 173-303-090(5) or (7), and are not designated as F020, F021, F022, F023, F026, or F027 will be stored on the floor within the unit. Labpacks are considered not to require further secondary containment and are also stored directly on the floor.

Dangerous waste containers are inspected for integrity and adequate seals before being accepted at the WMA. Waste received for storage and treatment at WMA are either picked up by waste management personnel or brought to the WMA in containers suitable for the waste. Depending on the container weight, size or number of containers to be moved, container(s) of dangerous waste are hand carried or moved on a platform or handcart, as appropriate. Waste management staff moves the dangerous containers, keeping incompatible wastes separated. Unsupervised waste management staff will not perform waste movement operations until they are formally trained.

Waste in containers that are damaged, leaking, lack integrity, or not securely sealed to prevent leakage are not accepted at the WMA. Examples of acceptable packaging include analytical reagents in their original bottles, U.S. Department of Transportation-approved containers, spray cans, sealed ampules, paint cans, leaking containers that have been over packed, etc.~~Miscellaneous Mixed Waste Containers~~

~~Miscellaneous mixed waste (secondary waste) will be managed in:~~

- ~~Laboratory waste management area (A-0139 and A-0139A/B/C/D)~~

~~Containers will be kept closed unless waste is being added, removed, or sampled while in the containment storage areas. Containers stored in these areas will be placed on pallets, or otherwise elevated to prevent contact with liquid, if present. Table 4H-4 summarizes the dimensions and maximum capacity of miscellaneous mixed waste storage areas. Containers will be managed in designated areas throughout the Lab, and then transferred to a suitable TSD facility.~~

~~The laboratory waste management area (A-0139 and A-0139A/B/C/D) will be located in the southern portion on the 0 ft elevation of the Lab. The unit will be used for storage of miscellaneous waste~~

containers prior to disposition to a receiving TSD facility. The aisle space will be 30 inches (in.) and waste containers may or may not be stacked. This unit's storage capacity is listed in Table 4H-4.Miscellaneous Nonradioactive Dangerous Waste Containers

Miscellaneous dangerous waste containers will typically be managed in non-permitted waste management units (SAAs and less-than-90-day storage areas) located throughout the Lab. 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.

4H.1.16.24H.1.2.2 Waste Tracking

A tracking database is used to inventory and track waste containers within the WMA.

The waste tracking database 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 regulator 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 waste tracking database does the following:

- Tracks each container by location and by waste type.
- Identifies each container by a unique PIN.
- Tracks the date of generation, days in storage and ship date.
- Has multiple levels of reporting capabilities (e.g., WTP management, DOE, regulators).
- Maintain a history of all container movements by date.
- Identifies container size and type.
- Identifies the type of waste (Dangerous, Radioactive, Mixed, Universal, Non-regulated).
- Provides capability to consolidate waste containers.

Records generated as part of waste management activities are managed in compliance with WTP procedures. Records are generated either as hard copies or electronically.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 include the following systems (all systems used at the plants/facilities and balance of facilities 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 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 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.

4H.1.174H.1.3 Container Labeling

Once material has been designated as dangerous or mixed waste, all containers are marked/labeled to describe the content of the container as required under WAC 173-303-630(3). Containers are marked with a unique identifying number assigned by the generating unit. All containers used for transfer of dangerous and/or mixed waste are prepared for transport in accordance with WAC 173-303-190.
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.

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.

4H.1.184H.1.4 Containment Requirements for Storing Waste

Secondary containment requirements for the waste are discussed below.

4H.1.18.14H.1.4.1 Secondary Containment System Design

Waste stored within the WMA are required to meet the requirements of WAC 173-303-090(5) and (7), WAC 173-303-630(7) and WAC 173-303-806(4)(b). The WMA is not constructed with containment systems to meet these secondary containment requirements. In order to meet the requirements for secondary containment, containers are placed on portable secondary containment systems or elevated (e.g., pallets, skids), to protect the containers from contacting accumulated liquids. Waste that does not contain free liquids or is not ignitable or reactive does not require a containment device as stated in WAC 173-303-630(7)(c) since the areas are within a building and are protected from precipitation. Each portable secondary containment systems 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.~~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~~

~~Containers can be placed on portable secondary containment systems or elevated (e.g., pallets, skids), to protect the containers from contacting accumulated liquids. Waste that does not contain free liquids or is not ignitable or reactive does not require a containment device as stated in WAC 173-303-630(7)(c) since the areas are within a building and are protected from precipitation. Further documentation discussing how WTP meets the WAC and permit requirements for storage areas in the Lab are located in the operating record.~~

~~4H.1.18.2 Miscellaneous Dangerous Waste~~

~~4H.1.18.3 Containers can be placed on portable secondary containment systems or elevated (e.g., pallets, skids), to protect the containers from contacting accumulated liquids. Waste that does not contain free liquids or is not ignitable or reactive does not require a containment device as stated in WAC 173-303-630(7)(c) since the areas are within a building and are protected from precipitation. Further documentation discussing how WTP meets the WAC and permit requirements for storage areas in the Lab are located in the operating record.~~

~~4H.1.18.4~~4H.1.4.2 System Design

The exterior walls of the waste management area (WMA) are constructed of reinforced concrete and the entire floor area is coated with a special protective coating. Coatings are provided to support the clean-up and decontamination of a potential spill and are not designed to provide secondary containment. The secondary containment requirement for containers containing liquid waste is met by using portable secondary containment pallets. The container storage areas in Rooms A-0139 and A-0139A, A-0139B, A-0139C, and A-0139D are not designed with containment systems as stated in WAC 173-303-630(7)(c) since the areas are within a building and protected from precipitation. Containers are~~can be~~ placed on portable secondary containment systems or elevated (e.g., pallets, skids), to protect the containers from contacting accumulated liquids. Waste that does not contain free liquids or is not ignitable or reactive does not require a containment device as stated in WAC 173-303-630(7)(c) since the areas are within a building and are protected from precipitation. An example of portable secondary containment pallets is provided in Figure 4H-3.

~~4H.1.18.5 Miscellaneous Mixed Waste~~

~~4H.1.18.6 There will be a miscellaneous mixed waste (secondary waste) container storage area at the Lab, as follows:~~

~~4H.1.18.7 Laboratory waste management area (A-0139 and A-0139A/B/C/D)~~

~~4H.1.18.8 Miscellaneous mixed waste containers can be placed on portable secondary containment systems or elevated (e.g., pallets, skids), to protect the containers from contacting accumulated liquids. Waste that does not contain free liquids or is not ignitable or reactive does not require a containment device as stated in WAC 173-303-630(7)(c) since the areas are within a building and are protected from precipitation. Further documentation discussing how WTP~~

Field Code Changed

~~meets the WAC and permit requirements for storage areas in the Lab are located in the operating record.~~

~~4H.1.18.9 Miscellaneous Dangerous Waste~~

~~4H.1.18.10 Miscellaneous dangerous waste containers can be placed on portable secondary containment systems or elevated (e.g., pallets, skids), to protect the containers from contacting accumulated liquids. Waste that does not contain free liquids or is not ignitable or reactive does not require a containment device as stated in WAC 173-303-630(7)(c) since the areas are within a building and are protected from precipitation. Further documentation discussing how WTP meets the WAC and permit requirements for storage areas in the Lab are located in the operating record.~~

Field Code Changed

~~4H.1.18.11~~4H.1.4.3 Structural Integrity of the Base

The WMA floor is not designed nor intended to, provide secondary containment of materials. Therefore, no structural integrity assessment is required.

Secondary containment is provided by commercially available portable secondary containment pallets/devices designed to contain 10% of the volume of all containers within the containment pallet, or the volume of the largest container, whichever is greater.

~~4H.1.18.12~~4H.1.4.4 Containment System Capacity ~~Miscellaneous Mixed Waste~~

Liquid waste may be stored in the WMA~~laboratory waste management area~~. Each container holding liquid dangerous waste is~~will be~~ 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~~ functions 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~~

~~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 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.~~

~~4H.1.18.13~~ Control of Run-On ~~Miscellaneous Mixed Waste~~

4H.1.4.5 ~~Run-on will not reach the interior of the miscellaneous mixed waste storage areas, because they will be located within the Lab building which is provided with a grated precipitation collection trough located outside of the container storage area roll up doors. Additionally, the building is provided with gutters to remove precipitation.~~

Run-on cannot reach the interior of the WMA because of its location inside the Lab. The possibility for precipitation to flow into the WMA through the roll-up door is mitigated by a grated precipitation collection trough located outside of the container storage area roll-up doors on the south side of the airlock/clean drum export area (Room A-0139D). Additionally, the building is provided with gutters to remove precipitation.

4H.1.18.14 Miscellaneous Dangerous Waste

4H.1.18.15 Run-on will not reach the interior of the miscellaneous dangerous waste storage areas, because the Lab building is provided with a grated precipitation collection trough located outside of the container storage area roll up doors. Miscellaneous dangerous waste will be managed in buildings with walls and roof to remove precipitation.

4H.1.18.164H.1.4.6 Removal of Liquids from Containment System

Spilled or leaked waste and liquids such as sprinkler water will be removed from the containment system in as timely a manner as is necessary to prevent overflow in accordance with WAC 173-303-630(7)(a)(ii).Miscellaneous Mixed Waste

Portable secondary containment 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 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.

4H.1.18.174H.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

Free liquids may be present in wastes managed in the WMA. Secondary containment is provided for individual containers that manage free liquids. Wastes with the F020-F023, F026, and F027 numberscodes are not identified for the DST system, nor are they anticipated to be generated by the Lab.Miscellaneous Mixed Waste

Liquids may be present in wastes in the laboratory waste management area. 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 Lab.

Miscellaneous Dangerous 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 Lab.

4H.1.194H.1.5 Prevention of Reaction of Ignitable, Reactive, and Incompatible Wastes in Containers Ignitable, Reactive, or Incompatible Miscellaneous Mixed Waste and Miscellaneous Dangerous Waste

The Lab generates and stores containers of dangerous or mixed waste exhibiting the characteristics of reactivity (D003) and ignitability (D001) as defined in WAC 173-303-090(5) and (7). Incompatible waste includes waste that is unsuitable for mixing with another waste or material because the mixture might produce heat or pressure, fire or explosion, violent reaction, toxic fumes, mists, or gases, or flammable fumes or gases. Proper precautions are taken to prevent any off-normal situations from occurring. Acids and bases are stored in flammable storage cabinets or on separate portable secondary containments; oxidizers are stored separately from combustible materials; and corrosive waste are stored on separate portable secondary containments or in flammable cabinets. These separate storage areas within the WMA are clearly marked with signs indicating the appropriate waste category. Incompatible waste containers are stored at least thirty inches apart with separate containment.

Separate labpack containers are used, and other waste types are not packed with ignitable waste. Ignitable, reactive, or incompatible waste is separated from containers of other waste types in the WMA. Within the WMA, ignitable or reactive waste are placed on separate portable secondary containment systems, such as individual spill pallets. Personnel inspect the containers for proper packaging, marking, and waste information before transport. Potentially incompatible waste ~~will~~ are be stored at least one aisle width (30") apart and in separate containment.

4H.1.5.1 Management of Ignitable and Certain Other Reactive Waste in Containers

Ignitable or reactive waste may be generated from analytical or maintenance activities. This waste is accumulated and managed in compliance with regulatory requirements, in approved containers. Containers holding reactive waste exhibiting the characteristic specified in WAC 173-303-090(7)(a)(vi), (vii), or (viii) are managed in accordance with WAC 173-303-395(1)(a).

~~4H.1.19.1~~4H.1.5.2 Design of Areas to Manage Incompatible Waste

Incompatible wastes are segregated by space and by portable secondary containment pallets. Incompatible wastes are also stored on separate secondary containment (if required) and at least 30-inches apart.

4H.2 Tank Systems

The RLD System vessels are located at approximately 19 ft below grade. Table 4H-3 lists current tank design information (capacity, materials of construction, and dimensions). Tank systems that manage liquid mixed or dangerous waste are provided with secondary containments. Table 4H-4 summarizes the secondary containment areas and calculated minimum secondary containment heights. Sumps, leak detection boxes, and secondary containment drain systems for the RLD are listed in Table 4H-5.

~~4H.1.20~~4H.2.1 Radioactive Liquid Waste Disposal (RLD) System

The Lab RLD System collects liquid effluent generated within the Lab from floor drains, sink drains, hotcell drains, and other drains in the various rooms and areas throughout the Lab

The analytical Lab~~laboratory~~ RLD ~~s~~System is primarily composed of the following:

- Floor Drain Collection Vessel (RLD-VSL-00163)
- Laboratory Area Sink Collection Vessel (RLD-VSL-00164)
- Hotcell Drain Collection Vessel (RLD-VSL-00165)
- Associated ancillary equipment

The Lab RLD System includes piping, instrumentation, pumps, valves, mixers, transfer pump pits, piping pits, cells, and other ancillary equipment associated with the collection and transfer of liquid within the Lab. The Lab vessels are connected to a vessel vent header which maintains a slight vacuum on the vessel headspace. All the vessels are located in areas that are not routinely accessible. Figure 4H-4 shows a simplified process flow diagram for the Lab RLD System.

4H.2.1.1 Laboratory Floor Drain Collection Vessel (RLD-VSL-00163)

The Floor Drain Collection Vessel (RLD-VSL-00163) collects, contains, and transfers noncontaminated liquid effluent. The floor drain collection vessel is identified as part of the RLD ~~s~~System. It is not designed or permitted to manage dangerous and/or mixed ~~or dangerous~~ wastes. If a spill or release were to occur that contaminated this vessel, the vessel ~~will be~~ is discharged to the Laboratory Area Sink Collection Vessel (RLD-VSL-00164) or the ~~H~~hotcell ~~D~~drain ~~C~~collection ~~V~~vessel (RLD-VSL-00165) and rinsed with water prior to being returned to service. ~~This vessel collects effluent from radiological~~

~~laboratory floor drains, eyewash, and safety shower equipment. The vessel also collects effluent from the C2 area floor drains located in areas such as the laboratory area corridors, hotcell bay area, and the filter room.~~

4H.2.1.2 Laboratory Sink Drain Collection Vessel (RLD-VSL-00164)

The laboratory area sink drain collection vessel (RLD-VSL-00164), and associated components are used for collecting, mixing and transferring liquid waste streams from the following sources during routine and non-routine operations:

- Rad Lab sinks
- Rad Lab fume hood sinks
- Floor drain collection vessel (RLD-VSL-00163)
- Decontamination room showers and sinks
- Process vacuum pump skid
- Hotcell maintenance access area drain
- Maintenance shop floor/sink drains
- Autosampling System (ASX) equipment drains
- Pump pit sump

Figure 4H-5 provides a simplified process flow diagram for the laboratory area sink drain collection vessel (RLD-VSL-00164).

The laboratory area sink drain collection vessel (RLD-VSL-00164) is located in the C3 Effluent Vessel Cell under the C3 filter/fan room in the Lab. Aqueous liquid ARL waste consists of samples (unused and residues), dilutions, and dissolution aliquots prepared for analysis. Liquids may be~~will be~~ partially neutralized to reduce corrosivity. ~~c~~Containers of aqueous liquids are~~will be~~ poured down ARL fume hood sink drains and flushed with a minimum of 0.5 gallon of flush water for each 40 milliliters (mL) of sample before they are discharged to the RLD-VSL-00164. While operating in the DFLAW configuration, the contents of the laboratory area sink drain collection vessel are~~will be~~ transferred to the EMF Direct Feed Effluent Transfer (DEP) system for evaporation and treatment prior to being returned to the LAW vitrification process, or sent to be treated at the Liquid Effluent Retention Facility/Effluent Treatment Facility (LERF/ETF). ~~During cold commissioning, the vessel may discharge to a tanker truck.~~

After the PTF is brought on-line, while operating in the baseline configuration, the contents of the laboratory area sink drain collection vessel are~~will be~~ transferred to the hotcell drain collection vessel (RLD-VSL-00165). The contents of RLD-VSL-00165 are then transferred to the PTF for treatment in the PTF and HLW vitrification process or treated at the LERF/ETF.

4H.2.1.3 Hotcell Drain Collection Vessel (RLD-VSL-00165)

The hotcell drain collection vessel (RLD-VSL-00165) and associated components for collecting, mixing, and transferring liquid waste streams, collect waste from the following sources during routine and non-routine operations:

- Hotcell floor drains
- Laboratory floor drain collection vessel, (RLD-VSL-00163)
- Laboratory sink drain collection vessel, (RLD-VSL-00164)
- Hotcell glovebox drains
- Hotcell transfer port drains

- C3 decontamination booth drain
- C5 pump and valve pit sumps
- Lab area sink drain collection vessel sump
- Hotcell drain collection vessel pit sump

Figure 4H-6 provides a simplified process flow diagram for the hotcell drain collection vessel (RLD-VSL-00165).

The vessel is located in the C5 Effluent Vessel Cell under the C5 pump maintenance room in the Lab. The vessel and cell are maintained under a negative pressure. The hotcell drain collection vessel is provided with vessel pumps (RLD-PMP-00183A/B) for transferring the contents of the vessel and sump. Pumps (RLD-PMP-00183A/B) are self-priming, horizontal centrifugal pumps located in pits above the vessel cell.

In the DFLAW configuration the AHL and the hotcell drain collection vessel will not be operational.

During baseline configuration when the AHL and the hotcell drain collection vessel are operational, to prevent cross-contamination of the demineralized water (DIW) system, a backflow preventer (RLD-BFP-00001) is provided in the DIW line for flushing of the transfer lines from the hotcell drain collection vessel pumps. Under normal operating conditions, a liquid heel is maintained in the vessel. The vessel is provided with a recirculation loop, but under normal operating conditions, the vessel and sump contents are transferred to the PT Facility plant wash drain vessel (PWD-VSL-00044). Wash rings are provided with DIW for vessel, vessel cell, and pump/valve pit flushing. The vessel is also equipped with level instrumentation and mixing eductors.

In the Baseline configuration liquid waste management in the AHL hotcells ~~will~~ requires remote handling prior to disposal to the ~~H~~hotcell ~~D~~drain ~~C~~collection ~~V~~vessel (RLD-VSL-00165) from hotcell cup sink drains. Aqueous liquid AHL waste consists of samples (unused and residues), dilutions, and dissolution aliquots prepared for analysis. Liquids will be partially neutralized to reduce corrosivity before they are discharged to the liquid waste system. Containers of aqueous liquids for disposal are moved to and poured down hotcell cupsink drains ~~using the MSMs~~ along with a minimum of 0.5 gallon of flush water for each 20 milliliters (mL) of sample. Liquid waste information (including quantity of liquid waste per disposal and identification of the sample that generated the waste) for each of the Lab RLD vessels is updated in LIMS using the computer workstation.

4H.2.2 Design, Installation, and Assessment of Tank Systems

Engineering documents and specifications addressing design of Lab vessels and ancillary equipment are included in WTP Unit-Specific Operating Record. The Lab RLD vessel design information, such as material of construction, total volume, dimensions, and operating parameters are provided in Table 4H-3.

4H.2.2.1 Design Requirements

Applicable codes and standards that were followed for design, construction, and inspection of Lab vessels include but are not limited to:

ANSI American National Standards Institute

API American Petroleum Institute

ASME American Society of Mechanical Engineers

ASTM American Society for Testing and Materials

EPA US Environmental Protection Agency

OSHA Occupational Safety and Health Administration

UBC Uniform Building Code

4H.2.2.2 Integrity Assessments

Independent Qualified Registered Professional Engineer (IQRPE) structural integrity assessments for the Lab RLD vessels, ancillary equipment, and secondary containment are included in the WTP Unit-Specific Operating Record.

The results of these assessments demonstrate that vessels, secondary containment, and ancillary equipment have adequate structural integrity and are acceptable for storing and treating dangerous and/or mixed wastes.

Periodic integrity assessment schedule and the results of the integrity assessments for the Lab RLD vessels is located in WTP Unit-Specific Operating Record.

4H.2.3 Secondary Containment and Release Detection for Tank Systems

This section describes the Lab RLD System secondary containment and leak detection systems installed in the Lab. Equipment used to detect and contain dangerous and/or mixed waste liquids include:

- Secondary Containment
- Leak Detection and Leak Detection Boxes
- Sumps
- Pump and Piping Pits
- Vault Systems

4H.2.3.1 Lab RLD System Secondary Containment

The Lab RLD System ancillary equipment installed to manage dangerous and/or mixed wastes has the following types of secondary containment and leak detection:

- Vessels equipped with radar level detection
- Coaxial or double-walled piping
- Stainless steel liners
- Stainless steel under-sink drip pans
- Pump and piping pits lined with stainless steel and equipped with radar level detection
- Stainless steel sumps equipped with radar level detection
- Leak detection boxes equipped with thermal level switches.

The Lab RLD System ancillary equipment piping may be single-walled or double-walled. Double-walled piping is constructed of either carbon steel or stainless steel outer containment. Single-walled piping is provided with additional secondary containment. The double-walled pipe is sloped to ensure that the containment pipe drains to the corresponding leak detection box or to a pump or valve pit that is provided with leak detection. The slope for double-walled pipe is sufficient to ensure that applicable leak detection criteria is met. Under-sink drip pans collect and direct spills into the annular space of in-slab double-walled piping where leaks are detected by thermal sensors located in downstream leak detection boxes.

The laboratory area sink collection vessel, (RLD-VSL-00164) is located in the C3 Effluent Vessel Cell (A-B003). The hotcell drain collection vessel, (RLD-VSL-00165) is located in the C5 Effluent Vessel Cell (A-B004). The cell floor is sloped a minimum 1% grade. Process cell walls and pump/piping pits are lined with stainless steel, to approved liner heights, and provide secondary containment for the permitted Lab RLD Systems. Minimum cell liner heights are summarized in Table 4H-4. The Lab secondary containment structural design is addressed in IQRPE reports located in the WTP Unit-Specific Operating Record.

The secondary containment stainless steel liners are designed to contain 100% capacity of the largest vessel in the cell. Detailed description of the minimum liner heights for the Lab RLD System are found in the WTP Unit-Specific Operating Record.

The Lab cells are provided with wash rings to facilitate in-cell periodic decontamination or waste removal in the cell. The sloped floors, sumps and sump pumps facilitate liquid collection and removal.

4H.2.3.2 Leak Detection

The Lab RLD System includes sumps and leak detection boxes provided with leak detection instruments to facilitate detection and removal of potential leaks/spills and wash fluids from the secondary containment. If a leak detection alarm occurs in the sump or leak detection box, the source of the leak is identified and the leaking equipment is removed from service until it is repaired. The sump, drain, and leak detection box location and design information is provided in Table 4H-5.

Leak or level indication alarms provide notification of a series of high as well as low level alarms. Alarms allow both a manual response or an automatic stop of agitation, effluent flow, or transfers depending on the type of alarm.

4H.2.3.3 Lab Leak Detection Boxes

The Lab leak detection boxes are designed to detect a leak in the annular space between the double-walled piping. Each box is installed with a drain plug in the closed position to facilitate collecting a detectable volume of leaked waste. All eight of the Lab LDBs are nominal pipe size (NPS) 8-inch, horizontal, schedule 40 pipe, with an NPS 8-inch cap on either end. A detectable leakage volume is built up in an 11-inch segment of pipe, plus the cap, by a 2- in. high baffle located in the middle of the device. The leak detection boxes are connected to drain headers that flow to the hotcell drain collection vessel (RLD-VSL-00165) and the laboratory area sink drain collection vessel (RLD-VSL-00164).

4H.2.3.4 Lab RLD System Sumps

There is one sump in each vessel cell. The sump is 30-inch nominal diameter and approximately 13 inches deep. The sump is made from a piece of nominal pipe size (NPS 30) standard-wall pipe (or an equivalent rolled plate) and a 30-in diameter, standard-wall, pipe cap (or equivalent ellipsoidal-head section). There is one sump in each pump and piping pit. The sump is formed by a shallow rectangular depression in the liner around the drain for the pit. A removable weir around the drain hole allows formation of a detectable volume before excess leakage is directed back to its associated vessel.

RLD-SUMP-00041. This sump is located in the C3 Effluent Cell (A-B003). It is equipped with radar-type level detection and two pumps (RLD-PMP-00182A/B) to transfer the sump contents to hotcell drain collection vessel, (RLD-VSL-00165) or laboratory sink drain collection vessel, (RLD-VSL-00164).

RLD-SUMP-00042. This sump is located in the C5 Effluent Cell (A-B004), and is similar to the RLD-SUMP-00041 described above. The contents of this sump are emptied by pump (RLD-PMP-00183A) into PTF vessel PWD-VSL-00044 or hotcell drain collection vessel, (RLD-VSL-00165).

RLD-SUMP-00045. This sump is located in the C3 pump and piping pit (A-B002). The liner on the floor of the pit consists of several sloped stainless steel plates that direct leakage and washwater (during maintenance) to a drain located at the lowest point in the pit. The sump is formed by a rectangular depression in the stainless steel liner around the drain that includes a removable weir. The volume of the sump is equal to the volume created by the depression in the liner in the vicinity of the drain and the height of the weir. This volume is limited to a maximum value of 2.4 gallons in order to be able to detect a design basis leak of 0.1 gal/h in 24 hours. With the weir installed, a detectable level is formed in the sump to allow the radar to sense potential liquids. The liquid spills over the weir and drains to the laboratory sink drain collection vessel RLD-VSL-00164. When the liquid is detected in the sump, the weir is manually removed from the sump via an extended drive spindle to allow the sump contents to drain by gravity to the vessel. The weir may be removed during maintenance to preclude the accumulation of washwater residues in the sump.

RLD-SUMP-00043A/B and RLD-SUMP-00044. These sumps are located in the C5 Pump and Piping Pit and are similar in design to the RLD-SUMP-00045 described above. The drain line from the two C5 pump sumps and the one C5 piping pit sump is located entirely within the C5 effluent vessel cell (A-B004). Secondary containment and leak detection for this drain line is provided by the C5 effluent vessel and the associated radar leak detection system. These sumps drain to the hotcell drain collection vessel RLD-VSL-00165 via a common drain line.

Documentation for general leak detection capabilities in secondary containment sumps and leak detection boxes are found in the WTP Unit-Specific Operating Record.

4H.2.3.5 Secondary Containment System Floor Drains

Locations and specifications on Lab secondary containment floor drains are listed in Table 4H-5.

4H.2.3.6 Pump and Piping Pits

The Lab pump and piping pits are stainless steel lined structural compartments that contain maintainable equipment and provide for maintenance and remote manual operation. The equipment is shielded from high radiation fields emanating from the vessels. The pump and piping pits are provided with wash rings and can be decontaminated to support maintenance activities and spill response. The pits are sloped to direct potential leakage to their respective sumps. Each pump and piping pit includes a sump that is equipped with a removable weir and a radar level sensor for leak detection. Access to the pump and piping pits is achieved via the removal of the pit covers. Table 4H-6 lists the location of the pumps and piping pits.

4H.2.3.7 Vault Systems

Laboratory area sink drain collection vessel, (RLD-VSL-00164) and the hotcell drain collection vessel (RLD-VSL-00165) are located in vault-like stainless steel lined cells which consist of a welded stainless steel liner attached to the walls and floors.

4H.2.4 Tank Management Practices

The RLD System collects liquid effluent generated within the Laboratory and does not have the capability to treat or alter its composition.

The effluent accumulated in the laboratory area sink drain collection vessel (RLD-VSL-00164) is comprised primarily of the liquid wastes generated within the ARL and disposed of through Lab sinks and cup sinks within the fume hoods. This effluent includes flush water (about 0.5 gallons per sample) which comprises the bulk of the effluent volume. Since solids and immiscible organic chemicals are separated from the sample and analytical wastes in the ARL and disposed of as solid waste, the residual amount of solids and organic chemicals in the effluent sent to the laboratory area sink drain collection vessel is minimal. Miscible organics (alcohols) if present in the effluent do not separated and are sent to the laboratory area sink drain collection vessel. The effluent contains inorganic chemicals from the samples, analytical standards and calibration fluids, and other chemicals used in the sample analyses

The effluent accumulated in hotcell drain collection vessel (RLD-VSL-00165) is comprised primarily of the liquid wastes generated within the AHL and disposed of through floor drains within the individual hotcells. This effluent includes flush water (about 0.5 gallons per sample) which comprises the bulk of the effluent volume. Effluent is also received through drains in the hotcell gloveboxes and sample import/export boxes. Since solids and immiscible organic chemicals are separated from the sample and analytical wastes in the AHL and disposed of as solid waste, the residual amount of solids and organic chemicals in the effluent sent to the hotcell drain collection vessel is minimal. The effluent contains inorganic chemicals from the samples, analytical standards and calibration fluids, and other chemicals used in the sample analyses.

To minimize the potential for radioactive contamination, in-cell sumps collect periodic wash-down of cells that help reduce the radioactive contamination. Built-in spray rings are installed to facilitate waste removal and decontamination.

4H.2.4.1 Laboratory Area Sink Collection Vessel RLD-VSL-00164

The laboratory area sink collection vessel, (RLD-VSL-00164), its internal components, and the associated ancillary equipment include the following:

- Three vessel mixing eductors
- Wash rings
- Instruments, including liquid level measurement
- Vessel overflow line to RLD-SUMP-00041
- Two pumps (RLD-PMP-00182A/B)

The laboratory area sink collection vessel, (RLD-VSL-00164) is equipped with wash rings for vessel wash down. There are three venturi jet eductors that use pressurized liquid to re-suspend solids and mix the vessel contents. The vessel has level instrumentation to maintain the liquid level within the acceptable operating range and detect vessel overflow.

Two pumps, RLD-PMP-00182A/B, are located in C3 Pump Pit (Room A-B002). The pumps are self-priming, magnetic-drive, seal-less centrifugal pumps equipped with electrical plugs for ease of removal. The wetted surfaces of the pumps are constructed of 316 stainless steel. Based upon valve configuration the pumps can re-circulate the vessel contents, or discharge to the hotcell drain collection vessel (RLD-VSL-00165), or empty RLD-SUMP-00045 located within the vessel cell. Failure of any individual pump during a transfer is detected by the pressure elements on the suction or discharge side of the pumps. If a pump fails due to mechanical problems, the alternate pump is placed in service.

The operating states of the laboratory area sink collection vessel (RLD-VSL-00164) are described below.

Receipt. Laboratory area sink collection vessel routinely collects effluent from the following sources:

- Rad Lab sinks and fume hood sinks
- Hotcell maintenance area drain
- C3 maintenance shop floor/sink drains
- C3 pump and piping pit sump
- Floor Drain Collection Vessel (RLD-VSL-00163)

Mix. The contents of the vessel may be periodically mixed to prevent formation of a hard layer of solids, or to re-suspend the solids prior to transfer. To initiate a mixing sequence, the manual and actuated valves are aligned for recirculation, a transfer pump is selected, and the mixing operation is initiated for a pre-determined amount of time.

Effluent transfer to hotcell drain collection vessel (RLD-VSL-00165). The contents of laboratory area sink collection vessel are transferred to the hotcell drain collection vessel for eventual transfer to the PTF. A mixing step may be performed prior to transfer to re-suspend any solids within the vessel; if necessary.

Wash. The vessel may be washed periodically or as required for maintenance purposes. The vessel is equipped with wash rings supplied with DIW to flush the interior of the vessel.

4H.2.4.2 Hotcell Drain Collection Vessel, RLD-VSL-00165

The lab hotcell drain collection vessel (RLD-VSL-00165), its internal components, and the associated ancillary equipment include the following:

- Eight eductors
- Wash rings
- Instruments, including liquid level measurement
- Vessel overflow line to RLD-SUMP-00042
- Two pumps (RLD-PMP-00183A/B)

Two pumps (RLD-PMP-00183A/B) are located in C5 Pump Pits (A-B005 and A-B007). The pumps are self-priming, magnetic-drive, seal-less centrifugal pumps, and are equipped with electrical plugs for ease of removal. The wetted surfaces of the pumps are constructed of 316 stainless steel. The pumps discharge the contents of hotcell drain collection vessel for transfer to the PTF (PWD-VSL-00044) located within the vessel cell. Failure of any individual pump during a transfer is detected by the pressure elements on the suction or discharge side of the pumps. If a pump fails due to mechanical problems, the alternate pump is placed in service.

The operations of the hotcell drain collection vessel are described below.

Receipt. The hotcell drain collection vessel routinely collects effluent from the following sources:

- H~~h~~otcell floor drains
- L~~l~~aboratory area sink collection vessel (RLD-VSL-00164) and sump RLD-SUMP-00042
- H~~h~~otcell transfer port and glove box drains
- C3 decontamination booth drain
- C5 pump and piping pit sumps

Mix. The contents of the vessel may be periodically mixed to prevent formation of a hard layer of solids, or to re-suspend the solids prior to transfer. To initiate a mixing sequence, the manual and actuated valves are aligned for recirculation, the transfer pump is selected, and the mixing operation is initiated for a pre-determined amount of time.

Transfer. The contents of hotcell drain collection vessel are transferred to PWD-VSL-00044. A mixing step may be performed prior to transfer to re-suspend any solids within the vessel, if necessary.

Wash. The vessel may be washed periodically or as required for maintenance purposes. The vessel is equipped with wash rings supplied with DIW to flush the interior of the vessel.

4H.2.5 Marking or Labeling

Due to ALARA concerns associated with the Lab RLD vessels, the vessels are not labeled. The vessels are located in stainless steel vaults, the entrance to the vaults are labeled to meet the requirements of WAC 173-303-395 and WAC 173-303-640(5)(d). The marking of the access points is legible from a distance of 50 feet and identifies the major risks associated with the waste. The label adequately warns employees, emergency response personnel, and the public of the major risks associated with the waste being stored within the vessel.

4H.2.6 Management of Ignitable or Reactive Waste in Tank Systems

Ignitable and/or reactive waste may be generated from analytical or maintenance activities. Lab wastes are designated by either process knowledge or sample analysis and if aqueous and acceptable for transfer are discharged to the Lab RLD System. Organic waste streams generated by analytical processes are not discharged to the Lab RLD System. These wastes are accumulated and managed in approved containers.

4H.2.7 Management of Incompatible Waste in Tank Systems

Incompatible waste generated from analytical or maintenance activities are not managed in the Lab RLD Systems. Reagents that could react with waste in the vessels are stored in areas that are segregated by physical barriers from process vessels.

~~4H.2~~4H.3 Air Emission Control

The analytical laboratory ventilation systems include C1V, C2V, C3V, and C5V systems that aid in the containment and confinement of radiological and hazardous chemical constituents. Clean occupied areas without contamination potential are classified as C1 and will be isolated from areas with the potential for contamination (C2) and from areas with restricted occupancy, normal radiological hazards and higher contamination potential (C3 and C5).

C3 areas are restricted occupied areas and allow operator access under administrative controls as required for scheduled maintenance and operations. C5 areas have the highest contamination potential and will normally be unoccupied. These areas have, by virtue of their location and the activities performed within them, an increased potential for the release of contamination. The design objectives of the analytical laboratory HVAC system, and therefore the C5 area ventilation system, will be as follows:

- Aid in the confinement and containment of radiological and hazardous chemical contamination sources.
- Remove airborne particulates from the discharge air to ensure that emissions are within prescribed limits.
- Maintain space temperatures within the indoor design conditions.
- Satisfy safety requirements and codes and standards that are a part of the Safety Requirements Document.

The C5V ventilation system, which services the hotcells and the Hotcell Drain Collection Vessel (RLD-VSL-00165), will be isolated while in the DFLAW configuration.

The C5 area ventilation system is being designed to maintain a negative pressure in the C5 areas with respect to the surrounding areas. Hotcell ventilation, the Hotcell Drain Collection Vessel (RLD-VSL-00165), and the C3 maintenance shop glovebox will be exhausted to the C5 ventilation system. Fume hoods within the Rad Labs, the waste reduction and lab pack room, and the C3 maintenance shop will be exhausted to the C3 ventilation system. The ventilation from C2 and C3 areas will be filtered through a single stage of HEPA filters and exhausted through the analytical laboratory stacks. Air cascading into the C5 areas from the adjacent C2 and/or C3 areas will be exhausted through the analytical laboratory building stacks by the C5 exhaust fans after passing through two stages of HEPA filter banks.

4H.3.1 Applicability of AA Standards

There are no process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations in the WTP Lab, so the requirements of WAC 173-303-690 do not apply.

4H.3.2 Applicability of BB Standards

Similarly, no waste management equipment contacting dangerous or mixed waste with organic concentrations of above 10% by weight is employed in the Lab, so the requirements of WAC 173-303-691 do not apply.

4H.3.3 Applicability of CC Standards

The regulations specified under WAC-173-303-692 and 40 CFR 264 Subpart CC do not apply to the WTP mixed waste Lab RLD Systems and containers.

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4H.2.1 Autosampling System (ASX)

The ASX is considered one of the laboratory systems; however, it includes components in the other WTP facilities. The ASX includes the autosampling assemblies in each of the WTP chemical process facilities and the Pneumatic Transfer System (PTS) that transports samples between those facilities and the Lab and will only be operational in the Baseline configuration. Samples from the EMF will be manually transferred to the Lab. The ASX is a support system that collects and manages samples from each of the process facilities. The DWP regulates the secondary containment of sample feed and sample return process piping and sample line flush piping internal to the PTF, HLW, and LAW sampler as described in Section 4H.2.2.1, Autosampler Secondary Containment and Leak Detection Functions.

Four ASX samplers are located in the PTF, three are located in the HLW facility, and two are located in the LAW facility. Each sampler interfaces with the process systems that require sampling of their contents via a process sample pipe loop. The loop will deliver process waste for sample collection to the sampler and return the pumped fluid, minus the collected sample, to the vessel from which it originated.

The PTS is a network of transport tubes, diverters, exhausters, HEPA filters, and controlled arrival stations that work concurrently to transfer the carriers and sample bottles to and from the analytical laboratory. Low-activity samples are delivered to the Fumehood Receipt Station in the analytical laboratory. The HCRS is the analytical laboratory receipt station for HLW and PTF samples. The Autosampling Control System (ASJ) will control and monitor the ASX process.

For high-frequency sampling and for highly radioactive, medium activity and transuranic-bearing streams, the sampling process is automated. Manual sampling techniques are primarily reserved for low-activity, low frequency, and large volume sample applications, or where needle-sampling techniques are inappropriate.

The WTP sampling systems for high-activity (HA) and low-activity (LA) sampling are independent and segregated because of the requirements for handling the HA samples when they reach the Lab. Both the HA and LA sample lines will transfer only one sample carrier at a time. The HA sampling system collects and pneumatically transfers samples from the PTF and HLW facilities to the Lab Hotcell. The LA sample line transfers samples collected from the LAW facility directly to the radiological laboratory. Diverters will provide junction points that enable the sample carriers to be routed to and from destinations on the transfer line. Tracking switches along the transfer lines will be used to track sample carrier movement. In addition to the primary HA and LA sample lines, samples from the tank farms or other locations, and grab samples taken from WTP facilities, will be manually delivered to the Lab in shielded sample carriers.

Process liquids will be circulated through pipe lines into and out of the autosampler enclosures. Samples are collected by the ISOLOK® samplers located in these recirculation loops. A supply line isolation valve will secure the recirculation process upon completion of sampling.

The mechanical process for ASX sample collection will commence by dispatching a carrier and sample bottle from the storage/dispatch magazine in the Lab and receiving it at the sampler docking station. The robotic arm will interface with the carrier at the glovebox docking port to retrieve the empty sample bottle from the carrier. The robotic arm will drive the sample bottle on to the ISOLOK sample injection needle. The ISOLOK captures, retains, and injects a specific volume of process material into the sample bottle. The ISOLOK sampler uses a pneumatically driven plunger to “grab” a measured sample volume of flowing material with each extension and retraction. The quantity collected for a sample, then, will be determined by the number of strokes set for the sample drawn.

The robotic arm replaces the filled sample bottle into the carrier, at the glovebox docking port, and the carrier is then flown through the PTS flight tube back to the HA or LA Lab receipt station where the sample will be retrieved for analysis. The carrier will also contain any potential leakage in the event of sample bottle damage or malfunction.

In conjunction with this sample collection sequence, two seal tests are performed. The Arm Interspace Seal Test (AIST) occurs at the initiation of a sample sequence. It confirms that the robotic arm has an effective seal on the docking port. The Carrier Interspace Seal Test (CIST) is performed when the carrier has been sealed against the docking port. It confirms that both the robotic arm and the carrier are sealed against the docking port. The CIST occurs prior to lifting the robotic arm off the docking port. The seal tests are performed to ensure that air from the glovebox confinement cannot be drawn into the PTS.

The ISOLOK sampler is flushed after sample collection to prevent needle plugging and to prevent cross contamination of subsequent samples. To flush the ISOLOK sampler, the sample vial with a triple septum cap will be repositioned with respect to the discharge needle so that water can be applied at a port that allows flow through the vent needle opening. The septum is punctured by the sample collection needles, and the vial is held in place while activating the flush valve. The sample plunger will be partially extended to align the ISOLOK port for this flush operation, which will continue until water runs clear, generating approximately 250 ml of secondary waste.

4H.2.1.1 Autosampler Secondary Containment and Leak Detection Functions

The ASX samplers in the PTF, HLW and LAW facilities contain both upper and lower secondary containment liners and leak detection systems. The upper containment area is designed to collect a potential leak from the incoming sample feed and return lines where they connect to the ISOLOK sampling device. If a leak occurs in the upper containment area, the leak flows to the sloped liner which diverts the leak to the annular space of the coaxial sample return lines. Leaks flow down the secondary containment pipe and discharge to secondary containment with leak detection, typically a sump with a radar level detector. The ASX sample feed and sample return lines, and the routing of potential leaks in the annular space of the return lines are shown on the associated process system P&IDs provided in Operating Unit Group 10, Appendices 8.2, 9.2, and 10.2.The sloped stainless steel liner in the lower containment area is designed to divert liquids to a sloped collection trough. The trough contains a removable weir that allows liquids to collect and activate the thermal level detection switch and alarms to indicate that a leak has occurred. Effluent from a leak flows to the same drain line that manages ISOLOK flush solutions. The ISOLOK flush lines terminate below the top of the trough drain to ensure that the leak detection system is not activated when flushing the ISOLOK. The ASX lower containment area drain lines are shown on the associated process system P&IDs provided in Operating Unit Group 10, Appendices 8.2, 9.2, and 10.2. Typical autosampler secondary containment design details are provided in the Secondary Containment Design permit document provided in Operating Unit Group 10, Appendix 7.5.

The ASX secondary containment liner, liner trough, weir, leak detection instruments, coaxial sample feed and sample return piping make up the secondary containment and leak detection systems for the PTF, HLW and LAW ASX samplers. The balance of the ASX sampler equipment in each facility; the ASX pneumatic sample transfer lines between facilities, and the ASX sample receipt system in the Lab are not part of the ASX secondary containment system, and are excluded from the WTP permit by the sample exclusion [WAC 173-303-071(l)]. Drain line and leak detection instrument design details are provided in Table 4H-3.

If a spill occurs in either the upper and lower containment area, these areas can be rinsed. In the upper containment area, a wash wand will be provided to allow for localized wash if required. In the lower containment area, a spray ring and spray wands are provided to rinse this containment area. Wash solutions will be directed to the required location by the operator. Valves mounted externally to the autosampler allow the operator to deliver a wash stream to targeted areas that may require decontamination.

4H.3 Air Emission Control

The analytical laboratory ventilation systems include C1V, C2V, C3V, and C5V systems that aid in the containment and confinement of radiological and hazardous chemical constituents. Clean occupied areas without contamination potential are classified as C1 and will be isolated from areas with the potential for contamination (C2) and from areas with restricted occupancy, normal radiological hazards and higher contamination potential (C3 and C5).

C3 areas are restricted occupied areas and allow operator access under administrative controls as required for scheduled maintenance and operations. C5 areas have the highest contamination potential and will normally be unoccupied. These areas have, by virtue of their location and the activities performed within them, an increased potential for the release of contamination. The design objectives of the analytical laboratory HVAC system, and therefore the C5 area ventilation system, will be as follows:

- Aid in the confinement and containment of radiological and hazardous chemical contamination sources.
- Remove airborne particulates from the discharge air to ensure that emissions are within prescribed limits.
- Maintain space temperatures within the indoor design conditions.
- Satisfy safety requirements and codes and standards that are a part of the Safety Requirements Document.

The C5V ventilation system, which services the hotcells and the Hotcell Drain Collection Vessel (RLD-VSL-00165), will be isolated while in the DFLAW configuration.

The C5 area ventilation system is being designed to maintain a negative pressure in the C5 areas with respect to the surrounding areas. Hotcell ventilation, the Hotcell Drain Collection Vessel (RLD-VSL-00165), and the C3 maintenance shop glovebox will be exhausted to the C5 ventilation system. Fume hoods within the Rad Labs, the waste reduction and lab pack room, and the C3 maintenance shop will be exhausted to the C3 ventilation system. The ventilation from C2 and C3 areas will be filtered through a single stage of HEPA filters and exhausted through the analytical laboratory stacks. Air cascading into the C5 areas from the adjacent C2 and/or C3 areas will be exhausted through the analytical laboratory building stacks by the C5 exhaust fans after passing through two stages of HEPA filter banks.

4H.4 Laboratory Maintenance

The analytical laboratory maintenance shop provides space for performing preventive and corrective maintenance on laboratory equipment. There will be two shops, located in different potential contamination areas. The C3 shop allows decontamination, maintenance, and storage of contaminated equipment such as hotcell manipulators. The C3 maintenance shop will be ventilated to the C3 ventilation system, and effluent from the C3 maintenance shop discharges to the Laboratory Area Sink Collection Vessel (RLD-VSL-00164). The C2 shop will provide space for the maintenance of equipment that is not expected to be radioactively contaminated such as electrical components, utilities systems components, and instruments, and will be ventilated to the C2 ventilation system.

A list of proposed maintenance activities that will be performed in the analytical laboratory maintenance shops is provided below.

Analytical Laboratory Maintenance and Waste Management Activity Summary

Task Description	Lab C3 Shop	In-Situ Activities
Filter change out [a]		X
Manipulator maintenance and repair [b]	X	X
Valve maintenance and repair		X
Pump maintenance and repair	X	X
Exhaust fan maintenance and repair		X
Repair and maintenance of fabricated equipment	X	X
Instrument maintenance and calibration	X	X

a Spent filters will be disposed of following filter changeout using approved maintenance, waste management, and radiological procedures

b Manipulators requiring extensive repairs will be pulled and transferred to the C3 workshop for decontamination. Once the contamination levels are reduced to within acceptable limits for hands-on maintenance, the manipulator will be repaired using approved maintenance and radiological procedures

4H.5 Solid Waste Management

Mixed and dangerous solid waste will be accumulated in hotcells and periodically placed in waste drums. Waste from the individual hotcells will be transferred to a waste management cell where waste management, consolidation, and packaging activities are conducted. The waste cell contains tools and equipment to complete size reduction. These solid mixed and dangerous wastes as well as organic lab pack wastes will be transferred into waste drums prior to being transferred to the laboratory waste drum management area. Mixed and dangerous solid waste and organic lab pack wastes from the Rad Labs and maintenance areas will be accumulated in the individual labs and shops until they are transferred to the laboratory waste management area for waste consolidation and volume reduction. Waste consolidation will be completed in the volume reduction and lab pack rooms in the waste drum management area.

Laboratory secondary solid wastes will be transferred to Hanford site and off-site treatment facilities for treatment as needed. Treated secondary wastes will be transferred to Hanford site TSD site (Integrated Disposal Facility or Low-Level Burial Grounds) for disposal. Low-level radioactive wastes will be transferred to a Hanford site low-level radioactive disposal facility.

4H.5.1 Hotcell Solid Waste Management

Mixed and dangerous solid waste will be accumulated in hotcells and periodically placed in waste drums. Solid waste management in the hotcell will require remote handling. Waste from the individual hotcells will be transferred to HC-14 where waste management, consolidation, and packaging activities are conducted. The waste cell contains tools and equipment to complete size reduction. These wastes will be transferred into waste drums prior to being transferred to the laboratory waste drum management area. Hotcell wastes will only be generated in the Baseline configuration.

Wastes generated in the hotcell area of the Lab are not packaged in the Waste Drum Management Area. Packaging and volume reduction of hotcell wastes, including high-activity wastes is completed in HC-14 prior to being transferred to the Waste Drum Management Area for storage.

4H.5.2 Container Storage Area for the Analytical Laboratory

The Lab Container Storage Area is located at the 0' 0" elevation and is referred to as the Waste Drum Management Area on laboratory facility drawings, and in laboratory system description documents. The Waste Drum Management Area includes five waste management rooms (139, 139A, B, C &D) located inside of the Lab facility. Room A-0139, the Waste Drum Management Room, is the primary dangerous and mixed secondary waste storage room, and is used to provide segregation of wastes. Separation of wastes will be provided to meet the separation distances provided in Uniform Fire Code and applicable sections of WAC 173-303.

The potential for precipitation inflow into the area is mitigated by a dry sump located inside the roll-up door on the south side of the airlock/clean drum export area.

Segregation and secondary containment for waste drums containing liquids will be provided by commercially available portable spill containment pallets/devices designed to contain 10 percent of the volume of all of the containers within the containment system or the volume of the largest container, whichever is greater. The exterior walls of the waste drum storage area are constructed of reinforced concrete and the entire floor area of the waste drum storage area is coated with a special protective coating. This coating is not designed to provide secondary containment. Coatings are provided to support the clean-up and decontamination of a potential spill.

Room A-0139A is equipped with a walk-in fume hood to support the packaging of organic liquids and other lab pack wastes. The room will be used to package and add absorbent to waste packages to comply with Hanford Site Solid Waste Acceptance Criteria (HSSWAC) and/or off-site disposal facility waste acceptance criteria for liquid and lab pack wastes. Room A-0139B is an airlock separating the main waste drum area and the lab pack and volume reduction areas. Room A-0139C is equipped with an in-drum compaction unit design to reduce the volume of low-activity wastes generated in the ARL areas. Because volume reduction and the packaging of wastes to meet transportation and/or disposal facility waste acceptance criteria is not a permitted activity, manufacturer cut sheets for support equipment in these rooms is not included in the package. The fifth room is Room A-139D, the airlock/clean drum export area. This area is used to provide additional storage, segregation, and management of waste containers prior to transfer to WTP, Hanford Site, or off-site waste disposal facilities.

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Table 4H-1 Analytical Areas

Area	Room	Function	Waste Activities	Permitted
ARL	Sample Receipt Laboratory	Sample receipt and staging for samples delivered manually or via the ASX	Dangerous and/or Mixed Waste managed in SAAs	No
ARL	Dissolution/Dilution Laboratory	General wet chemistry for preparation of samples, also primary location for decontamination of glassware/equipment.	Dangerous and/or Mixed Waste managed in SAAs	No
ARL	Distillation/Titration Lab	Sample preparation and analysis, including distillation, titration, and physical measurements of samples.	Dangerous and/or Mixed Waste managed in SAAs	No
ARL	Standard/Reagent Preparation Laboratory	Primary purpose is to prepare, stage and distribute reagents and quality control standards.	Dangerous and/or Mixed Waste managed in SAAs	No
ARL	X-ray Laboratory	Sample preparation, X-ray fluorescence, and optical microscopy. Quantifying metals concentrations utilizing the XRF system	Dangerous and/or Mixed Waste managed in SAAs	No
ARL	Instrument Laboratory	Primarily used for process technology testing. Space is provided for test beds for evaluation of ion exchange resins and Lab scale filtration units.	Dangerous and/or Mixed Waste managed in SAAs	No
ARL	Process Technology Laboratories	Non-routine measurement of physical characteristics of low-activity process samples and	Dangerous and/or Mixed Waste managed in SAAs	No

Table 4H-1 Analytical Areas

Area	Room	Function	Waste Activities	Permitted
		process tests using synthetic solutions. Particle size analysis, differential scanning calorimeter/ thermal gravimetric analysis (DSC/TGA), nonroutine tests, analytical method development, and process support using synthetic solutions.		
ARL	Elemental Analysis Laboratories	Preparation and analysis of samples using an inductively coupled plasma/atomic emission spectrometer (ICP/AES) or inductively coupled plasma-mass spectrometer (ICP/MS).	Dangerous and/or Mixed Waste managed in SAAs	No
ARL	General Chemistry Lab	Preparation and analysis of samples for selected anions, organic acids, total inorganic carbon, and total organic carbon.	Dangerous and/or Mixed Waste managed in SAAs	No
ARL	Radionuclide Preparation Laboratories	Samples are separated and prepared for counting. This includes weighing, evaporating, purifying, and preparing.	Dangerous and/or Mixed Waste managed in SAAs	No
ARL	Radioisotope Counting Laboratory	Quantitation of concentration of alpha, beta and gamma emitting radioisotopes in samples. Includes gamma spectrometry, gas proportional counting, alpha spectrometry, and liquid scintillation counting.	Dangerous and/or Mixed Waste managed in SAAs	No

Table 4H-1 Analytical Areas

Area	Room	Function	Waste Activities	Permitted
ARL	Sample Shipping and Receiving Area	Pprovides space for loading shipping containers with outsourced sample material to laboratories and for initial receipt of manually delivered samples.	Dangerous and/or Mixed Waste managed in SAAs	No
	Analytical Hotcell Laboratories			
AHL	Hotcell Sample Receiving	The hotcell is designed to receive the delivery of samples from the ASX or diluted manually delivered samples. Sample pH, specific gravity and temperature are performed in this hotcell.	Dangerous and/or Mixed Waste managed in SAAs	No
AHL	Hotcell Sample Preparation	Generation of individual sample aliquots using sample homogenizer, electronic scales, centrifuge, filtration, stirring, and desiccators.	Mixed Waste managed in SAAs	No
AHL	Limited Process Technology	Evaluation of anomalies occurring in the processing facilities such as potential plugging of ultrafilters, ion exchange malfunction and material foaming, etc.	Mixed Waste managed in SAAs	No
AHL	Physical Properties	Measurements such as rheology, solids, and particle size measurements to support process operations.	Mixed Waste managed in SAAs	No
AHL	Digestion/Dilution Hotcells	Perform thermal-assisted acid digestion and alkali fusion	Mixed Waste managed in SAAs	No

Table 4H-1 Analytical Areas

Area	Room	Function	Waste Activities	Permitted
		dissolutions of WTP process samples.		
AHL	Radionuclide Preparation Hotcells	Separate radionuclides for further isolation and also to reduce the radiological dose rate of samples for export from the hotcells for counting and analyses in ARL.	Mixed Waste managed in SAAs	No
AHL	Ion Chromatography (IC) and Total Inorganic Carbon/Total Organic Carbon Preparation	Prepare samples for ion chromatography or carbon analyses in the ARL. Liquid samples are diluted and transferred to the ARL. Solid samples are leached with water and transferred to the ARL for analyses.	Mixed Waste managed in SAAs	No
AHL	Boildown and Physical Properties	Determine volume reduction of sample material achievable before solids form and test compatibility of different waste types.	Mixed Waste managed in SAAs	No

Table 4H-1 Analytical Areas

Area	Room	Function	Waste Activities	Permitted
	ICP Preparation and Analyses	Preparation and analysis of samples using an inductively coupled plasma/atomic emission spectrometer (ICP/AES) or inductively coupled plasma-mass spectrometer (ICP/MS). These hotcells receive samples from sample preparation hotcells, or Limited Process Technology hotcell, or dissolution/dilution hotcells. ICP/AES instrument integrated with the glovebox/MS instrument integrated with the glovebox. The ICP/AES and ICP/MS instruments are integrated with a glovebox attached to the hotcell.	Mixed Waste managed in SAAs	No
	Hotcell Solid Waste Management	Mixed and dangerous waste is generated within the hotcells. Compatible aqueous liquid waste is poured directly into the floor drain and flushed to the radioactive liquid waste disposal (RLD) system. Organic and solid waste is packaged into drums and managed by the radioactive solid waste handling (RWH) system.	Mixed Waste managed in SAAs	No

Table 4H-2 Analytical Laboratory Container Storage Areas

Container Storage Area	Approximate Dimensions (L × W × H, in feet) [1]	Maximum Waste Volume (US Gallons) [2]
Room A-0139	9130 ft^3	68,297
Room A-0139A	1370 ft^3	10,248
Room A-0139B	1410 ft^3	10,548
Room A-0139C	1240ft^3	9,276
Room A-0139D	5510 ft^3	41,217
Total WMA Volume	18660 ft^3	139,586

[1] The dimension for height (H) is based on the assumption that the height of the largest waste container stored in the area (a B-25 box is 5 ft - stacked a maximum of two high is 10 ft)

[2] The conversion factor used to convert from cubic feet to gallons is 7 4805 gal/ft^3

Table 4H-3 Analytical Laboratory Tank Systems

	RLD-VSL-00164	RLD-VSL-00165
Design standard	ASME Sec VIII Div 1	ASME Sec VIII Div 1
Material	austenitic stainless steel UNS N08367, with a min. 6% Mo alloy.	austenitic stainless steel UNS N08367, with a min. 6% Mo alloy.
Corrosion allowance	0.04”	0.04”
Total volume (US Gallons)*	3,180	9,100
Diameter*	8’6”	16’0”
Height**	5’9”	2’3”
Shell thickness*	3/8”	11/16”
Bottom/top thickness*	3/8”	5/8”

Table 4H-3 Analytical Laboratory Tank Systems

	RLD-VSL-00164	RLD-VSL-00165
Maximum operating volume (US Gallons)	2,740	6,615
Operating pressure	Atmospheric	Atmospheric
Operating temperature	Ambient	Ambient
Level indicator	Radar	Radar

*Approximate value

**Approximate Dimensions (inside Diameter) x Height or Length in feet and inches (tangent line/ tangent line)

~~Table 4H-1 Analytical Laboratory 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~~	~~RLD~~	~~RLD-VSL-00164~~ ~~A-B003~~	~~Laboratory Area Sink Drain Collection Vessel~~	~~6% Mo~~	~~3,180~~	~~8' 6" x 5' 9"~~
~~2~~	~~RLD~~	~~RLD-VSL-00165~~ ~~A-B004~~	~~Hotcell Drain Collection Vessel~~	~~6% Mo~~	~~9,100~~	~~16' 0" x 2' 3"~~

Table 4H-~~2~~4 Analytical Laboratory Tank Systems ~~Tank Systems~~ Secondary Containment 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)
A-B003 Lab Area Sink Drain Collection Vessel Cell	27ft 3in x 13ft	Laboratory Area Sink Drain Collection Vessel RLD-VSL-00164	3,180	3.8
A-B004 Hot Cell Drain Collection, Vessel Cell	29ft x 21ft	Hot Cell Drain Collection, RLD-VSL-00165	9,100	2.7

Table 4H-4 Analytical Laboratory Container Storage Areas

Container Storage Area	Maximum Waste Volume (US Gallons) [1]	Approximate Dimensions (L × W × H, in feet) [2]
Analytical Laboratory		
1. Laboratory Waste Management Area (A-0139 and A-0139A/B/C/D)	139,586	49' x 38' x 10'

[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).

Table 4H-~~3~~5 Analytical Laboratory 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
Analytical Laboratory				
Sumps				
RLD-SUMP-00041 A-B003 (C3 Effluent Vessel Cell, El. -18'7")	30	Radar	30" Dia. x 13" Deep Stainless Steel	**24590-LAB** -M6-RLD-00002001
RLD-SUMP-00042 A-B004 (C5 Effluent Vessel Cell, El. -19'2")	30	Radar	30" Dia. x 13" Deep Stainless Steel	**24590-LAB** -M6-RLD-00001001
RLD-SUMP-00045 A-B002 (C3 Pump Pit Sump, EL -6'-81/2"LP)	1.60	Radar	2'-0" x 2'-6" x 1/2" Stainless Steel	**24590-LAB** -M6-RLD-00002003
RLD-SUMP-00043A A-B007 (C5 Pump Pit Sump, EL -6'-7"LP)	1.60	Radar	1'-6" x 3'-0" x 1/2" Stainless Steel	**24590-LAB** -M6-RLD-00001002
RLD-SUMP-00043B A-B005 (C5 Pump Pit Sump, EL -6'-7" LP)	1.60	Radar	1'-6" x 3'-0" x 1/2" Stainless Steel	**24590-LAB** -M6-RLD-00001003
RLD-SUMP-00044 A-B006 (C5 Piping Pit Sump, EL -6'-7" LP)	1.60	Radar	2'-0" x 2'-6" x 1/2" Stainless Steel	**24590-LAB** -M6-RLD-00001004
Leak Detection Boxes				
RLD-LDB-00002 A-B004 (C5 Effluent Vessel Cell, El. -10')	6	Thermal Dispersion	8" Dia. x 24" Length/ Stainless Steel	**24590-LAB** -M6-RLD-00008001
RLD-LDB-00004 A-B004 (C5 Effluent Vessel Cell, El. -10')	6	Thermal Dispersion	8" Dia. x 24" Length/ Stainless Steel	**24590-LAB** -M6-RLD-00008001

Table 4H-~~3~~5 Analytical Laboratory 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
RLD-LDB-00005 A-B003 (C3 Effluent Vessel Cell, El. -10')	6	Thermal Dispersion	8" Dia. x 24" Length/ Stainless Steel	**24590-LAB** -M6-RLD-00007001
RLD-LDB-00006 A-B003 (C3 Effluent Vessel Cell, El. -10')	6	Thermal Dispersion	8" Dia. x 24" Length/ Stainless Steel	**24590-LAB** -M6-RLD-00007001
RLD-LDB-00007 A-B003 (C3 Effluent Vessel Cell, El. -10')	6	Thermal Dispersion	8" Dia. x 24" Length/ Stainless Steel	**24590-LAB** -M6-RLD-00007001
RLD-LDB-00008 A-B003 (C3 Effluent Vessel Cell, El. -10')	6	Thermal Dispersion	8" Dia. x 24" Length/ Stainless Steel	**24590-LAB** -M6-RLD-00007001
RLD-LDB-00009 A-B004 (C5 Effluent Vessel Cell, El. -10')	6	Thermal Dispersion	8" Dia. x 24" Length/ Stainless Steel	**24590-LAB** -M6-RLD-00008001
RLD-LDB-00011 A-B003 (C3 Effluent Vessel Cell, El. -10')	6	Thermal Dispersion	8" Dia. x 24" Length/ Stainless Steel	**24590-LAB** -M6-RLD-00007001
Drain Lines				
RLD-WU-02207-S11E-04 Drain Line A-B003, (C3 Effluent Vessel Cell, El. -18'7")	N/A	N/A	4" Dia. 316L	**24590-LAB** -M6-RLD-00002001
RLD-ZN-02203-S11E-04 Drain Line A-B004, (C5 Effluent Vessel Cell, El. -19'2")	N/A	N/A	4" Dia. 316L	**24590-LAB** -M6-RLD-00001001
RLD-ZN-03393-S11E-04 Drain Line A-B004, (C5 Effluent Vessel Cell, El. -19'2")	N/A	N/A	4" Dia. 316L	**24590-LAB** -M6-RLD-00001001
RLD-ZN-03394-S11E-04 Drain Line	N/A	N/A	4" Dia.	**24590-LAB**

Table 4H-35 Analytical Laboratory 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
A-B004, (C5 Effluent Vessel Cell, El. -19'2")			316L	-M6-RLD-00001001

Table 4H-46 Analytical Laboratory Pump and Piping Pits

Cell Name	Room No.	Equipment	Leak Detection/Sump
C3 Pump Pit	A-B002	RLD-PMP-00182A/B	RLD-SUMP-00045
C5 Pump Pit (south)	A-B007	RLD-PMP-00183A	RLD-SUMP-0043A
C5 Piping Pit	A-B006	Valves and Piping for RLD-PMP-00183A/B	RLD-SUMP-00044
C5 Pump Pit (north)	A-B005	RLD-PMP-00183B	RLD-SUMP-00043B

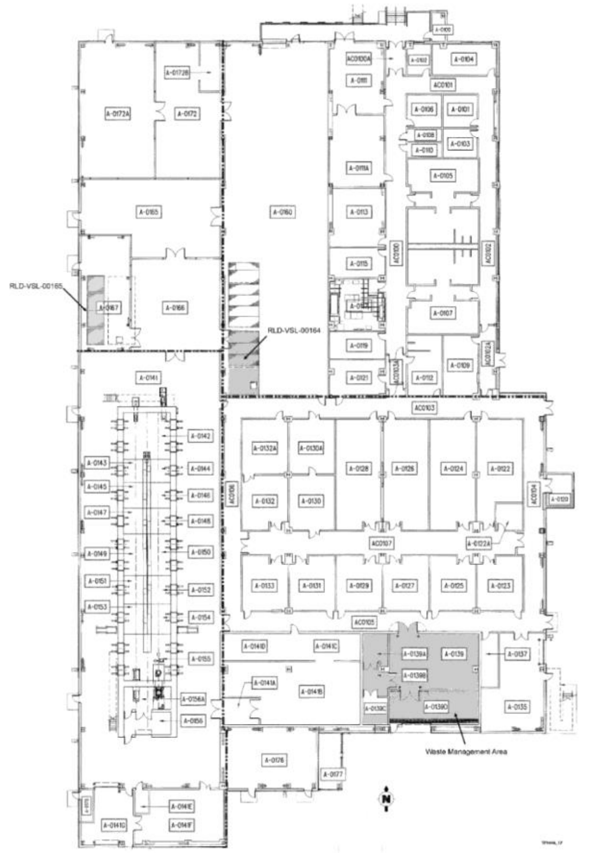

Figure 4H-1 Location of Analytical Laboratory Permitted Areas

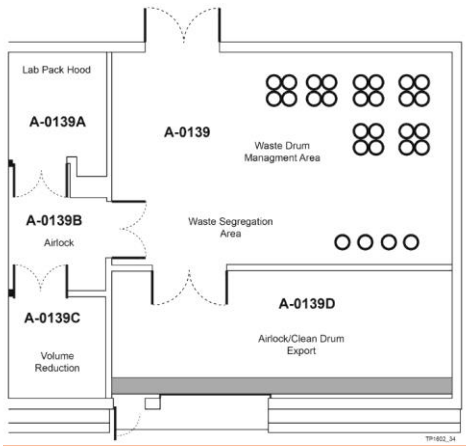

Figure 4H-2 Example of Drum Configuration in Waste Management Area

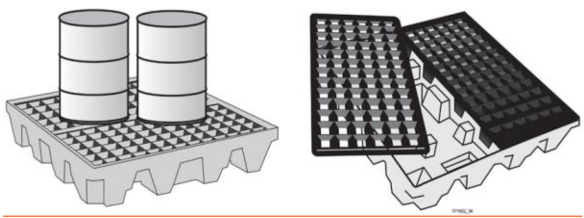

Figure 4H-3 Examples of Typical Secondary Containment Pallets

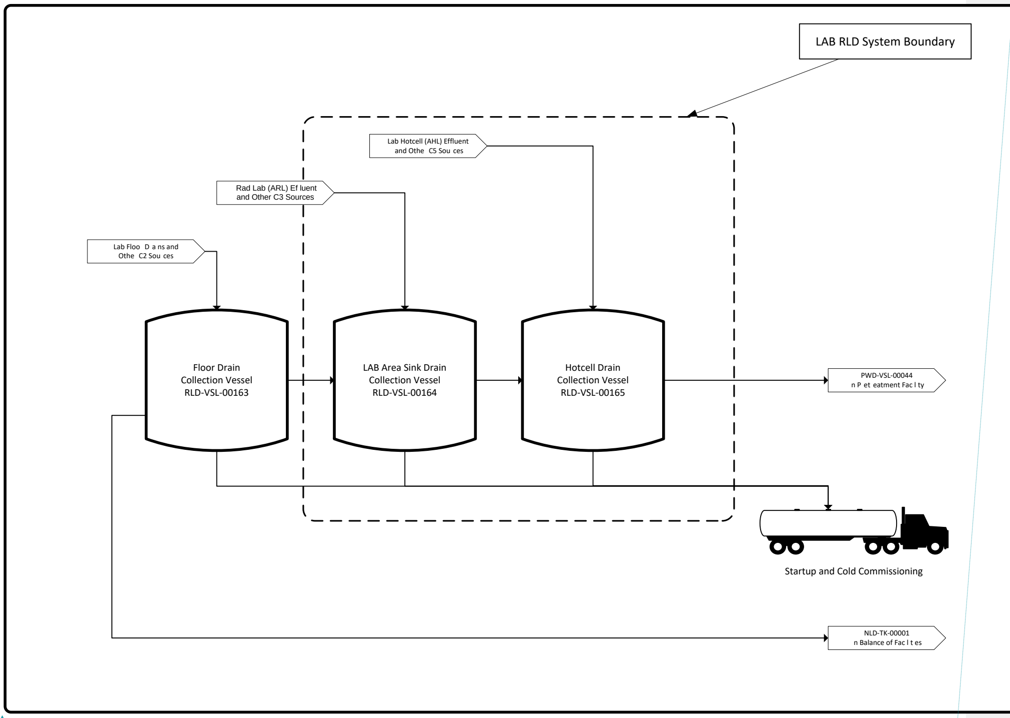

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Figure 4H-4 Simplified RLD Process Flow Diagram

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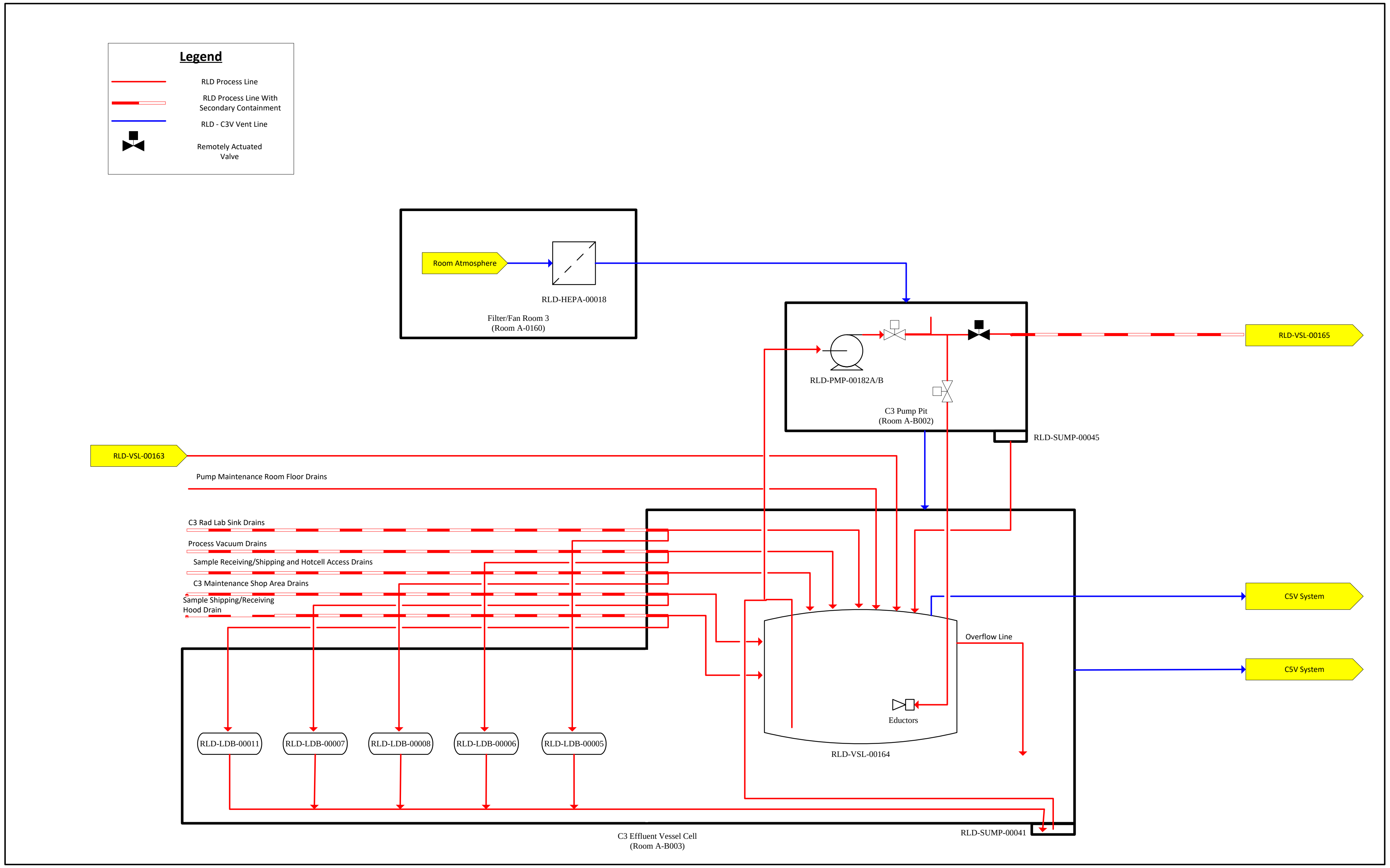

2
3 Figure 4H-5 Simplified Process Flow Diagram for Analytical Laboratory Area Sink Collection Vessel, RLD-VSL-00164

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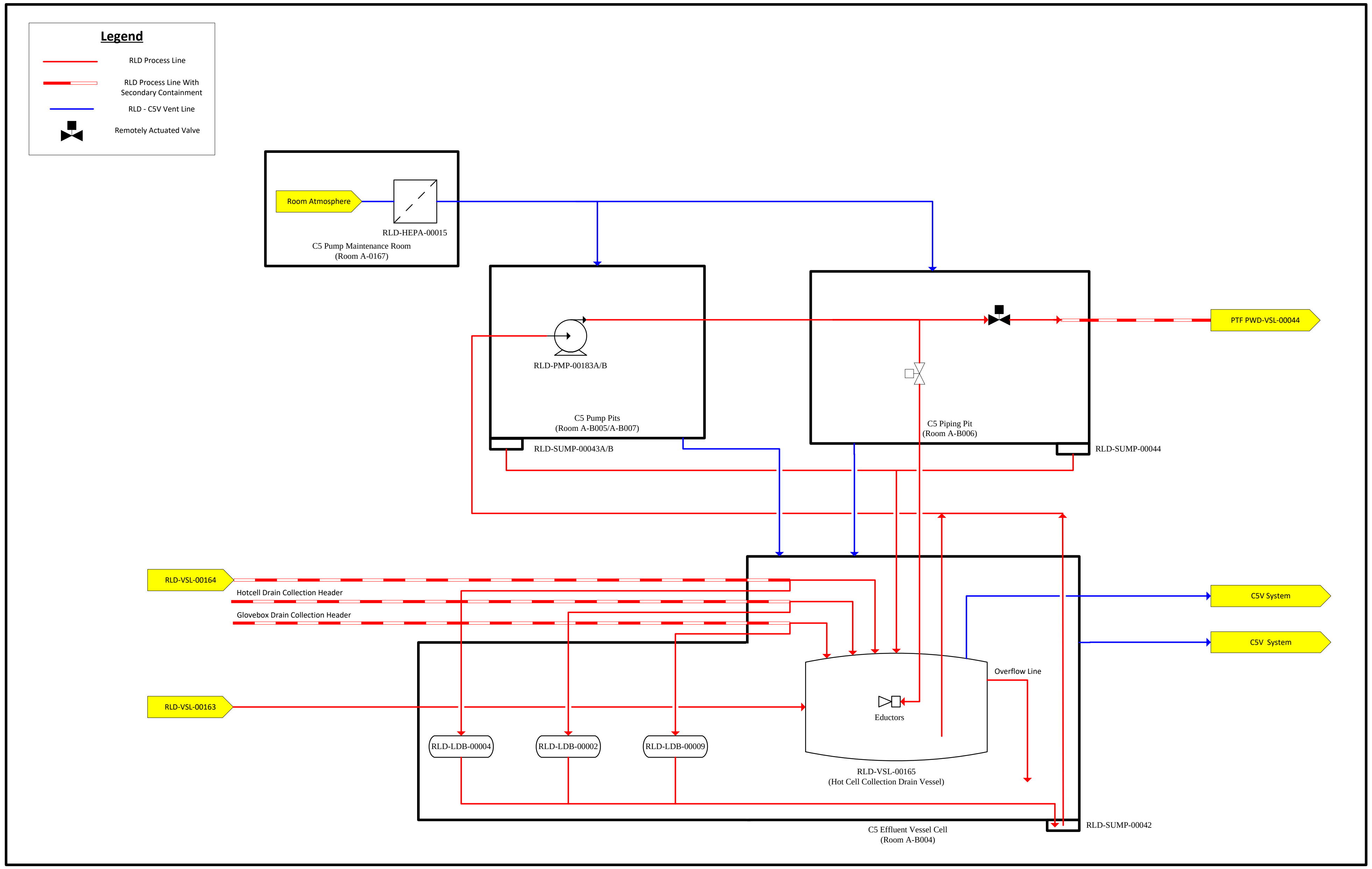

Figure 4H-6 Simplified Process Flow Diagram for Hotcell Drain Collection Vessel, RLD-VSL-00165