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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

MAY 24 1999

99-EAP-309

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Ms. L. E. Ruud, Permit Specialist
Nuclear Waste Program
State of Washington
Department of Ecology
1315 West Fourth Avenue
Kennewick, Washington 99336

Dear Ms. Ruud:

REVISED TEXT FOR THE 325 HAZARDOUS WASTE TREATMENT UNITS THAT REFLECTS CLASS 1 MODIFICATIONS WHICH THE STATE OF WASHINGTON DEPARTMENT OF ECOLOGY (ECOLOGY) APPROVED FOR QUARTER ENDING DECEMBER 31, 1998 (CHAPTER 4, CHAPTER 6, APPENDIX 3A, AND APPENDIX 8A)

Enclosed is the revised text for the 325 Hazardous Waste Treatment Units which is being submitted as a result of your letter dated March 15, 1999, stating that part of the Class 1 modifications submitted for quarter ending December 31, 1998, were not approved. The revised text is for the 325 Hazardous Waste Treatment Units Chapter 4, Chapter 6, Appendix 3A, and Appendix 8A which includes the approved Class1 modifications and deletes the modified text for those Class 1 modifications that Ecology did not approve. The text is being submitted to ensure that all activities conducted are in compliance with the Resource, Conservation and Recovery Act Permit, Dangerous Waste Portion. A record of these modifications is maintained in the Hanford Facility Operating Record.

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Should you have any questions regarding this information, please contact Ellen M. Mattlin, U.S. Department of Energy, Richland Operations Office, on (509) 376-2385; Susan M. Price, Fluor Daniel Hanford, Inc., on (509) 376-1653; or Alice K. Ikenberry, Pacific Northwest National Laboratory, on (509) 373-5638.

Sincerely,

James E. Rasmussen, Director
Environmental Assurance, Permits,
and Policy Division

EAP:EMM

Enclosure:
Revised text for the 325 Hazardous Waste Treatment Units which reflects Class 1 Modifications that Ecology approved for Quarter Ending December 31, 1998 (Chapter 4, Chapter 6, Appendix 3A, and Appendix 8A)

cc w/encl:
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Hanford Facility RCRA Permit Modification
Part III, Chapter 6 and Attachment 36
325 Hazardous Waste Treatment Units

Replacement Chapters and Appendices

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Chapter 4.0
Chapter 6.0
Appendix 3A
Appendix 8A

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4.0 PROCESS INFORMATION [D]

This chapter provides a description of waste management, equipment, treatment processes, and storage operations.

4.1 CONTAINERS [D-1]

The following sections describe the management of dangerous waste in containers at the 325 HWTUs. Container management occurs at both the HWTU and the SAL. Both portions of the 325 HWTUs are used to store and treat dangerous waste generated from onsite programs, primarily as a result of laboratory analytical activities in the 325 Building and other PNNL facilities. Descriptions of the containers used are provided in the sections that follow for the HWTU and SAL.

4.1.1 Description of Containers [D-1a]

The following sections describe the types of containers used for dangerous waste storage and treatment in the 325 HWTUs.

4.1.1.1 Containers Located in the Hazardous Waste Treatment Unit

Rooms 520 and 528 of the HWTU are used to store and treat dangerous waste generated primarily from laboratory operations 0throughout the 325 Building and the Hanford Facility. The containers used to store and treat dangerous waste vary widely from original manufacturer containers to laboratory glassware for sample analysis or to 322-liter containers used to overpack smaller containers. Containers used for storage or treatment of dangerous waste are compatible with the waste stored in them. Acceptable containers for acidic waste include plastic, steel lined with plastic, glass, and fiberglass containers. Acceptable containers for other waste include steel, glass, fiberglass, plastic, and steel lined with plastic. Table 4.1 provides an example of the types of containers that could be used in the HWTU rooms, including the material of construction and the capacity of the container.

All containers of dangerous waste are labeled to describe the contents of the container and the major hazards of the waste as required under WAC 173-303-395. Each container is assigned a unique identifying number. All containers used for onsite transfer are selected and labeled according to any applicable regulations, including 49 CFR as required by WAC 173-303-190.

All flammable liquid waste is stored in compatible containers and in Underwriter's Laboratory (UL)-listed and Factory Mutual (FM)-approved flammable storage. Solid chemicals are stored on shelving in specifically designated areas based on the hazard classification.

4.1.1.2 Shielded Analytical Laboratory Containers.

The primary function of the SAL is to conduct analysis of samples of waste streams collected at various locations on the Hanford Facility. The types of containers used to store dangerous waste in the SAL can vary widely from the original containers to laboratory glassware for sample analysis to 322-liter containers used to overpack smaller containers.

The containers used for storage or treatment of dangerous waste are compatible with the waste stored in the containers. Acceptable containers for acidic waste include plastic, steel lined with plastic, glass, and fiberglass containers. Acceptable containers for other waste include steel, glass, fiberglass, plastic, and

steel lined with plastic. Table 4.1 provides an example of the types of container that could be used in the SAL, including the material of construction and the capacity of the container.

Rooms 32, 200, 202, and 203 are used to store dangerous waste in containers. The back face of the SAL is typically used to store waste in the larger containers. These containers include various types of 208-liter steel containers (lined and unlined). Because of the nature of some dangerous waste being stored at the SAL, it is often necessary that these standard 208-liter containers be modified. This modification ensures that the containers are specially shielded to reduce the hazard of the radioactive component of the dangerous waste stored in the container and are compliant with the ALARA criteria. These specially designed shielded containers are packaged to contain anywhere from 3.79 liters to 53 liters of waste depending on the amount of shielding required. The solid waste typically is packed in individual 3.79-liter to 4.73-liter containers before placement in the 208-liter shielded container. The shielding is accomplished by surrounding the small containers with concrete, lead, or other materials to reduce the dose rate produced by the radiological component of the dangerous waste.

All containers of dangerous waste are labeled to describe the contents of the container and the major hazards of the waste as required under WAC 173-303-395. Each container is assigned a unique identifying number. All containers used for onsite transfer are selected and labeled according to any applicable regulations, including 49 CFR are required by WAC 173-303-190.

All flammable liquid waste is segregated from any incompatible waste types and packaged in approved containers.

4.1.2 Container Management Practices [D-1b]

Management practices and procedures for containers of dangerous waste ensure the safe receipt, handling, preparation for transfer, and transportation of the waste. The following sections describe the container management practices used for the HWTU and the SAL. Table 4.1 lists the typical containers used in the 325 HWTUs.

4.1.2.1 Hazardous Waste Treatment Unit Container Management Practices.

Dangerous waste containers are inspected for integrity and adequate seals before being accepted at the HWTU. Waste received for storage and treatment from outside Rooms 520 and 528 is either picked up by HWTU personnel or moved to Rooms 520 and 528 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, to Rooms 520 or 528. 325 HWTUs staff move the dangerous containers in accordance with 325 HWTUs collection procedures that address safety and hazard consideration. These procedures cover various waste types (transuranic (TRU) and low-level) and transportation modes. 325 HWTUs staff do not perform the operations, covered by a procedure, until they are formally trained on the procedure.

Containers in poor condition or inadequate for storage (e.g., damaged, not intact, or not securely sealed to prevent leakage) are not accepted at Rooms 520 and 528. Examples of acceptable packaging include laboratory reagent bottles, U.S. Department of Transportation-approved containers, spray cans, sealed ampules, paint cans, leaking containers that have been overpacked, etc. Unit operations personnel have the authority to determine whether a container is in poor condition or inadequate for storage using the criteria of WAC 173-303-190 and to use professional judgment to determine whether the packaging could leak during handling, storage, and/or treatment. Container stacking is not performed.

Inspection of Containers. A system of daily, weekly, monthly, and yearly inspections is in place to ensure container integrity, and to check for proper storage location, prevent capacity overrun, etc. Inspections are detailed in Chapter 6.0, Section 6.2. Containers are inspected for integrity before acceptance at or transport to the HWTU. Containers found to be in poor condition or inadequate for storage are not accepted.

Container Handling. All HWTU staff are instructed in proper container handling and spill prevention safeguards as part of their training (Chapter 8.0). Containers are kept closed except when adding or removing waste in accordance with WAC 173-303-630(5)a). All personnel are trained and all operations are conducted to ensure that containers are not opened, handled, or stored in a manner that would cause the container to leak or rupture. All flammable cabinets containing dangerous waste are maintained with a minimum of 76 centimeters of aisle space in front of the doors. The walk-in fume hood containing the 208-liter containers is designed to hold four 208-liter containers and has over 76 centimeters of aisle space; the containers are not stacked in the hood. Waste-handling operations can be conducted only when two or more persons are present in the unit or when the personnel present have immediate access to a communication device such as a telephone or hand-held radio.

4.1.2.2 Shielded Analytical Laboratory Container Management Practices.

Containers are not opened, handled, or stored in a manner that would cause the containers to leak or rupture. Containers will remain closed except when sampling, adding, or removing waste; or when analysis or treatment of the waste is ongoing. Containers of incompatible waste are segregated in the storage areas. Container stacking is not performed.

Inspection of Containers. A system of daily, weekly, monthly, and yearly inspections is in place to ensure container integrity, and to check for proper storage location, prevent capacity overrun, etc. Inspections are detailed in Chapter 6.0, Section 6.2. Containers are inspected for integrity before acceptance at or transport to the SAL. Containers found to be in poor condition or inadequate for storage are not accepted.

Container Handling. All personnel are instructed in proper container-handling safeguards as part of their training (Chapter 8.0). Containers are kept closed except when adding or removing waste in accordance with WAC 173-303-630(5)(a).

All container handling in the hot cells must be performed remotely with manipulators. Waste samples managed in the SAL enter the cells through rotating transfer wheels located in the back walls of cells 1, 2, and 6 and through a 17.8-centimeter borehole in the back wall of cell 1. Waste samples are moved into and out of the cells at these locations according to approved procedures that vary with the radioactivity level of the sample. After analysis of the sample and necessary confirmation of results, compatible solid waste samples are consolidated into appropriate size containers often referred to as 'paint cans' and usually stored in cell 1. However, any of the cells can be used for storage of waste during operations.

After evaluation for treatment and the subsequent treatment, liquid waste is either transferred to the SAL tank (discussed in Section 4.2) or solidified and repackaged into shielded 208-liter containers and stored in the back face area of the SAL. Waste generated outside of the hot cells is placed into appropriately sized containers and stored until packaged for shipment or transfer. Waste-handling operations are conducted outside of the cells only when a minimum of two persons are present in the unit or when the personnel present has immediate access to a communication device such as a telephone or hand-held radio.

4.1.3 Container Labeling [D-1c].1.3

Once the material has been designated as a dangerous waste, all containers are marked and/or labeled to describe the content of the container as required by WAC 173-303-395. Containers also are marked with a unique identifying number assigned by the generating unit. All containers used for transfer of dangerous waste are prepared for transport in accordance with WAC 173-303-190.

4.1.4 Containment Requirements for Storing Containers [D-1d and D-1d(1)(a)]

A description of secondary containment system design and operation is provided for the HWTU and SAL in this section.

4.1.4.1 Secondary Containment System Design and Operation for the Hazardous Waste Treatment Unit

The secondary containment system for the HWTU has three primary components: uniform fire code-approved flammable liquid storage cabinets, the floor of the rooms, and the fire water containment system (Figure 4.1).

Mixed and/or dangerous waste, in containers of 65 liters or less, is stored in Room 520 in steel flammable storage cabinets located in a storage room that forms the northeast corner of the room. An additional flammable storage cabinet is located beneath a stainless steel ventilated hood located along the south wall of Room 520. Containers over 65 liters are stored in a hood located along the east wall of the room. The containers are made of stainless steel or other suitable material depending on the characteristics of the waste and are kept closed except when waste is being added or withdrawn.

Dangerous waste in containers of 65 liters or less is stored in Room 528 steel storage cabinets in accordance with WAC 173-303-395(1)(a) and the Uniform Building Code (ICBO 1991). There are five storage cabinets, three for flammable waste and two for corrosive waste. Two cabinets (one flammable storage cabinet and one corrosive storage cabinet) are located along the north wall of the room. A cabinet for corrosive waste is located along the south wall. A cabinet for flammable waste also is located along the south wall. Further storage is provided by a flammable cabinet located beneath a stainless steel ventilated hood on the east wall of the room. Each cabinet is clearly marked as containing either flammable or corrosive waste. Flammable waste cabinets are painted yellow, and corrosive cabinets are painted blue.

Rooms 520 and 528 are located on the main floor of the 325 Building and are constructed of concrete. The concrete floors of both rooms have been equipped with a heat-sealed seamless chemical-resistant polypropylene coating that covers the entire floor area of both rooms and laps approximately 10 centimeters up all of the outside walls of each room. The coated floor is capable of containing minor spills and leaks of liquid mixed waste. In addition, because the floors are not sloped, waste containers stored on the floors are elevated or otherwise protected to prevent the container from coming in contact with spilled waste.

Major spills or leaks of liquid mixed waste flow into the fire water containment system. The fire water containment system consists of floor trenches located at each entrance to the rooms and the fire water containment tank located in the basement of the building. The system is designed to collect the fire-suppression water in the event that the automatic sprinkler system was activated. The location of the trenches is shown in Figure 4.1.

The floor trenches located under the double doors on the west side of Rooms 520 and 528 are approximately 20 centimeters wide, 46 centimeters deep, and 1.91 meters long. The floor trench located

under the single south door of Room 520 is approximately 20 centimeters wide, 46 centimeters deep, and 1.5 meters long. The floor trench located under the single southwest door of Room 528 is 20 centimeters wide, 61 centimeters deep, and 1.5 meters long. The trenches extend completely across the entrance of each room so that liquids do not flow out through a doorway. The trenches are constructed of 14-gauge stainless steel and are equipped with a steel grate cover. All seams are welded to ensure integrity. Trenches under the double doors are equipped with two drains in the bottom, and trenches located under single doors are equipped with one drain to allow liquid to drain from the trench through 15-centimeter-diameter carbon steel piping to the fire water containment tank.

The fire water containment tank is located beneath Room 520 in the basement of the 325 Building. The rectangular tank has dimensions of 1.65 meters by 2.25 meters by 1.92 meters and a capacity of 22,710 liters. The sides and floor of the tank are constructed of epoxy-coated carbon steel plate. The steel sides and floor provide support for the chemical-resistant polypropylene liner. The tank is secured to the concrete floor of the 325 Building basement with 1.3-centimeter bolts at 1.82-meter intervals.

The possibility of mixing incompatible waste in the containment system is minimized, because the number of containers open at one time will be limited to those in process (waste not in process is stored in closed containers). In addition, the very large volume of any fire water flow would dilute waste and would minimize the possibility of adverse reactions.

4.1.4.2 Secondary Containment System Design and Operation for the Shielded Analytical Laboratory

The secondary containment in the SAL is divided into three systems: the six hot cells, the front face, and the back face. Figure 4.2 provides a first floor plan view depicting these three areas.

The secondary containment for the six hot cells consists of the stainless steel base of the cell and a continuous trough located on the east side of the cells. The hot cell secondary containment system is shown in Figure 4.2. The base and trough can collect leaks and spills generated during analytical chemistry operations. The stainless steel bases are approximately 0.55 square meter. The troughs are approximately 15.2 centimeters wide, 7.6 centimeters deep, and extend across the entire 1.82-meter width of each cell. The troughs are equipped with a stainless steel grate cover. The leaks and spills are drained by gravity through drains in the bottom of the trough and through stainless steel piping to the SAL tank located in the basement (Room 32). The SAL tank is constructed of stainless steel and has a capacity of 1,218 liters. Design and operating specifications are provided in Section 4.2.

The secondary containment system for the back face of the SAL consists of shielded 208-liter containers and plastic containers. Solid mixed waste is packaged in containers (e.g., paint cans, bottles, bags) before removal from the hot cells. Once removed from the hot cells, the containers are placed into specially designed, shielded 208-liter containers to provide secondary containment. Containers of liquid waste are placed into plastic containers that provide secondary containment and prevent spilled liquids from contacting other waste containers. Some containers are placed in shielded cubicles in Room 202 depending on container dose rates. The location of the cubicles is shown in Figure 4.2.

The secondary containment system for the front face of the SAL, which is minimally used to store mixed waste, is similar to the system for the back face. Containers holding liquid and solid mixed waste are placed into containers to provide secondary containment; the primary area for mixed waste storage is the fume hood.

4.1.5 Structural Integrity of Base [D-1d(1)(b)

A description of the requirements for base or liner to contain liquid is provided in the following sections for the HWTU and the SAL.

4.1.5.1 Requirements for Base or Liner to Contain Liquids in the Hazardous Waste Treatment Unit

The floors in Rooms 520 and 528 have been equipped with the chemical-resistant polypropylene coating. All seams in the coating were finished by heat welding to ensure the integrity of the coating. The coating currently is free of cracks and gaps and will be maintained that way throughout the life of the HWTU. The condition of the floor is inspected weekly as part of the inspection program (Chapter 6.0). Floor coating assessment is carried out whenever the floor coating is observed to have been chipped, bubbled up, scraped, or otherwise damaged in a manner that would impact the ability of the coating to contain spilled materials. Minor nicks and small chips resulting from normal operations are repaired periodically.

The floor coating holds any spilled liquid until the liquid is cleaned up or enters the drains in each room. Once the liquid has entered the drains, the liquid drains into the fire water containment tank in the basement, where the liquid is stored pending chemical analysis and treatment and/or disposal.

The base of the HWTU floors consists of 14.2 centimeter, reinforced, poured concrete slabs with no cracks or gaps. The concrete is mixed in accordance with ASTM 094, Section 5.3, Alternate 2, and is finished with a smooth troweled surface. The concrete base has a load capacity of 976 kilograms per square meter.

The floor trenches that prevent liquids from migrating from the HWTU rooms are constructed of 14-gauge stainless steel. All seams are welded and the connections with the drains are tight. The stainless steel is compatible with and resistant to the liquid mixed waste managed in the HWTU.

4.1.5.2 Requirements for Base or Liner to Contain Liquids in the Shielded Analytical Laboratory

The base currently is free of cracks and gaps and will be maintained that way throughout the life of the SAL. The base of the floor for the six hot cells consists of a 0.48-centimeter layer of stainless steel formed on top of poured concrete. The stainless steel base is compatible with most of the waste generated in the hot cells. The exceptions are waste containing hydrofluoric acid and high concentrations of hydrochloric acids. This waste is stored in individual secondary containment to prevent contact of the waste with the stainless steel in the event that a primary waste container were to fail. Because the volumes of waste generated and stored are small, and because the hot cell floors are not sloped, any waste spilled during waste handling activities probably would remain in a localized area and be cleaned up expeditiously to ensure that no damage occurs to the stainless steel. As was previously discussed, the secondary containment system for the six cells is provided by a stainless steel tank. Liner and base requirements for the SAL tank are discussed in Section 4.2.

The bases of the back face and front face of the SAL consist of a 15.2 centimeter, reinforced, poured concrete slabs with no cracks or gaps. The concrete base has a load capacity of 976 kilograms per square meter. The base in Room 201 is topped with a seamless chemical resistant polypropylene coating. Rooms 202 and 203 are topped with epoxy based paint. In Room 200, the concrete slab is painted, and there is a trap door in the painted floor of Room 200 that enables transfer of equipment between Rooms 200 and 32. The air flow between these rooms is from Room 200 to Room 32 due to positive air pressure in Room 200.

4.1.6 Containment System Drainage

A description of the containment system drainage for the HWTU and SAL is provided in this section.

4.1.6.1 Containment System Drainage for the Hazardous Waste Treatment Unit

The floors in Rooms 520 and 528 are not sloped. Small spills of liquid probably will remain in a localized area until the spills are cleaned up. All containers of dangerous waste are stored either in drums, on shelves within open-faced hoods, or within flammable or corrosives storage cabinets to prevent the containers from contacting spilled materials. Large spills of liquid material would spread laterally across the flat surface of the floor. The flow of the spilled liquid would be stopped by an outside wall(s) of the room or by one of the trenches protecting the entrances to the room. The lower 10 centimeters of the outside walls of the rooms are covered with the same chemical-resistant coating as that on the floor to prevent spills from migrating throughout the walls.

The floor drains across each exit drain spill to an emergency fire water containment tank (22,710-liter capacity) located in the basement of the 325 Building. All drained liquid is captured by the tank, where the liquid is stored until sampling and analysis indicates a proper treatment and/or disposal method.

4.1.6.2 Containment System Drainage for the Shielded Analytical Laboratory

The stainless steel base of the hot cell is not sloped. Because of the small volume of waste that is handled, small spills probably would remain in a localized area until the spills are cleaned up. As a result, all containers of liquid mixed waste are stored within secondary containment to prevent spilled liquids from contacting the containers. Large spills that occur within the SAL hot cells flow to the stainless steel trough at the front of each cell, which gravity drains into the SAL tank (TK-1, Room 32).

The bases of the front and back faces are not sloped. Containers in these areas are stored within secondary containment and off the base surface to prevent spilled liquids from contacting the containers.

4.1.7 Containment System Capacity [D-1d(1)(c)

A description of the containment system capacity for the HWTU and SAL is provided in the following sections.

4.1.7.1 Containment System Capacity for the Hazardous Waste Treatment Unit

The maximum combined total volume of all containers of dangerous waste stored in both HWTU rooms is 10,000 liters. The largest mixed waste storage container is a 322-liter container. The fire water containment tank provides secondary containment for both HWTU rooms. The capacity of the fire water containment tank is 22,710 liters; therefore, the containment system is more than adequate to contain either 10 percent of the total volume of waste (2,840 liters) or the entire volume of the largest container (322 liters).

4.1.7.2 Containment System Capacity for the Shielded Analytical Laboratory

The largest container of liquid waste to be stored in the hot cells is a 7.6-liter container.

The SAL tank is considered to be the secondary containment for the hot cells. The largest quantity of liquid that could be stored in the hot cells while maintaining adequate (10 percent of total volume) secondary containment would be 12,491 liters. The total amount of liquid to be stored in the hot cells is governed by the area constraint of the cells. Typically, the largest amount of liquid waste to be stored in the hot cells at one time is 75.8 liters.

Liquid waste stored in Room 201 is stored in the fume hood. The waste is stored in glass or plastic bottles that are each placed in individual plastic containers of a size that is sufficient to hold all of the contents of the inner vessel. The quantity of liquid waste stored in the hood is governed by the area constraint in the hood. Similarly, liquid waste stored in Room 202 is stored in glass or plastic bottles that are each placed in individual secondary containment.

The floors of the front face and back face are constructed of concrete. The rear face floor in Rooms 202 and 203 is covered with vinyl tile. Floor drains flow to the retention process sewer (RPS) system, which has a diverter triggered by a radiation monitor that diverts radioactive liquids detected in the RPS line to the RLWS. Because of the small quantities of liquid stored in the front face and back face, any spill that is not contained by the plastic overpack probably would remain on the floor in a localized area until cleaned. Any liquid that managed to flow to the room drains would be conveyed by gravity to the RPS system or, depending on radionuclide content, to the RLWS.

4.1.8 Control of Run-On [D-1d(1)(d)

Run-on control for the HWTU and SAL is described in the following sections.

4.1.8.1 Control of Run-On for the Hazardous Waste Treatment Unit

The possibility of run-on for the HWTU is mitigated by the 325 Building. The level of the main floor is approximately 1.52 meters above the level of the ground surface around the building.

4.1.8.2 Control of Run-On for the Shielded Analytical Lab

The possibility of run-on for the SAL is mitigated by the 325 Building. The level of the main floor is approximately 1.52 meters above the level of the ground surface around the building.

4.1.9 Removal of Liquids from Containment System [D-1d(2)]

The removal of liquids from the containment system for the HWTU and SAL is described in the following sections.

4.1.9.1 Removal of Liquids from the Hazardous Waste Treatment Unit Containment System

On discovery of liquid accumulation in the containment resulting from a spill or other release, the Building Emergency Director (BED) must be contacted in accordance with the contingency plan (Chapter 7.0). The BED may determine that the contingency plan should be implemented. If the incident is minor, and if the BED approves, removal of the liquid commences immediately following a safety evaluation. Appropriate protective clothing and respiratory protection will be worn during removal activities; an industrial hygienist could be contacted to determine appropriate personal protection requirements and any other safety requirements that might be required, such as chemical testing or air monitoring. In addition, ventilation of the spill area might be performed if it is determined to be safe and if appropriate monitoring of the air discharge(s) is performed.

Liquid spills are contained within the Room 520 or Room 528 floor or within the fire water containment tank. Localized spills of liquids to the floor of the HWTU rooms are absorbed with an appropriate absorbent (after the appropriate chemical reaction has occurred to neutralize reactivity in the case of reactive waste or after neutralization has occurred in the case of corrosive materials). The absorbent material is recovered and placed in an appropriate container. The floor, cabinets, and any other impacted containers can be cleaned by dry rags, soap and water, or a compatible solvent, if necessary, to remove external contamination. Contaminated rags and other cleanup material are disposed of in an appropriate manner. If spilled materials in the HWTU reach the fire water containment tank, the material will be held in place until chemical analysis indicates an appropriate treatment and/or disposal method. The waste

analysis procedures and analytical methods used to designate the spilled materials are described in the waste analysis plan, Appendix 3A. The tank is designed to allow easy access for material sampling. Depending on the results of the analysis, the collected spill material is pumped to the RLWS or pumped to the RPS.

4.1.9.2 Removal of Liquids from the Shielded Analytical Laboratory Containment System

The removal of liquid from the SAL tank, which provides the secondary containment for the six hot cells, is discussed in Section 4.2. The tank will be emptied after the accumulated waste is designated.

On discovery of liquid accumulation in the back or front face containment resulting from a spill or other release, the BED must be contacted in accordance with the contingency plan (Chapter 7.0). The BED could determine that the contingency plan should be implemented. If the incident is minor, and if the BED approves, removal of the liquid commences immediately following a safety evaluation. Appropriate protective clothing and respiratory protection will be worn during removal activities; an industrial hygienist could be contacted to determine appropriate personal protection requirements and any other safety requirements that might be required, such as chemical testing or air monitoring. In addition, ventilation of the spill area could be performed if it is determined to be safe and if appropriate monitoring of the air discharge(s) is performed.

Localized spills of liquids to the floor of the SAL will be absorbed with an appropriate absorbent (after the appropriate chemical reaction to neutralize reactivity has occurred in the case of reactive waste or after neutralization has occurred in the case of corrosive materials). The absorbent material will be recovered and placed in an appropriate container. The floor, cabinets, and any other impacted containers can be cleaned by dry rags, soap and water, or a compatible solvent, if necessary, to remove external contamination. Contaminated rags and other cleanup material will be disposed of in accordance with applicable regulations and PNNL internal waste management procedures.

4.1.10 Management of Ignitable and Reactive Waste in Containers [D-1f(1) and D-1f(2)]

Management of ignitable and reactive-waste in containers within the HWTU and SAL is described in the following sections.

4.1.10.1 Management of Ignitable and Reactive Waste in Containers in the Hazardous Waste Treatment Units

Ignitable and reactive waste are stored in compliance with Article 79, Regulations for Flammable and Combustible Liquids (ICBO 1997). Containers of ignitable and reactive waste are stored in individual flammable storage cabinets within the HWTUs.

4.1.10.2 Management of Ignitable and Reactive Waste in Containers in the Shielded Analytical Laboratory

Ignitable and reactive waste are stored in compliance with Article 79, Regulations for Flammable and Combustible Liquids (ICBO 1997). Containers of ignitable and reactive waste are stored in individual flammable storage cabinets within the SAL.

4.1.11 Management of Incompatible Waste in Containers [D-1f(3)]

The prevention of reaction of ignitable, reactive, and incompatible waste in containers for the 325 HWTUs is discussed in the following sections.

4.1.11.1 Management of Incompatible Waste in Containers at the Hazardous Waste Treatment Unit

Containers of ignitable and reactive waste are stored in segregated flammable storage cabinets. Chapter 6.0, Section 6.5.2, describes the methods used to determine the compatibility of dangerous waste so that incompatible waste is not stored together. Incompatible waste is never placed in the same container or in unwashed containers that previously held incompatible waste. Operations are conducted such that extreme heat or pressure, fire or explosions, or violent reactions do not occur; uncontrolled toxic mists, fumes, dust, or gases in sufficient quantities to threaten human health or the environment are not produced; uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion are not produced; and damage to the container does not occur. Information on the hazard classification of waste accepted by the HWTU is documented by the generating unit, which is carefully reviewed by HWTU personnel before waste acceptance. Mixing of incompatible waste is prevented through waste segregation and storage. As the containers received in the HWTU usually are smaller than 19 liters, the most common segregation is performed by storage of incompatible hazard classes in separate chemical storage cabinets. Guidance for the segregation is provided in Chapter 6.0, Section 6.5.2.

Minimum aisle space is maintained according to the Uniform Fire Code to separate incompatible waste. The possibility of adverse reaction is minimized (Chapter 6.0, Sections 6.6 and 6.7 for methods used to prevent source of ignition).

4.1.11.2 Management of Incompatible Waste in Containers at the Shielded Analytical Laboratory

Incompatible waste in the SAL hot cells is managed by placing primary containers into a second container or tray capable of managing any leak or spilled material. Incompatible waste is never placed in the same container or in an unwashed container that previously held incompatible waste.

Treatment operations are conducted with minor amounts of waste to ensure that extreme heat or pressure, fire, or explosive or violent reactions do not occur. Potential releases would be controlled by the ventilation system that exhausts through two high-efficiency particulate air (HEPA) filters set in series, and due to the limited amount of waste in the SAL. These HEPA filters are part of the building exhaust system, which is maintained and inspected routinely in accordance with PNNL preventive maintenance standards. Radioactive and nonradioactive emissions from the 325 Building stack, and control devices for those emissions, are regulated by the Washington State Department of Health pursuant to Chapter 246-247 WAC, and the Washington State Department of Ecology (Ecology) pursuant to Chapters 173-400, 173-401, and 173-460 WAC, respectively. Air-pressure barriers for containment control are achieved by supplying air from areas of least contamination (i.e., offices) to areas of higher contamination (i.e., cells). These systems ensure proper emission flow through the HEPA filters.

Because waste normally is treated in the SAL hot cells, human exposure to the remote potential of mixing incompatible waste or reactive waste is minimal. Waste generated and treated within the SAL hot cells is stored within separate secondary containers, which eliminates the potential for combining incompatible waste. Waste stored in the front or back face of the SAL is packaged by hazard classes for transfer or are segregated in separate secondary containment.

4.2 TANK SYSTEMS

The following sections describe the management of dangerous waste in the 325 tank systems. Each tank system consists of the tank; associated piping, valves and pumps; and secondary containment. The first tank system is located in Room 32 of the SAL and is used to collect liquid waste generated from the analytical laboratory operations. This SAL tank system is described in Section 4.2.1. The second tank system is the RLWS load out tank system. This tank system will used to collect liquid waste discharged

to the RLWS prior to being transferred to the DST System. Design for the RLWS load out tank system is scheduled for completion in September 1997 and construction is scheduled to be complete in fiscal year 1998. Currently, radioactive liquid waste is collected from the SAL tank and the HWTU and transferred to the 340 Building via the existing RLWS. There are no tanks associated with the existing RLWS. Once the RLWS modifications are complete, the RLWS load out tank system will be operated as described in Section 4.2.2.

4.2.1 Shielded Analytical Laboratory Tank System

The SAL is an analytical chemistry laboratory used primarily to prepare and analyze samples of dangerous waste streams for waste characterization. This work is conducted in six inter-connected hot cells that form the nucleus of the SAL. Liquid waste generated during these operations is collected, treated if necessary, and drained from the hot cells to the SAL tank located in Room 32 of the basement directly below the hot cells. A stainless steel trough, 15.2 centimeters wide by 7.62 centimeters deep, traverses the front of all six hot cells in which solution is poured. The trough is equipped with stainless steel grating to capture solids during solution pour. The trough collects any liquid waste poured from analytical chemistry operations, mixed waste treatment operations, other chemical and mixed waste stored in the hot cells, and spills or leaks. The liquid waste is transferred through a common stainless steel pipeline that drains into the SAL tank. The waste is batch transferred from the SAL tank to the radioactive liquid waste system. The SAL tank volume is 1,218 liters and has a throughput of 80,000 liters per year.

4.2.1.1 Design, Installation, and Assessment of Tank Systems [D-2a]

The following sections discuss the design and installation of the SAL tank and provides information on the integrity assessment.

4.2.1.1.1 Design Requirements [D-2a(1)]

Waste stored in the SAL tank has a pH between 7 and 12. The tank is constructed of 316L stainless steel. This material is compatible with any of the dangerous waste that is discharged to the tank. All waste is treated or reacted before introduction into the tank to meet RLWS waste acceptance criteria.

The tank system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of the material is adequate and that it can withstand the stress of daily operation. The professional engineer evaluation is included in the tank integrity assessment.

The SAL tank is a vertical double-shell tank supported by 3 legs and stands approximately 1.7 meters above the ground. The top head is a 0.95-centimeter-thick flat stainless steel plate. Both bottom heads are flanged and dished heads (torispherical), and the bottom height is 10.2 centimeters above ground. The inner shell is 107 centimeters outside diameter, the outer shell is 114 centimeters outside diameter, and each shell is 0.8-centimeter-thick stainless steel plate. The tank is located inside a containment pan that has a 203-centimeter diameter and is 51 centimeters high; the total volume of the pan is 1,648 liters. The pan provides for secondary containment of leaks from the tank, piping, and ancillary equipment and instruments located above the tank. Flanged and threaded connections are located within the containment boundary of the pan to capture any leaks that might occur from these connections. Outside the containment area, all connections are welded. There are no outlets, drainage or otherwise, on the bottom or sides of the tank. Appendix 4A contains engineering drawings.

Solution enters the tank through a gravity flow, welded drain line piped from the hot cells. The SAL sources that tie into this drain pipe include the hot cells, sink drain, hood drain via the sink drain, and floor drain. The cup sink drain and hood drain line is sealed off and is not in use. The drain line also

functions as the tank vent that is exhausted by the hot cell exhaust system. Waste solution is pumped from the SAL tank to the RLWS by either a transfer gear pump or a water jet, both of which are located on top of the tank. Both the transfer pump and jet suction lines drop down vertically through the top head to the bottom head and are bent to the center of the tank to minimize the remaining liquid heel when transferring the liquid to the RLWS. The transfer pump is a gear pump with 30 liter per minute capacity at 9 meter water head with 1.5 meters suction head. A flow indicator/totalizer is located on the upstream process water line to be used to verify process water flow during water jet transfer operations. A second, smaller sample pump also is located above the tank. The sample pump provides for solution transfer to the sample station located just north of the tank system. The operators draw a sample at the ventilated sample hood by opening a small sample valve. The sample pump is a gear pump with 3.8 liter per minute capacity at 1.5 meter water head with 1.5 meters suction head. Both gear pumps have magnetic drives to avoid shaft leakage. The discharge piping from each pump has a pressure relief valve installed to protect the gear pumps. The discharge piping from the pressure relief valve is piped back into the tank to contain the solution. A mixer is located on top of the SAL tank to provide agitation of the contents for sampling and washout purposes. Process water also is provided to the tank system for cleanout of the tank and associated piping.

The SAL tank is located in a controlled access room and is monitored from two operating panels. The smaller sample panel is located next to the SAL tank, and the second main control panel is located in Room 201, the main operating gallery. The sample panel provides control for activities related to pulling a sample, such as activating the sample pump and controlling process water, and monitoring the liquid level of the tank. The main control panel provides the operators with the ability to monitor and control the entire SAL tank system. The main control panel provides level indication, high, and high-high level annunciation and contains switches for controlling pumps, agitators, valves, etc. The SAL tank is instrumented with three types of level-monitoring devices. Two devices are wired into the annunciator at the main control panel to provide high-level alarms, and one high-level alarm annunciates at the annunciator board in the control room on the third floor. This control room is staffed 24 hours a day, 7 days a week. If a high-alarm situation should occur after normal working hours, operations personnel would be notified immediately by the alarm and would take corrective action according to procedure. The SAL tank system normally is operated on the day shift. Personnel occupy the main operating gallery in Room 201, where the personnel would be alerted to off-normal conditions on the main control panel. A high-level alarm also would de-energize the process water solenoid valves to the closed position on three water lines into the hot cells and on the process water lines to the SAL tank. The containment pan contains a conductivity element that alarms at the main control panel should solution be detected in the pan. Operating procedures require that inspections of the entire system be made daily when in use (Chapter 6.0).

4.2.1.1.2 Integrity Assessments [D-2a(2) and D-2a(3)]

An independent, qualified, registered professional engineer's tank integrity certification has been completed and will be submitted as a separate document.

4.2.1.2 Secondary Containment and Release Detection for Tank Systems

This section describes the secondary containment systems and leak detection systems installed in the SAL.

4.2.1.2.1 Requirements for Tank Systems [D-2b(1), D-2b(2)(b), and D-2b(2)(c)]

The secondary containment system for the SAL Tank in Room 32 consists of two components: (1) the SAL tank is a double-walled vessel and the outer tank provides secondary containment for the inner tank; and (2) a pan has been installed under the tank to provide secondary containment for the pumps, valves, and flanges located on the top of the tank. The pan also provides tertiary containment for the tank.

The existing drain pipe from the hot cells to the SAL tank is a single-walled, 5.1-centimeter welded stainless steel pipe. This piping is visually inspected for leaks on a daily basis when the tank system is in use, by means of a remote video system. Flanges in this piping and ancillary equipment are located so that secondary containment is provided by the SAL tank secondary containment pan. For the existing RLWS, the transfer piping from the SAL tank to the 340 Building is single-walled, welded stainless steel pipe from the tank to the 325 Building boundary and double-walled stainless steel pipe from the RLWS tank to the cask loading station 325 Building boundary to the 340 Building. The modified RLWS system will utilize the single-walled, welded stainless steel pipe from the SAL tank to the RLWS load out tank, and a new double-walled stainless steel pipe will be used to transfer waste from the RLWS load out tank to the truck lock. New double-walled piping will also be installed to extend the drain line from Room 32 to the RLWS load out tank. Refer to Figure 2.3b for a schematic of the modified RLWS load out tank system. The welded single-walled transfer piping is visually inspected for leaks within 24 hours of a transfer. The 325 Building provides additional containment. The basement floors are concrete, and any liquid release remains in the immediate area until cleanup. The openings to the drains in the basement are elevated 10.2 centimeters above the floor; thus, any spill would remain in the basement until enough liquid collects to fill the entire basement to a 10.2-centimeter depth. The SAL tank can hold a maximum of 1,218 liters, and the entire contents of the SAL tank would fill an area of only 3.5 meters by 3.5 meters to a depth of 10.2 centimeters. Because the basement is larger than 3.5 meters square, the liquid from the SAL tank would not enter a drain opening. Details of the design, construction, and operation of the secondary containment system are described in the following sections.

4.2.1.2.2 Requirements for Secondary Containment and Leak Detection

The secondary containment has been designed to prevent any migration of waste or accumulated liquid from the tank system to the soil, groundwater, or surface water. The secondary containment system also can detect and collect releases of accumulated liquids. A zoom color television camera surveillance system allows for tank, ancillary equipment, and general Room 32 viewing. The camera, located in Room 32, is equipped with auxiliary lighting and mounted on a remote controlled pan and tilt head. The color monitor and camera controls are housed in a dedicated cabinet in Room 527 and can also be moved to and operated in Room 201. The following is the system description.

Materials of construction. The tank and components are constructed of 316L stainless steel; this material is compatible with the aqueous waste being discharged to the tank. The waste has a pH between 7 and 12.

Strength of materials. The system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of materials is adequate and that the tank can withstand the stress of daily operation (SAIC 1996). Also, pressure relief valves are installed in each line exiting the SAL tank. In the event that there is a blockage in the pipe or tubing, pressure will not build up in the lines. The pressure relief valves are set to 30 psi, which is well below the design strength of stainless steel pipe and tubing. Waste drains back into the SAL tank when a pressure relief valve opens.

Strength of foundation. The system design has been reviewed by an independent, qualified, registered professional engineer to verify that the strength of the tank mounting and foundation is adequate to withstand the design-basis earthquake (DBE). This ensures that the foundation is capable of providing support to the tank and will resist settlement, compression, or uplift.

Leak detection system description. The SAL tank is double walled, and a conductivity probe is installed in the annulus to detect any leak of liquid from the primary containment. If liquid is detected by the probe, alarms are sounded immediately in a local control panel located in Room 32 and in the main control room.

A pan installed beneath the SAL tank provides tertiary containment. The containment pan has a conductivity element that alarms at the main control panel if the presence of liquid in the pan is detected. The containment pan has an 203-centimeter diameter and a 51-centimeter height with a containment capacity of 1,648 liters. The containment pan will easily hold the total capacity of the 1,218-liter SAL tank plus any potential process water that might be released.

Removal of liquids from secondary containment. The tank secondary containment, the outer shell of the double-walled vessel, is designed to contain a liquid leak from the inner vessel until provisions can be made to remove the liquid. The liquid might not be removed within 24 hours because of the coordination that must take place in the 325 Building. A tube is installed in the annulus that extends to the bottom and is capped at the top of the tank. If liquid were detected in the annulus, the liquid could be removed by connecting a tube between the capped fitting and the transfer pump, which would pump the liquid into the RLWS transfer line.

A delay of greater than 24 hours in removing the liquid from the secondary containment poses no threat to human health or the environment, because the waste continues to be contained in a sealed vessel. In the event that the secondary containment should leak, the containment pan installed beneath the tank provides tertiary containment.

4.2.1.2.3 Secondary Containment and Leak Detection Requirements for Ancillary Equipment

Secondary containment for the SAL tank system ancillary equipment is provided by the containment pan below the SAL tank, by double-walled piping for the sample line between the tank and the sample station, and by daily visual inspection during use of the entire system including the existing single-walled piping. Flanged and threaded connections, joints, and other connections are located within the confines of the containment pan. Outside this pan, only double-walled piping and welded piping are allowed. The pumps are magnetic coupling pumps located above the pan. All material of construction is stainless steel; for welded parts the material is 316L stainless steel. Stainless steel material is compatible with the expected corrosive, dangerous, and mixed waste stored in the SAL tank. The strength and thickness of the piping, equipment supports, and containment pan are designed to onsite standards that take into account seismic requirements for the region and corrosion protection. The entire system is located on an existing basement floor built in the 1960s. The 325 Building has proven over time to be of a sound structural integrity to withstand mild earthquake forces. The containment pan has a liquid element sensor that alarms immediately at the main control panel should any leakage be detected. The containment pan has a 203-centimeter diameter and a 51-centimeter height, or 1,648 liters of capacity. The containment pan will hold the total capacity of the 1,218-liter SAL tank plus any potential process water that also might be released. In the event of an alarm, the process water solenoid valves will become de-energized to the closed position to minimize the loss of additional water.

The 325 Building is staffed or monitored 24 hours a day, 7 days a week. The control system is designed to alarm on any leak/spill or high-level alarm encountered. The personnel responding to the alarm condition will stop or secure the action causing the leak/spill, warn others of the spill, isolate the spill area, and minimize individual contamination and exposure. The spilled or leaked waste will be removed in an expeditious manner according to procedures for cleaning up spills and leaks.

4.2.1.2.4 Controls and Practices to Prevent Spills and Overflows

The SAL tank system has been designed to account for safe and reliable operation to prevent the system from rupturing, leaking, corroding, or otherwise failing. The tank is provided with redundant-level instrumentation to monitor tank levels. Both capacitance- and conductance-level probes are used for level monitoring and alarming. The tank will alarm on high level and interlock the process water to fail close. The process water is supplied to both the hot cells and the tank system. The containment pan is equipped with a liquid-sensing element to detect the presence of liquid and alarms at the main control panel if liquid is detected. Normally, liquid is drained to the tank by operators pouring solution into the troughs in the hot cells. This operation is carried out in a "batch mode." If this operation sets off a high-level alarm, the operators stop pouring solution into the troughs. Even if this operation caused an alarm condition, no spill is expected, because the tank has sufficient freeboard to hold additional waste solution. The initial level alarm is set at 92 percent of full volume.

Trained personnel respond to spills by stopping or securing the action causing the spill, notifying others in the area of the spill, and following guidance provided in the 325 Building Emergency Plan and the 325 HWTUs Contingency Plan (Chapter 7.0). Measures are in place to inspect the system daily.

4.2.1.3 Tank Management Practices [D-2d]

According to operating procedures, liquid waste is poured into the troughs. The troughs tie into the 5.08-centimeter drain header located under the hot cells. This drain header is sloped down to the SAL tank located in Room 32 of the basement. The existing drain header is the only method of introducing mixed waste solutions into this tank. The drain line is fully welded and is constructed of 316L stainless steel material. Because this drain line also serves as the SAL tank vent line, the SAL tank operates at the same pressure as that of the hot cells. The heating, ventilation, and air conditioning operating pressure for the hot cells, and therefore the SAL tank, is -1.27 centimeters water (vacuum). The SAL tank operates at slightly subatmospheric pressure, and no pressure controls are necessary for this tank system.

The SAL tank is fully monitored with tank-level instruments. A main control panel provides level status and high-alarm annunciation. Two control panels are provided with the SAL tank monitoring system. One control panel is located adjacent to the sampling station in Room 32 to control the sampling pump when samples are pulled. A second control panel is located on the operating floor in Room 201, the SAL main operating gallery. Tank status is monitored from the first floor control panel. Because waste solution is generated in a batch mode, waste solution drained to the tank is effectively controlled through operating and administrative procedures in order to prevent high-level-alarm conditions. A safety cutoff system for the tank will shut off all incoming water to the SAL in conjunction with a high-level-alarm condition. A backup tank system was determined to be unnecessary for the SAL operations because of the presence of tank monitoring devices and the use of administrative and operational (batch-processing) controls.

The tank transfer controls provide similar safety features. Once the SAL tank contains sufficient volume, the tank's solution is prepared for transfer to the RLWS. After waste characterization is completed, the transfer to the RLWS is initiated by following internal TSD procedures. Once started, the transfer

continues until a low-level condition automatically stops the transfer pump or until it is stopped by operator action. The solution can be transferred to the RLWS by either the transfer gear pump or by the water jet. Currently, the RLWS piping is a 316L stainless steel single-walled pipeline inside the basement from the SAL tank to the boundary of the 325 Building; once outside the 325 Building, this piping becomes a double-contained pipeline. Once the RLWS modifications are complete, the piping from the SAL tank to the RLWS load out tank will be single-walled 316L stainless steel, while the piping from the RLWS load out tank to the truck lock will be double-walled 316L stainless steel.

4.2.1.4 Marking or Labeling [D-2e]

Due to the high radiation levels associated with the SAL tank, the tank itself is not labeled. The tank is located in a locked room to prevent unnecessary radiation exposure. Access points to the room are labeled to meet the requirements of WAC 173-303-395. The marking of the access points is legible from a distance of 15 meters and identifies 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 tank. The tank also has a written placard identifying important radioactivity, criticality, and hazard concerns.

4.2.1.5 Ignitable, Reactive, and Incompatible Waste [D-2h]

Many different types of samples and waste materials will be brought to the SAL hot cells for analytical or research activities. These samples are accompanied by an internal PNNL documentation form that provides waste characterization information from the sample generating unit. Chemical characterization provided in these forms is based on previous chemical analysis or process knowledge. The hazard potential includes exposure to radiation, corrosive chemicals, and hazardous chemicals. All operations performed in the SAL hot cells are conducted by qualified operators following approved procedures. Typical hot cell analytic processes generate liquid waste that is highly acidic and/or that have a high chloride level. A small quantity of organic waste is generated and segregated prior to treatment or disposal. If heavy metals are present in the liquid waste before neutralization, the metals are precipitated as hydroxides incident to the neutralization and are filtered from the solution. If the chloride content of the liquid is above 0.01 Molar, the chlorides may be removed through silver nitrate precipitation. Therefore, waste solutions are not expected to be ignitable, reactive, or incompatible when transferred to the SAL tank.

The following factors will ensure a safe and reliable tank system with regard to ignitable, reactive, and incompatible waste: the tank system operates at ambient temperatures and pressures; all waste added to the tank meets the RLWS waste acceptance criteria; the tank construction material is stainless steel; and the operators are trained in the applicable procedures and have past operating experience.

4.2.2 Radioactive Liquid Waste System Load Out Tank System

The RLWS load out tank system modification is scheduled to be complete in FY 1998. This tank system will be placed in service prior to closing the 340 Building. Information provided in this permit application is based on information available in the conceptual design phase. Slight modifications to the design may be required as the final design is completed. All design changes will comply with the tank systems regulations in WAC 173-303-640.

The 340 Facility is scheduled for deactivation; therefore, the RLW will be collected and transported to the DSTs via an approved cask system when deactivation occurs. The RLWS load out tank system modifications include installing a tank system in the basement of the 325 Facility to collect radioactive liquid waste rather than directly piping the waste to the 340 Facility. The 325 Facility is expected to

continue to generate approximately 5,678 to 7,570 liters of radioactive liquid waste each year. The tank will sit below the basement floor in a tank pit.

4.2.2.1 Design, Installation, and Assessment of Tank Systems [D-2a]

The following sections discuss the design of the RLWS load out tank system. Information on the integrity assessment will be provided when complete in accordance with WAC 173-303-640 and 810.

4.2.2.1.1 Design Requirements [D-2a(1)]

The RLWS tank will be constructed of 316L stainless steel. This material is compatible with any of the dangerous waste that is discharged to the tank. Waste in the RLWS tank will be treated or reacted, if needed, to protect the tank integrity.

The RLWS load out tank system design will be reviewed by an independent, qualified, registered professional engineer to verify that the strength of the material is adequate and that it can withstand the stress of daily operation before operations begin. The professional engineer evaluation will be included in the tank integrity assessment.

The RLWS tank will be a vertical single-shell tank supported by multiple legs and stand approximately 2.4 meters in height and 2.4 meters in diameter. The tank will have a welded construction of 316L stainless steel and sit approximately 15.2 centimeters above the floor in the tank pit with a formed bottom to minimized a heel in the tank. The tank will be located inside a concrete pit below the basement floor. The tank pit will be lined with a stainless steel liner on the floor and approximately 0.6 meters up the walls to allow for a secondary containment capacity of at least 100% of the tank. Sealant will be placed along the walls at the end of the liner, and the remaining portion of the concrete pit walls will be painted with a chemically resistant coating. A concrete shielding cover will be placed over the pit. A tank control room will be constructed of steel studs and gypsum and located on the west side of the tank pit.

The primary tank control panels will be located in the control room, and secondary control panels will be located in the truck lock, Room 601, Room 201, and in the operator's office. Conductivity probes will be installed in the tank at 305 mm intervals. Signals from the probes will indicate the liquid level in the tank by signal lights on all control panels. Other signals from the conductivity probes will alarm high liquid level by a signal light on each control panel plus sound on the panel in the operator's office.

Liquid waste will enter the RLWS tank through gravity flow piping. A mixing pump system will be installed to provide agitation of the tank contents. Mixing pump system controls will be installed on the control panel in the control room.

Samples will be collected prior to transferring the waste from the RLWS tank to the DST System. A sampling pump and recirculating loop will be installed on the tank. A small sample hood will be located in the control room. Controls for the sample hood will be located near the sample hood. This hood will be connected to the HEPA filtered exhaust system.

4.2.2.1.2 Integrity Assessments [D-2a(2) and D-2a(3)]

An independent, qualified, registered professional engineer's tank integrity certification will be completed and provided to Ecology before the tank system begins operation.

4.2.2.2 Secondary Containment and Release Detection for Tank System [D-2b]

This section describes the secondary containment systems and leak detection systems to be installed in the RLWS load out tank system.

4.2.2.2.1 Requirements for Tank Systems [D-2b(1), D-2b(2)(b), and D-2b(2)(c)]

The secondary containment system for the RLWS tank will consist of the stainless steel liner in the bottom of the concrete tank pit and 0.6 meters up the tank pit walls. The remaining portion of the concrete walls will be painted with a chemically resistant coating and the boundary between the steel liner and the coating will be sealed.

The welded single-walled transfer piping will be visually inspected for leaks within 24 hours of a transfer. The 325 Building provides additional containment. The basement floors are concrete, and any liquid release remains in the immediate area until cleanup.

The transfer piping from the SAL tank to the RLWS tank is single-walled, welded stainless steel pipe. Sections of the RLWS load out tank system piping will have secondary containment where feasible. Secondary containment for the piping system will consist of double-walled stainless steel pipe with sensors in the annulus. Secondary containment piping will be installed on the new line from Room 40A to the RLWS waste tank. Secondary containment piping will also be installed on the line between Room 528 and the RLWS tank and from the RLWS tank to the cask loading station.

4.2.2.2.2 Requirements for Secondary Containment and Leak Detection

The secondary containment has been designed to prevent any migration of waste or accumulated liquid from the tank system to the soil, groundwater, or surface water. The secondary containment system will be able to detect and collect releases of accumulated liquids. Remote television cameras will provide a surveillance system for the tank, ancillary equipment, and general viewing of the tank pit. Viewing screens and controls will be located in the control room. The following is the system description based on conceptual design.

Materials of construction. The tank and components will be constructed of 316L stainless steel; this material is compatible with the aqueous waste being discharged to the tank. The waste has a pH between 7 and 12, and the chloride ion concentration averages less than 0.01 Molar.

Strength of materials. The system design will be reviewed by an independent, qualified, registered professional engineer to verify that the strength of materials is adequate and that the tank can withstand the stress of daily operation before operations begin.

Strength of foundation. The system design will be reviewed by an independent, qualified, registered professional engineer to verify that the strength of the tank mounting and foundation is adequate to withstand the Design Basis Earthquake (DBE) before operations begin. This ensures that the foundation is capable of providing support to the tank and will resist settlement, compression, or uplift.

Leak detection system description. Conductivity probes will be installed inside the single-walled tank to detect the liquid level in the tank. Any leaks from the tank will be collected in the stainless steel lined tank pit. Liquid sensing tape will be installed in the bottom of the tank pit to detect any leak of liquid

from the primary containment. If liquid is detected, alarms will sound immediately in a local control panel and in the operator's room.

Removal of liquids from secondary containment. The tank secondary containment, the lined tank pit, is designed to contain a liquid leak from the tank until provisions can be made to remove the liquid. The liquid might not be removed within 24 hours because of the coordination that must take place in the 325 Building and the DST personnel. A dip tube will be installed in the tank pit that extends from the bottom of the pit to the tank control room and is capped at the top. If liquid were detected in the tank pit, the liquid will be removed by connecting a transfer pump to the dip tube. Any liquid removed from the secondary containment would be transferred to the DSTs in a manner consistent with the transfer of waste from the RLWS tank to the DSTs.

A delay of greater than 24 hours in removing the liquid from the secondary containment poses no threat to human health or the environment, because the waste continues to be contained in the tank pit.

4.2.2.2.3 Secondary Containment and Leak Detection Requirements for Ancillary Equipment

Secondary containment for the RLWS load out tank system ancillary equipment will be provided by the lined tank pit, double-walled piping, and daily visual inspection during use of the entire system including the existing single-walled piping. All material of construction will be stainless steel; for welded parts the material is 316L stainless steel. Stainless steel material is compatible with the expected corrosive, dangerous, and mixed waste stored in the tank. The strength and thickness of the piping, equipment supports and secondary containment are designed to onsite standards that take into account seismic requirements for the region and corrosion protection. The entire system will be located on an existing basement floor built in the 1960s. The 325 Building has proven over time to be of a sound structural integrity to withstand mild earthquake forces. The tank pit has a liquid element sensor that alarms immediately at the main control panel should any leakage be detected. The tank pit will hold the total capacity of the 11,355-liter tank plus any potential process water that also might be released. In the event of an alarm, the process water solenoid valves will become de-energized to the closed position to minimize the loss of additional water.

The 325 Building is staffed or monitored 24 hours a day, 7 days a week. The control system is designed to alarm on any leak/spill or high-level alarm encountered. The personnel responding to the alarm condition will stop or secure the action causing the leak/spill, warn others of the spill, isolate the spill area, and minimize individual contamination and exposure. The spilled or leaked waste will be removed in an expeditious manner according to procedures for cleaning up spills and leaks.

4.2.2.2.4 Controls and Practices to Prevent Spills and Overflows

The RLWS load out tank system has been designed to account for safe and reliable operation to prevent the system from rupturing, leaking, corroding, or otherwise failing. The tank will be provided with redundant-level instrumentation to monitor tank levels. Conductance-level probes will be used for level monitoring and alarming, and a secondary tank level monitoring system will be provided. The tank will alarm on high level and interlock the process water to fail close.

Trained personnel respond to spills by stopping or securing the action causing the spill, notifying others in the area of the spill, and following guidance provided in the 325 Building Emergency Plan and the 325 HWTUs Contingency Plan (Chapter 7.0). Measures are in place to inspect the system daily.

4.2.2.3 Tank Management Practices [D-2d]

The RLWS tank will be installed in an existing pit in the basement, entirely below grade. The top of the tank will be shielded by a concrete deck on top of the pit. The deck will be constructed of multiple stepped cover blocks to simplify installation/removal.

The single wall vertical tank is supported by multiple legs. Secondary containment is provided by lining the lower portion of the tank pit. The stainless steel liner will be sealed to the pit wall, and the wall above the liner will be coated with a chemical-resistant material. The tank will be operated near atmospheric pressure and vented through HEPA filters.

The primary panel in the control room is adjacent to the tank pit. Other Liquid level monitoring panels will be located in Room 601, 325A truck lock, Room 201, Room 527 and the power operator's office. The tank will be monitored with two liquid level instruments, and meters/indicating lights will be provided in all control panels. Several of the panels have high liquid level alarms. These alarms will be audible or visual, depending on location.

There will be a leak detection system for the double walled piping and the tank pit liner. Liquid sensing cable will be connected to alarms in the operator's office. There will be remotely operated TV cameras in the pit to inspect the tank and the liner. These cameras will be viewed by operators when performing the daily inspection of the tank for evidence of corrosion and releases of dangerous waste.

Because liquid waste is generated in a batch mode, waste drained to the RLWS tank will be effectively controlled through operating and administrative procedures in order to prevent high-level-alarm conditions. When there is an alarm, a safety cutoff system will shut off all incoming process water lines.

A backup tank system was determined to be unnecessary because of the presence of tank monitoring devices and the use of administrative and operational (batch-processing) controls.

Liquid waste will be transported from 325 Building to DSTs using the cask system. The 325A truck lock has been modified to handle the cask system. There will be a transfer line with secondary containment in 325 Building between the tank and the truck lock. A pump or other means will be used to transfer the waste from the RLWS tank to the truck lock.

Prior to transferring waste from the RLWS load out tank, responsible personnel will schedule the cask system for a waste transfer. A small quantity of waste will be obtained for characterization using a sample pump and small hood. The cask system will be positioned in the 325A truck lock. Transfer of the waste to the cask system will be performed in accordance with 325 Building and approved cask system procedures.

4.2.2.4 Marking or Labeling [D-2e]

Due to the high radiation levels associated with the RLWS tank, the tank itself will not be labeled. The tank will be located below grade in a sealed pit. Access points to the tank pit will be labeled to meet the requirements of WAC 173-303-395. The marking of the access points will be legible from a distance of 15 meters and identify the waste. The label will adequately warn employees, emergency response personnel, and the public of the major risks associated with the waste being stored within the tank. The tank will also have a written placard identifying important radioactivity, criticality, and hazard concerns.

4.2.2.5 Ignitable, Reactive, and Incompatible Waste [D-2h]

Many different types of samples and waste materials will be brought to the SAL hot cells, and the HWTU. These samples are accompanied by an internal PNNL documentation form that provides waste characterization information from the sample generating unit. Chemical characterization provided in these forms is based on previous chemical analysis or process knowledge. The hazard potential includes exposure to radiation, corrosive/flammable chemicals, and hazardous chemicals.

Prior to transferring wastes to the RLWS system, the wastes are evaluated to ensure compatibility with the system and to preclude introduction of flammable or reactive waste in order to protect the integrity of the new RLWS tank. The RLWS load out tank system will be equipped with treatment capabilities including neutralization and chloride removal. These treatment systems will include chemical additive tanks and a tank agitator.

Based on analytical results and process knowledge of the 325 laboratories generating the waste, treatment of the SAL generated waste prior to discharge, and agitation and treatment capabilities in the RLWS tank, waste solutions are not expected to be ignitable, reactive, or incompatible.

The following factors will ensure a safe and reliable tank system with regard to ignitable, reactive, and incompatible waste: the tank system operates at ambient temperatures and pressures; all waste added to the tank meets the RLWS waste acceptance criteria; the tank construction material is stainless steel; and the operators are trained in the applicable procedures and have past operating experience. Closure of the RLWS tank is addressed in Section 11.4.

4.3 AIR EMISSIONS CONTROL [D-8]

The air emissions standards on 40 CFR 265, Subpart AA and BB, do not apply to any part of the 325 HWTUs. Containers in the 325 HWTUs are primarily managed as mixed waste. Such containers are exempt from 40 CFR 264, Subpart CC by 40 CFR 264.1080(6).

Figure 4-1. Hazardous Waste Treatment Unit Secondary Containment System.

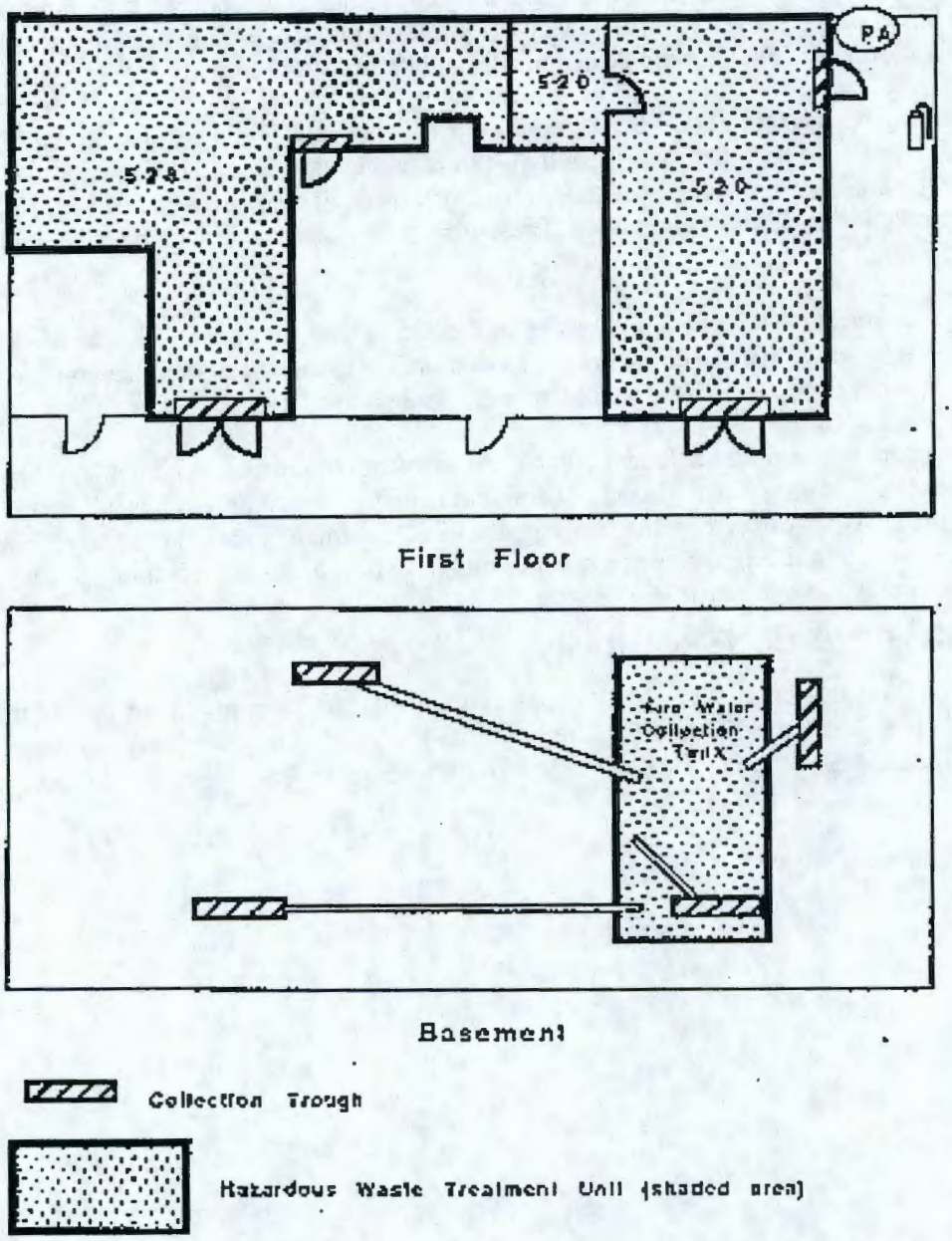

Figure 4-2. Hot Cell Secondary Containment System.

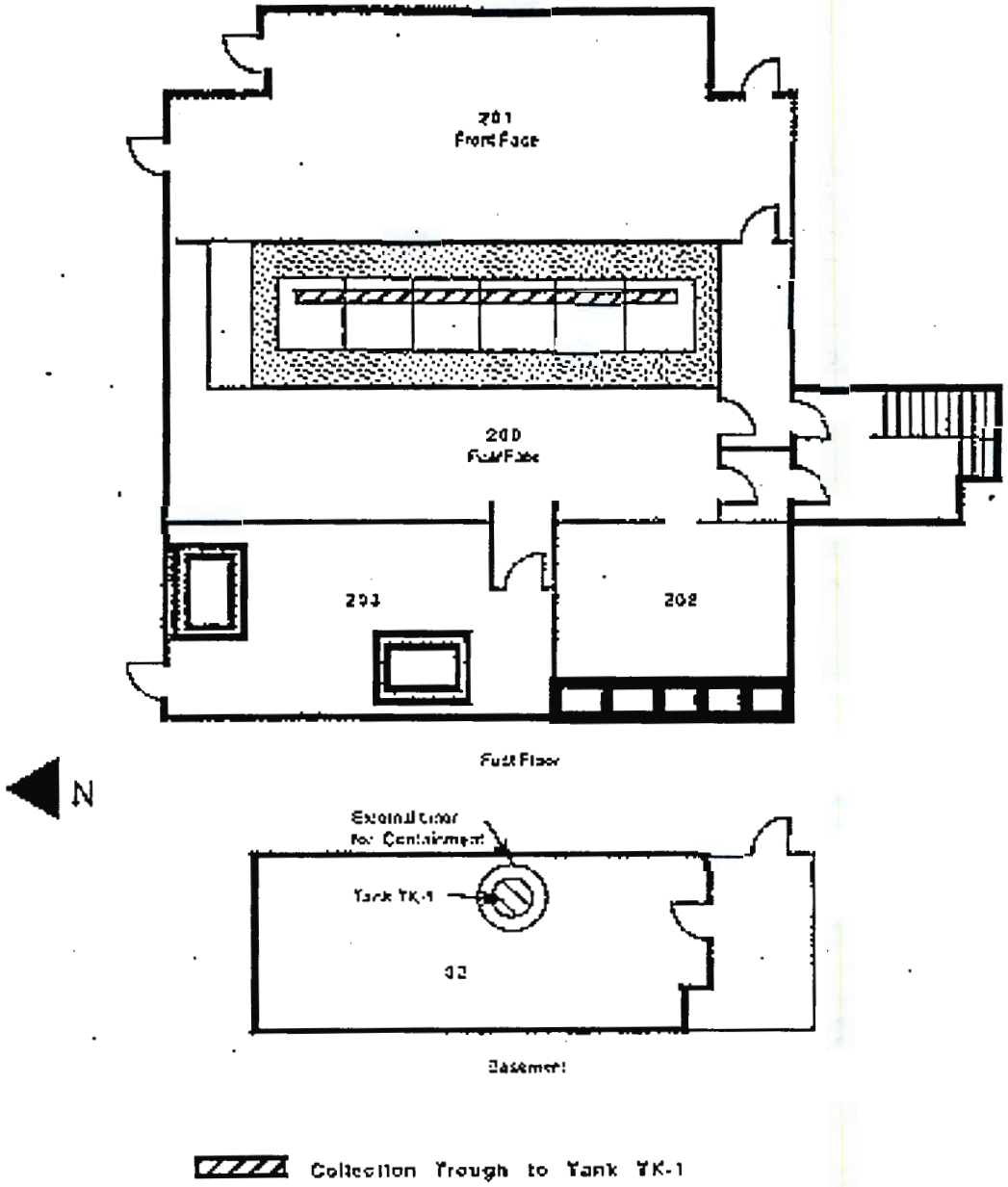

Table 4-1. Typical Storage Containers Used at the 325 Hazardous Waste Treatment Units.

Material of construction	Waste Capacity
Glass container/bottles	1 milliliter to 3.79 liters
Plastic containers/bottles	1 milliliter to 19 liters
Paint cans	0.47 liters to 4.73 liters
Steel containers	114 liters, 322 liters
Plastic-lined steel containers	114 liters, 208 liters
Steel "shielded" 208-liter container	Various nominal capacity depending on necessary shielding; 3.79 liters; 53 liters
Overpack containers	322 liters

APPENDIX 4A

Engineering Drawings

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6.0 PROCEDURES TO PREVENT HAZARDS [F]

The 325 HWTUs are operated to minimize exposure of the general public and operating personnel to dangerous wastes.

6.1 SECURITY [F-1]

The following sections describe the security measures, equipment, and warning signs used to control entry to the 325 HWTUs.

6.1.1 Security Procedures and Equipment [F-1a]

The following sections describe the 24-hour surveillance system, barrier, and warning signs used to provide security and control access to the 325 HWTUs.

6.1.1.1 24-Hour Surveillance System [F-1a(1)]

The entire Hanford Facility is a controlled access area [refer to General Information Portion (DOE/RL-91-28)].

6.1.1.2 Barrier and Means to Control Entry [F-1a(1)(a), (1)(b)]

The entire 300 Area is surrounded by a 2.4-meter chain link fence topped with three strands of barbed wire. There is no separate fence surrounding the 325 Building.

Entry to the 325 Building is indirectly controlled at all entry points to the 300 Area. Both active and passive controls are in place. Trespass warning signs are posted at all entry points. The Hanford Patrol periodically spot checks traffic entering the 300 Area. Entry to the 325 Building is controlled through the use of locked entrances with contact of 325 staff required for building access. The 325 HWTUs also are kept locked at all times. Access and access records to the 325 HWTUs are maintained by PNNL Security. The BED or designee has access to the 325 HWTUs and can provide access in an emergency. Personnel in possession of keys have been instructed to admit only persons having official business. All visitors to the 325 HWTUs must be escorted by HWTUs personnel.

Personnel have pedestrian access to the 325 Building through multiple pedestrian gates. For access, all persons must have a valid U.S. Department of Energy-Richland Operations Office (DOE-RL) security badge or temporary badge with proper escort. There is no general, authorized public access to the 325 Building.

6.1.1.3 Warning Signs [F-1a(2)]

Signs bearing the legend "DANGER--UNAUTHORIZED PERSONNEL KEEP OUT," or an equivalent legend, are posted at each entrance of the 325 HWTUs. The signs are in English, legible from a distance of 7.6 meters, and visible from all angles of approach. In addition to these signs, the fence around the 300 Area is posted with signs, printed in English, warning against unauthorized entry. These signs are also visible from all angles of approach.

6.1.2 Waiver [F-1b]

Waiver of the security procedures and equipment requirements for the 325 HWTUs are not requested. Therefore, the waiver requirement outlined in WAC 173-303-310(1)(a) and (b) are not applicable.

6.2 INSPECTION PLAN [F-2]

The purpose and intent of implementing inspection procedures at the 325 HWTUs are to prevent malfunctions, deterioration, operator errors, and/or discharges that might cause or lead to the release of

regulated waste to the environment or threats to human health. A system of daily, weekly, and monthly, inspections involving various PNNL departments and levels of management has been implemented at the 325 HWTUs. The Hanford Facility 300 Area Fire Department performs a once-every-four months inspection of the fire suppressant and notification systems and annually an inspection of the sprinkler systems.

6.2.1 General Inspection Requirements [F-2a]

The content and frequency of inspections performed at the 325 Building are described in this section. Also described is maintenance of inspection records.

Observations made and deficiencies and corrective actions noted during an inspection are recorded on the inspection checklist. The checklist includes the inspector's printed name, signature, date, and time. Once approved, the checklist is kept in 325 HWTUs files. The inspection records and dates are used to help determine any necessary corrective actions. Problems identified during the inspections are prioritized and addressed in a timely fashion as appropriate to mitigate health risks to workers, and to maintain integrity of waste management units.

6.2.1.1 Types of Problems [F-2a and F-2c]

Daily, weekly, monthly, quarterly, once every four months, and annual inspections are performed at the 325 HWTUs. The types of problems addressed by each of these inspections are described as follows.

Daily Inspections.

The 325 HWTUs staff perform daily inspections whenever waste packaging, transfer, shipping, or movement operations are conducted. HWTU personnel monitor container condition and integrity, the building waste containment system, and other building areas daily where waste is handled. Specific inspection points include, but are not limited, to the following:

- Container integrity
- Mislabeled or opened containers
- Improper storage (e.g., incompatible waste storage)
- Disorderliness or uncleanliness of storage unit
- Accumulation of waste in containment systems.

Results of these daily inspections are documented as part of the 325 HWTUs operating record.

Weekly Inspections.

The 325 HWTUs personnel conduct weekly inspections of both safety and operating equipment in the 325 HWTUs. Safety and emergency equipment are inspected for functionality and adequacy of supply. The weekly inspection usually is conducted on or before the last workday of each week and covers the same inspection points as the daily inspections (Section 6.2.1.1.1). Results of these weekly inspections are documented as a part of the 325 HWTUs operating records.

Monthly Inspections.

Monthly oversight inspections are conducted by 325 HWTU's line management or their designees. These monthly inspections are conducted on or near the last workday of each month. Items targeted for monthly inspections include, but are not limited to, equipment function and condition, housekeeping, chemical inventory, weekly inspections and corresponding corrective actions, safety equipment operation, spill

control and cleanup supplies, and general packaging material inventory. Inspection reports are part of the 325 HWTUs operating records.

Quarterly, Once Every Four Months, and Annual Inspections.

The Hanford Facility 300 Area Fire Department performs a once-every-four-months inspection of fire suppressant and notification systems (i.e., sprinkler system and fire alarm pull boxes). This inspection includes flow tests of the sprinklers to ensure that there is no blockage in the system lines; the alarm system is activated to ensure proper pull box operation. Annually, the Fire Department performs a full inspection of the sprinkler system, smoke detectors, heat detectors, and pull boxes. A complete flow test of the sprinkler system is performed from the furthest valve to ensure proper flow through the entire system. Fire extinguishers also are checked for proper pressure and function. Records of these fire inspections and their results are retained by the Hanford Fire Department.

Additional documented inspections are performed quarterly of the emergency eyewash/shower units, the fume hoods, and other ventilation system components. Records of these safety equipment inspections and the results, as well as documentation of any required corrective actions, are maintained by the appropriate facilities and operations staff.

6.2.1.2 Frequency of Inspections

The frequency of inspections is based on specific regulatory requirements and on the rate of possible deterioration of equipment and probability of environmental or human health incidents.

Areas where dangerous and mixed waste are actively handled, including all of the hot cells, the front and back face of the SAL, Rooms 520 and 528 in the HWTU, and the visible single wall transfer piping associated with the RLWS are considered to be areas subject to spills. These areas are given daily inspections when in use as required by WAC 173-303-320(2)(c).

The primary and secondary containment systems (i.e., floors, troughs, and sumps) are inspected daily when in use for accumulation of spilled material. The containment systems are inspected weekly for structural integrity (i.e., no cracks, gaps, leaks that could result in environmental release of wastes in the event of a spill). This frequency is based on the need to perform timely corrective actions in the event that problems are noted.

Aisle space between containers is inspected weekly when applicable. As the objective of the aisle space requirements is to allow for unobstructed movement of personnel and equipment in case of an emergency, the aisle space requirements do not apply to the hot cells, shielded cubicles, or storage cabinets. If quantities of waste are packaged in large containers or drums, temporarily stored before a transfer, a minimum aisle space of 76 centimeters is maintained in accordance with WAC 173-303-340(3), As-Low-As-Reasonably-Achievable (ALARA) concerns, and with applicable standards of the Uniform Building Code and Life Safety Code. Weekly inspections, where applicable, allow container spacing problems to be identified and corrected.

Emergency and safety equipment and personal protective equipment are inspected weekly. This frequency ensures that this equipment always is functional and is available in adequate supply.

6.2.2 Specific Process Inspection Requirements [F-2d]

The following sections detail the inspections to be performed at the 325 HWTUs.

6.2.2.1 Container Inspection [F-2d(1)]

Dangerous and mixed waste containers stored in the 325 HWTUs are inspected daily where waste handling activities are performed for leakage, evidence of damage or deterioration, proper and legible labeling, and proper lid and bung closure. Any observations made during the inspections, including any repairs or remedial actions taken, are documented in the logbook with the date, time, and printed name and signature of the inspectors. This logbook is maintained in the 325 HWTUs for at least 5 years from the dates of the inspections. All areas subject to spills are inspected daily when in use. Structural integrity of the containment systems is checked weekly.

6.2.2.2 Tank System Inspection [F-2d(2)]

The Shielded Analytical Laboratory (SAL) tank located in Room 32 is used to store mixed waste generated as a result of waste treatment activities. The RLWS load out tank planned to be located in the 325 basement tank pit will be used to store mixed waste discharged to the RLWS from the SAL tank, the HWTU, and slab tanks in Room 40. Routine inspections of the SAL tank system and the RLWS load out tank system are conducted in accordance with WAC 173-303-640. Routine inspections of the RLWS load out tank system will also be conducted in accordance with WAC 173-303-640 once operations begin. Inspections involve a combination of visual, mechanical, and electronic means. Due to ALARA considerations, visual inspections of the tank system may be conducted by remotely operated cameras mounted in Room 32 and the tank pit. These visual inspections are limited to areas of the tank system that can be observed by the camera. A very small portion of an RLWS line associated with the SAL tank system is not directly visible via the camera system, but is inspected indirectly with the camera using a mirror, and during periodic entries into Room 32. A logbook or inspection sheet of all inspections is maintained in the operating record for at least 5 years from the date of the inspection.

Tank System External Corrosion and Releases.

Aboveground portions of the SAL tank and the RLWS load out tank system are inspected each operating day to detect corrosion or releases of waste.

Tank System Construction Material and Surrounding Area.

The SAL tank is double-walled and constructed of corrosion-resistant stainless steel, with a capacity of 1,218 liters. The secondary wall is a cylindrical stainless steel tank that provides secondary containment sufficient to contain 100 percent of the inner tank volume. The construction materials of the tank and the area immediately surrounding the externally accessible portion of the tank system, including the secondary and tertiary containment systems, are inspected during use to detect erosion or signs of releases of mixed waste (e.g., wet spots).

The RLWS tank will be single-walled and constructed of corrosion- resistant stainless steel with a capacity of approximately 11,355 liters. The tank pit will be lined with stainless steel providing secondary containment sufficient to contain a minimum of 100 percent of the tank volume. The stainless steel liner will be sealed to the pit wall, and the wall above the liner will be coated with a chemical-resistant material. The construction materials of the tank and the area immediately surrounding the tank system, including the secondary containment systems, will be inspected by remote cameras during use to detect erosion or signs of releases of mixed waste.

Any deteriorations or malfunctions observed during inspection of the tank systems will be corrected. As applicable, any release to the environment is reported within 24 hours to Ecology, as identified in WAC

173-303-640(7)(d)(ii); and to the National Response Center, as identified in 40 CFR 302 for any detected leaks.

Tank System Overfilling Control Equipment.

The tank controls for the SAL tank include two high-level alarm systems that respond to overfill conditions. The initial tank high-level alarm is activated by a conductivity probe, the second by a capacitance probe. The conductivity probe high-level alarm and associated functions can be tested electrically by depressing a button on the main control panel in Room 201. Activation of this alarm results in a visible red light and audible alarm on the main control panel in Room 201, an alarm condition on the annunciator panel on the second floor of the 325 Building, and closure of electric solenoid valves on all inlet water supply lines to the hot cell area and tank system. Activation of the capacitance probe alarm results in a red light and audible alarm.

The tank controls for the RLWS tank will include conductivity probes that measure the liquid level inside the tank. Liquid sensing cable will also be located in the lined tank pit to detect any liquid in the secondary containment.

Tank System Monitoring and Leak Detection Equipment.

The leak detection conductivity probe for the SAL tank is located between the primary and secondary shells of the double-walled tank. The leak detection probe signal activates if any liquids collect in the annulus between the two walls of the tank. The leak detection probe can be functionally tested electrically by depressing a test button on the main control panel in Room 201. Leaks in the RLWS tank will be detected by liquid sensing cable. Liquid sensing cable will be located in the stainless steel lined tank pit to detect any liquid in the secondary containment that may have leaked from the tank. There will also be a method to test the liquid sensing cable circuits from the control room.

6.2.3 Inspection Log [F-2b]

Copies of the completed inspection checklists are provided to operations personnel and maintained in the 325 HWTUs files. Any corrective actions noted or deterioration or malfunctions in equipment discovered by the inspector are delegated to responsible individuals in the operations group. Corrective actions identified must be completed within 2 weeks unless there is documentation and reason for further delay. Examples of problems that could be identified and the corresponding remedial action are listed in Table 6.1. Inspection reports and corrective action response documentation are retained at the 325 HWTUs for a minimum of 5 years.

6.3 PREPAREDNESS AND PREVENTION REQUIREMENTS [F-3]

The following section documents the preparedness and prevention measures taken at the 325 HWTUs.

6.3.1 Equipment Requirements [F-3a]

The following sections describe the internal and external communications and emergency equipment in use at the 325 HWTUs.

6.3.1.1 Internal Communications [F-3a(1)]

Internal communication systems are used to provide immediate emergency instruction to personnel in the 325 HWTUs. Internal communications address general emergencies that might occur in the 300 Area and the 325 Building, as well as specific emergencies that might occur. Personnel have access to these internal communication devices whenever waste is handled.

Because of the nature of activities that occur in the 300 Area, the potential exists for emergencies outside of the 325 HWTUs (e.g., criticality) that could impact operations and personnel. Fire alarm signals are located in each building throughout the 300 Area. The nearest emergency siren for "area evacuation" and "take cover" is located approximately 46 meters northwest of the 325 Building on top of the 326 Building and is audible in all parts of the 325 Building. Numerous criticality howlers (horns) are located throughout the 325 Building and are audible in all parts of the building.

Internal communications to provide emergency instruction in the event of an emergency in the 325 HWTUs and in the 325 Building are fire alarms, radiation alarms, differential pressure alarms (for the SAL), a differential pressure alarm in the glovebox in Room 528, leak detection alarms (for the SAL), a building-wide public address (PA) system, an intercom system (for the SAL), and telephones.

The fire alarms are used to provide notification for immediate evacuation of the 325 Building. The fire alarms are initiated on activation of the manual pull boxes, heat detectors, and the sprinkler system. Fire alarm pull boxes are located as indicated in Figures 6.1 and 6.2. Radiation and air monitoring systems with alarms are located in the 325 HWTUs. The PA system is used for building-wide broadcasting of verbal emergency instructions to 325 Building personnel. The telephone system is used to provide verbal emergency instructions to 325 HWTUs personnel. The telephones also can be used to verbally transmit emergency information to personnel outside of the 325 HWTUs and to request emergency services. A network of telephones is provided throughout the 325 Building. Locations of telephones within the 325 HWTUs are shown in Figures 6.1 through 6.3. In addition to the telephone communication system, personnel have access to hand-held radios. The radios are available from the Building Manager. All of the radios transmit at the same frequency and are capable of summoning the PNNL Single-Point Contact in case of an emergency (DOE/RL-93-75).

Hazardous Waste Treatment Unit

There are two fire alarm pull boxes in the vicinity of the HWTU; one is located in the hall north of the entrance to Room 528, and one is in the hallway just east of the south entrance to Room 520. Rooms 520 and 528 are provided with smoke detectors that, upon activation, initiate the fire alarm system and close dampers between the two rooms and the corridor. Heat detectors are provided in the glovebox in Room 528. There are two fire alarm bells just outside the HWTU. These fire alarm bells are located north of the entrance to Room 528 in the hall and east of the south entrance to Room 520 in the hall.

Additionally, a fire alarm strobe is installed in Room. The locations of the fire pull boxes are shown in Figure 6.1.

An alpha radiation monitor, located near the glovebox in Room 528, is continually in use. When airborne contaminants or alpha radiation is detected, each of these monitors sounds a local alarm.

The glovebox in Room 528 is equipped with a differential air pressure alarm that monitors the glovebox for loss of negative pressure. If a loss occurs, a local alarm is sounded.

The PA system speakers are located in Rooms 520 and 528.

Shielded Analytical Laboratory

There are four fire alarm pull boxes provided in the SAL; three are in Room 201, and one is in Room 203. Additionally, a fire alarm pull box is located just outside of Room 32. Heat detectors are provided in the

six large interconnected hot cells in the SAL. Several fire alarm bells are located throughout the 325 Building, including two fire alarm bells within the SAL (one each in Rooms 201 and 203). These alarms are audible at all locations within the SAL. The locations of the fire alarm bells are shown in Figure 6.2.

The SAL is equipped with a beta continuous air monitor, which sounds a local alarm if airborne beta contamination is detected outside of the hot cells. Additionally, the SAL is provided with an area radiation monitor. If the radiation level outside of the hot cells reaches a set point, a local alarm sounds to alert personnel.

The six interconnected hot cells in the SAL are equipped with a differential air pressure alarm that monitors the hot cells for loss of negative pressure. If a loss occurs, a local alarm is sounded.

A cable leak-detection system is installed in Room 200. The cable runs behind the back wall of all six hot cells. Liquid escaping from the hot cells on the rear face (Room 200) would contact the cable and automatically sound an alarm device in Room 201. This conductivity cable runs from the hot cells to the tertiary containment pan for the SAL tank in Room 32. Any release of the tank system contents to this pan, which contacts the cable, initiates the cable leak-detection alarm.

The SAL tank is equipped with a conductivity probe for leak detection within the annulus of this double-shelled tank. The tank also is equipped with a high-liquid-level alarm. In the event of an interstitial leak or overfilling, audible alarms sound at the SAL tank's main control panel in Room 201.

The PA system speakers are located in Rooms 200, 201, and 203. An intercommunication system supplies two-way voice communications among Rooms 32, 200, 201, and 201a.

6.3.1.2 External Communications [F-3a(2)]

As mentioned in Section 6.3.1.1, a fire alarm system and telephone network system are in place at the 325 HWTUs. Both systems can be used to summon emergency assistance. The fire alarm system summons direct response from the 300 Area Fire Station. The telephone system can be used to access the PNNL Single-Point Contact directly by dialing 375-2400 or by dialing the emergency number 911. For DOE-RL and other non-PNNL contractor personnel dialing 911 from onsite phones, the call goes directly to the Hanford Patrol, which in turn calls the PNNL Single-Point Contact. Locations of fire alarm pull boxes and telephones are given in Figures 6.1 through 6.3. Personnel on the premises have access to these external communication devices.

6.3.1.3 Emergency Equipment [F-3a(3)]

Emergency equipment available for trained 325 HWTUs personnel includes portable fire extinguishers, a fire suppression system, spill response equipment, and decontamination equipment.

With the exception of the hot cells, the entire building also is equipped with automatic sprinkler protection consisting of Schedule 40 steel pipe per ASTM A120 (ASTM 1991) and 150-pound malleable iron fittings per ANSI B16.3 (ANSI 1992). All components are UL-listed or FM-approved. The fire sprinkler system was designed and installed in accordance with NFPA 13 for "ordinary hazard" (NFPA 1996).

Absorbent pillows are capable of absorbing small quantities of spilled inorganic and organic liquids and can be used to contain temporarily any spills of these materials. Their rated absorption capacities range from 250 to 4,000 milliliters.

Mercury spill kits are capable of cleaning up to 25 milliliter of spilled mercury. Acid, caustic, and solvent spill kits contain the materials necessary to clean up small spills of acids, bases, and organic solvents. The absorbent kits in the SAL contain absorbent pads and other materials needed to temporarily contain and clean up small chemical spills.

The appropriate spill kits can be applied, respectively, to small acid and base spills for neutralization during cleanup efforts. The caustic neutralizer has similar capabilities for neutralizing small quantities of spilled bases. If needed, additional emergency equipment is provided by the Hanford Fire Department.

Hazardous Waste Treatment Unit

Two portable 4.5 kilogram ABC fire extinguishers are available adjacent to the HWTU as shown in Figure 6.1. The portable fire extinguishers are located in the hall between the entrances to Rooms 528 and 520 and in the hall south of the south entrance to Room 520.

Additionally, for decontamination of high levels of radioactivity, an emergency shower is located in Room 601, which is in close proximity to the HWTU. For chemical contamination needs, another emergency shower is located in the hall between the entrances to Rooms 520 and 528 (Figure 6.2). An emergency eye wash is located in Rooms 520 and 528. Any contaminated water will be contained and cleaned up in accordance with the 325 HWTU contingency plan. Effluents are managed via the RPS or RLWS.

Shielded Analytical Laboratory

Four 9.0 kilogram ABC portable fire extinguishers are located in the SAL. Two portable fire extinguishers are located in Room 201, and Rooms 200 and 203 each have one portable fire extinguisher. Additionally, ABC dry chemical fire extinguishers are provided for each of the six large interconnected hot cells in Room 201. These extinguishers are mounted on the outside of each cell with the distribution system within the cells. The cell manipulator arms are used to direct the discharge at a fire within the cell.

Two emergency eye wash/showers are located in Rooms 200 and 201 (Figure 6.2). Any contaminated water will be contained and cleaned up in accordance with the 325 HWTU's contingency plan.

6.3.1.4 Water for Fire Control [F-3a(4)]

Adequate water volume and pressure are supplied by the five water pipelines that service the 325 Building for fire protection. Each of these lines is 15.2 centimeters in diameter.

Three fire hydrants are located in immediate proximity to the 325 Building; one is approximately 30.4 meters east of the southeast corner of the 325 Building; one is approximately 21.3 meters directly north of the northwest corner of the 325 Building, and one is 33.5 meters west of the southwest corner of the 325 Building. In addition, the 300 Area Fire Station is located within 0.4 kilometer of the building.

6.3.2 Aisle Space Requirements [F-3b]

Aisle spacing is sufficient to allow the movement of personnel and fire protection equipment in and around the containers. This storage arrangement also meets the requirements of the National Fire Protection Association and the Life Safety Code (NFPA 1994) for the protection of personnel and the environment. A minimum 76.0-centimeter aisle space is maintained between rows of containers as required by WAC 173-303-630(5)(c).

6.4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT [F-4]

The following sections describe preventive procedures, structures, and equipment.

6.4.1 Unloading Operations [F-4a]

Procedures have been developed to prevent hazards and to minimize the potential for breakage, punctures, or the accidental opening of containers during the transfer of waste to the 325 HWTUs. All waste is inspected before acceptance to ensure that the waste is in appropriate containers and that the containers are in good condition. Inspection of containers before acceptance minimizes the potential for spills during unloading operations. The potential for spills during waste handling also is minimized through the use of appropriate container-handling equipment; small waste items can be unloaded by hand.

The volumes of dangerous waste entering and exiting the SAL are in relatively small containers (Chapter 4.0) and, have double containment because of the packaging requirements for the radioactive materials. Any spill from such containers will be contained and not released to the environment.

6.4.2 Run-off [F-4b]

The HWTU and SAL were designed to eliminate the likelihood of waste migration via run-off. Because the 325 HWTUs are enclosed completely (i.e., complete roof and no open walls), run-off of precipitation is not a factor. The following paragraphs address additional design features provided to eliminate the likelihood of run-off.

Hazardous Waste Treatment Unit

The concrete floor of the HWTU is provided with a chemical-resistant polypropylene coating. The coating covers the entire floor and extends approximately 10 centimeters up on each perimeter wall in each room. The rooms also are provided with floor drains and floor trenches at each entrance. The trenches and floor drains flow into the fire water containment tank located in the basement of the 325 Building. The management of any mixed waste that might accumulate in the tank as a result of a fire is discussed in Chapter 4.0.

Shielded Analytical Laboratory

The secondary containment in the SAL is divided into three systems based on three designated areas of the SAL. These areas are the six large, interconnected hot cells, the front side of the SAL, and the back side of the SAL.

The secondary containment system for the six large, interconnected hot cells involves the use of a pan-type container in which the primary liquid container is placed during an operation. This outer container contains any liquid spill or leak from the primary container during the operation. In addition, the base of the cell is constructed of stainless steel with a 15.2-centimeter-wide by 6.7-centimeter-deep trough that runs continuously along the front face of each of the 1.8-meter cells.

Typically, the use of the secondary containment system is enough to ensure that waste is safely contained. If there were to be a larger scale spill, however, the cell base and trough would collect any spilled waste within the cell. The spills are drained by gravity through drains in the bottom of the trough and stainless steel piping to the SAL tank.

Specially designed, shielded, 208-liter containers are used as the secondary containment system for the back side of the SAL. The back side of the SAL is used to store mainly solid mixed waste in cans, which are packed in the containers. Any liquids stored here, however, are placed in plastic, pan-type containers for secondary containment as previously described.

The secondary containment system for the front side of the SAL, which is only used minimally to store mixed waste, consists of the same practice of using the plastic, pan-type containers described previously.

The secondary containment system for the HWTU and SAL is described in detail in Chapter 4.0.

6.4.3 Water Supplies [F-4c]

The 325 Building is designed and operated to safely contain waste and to prevent any contamination of water supplies. The secondary containment systems, described in Chapter 4.0, prevent releases to the environment and infiltration of waste that could contaminate groundwater. The containment systems also prevent waste run-off that could contaminate surface water. The nearest water supply is the 300 Area water intake located on the Columbia River, which is less than 0.8 kilometers from the 325 HWTUs.

6.4.4 Equipment and Power Failure [F-4d]

The 325 Building is provided with an emergency power system that initiates upon failure of the primary power system, thereby minimizing the likelihood of the release of dangerous waste or mixed waste during a power failure or equipment failure. The 325 HWTUs have emergency lighting systems that operate automatically during power-failure incidents. For actions to be taken in the event of power failure to unit systems or equipment, refer to the contingency plan (Appendix 7A).

6.4.5 Personal Protection Equipment [F-4e]

Protective clothing and equipment are provided to employees during normal and emergency operations. Protection levels for emergency situations are determined in consultation with an industrial hygienist.

During routine operations, the maximum number of personnel working in the SAL is five. Personal protective equipment is required in the front portion of the SAL when working in the fume hood or handling chemicals on the bench top. For personnel working in the back portion of the SAL, the minimum protection requirement is full radiological protective clothing (coveralls, hood, inner and outer gloves, canvas boots, and boot covers). Protective clothing and equipment available at the SAL include, but are not limited to, the following:

<u>Shielded Analytical Laboratory</u>

- safety glasses (Room 201)
- chemical protective suits (Rooms 200 and 201) (part of absorbent kits)
- goggles (Rooms 200 and 201) (part of absorbent kits)
- canner's gloves (Rooms 200 and 201) (part of absorbent kits).

Storage and treatment of dangerous waste can occur in Room 520 and 528 of the HWTU. Personal protective equipment is required for personnel working these areas of the HWTU. Protective clothing and equipment available at the HWTU include, but are not limited to, the following:

<u>Hazardous Waste Treatment Unit</u>

- laboratory (325 Building – Mens/womens change room)
- shoe covers (325 Building – Mens/womens change room)
- surgeon gloves (Rooms 520 and 528)
- chemical-resistant gloves (Rooms 520 and 528)

- chemical-resistant aprons (Rooms 520 and 528)
- face shields (Rooms 520 and 528)
- hard hats (Room 528)
- safety glasses (Rooms 520 and 528).

Personal protective equipment is required for personnel conducting sampling activities associated with the RLWS tank. Sampling activities for the RLWS tank will be conducted in the tank control room. Protective clothing and equipment that will be available at the RLWS tank include, but are not limited to, the following:

Radioactive Liquid Waste System Load Out Tank

- laboratory coats (325 Building – Mens/womens change room)
- shoe covers (325 Building – Mens/womens change room)
- surgeon gloves (Control Room)
- chemical-resistant gloves (Control Room)
- chemical-resistant aprons (Control Room)
- face shields (Control Room)
- hard hats (Control Room)
- safety glasses (Control Room).

The protective equipment storage areas are well stocked at all times. This equipment is replaced periodically as it is used. The above inventory reflects each type of personal protective equipment that typically are present at the 325 HWTUs. Additional radiological and nonradiological personal protective equipment can be obtained, as needed, from storage locations and sources outside of the 325 HWTUs. These areas include the personal protective equipment storage area in the 700 hall men's and women's change rooms, Room 529, and the men's and women's change rooms in the south end (first floor) of the 325 Building. This personal protective equipment also can be obtained from onsite suppliers for the 325 HWTUs.

Respiratory protective equipment (air-purifying, full-face/negative- pressure respirators) that can be used by personnel is managed by the 325 Building Manager and must be checked out. This equipment is stored within the 325 Building. In addition, the 700 hall men's and women's change rooms normally contain a 1-week supply of coveralls, laboratory coats, hoods, skull caps, cloth shoe covers, rubber shoe covers, and gloves (canvas, surgeon's, and canner's).

6.5 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND/OR INCOMPATIBLE WASTES [F-5]

The following sections describe prevention of reaction of ignitable, reactive, and incompatible waste.

6.5.1 Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Waste [F-5a]

The 325 HWTUs are used to store a variety of ignitable waste. Precautions to prevent ignition of ignitable waste involve separation of waste from sources of ignition and use of procedures to minimize the potential for accidental ignition. There are no routine sources of ignition or open flame in the 325 HWTUs. Work with ignition or heat sources, if required, is limited and controlled in the following ways by management and is performed in compliance with internal health and safety procedures for elimination of ignition sources.

- Use of open-flame equipment when working with flammable liquids is prohibited.
- Smoking is prohibited around flammable liquids (no smoking is allowed in the 325 Building).

- Electrical equipment used in flammable or explosive atmospheres is required to comply with the National Electrical Code, NFPA 70.
- Use of equipment with automatic, adjustable temperature controls and high-temperature limit switches is required to prevent overheating.
- Placement of flammable liquids on hot surfaces is prohibited.
- All static electricity sources are required to be grounded in areas where ignitable vapors might be present.
- Bonding of conductive containers is required when transferring flammable liquids.
- Use of nonsparking tools is required in flammable waste storage areas.

All maintenance or modifications in the 325 HWTUs that require work with ignition sources must receive prior approval by a safety engineer. This approval is documented in the operating records for the 325 HWTUs. Smoking is not allowed in the 325 Building at any time, and the interior and exterior of the building are clearly posted with "No Smoking" signs. Waste storage areas are not heated by any radiant heat source. All tools used to open ignitable waste containers are constructed of nonsparking materials.

Ignitable waste storage areas are inspected annually by a fire safety engineer familiar with the Uniform Fire Code. This inspection is documented in the operating records for each of the 325 HWTUs. There also are storage restrictions at the 325 HWTUs for combustible waste as part of fire safety requirements. The storage restrictions defined in the Uniform Building Code for Class B Occupancy apply to the 325 Building (ICBO 1991).

6.5.2 Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Wastes]F-5b]

As described in Section 6.5.1, ignitable waste is managed to protect the waste from sources of ignition or open flame. Ignitable waste containers are maintained in good condition and inspected weekly to minimize the potential for releases that could result in fire. Containers of ignitable waste are protected from high temperatures to prevent the potential for pressurization and buildup of ignitable vapors. Containers of ignitable waste are stored in flammable material storage cabinets within waste storage cells (Chapter 4.0). Limitations on sizes of containers and amount of storage in cabinets are discussed in Chapter 4.0.

Small quantities of reactive waste are accepted for storage in the 325 HWTUs. Information on all reactive and other waste accepted by the HWTU and SAL is documented on a waste tracking form, which is reviewed carefully by personnel before accepting the waste. This form contains information on the unique handling requirements of the waste. Any reactive waste requiring special handling and storage to prevent unwanted reactions is appropriately packaged before arriving at the 325 HWTUs. This packaging safeguards against reactions resulting from air or water contact, shock, and other causes. Reactive waste is handled and stored in a manner commensurate with the specific reaction hazards posed by the waste. This includes segregating the waste from other waste and reagent chemicals with which the waste potentially could react.

Because a wide variety of waste can be accepted at the 325 HWTUs, the potential exists for storage of incompatible waste. Mixing of incompatible waste is prevented through waste segregation and storage procedures. Chemical waste stored in the 325 HWTUs is separated by compatibility and hazard class and stored in separate storage areas. Separate storage shelves and cabinets are used within the storage areas

(Chapter 4.0) to provide further waste segregation. Before accepting unfamiliar waste from generating units, waste management staff determine the Reactivity Group Number per A Method for Determining the Compatibility of Hazardous Wastes (EPA 1980) for each waste so that waste can be stored with compatible materials. The following general guidance is used to segregate and separate chemicals:

- Store acids on a low storage shelf or in acid storage cabinets
- Separate acids from bases and alkaline metals such as potassium or sodium
- Separate oxidizing acids from organic acids and flammable or combustible materials
- Store bases away from acids and store solutions of inorganic hydroxides in polyethylene containers
- Store oxidizers away from flammable or combustible materials and reducing agents such as zinc, alkaline metals, and formic acid
- Store peroxide-forming chemicals in air-tight containers in a dark, cool, and dry place (inside of cabinets)
- Store flammable materials in approved containers or cabinets
- Separate flammable materials from oxidizing acids and oxidizers and keep them away from sources of ignition
- Clearly mark cabinets to identify the hazards associated with their contents.

The potential for waste ignition or reaction at the 325 HWTUs also is minimized through storage restrictions on hazardous materials quantities. The storage restrictions defined in the Uniform Building Code for Class B Occupancy apply to the 325 HWTUs (ICBO 1991). The weekly inspection of the 325 HWTUs includes checking to see if waste inventories are below these limits. These inspections are documented in the operating records that (includes the weekly inspection forms) for each of the 325 HWTUs.

In the unlikely event the fire sprinkler system in Rooms 520 and 528 is activated, the resulting run-off will be contained in the fire water collection tank located in the basement of the 325 Building. This tank is described in detail in Chapter 4.0, Section 4.1.4.1.

6.5.3 Management of Incompatible Wastes in Tank Systems [F-5b(1)

Waste discharged to the SAL tank from the hot cells typically consists of the same type of waste managed in the hot cells. Prior to discharge to the SAL tank, waste may be analyzed for pH, anions, metals, radionuclides, and total organic carbon to determine if the waste meets the waste acceptance criteria for the radioactive liquid waste system (RLWS). Sampling and analysis would be used if sufficient process knowledge is not available to characterize the waste for RLWS waste acceptance criteria purposes. The waste is treated in the SAL tank, if necessary.

Process knowledge will be used when possible for transfers to the RLWS tank from the SAL tank, HWTU, and Room 40. The waste in the RLWS tank will be sampled and treated for pH and chlorine as needed to protect the integrity of the tank. Sampling will be performed before each batch of waste is transferred from the RLWS tank to the DSTs.

6.5.4 Management of Incompatible Wastes in Containers or Tanks [F-5b(2)]

Incompatible waste and other materials are handled as described in Section 6.5.2 and in accordance with established operating methods. Storage restrictions that ensure proper separation of containers of incompatible material in the 325 HWTUs are described in Section 6.5.2.

Ignitable or reactive waste is not placed in the tank systems unless the waste has been treated, rendered, or mixed so that the waste no longer meets the definition of ignitable or reactive waste under WAC 173-303-090 (Chapter 3.0).

The SAL tank and the RLWS tank are located well within all NFPA, state, and local code buffer zone requirements for tanks. The buffer zone around the tanks meets all applicable NFPA, state, and local codes.

Drawings of the 325 HWTUs are available to ensure that ignitable and/or reactive waste is located at least 15 meters from the unit's property line.

Figure 6-1. Locations of Emergency Equipment at the Hazardous Waste Treatment Units

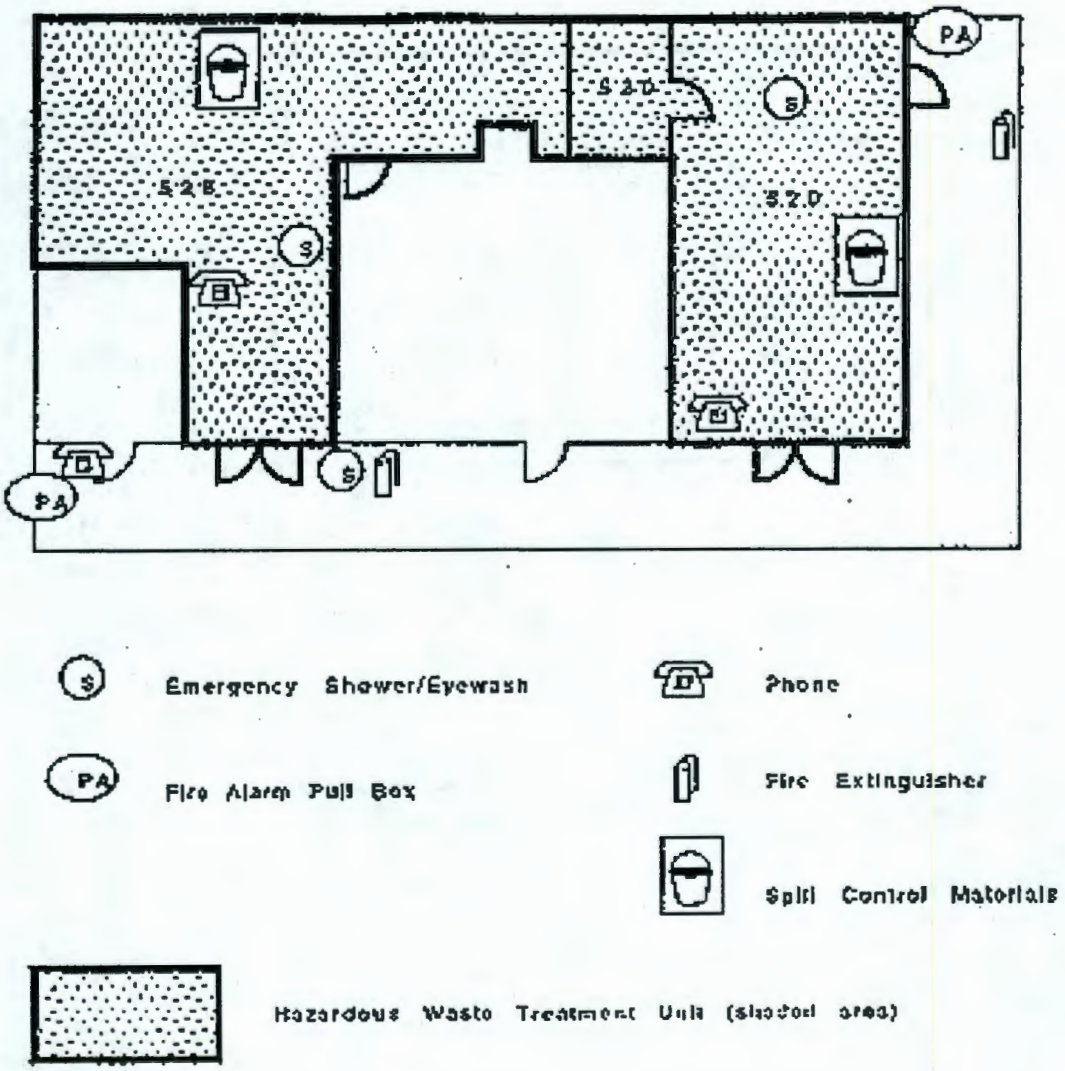

Figure 6-2. Locations of Emergency Equipment at the Shielded Analytical Laboratory (First Floor)

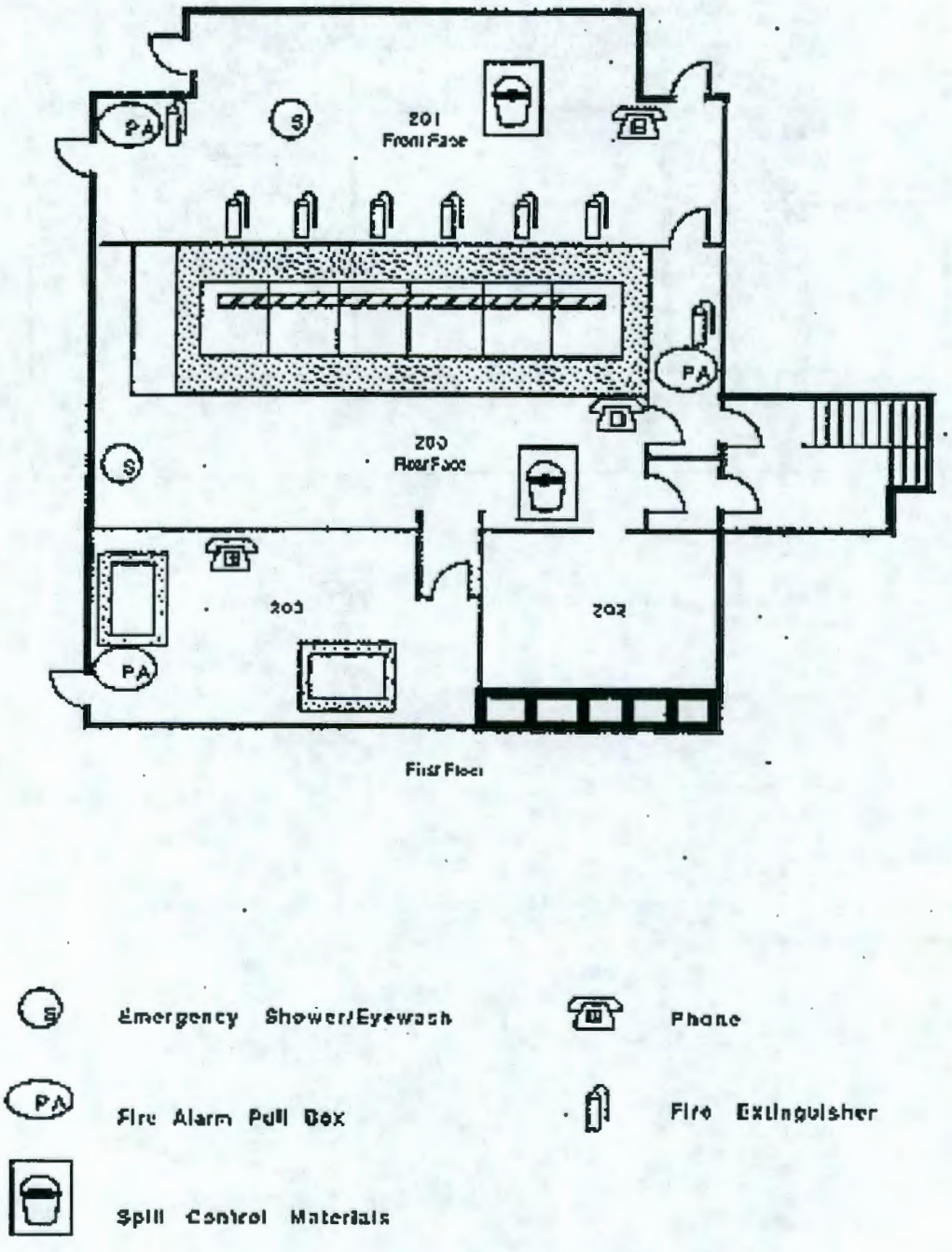

Figure 6-3. Locations of Emergency Equipment at the Shielded Analytical Laboratory (Basement)

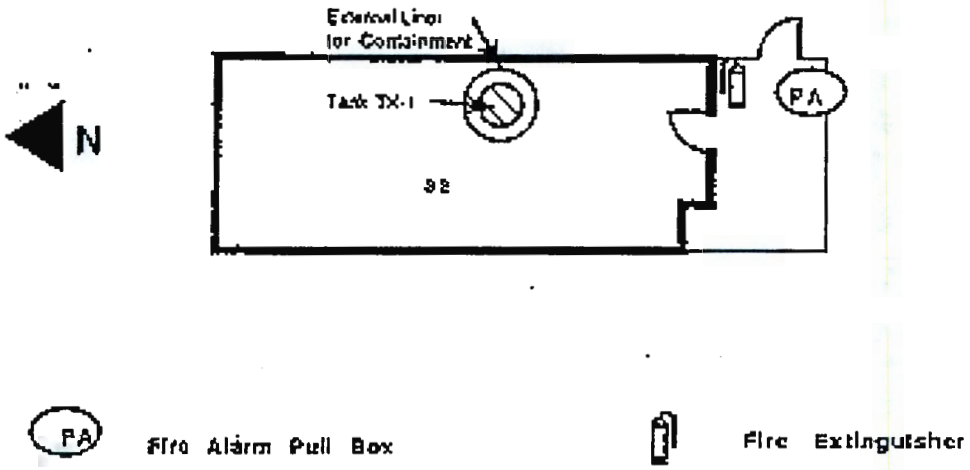

Table 6-1. Remedial Actions for Major Problems

1 Major Problems	Remedial Actions
2 Containment system failures	
3 Cracks in floor of container storage area	Remove containers from area and cease use until cracks are repaired.
4 Cracks in floor of SAL cell liner	Remove containers from area and cease use until cracks are repaired or provide secondary containment for existing containers that hold liquid waste.
5 Leaking container in container storage area	Transfer waste to another container. Clean up spill.
6 Leaking tank or ancillary equipment	For minor leaks or drips, conduct inspection of affected equipment every 12 hours. For major leaks, immediately remove all waste from tank system. Prevent addition of waste to tank system until repaired. Notify Building Emergency Director. Initiate contingency plan if appropriate.
7 Spills	
8 Minor spills in container storage area	Clean up spill according to guidance in the building emergency procedure.
9 Major spills in container storage areas	Notify Building Emergency Director. Initiate contingency plan if appropriate.

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GLOSSARY

ACRONYMS AND INITIALISMS

325 HWTUs	325 Hazardous Waste Treatment Units consists of the HWTU, SAL, and RLWS tank system subunits)
AA	atomic absorption
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
BED	Building Emergency Director
CDRR	Chemical Disposal/Recycle Request
CFR	Code of Federal Regulations
COLIWASA	Composite Liquid-Waste Sampler
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
GC/MS	gas chromatography/mass spectroscopy
HWTU	Hazardous Waste Treatment Unit
ICP	inductively coupled plasma
LDR	land-disposal restriction
MSDS	material safety data sheet
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PNL	Pacific Northwest Laboratory
PNNL	Pacific Northwest National Laboratory (PNL, above, was renamed to Pacific Northwest National Laboratory in October 1995)
QA	quality assurance

QC	quality control
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
SAL	Shielded Analytical Laboratory
TCLP	toxicity characteristic leaching procedure
TSD	treatment, storage, and disposal
UFC	Uniform Fire Code
WAC	Washington Administrative Code

ABBREVIATIONS

Ecology	Washington State Department of Ecology
g	gram
gal	gallon
h	hour
in.	inch
kg	kilogram
psf	pounds per square foot

TERMS

NOTE: Terms in *ITALICS* are defined in this glossary. Terms in underline indicate the source of the definition.

Acceptable Knowledge
Information collected by the *generator* to meet waste-management requirements and determined to be adequate by the *TSD unit*. According to EPA, the *generator* may use *process knowledge*, *waste-analysis* data, and records of *analysis* performed before the *effective date of regulation* (EPA 1994, page 1-11 and 1-12). *Process knowledge* is acceptable for assigning appropriate waste codes.

Analysis
The process that the *generator* completes to *characterize* the waste properly. This *analysis* must provide the information necessary to manage the waste in accordance with the requirements of WAC 173-303. The *analysis* may include or consist of a review of existing published or documented data on the [dangerous] waste, or on waste generated from similar processes, or data obtained by testing, if necessary. The information must include detailed information pertaining to the chemical, physical, and/or biological nature of a [dangerous] waste, or nondangerous wastes if applicable under WAC 173-303-610(4)(d) [WAC 173-303-300(2)].

Bulk Waste Stream
Large volumes of homogeneous waste from a single generating event, e.g., soil remediation from a single location.

Certification
See *LDR Certification*

Characterize (characterization)
The steps the *generator* or *TSD unit* takes to describe the contents of the waste to ensure proper management adequately and accurately. This *characterization* information is required to provide for compliant treatment, storage, or disposal of a dangerous waste and includes waste *designation*, *TSD unit waste-acceptance criteria*, or *land-disposal restriction* information (to facilitate discussions on *characterization*, we use the terms "*characterize for storage*," "*characterize for treatment*," or "*characterize for disposal*?) (WG 1996).

Characterize for Disposal
The minimum information required to demonstrate that a waste was not LDR or no longer LDR. This information consists of analytical data as described in the federal regulations (i.e., 40 CFR 268), which demonstrate the waste meets any concentration-based standards. To demonstrate that a specified technology was used to meet federal treatment standards (i.e., 40 CFR 268.42 or 268.45), *acceptable knowledge* must be obtained from the *customer* or by the *disposal unit*. For state-only *land-disposal restrictions*, the *disposal unit* will either test the waste, use *process knowledge*, or the two to confirm that the *customer* properly treated the waste, if applicable, to state *land disposal restriction* standards (Ecology 1997). Information must also be provided to demonstrate that the waste meets the operational parameters of the disposal facility, such as liner compatibility information (WG 1996).

Characterize for Storage
At a minimum, the information necessary to manage the waste appropriately at a TSD *storage unit*. *Acceptable knowledge* may be required for any operational parameters of the *TSD unit*, TSCA information (i.e., regulated for PCBs), and characteristics which may present a management concern (i.e., waste regulated for ignitability, corrosivity, and/or reactivity) (WG 1996).

Characterize for Treatment
The minimum information for a waste to be shipped to a *treatment unit* and successfully treated. This includes a complete *designation*, *land-disposal restriction* determination information including underlying hazardous constituent information (if applicable), and *treatment unit* operational parameters (WG 1996).

Confirm (confirmation)
The *confirmation* process includes completing appropriate *pre-shipment review* and *verification* steps and/or parameters. The requirement to confirm appears twice in WAC 173-303-300 and applies to two different scenarios.

Scenario 1: The process that an owner or operator uses to ensure knowledge supplied by the *generator* or *TSD unit* is *acceptable knowledge* to ensure that the waste is managed properly [WAC 173-303-300(1)].

Scenario 2: The process that a facility owner or operator receiving off-site facility shipments uses to determine, by *analysis* if necessary, that each waste received at the *facility* matches the identity of the waste specified on the accompanying manifest or shipping paper [WAC 173-303-300(3)].

Conformance Issue
Any issue which, if left unresolved, prevents acceptance of waste. This includes *manifest discrepancies* and *inconsistencies* (WG 1996).

Container Failure
A waste container for which a *manifest discrepancy* has been identified (WG 1996).

Container Receipt Inspection
The process a *TSD unit* uses to examine an incoming container and will include, but is not limited to, inspecting labels, checking the condition of the container, checking the piece count of the shipment, and checking the shipping papers associated with the container (WG 1996).

Corroborative Testing
Sampling and analysis performed by both the treater and disposer of an LDR waste to meet federal *land-disposal restriction* concentration-based treatment standards. The frequency of testing is determined on a case-by-case basis by the permit writer (55 FR 22669 and WG 1996).

Customer
The *generator* or *TSD unit* who ships waste to another *TSD unit*, the current custodian of the waste (WG 1996).

Designation
The process of determining if a solid waste is a mixed waste, resulting in the assignment of proper federal and state waste codes (WG 1996).

Disposal Unit
A *TSD unit* on the *Hanford Facility* permitted to dispose of mixed waste that meets all applicable state-only and federal *land disposal restrictions* (i.e., Low-Level Burial Grounds) (WG 1996).

Effective Date of Regulation
The date when mixed waste became subject to regulation in Washington State (August 19, 1987) (DOE-RL 1996; Ecology 1996; and EPA 1987).

Equivalent Test Method
A laboratory- or field-testing method used to determine characteristics or composition of a waste that has been approved by Ecology in accordance with WAC 173-303 rule-making procedures, in lieu of using a laboratory- or field-testing method required by regulation. A *generator* or owner/operator must submit a rule-making petition to Ecology in accordance with WAC 173-303-110(5) and WAC 173-303-910(2) (Ecology 1995a, comment 181 and 182).

Facility
All contiguous land, structures, other appurtenances, and improvements on the land used for recycling, reusing, reclaiming, transferring, storing, treating, or disposing of [dangerous] waste. The legal and physical description of the *Hanford Facility* is set forth in Attachment 2 of the Hanford Facility RCRA permit (Ecology 1995b, page 10 of 91).

Fingerprint Analysis
Sampling and analysis of several key chemical and physical parameters of a waste to substantiate or *verify* the composition of a waste as determined previously during *characterization*. *Fingerprint analysis* typically is used by *generators* to substantiate waste *characterization* of frequently generated wastes. *TSD units* may use *fingerprint analysis* for *verification*. Parameters for *sampling and analysis* may be a subset of the parameters used during *characterization*, or they may be parameters that are not normally present in the waste to *verify* the absence of certain constituents (WG 1996).

General Waste Stream
Waste from a single *customer* and Waste-Management Group. (See Attachment C for a discussion of "General Waste Streams") (WG 1996).

Generator
Any person, by site, whose act or process produces [dangerous] waste or whose act first causes a [dangerous] waste to become subject to regulation (WAC 173-303-040). The *generator* on the *Hanford Facility* is the U.S. Department of Energy Richland Operations Office and its contractors. A *generator* may accumulate (store or treat) a dangerous waste under the provisions in WAC 173-303-170 and -200.

Hanford Facility
See *Facility*.

Inconsistencies
Any other discrepancies which are not *manifest discrepancies* (WG 1996).

Independent Authorized Agent
A group or organization that is functionally independent from the waste-generating function (WG 1996).

Land-Disposal Restrictions (federal)
Federal requirements pertaining to dangerous wastes *designated* under 40 CFR Part 261 that were generated on or after the *effective date of regulation* (WG 1996). State-only dangerous wastes are not subject to the federal *LDR* requirements (Ecology 1994a).

Land-Disposal Restrictions (state-only)
State-only mixed-waste requirements pertaining to dangerous waste *designated* solely under WAC 173-303 and not 40 CFR 261 that were generated on or after the *effective date of regulation* (Ecology 1994a).

LDR Certification
A written statement of professional opinion and intent signed by an authorized representative that acknowledges an owner's or operator's and/or *generator's* compliance with applicable LDR requirements (EPA 1994, page F-1).

Manifest Discrepancy
Significant discrepancies between the quantity or type of the dangerous waste designated on the manifest or shipping paper and the quantity or type of dangerous waste a facility actually receives (WAC 173-303-370(4)(a).

Pre-Shipment Review
The process used by the *TSD unit* to obtain and evaluate the *generator's analysis* of waste to be received by the *TSD unit* and to document *acceptable knowledge* on the *waste profile* (WG 1996).

Process Knowledge
Knowledge the *generator* applies to a solid waste to determine if it is a [dangerous] waste in light of the materials or the process used when such knowledge can be demonstrated to be sufficient for determining whether a solid waste is *designated* properly (WAC 173-303-070(3)(c)(ii)). *Process knowledge* includes information on wastes obtained from existing published or documented *waste-analysis* data or studies conducted on [mixed] wastes generated by processes similar to that which generated the waste (EPA 1994, page 1-11). *Process knowledge* for dangerous waste may also include information obtained from surrogate material (NRC/EPA 1992, Section II(b) Characteristic Wastes).

QA/QC
Quality assurance (QA) is the process for ensuring that all data and the decisions based on that data are technically sound, statistically valid, and properly documented. Quality control (QC) procedures are the tools employed to measure the degree to which these quality-assurance objectives are fulfilled (EPA 1994, page 2-33).

Re-Characterization
A process which occurs when an unsafe condition arises and/or when a waste is removed from a *storage unit* to meet acceptance criteria for the receiving *treatment unit* or *disposal unit* (WG 1996).

Repeat and Review Frequency
The frequency specified in a WAP on a *TSD-unit* basis that the owner/operator will ensure the knowledge maintained on a specific *waste stream* is still *acceptable knowledge* and/or adequate *analysis*. *Repeat and review frequency* provisions do not apply to *corroborative testing* (WG 1996).

Sampling and Analysis (Sampling and Laboratory Analysis)
The process of obtaining a representative sample(s) from a dangerous waste to determine the accuracy of characteristics or composition of the sample through laboratory or field testing (WG 1996).

Shipment Failure
A maximum of two *container failures* within the first verification sample set or combined first and second verification sample set. If only one container fails, it is considered an anomaly and corrected. It is understood that if the shipment consists of one or two drums, the shipment fails if one drum fails *verification* (WG 1996).

Significant Discrepancy
A discrepancy with regard to a manifest or shipping paper means a discrepancy between the quantity or type of dangerous waste *designated* on the manifest or shipping paper and the quantity or type of dangerous waste a *TSD unit* actually receives. A significant discrepancy in quantity is a variation greater than ten (10) percent in weight for bulk quantities (e.g., tanker trucks, railroad tank cars, etc.) or any variation in piece count for nonbulk quantities (i.e., any missing container or package would be a significant discrepancy). A significant discrepancy in type is an obvious physical or chemical difference which can be discovered by inspection or *waste analysis* (e.g., waste solvent substituted for waste acid) (Ecology 1995b, page 11 of 91). This also includes a discrepancy in the number of inner containers in a labpack (WG 1996).

Storage Unit
A *TSD unit* on the *Hanford Facility* permitted to store dangerous waste (WG 1996).

Treatment Unit
A *TSD unit* on the *Hanford Facility* permitted to treat dangerous waste (WG 1996).

TSD Unit
See *Unit*.

Unit
The term "*unit*" (or *TSD unit*), as used in Parts I through VI of the *Hanford Facility* RCRA permit, means the contiguous area of land on or in which dangerous waste is placed, or the largest area where there is a significant likelihood of mixing dangerous-waste constituents in the same area. A *TSD unit*, for the purposes of this Permit, is a subgroup of the *Facility* which has been identified in the Hanford Facility Dangerous Waste Part A Permit Application Form 3 (Ecology 1995b, page 11 of 91).

Verify (Verification)
An assessment the receiving *TSD unit* performs to substantiate the *analysis* acquired by the *TSD unit* before acceptance. *Verification* must be performed by *TSD unit* personnel or an authorized agent on wastes received by the *TSD unit*. *Verification* may occur at the receiving *TSD unit* or at the *generator's* location, depending on many dangerous-waste shipment and packaging configuration factors. *Verification* activities include *container receipt inspection*, and as applicable, physical screening (which may include radiological methods), and/or chemical *screening/fingerprint analysis* (WG 1996).

Waste-Acceptance Criteria
The minimum requirements imposed by a *TSD unit* to ensure that a dangerous waste is managed properly (WG 1996).

Waste Analysis
See *Analysis*.

Waste Profile

A mechanism used by the receiving *TSD unit* to document the *generator's acceptable knowledge* to meet the owner or operator's *analysis* obligation in WAC 173-303-300(2). Example forms or documents typically used by the *TSD unit* to maintain *analysis* information are included in the WAP as attachments. For offsite facilities, the waste profile will include the *waste analysis* which dangerous-waste *generators* have agreed to supply in accordance with WAC 173-303-300(5)(g) (WG 1996).

Waste Stream

"Per" or "each" *waste stream* refers to individual *waste streams*, each with an individual *point of generation*. Individual *waste streams* include wastes that are physically or chemically different from each other; wastes that are generated from different types of processes; and wastes that are the same type, but are generated at different points along the same process or at different process locations (Ecology 1994b, page 2). For information, the *Hanford Facility* uses the following factors in determining a *waste stream*: (1) the Department of Transportation requirements pertaining to the waste materials; (2) the waste *designation* of the waste materials; (3) the order of events pertaining to the process which generates the waste materials, (4) impermissible dilution concerns based on WAC 173-303-150 and 40 CFR 268.3; and (5) any future treatment- and disposal-management pathways available to the waste materials (WG 1996).

METRIC CONVERSION CHART

The following conversion chart is provided to the reader as a tool to aid in conversion.

If you know	Multiply by	to get	If you know	Multiply by	to get
Length			**Length**		
Inches	25.40	Millimeters	Millimeters	0.0393	inches
Inches	2.54	Centimeters	Centimeters	0.393	inches
Feet	0.3048	Meters	Meters	3.2808	feet
Yards	0.914	Meters	Meters	1.09	yards
Miles	1.609	Kilometers	Kilometers	0.62	miles
Area			**Area**		
Square inches	6.4516	square centimeters	square centimeters	0.155	square inches
Square feet	0.092	square meters	square meters	10.7639	square feet
Square yards	0.836	square meters	square meters	1.20	square yards
Square miles	2.59	square kilometers	square kilometers	0.39	square miles
Acres	0.404	Hectares	Hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
Ounces	28.35	Grams	Grams	0.0352	ounces
Pounds	0.453	Kilograms	Kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			**Volume**		
fluid ounces	29.57	Milliliters	Milliliters	0.03	fluid ounces
Quarts	0.95	Liters	Liters	1.057	quarts
Gallons	3.79	Liters	Liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE, Second Ed., 1990, Professional Publications, Inc., Belmont, California.

325 HAZARDOUS WASTE TREATMENT UNITS WASTE ANALYSIS PLAN

1.0 UNIT DESCRIPTION

The 325 Hazardous Waste Treatment Units (325 HWTUs) are part of the Unit-Specific Portion of the Hanford Facility Dangerous Waste Permit Application, which reflects the organization of the Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit, WA7890008967.

The 325 HWTUs consist of three units, all within the 325 Building, located in the 300 Area on the Hanford Facility (Figure 1.1). Chapter 2 of the 325 HWTUs Part B Permit Application provides detailed location information.

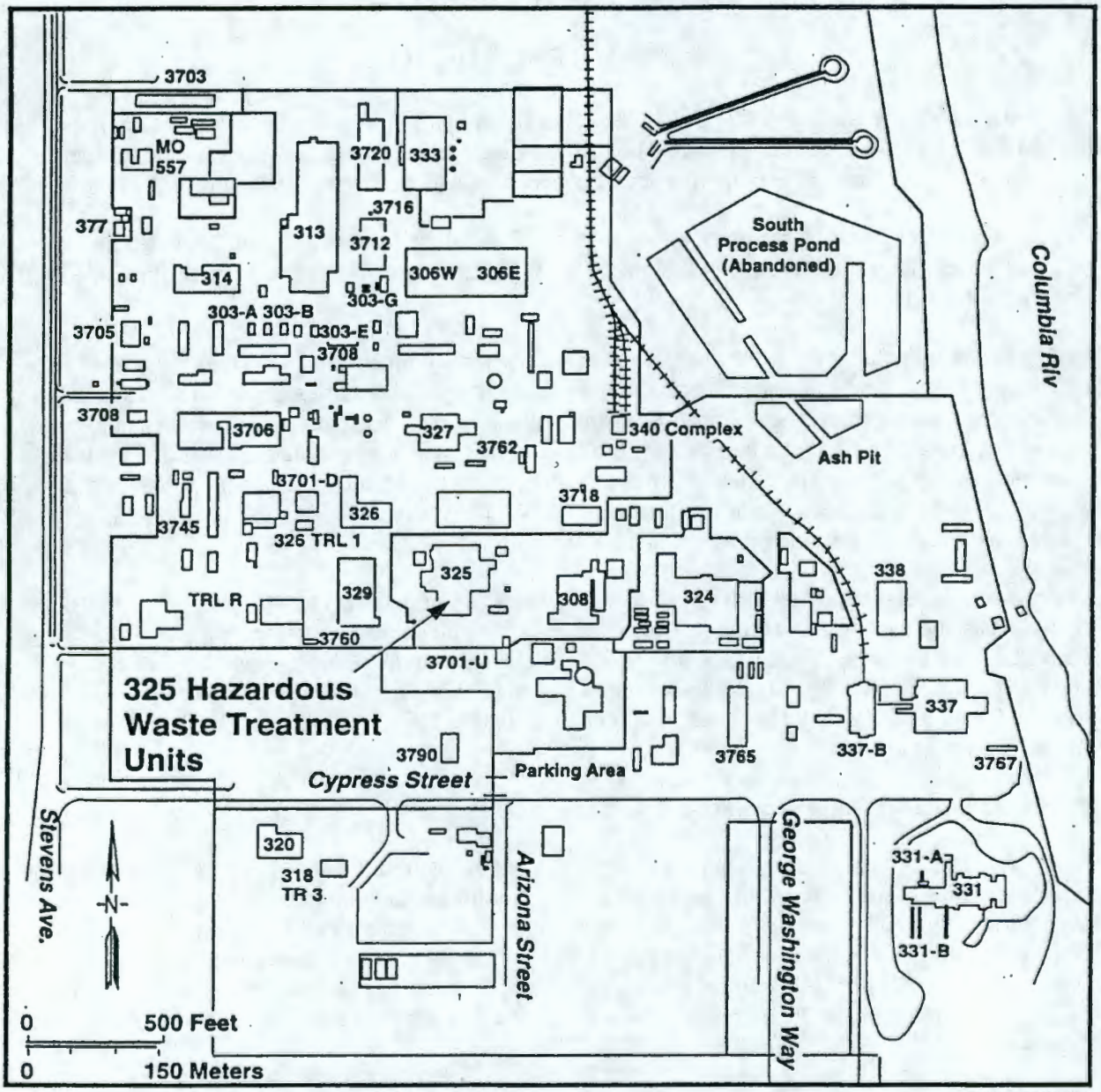
The 325 Building includes the following: (1) a central portion (completed in 1953) that consists of three floors (basement, ground, and second) containing general-purpose laboratories, provided with special ventilation and work enclosures, designed for radiochemical work; (2) a south (front) wing containing office space, locker rooms, and a lunch room; and (3) east and west wings containing shielded enclosures with remote manipulators. The Shielded Analytical Laboratory (SAL) is located in Rooms 32, 200, 201, 202, and 203. The Hazardous Waste Treatment Unit (HWTU) is located in Rooms 520, and 528. Figures 1.2 through 1.5 provide drawings of the TSD units.

The fire water-collection tank, which serves rooms 520 and 528 of the HWTU, is located beneath Room 520 in the basement of the 325 Building. The rectangular tank measures 1.65 meters by 2.25 meters by 1.92 meters, and has a 22,710-liter capacity. The sides and floor of the tank are constructed of epoxy-coated carbon-steel plate. The steel sides and floor provide support for the chemical-resistant polypropylene liner. The tank is secured to the concrete floor of the 325 Building with 1.3-centimeter bolts at 1.82-meter intervals.

1.1 Description Of Unit Processes And Activities

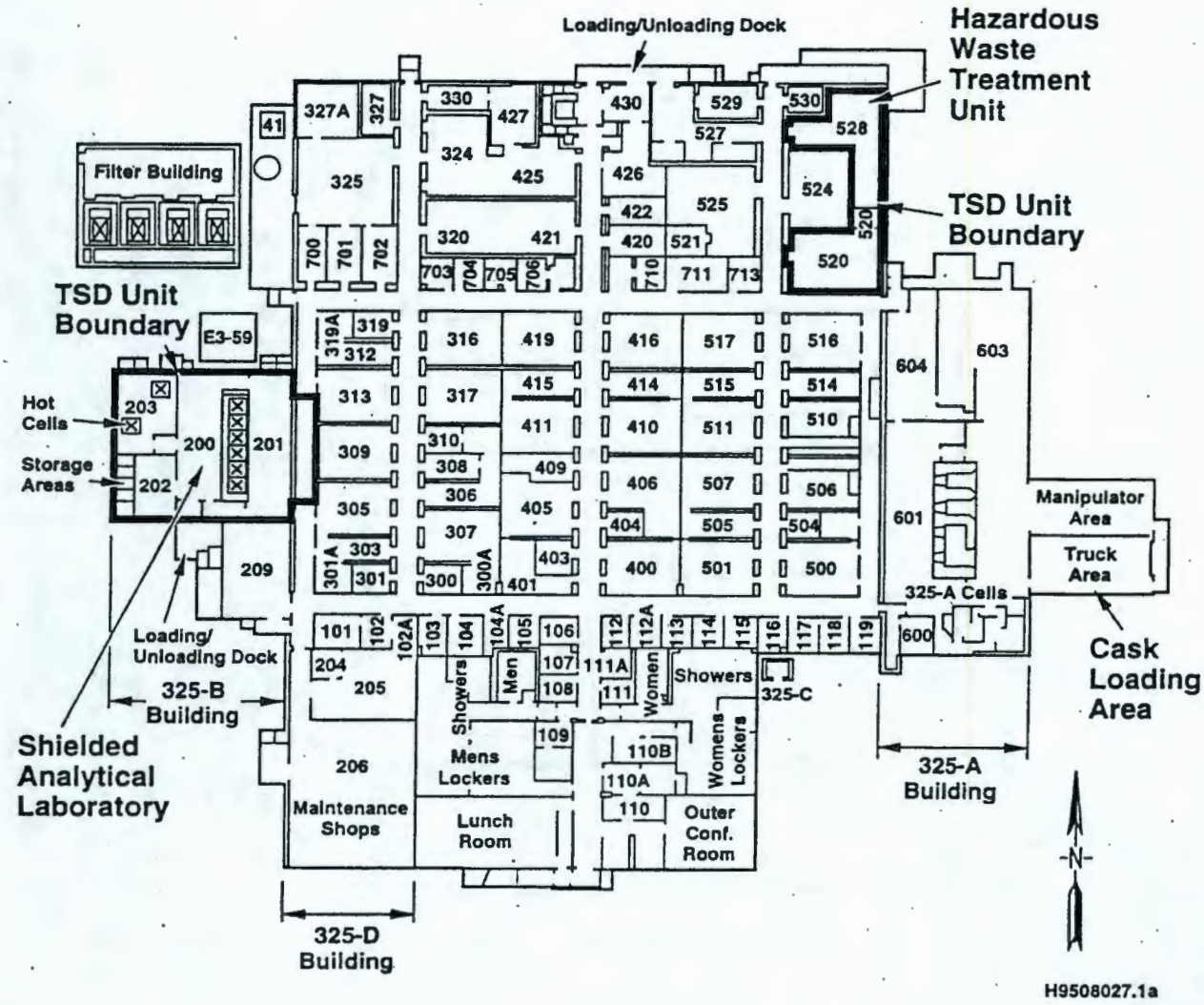
The 325 HWTUs store and treat dangerous waste generated by Hanford Facility programs (primarily from research activities in the 325 Building and other Pacific Northwest National Laboratory [PNNL] facilities) and potentially from other onsite/offsite laboratories. Storage in containers and bench- or small-scale treatment of dangerous waste occur in both the HWTU and the SAL. As described in further detail in Chapter 4.0 of the 325 HWTUs Part B Permit Application, containers are managed in accordance with Washington Administrative Code (WAC) 173-303-630; the SAL tank is managed and operated in accordance with WAC 173-303-640.

Figure 1-1. Drawings of the TSD Units



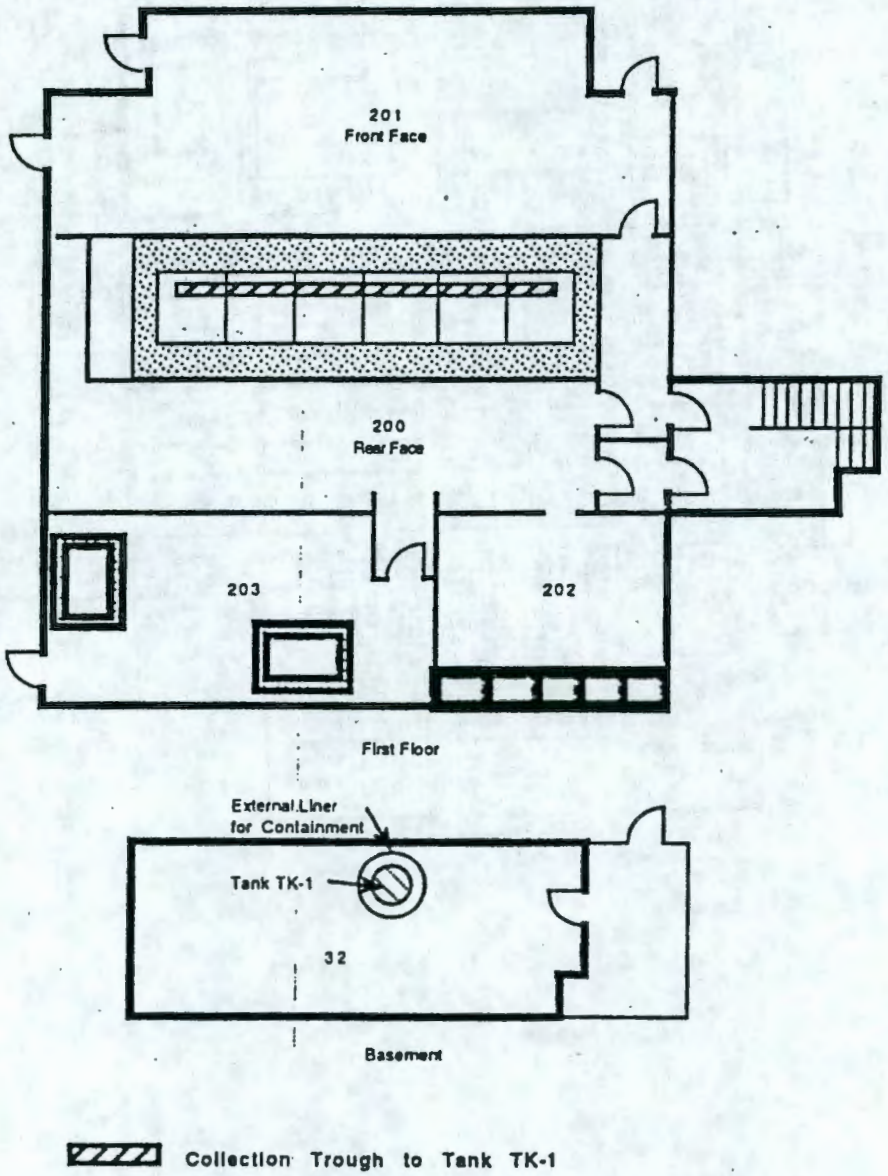
SG97030295.4

Figure 1-2. Drawings of the TSD Units



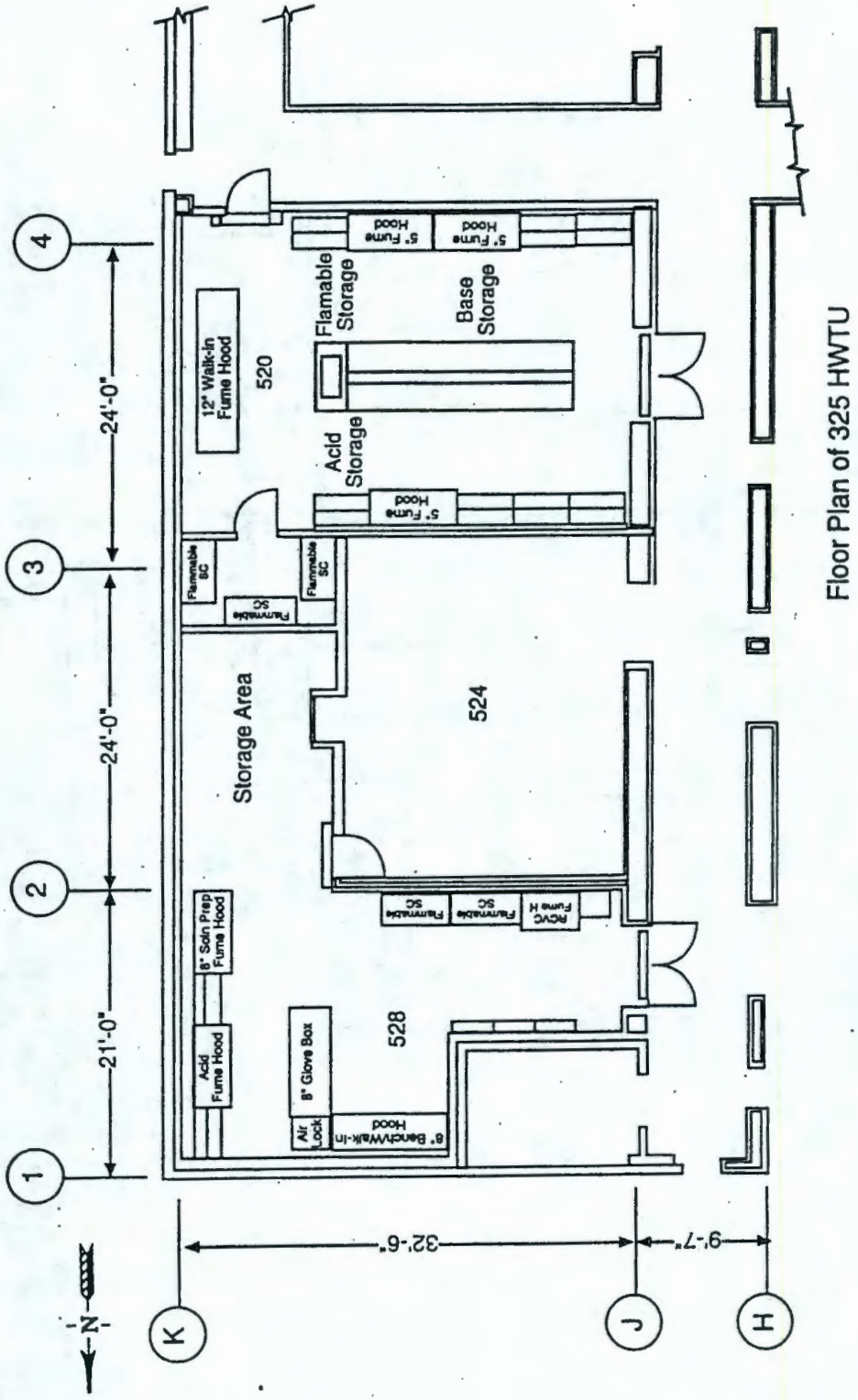
1

Figure 1-3. Floor Plan of SAL

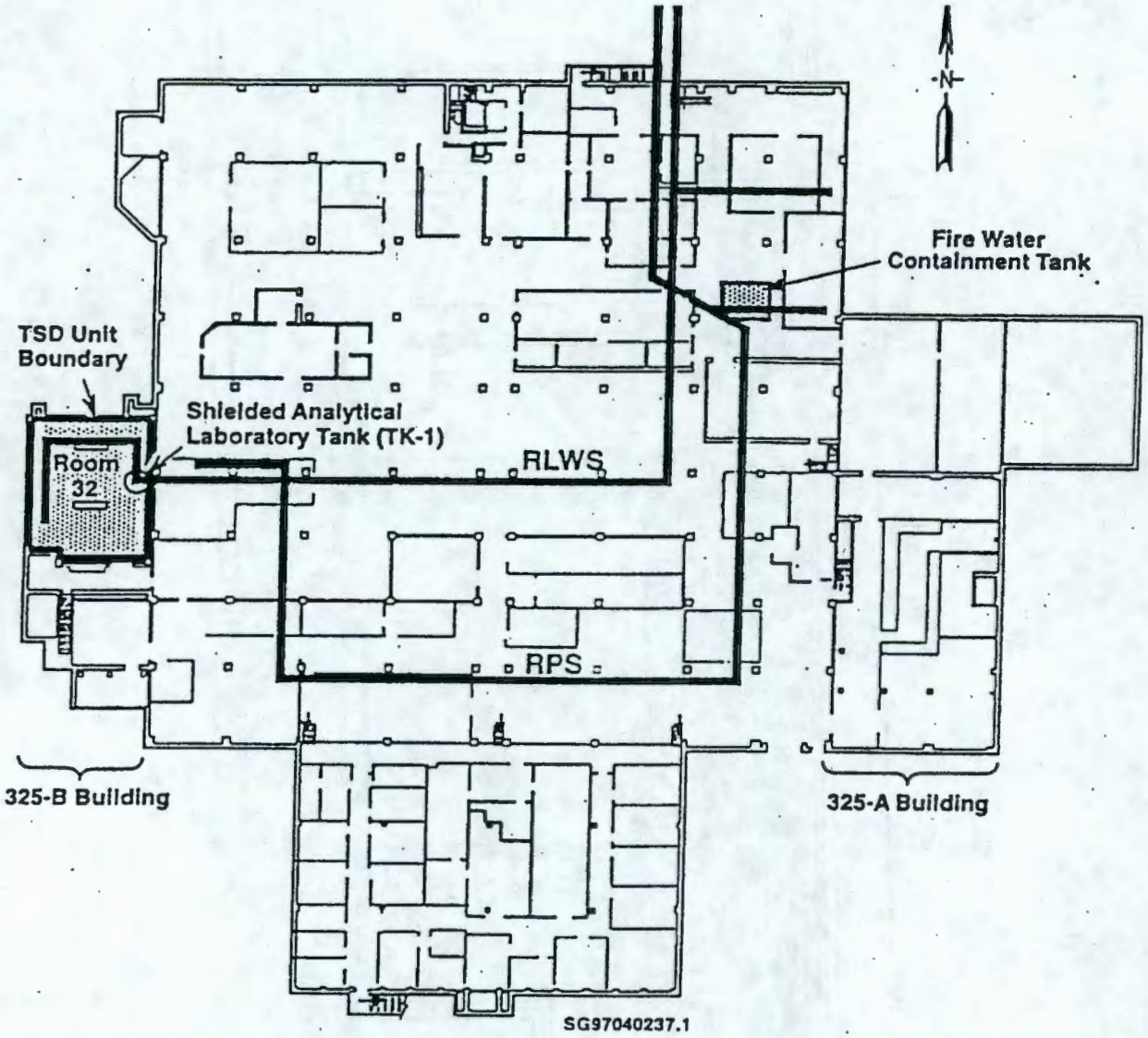


1

Figure 1-4. Drawings of the TSD Units

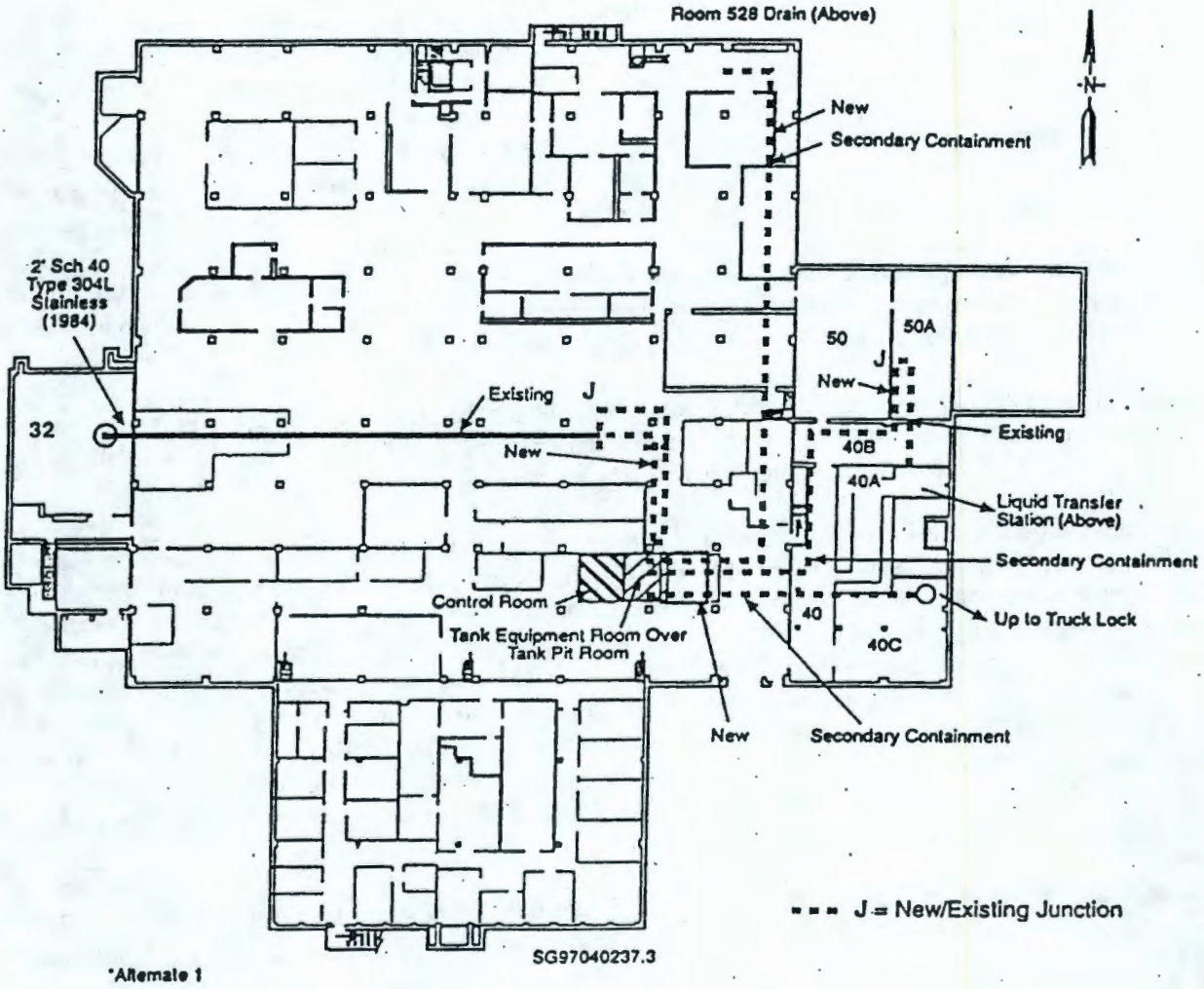


1 **Figure 1-5. Location of 325 HWTUs: Basement Areas**



1

Figure 1-6. 325 RLWS Modifications



Basement Plan

At the SAL, dangerous waste liquid is stored in a tank in Room 32. This dangerous waste, along with contributions from the HWTU, currently is discharged to the 340 Building via the RLWS. Because of the scheduled deactivation of the 340 Building, a modification to the existing 325 RLWS system is required. As part of this modification, dangerous waste will be collected, stored, and possibly treated in a tank before being transported to the double-shell tank system. This modified system will be referred to as the ?RLWS load-out tank system.? Waste from the RLWS load-out tank system will be transferred to the truck lock where the waste will be transported to the double-shell tank via a shielded-cask trailer system. Two stretches of piping from the existing RLWS system that are associated with the HWTU will not be used in the modified system. As discussed in Chapter 11 of the 325 HWTUs Part B Permit Application, these lines will be capped in place and closed during final closure activities of the RLWS load-out tank system.

Before receipt or acceptance of waste at the 325 HWTUs, the generator must supply adequate information to characterize and manage the waste properly. The information may include waste-characterization data, waste volume, container information, and process information.

If the material safety data sheets (MSDS), laboratory reagent, process knowledge, or analytical information provide insufficient information for a complete designation, the 325 HWTUs personnel require the generator unit to provide laboratory analyses before acceptance of the waste at the 325 HWTUs.

Containers in poor condition or inadequate for storage (e.g., damaged, not intact, or not securely sealed to prevent leakage) are not accepted in the 325 HWTUs. Examples of acceptable packaging include laboratory reagent bottles, U.S. Department of Transportation (DOT)-approved containers, spray cans, sealed ampules, paint cans, leaking containers that have been overpacked, etc. Unit operations personnel have the authority to determine whether a container is in poor condition or inadequate for storage using the criteria of WAC 173-303-190, and using professional judgment to determine whether the packaging could leak during handling, storage, and/or treatment. Containers will not be opened, handled, or stored in a manner that would cause the containers to leak or rupture. Containers will remain closed except when sampling, adding, or removing waste or when analysis or treatment of the waste is ongoing. Containers of incompatible waste are segregated in the storage areas.

The regulated waste managed in the 325 HWTUs includes dangerous waste designated as listed waste; waste from nonspecific sources; selected waste from specific sources, characteristic waste, and state-only. Dangerous wastes that are managed in the 325 HWTUs are listed by waste code in the current version of the 325 Hazardous Waste Treatment Units Part A Permit Application, Form 3.

Specific waste-treatment processes are found in the list of treatments attached to the Part A, Form 3, found in Chapter 1 of the 325 HWTUs Part B Permit Application. Part A, Form 3 also provides the maximum process-design capacity for treatment and storage activities conducted in the HWTU and SAL.

All containers of dangerous waste are labeled to describe the contents of the container and the major hazards of the waste, as required under WAC 173-303-395. Each container is assigned a unique identifying number. All containers used for transfer are selected and labeled according to applicable regulations. Shipments may include manifesting and DOT compliance requirements. Shipments will be in accordance with 49 CFR as required by WAC 173-303-190.

The containers used for storage or treatment of dangerous waste are compatible with the waste stored in the containers.

All flammable-liquid waste is stored in compatible containers and in Underwriter's Laboratory (UL)-listed and Factory Mutual (FM)-approved flammable-storage cabinets or DOT-approved shipping containers.

Solid chemicals are stored on shelving/flat surfaces in specifically designated areas based on need. All incompatible materials will be segregated. Storage of dangerous waste in the HWTU is governed by the Uniform Building Code restrictions (ICBO 1991).

325 HWTUs staff move the dangerous waste containers in accordance with 325 HWTUs collection procedures that address safety and hazard considerations. The procedures cover various dangerous waste types and transportation modes. 325 HWTUs staff do not perform the operations, covered by a procedure, until they are formally trained on the procedure. All 325 HWTU staff are instructed in proper container handling and spill-prevention safeguards as part of their training. When in storage, containers are kept closed except when adding or removing waste, in accordance with WAC 173-303-630(5)(a).

Because of the nature of some dangerous waste stored at the SAL, it is often necessary to modify the standard containers. This modification ensures that the containers are specially shielded to reduce the hazard of the radioactive component of the dangerous waste stored in the container and are compliant with ALARA criteria. These specially designed shielded containers are packaged depending on the amount of shielding required. The shielding is accomplished by surrounding the containers with concrete, lead, or other materials to reduce the dose rate produced by the radiological component of the dangerous waste.

The 325 HWTUs have two drainage systems to handle liquid waste, the RPS and the RLWS. These two systems serve several laboratory and research areas in the 325 Building and are part of the larger liquid-waste systems that serve the entire 300 Area and are not part of the regulated TSD unit.

The RPS system is not part of the regulated unit but serves the entire 325 Building, including the 325 HWTUs. It is included here for informational purposes only.

The RPS system is connected to drains in both the SAL and HWTU subunits. The RPS is used for disposal of wastewater that has been handled in radiation areas (including the SAL and HWTU areas) but is not expected to be radioactively contaminated. The RPS is not used for the disposal of dangerous waste. Unless diverted as stated in the next paragraph, the RPS effluent flows to the 300 Area Treated Effluent Disposal Facility via the process sewer lines.

RPS effluents are routed through a diversion station in the basement common area of the 325 Building. The diversion station is equipped with a radioactivity monitor, which diverts the RPS flow to the RLWS if radioactivity is detected in the RPS flow. A secondary diversion-monitoring system backs up the building system. If a diversion occurs, an alarm sounds to notify appropriate staff.

One laboratory fume-hood sink in HWTU Room 528 is also connected to the RLWS. The radioactive liquid waste flows directly into the RLWS leaving the 325 Building. The radioactive liquid waste exits the 325 Building at two points to join the 300 Area RLWS outside the building and is routed to the 340 Building. From the 340 Building, accumulated waste from the entire 300 Area is transferred to railroad tank cars and eventually is transferred for storage to the Double-Shell Tanks System on the Hanford Facility.

The requirements in WAC 173-303-140 encourage the best-management practices for dangerous waste according to the priorities of RCW 70.105.150. In order of priority, these are reduction; recycling; physical, chemical, and biological treatment; incineration; stabilization and solidification; and landfilling. The 325 HWTUs will observe these priorities whenever a management option exists. Recycling will be performed whenever waste can be used as reagent material to treat other waste received. To the extent practical, reduction of waste will be incorporated in the treatment processes so that the volume of residues will be reduced.

1.2 Identification/Classification and Quantities of Dangerous Waste Generated or Managed at the 325 HWTUs and Restricted/Prohibited

The dangerous waste managed at the 325 HWTUs can be categorized as originating from the following general sources:

- listed waste from specific and nonspecific sources
- laboratory waste resulting from analysis of samples
- discarded commercial chemical products
- waste from chemicals synthesized or created in research activities using radioactive isotopes
- discarded commercial chemical products exhibiting dangerous-waste characteristics and/or criteria.

Each of these waste categories is discussed in the following sections, including waste descriptions, hazard characteristics, and basis for hazard designations. This information includes data that must be known to treat, store, or dispose of the waste as required under WAC 173-303-806(4)(a)(ii).

1.2.1 Listed Waste from Specific and Nonspecific

Waste from specific and nonspecific sources consists of listed waste identified in WAC 173-303-9904. The Part A permit application, Form 3 (Chapter 1.0), for the 325 HWTUs identifies the following waste from this category:

- F001 - spent halogenated degreasing solvents and sludges
- F002 - spent halogenated solvents and still bottoms
- F003 - spent nonhalogenated solvents and still bottoms
- F004 - spent nonhalogenated solvents and still bottoms
- F005 - spent nonhalogenated solvents and still bottoms
- F006 - wastewater treatment sludges from electroplating operations
- F007 - spent cyanide-plating-bath solutions from electroplating operations
- F009 - spent stripping- and cleaning-bath solutions from electroplating operations where cyanides are used in the process
- F027 - discarded polychlorinated phenol formulations
- F039 - leachate resulting from the disposal of more than one restricted waste classified as hazardous
- K011 - bottom stream from the wastewater stripper in the production of acrylonitrile
- K013 - bottom stream from acrylonitrile column in the production of acrylonitrile
- K048 - dissolved air flotation (DAF) float from petroleum-refining industry
- K049 - slop oil emulsion solids from the petroleum-refining industry
- K050 - heat exchange, bundle-cleaning sludge from petroleum-refining industry
- K051 - American Petroleum Institute separator sludge from the petroleum-refining industry
- K052 - tank bottoms (leaded) from the petroleum-refining industry.

These halogenated and nonhalogenated solvents are in the form of spent solvents. Degreasing solvents (F001) as well as spent halogenated solvents (F002) are generated primarily in research and analytical processes. Spent nonhalogenated solvents (F003, F004, and F005) also come primarily from research laboratories. Much of the waste to be treated in the 325 HWTUs results from analyses of waste samples from sources already designated as F001 through F005. Manufacturing activities are not performed on the Hanford Facility; therefore, dangerous waste from specific sources (WAC 173-303-9904 K-listed waste)

typically is not generated at PNNL. Small quantities of K-listed waste, however, have been generated from treatability studies and sample-characterization activities at PNNL in the past; the residues from these tests could be treated at the 325 HWTUs (if covered on the Part A).

The F-listed waste is designated on the basis of the process knowledge (e.g., information from container labels, MSDS, or process information). Sampling might be performed if additional information is needed to document the composition and characteristics of the waste. The generating unit is responsible for specifying the characteristics of the waste, based on knowledge of the chemical products used (i.e., information supplied by the manufacturer) and the process generating the waste. The F001- and F002-listed waste types are designated as dangerous waste if the waste contains less than 1 percent halogenated hydrocarbons. The F001- and F002-listed waste types containing 1 percent or greater halogenated hydrocarbons are designated as extremely hazardous waste.

The K-listed waste on the Part A permit application, Form 3, is designated based on the source of the process generating the original waste. These waste types are designated as dangerous waste, unless the waste is mixed with other constituents that require the mixture to be designated as extremely hazardous waste.

1.2.2 Laboratory Waste Resulting from Analysis of Samples

Laboratory waste resulting from analyzing samples makes up the largest volume of waste to be treated or stored in the 325 HWTUs. These waste types include those designated from the dangerous-waste source list as described in WAC 173-303-082, designated as characteristic dangerous waste under WAC 173-303-090, and designated as dangerous waste by the criteria set forth under WAC 173-303-100. These waste types are designated based on process knowledge (e.g., project requirements, client-supplied information, and process information) as well as analytical results. Currently, much of this waste is designated as listed waste from the dangerous-waste source list, based on information provided by the generator. The waste is designated as dangerous waste unless constituent concentrations in the waste require the designation to be extremely hazardous waste.

1.2.3 Discarded Commercial Chemical Products

Discarded chemical products consist of those products listed in WAC 173-303-081. The Part A permit application, Form 3, for the 325 HWTUs identifies all of the discarded chemical products listed in WAC 173-303-9903 (P001 through P123 and U001 through U359) and specifies an estimated maximum annual management quantity. Typically, only a few of these waste types are generated at any one time. The Part A application, Form 3, lists all of the wastes, because the wide variety of research activities conducted on the Hanford Facility presents the potential for generating these waste types.

Waste types in this category are designated based on process knowledge. Because this waste is usually in the original container, information on the container label is verified by process knowledge (i.e., knowledge that material is in its original container) and the label is used to identify contents. Excess or expired chemicals that have been determined to be waste and that are still in the original container will not be sampled. These listed waste types contain those designated as dangerous waste as well as those designated as extremely hazardous waste. These waste types also are subject to LDR regulations under 40 CFR 268 and WAC 173-303-140, including disposal prohibitions and treatment standards.

1.2.4 Waste from Chemicals Synthesized or Created in Research Activities Using Radioactive Isotopes

Dangerous waste from research activities using radioactive isotopes is designated as dangerous waste and typically is generated in small quantities ranging from a few grams to a few liters. These waste types consist primarily of radiologically contaminated chemicals, such as organics. Waste is designated based on process knowledge or on the basis of sampling and analysis. Process knowledge is used if the generator has kept accurate records of the identities and concentrations of constituents present in the waste (e.g., log sheets for accumulation containers).If information available from the generator is inadequate for waste designation, then the waste is sampled and the results of the analysis are used for designation. These waste types include waste designated as characteristic dangerous-waste mixtures under WAC 173-303-090 and waste designated as dangerous waste under WAC 173-303-100. The Part A permit application, Form 3, includes all categories of toxic and persistent waste mixtures (i.e., both dangerous waste and extremely hazardous waste). While not all of these waste types currently are generated or have been generated, the wide variety of research activities conducted on the Hanford Facility presents the potential that these waste types could be generated and could require subsequent management at the 325 HWTUs. Similarly, the Part A permit application, Form 3, includes the characteristic dangerous-waste categories D001 through D043 (i.e., ignitable, corrosive, reactive, and TCLP toxic because of metals or organics content).

The waste also could be LDR waste, regulated under 40 CFR 268 and WAC 173-303-140.

1.2.5 Discarded Commercial Chemical Products Exhibiting Dangerous-Waste Characteristics and/or Criteria

Many discarded chemical products handled in the 325 HWTUs are not listed in WAC 173-303-9903 but are still considered dangerous waste because these products exhibit at least one dangerous-waste characteristic and/or criterion (WAC 173-303-090 and WAC 173-303-100). This waste is included in the Part A permit application, Form 3, under waste numbers D001 through D043, WT01, WT02, WP01, WP02, WP03, and WSC2. This waste typically is received in the manufacturer's original container.

Waste in this category is designated based on the process knowledge. As this waste is usually in the original container, information on the container label is used to identify the contents. This waste includes waste designated as dangerous waste and waste designated as extremely hazardous waste. The waste also could be LDR waste regulated under 40 CFR 268 and WAC 173-303-140.

2.0 DESCRIPTION OF CONFIRMATION PROCESS

325 HWTUs staff require confirmation on all dangerous wastes before acceptance into the unit for treatment or storage. Generators must supply adequate information to characterize and manage the waste properly. The information includes waste-characterization data, waste volume, container information, and process information. A flow chart describing the confirmation process is shown in Table 2.1.

2.1 Pre-Shipment Review

Essentially all of the waste received at the 325 HWTUs is characterized before acceptance because the waste streams are generated from known processes. Unknown wastes are analyzed by the generator before they are accepted into the 325 HWTUs. Nearly all dangerous waste generated in the 325 Building is generated from analytical or research processes, both of which require detailed records.

The primary source of information used by the generator to complete the waste-tracking form is process knowledge. Other information sources could be used, so long as these sources provide detailed information on the chemical constituents present, chemical concentrations, material characteristics (e.g., physical state, ignitability), and the characterization requirements on the waste-tracking form.

If the MSDS, laboratory reagent, process knowledge, or analytical information provides insufficient information for a complete designation, the 325 HWTUs personnel require the generator to provide laboratory analyses before acceptance of the waste at the 325 HWTUs.

2.1.1 Technical Review Process Overview

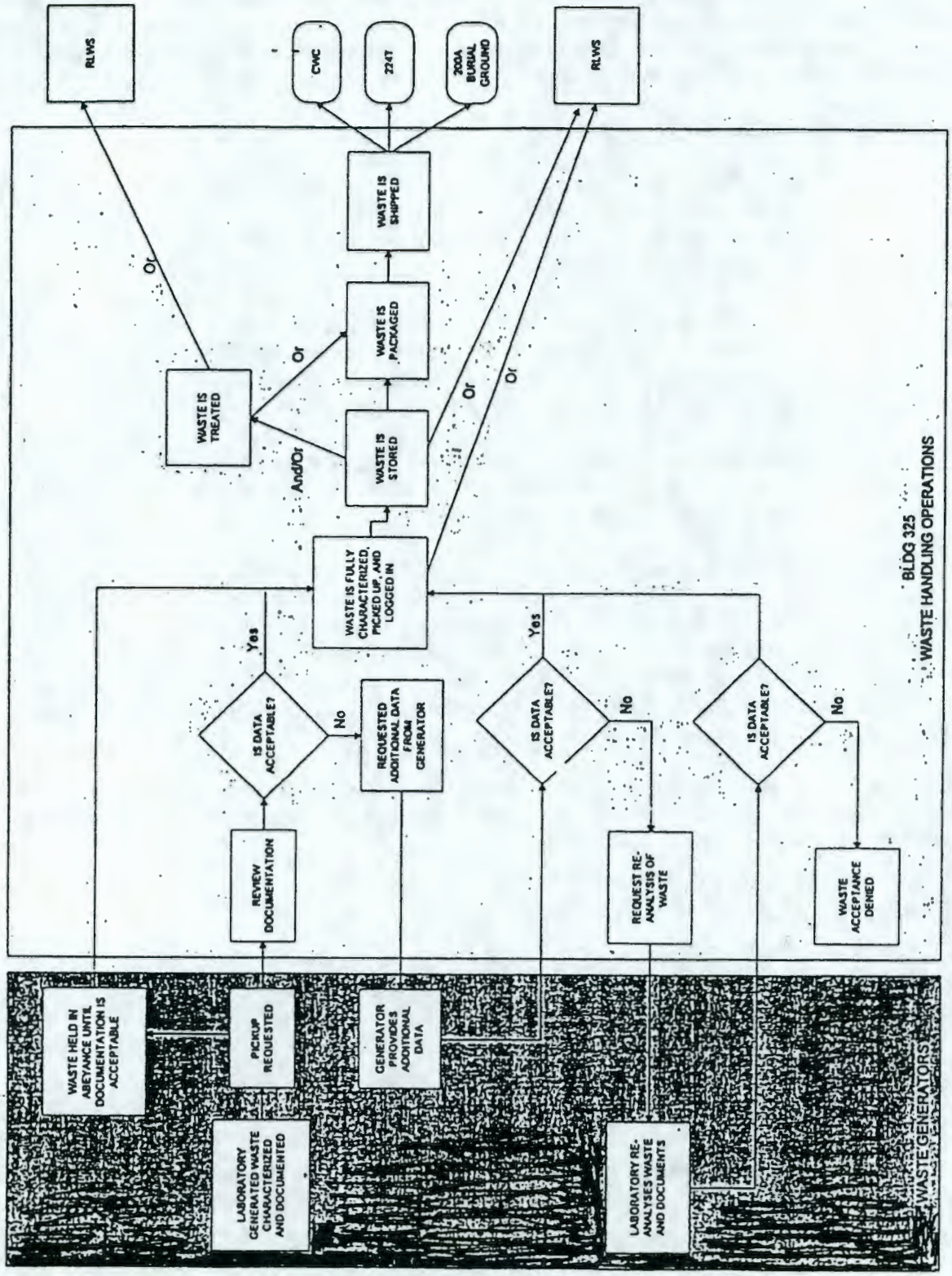
This program, administered by the 325 HWTUs personnel, is designed to obtain the waste information required pursuant to 40 CFR 264.13 and WAC 173-303-300. The review is conducted by qualified 325 HWTUs personnel using procedural guidelines and professional judgment. The reviewer(s), at their discretion, could request additional information or require additional analytical data before determining waste acceptability.

The first step in evaluating the acceptability of a waste is to obtain a general description of the wastes and to identify the waste codes and regulatory requirements that apply to the waste. Examples of forms before movement of the waste to the 325 HWTUs are:

- Chemical Disposal/Recycle Request
- Radioactive Liquid Waste Transfer Request
- Waste Designation Form
- Waste Inventory Sheet
- Analytical Report, if available
- Waste Treatment Information Review Sheet
- Hazardous Waste Record
- Chain of Custody.

Examples of these forms are included at the end of this section. Any revision or updates to these forms will be available at the 325 HWTUs for review or inspection.

Figure 2-1. Flow Chart of the Confirmation Process



Technical review of waste information is designed to accomplish three objectives: (1) determine if the 325 HWTUs can accept the material; (2) identify special handling procedures necessary to store the material safely before and during treatment; and (3) identify treatment technologies that meet waste-minimization efforts and applicable regulatory restrictions (e.g., LDR).

The waste-stream file includes the following information submitted by the generator and any literature reviews, records of conversations, etc., completed by the reviewer:

- copies of laboratory-test results, specific information on the process that generated the waste, MSDSs, etc., used to determine the components of the waste;
- waste characteristics, including compatibility, reactivity, ignitability, and corrosivity;
- documentation of conversations that clarify omissions or discrepancies;
- copies of data from additional analytical tests requested or conducted by the 325 HWTUs personnel; and
- container information, including number of containers, volume capacity of each of the containers, and type of material.

2.1.2 Review Criteria

The documentation and any required analyses must provide the information necessary to make decisions concerning waste acceptance or denial, storage requirements, treatments, legal/regulatory requirements, additional laboratory work, potential safety and handling hazards, and methods to verify that treatment is successful.

2.2 Verification

Where potential deficiencies exist in the information provided or where additional waste constituents might be expected to be present that do not appear on the waste-tracking form, the generator is contacted by 325 HWTUs personnel for resolution. Upon approval, the 325 HWTUs personnel review the form to determine the following information:

- appropriate waste designation per WAC 173-303-070
- LDR per 40 CFR 268
- packaging, marking, and labeling requirements
- DOT compatibility groups, if applicable
- identification of a proper storage location within the 325 HWTUs.

Analysis and characterization, as required by WAC 173-303-300(2), are performed on each waste before acceptance at the 325 HWTUs to determine waste designation and characteristics. The characterization of the waste, based on this information, is reviewed each time a waste is accepted. The information must be updated by the generator annually or when the waste stream changes, whichever comes first, or if the following occurs.

- The 325 HWTUs personnel have reason to suspect a change in the waste, based on inconsistencies in packaging or labeling of the waste.
- The information submitted previously does not match the characteristics of the waste submitted.
- Parameters for the waste designation and/or characterization rationale are listed in Table 2.1.

Sampling and laboratory analysis or physical screening could be required to verify or establish waste characteristics for waste that is stored at the 325 HWTUs. The following are instances where sampling and laboratory analysis is required:

- inadequate information on PNNL-generated waste
- waste streams generated onsite will be verified at 5 percent of each waste stream
- waste streams received for treatment or storage from non-PNNL offsite generators will be verified at 10 percent of each waste stream applied per generator, per shipment
- identification and characterization for unknown waste and spills within the unit.

Exceptions to physical screening for verification are:

- Shielded, classified, and remote-handled dangerous waste are not required to be physically screened; however, 325 HWTUs staff must perform a more rigorous documentation review and obtain the raw data to characterize the waste (<1% of current waste receipts).

- Wastes which cannot be verified at the 325 HWTUs must be verified at the generating unit (e.g., large components, containers which cannot be opened, are greater than 20 mrem/hr, contain greater than 100 nCi/g of transuranic radionuclides, or will not fit into the NDE unit). Physical screening at the customer location consists of observing packaging of the waste.

If no location can be found to do the physical screening, then no screening is required.

- Wastes which are packaged by the 325 HWTUs authorized independent agent are considered to have met the physical screening requirements (e.g., PNNL-packaged waste which is transferred to PNNL-operated TSD units).

A bulk-waste stream (e.g., large volumes of waste from a single generating event, such as soil remediation from a single event) may be verified by screening the allowable rate of the total number of loads throughout the waste stream.

1 **Table 2-1. Summary of Test Parameters, Rationales, and Methods**

Waste-management unit type	Waste parameter	Media type	Rationale for selection
Containers	PH	L, SI	Identify waste that might compromise containers. RLWS waste-acceptance criteria for liquids.
	Flash point	L	Identify appropriate storage conditions (i.e., compatible waste storage). RLWS waste-acceptance criteria for liquids.
	Total and amenable cyanide or sulfide	L, SI, So	Identify potential reactivity and appropriate storage conditions.
	Halogenated hydrocarbon content	L, So	Identify constituents for compliance with Hanford Facility RCRA Permit.
	Polycyclic aromatic hydrocarbon content	L, So	Identify constituents for compliance with Hanford Facility RCRA Permit.
	Free liquids	SI	Identify/verify land-disposal restrictions for liquid waste.
	PCBs	L, So	Identify constituents for compliance with Hanford Facility RCRA Permit.
	Reactivity	L, SI, So	Identify potential reactivity and appropriate storage conditions.
	Halides	L	RLWS waste-acceptance criteria.
	TCLP constituents	L, SI, So	Identify constituents for compliance with Hanford Facility RCRA Permit.
Tanks	PH	L, SI	Identify waste that might compromise tank-system integrity. RLWS waste-acceptance criteria for liquids.
	Flash point	L	Identify appropriate storage conditions (i.e., compatible waste storage). RLWS waste-acceptance criteria for liquids.
	Total and amenable cyanide or sulfide	L, SI, So	Identify potential reactivity.
	Reactivity	L	Identify potential reactivity.
	Halides	L	RLWS waste-acceptance criteria.
	TCLP constituents	L	Identify constituents for compliance with Hanford Facility RCRA Permit.

L = liquid

PCB = polychlorinated biphenyls

RLWS = radioactive liquid waste system

SI = sludge

So = solid

TCLP = toxicity characteristic leaching procedure

1

Figure 2-2. Chemical Disposal/Recycle Request Form

Battelle
Pacific Northwest Laboratories

CHEMICAL DISPOSAL/RECYCLE REQUEST

Page 1 of _____

Received/Approved
Request No.
Picked Up/Labeled
Entered

Send Completed Form to:

- 300 Area Nonradioactive Materials: TJ Murphy, 372-2745, P8-45
- 3000 Area Nonradioactive Materials: EL Grohs, 375-6309, K3-80
- Radioactive Mixed Waste: MJ Riese, 372-3517, P7-68

☐ 1030 ☐ 1031 | Org. Code: | Work Package No.:

Level 3 Manager Signature/Date:

Technical Contact/Phone No. (if other than Requester)

☐ <90 Day Accumulation ☐ Satellite Accumulation | Accumulation Date for <90 Day Waste (<30 Days for PCB's)

Requested by (printed or typed name): | Telephone No.:

Requester Signature/Date (indicating accuracy of information to the best of my knowledge)

Location of Waste: (Area/Bldg/Rm) | Requester MSIN:

☐ Nonradioactive Material (complete and submit a CWC form for nonrad material);
☐ Radioactive Material (include Curies Quantities Below)

SHADED AREA FOR WM USE ONLY | Complete ALL Applicable Information: Detailed Instructions on Reverse, Continuation Sheets Available | SHADED AREA FOR WM USE ONLY

Container ID: WM No.	Container: Quant.	Size	Type (a)	Kilograms of Material per Container	Material Description or Trade Name (b)	Chemical Component (use proper chemical name include isotopes and curies for RMW) (c)	Wt. % (d)	Physical State S/L/M/G (e)	Status (f)	Hazards	WM Waste Codes
										PG I II III D E	O I Leg
										PG I II III D E	O I Leg
										PG I II III D E	O I Leg
										PG I II III D E	O I Leg
										PG I II III D E	P I Leg
										PG I II III D E	O I Leg

WASTE INVENTORY SHEET

Verify integrity of container _____
Signature

Page ___ of ___

Bldg. #	Room #	WTN:	Container type:	WSRd No.	Internal Packaging:	Compactible? Yes ___ No ___

Initio	Date	Physical/Chemical Description	Volume	Weight	Radionuclide	Curies	Weight
		Page Totals					
		Total All Pages					

I believe that the submitted information is true, accurate and complete and that unless designated a mixed waste, this package does not contain hazardous or dangerous waste constituents as defined in WAC 173-303, RCRA or TSCA.

_____
Signature of Person Sealing Container

Print Name: _____ Phone #: _____ Date: _____

Radiation Survey Information on Container

Max Contact: [ ] <0.5 mrem/hr or ____ mrem/hr
at 3": [ ] 0.5 mrem/hr or ____ mR/hr

Smearable Contamination:
[ ] <2200 d/m/100 cm² BETA-GAMMA
[ ] <220 d/m/100 cm² ALPHA

Other: _____

Surveyed by: _____
Date: _____

VOLUME % COMPOSITION

____ % Paper	____ % Metal
____ % Rags	____ % Concrete
____ % Wood	____ % Glass
____ % Rubber	____ % Absorbent
____ % Plastic	____ % Animal
____ % _____ (Specify)	____ % Kotex

Figure 2-3. Waste Inventory Sheet

1 **Figure 2-4. Radioactive Liquid Waste Transfer Request Form**

RADIOACTIVE LIQUID WASTE TRANSFER REQUEST | RLWS Transfer No:

Generator Name | Generating Facility | Phone No.

Waste volume = _____ liters Flush volume = _____ liters Total transfer volume = _____ liters

This is a: ☐ One-Time Transfer Request
☐ Multiple Transfer Request

Disposal Method: ☐ RLWS Drain
☐ Deliver to 340 Facility

WASTE CHARACTERIZATION INFORMATION

Dose Rate:
(indicate units and distance)

Radiological Characterization
List all radionuclides and activity levels (indicate units):

Waste Composition	RLWS Limits
pH:	pH < 13
Total Halides (F+Cl+Br+I) (moles/):	<0.01 M
% Total Organic Carbon:	TOC < 1%
Maximum Particle Size (microns):	< 100 μm
Are solidifying substances present?	Not Allowed
Are separable organics present?	Not Allowed
Fissile Content (grams/gallon):	< 0.01 g/gal
Does waste contain radioiodine?	Not Allowed

Waste Description:

Identify all applicable waste codes:

☐ D002	☐ D004	☐ D005	☐ D006	☐ D007	☐ D008	☐ D009
☐ D010	☐ D011	☐ D018	☐ D019	☐ D022	☐ D028	☐ D029
☐ D030	☐ D033	☐ D034	☐ D035	☐ D038	☐ D039	☐ D040
☐ D041	☐ D043	☐ F001	☐ F002	☐ F003	☐ F004	☐ F005
☐ WT01	☐ WT02	☐ WP01	☐ WP02	☐ WP03	INDICATE: ☐ DW or ☐ EHW	

(If your waste has codes which are not on this list, the 340 Facility may be unable to properly manage it. Contact 340 Facility Management at 376-5657 for assistance.)

<90-Day Accumulation Start Date:

Does this waste contain a reportable quantity (RQ) 40 CFR 302.4? _____
If "YES" then identify the hazardous substance(s) and the corresponding RQ value(s).

Is this waste a hazardous waste subject to the land disposal restrictions of 40 CFR 268? _____
If waste is land disposal restricted then provide applicable LDR information to the 340 Facility.

GENERATOR CERTIFICATION

This is to certify that, to the best of my knowledge and ability, the waste described on this form is properly designated and completely described in accordance with the applicable requirements. I understand there are significant penalties, including fines and imprisonment, for falsifying such information.

Certifier's Name _____ Signature _____ Date _____

RLWS TRANSFER APPROVAL

Special Instructions:

340 Facility Review/Approval:

Cognizant Engineer _____ Date _____ Environmental Compliance Officer _____ Date _____

Send completed forms to: 300 LEF Process Engineering
MSIN L6-04

PNNL Building Manager _____

Revision 3
11/12/95

990422.0810

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Figure 2-5. Waste Designation Form

CDRR#:_____ Date:_____
Item #:_____ pH:_____

Composition: a) formula b) chemical name c) CAS# d) designation info. e) Wt%

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

WASTE DESIGNATION:

Discarded Chemical Product? (WAC 173-303-081) ____Yes ____No
designation:_____

Dangerous Waste Source? (WAC 173-303-082) ____Yes ____No
designation:_____

Ignitable? (WAC 173-303-090(5)) ____Yes ____No D001:_____
____Flammable (Flashpoint <140F) F=9/5(C)+32
____Combustible (Flashpoint <100-200F)
____Oxidizer (> = 10% oxidizer)

Corrosive Liquid? (WAC 173-303-090(6)) ____Yes ____No D002:_____
(pH ≤2 or ≥12.5..or.. corrodes steel @rate .25"/yr.)

Corrosive Solid? ____Yes ____No WSC2:_____
(pH ≤2 or ≥12.5)

Reactive? (WAC 173-303-090(7)) ____Yes ____No D003:_____
(cyanides, sulfides, DWW, explosives, ≥ 70% H_2SO_4 or HNO_3)

TCLP? (WAC 173-303-090(8)) ____Yes ____No
designation:_____

Toxic? (WAC 173-303-100) E.C.:_____ ____WT01(1.0EC) ____WT02 (≥0.001EC)
____EHW ____DW

Persistent? (WAC 173-303-100) ____Yes ____No ____WP01 (HH≥1%) EHW
____WP02 (HH≥.01%) DW
____WP03 (PAH≥1%) EHW

Waste Codes:_____ DW_____ EHW_____

Designator:_____ Labels Req'd: Hazardous Waste

1 **Figure 2-6. Waste Treatment Information Review Sheet**

WASTE TREATMENT INFORMATION REVIEW SHEET

HWTU REFERENCE #:_____ Date:_____

GENERATOR NAME:_____
FACILITY ADDRESS:_____ PHONE #:_____

CONTACT NAME:_____ TITLE:_____

Compatibility Class_____

WHO Technical Review:_____ Signature_____

APPROVED OR DENIED - REASONS:_____ All Correspondence To:

SPECIAL HWTU INSTRUCTIONS:_____ cc:_____

_____ No sample necessary for waste stream verification.

WASTE TREATMENT SUMMARY

Treatment Procedure Number(s) _____

Location of Treatment Documentation: HWTU Logbook___, Page Number ___; HWTU File Number ___;

HWTU Computer database _____

Approved for treatment_____ Approved for storage/packaging_____

Waste Treatment Code Assigned _____

Is this a RCRA/Ecology coded waste which has a specified treatment technology to be performed?

____NO ____YES: Specify_____

Specify treatment in detail: _____

Treatment will {destroy/lessen _____(constituent) and will be verified by_____(test; specify which; or operator knowledge).

Final disposition of waste treatment residue_____

HWTU Signature _____

Page 1 of 1 HWTU-WTIRS (3/94)

1

Figure 2-7. Chain-of-Custody Form

Page 1 of _____ Chain of Custody Number: _____

BATTELLE, PACIFIC NORTHWEST LABORATORIES

Project No.: _____ Originating Technical Group: _____

General Sample
Description: _____

Test Instruction or ASR No. (as applicable):

_____

Analysis Requested and/or Technical Group:

_____

Prep Method Description: _____

SAMPLE NUMBER	SAMPLE DESCRIPTION	COMMENTS

Sender: _____ Receiver: _____

(signature/date) (signature/date)

Original - File

Hazardous Waste Record

Record Number: _____

IRSI Number: _____

Customer Id: _____

Waste Description: _____

Waste Chemical Composition			
Chemical Name	Vol %	Chemical Name	Vol %

Before Treatment		After Treatment		After Treatment	
Container Number		Container Number		Container Number	
Container Type	Metal Can / Glass Jar / Poly Bottle / Metal Drum / Other:	Container Type	Metal Can / Glass Jar / Poly Bottle / Metal Drum / Other:	Container Type	Metal Can / Glass Jar / Poly Bottle / Metal Drum / Other:
Container Wt. (Tare)	Kg	Container Wt. (Tare)	Kg	Container Wt. (Tare)	Kg
Container Wt (Gross)	Kg	Container Wt. (Gross)	Kg	Container Wt.(Gross)	Kg
WASTE pH		WASTE pH		WASTE pH	
Physical Form	S L G M	Physical Form	S L G M	Physical Form	S L G M
WASTE Weight	Kg	WASTE Weight	Kg	WASTE Weight	Kg
WASTE Volume	Liters	WASTE Volume	Liters	WASTE Volume	Liters
WASTE Density	Kg/Liter	WASTE Density	Kg/Liter	WASTE Density	Kg/Liter
Waste Designation-Before Treatment		Waste Designation-After Treatment		Waste Designation-After Treatment	
I O	DW EHW	I O	DW EHW	I O	DW EHW
Enter All Applicable Waste Codes		Enter All Applicable Waste Codes		Enter All Applicable Waste Codes	

Figure 2-8. Hazardous Waste Record (front)

1

Figure 2-9. Hazardous Waste Record (back)

PROCESS CODES:		HANDLING CODES:		
PIS = Placed in Storage	CIS = Consolidated in Storage	S01 = Container	T24 = Chemical Reduction	T40 = Filtration
MIS = Moved in Storage	SIS = Split in Storage	S02 = Tank	T30 = Ion Exchange	T41 = Other (specify)
TRE = Treated	DIS = Transferred	T22 = Chemical Oxidation	T31 = Neutralization	T50 = Blending
		T23 = Chemical Precipitation	T38 = Detoxifying	T51 = Evaporation
		XFR = Transferred (specify location)	Refer to WAC 173-303 for other applicable codes	

Container Number	Process	Date	Handling Code	Location	Comments

ATTACHMENTS:

[ ] RLWS	[ ] Storage	[ ] Disposal	Other Attachments
[ ] COIC #	[ ] CORR #	[ ] Manifest #	[ ] Analytical Data
[ ] Waste Designation Form	[ ] Waste Designation Form	[ ] SWBOR	Project #
[ ] RLWS Request #	[ ]	[ ] RSR	[ ]
[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]

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3.0 SELECTING WASTE-ANALYSIS PARAMETERS

State and federal regulations [WAC 173-303-300(2) and (5)(a); WAC 173-303-140; 40 CFR 268.7(a)] require that information be obtained, documented, and/or reported on wastes received by a TSD unit. These requirements include ensuring that only wastes which meet 325 HWTUs permit requirements are accepted, and reporting the information required by WAC 173-303-380. In addition to providing a general description of the waste, the focus of the information collected for regulatory purposes is to ensure that the 325 HWTUs are permitted to accept the waste and treat it to LDR requirements.

The 325 HWTUs accept only wastes that have been characterized properly. Before receipt or acceptance of waste at the 325 HWTUs, generators must supply adequate information to characterize and manage wastes properly.

One of the most important aspects of operating the 325 HWTUs in a safe manner is to ensure that incompatible wastes are not mixed together. For the purposes of this document, wastes are considered compatible when mixed they do not: (1) generate extreme heat or pressure, fire, or explosion, or violent reaction; (2) produce uncontrolled toxic mists, dusts, or gases in sufficient quantities to threaten human health; (3) produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions; (4) damage the structural integrity of the device or facility containing the waste; or (5) through other like means threaten human health or the environment.

Sampling and laboratory analysis could be required to verify or establish waste characteristics for waste that is stored at the 325 HWTUs. The following are instances where sampling and laboratory analysis is required:

- inadequate information on PNNL-generated waste
- 5% waste verification for PNNL-generated waste
- 10 percent waste verification for non-PNNL-generated waste identification and characterization for unknown waste and spills within the unit.

3.1 Parameter Selection Process

The selection of analytical parameters is based on the State of Washington's "Dangerous Waste Regulations," WAC 173-303-300 and *EPA Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Wastes, A Guidance Manual* (EPA 1994).

3.2 Criteria and Rationale for Parameter Selection

Waste-testing parameters and the rationale for these parameters are summarized in Table 2.1. Testing parameters for each type of waste were selected to obtain data sufficient to designate the waste properly under WAC 173-303-070, meet requirements for Land Disposal Restrictions (see Section 4.5), and to manage the waste properly. If information on the source of the waste is available, then all parameters might not be required, e.g., exclusion of testing for pesticides from a metal-machining operation.

Some of the analytical screening parameters that could be used for waste received at the 325 HWTUs are as follows.

- Physical description — used to determine the general characteristics of the waste. This facilitates subjective comparison of the sampled waste with previous waste descriptions or samples. Also, a physical description is used to verify the observational presence or absence of free liquids.

- pH screen — used to identify the pH and corrosive nature of an aqueous or solid waste, to aid in establishing compatibility strategies, and to indicate if the waste is acceptable for treatment and/or storage in the 325 HWTUs.

- Cyanide screen — used to indicate whether the waste produces hydrogen cyanide upon acidification below pH 2.

- Sulfide screen — used to indicate if the waste produces hydrogen sulfide upon acidification below pH 2.

- Halogenated hydrocarbon content screen — used to indicate whether chlorinated hydrocarbons or polychlorinated biphenyls (PCBs) are present in waste and to determine if the waste needs to be managed in accordance with the regulations prescribed in the *Toxic Substance Control Act of 1976*.

- Ignitability screen — used to identify waste that must be managed and protected from sources of ignition or open flame.

4.0 SELECTING SAMPLING PROCEDURES

Because of physical variations of the waste that could be received at 325 HWTUs, sampling methodologies differ among the waste streams. The specific sampling methods and equipment used will vary with the chemical and physical nature of the waste material and the sampling circumstances. In all instances, the sampling methods adhere to guidance provided in SW-846 and other pertinent references published and accepted by the EPA. In general, aqueous liquids will be sampled using polyethylene samplers, organic liquids will be sampled using glass samplers, and solids will be sampled using polyethylene samplers. Typical sample-container requirements for aqueous and solid samples are provided in Table 4.1.

Representative samples of liquid wastes (vertical "core sections") will be obtained using a composite liquid-waste sampler (COLIWASA) or tubing, as appropriate. If a liquid waste has more than one phase, then each phase will be separated for individual testing and designation. Other waste types that may require sampling are sludges, powders, and granules. In general, nonviscous sludges will be sampled using a COLIWASA. Highly viscous sludges and cohesive solids will be sampled using a trier, as specified in SW-846 (EPA 1986). Dry powders and granules will be sampled using a thief, also as specified in SW-846 (EPA 1986). The sampling methods and equipment used are identified on Table 4.2. In all instances, sampling methods will conform to the representative sample methods referenced in WAC 173-303-110(2), i.e., American Society for Testing and Materials (ASTM) standards for solids and SW-846 for liquids.

The number of samples collected will depend on the amount of waste present and on the homogeneity of the waste, as determined by observation. In most instances, there will be only one container of waste present. In such instances, only one vertical composite sample will be collected (e.g., COLIWASA). If more than one container of a waste stream is present, then a random number of samples will be collected and analyzed statistically using the procedures specified in Section 9.2 of SW-846 (EPA 1986).

Generators or 325 HWTUs personnel are responsible for arranging all sampling and laboratory support for sample analysis. Samples are processed either onsite or offsite at one of several laboratories qualified to perform analysis of waste samples in accordance with SW-846 methods. Sampling methodologies are included in Table 4.2.

Table 4-1. Sample-Container Compatibility

Sample	Container		
	Plastic	Glass	Metal
Acids (except hydrofluoric acid)	*	*	
Hydrofluoric acid	*		
Alkali	*	*	
Solvents/solvent-contaminated oils	*[1]	*	*
Oils	*	*	*
Solids	*	*	*
Aqueous waste	*	*	*

* Sample compatible for storage in this type of container.
[1] Polypropylene may be used with some solvent/solvent-oil waste.

Table 4-2. Sampling Methods and Equipment

Material	Sampling Method	Sampling Equipment
Containerized liquids	SW-846	COLIWASA* or tubing
Extremely viscous liquid	ASTM D140-70	Tubing or trier
Crushed or powdered material	ASTM D364-75	Tubing, trier, auger, scoop or shovel
Soil or rock-like material	ASTM D420-69	Tubing, trier, auger, scoop or shovel
Soil-like material	ASTM D1452-65	Tubing, trier, auger, scoop or shovel
Fly ash-like material	ASTM D2234-76	Tubing, trier, auger, scoop or shovel
Containment systems	Wipe sample (OSHA 1977)	Filter paper and cleaning solution

* COLIWASA: composite liquid-waste sampler.

Generators or 325 HWTUs personnel also document the sampling activities and chain of custody and arrange sample shipment. Sampling information, custody records, and analytical results are submitted as part of the waste-tracking form data package submitted by the generator to the waste-management section for review, approval, and designation.

All sampling will conform to the protocols in SW-846 or an equivalent. These protocols are described briefly in the following paragraphs.

Sample-control procedures (i.e., chain-of-custody forms) are designed to ensure that each sample is accounted for at all times. The primary objectives of the sample-control procedures are as follows:

- Each sample received for analysis is uniquely identified.
- Correct samples are analyzed and are traceable to the applicable data records.
- Important and necessary sample constituents are preserved.
- Samples are protected from loss, damage, or tampering.
- Any alteration of samples during collection or shipping (e.g., filtration, preservation, breakage) is documented.
- A record of sample custody and integrity is established that will satisfy legal scrutiny.

Sample-container selection is crucial to sample quality. Considering waste compatibility, durability, volume, and analytical sensitivities, the containers listed in Table 4.1 are recommended to the generators for these efforts.

The basic sampling procedure is as follows:

- Obtain samples using a precleaned sampler.
- Fill sample containers in the following sequence: head-space volatile organics, volatile organics, semi-volatile organics, metals, ignitability, pH (corrosivity), reactivity, radiochemical parameters.
- Label sample containers.
- Properly clean and decontaminate sample containers and the sampling hardware.
- Custody-seal and blister-wrap all sample containers, place wrapped containers in a leak-tight polyethylene bag, and place samples in a durable ice-filled cooler or comparable receptacle for transport to the laboratory or laboratory receiving facility. Radioactive dose rate permitting, custody-seal and blister-wrap will be used; otherwise, seals will be placed on secondary containers.
- Complete the chain-of-custody and request-for-analysis forms.
- Review all paperwork and enclose the forms in a leak-tight polyethylene bag taped to the underside of the cooler lid or attach paperwork to the container as appropriate.
- Seal and mark the coolers or comparable receptacles in accordance with applicable DOT requirements.

Transport coolers or appropriate containers to the analytical laboratory or laboratory receiving facility.

All samples are labeled with at least the following information:

- a unique alpha-numeric identifier
- date and time of collection
- sample collector's name
- preservatives used

- analyses requested.

Immediately after collection, samples are placed on blue ice or an equivalent, as required, in durable coolers or comparable receptacles for transport to the offsite laboratory. Before shipping or transfer, coolers or comparable receptacles are tightly sealed with ~~duct~~ tape and are custody-sealed along the front and back edges of the lids. Samples are transported to offsite laboratories within 24 hours of collection. Samples are transported to offsite laboratories by overnight courier to ensure delivery within 24 hours of sample collection. All offsite sample collection, preparation, packaging, transportation, and analyses conform to the requirements of SW-846 or equivalent.

During all sampling activities, strict compliance with health physics, industrial hygiene, and safety standards is mandatory. Personnel are required to wear eye-, skin-, and respiratory-protection gear as dictated by industrial hygiene and health- physics personnel. If personnel accidentally contact waste material, decontamination procedures are to be performed immediately.

A chain-of-custody record accompanies samples being analyzed for chemical constituents at all times. The record contains the sample number, date and time of collection, sample description, and signatures of the collector and all subsequent custodians.

Transportation of samples is in accordance with the DOT and the DOE-RL requirements. Hazardous-waste samples are properly packaged, marked, and labeled. For offsite shipments, shipping papers are prepared in accordance with applicable DOT regulations.

All equipment used to sample waste materials is disposable or designed for easy decontamination. Cleanable equipment is thoroughly decontaminated before reuse. Decontamination solutions are managed as hazardous waste as appropriate, according to the threshold-contaminant levels exceeded in the sampled liquids. Disposable samplers will be used whenever possible to eliminate the potential for cross-contamination.

4.1 Sample Custody

The generators or 325 HWTUs personnel are responsible for initiating and following chain-of-custody procedures. Generators initiate sample-custody records in the field at the time samples are collected. A chain-of-custody form is used to document sample-collection activities, including sampling site, sample identification, number of samples, and date and time of collection. Additionally, the form documents the chain of custody including the names of responsible individuals and the dates and times of custody transfers.

4.2 Sample Receipt and Storage

Samples are received at a qualified contracted laboratory or laboratory receiving facility by a sample custodian. This individual carefully reviews received samples and documentation for compliance with sampling and documentation requirements, such as type and condition of container, sample preservation, collection date, and chain-of-custody forms. The sample custodian signs and dates the chain-of-custody form after verifying that all samples submitted are listed and that the required information is listed on the form. The sample custodian places an identification number on each sample and returns the samples to a refrigerator, if required, designated for storage of samples requiring analysis, as required. The sample custodian stores and secures the samples appropriately (e.g., in a locked refrigerator). Based on the type of sample and analysis requested, special procedures for sample handling, storage, and distribution could be specified.

4.3 Sample Distribution

Where practical, chain-of-custody documentation for samples continues throughout the analytical process. After logging in and storing the samples, the sample custodian distributes sample documentation, which lists sample numbers and analyses to be performed, to the appropriate analysts and technical leaders. On completion of analyses, results are submitted to the generators or 325 HWTUs personnel along with QA/QC information.

4.4 Field Analytical Methods

Analytical methods employed to verify or characterize waste are of two types: fingerprint analysis and laboratory analysis. Fingerprint analysis is used primarily to verify waste characteristics of waste received from offsite. Laboratory analytical methods will be employed to establish waste identity and characteristics and verify waste characteristics when 325 HWTUs personnel determine it is necessary.

4.4.1 Fingerprint Sampling Analytical Methods

A representative sample will be taken of the waste (if more than one phase is present, each phase must be tested individually), and the following field tests will be performed:

- Reactivity – HAZCAT oxidizer, cyanide, and sulfide tests. These tests will **not** be performed on materials known to be organic peroxides, ethers, and/or water-reactive compounds.
- Flashpoint/explosivity — by HAZCAT flammability Procedure B, explosive-atmosphere meter, or a closed-cup flashpoint-measurement instrument.
- pH - by pH meter or pH paper (SW-846 9041). This test will not be performed on non-aqueous materials (i.e., organic solvents).
- Halogenated organic compounds - by organic-vapor analyzer with a flame ionization detector, Chlor-D-Tect kits, or the HAZCAT fluoride, chloride, bromide, and iodide tests.
- Volatile organic compounds - by gas chromatograph/mass spectrometer or gas chromatograph (GC) with a photo- or flame-ionization detector.

If the waste meets the parameters specified in the documentation, then confirmation of designation is complete. If the waste does not meet these parameters, then proceed to the next step.

1. Sample and analyze the materials in accordance with WAC 173-303-110.
2. Reassess and redesignate the waste. Repackage and label as necessary or return to the generator.
3. Data obtained through the waste-verification process will be used to verify the accuracy of the waste designation for waste received at 325 HWTUs.

4.5 LDR Waste-Analysis Requirements

The *Hazardous and Solid Waste Amendments of 1984* prohibit the land disposal of certain types of waste that are subject to RCRA. Many of the waste types stored at 325 HWTUs fall within the purview of these land-disposal restrictions (LDRs). Information presented below describes how generators and 325 HWTUs personnel characterize, document, and certify waste subject to LDR requirements.

4.5.1 Waste Characterization

Before being received at 325 HWTUs, the RCRA waste characteristics, the level of toxicity characteristics, and the presence of listed waste are determined during the physical and chemical analyses process. This information allows waste-management personnel to make all LDR determinations accurately and complete appropriate notifications and certifications.

4.5.2 Sampling and Analytical Procedures

The LDR characterization and analysis may be performed as part of the waste-characterization and analysis process. If waste is sampled and analyzed for LDR characterization, then only EPA or equivalent methods are used to provide sufficient information for proper management and for decisions regarding LDRs pursuant to 40 CFR 268.

4.5.3 Frequency of Analysis

Before acceptance and during the waste-characterization and analysis process, all LDR characterizations and designations are made. The characterization and analysis process is performed when a CDRR is submitted for waste pick-up, unless there is insufficient data or if the waste stream has changed. Instances where sampling and laboratory analysis may be required to determine accurate LDR determinations include the following:

- when waste-management personnel have reason to suspect a change in the waste based on inconsistencies in the waste-tracking form, packaging, or labeling of the waste
- when the information submitted previously by a generator does not match the characteristics of the waste that was submitted
- when the offsite TSD facility rejects the waste because the fingerprint samples are inconsistent with the waste profile provided by 325 HWTUs, which was established using generator information.

4.5.4 Documentation and Certification

The 325 HWTUs have and will continue to receive and store LDR waste. Because 325 HWTUs personnel determine designations and characterization, including LDR determinations, all notifications and certifications, as required by 40 CFR 268, are prepared by PNNL qualified staff for PNNL-generated waste. The 325 HWTUs staff collect from the generator(s) the information pursuant to 40 CFR 268 regarding LDR wastes, the appropriate treatment standards, whether the waste meets the treatment standards, and certification that the waste meets the treatment standards, if necessary, as well as any other data, e.g., documented process knowledge and waste-analyses data that support the generator's determinations. If any of the requested information is not supplied by the generator, then the 325 HWTUs personnel complete and transmit all subsequent information regarding LDR wastes, pursuant to 40 CFR 268. The notification and certifications are submitted to onsite and offsite TSD units during the waste-shipment process. Additionally, any necessary LDR variances are prepared and submitted by PNNL qualified staff.

The 325 HWTUs staff require applicable LDR information/notifications from non-PNNL generators.

Where an LDR waste does not meet the applicable treatment standards set forth in 40 CFR 268, Subpart D, or exceeds the application prohibition levels set forth in 40 CFR 268.32 or Section 3004(d) of RCRA, 325 HWTUs provides to the onsite and offsite TSD a written notice that includes the following information:

- EPA hazardous-waste number

- the corresponding treatment standards and all applicable prohibitions set forth in WAC 173-303, 40 CFR 268.32, or RCRA Section 3004(d)
- the manifest number associated with the waste
- all available waste-characterization data.
- identification of underlying hazardous constituents.

In instances where 325 HWTUs determines that a restricted waste is being managed that can be land-disposed without further treatment, 325 HWTUs staff submits a written notice and certification to the onsite or offsite TSD where the waste is being shipped, stating that the waste meets applicable treatment standards set forth in WAC 173-303-140 (40 CFR 268, Subpart D), and the applicable prohibition levels set forth in 40 CFR 268.32 or RCRA Section 3004(d). The notice includes the following information:

- EPA hazardous-waste number
- corresponding treatment standards and applicable prohibitions
- waste-tracking number associated with the waste
- all available waste-characterization data
- identification of underlying hazardous constituents.

The certification accompanying any of the previously described notices is signed by an authorized representative of the generator and states the following:

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d). I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

Copies of all notices and certifications described are retained at the TSD unit for at least 5 years from the date that the waste was last sent to an onsite or offsite TSD unit. After that time, the notices and certifications are sent to Records Storage.

4.6 Waste Analysis for Spills and Unknowns

In the event of a spill or release of DW within 325 HWTUs, the following steps will be implemented:

1. The identification number on the leaking container will be determined based on visual inspection. If the container(s) involved cannot be approached, the location of the container involved and the associated storage-cell designations can be determined from a distance.

2. The container-identification number or container-location number will be entered into 325 HWTUs inventory database to determine the CDRR number.

3. The hard copy of the CDRR or a computerized information printout for the container, which contains all applicable information regarding the contents of the container, will be located. The hazards associated with the waste will be determined before exercising the emergency-response procedures outlined in the *325 HWTUs Contingency Plan.*

4. Respond to the spill in accordance with the requirements of the 325 Building Emergency Plan. The *325 HWTUs Contingency Plan* is implemented if there is a threat to human health or the environment.

5. A new CDRR will be filled out using the information from the original CDRR and information from any spill-cleanup kits or absorbents. The waste will then be designated and characterized.

If a leak or other liquid is discovered in the 325 HWTUs that cannot be tracked to a specific container because of safety or logistics reasons, then the procedures outlined in the *325 HWTUs Contingency Plan* would be implemented for responding to an "unknown" chemical release. The residues, including cleanup absorbents, of such a release would be sampled and analyzed in accordance with the requirements in the *325 HWTUs Contingency Plan* to determine the characteristics of the waste residue as defined by WAC 173-303-070. Sampling and analysis of the residues will include pH, metals, volatile organics, and semi-volatile organics analyses, as required.

Based on the information gathered from the laboratory analysis, a new CDRR for the waste cleanup will be filled out. The waste will then be designated and characterized.

5.0 SELECTING A LABORATORY, LABORATORY TESTING, AND ANALYTICAL METHODS

Laboratory selection is limited; only a few laboratories are equipped to handle mixed waste because of special equipment and procedures that must be used to minimize personnel exposure. Preference will be given to the 325 Analytical Chemistry Laboratory (ACL) and then to other laboratories on the Hanford Facility that exhibit demonstrated experience and capabilities in three major areas:

1. comprehensive written QA/QC program based on DOE-RL requirements specifically for that laboratory
2. audited for effective implementation of QA/QC program
3. participate in performance-evaluation samples to demonstrate analytical proficiency.

All laboratories (onsite or offsite) are required to have the following QA/QC documentation.

- Daily analytical data generated in the contracted analytical laboratories is controlled by the implementation of an analytical laboratory QA plan.
- Before commencement of the contract for analytical work, the laboratory will, if requested, have their QA plan available for review. At a minimum, the QA plan will document the following:
  - sample custody and management practices
  - requirements for sample preparation and analytical procedures
  - instrument maintenance and calibration requirements
  - internal QA/QC measures, including the use of method blanks
  - required sample preservation protocols
  - analysis capabilities.

5.1 Testing and Analytical Methods

325 HWTUs customers will need to conduct analyses to provide information to fill out CDRRs, and to determine compatibility, safety, and operating information. As needed, 325 HWTUs staff also will conduct analyses to determine completeness of information and if treatment and verification material meets the acceptance criteria for either disposal via the RLWS, treatment or storage at one of the Hanford Facility-permitted treatment/storage/disposal areas or that of the offsite TSD facility. Examples of the Waste-Treatment Verification form and the RLWS Disposal Log are included at the end of this section for informational purposes only. Any revision or update of these forms will be available at the 325 HWTUs for review and inspection. Testing and analytical methods will depend on the type of analysis sought and the reason for needing the information.

All testing is performed by chemists and/or appropriate analytical personnel working under approved QA guidelines. Analytical methods will be selected from those that are used routinely by the Analytical Chemistry Laboratory (ACL) in located in the 325 Building or the various Hanford Facility analytical laboratories.

The 325 HWTUs manages limited quantities of dangerous waste; therefore, deviations from SW-846 protocols may occur during its analysis. Many of the deviations from the SW-846 protocols arise from the radioactive nature of the samples handled.

Analytical methods will be selected from those that are routinely used by the ACL in 325, or by the various Hanford Facility analytical laboratories.

5.2 Quality Assurance and Quality Control

Pacific Northwest National Laboratory is committed to maintaining a high standard of quality for all of its activities. A crucial element in maintaining that standard is a quality-assurance program that provides management controls for conducting activities in a planned and controlled manner and enabling the verification of those activities.

Activities pertaining to waste analysis include, but are not limited to, the preparation, review, and control of procedures and the selection of analytical laboratories. The Laboratory's QA manual has administrative procedures that establish requirements and provide guidance for the preparation of analytical and technical (i.e., sampling, chain-of-custody, work processes) procedures, as well as other administrative procedures. Procedures undergo a review cycle and, once issued, are controlled to ensure that only current copies are used.

The primary purpose of waste testing is to ensure that the waste is properly characterized in lieu of process-knowledge data, in compliance with RCRA requirements for general waste analysis [WAC 173-303-300(2); 40 CFR 264.13]. Waste testing also is performed to ensure the safe management of waste being stored, proper disposition of residuals from incidents that might occur, and control of the acceptance of waste for storage. The specific objectives of the waste-sampling and analysis program at 325 HWTUs are as follows:

- Identify the presence of waste that is substantially different from waste currently stored.
- Provide a detailed chemical and physical analysis of a representative sample of the waste, before the waste is accepted at or transferred from 325 HWTUs to an offsite TSD facility, to ensure proper management and disposal.
- Provide an analysis that is accurate and up-to-date to ensure that waste is properly treated and disposed of.
- Ensure safe management of waste undergoing storage at 325 HWTUs.
- Ensure proper disposal of residuals.
- Ensure compliance with LDRs.
- Identify and reject waste that does not meet 325 HWTUs acceptance requirements (e.g., incomplete information).
- Identify and reject waste that does not meet specifications for 325 HWTUs (i.e., Part A listing, restricted from storage at 325 HWTUs).

5.3 Quality Assurance and Quality Control Objectives

The objectives of the QA/QC program are two-fold. The first objective is to control and characterize any errors associated with the collected data. Quality-assurance activities, such as the use of standard procedures for locating and collecting samples, are intended to limit the introduction of error. Quality-control activities, such as the collection of duplicate samples and the inclusion of blanks in sample sets, are intended to provide the information required to characterize any errors in the data. Other QC activities, such as planning the QC program and auditing ongoing and completed activities, ensure that the specified procedures are followed and that the QA information needed for characterizing error is obtained.

The second QA/QC objective is to illustrate that waste testing has been performed according to specification in this waste-analysis plan. The QA/QC activities will include the following:

- Field inspections — performed by a PNNL QA officer or designee, depending on the activity. The inspections primarily are visual examinations but might include measurements of materials and equipment used, techniques employed, and the final products. The purpose of these inspections is to verify that a specific guideline, specification, or procedure for the activity is completed successfully.

- Field testing — performed onsite by the QA officer (or designee) according to specified procedures.

- Laboratory analyses — performed by onsite or offsite laboratories on samples of waste. The purpose of the laboratory analyses is to determine constituents or characteristics present and the concentration or level.

- Checklists — required for crucial inspections. Checklists are filled out during the course of inspection to document inspection results.

- Instrument calibration — required for maintaining records of calibration of all instruments used to perform surveying, field testing, and laboratory analyses.

5.4 Sampling Objectives

The data-quality objectives (DQO) for the waste sampling and data analyses are as follows:

- Determine if waste samples are representative of the contents of the containers at the time the samples were taken.

- Determine if waste samples are representative of long-term operations affecting 325 HWTUs.

- Determine if waste accepted for storage is within the RCRA permit- application documentation limitations.

- Determine if waste accepted for storage meets the requirements of 325 HWTUs waste-acceptance criteria.

- Determine if waste accepted for storage meets the information provided by the generator.

5.5 Data Collection/Sampling Objectives

The acquired data need to be scientifically sound, of known quality, and thoroughly documented. The DQOs for the data assessment will be used to determine compliance with national quality standards, which

are as follows:

- Precision — The precision will be the agreement between the collected samples (duplicates) for the same parameters, at the same location, and from the same collection vessel.

- Representativeness — The representativeness will address the degree to which the data accurately and precisely represent a real characterization of the population, parameter variation at a sampling point, sampling conditions, and the environmental condition at the time of sampling. The issue of representativeness will be addressed for the following points:

- Based on the generating process, the waste stream, and its volume, an adequate number of sampling locations are selected

The representativeness of selected media has been defined accurately.

- The sampling and analytical methodologies are appropriate.

- The environmental conditions at the time of sampling are documented.

- Completeness — The completeness will be defined as the capability of the sampling and analytical methodologies to measure the contaminants present in the waste accurately.

- Comparability — The comparability of the data generated will be defined as the data that are gathered using standardized sampling methods, standardized analyses methods, and quality-controlled data-reduction and validation methods.

5.6 Analytical Objectives

Analytical data will be communicated clearly and documented to verify that laboratory data-quality objects are achieved.

5.7 Field Quality Assurance and Quality Control

Internal QA/QC checks will be established by submitting QA and QC samples to the analytical laboratory. The number of field QA samples will be approximately 5% of the total number of field samples taken. The 5% criterion commonly is accepted for a minimum number of QA/QC samples. The types and frequency of collection for field QA samples are as follows:

- Field Blanks — A sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. Field blanks are prepared and preserved using sample containers from the same lot as the other samples collected that day. A sample blank is used to document contamination attributable to shipping and field-handling procedures. This type of blank is useful in documenting contamination of volatile organics samples.

- Field Duplicates — defined as independent samples collected in such a manner that the samples are equally representative of the variables of interest at a given point in space and time. The laboratory will use the field duplicate as laboratory duplicate and/or matrix spikes. Thus, for the duplicate sample, there will be the normal sample analysis, the field duplicate, and the laboratory duplicate (inorganic analysis). Duplicate samples will provide an estimate of sampling precision.

5.8 Laboratory Quality Assurance and Quality Control

All analytical work, whether performed in-house by PNNL's ACL or by outside, independent laboratories, is defined and controlled by a Statement of Work, prepared in accordance with administrative procedures. The daily quality of analytical data generated in the analytical laboratories will be controlled by the implementation of an analytical laboratory QA plan. At a minimum, the plan will document the following:

- sample custody and management practices
- requirements for sample preparation and analytical procedures
- instrument maintenance and calibration requirements
- internal QA/QC measures, including the use of method blanks
- required sample preservation protocols
- analysis capabilities.

The types of internal quality-control checks are as follows:

- Method Blanks — Method blanks usually consist of laboratory reagent-grade water treated in the same manner as the sample (i.e., digested, extracted, distilled) that is analyzed and reported as a standard sample would be reported.

- Method Blank Spike — A method blank spike is a sample of laboratory reagent-grade water fortified (spiked) with the analytes of interest, which is prepared and analyzed with the associated sample batch.

- Laboratory Control Sample — A QC sample introduced into a process to monitor the performance of the system.

- Matrix Spikes — An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. Matrix spikes will be performed on 5% of the samples (1 in 20) or one per batch of samples.

- Laboratory Duplicate Samples — Duplicate samples are obtained by splitting a field sample into two separate aliquots and performing two separate analyses on the aliquots. The analyses of laboratory duplicates monitor the precision of the analytical method for the sample matrix; however, the analyses might be affected by nonhomogeneity of the sample, in particular, by nonaqueous samples. Duplicates are performed only in association with selected protocols. Duplicates are performed only in association with selected protocols. Laboratory duplicates are performed on 5% of the samples (1 in 20) or one per batch of samples. If the precision value exceeds the control limit, then the sample set must be reanalyzed for the parameter in question.

- Known QC Check Sample — This is a reference QC sample as denoted by SW-846 of known concentration, obtained from the EPA, the National Institute of Standards and Technology, or an EPA-approved commercial source. This QC sample is taken to check the accuracy of an analytical procedure. The QC sample is particularly applicable when a minor revision or adjustment has been made to an analytical procedure or instrument. The results of a QC-check- standard analysis are compared with the true values, and the percent recovery of the check standard is calculated.

5.8.1 PNNL Analytical Chemistry Laboratory QA/QC

PNNL's analytical chemistry laboratory may need to be used to analyze samples of high-activity dangerous

waste. It has a rigorous QA plan that ensures that data produced are defensible, scientifically valid, and of known precision and accuracy, and meets the requirements of its clients, i.e., the 325 HWTUs.

5.8.2 Offsite Laboratory QA/QC

When it is necessary to send samples to an independent laboratory, contracts are not awarded until a pre-award evaluation of the prospective laboratory has been performed. The pre-award evaluation process involves the submittal of its QA plan to the waste-analysis project manager and the QA officer for approval. It also may involve a site visit by QA personnel and a technical expert, or may consist of a review of the prospective laboratories' QA/QC documents and records of surveillances/inspections, audits, non-conformances, and corrective actions maintained by PNNL or other Hanford Facility contractors.

5.9 Record-Keeping

Records associated with the waste-analysis plan and waste-verification program are maintained by the waste-management organization. A copy of the CDRR for each waste stream accepted at 325 HWTUs is maintained as part of the operating record. Generators maintain their sampling and analysis records. The waste-analysis plan will be revised whenever regulation changes affect the waste-analysis plan.

Figure 5-1. RLWS Disposal Log

ITEM#	Date Received	Generator Waste	Orig. Code	Lab No.	Principle Radionuclides	Hazards	Chemical Compliance	Neutralizing Agent	Amount	Final pH	Final Volume	Flush Volume	IML	RLWS Approval No.

1 **Figure 5-2. HWTU Waste Treatment Verification Form**

HWTU REFERENCE #: _____ Date: _____

GENERATOR NAME: _____

FACILITY ADDRESS: _____ PHONE #: _____

CONTACT NAME: _____ TITLE: _____

Constituents of Concern	Concentration to be Achieved	Actual Concentration After Treatment

Check One:

____ Waste meets all treatment standards

____ Waste requires further treatment

____ Waste treated to no residue

HWTU Signature _____

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6.0 SELECTING WASTE RE-EVALUATION FREQUENCIES

Essentially all of the waste received at the 325 HWTUs is characterized before acceptance.

Some analysis will be needed to verify that waste streams received by the 325 HWTUs conform to the information on the CDRR and or the waste analysis sheet supplied by the generator. If discrepancies are found between information on the CDRR, hazardous-waste manifest, shipping papers, waste- analysis documentation and verification analysis, then the discrepancy will be resolved by:

1. returning waste to the generator, or sample and analyze the materials in accordance with WAC 173-303-110; and/or
2. reassessing and redesignating the waste; repackaging and labeling as necessary or return to the generator.

Periodic re-evaluation provides verification that the results from the initial verification are still valid. Periodic re-evaluation also checks for changes in the waste stream.

Exceptions to physical screening for verification are:

- Shielded, classified, and remote-handled dangerous waste are not required to be physically screened; however, 325 HWTUs staff must perform a more rigorous documentation review and obtain the raw data to characterize the waste (< 1% of current waste receipts).
- Wastes which cannot be verified at the 325 HWTUs must be verified by the generator (e.g., large components, containers which cannot be opened, are greater than 20 mrem/h, contain greater than 10 nCi/gram of transuranic radionuclides, or will not fit into the NDE unit).

Analysis and characterization, as required by WAC 173-303-300(2), are performed on each waste before acceptance at the 325 HWTUs to determine waste designation and characteristics. The characterization of the waste, based on this information, is reviewed each time a waste is accepted. The information must be updated by the generator annually or when the waste stream changes, whichever comes first, or if the following occurs.

- The 325 HWTUs personnel have reason to suspect a change in the waste, based on inconsistencies in packaging or labeling of the waste.
- The information submitted previously does not match the characteristics of the waste submitted.

Sampling and laboratory analysis could be required to verify or establish waste characteristics for waste that is stored at the 325 HWTUs. The following are instances where sampling and laboratory analysis are required:

- inadequate information on PNNL-generated waste
- waste streams generated onsite will be verified at 5 percent of each waste stream
- inadequate information before waste was shipped or discrepancy discovered
- waste streams received for treatment from offsite generators will be verified at 10 percent of each waste stream applied per generator, per shipment
- identification and characterization for unknown waste and spills.

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7.0 SPECIAL PROCEDURAL REQUIREMENTS

7.1 Procedures for Receiving Shipments

The generator is responsible for identifying waste composition accurately and arranging for the transport of the waste. A copy of each transfer-tracking form and any other pertinent operating records are maintained by the 325 HWTUs for 3 years. The waste-tracking methods are as follows.

- **Inspection of Transfer Papers/Documentation** — The necessary transfer papers for the entire transfer are verified (i.e., signatures are dated, all waste containers included in the transfer are accounted for and correctly indicated on the transfer documentation, there is consistency throughout the different transfer documentation, and the documentation matches the labels on the containers).

- **Inspection of Waste Containers** — The condition of waste containers is checked to verify that the containers are in good condition (i.e., free of holes and punctures).

- **Inspection of Container Labeling** — Transfer documentation is used to verify that the containers are labeled with the appropriate "Hazardous/Dangerous Waste" labeling and associated markings according to the contents of the waste container.

- **Acceptance of Waste Containers** — The 325 HWTUs personnel sign the transfer documents and retain a copy.

If transport will be over public roads (unless those roads are closed to public access during waste transport) or offsite, then a Uniform Hazardous Waste Manifest will be prepared identifying the 325 HWTUs as the receiving unit (Hanford Facility Permit Condition II.Q1). The 325 HWTUs operations staff will sign and date each copy of the manifest to certify that the dangerous waste covered by the manifest was received. The transporter will be given at least one copy of the signed manifest. A copy of the manifest will be returned to the generator within 30 days of receipt at the 325 HWTUs. A copy of the manifest also will be retained in the 325 HWTUs operating records for 3 years.

7.2 Response to Significant Discrepancies

The primary concern during acceptance of containers for storage is improper packaging or waste-tracking form discrepancies. Containers with such discrepancies are not accepted at the 325 HWTUs. Depending on the nature of the condition, such discrepancies can be resolved through the use of one or more of the following alternatives.

- Incorrect or incomplete entries on the Uniform Hazardous Waste Manifest or the onsite waste-tracking form can be corrected or completed with concurrence of the onsite generator or offsite generator. Corrections are made by drawing a single line through the incorrect entry. Corrected entries are initialed and dated by the individual making the correction.
- The waste packages can be held and the onsite generator or offsite waste generator requested to provide written instructions for use in correcting the condition before the waste is accepted.
- Waste packages can be returned as unacceptable.
- The onsite generator or offsite waste generator can be requested to correct the condition on the Hanford Facility before the waste is accepted.
- If a noncompliant dangerous waste package is received from an offsite waste generator, and the waste package is nonreturnable because of condition, packaging, etc., and if an agreement cannot be reached

among the involved parties to resolve the noncompliant condition, then the issue will be referred to DOE-RL and Ecology for resolution. Ecology will be notified if a discrepancy is not resolved within 15 days after receiving a noncompliant shipment. Pending resolution, such waste packages, although not accepted, might be placed in the 325 HWTUs. The package(s) will be segregated from other waste.

7.3 Provisions for Non-Acceptance of Shipment

Before waste is brought into the 325 HWTUs, all associated documentation is inspected and verified for treatment and/or storage authorization. Any transfer of materials that the 325 HWTUs are not designed to treat and/or store neither are unloaded from the vehicle nor accepted for treatment or storage.

7.4 Activation of Contingency Plan for Damaged Shipment

If waste transfers arrive at the 325 HWTUs in a condition that presents a hazard to public health or the environment, the building emergency plan is implemented as described in Appendix 7A of the 325 HWTUs Part B Permit Application.

7.5 Tracking System

Upon generation or receipt into the 325 HWTUs, each container of waste is assigned a unique tracking number. This number is used to track the following information:

- a description and the quantity of each dangerous waste received and the method(s) and date(s) of storage or treatment in the 325 HWTUs, in accordance with WAC 173-303-380(2)
- the location of each dangerous-waste container stored in the unit and the quantity at each location, including cross-reference to any applicable manifest and/or waste-tracking numbers
- waste-analysis results.

This system effectively tracks waste containers as the containers move through treatment or storage at the 325 HWTUs. The information is retained as part of the 325 HWTUs operating record.

Sample-container selection is crucial to sample quality. When considering waste compatibility, durability, volume, and analytical sensitivities, the containers listed in Table 4.1 are recommended.

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APPENDIX 8A

TRAINING

APPENDIX 8A

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APPENDIX 8A

8.0 PERSONNEL TRAINING

The 325 Hazardous Waste Treatment Units (325 HWTUs) training plan outlines the training program developed and implemented for the 325 HWTUs employees whose duties are identified as being associated with dangerous waste management. The 325 HWTUs training program uses existing training courses. The program is designed to ensure the 325 HWTUs operations comply with the training requirements instituted in accordance with WAC 173-303-330 (see Section 8.2).

8.1 OUTLINE OF TRAINING PROGRAM [H-1]

The training program was designed to ensure that the 325 HWTUs are operated and maintained in accordance with the requirements of the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and the U.S. Department of Energy, Richland Operations Office (DOE-RL). The training program also is designed to prepare employees to operate and maintain the units in a safe, effective, efficient, and environmentally sound manner, and ensures that employees are prepared to respond in a prompt and effective manner should abnormal or emergency conditions occur. The 325 HWTUs management is responsible for identifying training requirements and providing personnel training. Training requirements for personnel outside of the 325 HWTUs is the responsibility of that person's management.

Pacific Northwest National Laboratory (PNNL) personnel not assigned to the 325 HWTUs may, on an occasional basis, assist with specific operations at this unit. Proper training for the job will be given to the personnel in these situations, before the beginning of any unsupervised work. This training shall be documented and kept on file at PNNL for future reference.

General requirements of a training program include:

- Teaching personnel to perform duties in compliance with Washington Administrative Code (WAC) 173-303 Dangerous Waste Regulations
- Instruction by a person knowledgeable of dangerous waste management procedures to include training relevant to the employee's position
- Development of a unit-specific program that includes instruction to familiarize personnel with applicable procedures, container management practices, spill response, and emergency procedures
- New employees must receive training within 6 months of employment and must be supervised until completion of training
- Employees must participate in an annual, biennial, and triennial requalification of training.

Management reevaluates the training program courses annually to ensure that dangerous waste training requirements continue to be met. These reevaluations could result in modifying or adding new material to the current training program.

Training requirements are provided in Table 1.

8.1.1 Job Titles and Job Descriptions [H-1a]

The HWTU Technical Specialist(s) is responsible for the proper acceptance, treatment, storage, and transport of dangerous waste at the HWTU. In addition, the HWTU Technical Specialist oversees dangerous waste pickup and transportation to the HWTU storage areas. When adequate volumes of waste

have accumulated, the HWTU Technical Specialist is responsible for readying the waste for transfer. These duties could include packaging, labeling, manifesting, and recordkeeping to ensure compliance with applicable regulations.

8.1.1.1 325 Hazardous Waste Treatment Unit Job Positions and Descriptions

The HWTU Activity Manager is responsible for the daily operation of the HWTU in compliance with regulations administered under the Resource Conservation and Recovery Act of 1976 (RCRA), WAC 173-303, and PNNL waste operating procedures.

The HWTU Activity Manager ultimately is responsible for assessing HWTU compliance, conducting inspections and overseeing any corrective actions that might result from the inspections, ensuring that waste handling and storing procedures are followed, and implementing the 325 HWTUs Contingency Plan and Emergency Procedures in coordination with the 325 Building Emergency Director (BED). In addition to these responsibilities, the HWTU Activity Manager directs new employees so that successful completion of introductory and on-the-job training is accomplished in the first 6 months of employment. The HWTU Activity Manager has final authority on acceptance of waste at the HWTU. The HWTU Activity Manager could review all waste disposal requests to ensure their accuracy and reliability, designate the waste, determine treatment and storage requirements, and oversee treatment of the waste. The HWTU Activity Manager also could perform waste management operations such as pickup and lab packing of small containers, oversight of waste shipping, and ensuring compliance with U.S. Department of Transportation regulations.

The HWTU Engineer/Scientist(s) is responsible for the proper acceptance, treatment, storage, and transport of dangerous waste at the HWTU. In addition, the HWTU Science/Engineer Associate oversees dangerous waste pickup and transportation to the HWTU storage areas. When adequate volumes of waste have accumulated, the HWTU Science/Engineer Associate is responsible for readying the waste for transfer. These duties could include packaging, labeling, manifesting, and recordkeeping to ensure compliance with applicable regulations.

The HWTU Technical Specialist(s) also performs waste management operations such as pickup and lab packing of small containers. The HWTU Technical Specialist(s) implements the 325 HWTUs Contingency Plan and Emergency Procedures in the absence of the HWTU Activity Manager.

The HWTU Technician(s) is responsible for the physical operations at the HWTU. This person is responsible for packaging, labeling, and preparing waste for transfer and assisting in any treatment or sampling activities and/or waste pickups. The HWTU Technician(s) also is responsible for performing minor maintenance and upkeep of the HWTU.

The HWTU Clerk(s) assists the technical specialist(s) and technicians(s) in recordkeeping and database maintenance, verification of waste inventories, and preparation of reports, labels, manifests, waste tracking forms, and other associated documentation.

8.1.1.2 Shielded Analytical Laboratory Job Titles and Descriptions.

The SAL Technical Group Leader (Supervisor) has responsibility for all operations within the SAL portion of the 325 HWTUs at the technical group management level. This includes all technical, managerial, and operational aspects of the SAL.

The SAL Technical Group Leader has responsibility for all aspects of the day-to-day operation of the SAL. Guidance and direction is provided to all personnel in the technical group. Final decisionmaking for operations within the technical group rests with the SAL Technical Group Leader. The SAL Technical Group Leader is responsible for the daily operations of the SAL, including all aspects of mixed

waste treatment activities. This includes ensuring compliance with RCRA, WAC 173-303, and PNNL waste operating procedures. The SAL Technical Group Leader also serves as a zone warden for the SAL and assists the 325 Building BED in the event of an offnormal event or emergency.

The SAL Waste Management Technician is responsible for the preparation and analysis of dangerous waste as performed in analytical chemistry hot cells and for the proper treatment and storage of mixed waste materials. The SAL Waste Management Technician is responsible for recordkeeping, waste designation, packaging, and transferring for the SAL portion of the 325 HWTUs. The position also involves all aspects of hot cell operation and master/slave manipulator operation, including the operation of analytical instrumentation situated in the hot cells.

The SAL Technical Specialist(s) and Technician(s) are responsible for the preparation and analysis of samples and conducting research activities as performed in analytical chemistry hot cells. The positions also involve all aspects of hot cell operation and master/slave manipulator operation, including the operation of analytical instrumentation situated in the hot cells.

The SAL Clerk(s) assists the Technical Group Leader in recordkeeping, database maintenance, and preparation of reports, labels, manifests, waste tracking forms, and other associated documentation.

325 Building Emergency Director.

The 325 Building BED has responsibility for directing emergency activities for the 325 Building, and serves as the Emergency Coordinator as described in WAC-173-303-360. This person will receive, in the event of an emergency, additional hazard information from the HWTU Activity Manager.

8.1.2 Training Content, Frequency, and Techniques [H-1b]

A list of required courses and associated training frequencies are provided in Table 1, and a brief description of these courses is processed in Sections 8.1.4 and 8.1.5. Personnel training could consist of both classroom and on-the-job training. Equivalent training that meets regulatory requirements could be taken in lieu of training identified in Table 1, with approval from the HWTU Activity Manager.

New employees at the 325 HWTUs must successfully complete the training program within 6 months after their employment or assignment to the unit or transfer to a new position within the unit. At a minimum, the training familiarizes personnel with emergency equipment and procedures, and unit operations. All current employees and new employees, upon completion of an initial qualification phase, will receive ongoing training relevant to the position for which they are employed. The continuing training received by each employee will be evaluated for relevance and completeness.

8.1.3 Training Coordinator [H-1c]

Training at PNNL is scheduled and provided by a number of specialists in their fields. The staff member's immediate line management has the responsibility for identifying training needs and coordinating completion of the training. The immediate line management is knowledgeable in dangerous waste management procedures.

PNNL also has a system that tracks and monitors training for employees. This coordination includes a system for flagging affected employees when additional training and/or followup is warranted.

8.1.4 Relevance of Training to Job Position [H-1d].

At a minimum, all Treatment, Storage, and Disposal (TSD) unit personnel will receive training commensurate with the level of knowledge necessary to ensure that each employee understands the general and specific aspects of their work environment. The titles and job descriptions of personnel involved in operating the 325 HWTUs are set forth in Section 8.1.1. All training for personnel is relevant

to the positions in which they are employed. For normal operating conditions, the training includes the following.

- Laboratory Standard Hazard Communication –Initial: This course familiarizes the personnel with their rights under the right-to-know statutes. Information on material safety data sheets (MSDS) and their availability and on standard industrial hygiene terms also is covered.

- Radiological Worker I – General Radiation Safety–Biennial: This course gives information on radiological fundamentals, radiation work permits, the ALARA program, personnel monitoring, radiological postings and controls, and radiological emergencies. A brief refresher to this class is required during alternate years.

- Radiological Worker II – General Radiation Safety–Biennial: This course gives information on the basic characteristics of radiation, natural and manmade sources, biological effects and risks of radiation exposure, ALARA, contamination control, and warnings and alarms. A brief refresher to this class is required during alternate years.

- Hazardous Waste Management/Hazardous and Mixed Waste Generator – Annual: This training covers internal PNNL dangerous and mixed waste procedures and issues and regulatory requirements applicable to PNNL operations.
- Hazardous Material Shipping Representative – Annual: This course introduces the requirements for transferring or shipping hazardous materials onsite and offsite.
- Radioactive Liquid Waste System Training – Annual: This course familiarizes personnel with the radioactive liquid waste system (RLWS) and provides specific waste acceptance criteria. In addition, the characteristics of hazardous waste are discussed.
- Low-Level Waste Package Training – Annual: This course provides details associated with the disposal of solid low-level waste. The course shows the waste certification process, along with the paperwork associated with the physical disposal process.
- Transuranic (TRU) Waste Packager Training – Annual: This class covers the applicable requirements for packaging, storing, certifying, and shipping TRU waste.

- Laboratory Hood Safety Training – Biennial: This course explains the operation of, proper use of, and hazards associated with laboratory hoods.

- Glove Box Operational Safety – Biennial: This 1-hour course is designed to serve as the basis for new glove box users and to refresh the experienced glove box user in the proper procedures of using the glove box, including glove change and bag-out methods.

- Crane Hoist and Rigging Safety – Triennial: This course provides instruction in the safe operation of cranes and in proper rigging techniques.

- Lock and Tag: General Employee Orientation – Initial: This course introduces the requirements of the lock and tag policy to personnel who might be in areas where machinery or equipment could be locked and tagged out of service.

- Lock and Tag for Authorized Staff Members – Annual: This course familiarizes personnel with the duties of identifying hazardous energy and the methods for its control, the importance of verifying that hazardous energy is adequately controlled, and the means of properly installing and removing lockout/tagout devices.

- Operational Safety Requirements (OSRs) General Training – Biennial: This course is intended to provide a general understanding of OSRs, why the requirements are needed, the development process, and how the requirements are implemented.

- 325 Building OSR Checklist Training – Biennial: This course is conducted to ensure that all personnel who work on or with projects or building systems in the 325 Building are familiar with and fully understand the contents and significance of the specific OSRs as detailed in the OSR Checklist.

- 325 HWTUs Permit Application Review – Annually or whenever the permit is revised, whichever is more frequent: This requirement is fulfilled by reading and studying the Permit and the permit application documentation.

- 325 Technical/Administrative Procedures – Initially and whenever the procedure content is revised: This requirement is fulfilled by reading and studying the written procedures pertaining to the individual's work area. The procedures include the Waste Handling Organization Procedures for HWTU personnel and the TSD-related Analytical Chemistry Laboratory Procedures for SAL personnel.

Training is tracked and documented through the laboratory training database system (LTDS). Training records and class documentation are held on file in the operations offices at the 325 HWTUs as part of the Operating Records.

8.1.5 Training for Emergency Response [H-1e]

Training is provided to ensure that personnel are able to respond effectively to emergencies and are familiar with emergency procedures, emergency equipment, and emergency systems. Emergency response training areas include, but are not limited to, the following:

- Using, inspecting, repairing or replacing 325 HWTUs emergency and monitoring equipment

- Activating and responding to communications and alarm systems

- Responding to fires and explosions

- Shutting down operations.

8.1.5.1 Procedures for Using, Inspecting, Repairing, and Replacing Unit Emergency and Monitoring Equipment.

Personnel operating the 325 HWTUs are adequately trained to ensure prompt and effective response to emergency situations that might arise during operation. The following required safety courses address emergency response and outline procedures for using, inspecting, repairing, and replacing unit emergency and monitoring equipment.

- 325 Building Emergency Procedure and Contingency Plan–Annually or when changes are made, whichever is more frequent: This course familiarizes personnel with the specific responsibilities of the emergency procedures and the written contingency plan.

- Respiratory Protection–Annual: This course familiarizes the personnel with the proper use of air purifying respirators and their limitations. It also makes personnel aware of potential respiratory hazards, how to recognize the hazards, and what actions to take.

- Treatment, Storage, or Disposal (TSD) Facility Hazardous Waste Operations Training–24-hour initial training and an 8-hour annual refresher: This course provides extensive instruction on the use of field survey instruments such as combustible gas indicators, oxygen meters, detector tube systems, photo and flame ionization instruments, organic vapor analyzer (OVA) meters, and atmospheric sampling instruments. Other topics covered include heat-induced illnesses, OSHA's Emergency Response Standards, lists of personal protective equipment, hazardous materials classification systems, confined space work practices, liquid storage tanks, contamination control, toxicology, and medical monitoring.

- Emergency Safety Showers and Eyewash Stations–Initial: This 8-minute video course provides personnel with training on emergency safety showers and eyewash stations.

- Fire Extinguisher Use–Annual: This 1.5-hour course covers the actual use of a portable fire extinguisher. The types, uses, and limitations of portable fire extinguishers are discussed; the trainee demonstrates the ability to extinguish a combustible liquid fire.

8.1.5.2 Key Parameter for Automatic Waste Feed Cut-Off Systems.

The 325 HWTUs have no automatic waste feed systems.

8.1.5.3 Communications or Alarm Systems.

Personnel operating the 325 HWTUs are properly trained in handling communication devices, alarm systems, and recognizing and understanding the meaning of alarm sirens. In addition, the 325 Building Emergency Procedure, required reading for all 325 HWTUs personnel, also details communication and alarm systems, as well as proper response to each system during an emergency.

8.1.5.4 Response to Fires.

Personnel at the 325 HWTUs are adequately trained in response to fires. All personnel are trained annually in the implementation of the Contingency Plan, which outlines each person's immediate and sequential actions in the event of any emergency. In addition, responsible personnel receive training for proper handling, maintenance, and discharge of fire extinguishers and proper activation of alarm and fire suppressant systems.

8.1.5.5 Response to Groundwater Contamination Incidents.

Groundwater monitoring is not required for the 325 HWTUs.

8.1.5.6 Shutdown of Operations.

In the event of a shutdown of operations in the 325 HWTUs due to an emergency situation, personnel follow plans outlined in the 325 HWTUs Contingency Plan. As mentioned previously, all personnel are trained annually in the implementation of the Contingency Plan. The persons responsible for the decision to shut down either the HWTU Activity Manager and the SAL Technical Group Leader.

8.2 IMPLEMENTATION OF TRAINING PROGRAM [H-2]

The training program is currently being implemented. All personnel will receive training within 6 months of their date of hire or their transfer to a new position in the 325 HWTUs. Personnel will not work in unsupervised positions until they have successfully completed the appropriate training courses. Records documenting formal training are maintained at the 325 HWTUs; primary files are kept at the office of the PNNL Laboratory Training Coordinator. Training records of current employees will be kept until closure of the unit. Records of former employees are kept for at least 3 years from the date when the employee last worked at the 325 HWTUs.

Table 8-1. 325 Hazardous Waste Treatment Units Training Requirements

TRAINING COURSE NAME	JOB POSITION								
	HWTU Personnel				SAL Personnel				
	AM	TS	T	C	GL	WT	T	C	BED
325 Building Emergency Procedure	A	A	A	A	A	A	A	A	A
325 HWTUs Contingency Plan	A	A	A	A	A	A	A	A	A
Laboratory Standard Hazard Communication	I	I	I	I	I	I	I	I	I
Radiological Worker I/Refresher	N	N	N	B	N	N	N	N	N
Radiological Worker II/Refresher	B	B	B	N	B	B	B	B	B
Respiratory Protection	A	A	A	N		N	A	A	N
Hazardous Waste Management	A	A	A	N	A	A	A	N	A
Hazardous Material Shipping Representative	B	B	N	N	N	B	N	N	N
24- & 8-Hour TSD Facility Hazardous Waste Operations	I/A	I/A	I/A	I/A	I/A	I/A	I/A	I/A	I/A
Radioactive Liquid Waste System Training	A	A	A	N	N	A	A	N	N
Low-Level Waste (LLW) Packager Training	A	A	A	N	A	A	N	N	N
Transuranic (TRU) Waste Packager	A	A	A	N	A	A	A	N	N
Emergency Safety Showers & Eyewash Stations	I	I	I	N	I	I	I	N	I
Laboratory Hood Safety	B	B	B	N	N	B	B	N	N
Glove Box Operational Safety	B	B	B	N	N	N	N	N	N
Lock & Tag for Authorized Staff Members	A	N	N	N	N	A	N	N	A
Lock & Tag General Employee Orientation	N	I	I	N	I	I	I	N	N
Crane-Hoist & Rigging Safety	T	T	T	N	N	T	T	N	N
Hands On Fire Extinguisher Use	A	A	A	N	N	A	N	N	N
Operational Safety Requirements General	B	B	B	B	B	B	B	B	B
325 Building OSR Checklist	B	B	B	B	B	B	B	B	B
325 HWTUs Permit Application Review	A	A	A	N	A	A	A	N	N
Applicable 325 TSD-related Operational Procedures	I*	I*	I*	N	I*	I*	I*	N	N

Job Position Key:

AM – HWTU Activity Manager
GL – SAL Technical Group Leader
WT – SAL Waste Technician
T – Unit/SAL Technical Specialist/Technician
TS – Unit Technical Specialist
C – Unit/SAL Clerk
BED – Building Emergency Director

Requirements Key

A – Annually
B – Biennially
I* – Initially, then when procedures are revised
I – Initially upon assignment to the unit
N – Not required
T – Triennially

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