ADDENDUM C

PROCESS INFORMATION

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ADDENDUM C

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Contents

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C PROCESS INFORMATION

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

The 325 HWTUs consist of two dangerous waste management units:

- The Shielded Analytical Laboratory (SAL), consisting of Rooms 200, 201, 202, 203, and 32 of the 325 Building. This area is used for treatment and storage of dangerous waste in containers and treatment and storage of dangerous waste in a 1514-liter tank located in Room 32 (basement of 325 Building).
- The Hazardous Waste Treatment Unit (HWTU) consisting of Rooms 520, 524, and 528 of the 325 Building. This area is used for treatment and storage of containerized dangerous waste.

The maximum amount of dangerous waste being treated or stored at any given time (design capacity) in the dangerous waste management units is as follows:

Activity	HWTU Containers	SAL Containers	SAL Tank
Storage (liters)	9000	3000	1218
Treatment (liters/day)	946	568	1218

The estimated annual quantity of containerized waste managed in the 325 HWTUs is 60,000 kilograms of waste storage per year and 22,500 kilograms of waste treatment. The estimated annual quantity for the SAL tank is 10,000 kilograms per year of storage and treatment. The actual quantity of waste present varies each day.

The 325 HWTUs receive and treat and/or store wastes described in Addendum B, Waste Analysis Plan. Small-volume containers are segregated by compatibility and stored until sufficient quantity is accumulated to prepare a labpack or bulk container (usually a 208-liter (55 gallon) drum.) Waste introduced into the Shielded Analytical Laboratory (SAL) tank is containerized for further management as described in Section C.2.1. Containers are repackaged for shipment as necessary and shipping documentation prepared pursuant to Permit Condition II.N for shipment to a permitted onsite dangerous waste management unit or offsite TSD facility for any necessary further treatment and compliant disposal.

C.1 Containers

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 wastes generated from onsite programs, primarily research laboratory analytical activities in the 325 Building and other PNNL facilities. Containers are then prepared for shipment to other on-site units or off-site TSD facilities for further treatment as required and compliant disposal. Descriptions of the containers used are provided in the sections that follow for the HWTU and SAL.

C.1.1 Container Selection

C.1.1.1 Containers Located in the Hazardous Waste Treatment Unit

Rooms 520, 524, and 528 of the HWTU will be used to store and treat dangerous waste generated primarily from laboratory operations throughout 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 will be selected based on several criteria, which may include guidance provided in PNNL's Environmental Management System, Department of Transportation container specifications, specific safety requirements (e.g. fire code requirements for storage of flammable liquids), compatibility with the waste, and/or waste acceptance criteria provided by the facilities to which the waste will

ultimately be shipped. Suitable containers will be identified by the waste generator and reviewed by 325 HWTUs staff prior to waste acceptance. 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 C.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 will be labeled to describe the contents of the container and the major hazards of the waste as required under WAC 173-303-395 and WAC 173-303-630(3). Each container will be assigned a unique identifying number. All containers used for onsite transfer will be selected and labeled according to requirements of this permit, and any other applicable rules and regulations, such as 49 CFR as required by WAC 173-303-190.

All flammable liquid waste will be stored in compatible containers and in Underwriter's Laboratory (UL)-listed and Factory Mutual (FM)-approved flammable storage. Wastes that also designate as ignitable will be managed according to the requirements of WAC 173-303-630(8)(b) and WAC 173-303-395(1)(a)-(c). Solid chemicals will be stored on shelving or in drums in specifically designated areas based on the hazard classification (49 CFR 172.101).

C.1.1.2 Shielded Analytical Laboratory Containers

The primary function of the SAL is to conduct preparation and analysis of samples of highly radioactive materials originating from various locations on the Hanford Site. The types of containers used to store dangerous waste in the SAL can vary widely from laboratory glassware for sample analysis to 322-liter containers used to overpack smaller containers.

The containers used for storage or treatment of dangerous waste will be compatible with the waste stored in the containers. Containers used will be selected based on several criteria, which may include guidance provided in PNNL's Environmental Management System, Department of Transportation container specifications, specific safety requirements (e.g. fire code requirements for storage of flammable liquids), compatibility with the waste, and/or waste acceptance criteria provided by the facilities to which the waste will ultimately be shipped. Suitable containers will be identified by the waste generator and reviewed by 325 HWTUs staff prior to waste acceptance. 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 C.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, 201, 202, and 203 will be used to store dangerous waste in containers. The back face of the SAL (Rooms 200, 202, and 203) will typically be used to store waste in larger containers. These containers include various types of 208-liter steel containers (lined and unlined). Because of the nature of some mixed waste being stored at the SAL, it is often necessary that these containers be modified. This modification is intended to make these containers compliant with ALARA criteria. These shielded containers usually contain anywhere from 3.79 liters to 53 liters of waste depending on the amount of shielding required. The waste can be packed in individual 3.79-liter to 4.73-liter containers before placement in the shielded container. The shielding may be accomplished by surrounding the small containers with concrete, lead, or other materials.

All containers of dangerous waste must be labeled to describe the contents of the container and the major hazards of the waste as required under WAC 173-303-395 and WAC 173-303-630(3). Each container is assigned a unique identifying number. All containers used for onsite transfer must be selected and labeled according to requirements of the permit and any applicable regulations, such as 49 CFR when required by WAC 173-303-190.

All flammable liquid waste must be segregated from any incompatible waste types and packaged in approved containers as described above.

C.1.2 Container Management Practices

The following sections describe the container management practices used for the HWTU and the SAL, to ensure the safe receipt, handling, preparation for transfer, and transportation of dangerous waste. Table C.1 lists the typical containers used in the 325 HWTUs. Container labels are removed or completely obscured when the container to which they are attached is rendered empty, unless the container will continue to be used for storing dangerous waste.

C.1.2.1 Hazardous Waste Treatment Unit Container Management Practices

Dangerous waste containers will be inspected for integrity and adequate seals before being accepted at the HWTU. Waste received for storage and treatment from outside Rooms 520, 524, and 528 will either be picked up by HWTU personnel or moved to Rooms 520, 524, 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 will be hand carried or moved on a platform or handcart, as appropriate, to Rooms 520, 524, or 528. 325 HWTUs staff moves the dangerous containers, keeping incompatible wastes separated. Unsupervised 325 HWTUs staff will not perform waste movement operations until they are formally trained.

Waste in containers that are damaged, leaking, lack integrity, or not securely sealed to prevent leakage will not be accepted at Rooms 520, 524, and 528. Examples of acceptable packaging include laboratory reagents in their original bottles, U.S. Department of Transportation-approved containers, spray cans, sealed ampules, paint cans, leaking containers that have been over packed, etc. Unit operations personnel have the authority to determine whether a container is in poor condition or inadequate for storage using the criteria referenced by WAC 173-303-190 and to use professional judgment to determine whether the packaging could leak during handling, storage, and/or treatment.

Inspection of Containers

A system of daily, weekly, and yearly inspections will be in place to ensure container integrity, and to check for proper storage location, prevent capacity overrun, etc. Inspections are detailed in Addendum I. Containers will be inspected for integrity as part of the HWTU waste acceptance process documented in Addendum B. Containers found to be in poor condition or inadequate for storage will not be accepted unless over packed or repackaged into acceptable containers.

Container Handling

All HWTU staff will be instructed in proper container handling and spill prevention safeguards as part of their training (Addendum G). Containers will be kept closed except when adding or removing waste in accordance with WAC 173-303-630(5)(a). All personnel will be trained and all operations will be 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 will be maintained with a minimum of 76 centimeters of aisle space in front of the doors. In Room 520, 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 will not be stacked in the hood. In Room 524, the walk-in fume hood containing the 208-liter containers is designed to hold two 208-liter containers and has over 76 centimeters of aisle space in front of the doors; the containers will not be stacked in the hood. Waste-handling operations will 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.

C.1.2.2 Shielded Analytical Laboratory Container Management Practices

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 will be segregated in the storage areas. In-cell containers will be stacked no more than four high and labels will not be obscured.

Inspection of Containers

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

Container Handling

All personnel will be instructed in proper container-handling safeguards as part of their training (Addendum G). Containers will be 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. After analysis of the sample and necessary confirmation of results, compatible solid waste samples will be 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 will either be transferred to the SAL tank (discussed in §C.2), prepared for disposal through stabilization, or absorbed onto appropriate material as necessary to meet the anticipated final disposal unit waste acceptance criteria. The waste will be repackaged into shielded 208-liter containers and stored in the back face area of the SAL. Waste-handling operations will be 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.

C.1.3 Container Labeling

Once the material has been designated as a dangerous waste, all containers will be marked and/or labeled to describe the content of the container as required by WAC 173-303-395 and WAC 173-303-630(3). Containers also will be marked with a unique identifying number assigned by the generating unit. All containers used for transfer of dangerous waste will be prepared for transport in accordance with WAC 173-303-190.

C.1.4 Containment Requirements for Storing Containers

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

C.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: UL or FM-approved storage cabinets, individual secondary containment devices, and the firewater containment system (Figure C.1).

Liquid dangerous waste and other waste requiring secondary containment in containers not exceeding the secondary containment capacity of the cabinet will be stored in Rooms 520, 524, and 528 in steel storage cabinets. The secondary containment capacity of the cabinets will be documented in the Hanford Facility Operating Record, 325 HWTUs File, and the quantity of waste stored in the cabinet or the capacity of the largest container in the cabinet will be limited by that capacity. The containers are selected as described in Section C.1.1.1 and will be kept closed except when waste is being added or withdrawn. Ignitable and reactive waste will be managed in accordance with WAC 173-303-395(1)(a) and the Uniform Building Code (ICBO 1991) (Note: The UBC references requirements of the Uniform Fire Code, or UFC).

Larger waste containers that contain bulk liquids will be stored inside DOT approved containers providing secondary containment, or managed on spill containment pallets. For compatible wastes

consolidated into lab-pack containers, the DOT approved outer container serves as secondary containment – such outer containers will be stored directly on the floor. Containers holding waste not subject to containment system requirements pursuant to WAC 173-303-630(7)(c) will be stored on the floor.

Each cabinet will be clearly marked as containing either flammable or corrosive waste. Flammable waste cabinets will be painted yellow, and corrosive cabinets will be painted blue.

Prior to acceptance at the unit, liquid "bulk" containers (i.e. containing free liquids) which will not be stored in cabinets will be evaluated to determine compatibility with any other "bulk" containers currently in storage in Rooms 520 or 528. If incompatible (as determined by the Waste Analysis Plan), the incompatible liquid wastes will be placed within drip pans or similar secondary containment devices complying with WAC 173-303-630(7)(a). This is intended to prevent incompatible materials from mixing in the fire water tank secondary containment system. Containers from 65 to 328 liters (17 to 85 gallons) capacity holding only wastes that do not contain free liquids, do not exhibit either the characteristic of ignitability or reactivity as described in WAC 173-303-090(5) or (7), and are not designated as F020, F021, F022, F023, F026, or F027 will be stored in DOT approved drums on the floor within the unit. Labpacks are considered not to require further secondary containment and will also be stored directly on the floor.

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, and prevents migration of spilled waste from one room to another.

Major spills or leaks of liquid mixed waste flow into the firewater containment system. The firewater containment system consists of floor trenches located at each entrance to 520 and 528 and the firewater 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 C.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 firewater containment tank.

The firewater 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 will be minimized since the number of containers open at one time is limited to those in process (waste not in process will be stored in closed containers). As noted above, independent secondary containment will be provided for bulk liquid wastes which are incompatible with any other bulk liquid wastes in storage. In addition, the very large volume of any firewater flow would dilute waste and would minimize the possibility of adverse reactions.

C.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 (Room 201), and the back face area (Rooms 200, 202, and 203). Figure C.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. All waste requiring it will be stored in secondary containment consisting of larger containers (e.g. "paint cans" as noted in Section C.1.2.2) and/or pans/trays.

The secondary containment system for the back face of the SAL consists of shielded 208-liter containers and plastic containers. Waste will be packaged in containers (e.g., paint cans, bottles, and bags) before removal from the hot cells. Containers of liquid waste will be placed into plastic containers that provide secondary containment and prevent spilled liquids from contacting other waste containers. Once removed from the hot cells, the containers will be placed into specially designed, shielded 208-liter containers to provide secondary containment. Some containers will be placed in shielded cubicles in Room 202 or in the glove boxes in Room 203 depending on container dose rates. The location of the cubicles and glove boxes is shown in Figure C.2. If any bulk liquid waste is stored in the back face area, it will be provided with compliant secondary containment per WAC 173-303-630(7)(a).

The secondary containment system for the front face of the SAL, which is minimally used to store mixed waste (near the north end away from the manipulator area), is similar to the system for the back face. Containers holding liquid and solid mixed waste will be placed into containers to provide secondary containment.

C.1.5 Structural Integrity of Base

A description of the requirements for base or liner to contain liquid is provided in the following sections for the HWTU and the SAL. The Permittees will place documentation in the Hanford Facility Operating Record, 325 HWTUs File identifying the specific chemical resistant floor and wall coatings used for secondary containment in the 325 HWTUs.

C.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 a 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, gaps, and will be maintained that way throughout the life of the HWTU. The condition of the floor will be inspected weekly as part of the inspection program (Addendum I). Floor coating assessment will be carried out whenever the floor coating is observed to be 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 will be repaired periodically.

The floor coating holds spilled liquid until the liquid is cleaned up, or enters the drains in each room. Once the liquid has entered the drains, it flows into the firewater containment tank in the basement, where the liquid will be 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 will be mixed in accordance with ASTM 094, Section 5.3, Alternate 2, and will be 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 rooms 520 and 528 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.

C.1.5.2 Requirements for Base or Liner to Contain Liquids in the Shielded Analytical Laboratory

The base currently is free of cracks, 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 will be 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 will be stored in individual secondary containment to prevent contact of the waste with the stainless steel in the event that a primary waste container was to fail. Because the volumes of waste generated and stored are small and the hot cell floors are not sloped, waste spilled during waste handling activities probably would remain localized and will be cleaned up expeditiously to ensure that no damage occurs to the stainless steel. In order to avoid spillage reaching the stainless steel tank serving the hot cells, separate secondary containment will be provided for waste stored in the six cells as required by WAC 173-303-630(7). Liner and base requirements for the SAL tank are discussed in §C.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. The Room 200 concrete floor is painted with an epoxy-based paint, and has epoxy sealant applied to a trap door in the floor that enables transfer of equipment between Rooms 200 and 32. The airflow between these rooms is from Room 200 to Room 32 due to positive air pressure in Room 200.

C.1.6 Containment System Drainage

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

C.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 collect in the cabinet and remain in a localized area until the spills are cleaned up. Containers of dangerous waste will be stored in drums, on shelves within open-faced hoods, or within flammable or corrosive 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 through the walls.

The floor in Room 524 is not sloped. All liquid waste in this room will be stored in secondary containment. The secondary containment for liquids will consist of steel storage cabinets with secondary containment, DOT approved containers or one of the stainless steel 'container pans'. Any container holding waste not subject to containment system requirements will be stored on the floor.

The floor drains across each exit in Rooms 520 and 528 drain spills to an emergency firewater containment tank (22,710-liter capacity) located in the basement of the 325 Building. The tank captures all drained liquid, where the liquid will be stored until sampling and analysis indicates a proper treatment and/or disposal method.

C.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 will be stored within secondary containment to prevent contact with accumulated liquids.

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

C.1.7 Containment System Capacity

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

C.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 the HWTU is 12,000 liters. The largest mixed waste storage container is a 322-liter container. The firewater containment tank provides secondary containment for larger containers stored in Rooms 520 and 528. The capacity of the firewater 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).

C.1.7.2 Containment System Capacity for the Shielded Analytical Laboratory

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. In-cell secondary containment as described in Section C.1.4.2 is provided for all stored wastes requiring it per WAC 173-303-630(7).

Liquid waste stored in Room 201 will be stored in the fume hood. The waste will be stored in glass or plastic bottles that are 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 will be 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, and the rear face floor is coated with an epoxy-based paint. The rear face floor in Rooms 202 and 203 is covered with epoxy paint. 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.

C.1.8 Control of Run-on

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

C.1.8.1 Control of Run-on for the Hazardous Waste Treatment Unit

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

C.1.8.2 Control of Run-on for the Shielded Analytical Lab

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

C.1.9 Removal of Liquids from Containment System

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

C.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 (Addendum J). 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 will be contained within the Room 520, 524 or 528 storage cabinets, floor, or within the firewater containment tank. Localized spills of liquids to the floor of the HWTU rooms will be 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 will be recovered and placed in an appropriate container. The floor, cabinets, and any other impacted containers will 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 an appropriate manner. If spilled materials in the HWTU reach the firewater 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 documented in Addendum B, Waste Analysis Plan. The tank is designed to allow easy access for material sampling. Depending on the results of the analysis, the collected spill material will be recovered and disposed of at an appropriate facility.

C.1.9.2 Removal of Liquids from the Shielded Analytical Laboratory Containment System

On discovery of liquid accumulation in the hot cells or 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 (Addendum J). 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. For in-cell spills, hot cell technicians will clean up the spill using sorbents or wipers (possibly including neutralization of a spilled acid or base) and the waste will be submitted for disposal in accordance with Addendum B. For liquids discovered in the back or front face areas, 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.

C.1.10 Management of Ignitable and Reactive Waste in Containers

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

C.1.10.1 Management of Ignitable and Reactive Waste in Containers in the Hazardous Waste Treatment Units

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

C.1.10.2 Management of Ignitable and Reactive Waste in Containers in the Shielded Analytical Laboratory

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

C.1.11 Management of Incompatible Waste in Containers

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

C.1.11.1 Management of Incompatible Waste in Containers at the Hazardous Waste Treatment Unit

Containers of ignitable and reactive waste will be stored in segregated flammable storage cabinets. Addendum F, §F.3.2, describes the methods used to determine the compatibility of dangerous waste so that incompatible waste is not stored together. Incompatible waste will never be placed in the same container or in unwashed containers that previously held incompatible waste. Operations will be 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 will not be produced; uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion will not be produced; and damage to the container will not occur. Information on the hazard classification of waste accepted by the HWTU will be documented by the generating unit, which is carefully reviewed by HWTU personnel before waste acceptance. Mixing of incompatible waste will be 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 Addendum F, §F.3.2.

Minimum aisle space will be maintained according to the Uniform Fire Code to separate incompatible waste, and the aisle space requirements of WAC 173-303-630(5) and (9), and WAC 173-303-340(3). The possibility of adverse reaction is minimized (see Addendum F, §F.3.1 for methods used to prevent sources of ignition).

C.1.11.2 Management of Incompatible Waste in Containers at the Shielded Analytical Laboratory

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

Treatment operations will be conducted 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 will be maintained and inspected routinely in accordance with PNNL preventive maintenance standards. 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 will be 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

will be stored within separate secondary containers, which eliminates the potential for combining incompatible waste. Waste stored in the front or back face of the SAL will be packaged by hazard classes for transfer or will be segregated in separate secondary containment.

C.2 Tank Systems

The following sections describe the management of dangerous waste in the SAL tank system. The tank system consists of the tank; associated piping, valves and pumps; and secondary containment. The 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 §C.2.1 and depicted in Figure C.2.

C.2.1 Shielded Analytical Laboratory Tank System

The SAL is an analytical chemistry laboratory used primarily to prepare and analyze samples for research and development activities and waste characterization. Storage and treatment of dangerous waste in containers also occurs in the SAL. This work is conducted in six inter-connected hot cells. Liquid waste generated during these operations will be collected, treated if necessary, and may be containerized or 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 will be treated in the tank, as needed, and batch transferred from the SAL tank to containers for disposal through a pressurized transfer line that leads back into Cell 6 of the SAL. The SAL tank volume is 1,218 liters and has a throughput of 10,000 kilograms per year.

C.2.1.1 Design, Installation, and Assessment of Tank Systems

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

C.2.1.1.1 Design Requirements

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.

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.

Solution enters the tank through a gravity flow, welded drain line piped from the hot cells. The SAL sources that tie into this drainpipe includes: 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. A return line of stainless steel is attached to the top of the tank and can be 'jetted' using water pressure to transfer the tank contents back

up to Cell 6 of the SAL. 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 solution will be stored in the SAL tank, treated as needed and transferred to containers for final disposal.

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 will be staffed 24 hours a day, 7 days a week. If a high-alarm situation occurs 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 deenergize 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 (Addendum I).

C.2.1.1.2 Integrity Assessments

An independent, qualified, registered professional engineer's tank integrity certification has been completed and must be maintained on file in the Hanford Facility Operating Record, 325 HWTUs File. The Permittees will conduct periodic integrity assessments according to the schedules included in the integrity assessment report.

C.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.

C.2.1.2.1 Requirements for Tank Systems

The secondary containment system for the SAL Tank in Room 32 consists of two components. The SAL tank is a double-walled vessel and the outer tank provides secondary containment for the inner tank. However, since the inner tank cannot be easily inspected, the outer tank is considered the "primary containment" and a pan installed under the tank is considered to provide secondary containment for the tank system.

The existing drainpipe from the hot cells to the SAL tank is a single-walled, 5.1-centimeter welded stainless steel pipe. This piping will be 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. 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.

C.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 527A. The HWTU will have the option of either keeping the camera/monitor controls in Room 527A or moving it to another location for operational flexibility. By maintaining operational flexibility of where the camera controls are located, the HWTU can meet ALARA (As Low As Reasonably Achievable) requirements and minimize the expense of added HWTU training requirements.

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. In addition, 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 secondary 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 a 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 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 tank annulus, extending to the bottom and is capped at the top. 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 out the liquid to appropriate containers.

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 outer tank should also leak, the containment pan installed beneath the tank provides secondary containment.

C.2.1.2.3 Secondary Containment and Leak Detection Requirements for Ancillary Equipment

Secondary containment for the SAL tank system ancillary equipment will be 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 will be allowed. The pumps are magnetic coupling pumps located above the pan. All construction material is stainless steel; for the 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 Addendum J requirements for cleaning up spills and leaks. Any required release reports will be filed according to the requirements of WAC 173-303-640(7).

C.2.1.2.4 Controls and Practices to Prevent Spills and Overflows

The SAL tank system has been designed to provide safe and reliable operation that prevents the system from rupturing, leaking, corroding, or otherwise failing. The tank will be provided with redundant-level instrumentation to monitor tank levels. Both capacitance- and conductance-level probes will be used for level monitoring and alarming. The tank will alarm on high level and interlock the process water to fail close. The process water will be supplied to both the hot cells and the tank system. The containment pan will be 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. This provides an allowance of 97 liters.

Trained personnel respond to spills by stopping or securing the action causing the spill, notifying others in the area of the spill, and following the requirements of Addendum J. Measures will be in place to inspect the system daily (see Addendum I).

C.2.1.3 Tank Management Practices

Wastes to be introduced to the SAL tank will first be profiled and approved in accordance with the Waste Analysis Plan, Addendum B, before introduction. Introduction of liquid waste to the SAL tank will be conducted by pouring the waste 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 sub-atmospheric pressure, and no pressure controls are necessary for this tank system.

The SAL tank will be 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 will be 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. The SAL tank volume may be transferred to SAL Cell 6 for treatment and/or subsequent storage in containers using a transfer line. As with the drain lines, the transfer line is constructed of single-wall stainless steel piping. All transfer line connections outside the tank's secondary containment system are protected against over pressurization via a pressure-relief valve on the tank set for 19 psig.

C.2.1.4 Marking or Labeling

Due to the ALARA concerns associated with the SAL tank, the tank itself is not labeled. The tank will be located in a locked room to comply with ALARA standards. Access points to the room will be labeled to meet the requirements of WAC 173-303-395 and WAC 173-303-640(5)(d). The marking of the access points will be legible from a distance of 15 meters and identifies the major risks associated with the waste. The label adequately warns employees, emergency response personnel, and the public of the major risks associated with the waste being stored within the tank. The tank will also have a written placard identifying important hazard concerns.

C.2.1.5 Ignitable, Reactive, and Incompatible Waste

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 internal PNNL documentation 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 mixed waste, corrosive chemicals, and hazardous chemicals. All operations performed in the SAL hot cells will be 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 will be 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.

C.3 Air Emissions Control

There are no process vents in Operating Unit Group 5 (325 HWTU), so the requirements of WAC 173-303-690 do not apply. Similarly, there is no equipment managing or contacting dangerous or mixed waste with volatile organics above 10 wt%, so the requirements of WAC 173-303-691 do not apply. The SAL will be used solely for the management of mixed waste and is therefore exempt from

WAC 173-303-692. Containers stored in the HWTU will be evaluated for compliance with WAC 173-303-692 as follows.

Compliance with the Subpart CC standards will be maintained at the HWTU by utilizing DOT-specification containers for storage, when the container has a design capacity greater than 0.1 m^3 (26.4 gallons). Containers greater than 0.46 m^3 (121 gallons) are not typically utilized at the HWTU, and if they are, they will be used only for materials with low vapor pressures. Hence Level 1 container standards are the only standards that must be met.

To meet the Level 1 standards, the following standards are observed:

- Opening hazardous waste containers only occurs when adding or removing waste, or for necessary inspection or sampling, after which the container is promptly re-closed.
- Inspection of the closure of hazardous waste containers will be checked prior to loading for shipment to the HWTU as part of the waste acceptance process (Addendum B, Section B.2.1).
- Any waste container greater than 0.1 m3 capacity stored longer than one year will be re-inspected at least once every 12 months to check the container for deterioration or damage. Any deterioration or damage will be documented and promptly repaired in accordance with 40 CFR 264.1086(c)(4)(iii).

Determination that containers with capacity greater than 0.46 m^3 (121 gallons) are not in "light material service" is provided through the acceptance criteria in the 325 HWTUs waste analysis plan (Addendum B, Section B.1.1.1.2).

Table C.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

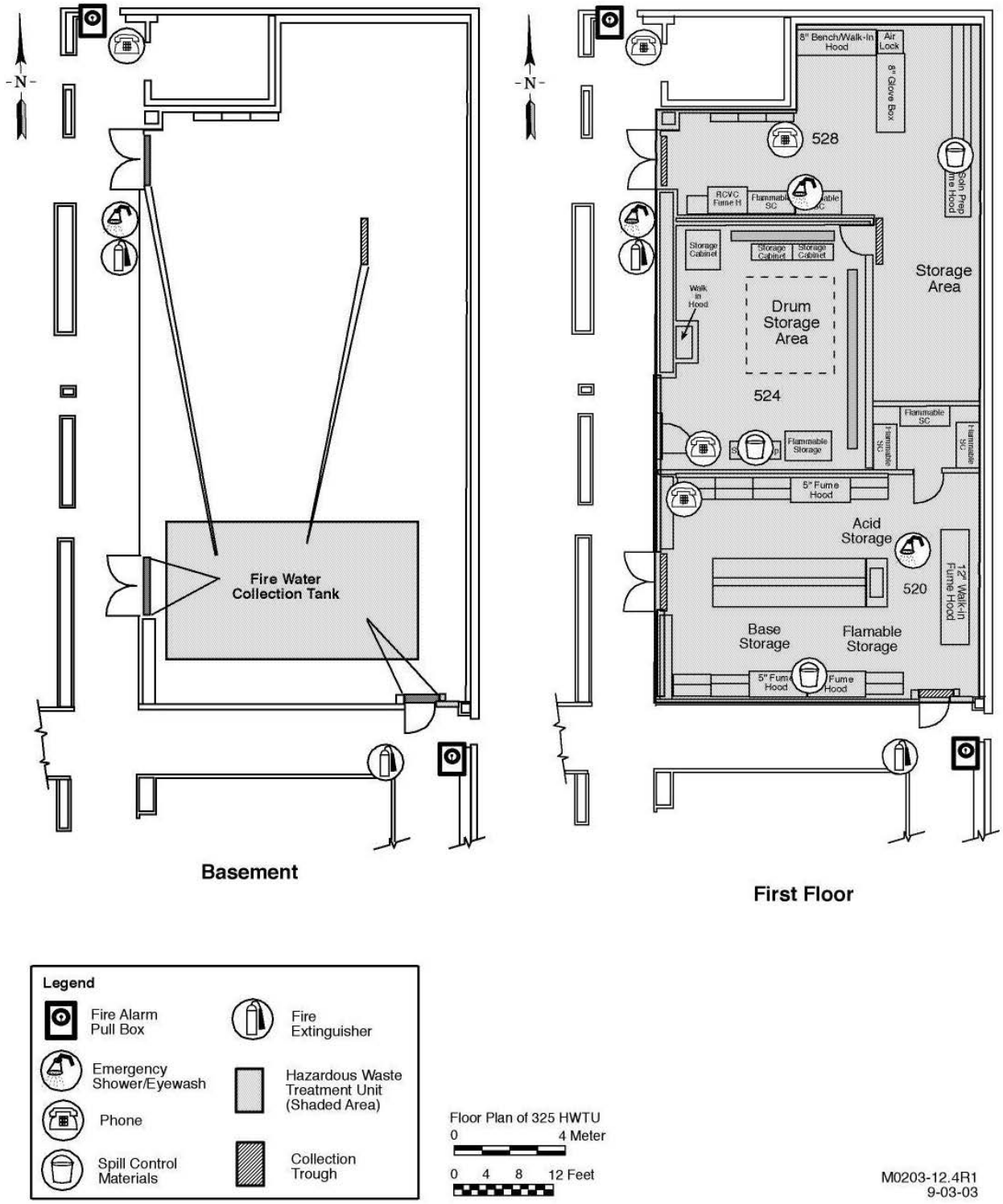

Figure C.1. Hazardous Waste Treatment Unit Secondary Containment System

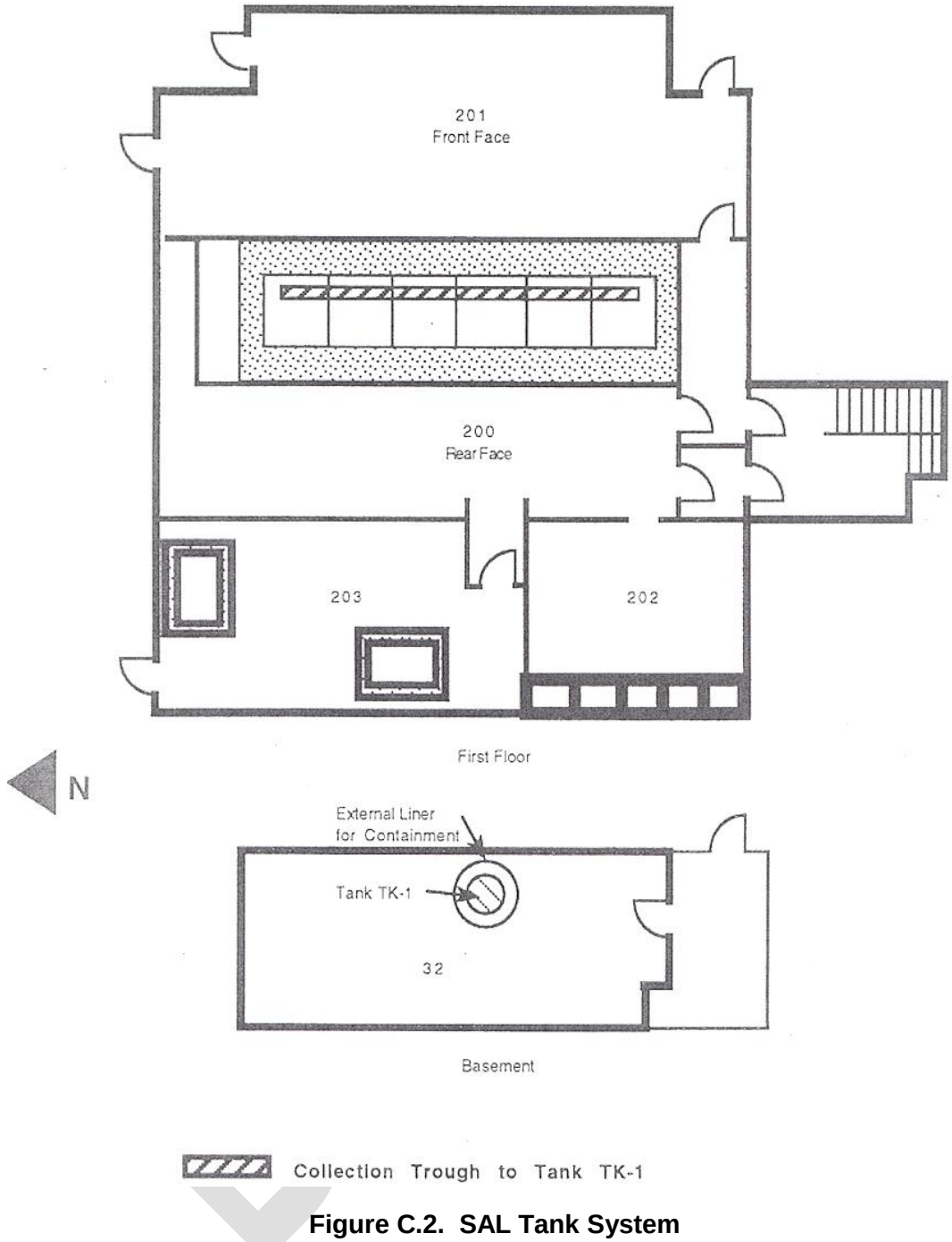

Figure C.2. SAL Tank System