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TITLE: Response to Class 1 Modifications to Hanford Facility RCRA Permit December 31 2003

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Department of Energy

Richland Operations Office
P.O. Box 550
Richland, Washington 99352

04-OES-0142

SEP 2 8 2004

Ms. Greta P. Davis
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99352

Dear Ms. Davis:

RESPONSE TO CLASS 1 MODIFICATIONS TO THE HANFORD FACILITY RESOURCE CONSERVATION AND RECOVERY ACT PERMIT (DECEMBER 31, 2003)

This letter is in response to the State of Washington Department of Ecology (Ecology) letters dated July 19 and August 12, 2004, concerning the December 31, 2003, modifications in Part III, Part IV, and Part V of the Hanford Facility Resource Conservation and Recovery Act Permit (Permit). Enclosed are the Permit Attachments reflecting Ecology's review. The specific items addressed in the Permit Attachments are listed in this letter for Part III (305-B Storage Facility, PUREX Storage Tunnels, Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility, 242-A Evaporator, and 325 Hazardous Waste Treatment Units), Part IV (100-NR-1 Operable Unit and 100-NR-2 Operable Unit), and Part V (1324-N Surface Impoundment and 1324-NA Percolation Pond, and 1301-N and 1325-N Liquid Waste Disposal Facilities). A record of these modifications is maintained in the Hanford Facility Operating Record. The Class 1 modifications ensure that all activities are conducted in compliance with the Permit.

Part III, Attachment 18, 305-B Storage Facility:
1. Permit Condition III.2, modified to reflect Ecology's comments (Modification Notification Form, Page 2 of 22).
2. Chapter 11.0, §11.1.4.1, retained Section (Modification Notification Form, Page 16 of 22).
3. Chapter 12.0, retained Chapter (Modification Notification Form, Page 21 of 22).
4. Chapter 13.0, retained Chapter (Modification Notification Form, Page 22 of 22).

Part III, Attachment 28, PUREX Storage Tunnels:
1. Permit Condition III.3, modified to reflect Ecology's comments (Modification Notification Form, Page 2 of 47).
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4. Chapter 3.0, §3.3, accepted modification and modified Section to reflect Ecology's requested language (Modification Notification Form, Page 8 of 47).
5. Chapter 3.0, §3.5.1.4, retained Section (Modification Notification Form, Page 15 of 47).

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7. Chapter 3.0, §3.5.2.3, accepted modification and modified Section to reflect Ecology's requested language (Modification Notification Form, Page 18 of 47).
8. Chapter 3.0, §3.6.1, retained Section (Modification Notification Form, Page 19 of 47).
9. Chapter 3.0, §3.8.2, accepted modification and modified last paragraph of Section to reflect Ecology's requested language (Modification Notification Form, Page 21 of 47).
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11. Chapter 4.0, §4.1.6.2, accepted modification and modified Section to reflect Ecology's requested language (Modification Notification Form, Page 34 of 47).
12. Chapter 6.0, §6.4.4.2, accepted modification and modified Section to reflect Ecology's requested language (Modification Notification Form, Page 41 of 47).
13. Chapter 6.0, 6.4.5, accepted modification and corrected Section numbering(Modification Notification Form, Page 42 of 47).
14. Chapter 7.0, §7.1.5, accepted modification and modified Section to reflect Ecology's requested language (Modification Notification Form, Page 43 of 47).
15. Chapter 11.0, §11.0, accepted modification and modified Section to reflect Ecology's requested language (Modification Notification Form, Page 45 of 47).
16. Chapter 12.0, retained Chapter (Modification Notification Form, Page 46 of 47).
17. Chapter 13.0, retained Chapter (Modification Notification Form, Page 47 of 47).

Part III, Attachment 34, Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility:
1. Permit Condition III.4, modified to reflect Ecology's comments (Modification Notification Form, Page 2 of 42).
2. Chapter 3.0, §3.6.1.1, accepted modification and modified Section to reflect Ecology's requested language (Modification Notification Form, Page 15 of 42)
3. Chapter 7.0, §7.3.2.5, retained Section (Modification Notification Form, Page 33 of 42)
4. Chapter 12.0, retained Chapter (Modification Notification Form, Page 41 of 42)
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Part III, Attachment 35, 242-A Evaporator:
1. Permit Condition III.5, modified to reflect Ecology's comments (Modification Notification Form, Page 2 of 34).
2. Chapter 2.0, §2.0, accepted modification and modified Section to reflect Ecology's requested language (Modification Notification Form, Page 8 of 34).
3. Chapter 12.0, retained Chapter (Modification Notification Form, Page 33 of 34).
4. Chapter 13.0, retained Chapter (Modification Notification Form, Page 34 of 34).

Part III, Attachment 36, 325 Hazardous Waste Treatment Units:
1. Permit Condition III.6, modified to reflect Ecology's comments (Modification Notification Form, Page 2 of 54)
2. Chapter 3.0, §3.0, retained Section (Modification Notification Form, Page 5 of 54)
3. Chapter 3.0, §3.3, retained Section (Modification Notification Form, Page 9 of 54)
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Part V, Attachment 41, 1301-N and 1325-N Liquid Waste Disposal Facilities:
1. Permit Condition V.16, retained Chapter 16 (Modification Notification Form, Page 2 of 7)
2. Permit Condition V.17, retained Chapter 16 (Modification Notification Form, Page 2 of 2)

Part V, Attachment 42, 1324-N Surface Impoundment and 1324-NA Percolation Pond:
1. Permit Condition V.18, pending, retained Chapter 18 (Modification Notification Form, Page 2 of 2)
2. Permit Condition V.19, pending, retained Chapter 19 (Modification Notification Form, Page 2 of 2)

Part IV, Attachment 47, 100-NR-1 and 100-NR-2 Operable Units:
1. Permit Condition IV.1, retained 100-NR-1 Operable Unit Chapter and Attachment 47
2. Permit Condition IV.2, retained 100-NR-2 Operable Unit Chapter and Attachment 47

Part IV, Attachment 48, 100-NR-1 and 100-NR-2 Operable Units:
1. Permit Condition IV.1, retained 100-NR-1 Operable Unit Chapter and Attachment 48
2. Permit Condition IV.2, retained 100-NR-2 Operable Unit Chapter and Attachment 48

If you have any questions, please contact me, or your staff may contact Joel Hebdon, Director, Office of Environmental Services, on (509) 376-6657.

Sincerely,

for Keith A. Klein
Manager

OES:ACM

Enclosure

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Ecology NWP Library
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A. A. Hamar, Ecology
T. E. Logan, BHI
S. J. Skurla, Ecology
J. J. Wallace, Ecology

FH-0304837 R1

ATTACHMENT

Transmittal Letter and Enclosure to G. P. Davis, Ecology

Ms. Greta P. Davis
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton Blvd.
Richland, Washington 99352

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If you have any questions, please contact Joel Hebdon, Director, Office of Environmental Services, at (509) 376-6657.

Sincerely

Keith A. Klein
Manager

OES:ACM

Enclosure

cc w/encls:
F. W. Bond, Ecology
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J. J. Wallace, Ecology

Attachment 18
305-B Storage Facility

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ATTACHMENT 18
305-B Storage Facility

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11.0 CLOSURE AND POSTCLOSURE REQUIREMENTS

This chapter is submitted in accordance with the requirements of WAC 173-303-806(4)(a)(xiii) to demonstrate that DOE-RL has developed a plan to ensure safe closure of the 305-B Storage Facility. In accordance with WAC 173-303-610, copies of the closure plan and all revisions will be maintained at 305-B Storage Facility until certification of closure completeness has been submitted and accepted by Ecology. A post-closure plan is not required because 305-B Storage Facility is not a disposal unit and all dangerous waste and dangerous waste residues will be removed at the time of closure.

11.1 CLOSURE PLANS

This plan presents the activities required for final closure of the 305-B Storage Facility at its maximum extent of operation. The wastes included are those regulated as dangerous waste and mixed waste. Partial closure will not be conducted. Closure activities are presented in sufficient detail such that the closure process is understandable and a closure schedule can be developed.

11.1.1 Closure Performance Standard

The 305-B Storage Facility will be closed in a manner that will minimize the need for further maintenance and eliminate post-closure release of dangerous/mixed waste or dangerous/mixed waste constituents that could pose a risk to human health or the environment. This standard will be met by removal of all dangerous/mixed waste and dangerous/mixed residues from the unit. Closure activities will return the 305-B Storage Facility site to the appearance and use of surrounding land areas. After closure, the 305-B Storage Facility will be in a condition suitable for use to support research and development activities. This use is consistent with the surrounding land use.

If there is any evidence of spills or leaks from the unit into the environment, samples will be taken and analyzed to determine the extent of contamination in the soil, and if necessary, in groundwater. Evidence of spills or leaks will be obtained through sampling of unit structures accessible to the environment (e.g., floors) and through inspection of all barriers designed to prevent migration to the environment (e.g., sumps). If this sampling program indicates that contamination is present, the potential for migration of contamination to the environment will be evaluated. If potential migration appears likely, additional samples will be taken. In addition, if the inspections identify any potential contaminant migration routes (e.g., cracks in sumps), additional samples will be collected to determine whether migration has occurred. Spill reports and logs shall be consulted to determine potential areas of contamination.

Any contaminated soil will be excavated, removed, and disposed as dangerous or mixed waste. Soil will be decontaminated to the following levels, as required under WAC 173-303-610(2)(b):

- Background environmental levels for waste which are listed under WAC 173-303-081 or WAC 173-303-082
- Background environmental levels for waste which are characteristic dangerous waste under WAC 173-303-090
- Designation limits for waste that are designated under WAC 173-303-084, or WAC 173-303-101 through WAC 173-303-103.

Equipment and structural components will be decontaminated using the procedures described in Section 11.1.4. All residues resulting from decontamination will be sampled and analyzed, as described in Section 11.1.4.3, to determine whether they are dangerous waste. All residues will be removed from the unit and transferred to a facility having the necessary permits. Residues containing listed waste, having dangerous waste characteristics, or exceeding dangerous waste designation limits will be disposed as dangerous waste.

11.1.2 Partial and Final Closure Activities

This plan identifies the steps necessary to perform final closure of the unit in order to meet the aforementioned closure performance standard (Section 11.1). Closure activities involve removal of dangerous and mixed waste from the unit and decontamination of the unit. These activities can be implemented at any point during the active life of the unit. Partial closure of the unit will not be conducted. The entire 305-B Storage Facility will be in use at all times prior to closure. The entire unit, therefore, represents the maximum extent of the operation that will be unclosed during the unit's active life.

11.1.3 Maximum Waste Inventory

The 305-B Storage Facility is used to store a variety of different research-related waste. The maximum inventory of waste in storage at any time will be constrained by three factors:

- The total amount of dangerous/mixed waste in storage at 305-B Storage Facility at any time will not exceed the design capacity of 30,000 gallons (it is typically 2,000 to 5,000 gallons)
- The total amount of any particular dangerous/mixed waste in storage during any given year will not exceed the amounts given in the Part A permit application for 305-B Storage Facility (Attachment 18, Chapter 1.0, Part A)
- The total amount of dangerous/mixed waste by hazard class in storage at any one time will not exceed Uniform Building Code Class B Hazardous Material Quantity Restrictions (Attachment 18, Chapter 4.0, Table 4.1).

Except on the relatively rare occasion when 85-gallon overpacks are used, approximately 90 percent of all dangerous wastes shipped from the unit are contained in 55-gallon drums, with the remaining 10 percent consisting of 30-gallon and smaller containers.

11.1.4 Inventory Removal, Disposal or Decontamination of Equipment, Structures, and Soils

Steps for removing or decontaminating all dangerous/mixed waste containers, residues, and contaminated equipment are described below.

11.1.4.1 Inventory Removal

Closure activities will be initiated by removal of the dangerous/mixed waste inventory present at 305-B Storage Facility at the time of closure. Inventory removal procedures will be identical to the waste handling, packaging, and manifesting activities associated with normal operation of the unit. All dangerous waste present will be placed into proper containers according to currently accepted waste handling procedures; mixed waste will be placed into containers and meet Hanford specifications outlined in WHC-EP-0063, Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements. To the extent possible, chemicals will be bulked into larger containers. If wastes are bulked, containers will be emptied in compliance with WAC 173-303-160 so that they are not dangerous waste. Small quantity laboratory chemicals that cannot be bulked will be packaged into labpack containers in compliance with the requirements of WAC 173-303-161. All containers of dangerous/mixed waste will be manifested, and custody transferred to a dangerous waste transporter having a proper dangerous waste identification number. Waste will be transported to a permitted dangerous waste facility for treatment or disposal.

11.1.4.2 Decontamination of Building Equipment and Structures

All equipment and structures in dangerous/mixed waste handling and storage areas will be decontaminated at the time of closure. Equipment and structures to be decontaminated include:

- Floors and walls of the four dangerous waste storage cells
- Floors, walls, and ceiling of high bay and flammable liquid bulking module areas
- Floors and walls of remainder of first floor except for offices, work area, and lavatories/change rooms
- Floors, walls, and ceiling of basement except equipment storage room
- Interior surfaces of all secondary containment trenches
- Fork lift and loading hoist
- Asphalt ramp outside north high bay door.

Before decontamination, sampling and analysis will be performed to determine decontamination requirements. In most cases, minimal decontamination consisting of washing or wiping will be performed unless the sampling and analysis indicates the presence of significant contamination. In order to determine whether such contamination exists, a systematic sampling approach designed to identify the presence of contaminated areas will be employed. Structures (i.e., floors, walls, ceilings) to be sampled before decontamination will be sampled on a regular grid with a spacing of 5 feet. This spacing provides an 80 percent probability of detecting a circular area of contamination having a radius of 2.5 feet or larger. Biased sampling of areas more likely to have been contaminated by unit operations, such as cracks or seams in the concrete floor or any visible stains, or areas of documented spills or releases, will also be performed. If any areas of contamination are detected, more thorough decontamination procedures will be used in those areas.

Structural surfaces will be sampled by collecting wipe samples at each grid point. At each sample location, two samples will be collected within adjacent 1 foot square templates. One sample will be collected using a gauze pad wetted with dilute nitric acid for extraction of inorganic contaminants. The other sample will be collected with a gauze pad wetted with hexane for extraction of organic contaminants.

Decontamination of equipment and structures will take place as described below. The magnitude of each phase of the operation and estimated time for completion is included.

11.1.4.2.1 Decontamination of Basement

Once Cell 7 has been completely emptied of stored waste, any visible residues present will be scraped, vacuumed and/or swept up until visibly clean. All residues thus obtained will be placed in open top drums and disposed of as appropriate. All waste materials generated during the decontamination process of the Cell 7 will be designated to determine whether the waste generated from decontamination is mixed waste. After the above process is completed, wipe samples will be collected at various points along the floors, walls, and ceiling of the basement.

Swab samples will be collected from the Cell 7 to test for dangerous waste contamination resulting from storage activities. Any dangerous waste contamination found during this testing will be presumed to have come from storage activities unless otherwise documented. Random and biased sampling locations will be selected using the procedures noted in Section 11.4.4.

The swab samples will be analyzed for mixed waste constituents. Baseline smears will have been documented prior to introduction of mixed waste. Once the results from the testing are known, a decision can be made as to the appropriate decontamination procedures. If no contamination is found on the swab samples, decontamination procedures will consist of dusting, vacuuming, and wiping with soap and water. Vacuuming is performed using a commercial or industrial vacuum equipped with a high-efficiency particulate air (HEPA) filter. The vacuum cleaner bag containing captured particulates is disposed of as appropriate.

Dusting/wiping is done with a damp cloth or wipe (soaked with water or solvent) to remove dust from surfaces not practically treatable with a vacuum. The cloth or wipe is also disposed of as appropriate. Brushing or sweeping is used to clean up coarse debris.

Minimal time will be required for setup of the equipment. Labor requirements for the process should be moderate. Minimal time will also be required for packaging debris and dismantling and removing cleaning equipment. Little wastewater (only the contents of the buckets) will be generated by this procedure. However, if contamination is found on the swab samples, more sophisticated decontamination procedures must be implemented. The entire Cell 7 storage room will be extensively treated via steam cleaning. Applying steam from a hand-held wand to remove all residues from the surfaces will treat the ceiling, all four walls, and the floor. The contaminated wastewater generated by this activity will be contained by the designed spill controls already in place for waste storage areas. Pumps or vacuums will be used to empty the wastewater from the containment area into polyethylene-lined, closed top drums. These containers will be transported for proper management at an approved dangerous waste or mixed waste TSD facility.

Although this procedure will require more time than the dusting, vacuuming, and wiping procedures outlined above, time requirements are still considered to be minimal for the steam cleaning approach. Wastewaters generated by this procedure are not anticipated to exceed 100 gallons.

Following completion of decontamination, sampling will be performed, as described in Section 11.1.4.4, to verify that decontamination is complete.

11.1.4.2.2 Decontamination of Waste Handling Equipment

All equipment will be decontaminated first by solvent washing followed by steam cleaning, or disposed of as dangerous waste at an approved disposal facility. The decision to dispose or decontaminate equipment will be made at the time of closure. Whichever option, in the opinion of the Building Supervisor, is most environmentally and economically feasible will be chosen. If the equipment is not considered to be substantially contaminated, the solvent washing may not be performed. In this case, the steam cleaning technique only will clean the equipment.

All equipment to be decontaminated will be placed in one of the fully contained storage cells and subjected to the solvent wash deemed most effective for the removal of the suspected contamination. The equipment is then subjected to a final washing and rinsing by a steam-cleaning unit. All wastewaters will be collected in the storage cell sumps, pumped to polyethylene-lined closed top drums, and transported and disposed of as dangerous waste.

The time required for completion and wastewaters generated by these processes are largely dependent upon the amount of equipment that needs to be treated. However, at this time, minimal time and effort are anticipated. In addition, wastes to be generated are not anticipated to exceed 50 gallons.

Following completion of decontamination, sampling will be performed, as described in Section 11.1.4.4, to verify that decontamination is complete.

11.1.4.2.3 Decontamination of Dangerous Waste Storage Cells

Any visible contamination present in the storage cells will be scraped and/or swept until visibly clean. All residues obtained from the scraping/sweeping exercise will be placed in open top drums and disposed of as dangerous waste. Each of the four storage cells will be steam cleaned and the generated wastewaters collected in each of the storage cell's individual sumps. The wastewaters will be pumped from the sumps to polyethylene-lined, closed top drums in preparation for disposal. No wastewaters will be mixed with scrapings, sweepings, or wastewaters from other storage cells. Each sump area will be re-rinsed with water. This water will similarly be pumped to containers for disposal.

The containerized wastewaters will be analyzed to determine if they are designated as dangerous waste under WAC 173-303-070. If designated as dangerous, the wastewaters will be handled, transported, and disposed of as dangerous waste. If not dangerous waste, the wastewater will be managed appropriately. Total decontamination of the storage cells should be completed in no more than 2 weeks. Each of the storage cells should have approximately 30 gallons of wastewater generated during the cleaning and rinsing process; therefore, a total of 120 gallons of wastewater will need to be analyzed and disposed.

Following completion of decontamination, sampling will be performed, as described in Section 11.1.4.4, to verify that decontamination is complete.

11.1.4.2.4 Decontamination of High Bay, Flammable Liquid Bulking Module and Other First Floor Areas

Wipe samples will be collected at various points along the floors, walls, and ceiling of the entire first floor, except for the office, supply/office area, lunch room, and rest room. The wipe samples will be analyzed to determine if these areas have been contaminated with dangerous waste constituents. Once the results from the testing are known, a decision can be made as to the appropriate decontamination procedures.

If no contamination is found on the wipe samples, decontamination procedures will consist of dusting, vacuuming, and wiping. Vacuuming is performed using a commercial or industrial vacuum equipped with a HEPA filter. The vacuum cleaner bag containing captured particulates is disposed of as appropriate.

Dusting/wiping is done with a damp cloth or wipe (soaked with water or solvent) to remove dust from surfaces not practically treatable with a vacuum. The cloth or wipe is also disposed of as appropriate. Brushing or sweeping is used to clean up coarse debris.

Minimal time will be required for setup of the equipment. Labor requirements for the process should be moderate. Minimal time will also be required for packaging debris and dismantling and removing cleaning equipment. Little wastewater (only the contents of the buckets) will be generated by this procedure.

On the other hand, if contamination is found on the wipe samples, more sophisticated decontamination procedures must be implemented. The affected areas will be extensively treated via steam cleaning. Applying steam with a hand-held wand to remove all residues from the surfaces will treat such areas. The contaminated wastewater generated by this activity will be contained by the designed spill controls already in place for the waste storage areas. Pumps will be used to empty the wastewater from the containment area into polyethylene-lined closed top drums. These containers will be transferred for proper treatment or disposal at an approved dangerous waste facility. Although this procedure will require more time than the dusting, vacuuming, and wiping procedures outlined above, time requirements are still considered to be minimal for the steam cleaning approach. Wastewaters generated by this procedure are not anticipated to exceed 200 gallons.

Following completion of decontamination, sampling will be performed, as described in Section 11.1.4.4, to verify that decontamination is complete.

11.1.4.2.5 Decontamination of Sumps

All collection sumps located at the 305-B Storage Facility, including those lining the storage cells on the west side of the unit, the sump along the east side inside wall, and those protecting the exits on the north and south ends, will be decontaminated by steam cleaning. Wastewaters collected in each sump from the implementation of the cleaning process will be pumped into polyethylene-lined, closed top drums and analyzed as to whether or not the wastewater is designated as dangerous waste under WAC 173-303-070. If designated, the wastewater will be disposed of as dangerous waste. If the wastewater is not dangerous waste, the wastewaters will be discharged to the 300 Area process sewer system. The steam cleaning of all the sumps should take minimal time and generate approximately 100 gallons of wastewater.

Following completion of decontamination, sampling will be performed, as described in Section 11.1.4.4, to verify that decontamination is complete.

11.1.4.3 Management of Decontamination Waste

Liquid decontamination waste will be placed in drums and sampled to determine disposal requirements. Grab samples will be collected from drums using COLIWASA samplers. In order to properly designate the decontamination waste under WAC 173-303-070, grab samples from each drum will be analyzed for the following:

- Corrosivity using the methods described in SW-846
- Flash point using methods described in SW-846
- Toxicity characteristic using the toxicity characteristic leaching procedure described in SW-846 (includes analysis for metals, volatile organics, and semi-volatile organics including chlorinated pesticides)

The results of sample analysis will be used to determine how to dispose of liquid decontamination waste. The results of volatile and semi-volatile organic analysis of the liquid performed as part of the TCLP will be used to determine the presence of potential listed [WAC 173-303-081(1) and WAC 173-303-082(1)] dangerous waste constituents above background. (Background levels will be determined by analysis of the tap water used for makeup of the decontamination solutions.) Those liquid wastes with listed waste constituents above background will be designated as dangerous waste. The results of the ignitability, corrosivity, and TCLP analyses will be used to determine if liquid wastes are characteristic dangerous waste [WAC 173-303-090]. Organic and inorganic analytical results will also be used to determine if liquid wastes are dangerous waste mixtures [WAC 173-303-084]. These results will also be used to determine whether the wastes are LDR [WAC 173-303-140(4) and 40 CFR 268]. The results of the analyses will be used to determine whether any of the liquid wastes are mixed waste. Depending on designation, liquid decontamination waste will be disposed of as follows:

- Dangerous Manifested and shipped to a permitted dangerous waste TSD facility
- Mixed Waste Manifested and shipped to a permitted mixed waste TSD facility
- Nonregulated Shall be handled in accordance with the Liquid Effluent Consent Order (No. DE91NM-177) and Milestone M-17 of the Hanford Federal Facility Agreement and Consent Order.

All non-liquid waste generated during decontamination of dangerous waste storage areas and equipment (e.g., personnel protective clothing) will be collected in 55-gallon open-head drums and managed as dangerous waste. All non-liquid waste generated during decontamination of mixed waste storage areas and equipment will be similarly collected and managed as mixed waste.

11.1.4.4 Methods for Sampling and Testing to Demonstrate Success of Decontamination.

A series of wipe samples will be collected at various points along floors, walls, ceilings, and equipment of areas at which decontamination activities were conducted. These samples will be analyzed and used to verify whether decontamination procedures were effective. To verify decontamination, a systematic sampling approach designed to identify the presence of "hot spots" will be employed. Samples will be collected on a regular grid with a spacing of 5 feet. This spacing provides an 80 percent probability of detecting a circular "hot spot" having a radius of 2.5 feet or larger (Gilbert 1987, pp. 119-125). Biased sampling of areas more likely to have been contaminated by unit operations, such as cracks or seams in the concrete floor or any visible stains, or areas of documented spills or releases, will also be performed. If any "hot spots" are detected, additional decontamination will be performed. Decontaminated surfaces will be sampled by collecting wipe samples at each grid point. At each sample location, two samples will be collected within adjacent 1 foot square templates. One sample will be collected using a gauze pad wetted with dilute nitric acid for extraction of inorganic contaminants. The other sample will be collected with a gauze pad wetted with hexane for extraction of organic contaminants.

11.1.4.5 Closure of Containers

At closure, all containers will be removed from the 305-B Storage Facility. All dangerous waste residues will be removed from the containment system components. Contaminated equipment, floors, walls, and loading areas will be decontaminated or removed. All decontamination equipment and rinsate will be containerized, tested, and properly disposed. Sampling and analysis will be conducted to ensure that no contamination remains around the storage area and containment system. Additional details for closure and decontamination are provided in Sections 11.1.4.1 through 11.1.4.3.

11.1.4.6 Closure of Tanks

This section is not applicable to the 305-B Storage Facility because waste are not stored or treated in tanks.

11.1.4.7 Closure of Waste Piles

This section is not applicable to the 305-B Storage Facility because wastes are not stored in waste piles.

11.1.4.8 Closure of Surface Impoundments

This section is not applicable to the 305-B Storage Facility because wastes are not placed in surface impoundments.

11.1.4.9 Closure of Incinerators

This section is not applicable to the 305-B Storage Facility because wastes are not incinerated.

11.1.4.10 Closure of Land Treatment Facilities

This section is not applicable to the 305-B Storage Facility because wastes are not treated in land treatment units.

11.1.5 Closure of Disposal Facilities

This section is not applicable to the 305-B Storage Facility because it will not be closed as a dangerous waste disposal unit.

11.1.6 Closure Schedule

When closure begins, the inventory of dangerous and mixed waste will be removed within 90 days from receipt of the final volume of waste. All closure activities will be completed within 180 days of receipt of the final volume of waste. The Director of the Washington State Department of Ecology will be notified by DOE-RL at least 45 days before the final closure activities are begun. Closure activities are summarized in Table 11.1. A detailed schedule of closure activities is provided in Figure 11.1.

11.1.7 Extension of Closure Time Frame

The inventory of dangerous and mixed waste will be removed from the 305-B Storage Facility within 90 days of receipt of the last volume of waste. The closure activities described in this plan will be completed within 180 days of receipt of the final volume of waste. No extension to the time frame for initiation and completion of closure is currently expected to be necessary. Extensions to the time frames for closure would only be necessary if unexpected conditions were encountered during closure of the unit. If it becomes apparent that all waste cannot be removed within 90 days, Ecology will be so notified at least 30 days prior to expiration of the 90-day period. This notification will demonstrate why more than 90 days is required for removal of the waste and will demonstrate that steps have been taken to prevent threats to human health and the environment and that the unit is in compliance with applicable permit standards. If it becomes apparent that closure cannot be completed within 180 days after approval of this plan, Ecology will be so notified at least 30 days prior to expiration of the 180-day period. This notification will demonstrate why more than 180 days is required for closure and will demonstrate that steps have been taken to prevent threats to human health and the environment and that the unit is in compliance with applicable permit standards.

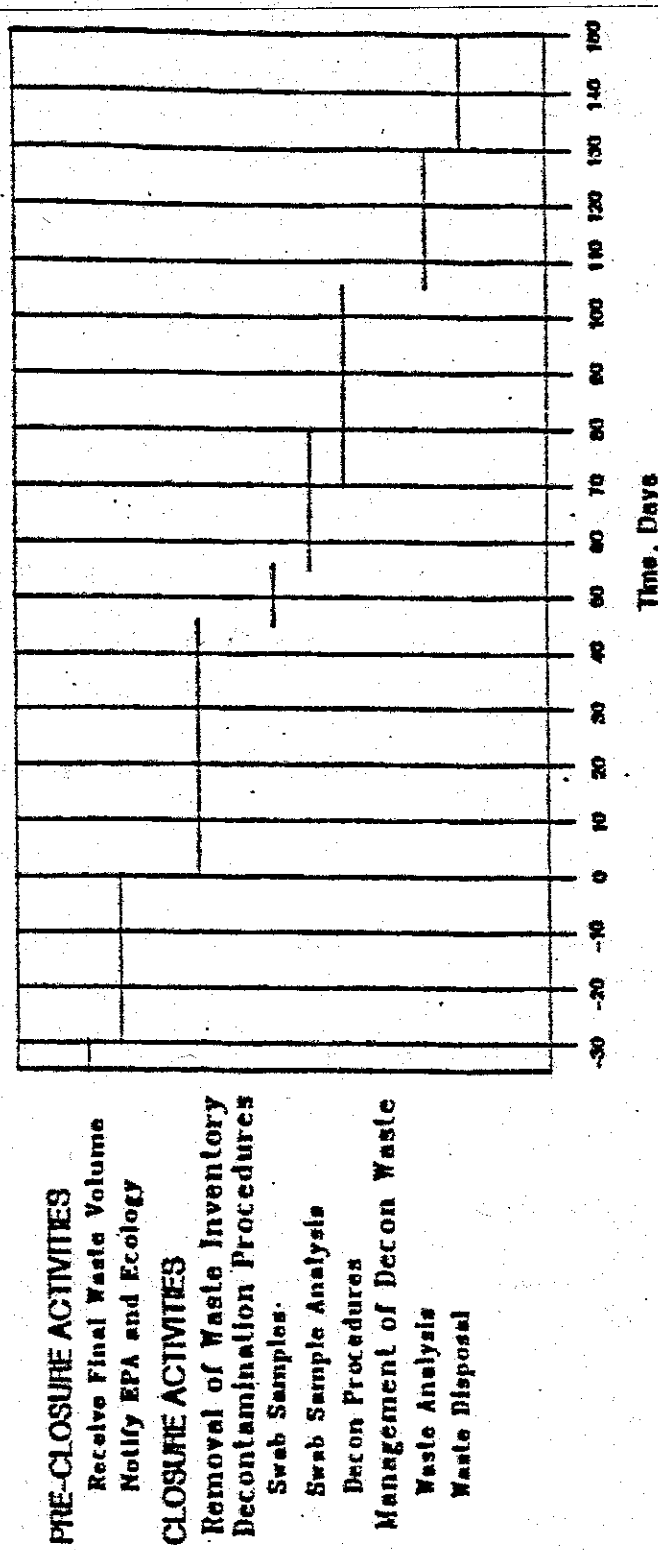
11.1.8 Amendments to Closure Plan

If changes are deemed necessary to the approved closure plan, DOE-RL will submit a written request to Ecology for authorizing a change to the approved plan. The written request will include a copy of the amended plan, in accordance with WAC 173-303-610(3)(b).

Table 11.1. Summary of Closure Activities.

Closure Activity Description	Expected Duration
Receipt of final volume of dangerous and/or mixed waste	N/A
Notify EPA and Ecology that closure will begin	N/A
Remove waste inventory – package all dangerous and mixed waste, manifest, and transfer to permitted facility for treatment and/or disposal	45 days
Obtain wipe samples from structural surfaces and equipment to identify areas of contamination and determine level of decontamination needed	10 days
Analyze wipe samples	25 days
Decontaminate structural surfaces and equipment using procedures based on results of wipe sampling	35 days
Obtain wipe samples to verify decontamination	25 days
Analyze verification samples	35 days
Analyze decontamination waste to determine proper methods of treatment/disposal	25 days
Dispose of decontamination waste based on results of waste analysis	20 days

Figure 11.1. Detailed Schedule of Closure



11.2 CERTIFICATION OF CLOSURE

Within 60 days of completion of the final closure activities described in this plan, a certification of closure will be submitted to Ecology. This certification will indicate that the 305-B Storage Facility has been closed as described in this plan and that the closure performance standards given in Section 11.1 has been met. The certification will be submitted by registered mail and will be signed by DOE-RL and an independent Professional Engineer registered in the State of Washington as described below.

The DOE-RL will self-certify with the following document or a document similar to it:

> *I, (name), an authorized representative of the U.S. Department of Energy-Richland Operations Office located at the Federal Building, 825 Jadwin Avenue, Richland, Washington, hereby state and certify that the 305-B Storage Facility at the 300 Area, to the best of my knowledge and belief, has been closed in accordance with the attached approved closure plan, and that the closure was completed on (date).*
>
> (Signature and date)

The DOE-RL will engage an independent Professional Engineer registered in the State of Washington to inspect closure activities, to verify that closure activities are being conducted according to this plan, and to certify that closure has been performed in accordance with this plan.

The engineer will inspect the 305-B Storage Facility at least weekly while closure activities are being performed. During these inspections the engineer will observe closure activities to determine whether they are being performed according to this plan. Inspections will include, but not be limited to:

- Inspection of dangerous and mixed waste containment structures and systems to determine whether releases of waste to the environment have occurred
- Verification that the dangerous and mixed waste inventory has been removed within 90 days of receipt of the last waste shipment
- Inspection of manifests and Operating Record to verify that these waste were disposed of in compliance with WAC 173-303
- Inspection of decontamination operations to verify that they are being performed using the procedures described in this plan
- Inspections of the Operating Record to verify that samples of liquid decontamination waste were collected and analyzed using the procedures described in this plan
- Inspection of the Operating Record to verify that decontamination waste were properly designated in compliance with WAC 173-303-070 and properly disposed.

Inspections by the engineer will be documented in a bound notebook. Notations will include the date and time of the inspection, the areas inspected, the activities inspected, applicable closure plan requirements inspected, status of observed activities with respect to plan requirements, corrective actions required status of past corrective actions, and name and signature of inspector. This inspection notebook will be made available to Ecology upon request.

Upon completion of closure according to the plan, the DOE-RL will require the engineer to sign the following document or a document similar to it:

> *I, (name), a certified Professional Engineer, hereby certify, to the best of my knowledge and belief, that I have made visual inspection(s) of the 305-B Storage Facility at the 300 Area and that closure of the aforementioned unit has been performed in accordance with the attached approved closure plan.*
>
> (Signature, date, state Professional Engineer license number, business address, and phone number.)

11.3 POSTCLOSURE PLAN

This section and subsequent subsections are not applicable because the 305-B Storage Facility is not to be closed as a dangerous waste disposal unit.

11.4 NOTICE IN DEED

This section is not applicable because the 305-B Storage Facility is not to be closed as a dangerous waste disposal unit.

11.5 CLOSURE COST ESTIMATE

It is DOE-RL's understanding that federal facilities are not required to comply with WAC 173-303-620. However, projections of anticipated costs for closure will be provided in accordance with Permit Condition II.H.1.

11.6 FINANCIAL ASSURANCE MECHANISM FOR CLOSURE

In accordance with 40 CFR 264.140(c) and WAC 173-303, this section is not required for federal facilities. The Hanford Site is a federally owned facility for which the federal government is an operator and this section is therefore not applicable to the 305-B Storage Facility.

11.7 POSTCLOSURE COST ESTIMATE

A postclosure cost estimate is not required for the 305-B Storage Facility because it will not be closed as a dangerous waste disposal facility.

11.8 FINANCIAL ASSURANCE MECHANISM FOR POSTCLOSURE CARE

Post-closure financial assurance is not required for the 305-B Storage Facility because it will not be closed as a dangerous waste disposal facility.

11.9 LIABILITY REQUIREMENTS

In accordance with 40 CFR 264.140(c) and WAC 173-303, this section is not required for federal facilities. The Hanford Site is a federally owned facility for which the federal government is an operator and this section is therefore not applicable to the 305-B Storage Facility.

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12.0 REPORTING AND RECORDKEEPING

This chapter summarizes the reporting and recordkeeping requirements. The reports are submitted to Ecology and/or the EPA as required by applicable regulations, and required records are maintained at ~~the305-B Storage Facility. A general reporting requirement applicable to all dangerous waste~~ management facilities (e.g., notification) is described, as well as reporting and recordkeeping requirements for generators, transporters, and treatment, storage, and/or disposal facilities. Reports and records applicable to the 305-B Storage Facility are summarized in Table 12.1.

12.1 NOTIFICATION OF HAZARDOUS WASTE ACTIVITIES

Facilities generating or transporting dangerous waste and the owner and operators of treatment, storage, and/or disposal facilities must have current EPA/State Identification Numbers. The 305-B Storage Facility operates under EPA/State Identification Number WA7890008967, issued to the Hanford Facility.

12.2 GENERATOR REQUIREMENTS

The 305-B Storage Facility generates only minor amounts of waste during the cleanup of container spills or leaks and this waste is handled together with other waste generated on the Hanford Site. Hanford Site waste generation records and required reports (e.g., annual reports) are compiled and issued as single records or reports for the entire Hanford Site; information on waste generated by the 305-B Storage Facility is compiled and provided together with other Hanford Site generator records and reports.

12.2.1 Recordkeeping

Generator records maintained by the Hanford Site include the following:

- Records of waste generated onsite
- Records of waste packaged to be shipped offsite
- A copy of each annual report
- Land disposal restriction records.

Waste generation records are retained as required by WAC 173-303-210 and 40 CFR 268.7.

12.2.2 Reporting

Generator reports required by WAC 173-303-220 submitted by the Hanford Site include the annual report, exception reports, and any required additional reports.

The Hanford Site submits an annual report of waste generation activities to Ecology. The annual report is submitted on the *Generator Annual Dangerous Waste Report–Form 4*. All dangerous waste generated at the 305–B Storage Facility is included in the annual report.

Table 12.1. Reports and Records.

Item	STORAGE	
	Retention Time	Location
Notification of dangerous waste activities	Life of facility	Facility File
GENERATOR REPORTS AND RECORDS:		
Annual report	5 years after last waste shipment	Hanford Site[1]
Exception report	5 years after last waste shipment	Hanford Site
Additional reports and records as required (i.e., inspection logs)	5 years after closure	Hanford Site
Test and Waste Analysis Results:		
Waste generated onsite	5 years after last waste shipment	Hanford Site
Waste packaged for offsite shipment	5 years after last waste shipment	Hanford Site
Waste Manifest Reports and Records:		
Manifests	5 years after last waste shipment	Hanford Site
Manifest discrepancy	5 years after last waste shipment	Hanford Site
Unmanifested waste	Not required	N/A
Land Disposal Restriction Records:		
Extension to an effective date	At least 5 years from the date of shipment	Hanford Site
Petition for a variance	At least 5 years from the date of shipment	Hanford Site
Notice and certification of treatment standards	At least 5 years from the date of shipment	Hanford Site
Demonstration and certification for a temporary extension to the effective date	At least 5 years from the date of shipment	Hanford Site
TRANSPORTER REPORTS AND RECORDS:		
None required	N/A	N/A
TREATMENT, STORAGE, AND/OR DISPOSAL REPORTS AND RECORDS:		
Permit Application Plans:		
Waste analysis plan	Life of facility	Hanford Site
Contingency plan and amendments	Life of facility	Hanford Site
Training plan	Life of facility	Hanford Site
Closure plan	Life of facility	Hanford Site
Post–closure plan	Not Required	N/A
Inspection plans	Life of facility	Hanford Site

[1] Hanford Site: Records pertaining to the 305-B Storage Unit will be retained at the unit until completion of closure. Documents requiring longer retention, as specified, will be retained in the Hanford Facility File.

Item	STORAGE	
	Retention Time	Location
Operating Reports and Records		
Waste description and quantity	Life of facility	Hanford Site
Waste location	Until closure	Hanford Site
Waste analysis data	Life of facility	Hanford Site
Inspection records	5 years after inspection	Hanford Site
Certification of waste minimization efforts	Life of facility	Hanford Site
Land Disposal Restriction Records:		
Extension to an effective date	At least 5 years from the date of shipment	Hanford Site
Petition for a variance	At least 5 years from the date of shipment	Hanford Site
Notice and certification of treatment standards	At least 5 years from the date of shipment	Hanford Site
Demonstration and certification for a temporary extension to the effective date	At least 5 years from the date of shipment	Hanford Site
Waste Manifest Reports and Records:		
Manifests	5 years after receipt of waste	Hanford Site
Manifest discrepancy	5 years after receipt of waste	Hanford Site
Unmanifested waste	Not required	N/A
Groundwater Monitoring Reports and Records:		
None required	N/A	N/A
Contingency Plan Incident Reports and Records:		
Immediate notification—Event Fact Sheet	Life of facility	Hanford Site
Assessment report	Life of facility	Hanford Site
Facility restart notification	Life of facility	Hanford Site
Spills, Discharges, and Leaks Reports and Records:		
Immediate notification	Life of facility	Hanford Site
Closure Reports and Records:		
Certification of closure	Life of facility	Hanford Site
Survey plat	Not required	N/A
Closure cost estimates	Not required	N/A
Post–Closure Reports and Records:		
None required	N/A	N/A
Miscellaneous Support Reports and Records:		
Annual report	5 years from due date	Hanford Site
Biennial report	Life of facility	Hanford Site
Training documentation	Life of facility	Hanford Site
Liability coverage documentation	Not required	N/A

If a copy of the manifest is not returned with the signature of the owner/operator of a permitted unit designated to receive nonradioactive dangerous waste offsite within 35 days, the 305–B Storage Facility staff will contact the initial transporter or facility to determine the status of the waste shipment. If a copy of the manifest with the handwritten signature of the designated facility's owner/operator is not received by 305–B Storage Facility staff within 45 days of the date the waste was offered to the initial transporter, an exception report will be submitted to Ecology. The report will include the following:

- A legible copy of the manifest for which delivery was not confirmed
- A cover letter explaining the efforts to locate the waste and the results of those efforts.

Copies of waste analysis reports or other documentation relating to the composition of dangerous waste shipped from the 305-B Storage Facility will be retained at the unit. Documents relating to land disposal restrictions are discussed in Section 12.4.2.1.7.

Any additional reports deemed necessary by Ecology or EPA are furnished by the Hanford Site upon request.

12.3 TRANSPORTER REQUIREMENTS

Transporter recordkeeping and reporting requirements are not strictly applicable to the 305-B Storage Facility since 305-BStorage Facility does not transport dangerous wastes offsite. Transporters having their own EPA/State Identification Numbers are used to transport dangerous wastes from 305-B Storage Facility to a permitted off–site treatment, storage, and/or disposal facility. Wastes are transported to 305-B Storage Facility by PNNL waste management organization staff. Wastes transported to 305-B Storage Facility on public roadways or highways are considered to be off–site shipments and the PNNL waste management organization complies with transporter recordkeeping and reporting requirements under WAC 173-303-260 and WAC 173-303-270 for these shipments.

12.4 TREATMENT, STORAGE, AND/OR DISPOSAL REQUIREMENTS

Storage facility reporting and recordkeeping requirements are discussed below.

12.4.1 Reports

This section discusses the reporting requirements of WAC 173-303 relating to aspects of dangerous waste. The reporting requirements include the following:

- Waste manifest reports
- Annual reports
- Groundwater monitoring reports
- Contingency plan incident reports
- Spills, discharges, and leaks reports
- Closure reports
- Post-closure reports.

Additional details of these reports are provided below. Copies of these reports are maintained by the 305-B Storage Facility or other Hanford Site organizations as appropriate.

12.4.1.1 Waste Manifest Reports

The waste manifest or lack thereof, is the source of two possible reports, the manifest discrepancy report and the unmanifested waste report.

12.4.1.1.1 Manifest Discrepancy

Each dangerous or mixed waste transfer to the 305-B Storage Facility transported on roads accessible to the general public must have a Uniform Hazardous Waste Manifest for the transfer to be approved (refer to Section 2.8). The waste manifests received are checked to verify that they are properly filled out and the waste received is identical to the material described on the manifest. Every effort is made to resolve manifest discrepancies with the generator. If discrepancies are not resolved in 15 days, a report will be submitted to Ecology in accordance with WAC 173-303-370. This report describes the discrepancy and attempts to reconcile it. A copy of the manifest or shipping paper at issue is attached to the report.

12.4.1.1.2 Unmanifested Waste

The 305-B Storage Facility receives wastes generated by DOE-RL and/or PNNL sponsored programs. As noted in Section 2.8.4, unmanifested waste which requires a manifest may either be rejected, or an unmanifested waste report will be filed with Ecology within 15 days of receipt of shipment using Ecology Form 6, *Unmanifested Dangerous Waste Report.*

The report shall include at least the following information:

1. The EPA/State identification number, name, and address of the facility;
2. The date the unit received the waste;
3. The EPA/State identification number, name, and address of the generator and transporter, if available;
4. A description and the quantity of each unmanifested dangerous waste the unit received;
5. The method of management for each dangerous waste;
6. The certification signed by the owner or operator of the unit or the authorized representative; and
7. A brief explanation of why the waste was unmanifested, if known.

12.4.1.2 Annual Report

The state of Washington, pursuant to WAC 173-303-390, requires an annual report for each facility which holds an active EPA/State Identification Number. The report is due to Ecology on March 1 of each year. A single report is prepared for the entire Hanford Site and covers each dangerous waste treatment, storage, and disposal unit at Hanford, including 305-B Storage Facility. The report contents for each unit include the following:

- EPA/State Identification Number
- Name and address of the unit
- Calendar year covered by the report
- Sources of the waste received by the unit
- Description and quantity of the waste received by the unit
- Treatment, storage, and/or disposal methods
- Certification statement signed by an authorized representative.

The report form and instructions in the *Treatment, Storage, or Disposal Unit Annual Dangerous Waste Report*—Form 5 are used for this report. The above information applicable to the 305-B Storage Facility is compiled by the PNNL waste management organization and submitted to PHMC. PHMC is the organization responsible for preparing the Hanford Site annual report.

12.4.1.3 Biennial Report

The EPA requires, pursuant to 40 CFR 264.75, that an overall report describing each dangerous waste facility activity be submitted on March 1 of each even-numbered year. The biennial report is not required by Ecology. As with the annual report described in Section 12.4.1.2, a single report is prepared for the entire Hanford Site covering all dangerous waste treatment, storage, and disposal facilities at Hanford. The report contents for each unit include the following:

- EPA/State Identification Number
- Name and address of the unit
- Calendar year covered by the report
- Sources of the waste stored at 305-B Storage Facility
- Description and quantity of the waste received at 305-B Storage Facility
- Treatment, storage, and/or disposal methods
- Waste minimization efforts
- Certification statement signed by an authorized representative.

This information covers activities for the previous calendar year. The above information applicable to the 305-B Storage Facility is compiled by the PNNL waste management organization and is included in the Hanford Site annual report.

12.4.1.4 Groundwater Monitoring Reports

The 305-B Storage Facility is not operated as a dangerous waste surface impoundment, waste pile, land treatment unit, or landfill as defined in WAC 173-303-645(1)(a). Therefore, no groundwater monitoring or reporting is required for this unit.

12.4.1.5 Contingency Plan Incident Reports

The BED and 305-B Storage Facility line management are responsible for making notifications (as detailed in Attachment 18, Chapter 7.0, Sections 7.4.1.3 and 7.8) of all emergency situations requiring contingency plan implementation as required by WAC 173-303-360.

All situations requiring contingency plan implementation are documented in accordance with Attachment 18, Chapter 7.0, Section 7.8.2, DOE Event Reporting. A copy of all such documentation for incidents at305-B Storage Facility will be retained at the unit as part of the Operating Record.

If the unit stops operations in response to a fire, explosion, or release that may present a hazard to human health or the environment, the BED notifies DOE-RL, via line management, when the unit and emergency equipment cleanup is complete.

The DOE-RL is responsible for three types of notifications: an immediate notification; the incident assessment report; and the unit restart notification. Details of these notifications are provided below.

12.4.1.5.1 Immediate Notification

The DOE-RL will immediately notify Ecology and the individual designated as the on-scene coordinator for the southeastern Washington area of the National Response Center, telephone number (800) 424-8802, if the unit has had a fire, explosion, or release which requires reporting under applicable regulations.

- The DOE-RL report will contain the following information:
- Name and telephone number of reporter
- Name and address of the unit
- Time and type of incident
- Name and quantity of material(s) involved to the extent known
- Extent of injuries if any
- Possible hazards to human health or the environment outside the unit.

12.4.1.5.2 Incident Assessment Report

A written report is provided to Ecology within 15 days of any incident that requires implementation of the contingency plan. This report includes the following information:

- Name, address, and telephone number of the owner or operator
- Name, address and telephone number of the unit
- Date, time, and type of incident
- Name and quantity of material(s) involved
- Extent of injuries if any
- Assessment of actual or potential hazards to human health or the environment where this is applicable
- Estimated quantity and disposition of recovered material that resulted from the incident
- Cause of the incident
- Description of corrective action taken to prevent recurrence of the incident.

12.4.1.5.3 Unit Restart Notification

If the 305-B Storage Facility stops operations in response to a fire, an explosion, or release that may present a hazard to human health or the environment, the DOE-RL will notify Ecology and the appropriate local authorities before normal operations are resumed in the affected area(s) of the unit. The notification will indicate that cleanup procedures are completed and that emergency equipment is cleaned and fit for its intended use.

12.4.1.6 Spills, Discharges, and Leak Reports

This section discusses the reports prepared as a result of unpermitted spills and discharges into the environment.

12.4.1.6.1 Spills and Discharges Reports

In the event of any unplanned release of dangerous materials, the building emergency director will document the incident on an Event Fact Sheet. A copy of the Event Fact Sheet will be retained at the unit. PNNL line management will immediately notify the DOE-RL. The following information will be transmitted to the DOE-RL:

- Name and telephone number of reporter
- Name and address of the unit
- Time and type of incident
- Name and quantities of material(s) involved to the extent known
- Extent of injuries if any
- Possible hazards to human health or the environment outside the unit.

The PNNL waste management organization immediately notifies the DOE-RL of all reportable releases to the environment in accordance with DOE Orders.

The DOE-RL will immediately notify Ecology of all spills and discharges of hazardous materials (unless permitted) in accordance with WAC 173-303-145(2) and Condition I.E.15 of the Facility Wide Permit.

12.4.1.7 Closure Reports

Reports regarding the closure of the305-B Storage Facility will be made in accordance with the requirements of WAC 173-303-610(6) and (9).

12.4.1.7.1 Certification of Closure

Within 60 days of completion of closure of the305-B Storage Facility, certification signed by the DOE-RL and an independent registered Professional Engineer will be submitted to Ecology. The certification will be sent by registered mail. The certification will state that the unit was closed in accordance with the approved closure plan. Documentation supporting the independent registered Professional Engineer's certification will be supplied upon request of Ecology.

12.4.1.7.2 Survey Plat

The 305-B Storage Facility is not a disposal facility; therefore, this requirement is not applicable.

12.4.1.8 Post-Closure Reports

~~Post-closure reports required by WAC 173-303-610(9), (10), and (11) are not required because the~~ 305-B Storage Facility is not a disposal facility.

12.4.2 Recordkeeping Requirements

The records kept by the 305-B Storage Facility include plans described in other portions of this permit application, operating records, miscellaneous support records, and records of reports made to Ecology and EPA. These records are described in the following sections.

12.4.2.1 Operating Record

The Operating Record maintained at the 305-B Storage Facility includes:

- A description and the quantity of each dangerous waste received and the method(s) and date(s) of storage at the 305-B Storage Facility in accordance with WAC 173-303-380
- The location of each dangerous waste stored within the unit and the quantity at each location, including cross-reference to manifest numbers
- Waste analysis results
- Contingency plan implementation reports
- Inspection records
- Copies of notices from off-site facilities informing 305-B Storage Facility that the off-site facilities have all required permits.

12.4.2.1.1 Waste Description and Quantity

Each dangerous waste received at the 305-B Storage Facility is described by its common name and dangerous waste number(s) from WAC 173-303-080 through 173-303-104. When a dangerous waste contains multiple dangerous waste constituents, the waste description includes all applicable dangerous waste numbers. For waste numbers that are not listed in WAC 173-303, the waste description includes the name of the process that generated the waste. The waste description includes the following information:

- physical form (i.e., liquid, solid, sludge, or gas)
- Weight, or volume and density, using one of the units of measure in WAC 173-303-380(2)(c)
- Date and management method for each waste, including handling code specified in WAC 173-303-380(2)(d).

12.4.2.1.2 Waste Location

The location of each dangerous waste container stored within the 305-B Storage Facility is documented and maintained.

12.4.2.1.3 Waste Analysis

As described in Section 3.2, most of the wastes received at 305-B Storage Facility do not require analysis. Only those wastes which are unknown or for which the generator does not have documentation of contents require analysis. Waste sampling and analysis is performed by the generator. Waste analysis results are submitted to the PNNL waste management organization with the disposal request. These results are used by the PNNL waste management organization to designate the waste in accordance with WAC 173-303-070, to determine waste compatibility for proper storage, and to determine waste packaging and labeling requirements. Results of waste analyses submitted with the disposal request forms are kept at 305-B Storage Facility.

Analysis of wastes generated at 305-B Storage Facility would only be required in the case of spill or leak response when it is necessary to determine whether cleanup residuals are dangerous wastes. 305-B Storage Facility staff is responsible for sampling such wastes and having the required analyses performed by on-site or off-site laboratories. If such wastes are determined to be dangerous wastes, copies of the waste analysis results will be kept at 305-B Storage Facility and cross-referenced to manifest numbers.

12.4.2.1.4 Contingency Plan Implementation Report

Records documenting the details of any incidents requiring the implementation of the contingency plan, as described in Attachment 18, Chapter 7.0 and Section 12.4.1.5, are maintained as part of the 305-B Storage Facility Operating Record as required by WAC 173-303-380.

12.4.2.1.5 Inspection Records

Records of the 305-B Storage Facility general inspections are maintained at the unit for at least five years from the inspection date. The records include the following:

- The date and time of inspection
- The inspector's printed name and handwritten signature
- Notations of observations
- The date and nature of any repairs or other remedial actions.

12.4.2.1.6 Waste Minimization Certification

Annually, a certification by DOE-RL that the 305-B Storage Facility has a program in place to reduce the volume and toxicity of hazardous waste is inserted into the 305-B Storage Facility Operating Record as required by 40 CFR 264.73(b)(9).

12.4.2.1.7 Land Disposal Restrictions Records

Records related to storage of waste subject to land disposal prohibitions are maintained as required by 40 CFR 264.73(b)(10) and (16). Records potentially include:

- Records of waste placed in land disposal units under an extension to the effective date of any land disposal restriction granted pursuant to 40 CFR 268.5
- Records of waste placed in land disposal units under a petition granted pursuant to 40 CFR 268.6
- Records of the applicable notice and certification required by 40 CFR 268.7(a)
- Records of the demonstration and certification required by 40 CFR 268.8, if applicable, for waste subject to land disposal prohibitions or restriction.

Additional discussion of land disposal records is provided in the following sections.

12.4.2.1.7.1 Date Extension

The 305-B Storage Facility will not apply for an extension to the effective date of a land disposal restriction. The Hanford Site generator or the permitted off-site disposal facility may apply for an extension if required. If such an extension is approved by EPA, the generator or permitted off-site disposal facility, as appropriate, will provide a copy of the approval indicating the waste subject to the extension. Copies of these records, as well as the quantities and the date of placement (information the permitted off-site disposal facility is requested to provide to 305-B Storage Facility following disposal) for each shipment of waste subject to the date of the extension will be maintained in the 305-B Storage Facility files.

12.4.2.1.7.2 Petition

~~The 305-B Storage Facility will not petition to allow land disposal of a waste subject to a land disposal~~ restriction under 40 CFR 268, Subpart C. The permitted off-site disposal facility may petition to the regulatory authority for a variance to allow disposal of a restricted or prohibited waste if required. If such a petition is approved by EPA for waste shipped by 305-B Storage Facility, the disposal facility will be requested to provide information related to the petition so that 305-B Storage Facility may ensure that the waste shipped complies with the petition. Copies of the records of the petition, as well as the waste quantities and date of placement (information on the permitted off-site disposal facility is requested to provide to 305-B Storage Facility following disposal) for each waste shipment covered by the petition will be maintained in the 305-B Storage Facility files.

12.4.2.1.7.3 Notice and Certification

Each waste generator is required to provide the PNNL waste management organization with adequate waste characterization data for the waste management organization to determine whether the waste is subject to land disposal restrictions. The waste management organization determines whether the waste is subject to land disposal restrictions prior to transporting the waste offsite from 305-B Storage Facility. If wastes are determined to be subject to land disposal restrictions, the required notices and certifications are included with waste shipments from 305-B Storage Facility to off-site treatment, storage, and/or disposal facilities. Such notifications are made as described below. Copies of notifications, certifications, demonstrations, and supporting documentation for each shipment of waste subject to a land disposal restriction or prohibition are maintained at 305-B Storage Facility.

<u>Waste Does Not Meet Applicable Treatment Standards or Exceeds Applicable Prohibition Levels</u>. If the waste does not meet the applicable treatment standards or exceeds an applicable prohibition level set forth in 40 CFR 268.32 or Section 3004(d) of RCRA, a notice is provided with each shipment of waste containing the following information:

- The EPA Hazardous Waste Number
- Corresponding treatment standards and all applicable prohibitions set forth in 40 CFR 268.32 or Section 3004(d) of RCRA
- The waste manifest number associated with the shipment of waste
- Waste analysis data where available or a statement of the basis of the determination with supporting data.

<u>Waste Meets the Applicable Treatment Standards</u>. If the waste meets the applicable treatment standards and can be land-disposed without further treatment, a notice and certification is provided by the 305-B Storage Facility unit with each shipment of waste. The notice contains the following information:

- The EPA Hazardous Waste Number
- Corresponding treatment standards and all applicable prohibitions set forth in 40 CFR 268.32 or Section 3004(d) of RCRA
- The manifest number associated with the waste shipment
- Waste analysis data where available or a statement of the basis of determination with supporting data.

In addition, the shipment will be accompanied by the certification required under 40 CFR 268.7(a)(2)(ii) that the waste complies with treatment standards and prohibitions.

12.4.2.1.7.4 Demonstration and Certification

Certain wastes may be land-disposed without treatment under certain conditions which comply with 40 CFR 268. If such wastes are shipped from 305-B Storage Facility for land disposal, the initial shipment will be accompanied by the demonstration and certification required under 40 CFR 268.8(a). Each additional shipment will be accompanied only by the certification provided that the conditions covered by the original certification have not changed.

12.4.2.2 Miscellaneous Support Records

Miscellaneous support records include the following:

- Training records
- Liability coverage documentation
- Closure and post-closure cost estimates
- Report records.

12.4.2.2.1 Training Documentation

The training plan is maintained at 305-B Storage Facility. The name of each employee and the 305-B Storage Facility waste management position held is maintained by the unit. Training records document that employees have received the training or have work experience required for that position. The records are maintained by the unit. Training records on current employees are kept until closure of the unit. Training records on former employees are kept for three years from the date the employee last worked at the unit. Auditable copies of these records are maintained by the PNNL training organization.

12.4.2.2.2 Liability Coverage Documentation

Financial assurance and liability coverage mechanisms are not required for federal facilities. Therefore, this requirement is not applicable to the 305-B Storage Facility.

12.4.2.2.3 Closure and Post-closure Cost Estimates

Financial assurance mechanisms for closure and post-closure costs are not required for federal facilities. However, projections of anticipated costs for closure will be provided annually in accordance with Attachment 18, Chapter 11.0, §11.5.

12.4.2.3 Report Records

The reports described in Sections 12.1, 12.2.2, and 12.4.1 are contained in records maintained either by the 305-B Storage Facility or by other Hanford Site organizations as noted in Table 12-1. Copies of the reports will be made available upon the request of Ecology or EPA.

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13.0 OTHER RELEVANT LAWS

13.1 Toxic Substances Control Act

Wastes containing polychlorinated biphenyls (PCB), which are subject to regulation under the *Toxic Substances Control Act* (TSCA), are stored in the 305-B Storage Facility. These wastes are stored for periods less than one (1) year before shipment to a disposal facility permitted under TSCA. Storage of PCB wastes in 305-B Storage Facility for periods less than one (1) year will continue to be done in compliance with applicable TSCA regulations in 40 CFR Part 761.

13.2 Other Requirements

The application of insecticides and herbicides on or in the immediate vicinity of the 305 B Storage Facility will be conducted in compliance with the *Federal Insecticide, Fungicide, and Rodenticide Act of 1975*, TSCA, and the applicable provisions of the *Washington State Water Quality Standards*, WAC 173-201.

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Attachment 28
PUREX Storage Tunnels

Replacement Chapters

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ATTACHMENT 28
PUREX Storage Tunnels

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2.0 UNIT DESCRIPTION

2.1 PUREX STORAGE TUNNELS

~~The PUREX Storage Tunnels branch off from the railroad tunnel and extend southward from the east end~~ of the PUREX Plant (Figure 2.1). The tunnels are used for storage of mixed waste from the PUREX Plant and from other onsite sources. Each storage tunnel is isolated from the railroad tunnel by a water-fillable shielding door. There are no electrical utilities, water lines, drains, fire detection or suppression systems, or communication systems provided inside the PUREX Storage Tunnels.

Material selected for storage is loaded on railcars modified to serve as both transport and storage platforms. Normally, a remote-controlled, battery-powered locomotive was used to position the railcar in the storage tunnel. In the past and possibly in the future, other remote movers, e.g., standard locomotive with a string of railcar spacers, power winch, etc., have or could be used to position a railcar into the tunnel or to withdraw a car from the tunnel. The railcar storage positions are numbered sequentially, commencing with Position 1 that abuts the railstop bumper at the south end of each tunnel. Position 2 is the location of the railcar that abuts the railcar in Position 1 and so forth. The railcars and material remain in the storage tunnel until retrieval is required. Each railcar is retrievable; however, because the railcars are stored on a single, dead-end railroad track, the railcars can be removed only in reverse order (i.e., last in, first out).

Transfers into or out of the PUREX Storage Tunnels were infrequent and were not manpower-intensive operations. A more detailed description of the operation of the PUREX Storage Tunnels is provided in Attachment 28, Chapter 4.0.

2.1.1 Tunnel Number 1 (218-E-14)

Construction of Tunnel Number 1 was completed in 1956 and consists of three areas: the water-fillable door, the storage area, and the vent shaft (Figure 2.3). The water-fillable door is located at the north end of Tunnel Number 1 and separates the storage tunnel from the PUREX railroad tunnel. The door is 7.5 meters high, 6.6 meters wide, and 2.1 meters thick, and is constructed of 1.3 centimeter steel plate. The door is hollow so that the door can be filled with water to act as a shield when the door is in the down (closed) position. If the door is filled with water, the water must be pumped from the door before the door can be raised.

Above the door is a reinforced concrete structure into which the door is raised to open the tunnel. Electric hoists used for opening and closing the door are located on the top of this concrete structure.

Pumps and valves used for filling and draining the door are located in a room northwest of the door closure. Operational controls are located in the PUREX Plant on the north wall at the east end of the pipe and operating gallery.

Beneath the water-fillable door is a sump with a 15.2-centimeter drain that connects to a railroad tunnel sump; water was pumped to the Double-Shell Tank System. The drain was sealed as part of deactivation activities.

The storage area is that portion of the tunnel that extends southward from the water-fillable door. Inside dimensions of Tunnel Number 1 are 109.1 meters long, 6.7 meters high, and 5.9 meters wide. Ceiling and walls are 35.6 centimeters thick and constructed of 30.5- by 35.6-centimeter creosote pressure-treated Douglas fir timbers arranged side by side. The first 30.5 meters of the east wall are constructed of 0.9-meter-thick reinforced concrete (Section AA of Figure 2.3). A 40.8-kilogram- mineral-surface roofing material was used to cover the exterior surface of the timbers before placement of 2.4 meters of earth fill. The earth cover serves as protection from the elements and as radiation shielding. The timbers that form the walls rest on reinforced concrete footings 0.9 meter wide by 0.3 meter thick. The floor consists of a railroad track laid on a gravel bed. The space between the ties is filled to top-of-tie with gravel ballast. The tracks are on a 1.0 percent downward slope to the south to ensure that the railcars remain in their storage position. A railcar bumper is located 2.4 meters from the south end of the tracks to act as a stop. The capacity of the storage area is eight, 12.8-meter-long railcars.

From 1962 through 1980, nine pipe risers were installed through the roof of Tunnel Number 1. Seven of the nine risers were used for wood sampling of the tunnel ceiling timbers. The other two risers were used to obtain air samples and temperature data of the internal environment of the tunnel. Currently, all risers are capped.

The results of the wood strength survey (conducted in 1980) concluded that the wood beams in Tunnel Number 1 were within standards for present day wood. Design calculations performed at the time also found the tunnel to be within safe limits (Silvan 1980). Air sampling conducted in Tunnel Number 1 did not identify the presence of any combustible gases and found oxygen levels to be at about 21 percent with carbon dioxide at about 0.3 percent. The reported temperature in Tunnel Number 1 remains consistent at 15.6 °C (Rambosek and Foster 1972).

An independent evaluation of the 1980 data collected by Silvan was conducted in 1991 to further evaluate the structural integrity of PUREX Storage Tunnel Number 1 (Hand and Stevens 1991). This study concluded that any degradation of the treated timbers because of decay or insect attack should be minimal and found that the tunnel timbers structurally should be sound. This study also confirmed the reasonableness of the values used and agreed with the findings of the Silvan study. In addition, the study concluded that the methods used by Silva to calculate the loss of timber strength were sufficiently conservative to accurately determine the soundness of the timbers. The exposure of the timbers to the high gamma radiation field emitted by the material stored within the tunnel was factored into the evaluation.

A vent shaft is located at the south end of Tunnel Number 1. The shaft is approximately 1.5 meters by 1.5 meters in cross-section and is constructed of reinforced concrete. The vent stack extends approximately 0.3 meter above grade and was capped with a single-stage, high-efficiency particulate air (HEPA) filter, a 283-cubic-meter per minute exhaust fan, and a 6.1-meter tall exhaust stack. After filling Tunnel Number 1 to capacity, the tunnel was sealed. Sealing activities included de-energizing the ventilation system and blanking the ventilation system to prevent interaction of the tunnel air with external air. Deactivation of the vent system is described in Attachment 28, Chapter 4.0, §4.1.6.1. A further discussion of the tunnel ventilation system is provided in Attachment 28, Chapter 4.0.

In June 1960, the first two railcars were loaded with a single, approximately 12.5-meter-long, failed separation column and placed in Tunnel Number 1. Between June 1960 and January 1965, six more railcars were placed in Tunnel Number 1, filling the tunnel. After the last car was placed in the northern-most storage position (Position 8), the water-fillable door was closed, filled with water, and deactivated electrically. The Tunnel Number 1 door was drained as part of PUREX Facility transition activities.

2.1.2 Tunnel Number 2 (218-E-15)

Construction of Tunnel Number 2 was started and completed in 1964. Like Tunnel Number 1, Tunnel Number 2 consists of three functional areas: the water-fillable door, the storage area, and the vent shaft. Construction of Tunnel Number 2 differs from that of Tunnel Number 1 as follows.

- A combination of steel and reinforced concrete was used in the construction of the storage area for Tunnel Number 2 (Figure 2.4) rather than wood timbers, as used in Tunnel Number 1.
- Tunnel Number 2 is longer, having a storage capacity of five times that of Tunnel Number 1.
- The floor of Tunnel Number 2, outboard of the railroad ties, slopes upward to a height of approximately 1.8 meters above the railroad bed, whereas the floor in Tunnel Number 1 remains flat all the way out to the sidewalls.
- The railroad tunnel approach to Tunnel Number 2 angles eastward then angles southward to parallel Tunnel Number 1 (Figure 2.1). The approach to Tunnel Number 1 is a straight extension southward from the PUREX Plant. Center-line to center-line distance between the two tunnels is approximately 18.3 meters.

The physical structure of the water-fillable door at the north end of Tunnel Number 2 essentially is identical to the water-fillable door for Tunnel Number 1. The water-fillable door for Tunnel Number 2 is approximately 57.9 meters south and 18.3 meters east of the water-fillable door for Tunnel Number 1 (Figure 2.3).

Controls for operation of the water-fillable door are located above the tunnel on the east exterior wall of the door enclosure (Attachment 28, Chapter 4.0, Figure 4.1). Attachment 28, Chapter 4.0 provides additional operational information on the Tunnel Number 2 water-fillable door. Presently, the door is empty and there are no plans to fill it. Procedures for filling and draining the door are presented in Attachment 28, Chapter 4.0.

The storage area of Tunnel Number 2 is that portion of the tunnel extending southward from the water-fillable door. Construction of this portion of Tunnel Number 2 consists of a 10.4-meter diameter, steel (0.5 centimeter plate), and semicircular-shaped roof, supported by internal I-beam wales attached to external, reinforced concrete arches. The concrete arches are 0.4-meter thick and vary in width from 0.4 to 1.8 meters. The arches are spaced on 4.8-meter centers. This semicircular structure is supported on reinforced concrete grade beams approximately 1.8 meters wide by 1.2 meters thick (one on each side) that run the full length of Tunnel Number 2. The interior and exterior surfaces of the steel roof are coated with a bituminous coating compound to inhibit corrosion. The entire storage area is covered with 2.4 meters of earth fill to serve as shielding.

The nominal inside dimensions of Tunnel Number 2 are 514.5 meters long, 7.9 meters high, and 10.4 meters wide. However, because of the arch-shaped cross-section of Tunnel Number 2 and entry clearance at the water-fillable door, the usable storage area (width and height above top-of-rail) is 6.7 meters high and 5.8 meters wide, the same dimensions as for Tunnel Number 1. The floor consists of a railroad track laid on a gravel bed. The space between ties is filled to top-of-tie with gravel ballast. Commencing at the ends of the 2.4-meter-long ties, the earth floor is sloped upward on a 1 (vertical) to 1 1/2 (horizontal) grade. The tracks are on a 1/10 of 1 percent downgrade slope to the south to ensure the railcars remain in their storage position. A railcar bumper is located 2.4 meters from the south end of the tracks to act as a stop. The capacity of the storage area is 40, 12.8-meter-long railcars.

There are 17 tunnel ports located along the ridge of the tunnel roof (for details, refer to Drawing H-2-58195). The ports are on 29.3-meter centers. A 7.6-centimeter diameter bar plug is located in the center of each tunnel port and is secured in place with a length of chain and a padlock. Operations administer access control of these tunnel ports.

The vent shaft, located at the south end of Tunnel Number 2, is approximately 1.5 meters by 1.5 meters in cross-section and is constructed of reinforced concrete. The vent shaft extends approximately 0.3 meter above grade and is capped with an exhaust system consisting of a single-stage, HEPA filter, a 153-cubic meter per minute exhaust fan, and a 6.1-meter-tall exhaust stack. The ventilation system currently is inactive (Attachment 28, Chapter 4.0, §4.6.1.2); however, when operating the exhaust fan normally is dampered to provide only about 100 cubic meters per minute of exhaust flow. A further discussion of the tunnel ventilation system is provided in Attachment 28, Chapter 4.0.

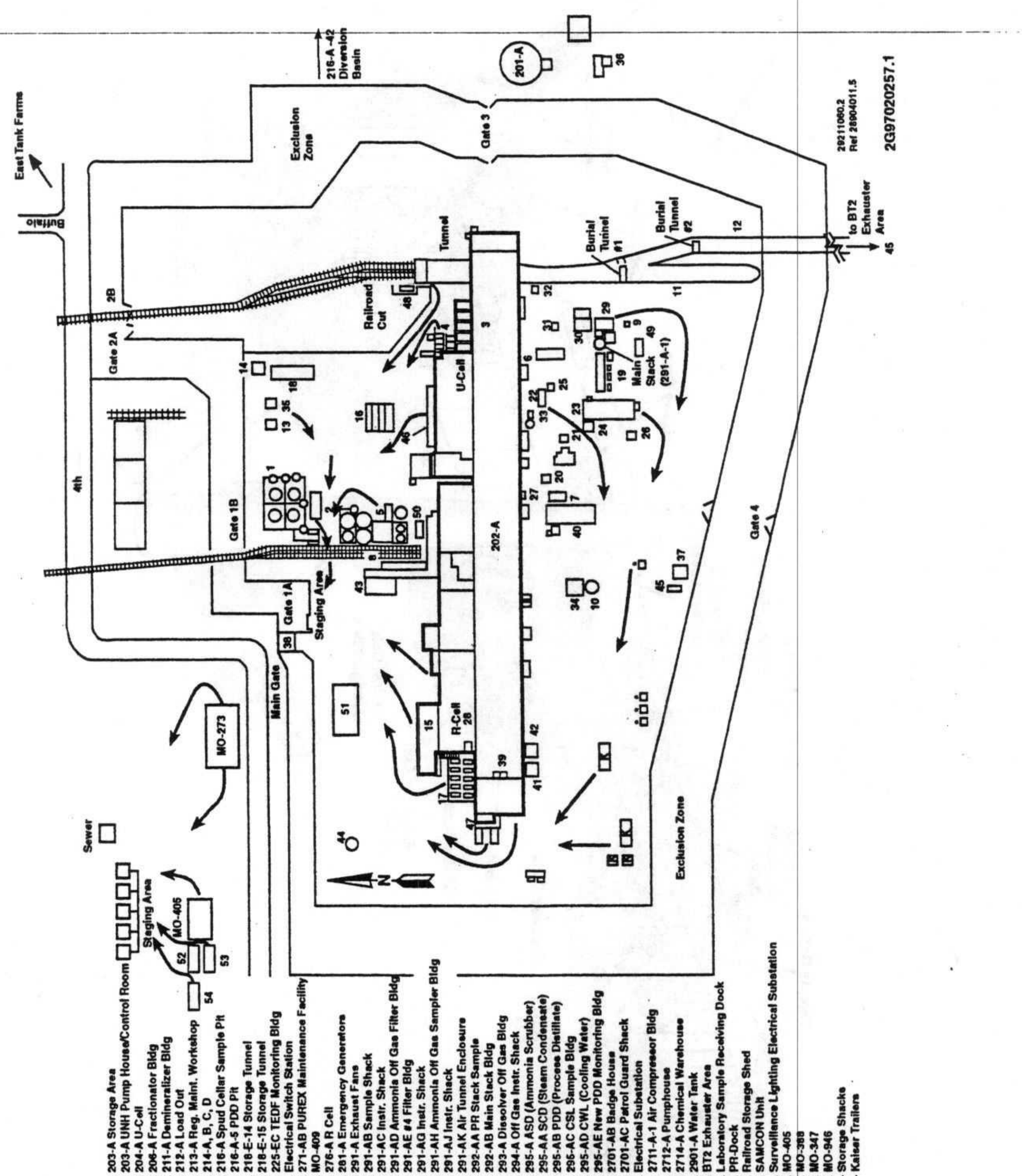
The first railcar was placed in storage in December 1967. Attachment 28, Chapter 3.0, Table 3-1 contains current storage inventory data.

2.2 TOPOGRAPHIC MAP

Topographic map (Drawing H-13-000264), shows the distance of at least 305 meters around the PUREX Storage Tunnels. This map is at a scale of 1-unit equals 2,000 units. The contour interval clearly shows the pattern of surface water flow in the vicinity of each storage tunnel. The map contains the following information:

- Map scale
- Date
- Prevailing wind speed and direction
- A north arrow
- Surrounding land use
- Buildings
- Access road location
- Access control
- Monitoring and sampling well locations
- TSD unit locations.

Figure 2.1. The PUREX Facility



1 Figure 2.2. The PUREX Plant (Building 202-A)

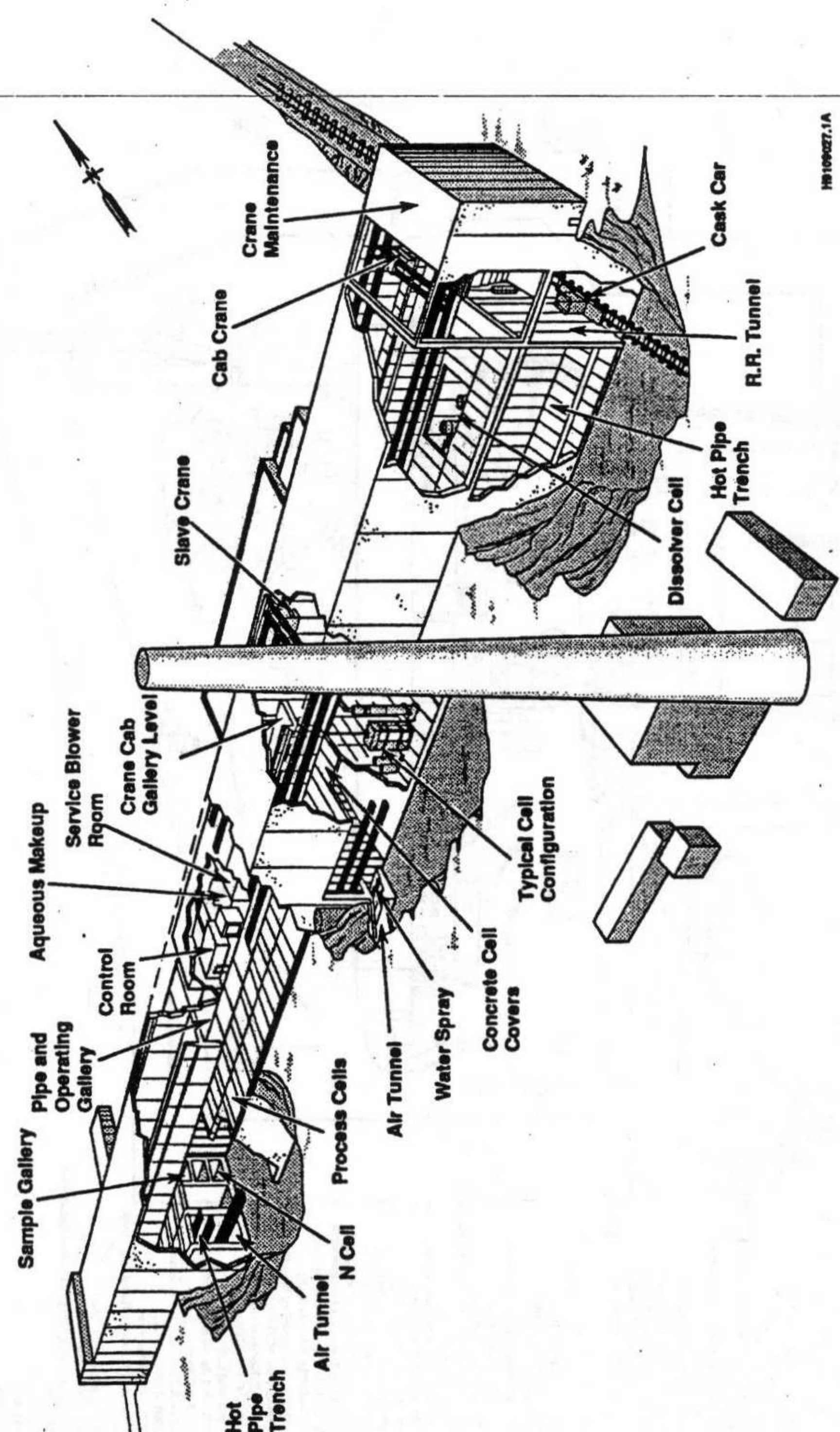


Figure 2.3. The PUREX Storage Tunnel Number 1

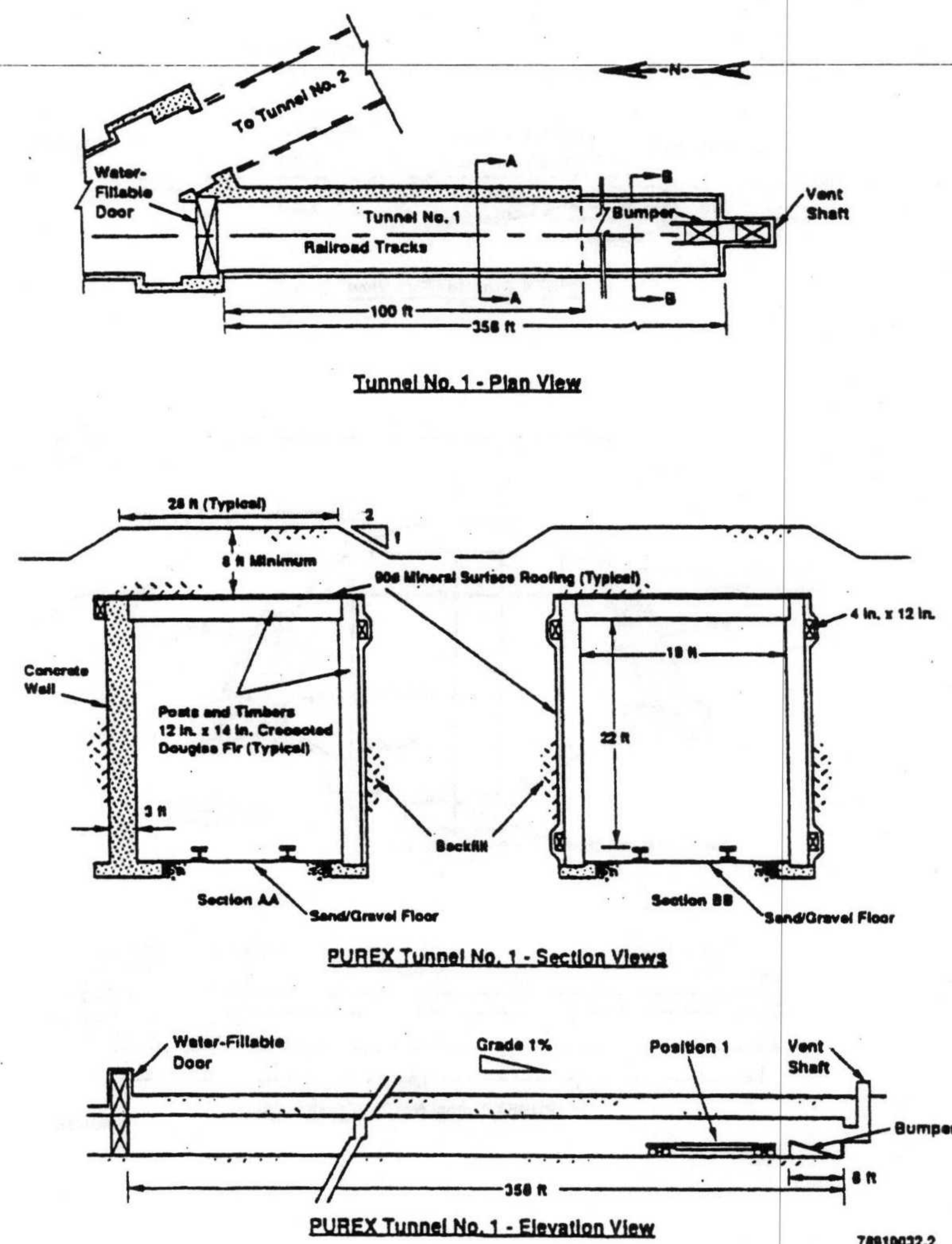
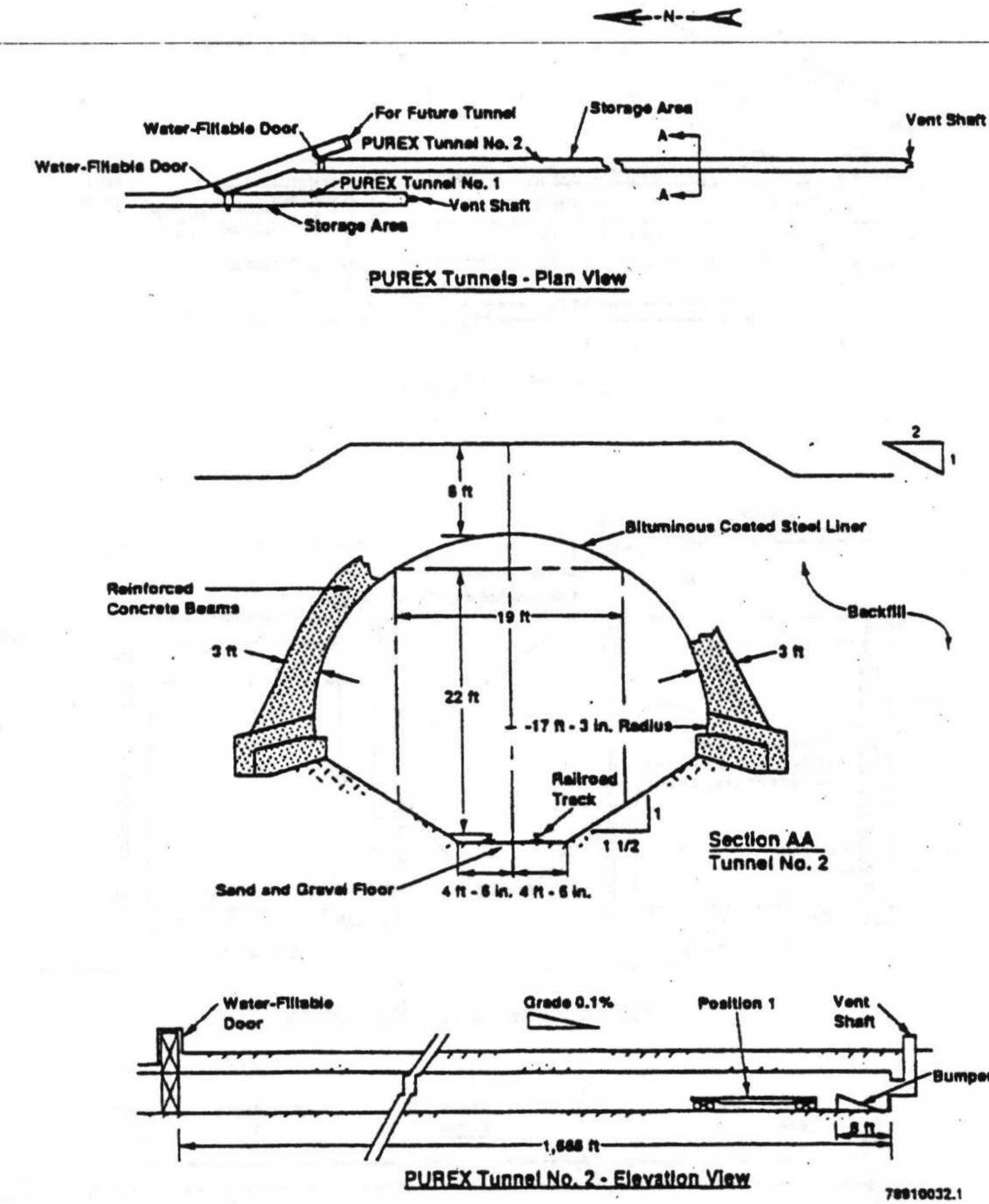


Figure 2.4. The PUREX Storage Tunnel Number 2



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GLOSSARY

~~ALARA~~	~~as low as reasonably achievable~~
ECOLOGY	Washington State Department of Ecology
EHW	extremely hazardous waste
EPA	U.S. Environmental Protection Agency
pH	negative logarithm of the hydrogen-ion concentration
PUREX	plutonium-uranium extraction
QA/QC	quality assurance and quality control
TSD	treatment, storage, and/or disposal
WAC	Washington Administrative Code
WAP	waste analysis plan

METRIC CONVERSION CHART

The following conversion chart provides the reader an aid in conversion.

Into metric units			Out of metric units		
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	0.76456	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.

3.0 WASTE ANALYSIS PLAN

This chapter provides information on the chemical, biological, and physical characteristics of the dangerous waste stored in the PUREX Storage Tunnels. Waste in the tunnels is stored and managed as mixed waste. The PUREX Storage Tunnels provide the necessary shielding for the protection of employees and the environment from mixed waste.

3.1 CHEMICAL, BIOLOGICAL, AND PHYSICAL ANALYSES

Regulated material presently stored in the PUREX Storage Tunnels contains the following dangerous waste:

- Lead
- Mercury
- Silver and silver salts
- Chromium
- Cadmium
- Barium
- Mineral oil.

In general, dangerous waste is either attached to, contained within, or actually is material removed from the PUREX Plant and other onsite sources. Changes in dangerous waste stored is updated annually in the annual dangerous waste report submitted to Ecology. Future storage of barium and selenium may occur in Tunnel Number 2. The PUREX Storage Tunnels are permitted as a miscellaneous unit under WAC 173-303-680 because the tunnels are not a typical containerized storage unit. That is, the bulk of the material stored in the tunnels is not placed in a container; rather, this material is placed on a portable device (railcar) used as a storage platform. The mixed waste stored in the PUREX Storage Tunnels is encased or contained within carbon or stainless steel plate, pipe, or vessels that meet the WAC 173-303-040 definition of container. Therefore, the mixed waste normally is not exposed to the tunnel environment.

The only free-liquid dangerous waste stored in the tunnels is elemental mercury. The mercury is contained within thick-walled (0.8-centimeter) thermowells. The amount of mercury per thermowell is less than 1.7 liters.

Other liquid containers, such as large discarded process tanks, are stored in the PUREX Storage Tunnels. These containers are 'empty' [per WAC 173-303-160(2)(a)]. In the future, containers will be flushed and the final rinsate sampled and analyzed to verify that the residual heel is not a dangerous waste.

The only stored mixed waste that is designated as either reactive or ignitable (D001) is silver nitrate in the silver reactors [WAC 173-303-090(5)]. There is no mixed waste designated as reactive (D003). The potential for ignition from this source is considered negligible because this material is dispersed on ceramic packing and is physically isolated from contact with any combustible material or ignition source.

3.2 TRACKING SYSTEM

Specific waste tracking forms for the movement of waste destined for the PUREX Storage Tunnels are used. These waste tracking forms effectively track waste inventories from generation through storage.

The waste tracking forms and other supporting documentation will be maintained at the Hanford Facility for a minimum of 5 years following closure of the PUREX Storage Tunnels.

3.3 FACILITY DESCRIPTION

This waste analysis plan (WAP) has been prepared for the PUREX Storage Tunnels, located on the Hanford Facility, Richland, Washington. This WAP applies to all mixed waste (containing dangerous components) regulated by Washington Administrative Code (WAC) 173-303 that is transferred to and/or contained in the PUREX Storage Tunnels.

The PUREX Storage Tunnels are permitted as a miscellaneous unit under WAC 173-303-680. The bulk of the waste stored in the PUREX Storage Tunnels is not placed in a typical container; rather, this waste is placed on a portable device (railcar) that is used as a storage platform. In general, the mixed waste stored in the PUREX Storage Tunnels is encased or contained within carbon or stainless steel plate, pipe, or vessels. Therefore, the mixed waste normally is not exposed to the tunnel environment.

The PUREX Facility, located in the 200 East Area, consists of two separate treatment, storage, and/or disposal (TSD) units, the PUREX Plant (202-A Building) and the PUREX Storage Tunnels. Access to the PUREX Storage Tunnels is by means of the railroad tunnel.

The PUREX Storage Tunnels branch off from the railroad tunnel and extend southward from the east end of the PUREX Plant. The tunnels are used for storage of mixed waste from the PUREX Plant and from other onsite sources. Each storage tunnel is isolated from the railroad tunnel by a water-fillable shielding door. There are no electrical utilities, water lines, drains, fire detection or suppression systems, or communication systems provided inside the PUREX Storage Tunnels.

Material selected for storage is loaded on railcars modified to serve as both transport and storage platforms. Normally, a remote-controlled, battery-powered locomotive was used to position the railcar in the storage tunnel. In the past and possibly in the future, other remote movers, e.g., standard locomotive with a string of railcar spacers, power winch, etc., have or could be used to position a railcar in the tunnel or to withdraw a car from the tunnel. The railcar storage positions are numbered sequentially, commencing with Position 1 that abuts the rail stop bumper at the south end of each tunnel. Position 2 is the location of the railcar that abuts the railcar in Position 1 and so forth. The railcars and material remain in the storage tunnel until final disposition is determined. Each railcar is retrievable; however, because the railcars are stored on a single, dead-end railroad track, the railcars can be removed only in reverse order (i.e., last in, first out).

Construction of Tunnel Number 1 was completed in 1956. The Tunnel has three areas, the water-fillable door, the storage area, and the vent shaft. The water-fillable door is located at the north end of Tunnel Number 1 and separates the storage tunnel from the railroad tunnel. The door is 7.5 meters high, 6.6 meters wide, and 2.1 meters thick, and is constructed of 1.3-centimeter steel plate. The door is hollow so that the door can be filled with water to act as a shield when the door is in the down (closed) position. If the door is filled with water, the water must be pumped from the door before the door can be raised. Above the door is a reinforced concrete structure in which the door is raised to open the tunnel. Electric hoists used for opening and closing the door are located on the top of this concrete structure.

The storage area is that portion of the tunnel that extends southward from the water-fillable door. Inside dimensions of Tunnel Number 1 are 109.1 meters long, 6.7 meters high, and 5.9 meters wide. Ceiling and walls are 35.6-centimeters thick and constructed of 30.5- by 35.6-centimeter creosote pressure-treated Douglas fir timbers arranged side by side. The first 30.5 meters of the east wall are constructed of 0.9-meter-thick reinforced concrete. A 40.8-kilogram mineral-surface roofing material was used to cover the exterior surface of the timbers before placement of 2.4 meters of earth fill. The earth cover serves as protection from the elements and as shielding. The timbers that form the walls rest on reinforced concrete footings 0.9 meter wide by 0.3 meter thick. The floor consists of a railroad track laid on a gravel bed. The space between the ties is filled to top-of-tie with gravel ballast. The tracks are on a 1.0 percent downward slope to the south to ensure that the railcars remain in their storage position. A railcar bumper is located 2.4 meters from the south end of the tracks to act as a stop. The capacity of the storage area is eight, 12.8-meter-long railcars.

In June 1960, the first two railcars were loaded with a single, approximately 12.5-meter-long, failed separation column and placed in Tunnel Number 1. Between June 1960 and January 1965, six more railcars were placed in Tunnel Number 1, filling the tunnel. After the last car was placed in the northern-most storage position (Position 8), the water-fillable door was closed, filled with water, and deactivated electrically.

Construction of Tunnel Number 2 was started and completed in 1964. Like Tunnel Number 1, Tunnel Number 2 consists of three functional areas: the water-fillable door, the storage area, and the vent shaft. Construction of Tunnel Number 2 differs from that of Tunnel Number 1 as follows.

- A combination of steel and reinforced concrete was used in the construction of the storage area for Tunnel Number 2 rather than wood timbers, as used in Tunnel Number 1.
- Tunnel Number 2 is longer, having a storage capacity of five times that of Tunnel Number 1.
- The floor of Tunnel Number 2, outboard of the railroad ties, slopes upward to a height of approximately 1.8 meters above the railroad bed, whereas the floor in Tunnel Number 1 remains flat all the way out to the sidewalls.
- The railroad tunnel approach to Tunnel Number 2 angles eastward then angles southward to parallel Tunnel Number 1. The approach to Tunnel Number 1 is a straight extension southward from the PUREX Plant. Center-line to center-line distance between the two tunnels is approximately 18.3 meters.

The physical structure of the water-fillable door at the north end of Tunnel Number 2 essentially is identical to the water-fillable door for Tunnel Number 1. The water-fillable door for Tunnel Number 2 is approximately 57.9 meters south and 18.3 meters east of the water-fillable door for Tunnel Number 1. As of March 1997, the door is empty and there is no plan to fill the door.

The storage area of Tunnel Number 2 is that portion of the tunnel extending southward from the water-fillable door. Construction of this portion of Tunnel Number 2 consists of a 10.4-meter diameter, steel (0.5 centimeter plate), and semicircular-shaped roof, supported by internal I-beam wales attached to external, reinforced concrete arches. The concrete arches are 0.4 meter thick and vary in width from 0.4 to 1.8 meters. The arches are spaced on 4.8-meter centers. This semicircular structure is supported on reinforced concrete grade beams approximately 1.8 meters wide by 1.2 meters thick (one on each side) that run the full length of Tunnel Number 2. The interior and exterior surfaces of the steel roof are coated with a bituminous coating compound to inhibit corrosion. The entire storage area is covered with 2.4 meters of earth fill to serve as shielding.

The nominal inside dimensions of Tunnel Number 2 are 514.5 meters long, 7.9 meters high, and 10.4 meters wide. However, because of the arch-shaped cross-section of Tunnel Number 2 and entry clearance at the water-fillable door, the usable storage area (width and height above top-of-rail) is 6.7 meters high and 5.8 meters wide, the same dimensions as for Tunnel Number 1. The floor consists of a railroad track laid on a gravel bed. The space between ties is filled to top-of-tie with gravel ballast. Commencing at the ends of the 2.4-meter-long ties, the earth floor is sloped upward on a 1 (vertical) to 1 1/2 (horizontal) grade. The tracks are on a 1/10 of 1 percent downgrade slope to the south to ensure the railcars remain in their storage position. A railcar bumper is located 2.4 meters from the south end of the tracks to act as a stop. The capacity of the storage area is 40, 12.8-meter-long railcars.

The first railcar was placed in storage in December 1967. Table 3.1 contains an approximate inventory of waste stored in the PUREX Storage Tunnels.

The only free-liquid dangerous waste stored in the tunnels is mercury. The mercury is contained within thick-walled 0.8-centimeter thermowells constructed from 7.6-centimeter Schedule 80, 304L stainless steel pipe. The top of the thermowell is closed with a 304L stainless steel nozzle plug with a metal-to-metal seal. The amount of mercury per thermowell is less than 1.7 liters.

Other liquid containers, such as large discarded process tanks or vessels, are stored in the PUREX Storage Tunnels. The containers in storage are empty [per WAC 173-303-160(2)(a)]. Before storage, the vessels have been flushed and in recent years, the final rinsate sampled and analyzed to verify that the residual heel is not a dangerous waste.

The only stored dangerous waste that is either reactive or ignitable is silver nitrate in the silver reactors, which is designated as ignitable (D001) [WAC 173-303-090(5)]. The potential for ignition is considered negligible because this material is dispersed on ceramic packing and is physically isolated from contact with any combustible material or ignition source.

3.3.1 Process and Activities

The function of the PUREX Tunnels is to store mixed waste until the waste can be processed for final disposal. When waste is to be placed in the storage tunnels, a work plan, describing the overall transfer activities, and a storage tunnel checklist are prepared. The work plan and storage tunnel checklist are routed for review and concurrence by key personnel and forwarded to management for approval.

3.3.2 Physical Characterization of Material to be Stored

Physical characterization of waste includes an evaluation of the following physical properties:

- Length, width, and height
- Gross weight and volume
- Preferred orientation for transport and storage
- Presence of dangerous waste constituents.

Information sources used in physical characterization include equipment fabrication and installation drawings, operational records, and process knowledge. Physical characterization provides information necessary to describe the waste material. Such information also is used to design and fabricate, if required, supports on the railcar.

Before removal from service, the equipment could be flushed to minimize loss of products, to reduce contamination, and to reduce dangerous waste constituents present in a residual heel to nonregulated levels. When equipment is flushed, analysis of the rinsate is used to determine when these goals have been achieved.

3.4 IDENTIFICATION/CLASSIFICATION AND QUANTITIES OF DANGEROUS WASTE MANAGED WITHIN THE PUREX STORAGE TUNNELS

Table 3.1 contains an approximation of the total amount of waste stored within the PUREX Storage Tunnels.

3.5 WASTE ANALYSIS PARAMETERS

Analytical requirements were selected based on knowledge required for the safe handling and storage of the waste within the PUREX Storage Tunnels, including any operational compliance issues.

3.5.1 Waste Identification

A prerequisite step in proper waste management is to address whether waste being considered for management within the PUREX Storage Tunnels falls within the scope of this unit's permit. This includes identifying any dangerous waste in accordance with regulatory and permit requirements and applicability of any land disposal restrictions.

This section provides information on how the chemical and physical characteristics of the mixed waste currently stored in the PUREX Storage Tunnels were determined so that the waste is stored and managed properly.

Regulated material presently stored in the PUREX Storage Tunnels contains the following dangerous waste:

- Lead
- Mercury
- Silver and silver salts
- Chromium
- Cadmium
- Barium
- Mineral oil.

Storage of non-PUREX Plant waste is reviewed on a case-by-case basis. Sampling, chemical analysis, process knowledge (as discussed in the following section), and/or inventory information from waste tracking forms provided from other onsite sources are required to confirm the characteristics and quantities of mixed waste to be stored. Future waste and dangerous constituents might not be in the same configuration or form as described in the following sections.

3.5.1.1 Lead

Lead stored was used in various capacities during past Hanford Facility operations. Primary functions of lead included use as weights, counterweights, and shielding. Often the lead is encased in steel (carbon or stainless) to facilitate its attachment to various types of equipment.

Lead exhibits the characteristic of toxicity as determined by the toxicity characteristics leaching procedure and is designated D008 [WAC 173-303-090(8)]. The quantity of lead present could produce an extract greater than 500 milligrams per liter should the lead be exposed to a leachate. However, because the bulk of the lead is encased in steel, is stored inside a weather-tight structure, and is elevated above floor level on railcars that isolate the lead from other materials stored, the potential for exposure of bare lead to a leachate is considered negligible.

Sampling and chemical analysis is not performed on lead associated with the material placed in the PUREX Storage Tunnels. Therefore, the accuracy of the estimate on the amount of lead presently stored in each tunnel is limited to the data available from process knowledge. Counterweights on equipment dunnage and lead used for shielding cannot be quantified by existing historical records and are not included for lead listed on Table 3.1. However, if removed from the tunnels, the material will be examined and any suspect attachments will be removed, evaluated, and disposed of in accordance with established methods.

3.5.1.2 Mercury

Mercury is contained within thermowells that are an integral part of spent reactor fuel dissolvers used at the PUREX Plant. The dissolvers are large 304L stainless steel process vessels that are approximately 2.7 meters in diameter, 7.3 meters tall, and weigh approximately 26,309 kilograms. The outer shell is constructed of a 1-centimeter-thick plate. The dissolvers were used in decladding and dissolving spent reactor fuel in the PUREX Plant.

Depending on the specific dissolver in question, 19.1 or 45.4 kilograms of mercury (1.4 or 1.77 liters) were poured in each of the two thermowells per dissolver (38.2 or 90.8 kilograms total per dissolver) following vertical installation of the dissolvers inside the PUREX canyon and before the dissolver was installed in a process cell. The mercury served to transfer heat from the dissolver interior to the thermohm temperature sensor mounted within the thermowell. This mercury remains within the thermowells of discarded dissolvers. In preparation for storage, the thermohms were removed and the upper end of each thermowell was plugged with a 304L stainless steel nozzle plug. In storage, the discarded dissolver rests in an inclined position in a cradle on the railcar. The mercury contained in the thermowells remains in the lower portion of each thermowell and, under normal conditions, is never in contact with the mechanical closure on the nozzle end of the thermowell.

Mercury exhibits the characteristic of toxicity as determined by the toxicity characteristics leaching procedure and is designated D009 [WAC 173-303-090(8)].

The potential for mercury to become exposed to leachate is considered negligible. The PUREX Storage Tunnels are designed and constructed as weather-tight structures. Further, the mercury is encased in a stainless steel pipe within a stainless steel vessel that is stored on a railcar above the floor level of the tunnels. Therefore, exposure of the mercury stored in the tunnels to leachate is not considered a credible occurrence.

Sampling and chemical analysis is not performed on mercury associated with the dissolvers stored in Tunnel Number 2. The quantity of mercury present in each thermowell is documented on Table 3.1.

3.5.1.3 Silver

Silver, mostly in the form of silver salts deposited on unglazed ceramic packing, is contained within the discarded silver reactors stored in Tunnel Number 2. The silver reactors were used to remove iodine from the offgas streams of the spent reactor fuel dissolvers. The reactor vessel is approximately 1.4 meters in diameter by 4.1 meters tall and is constructed of 1-centimeter 304L stainless steel. The vessel contains two 1.2-meter-deep beds of packing. Each bed consists of a 30.5-centimeter depth of 2.5-centimeter unglazed ceramic saddles topped with a 0.6-meter depth of 1.3-centimeter unglazed ceramic saddles. The two beds are separated vertically by a distance of about 0.6 meter, and each bed rests on a support made of stainless steel angles and coarse screen. The packing was coated initially with 113.4 kilograms of silver nitrate used for iodine retention. Nozzles on the top of the reactor were provided to allow flushing and/or regeneration of the packing with silver nitrate solution as the need arose.

Because of competing reactions, which include conversion of silver nitrate to silver iodide, reduction of silver nitrate to metallic silver, and formation of silver chloride, the packing of a stored silver reactor contains a mixture of silver nitrate, silver halides, and silver fines.

Silver salts exhibit the characteristics of toxicity as determined by the toxicity characteristics leaching procedure and are designated D011 [WAC 173-303-090(8)]. Silver salts exhibit the characteristic of ignitability and are designated as D001 [WAC 173-303-090(5)].

The potential of silver, including silver salts, stored in the PUREX Storage Tunnels to become exposed to leachate is considered negligible. Silver is contained within a stainless steel vessel, stored inside a weather-tight structure, and elevated above floor level on a railcar. Therefore, exposure of the silver stored in the tunnels to leachate is not considered a credible occurrence. In addition, the contained silver is isolated from contact with any combustibles; therefore, the possibility of ignition is considered extremely remote.

Provisions for taking samples of the packing were not provided in the design of the vessels. Therefore, sampling and chemical analysis are not performed for silver salts before placing a silver reactor in storage. However, for accountability, the total silver content (Table 3.1) is considered silver nitrate, the salt that exhibits the characteristics of both ignitability and toxicity.

The quantity of silver salts contained within a discarded silver reactor is a function of silver nitrate regeneration history. Operating records (process knowledge) of regenerations and flushes are used to estimate the total accumulation of silver within each reactor.

3.5.1.4 Chromium

Presently, chromium stored in Tunnel Number 2 is contained within a failed concentrator removed from the PUREX Plant, and within stainless steel containers received from the 324 Building. The concentrator is a vertical tube structure that was used to concentrate aqueous streams from the final uranium cycle, final plutonium cycles, final neptunium cycles, and condensate from the acid recovery system for recycle. Following service, the concentrator was inspected and found to contain silicate solids with high levels of chromium from the corrosion of stainless steel. The existence of chromium within the 324 Building waste was determined through process knowledge. Chromium exhibits the characteristic of toxicity as determined by the toxicity characteristics leaching procedure and is designated D007 [WAC 173-303-090(8)]. The potential for the chromium stored in Tunnel Number 2 to become exposed to leachate is considered negligible. Tunnel Number 2, is designed and constructed to be weather-tight. Further, the chromium is encased within stainless steel vessels and containers that are stored on railcars above the floor level of the tunnel. Therefore, exposure of the chromium stored in the tunnel to leachate is not considered a credible occurrence.

The quantity of chromium within the concentrator was estimated by calculating the volume of silicate solids and the percentage of chromium within the silicate solids. The quantity of chromium in the 324 Building waste was based on process knowledge.

3.5.1.5 Cadmium

Presently, cadmium stored in the PUREX Storage Tunnel Number 2 is associated with shielding and with a dissolver moderator removed from the PUREX Plant, and within stainless steel containers received from the 324 Building. The cadmium was used to shield equipment and consists of sheets of the metal attached to lead, both of which could be encased in steel. The cadmium received from the 324 Building was used in waste technology research and development programs.

The dissolvers are annular vessels that are geometrically favorable for criticality safety. The dissolvers were placed over cadmium lined (neutron absorbers) moderators for additional criticality safety. The moderator is a centrally located, cylindrical, cadmium-jacketed 0.08-centimeter-thick concrete 15.2-centimeter-thick neutron absorber. The moderators are approximately 4.4 meters tall by approximately 1.5 meters outer diameter.

Cadmium exhibits the characteristic of toxicity as determined by the toxicity characteristics leaching procedure and is designated D006 [WAC 173-303-090(8)]. If exposed to a leachate, the quantity of cadmium present could produce an extract having a concentration of greater than or equal to 1 milligram per liter, but less than 100 milligrams per liter; therefore, the mixed waste is managed as a WT02 [WAC 173-303-100(5)].

The potential for the cadmium stored in Tunnel Number 2 to become exposed to leachate is considered negligible. Tunnel Number 2 is designed and constructed to be weather-tight. Further, the cadmium is stored on railcars above the floor level of the tunnel. Therefore, exposure of the cadmium stored in the tunnel to leachate is not considered a credible occurrence.

3.5.1.6 Barium

Presently, barium is stored in Tunnel Number 2 in stainless steel containers received from the 324 Building. The waste was generated during numerous research and development programs conducted in B-Cell of the Waste Technology Engineering Laboratory (324 Building). The existence of barium within the 324 Building waste was determined through process knowledge.

Barium exhibits the characteristic of toxicity as determined by the toxicity characteristics leaching procedure and is designated D005 [WAC 173-303-090(8)].

The potential for barium stored in Tunnel Number 2 to become exposed to leachate is considered negligible. Tunnel Number 2 is designed and constructed to be weather-tight. Further, the barium is encased in steel containers stored on a railcar above the floor level of the tunnel. Therefore, exposure of the barium stored in the tunnel to leachate is not considered a credible occurrence.

3.5.1.7 Mineral Oil

Presently, mineral oil is stored in Tunnel Number 2 in stainless steel containers received from the 324 Building. The mineral oil was used in the B-Cell viewing windows in the 324 Building. Oil leaking from the windows was absorbed on rags and clay absorbent material.

The material safety data sheet for the mineral oil lists a lethal dose (LD50) of 2 grams per kilogram (dermal rabbit). Therefore, the oil designates as a Toxic Category A WT02 [WAC 173-303-100(5)].

The potential for the absorbed mineral oil stored in Tunnel Number 2 to become exposed to leachate is considered negligible. Tunnel Number 2 is designed and constructed to be weather-tight. Further, the mineral oil is encased in steel containers stored on a railcar above the floor level of the tunnel. Therefore, exposure of the mineral oil stored in the tunnel to leachate is not considered a credible occurrence.

3.5.1.8 Identification of Incompatible Waste

The next step is to ensure that sufficient information concerning the waste has been provided so the waste can be managed properly. This includes identifying incompatible waste. These safety issues primarily are related to prevention of unwanted chemical reactions that could create a catastrophic situation, such as a fire, an explosion, or a large chemical release.

3.5.1.9 Operational Considerations

Sufficient information must be available to ensure that incoming waste meets operational acceptance limits, e.g., physical size, ALARA concerns, and WAC 173-303 requirements. These operating specifications are limits and controls imposed on a process or operation that, if violated, could jeopardize the safety of personnel, and could damage equipment, facilities, or the environment. Operating specifications have been established from operating experience, process knowledge, and calculations.

3.5.2 Parameter and Rationale Selection Process

This WAP describes the process to ensure that the dangerous waste components of the material stored in the tunnels are properly characterized and designated so that dangerous and mixed waste is managed properly.

The parameters considered for waste designation under WAC 173-303-070(3) and the rationale for there application is discussed in the following sections.

3.5.2.1 Discarded Chemical Products

The first category of dangerous waste designation is "Discarded Chemical Products" (WAC 173-303-081). The waste stored in the tunnels does not fit the definitions in WAC 173-303-081 for a discarded chemical product. Therefore, the waste stored in the PUREX Storage Tunnels is not designated as a discarded chemical product.

3.5.2.2 Dangerous Waste Sources

The second category of dangerous waste designation is "Dangerous Waste Sources" (WAC 173-303-082). The waste stored in the tunnels is not listed on the "Dangerous Waste Sources List" (WAC 173-303-9904). Therefore, the waste stored in the PUREX Storage Tunnels is not designated as a dangerous waste source.

3.5.2.3 Dangerous Waste Characteristics

The third category of dangerous waste designation is "Dangerous Waste Characteristics" (WAC 173-303-090). The characteristics are as follows.

- Characteristic of Ignitability – Although the solid silver nitrate has not been tested in accordance with Appendix F of 49 CFR 173, the waste is assumed to be an oxidizer as specified in

49 CFR 173.127(a). Therefore, the silver nitrate waste is assumed to exhibit the characteristic of ignitability under WAC 173-303-090(5) and is designated as D001.

- Characteristic of Corrosivity – Some of the material stored within the tunnels either has contained or has been in contact with corrosive liquids. The standard operating procedure has been to flush vessels with water to recover as much special nuclear material as practical. In addition, flushing removes much of the mixed waste contamination, minimizing the spread of contamination during handling. Currently, the final aqueous rinse is sampled and analyzed to confirm that the pH is greater than 2 and less than 12.5. Therefore, the waste stored in the PUREX Storage Tunnels is not designated as corrosive waste.
- Characteristic of Reactivity – The waste stored in the tunnels does not meet any of the definitions of reactivity as defined in WAC 173-303-090(7). The waste material is not unstable, does not react violently with water, does not form explosive mixtures, or does not generate toxic gases. Therefore, the waste stored in the PUREX Storage Tunnels is not designated as reactive waste.
- Characteristic of Toxicity – Lead, mercury, silver, chromium, barium, and cadmium are identified on the Toxicity Characteristics list. The quantity of these materials stored in the tunnels is sufficient that, should the substances come in contact with a leachate (an event considered unlikely), the concentration of the extract could be above the limits identified in the list. Therefore, this waste is designated D005, D006, D007, D008, D009, and D011.

The PUREX Storage Tunnels also are permitted for selenium (D010). Currently, there is no waste stored in the tunnels that is designated for D010; however, there is a potential for waste with this waste number to be stored within the tunnels.

3.5.2.4 Dangerous Waste Criteria

The fourth category of dangerous waste designation is "Dangerous Waste Criteria" (WAC 173-303-100). The criteria are as follows:

- Toxicity Criteria – Cadmium meets the toxicity criteria in WAC 173-303-100(5) when performing a book designation. Because of the concentrations present, the waste containing these constituents is designated as dangerous waste (DW) and is assigned the dangerous waste number of WT02.
- Persistence Criteria – Currently, no waste stored in the tunnels has been designated as persistent per WAC 173-303-100(6).

3.5.2.5 Waste Designation Summary

The mixed waste currently stored in the PUREX Storage Tunnels is designated as follows:

- Lead – D008; EHW
- Mercury – D009; EHW
- Silver and silver salts – D001, D011; EHW
- Chromium – D007; EHW
- Cadmium – D006, WT02; DW
- Barium – D005; EHW
- Mineral Oil – WT02; DW.

3.5.3 Rationale for Parameter Selection

Refer to Section 3.5.2.

3.5.4 Special Parameter Selection

Refer to Section 3.5.2.

3.5.5 Selection of Sampling Procedures

The following sections discuss the sampling methods and procedures that will be used. Sampling usually will be in accordance with requirements contained in the pertinent sampling analysis plan, procedures, and/or other documents that specify sampling and analysis parameters.

3.5.6 Sampling Strategies

The only analysis presently used in support of the PUREX Storage Tunnels operation is a corrosivity check on the final in-place aqueous rinse of discarded vessels before the vessels are released for storage. The pH is determined by a pH meter using U.S. Environmental Protection Agency (EPA) Test Method 9040 or 9041 in Test Methods for the Evaluation of Solid Waste: Physical/Chemical Methods (EPA 1986). The RCRA sampling will not be performed on any waste currently stored in the PUREX Storage Tunnels.

Waste received that is not generated at the PUREX Plant could require sampling strategies associated with this waste that will be developed on a case-by-case basis.

3.5.6.1 Sampling Methods

Process knowledge of the characteristics and the quantities of the dangerous waste to be stored in the PUREX Storage Tunnels is considered sufficient to properly designate and manage the stored waste.

The waste currently stored in the tunnels is lead, mercury, chromium, cadmium, barium, mineral oil, silver, and silver salts. Sampling and chemical analysis of the lead, mercury, cadmium, barium, mineral oil, or chromium to confirm their presence would not provide additional data beneficial to proper management of the waste and would not comply with ALARA principles. The silver salts are dispersed over a large area on ceramic packing contained within a large stainless steel reactor vessel. Representative sampling of the ceramic packing is not considered to be practical and therefore was not performed.

If RCRA sampling is required for operation of the PUREX Storage Tunnels, representative sampling methods referenced in WAC 173-303-110 or some other method approved by the Washington State Department of Ecology (Ecology) will be used. For waste received from other Hanford Facility activities, existing sampling, chemical analysis, and/or process knowledge documentation is used to confirm the characteristics and quantities of mixed waste to be stored. Storage of non-PUREX Facility waste is reviewed on a case-by-case basis.

3.5.6.2 Frequency of Analyses

Because the dangerous waste components of mixed waste stored in the PUREX Storage Tunnels are stable and will remain undisturbed for a long time, the waste designations and quantities present will remain the same as assigned at the time of storage. Therefore, repeated analysis is not considered necessary to ensure that waste designation data are representative.

3.5.7 Selection of Sampling Equipment

The only analysis presently used in support of the PUREX Storage Tunnels operation is for corrosivity on the final in-place aqueous rinse of discarded vessels before the vessels are released for storage. The pH is determined by Method 9040 or 9041 (SW-846). The RCRA sampling methods, as referenced in WAC 173-303-110, will not be performed on any waste currently stored in the PUREX Storage Tunnels.

3.5.8 Maintaining and Decontaminating Field Equipment

All RCRA sampling equipment used to collect and transport samples must be free of contamination that could alter test results. Equipment used to obtain and contain samples must be clean. Acceptable cleaning procedures for sample bottles and equipment include, but are not limited to, washing with soap or solvent, and steam cleaning. After cleaning, cleaning residues must be removed from all equipment that could come in contact with the waste. One method to remove these residues would be a solvent (acetone or other suitable solvent) rinse followed by a final rinse with deionized water. Equipment must be cleaned before use for another sampling event.

After completion of sampling, equipment should be cleaned as indicated previously. If decontamination of the equipment is not feasible, the sampling equipment should be disposed of properly.

3.5.9 Sample Preservation and Storage

Following RCRA sampling, sample preservation follows methods set forth for the specific analysis identified. Preservation is in accordance with the methods stated in SW-846 or any of the test methods adopted by the Hanford Facility that meet WAC 173-303 requirements. No preservation method will be used when there are ALARA concerns.

3.5.10 Quality Assurance and Quality Control Procedures

The only test method presently used in support of the PUREX Storage Tunnels operation is a corrosivity check on the final in-place aqueous rinse of discarded vessels before the vessels are released for storage. The RCRA sampling will not be performed on any waste currently stored in the PUREX Storage Tunnels. Field duplicates, field blanks, trip blanks, and equipment blanks will not be taken. Split samples could be taken at the request of Ecology.

Generally, quality assurance and quality control (QA/QC) requirements for sampling will be divided between paperwork requirements, such as chain-of-custody, and sampling and analysis activities. This section addresses sampling QA/QC requirements. Analytical QA/QC is discussed in Section 3.6.

A chain-of-custody procedure is required for all sampling identified by this WAP. At a minimum, the chain of custody must include the following: (1) description of waste collected, (2) names and signatures of samplers, (3) date and time of collection and number of containers in the sample, and (4) names and signatures of persons involved in transferring the samples.

3.5.11 Health and Safety Protocols

The safety and health protocol requirements established for the Hanford Site must be followed for all RCRA sampling activities required by this WAP.

3.6 LABORATORY SELECTION AND TESTING AND ANALYTICAL METHODS

This section discusses laboratory selection and the types of acceptable analytical methods for RCRA samples.

3.6.1 Laboratory Selection

Laboratory selection is limited as only a few laboratories are equipped to handle mixed waste because of the special equipment and procedures that must be used to minimize personnel exposure to mixed waste. Laboratory selection depends on laboratory capability, nature of the sample, timing requirements, and cost. At a minimum, the selected laboratory must have the following:

- A comprehensive QA/QC program (both qualitative and quantitative)
- Technical analytical expertise
- An effective information management system.

These requirements will be met if the selected laboratory follows the pertinent requirements contained in the Hanford analytical services quality assurance requirements. The selected laboratory also can meet these requirements by having some other type of QA/QC program as long as equivalent data quality is achieved.

3.6.2 Testing and Analytical Methods

The testing and analytical methods for corrosivity used by the various onsite analytical laboratories are outlined in SW-846. These methods in some cases deviate from SW-846 and American Society for Testing and Materials-accepted specifications for holding times, sample preservation, and other specific analytical procedures. These deviations are discussed in Analytical Methods for Mixed Waste Analyses at the Hanford Site (DOE/RL-94-97).

3.7 WASTE RE-EVALUATION FREQUENCIES

Re-evaluation of waste within the PUREX Storage Tunnels will not occur because of the personnel and environmental exposure to mixed waste and the way the railcars are positioned in the tunnels. The waste is expected to remain stable.

3.8 SPECIAL PROCEDURAL REQUIREMENTS

The following sections describe special procedural requirements associated with waste in the PUREX Storage Tunnels.

3.8.1 Procedures for Receiving Wastes Generated Offsite

The PUREX Storage Tunnels do not accept waste generated off the Hanford Site.

3.8.2 Procedures for Ignitable, Reactive, and Incompatible Waste

Presently, the only ignitable, reactive, or incompatible dangerous waste stored in the PUREX Storage Tunnels is the silver nitrate coating on the ceramic packing inside the silver reactors. This material is confined to the interior of a large stainless steel vessel (Section 3.5.1.1) that separates this material from all other waste material stored in the tunnel. The requirements in WAC 173-303-395(1)(a) require 'No Smoking' signs be conspicuously placed wherever there is a hazard present from ignitable or dangerous waste. 'No Smoking' signs are not considered appropriate at the PUREX Storage Tunnels because of ALARA principles. Smoking is not allowed in any area with ALARA concerns and rules prohibiting smoking are strictly enforced. This policy serves to achieve the no smoking intent of WAC 173-303-395(1)(a), posting and maintaining 'No Smoking' signs are not considered appropriate.

Isolated areas within the PUREX Storage Tunnels make periodic inspections inconsistent with ALARA guidelines[e.g., an annual fire inspection as required by WAC 173-303-395(1)(d) for storage areas containing ignitable waste]. Therefore, such inspections are not performed.

3.8.3 Provisions for Complying with Land Disposal Restriction Requirements

Operation of the PUREX Storage Tunnels does not involve land disposal or treatment of dangerous waste. The information provided by the generating unit regarding land disposal restrictions of dangerous waste is sufficient to operate the PUREX Storage Tunnels in compliance with land disposal restriction requirements. When final disposition of the waste occurs, this information will be passed on for final treatment or disposal of the waste.

3.8.4 Deviations from the Requirements of this Plan

Management may approve deviations from this plan if special circumstances arise that make this prudent. These deviations must be documented in writing with a copy to be retained by the management.

3.9 RECORDKEEPING

Records associated with this waste analysis plan and waste verification program are maintained on the Hanford Facility. These records will be maintained until closure of the PUREX Storage Tunnels. Records associated with the waste inventory will be maintained for 5 years.

3.10 REFERENCES

DOE/RL-94-55, Hanford Analytical Services Quality Assurance Plan, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-94-97, Analytical Methods for Mixed Waste Analyses at the Hanford Site, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA, 1986, Test Methods for the Evaluation of Solid Waste: Physical/Chemical Methods, SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.

Table 3.1. PUREX Storage Tunnels Inventory

PUREX #1 Storage Tunnel (218-E-14)

Tunnel #1 is at its Capacity as of 1/22/65

PUREX #1 Storage Tunnel is located at the southeast end of the PUREX Plant and is an extension of the railroad tunnel. The storage area is approximately 109 meters long, 6.9 meters high, and 5.8 meters wide. The tracks have a one percent downgrade toward the south end of the tunnel. The capacity of the Storage Tunnel is eight modified railroad cars, 12.8 meters long.

Position	PUREX #1 Storage Tunnel (218-E-14)
1. & 2.	HA column and miscellaneous jumpers in box placed in Tunnel #1 on 6/60 HA 4,700 Cu. Ft. Jumpers 2,190 Cu. Ft., Pb-~115 Kg
3.	E-F11 #1 (1WW Waste) Concentrator failed 7/24/60. Placed in Tunnel #1 on 7/29/60, 1,900 Cu. Ft.
4.	G-E2 Centrifuge, miscellaneous jumpers in box and two tube bundles. Placed in Tunnel #1 on 12/24/60. (FUG SER# 762) 2,465 Cu. Ft., Pb-~115 Kg.,
5.	E-H4 (3WB) Concentrator failed 1/4/61. Placed in Tunnel #1 on 1/4/61, 2,336 Cu. Ft.
6.	E-F6 (2\NW Waste) Original Concentrator failed 4/21/61. Placed in Tunnel #1 on 4/21/61, 2,336 Cu. Ft.
7.	E-F11 (1WW Waste) #2 Concentrator failed 2/1/62. Placed in Tunnel #1 on 2/8/62, 2,336 Cu. Ft.
8.	E-F6 (2WW Waste) #3 Spare Concentrator failed 5/23/64. Placed in Tunnel #1 on 1/22/65 Flat Car 3621, 2400 Cu. Ft.

Table 3.1. PUREX Storage Tunnels Inventory

The storage area is approximately 514.5 meters long, 7.9 meters high, and 10.4 meters wide. The tracks have a one percent downgrade toward the south end of the tunnel. The capacity of the Storage Tunnel is 38-40 modified railroad cars, 12.8 meters long. The Tunnel contains 21 cars as of 2/95.

Position	PUREX #2 Storage Tunnel (218-E-15)
1.	E-F6 # (2WW Waste) Concentrator, TK F 15-2, One tube bundle and agitator motors, placed in Tunnel on 12/12/67 on Car 61439. 2,400 Cu. Ft.
2.	E-F6 #5 (E-H4 3WB) Concentrator, two tube bundles placed in Tunnel on 3/26/69. On Car MILW 60883, 2,400 Cu. Ft.
3.	E-F6 #6 (2WW Waste) Concentrator, two tube bundles failed placed in Tunnel on 3/19/70. On Car 3612, 2,400 Cu. Ft.
4.	L Cell Package in a sealed steel box (H2-66012) placed in Tunnel on 12/30/70 on Car MILW 60033, 2,400 Cu. Ft.
5.	F2 Silver Reactor, F6 Demister, Vessel Vent Line, Steel Catwalk and Guard Rails, placed in Tunnel on 2/26/71. On Gondola Car 4610, 2,400 Cu. Ft., Ag-~625 Kg
6.	Modified A3-1 tower, scrubber, liquid, and vapor line placed in Tunnel on 12/12/71. On Gondola Car 4611, 2,400 Cu. Ft.
7.	A3 Dissolver placed in Tunnel on 12/22/71. On 9 Ft. shortened Car B58, 2,400 Cu. Ft., Hg-~45 Kg.
8.	A1W1 Fuel ends in steel liner box and NPR fuel handling equipment. Used with the suspected canisters, on Car 19808. Placed in Tunnel on 8/29/72, 800 Cu. Ft.
9.	C3 Dissolver placed in Tunnel on 9/30/72, on Car 19811, 1590 Cu. Ft., Hg-~45 Kg.
10.	E-H4 (3WB) Concentrator, #61 tube bundle, prototype cooling coil, and F-Fl Filter Tank, placed in Tunnel 8/30/83, on Car CDX-1, 2,400 Cu. Ft.
11.	A3 Dissolver (Vessel #10 and Heater Vessel #6), placed in Tunnel on 1/18/86, on Car 3613, 3960 Cu. Ft. Hg-~40 Kg., Cd-~43 Kg
12.	White box (H2-58456) containing eight tube bundles #S 57.
13.	J5 Tank (Vessel #30), FL condenser (Vessel #13), and F12-B Cell Block, old four-way dumper, disc yoke, and flange plate placed in Tunnel on 1/21/86, on Car 19806, 2,500 Cu. Ft.
14.	L-I Pulser, 2-column cartridges, 1-jumper cutter, 3-jumper alignment tools, 9-exterior dumping trunnions, 10-pumps, 3-agitators, 4-tube bundles, 2-vent jumpers and 7-yokes placed in Tunnel on 11/18/87, on Car PX-10 (10A-19380) & Rack H2-96629.50. 50 tons, 3,600 Cu. Ft., Pb-~2540 Kg.

Position	PUREX #2 Storage Tunnel (218-E-15)
15.	Silver Reactor, E-F2 steam heater, and storage liner (H2-65095), full of cut up jumpers placed in Tunnel on 5/13/88, on Car PX-9 (10A-19809) & S/R Cradle SK-GLR-11-2-87. ~~20 tons, 2,775 Cu. Ft., Cd-~13 Kg., Ag-~115 Kg., Pb-~230 Kg.~~
16.	E-J8-1 Unitized Concentrator Vessel #1 H2-52477, failed 3/11/89. Placed on storage Car H2-99608, Px-6 (10A-19028) and in #2 Tunnel 4/6/89 graveyards. Estimated 42 tons, 6,000 Cu. Ft.
17.	North storage liner H2-65095 containing six pumps, one agitator, and cut up jumper (14 tons). South storage liner H2-65095 containing one pump, one #15 yoke and cut up jumpers (11.5 tons). Placed on storage Car PX-19 (10A-19030) and in #2 Tunnel on days 8/5/89. Estimated 25.5 tons, 2,574 Cu. Ft.
18.	T-F5 Acid absorber, ID#1-T-F5/F-168713, H2-52535 and H2-52487/488. Placed on storage Car PX-2 and in #2 Tunnel on 4/8/94. Estimated 22 tons, 835 Cu. Ft.
19.	Four metal liner storage boxes H-2-65095-3/H-2-100187-0 containing failed jumpers and miscellaneous obsolete canyon equipment items. Placed on storage Car PX-23 and in #2 Tunnel 9/16/94. Estimated 60 tons, 4032 Cu. Ft.
20.	E-H4-1 unitized concentrator (H-2-52477/56213)/(E-H4-1) Placed in Tunnel on 1/27/95, on Car Px-28. Estimated 40 tons, 5,760 Cu. Ft., Cr-~8 Kg.
21.	Tank E-5 (H-2-52453)/(F-166955), lead storage box assembly (H-2-131629)/(H-2-131629-1), H4 concentrator tower (H-2-58102)/(F-223017-CBT-4), hot shop cover plate (H-2-52222)/("Q"), tube bundle wash capsule (H-2-58647), dissolver charging insert (H-2-75875)/ (H-2-75875-1), lifting yoke #7A (H-2-96837), lifting yoke #9 (H-2-52458). Placed in tunnel on 2/8/95 on Car PX-3609. Estimated 44 tons, 3,457 Cu. Ft., Pb-~1830 Kg
22.	Metal uner box (H-2-65096) containing jumpers and failed/obsolete canyon equipment. F7 neutron monitor (H-2-75825), lead storage box (H-2-131629) containing jumper counterweights and miscellaneous lead items, scrap hopper (H-2-57347) containing miscellaneous canyon equipment, canister capping station (H-2-821831), test canister containing various lengths of carbon steel pipe. Placed in Tunnel on 3-11-06, on Car #3616. Estimated weight 22 tons, 1,712 Cu. Ft., Pb-~3232 Kg., Cd-~2 Kg.
23.	Two burial boxes (H-2-100187) containing jumpers and failed/obsolete canyon equipment, lifting yoke (H-2-99652). Placed in Tunnel 3-11-96 on Car #PX-31. Estimated weight 21 tons, 2,116 Cu. Ft.
24.	Concrete burial box (H-1-44980) storing 8 containers of 324 Building, B-Cell waste. For additional details, see PUREX Work Plan WP-P-95-60. Placed in Tunnel on Car #PX-29, on April 26, 1996. Estimated weight 36 tons, 1,890 Cu. Ft. Cd-~10.5 kg., absorbed oil-~8.5 kg., Cr-~1 kg., Ba-~ 3 kg

Position	PUREX #2 Storage Tunnel (218-E-15)
25.	Concrete burial box (H-1-44980) storing 9 containers of 324 and 325 Building waste. For additional details, see PUREX Work Plan WP-P-96-015. Placed in tunnel on Car #10A-3619, on June 12, 1996. Estimated weight 46.5 tons, 1,890 Cu. Ft. Ba-~4g., Cd-<1g., Cr-~2g., Pb- <1g
26.	20,000-gallon liquid waste tank Car HO-10H-18580, empty per RCRA, placed in Tunnel on June 19, 1996, approximately 30 tons.
27.	20,000 gallon liquid waste tank Car HO-10H-18579, empty per RCRA, placed in Tunnel on June 19, 1996, approximately 30 Tons
28.	20,000-gallon liquid waste tank Car HO-10H-18582, empty per RCRA, placed in Tunnel on June 19, 1996, approximately 30 tons.

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4.0 PROCESS INFORMATION

This chapter discusses the processes involved in the operation of the PUREX Storage Tunnels. The PUREX Storage Tunnels are used for the storage of mixed waste from the PUREX Plant and other onsite sources.

The PUREX Storage Tunnels were designed and constructed to provide a means of protecting personnel and the environment from exposure to mixed waste associated with stored material. This design also serves to protect personnel and the environment from the dangerous waste component of the mixed waste stored inside the tunnels.

The PUREX Storage Tunnels are being permitted as a miscellaneous unit under WAC 173-303-680. The WAC regulations require that miscellaneous unit permit terms and provisions address appropriate requirements provided for other TSD units. Because the operation and construction of the PUREX Storage Tunnels most closely resemble that of a container storage unit, the appropriate requirements prescribed for a container storage unit are addressed in this chapter.

4.1 OPERATION OF THE PUREX STORAGE TUNNELS

This section describes the selection, characterization, preparation, placement, and removal activities associated with storage of mixed waste in the PUREX Storage Tunnels.

4.1.1 Preparation for Tunnel Activities

Management, with the concurrence of an appropriate cognizant engineer, determines when material is to be removed and transported to the PUREX Storage Tunnels. A job specific work plan describing the overall transfer activities is prepared.

4.1.1.1 Storage/Removal Equipment Preparation

A remotely controlled, battery-powered locomotive normally was used to move railcars into and out of the PUREX Storage Tunnels. Other mechanical means such as a standard locomotive or a winch also can be used independently or in combination with the remote locomotive should the need arise. Methods for use of the remote locomotive are described in this chapter as this represents the normal placement and removal of railcars at the PUREX Storage Tunnels. Should storage activities require the use of a mechanical means other than the remote locomotive to place or withdraw a railcar, methods for that application will be developed.

Preparatory activities associated with the remote-controlled locomotive included the following:

- Charging the batteries for both the locomotive and the radio transmitter
- Performing operational checks
- Installing a plastic shroud over the locomotive to facilitate decontamination
- Installing an anticoupling device on the south coupler of the locomotive (storage only)
- Performing physical inspections of the railroad track within the railroad tunnel to ensure that the track switches are positioned properly and the track is clear of obstructions.

4.1.1.2 Water-Fillable Door Preparation

Each PUREX Storage Tunnel has a water-fillable door that isolates the storage area from the PUREX railroad tunnel.

Currently, the water-fillable door to Tunnel Number 2 is empty and is not expected to be filled. Operational checks are performed on the door hoists. Before performing operational checks on the water-fillable door, the operator confirms with a dispatcher that the railroad tunnel area is clear of personnel.

4.1.1.3 Other Preparation Tasks

Before material storage, the following preparatory tasks are completed.

- The storage tunnel exhaust fan is verified to be operating.
- Labels will be attached to the railcar in accordance with WAC 173-303-395(6) and 173-303-630(3) if the material contains dangerous waste components.

4.1.2 Tunnel Storage Activities

This section describes the placement of material within the PUREX Storage Tunnels.

4.1.2.1 Physical Characterization of Material to be Stored

Physical characterization includes an evaluation of the following physical properties:

- Length, width, and height
- Gross weight and volume
- Preferred orientation for transport and storage
- Presence of mixed waste.

Information sources used in physical characterization include equipment fabrication and installation drawings, operational records, and process knowledge. Physical characterization provides information necessary to appropriately describe the mixed waste materials. Such information also is used to design and fabricate, if required, supports on the railcar.

Specific material known to contain constituents that would cause the equipment to be designated as mixed waste is discussed in the waste analysis plan (Attachment 28, Chapter 3.0). The material includes but is not limited to dissolvers that contain elemental mercury; silver reactors that contain silver salts; jumpers and other equipment that have elemental lead counterweights; a concentrator that contains chromium; neutron absorbing equipment containing cadmium. Characteristics of these materials when stored as mixed waste are described in Attachment 28, Chapter 3.0. Waste transferred to the PUREX Storage Tunnels from other than PUREX Plant also would be physically characterized.

4.1.2.2 Material Flushing

Before removal from service, the material from the PUREX Plant was flushed to minimize loss of products, to reduce contamination, and to reduce to nonregulatory levels the concentration of any dangerous chemicals present in a residual heel. In the future the analysis of the rinsate will be used to determine when these goals have been achieved. The analysis of the final flush will be retained as part of the PUREX Storage Tunnel records. Material removed from other onsite units will be prepared for transfer to the tunnels in accordance with this dangerous waste permit.

4.1.2.3 Railcar Preparation

Railcars are modified to serve as dedicated storage platforms and transporters for material placed in the PUREX Storage Tunnels. The wooden decking on the railcars is removed to minimize the amount of combustible material placed in the PUREX Storage Tunnels. The south coupler is disabled or removed to prevent the railcar from coupling to the railcar stored ahead. Brakes are disabled to ensure freewheeling of the railcar. Steel decking, catch pans filled with absorbent, and equipment cradles are provided as needed to modify the railcar for its specific task.

4.1.2.4 Placement of Material into Storage Position

With all preparations complete and with the approval of cognizant management, transferring material to the PUREX Storage Tunnels proceeds as follows.

- The water-fillable door to the storage tunnel is opened.
- The railcar is loaded as specified in the storage tunnel checklist.
- An inventory of items loaded on the railcar and a record of their location on the railcar are recorded in the storage tunnel checklist.
- A survey is obtained of the loaded railcar at a distance commensurate with ALARA practices.
- The railcar is pushed into the storage tunnel to its storage position.
- Once the railcar is in position, the water-fillable door is closed.

4.1.3 Removal of Stored Material

Removal of material stored within the PUREX Storage Tunnels is not conducted routinely. It is planned that the material will remain in storage until a means to accommodate processing and repackaging of the material for disposal or further storage or until another final disposition option becomes available. Removal of material from storage within the PUREX Storage Tunnels would proceed after the preparation activities identified in Section 4.1.1.

With all preparations complete and approval of management, removal of material from the storage area of the PUREX Storage Tunnels would proceed as follows.

- The equipment that will be used to remove material is positioned in the PUREX railroad tunnel.
- Verification is made that the PUREX railroad tunnel is configured properly to proceed with entrance into the PUREX Storage Tunnels (i.e., tunnel ventilation system is operating, the overhead door is closed and a survey of the area is performed for ALARA concerns).
- The water-fillable door is opened.
- The equipment that will be used to remove material is moved into the storage tunnel and connected to the railcar.
- Verification is made that the railcar is connected to the removal equipment and the railcar is extracted from the storage tunnel and positioned within the PUREX railroad tunnel.
- The water-fillable door is closed.

The loaded railcar retrieved from the tunnel would be remotely viewed and measurements may be obtained to determine the possibility of mixed waste containment failure during storage in the PUREX Storage Tunnels. If evidence of containment failure is detected, the specific details (i.e., material, location on railcar, storage position) would be documented and attached to the waste tracking form. This information would be maintained in the files and would be used to establish sampling locations within the tunnels at closure. After remote viewing and surveying, the railcar and associated material may be prepared as required for transfer to an appropriate onsite TSD unit for treatment or further storage.

4.1.4 Filling the Water-Fillable Door (Tunnel Number 2)

If shielding beyond that provided by the empty water-fillable door becomes necessary, the door can be filled with water. In the past, this was accomplished by connecting a fire hose from the water hydrant to the wall stub on the exterior of the door housing (Figure 4.1). Once the fire hose was in place, the hydrant valve was opened and the door was filled with water.

The hydrant was closed by personnel when a high-level indicator light illuminated. Although attendance by an operator is required at all times during filling operations, should the door overfill, excess water is channeled through a vent/spill pipe to the door sump. A 15.2-centimeter drain is provided in each door sump. Water accumulated in the door sump was pumped out to the Double-Shell Tank System, and the sump and drain were made inoperable during PUREX Facility deactivation activities. The drain was sealed during PUREX Facility deactivation. In the future, a temporary source of water could be provided for filling the water-fillable door.

4.1.5 Poststorage Activities

The following poststorage activities would conclude the tunnel storage task.

- Decontamination activities, if required, are performed.
- Management is notified of any unusual conditions observed during the storage/retrieval activities.

4.1.6 Operation of the Tunnel Ventilation System

The ventilation systems for Tunnel Number 1 and Tunnel Number 2 were designed to ventilate air from within the tunnels so the airborne contamination is vented through a HEPA filtered exhaust system.

4.1.6.1 Tunnel Number 1 Ventilation

Active ventilation of Tunnel Number 1 presently is not provided. After placement of the last railcar into Tunnel Number 1, the tunnel was sealed (Attachment 28, Chapter 2.0). As part of the sealing activities, the ventilation fan was deactivated electrically and the exhaust stack and filter were isolated from the system by installing blanks upstream and downstream of both the exhaust fan and filter and the stack was removed. In the event railcar removal activities are initiated, it is planned that the ventilation system would be reactivated. Operation of the ventilation system would be similar to that for Tunnel Number 2.

4.1.6.2 Tunnel Number 2 Ventilation

The Tunnel Number 2 ventilation system presently is inactive. As part of PUREX Facility deactivation, the water-fillable door and outer PUREX railroad tunnel door were sealed. The seal may be temporary or permanent depending on the future need for storing waste in the tunnel. The ventilation system may be operated continuously, or de-energized and reactivated during waste placement activities. During deactivation, a blank was installed on the downstream side of the filter and the stack was capped. When the determination has been made that Tunnel Number 2 will no longer receive waste, the ventilation system will be blanked and deactivated electrically similar to the Tunnel Number 1 ventilation system. While the Tunnel Number 2 ventilation system is operating and the water-fillable door is closed, the exhaust system, which discharges approximately 100 cubic meters per minute, maintains a slightly negative pressure in the tunnel. The exhaust air is replaced by infiltration around the water-fillable door and through the porosity of the tunnel structure (e.g., the rail-bed ballast). When the water-fillable door is open (during transfer activities), inward airflow is maintained through the open doorway. This inward airflow channels airborne radioactive contamination away from both the railroad tunnel and personnel following railcars (if allowed) into the storage tunnel. A HEPA filter provides filtration of all exhaust air before release to the atmosphere. When the ventilation system is operating, the HEPA filter is tested in place at least annually to ensure radioactive particulate removal efficiency. Exhausted air is sampled periodically and analyzed for airborne radionuclides.

4.2 CONTAINERS

This section describes the various types of containment used to isolate mixed waste stored in the PUREX Storage Tunnels. The PUREX Storage Tunnels are considered to be a miscellaneous unit most closely resembling that of a container storage unit. The mixed waste stored in the PUREX Storage Tunnels is contained and is not considered a risk to human health or to the environment.

4.2.1 Containers with Free Liquids

The only mixed waste stored as a free liquid is elemental mercury. A small quantity, less than 1.7 liters, of mercury is contained in each of the two thermowells attached to and contained within each dissolver (Attachment 28, Chapter 3.0). Primary containment of the mercury is provided by the all-welded construction of the thermowell itself, which is fabricated from 7.6-centimeter, Schedule 80, 304L stainless steel pipe. The open upper end of the thermowell was plugged with a 304L stainless steel nozzle plug in preparation for storage. The dissolver rests on a cradle on its railcar in an inclined position. This ensures that the mercury remains in the lower portion of the thermowell and is not in contact with the mechanical closure on the nozzle end of the thermowell.

A secondary containment barrier for mercury, should it leak from the thermowell, is provided by the dissolver itself. The dissolver is a 304L stainless steel process vessel constructed from 1-centimeter-thick plate and is approximately 2.7 meters in diameter. The dissolver is of all-welded construction and contains no drains or nozzle outlets in the bottom several feet of its lower section, which contains both thermowells.

The 304L stainless steel used to contain the elemental mercury is both compatible with the waste itself and the storage environment. The potential for significant deterioration of either the primary or secondary containment barrier material before closure is considered to be negligible.

The dissolvers stored within the PUREX Storage Tunnels are not labeled as containing characteristic toxic mercury (D009) [WAC 173-303-090(8)(c)]. Procedures for labeling were not in place at the time of storage. Personnel access into the storage area for purposes such as labeling is not feasible and cannot be justified under ALARA guidelines. Based on ALARA, mixed waste presently within the PUREX Storage Tunnels will remain unlabeled. However, during future transfers of mixed waste into the PUREX Storage Tunnels the railcars will be labeled as specified by WAC 173-303-395(6) and WAC 173-303-630(3).

4.2.2 Containers without Free Liquids that do not Exhibit Ignitability or Reactivity

Most lead is fully contained in all-welded encasements of either carbon steel or 304L stainless steel (refer to Attachment 28, Chapter 3.0, Table 1). The encasement serves as support, protection against mechanical damage, and protection of the lead from exposure to the environment. Also, lead has been placed in burial boxes of appropriate size. The boxes provide secondary containment for the lead in the unlikely event the primary encasement should fail. Although boxes may be open on the top, the PUREX Storage Tunnels are enclosed; therefore, the containers are protected from the elements.

Both carbon steel and 304L stainless steel used to encase the lead are compatible with the waste and the storage environment. Significant deterioration of either the primary or secondary containment barrier materials before closure is not considered to be credible.

In the past, material that contains lead or that has encased lead attached was not labeled as containing characteristic toxic lead (D008) [WAC 173-303-090(8)], because the requirements were not yet on line. As stated in Section 4.2.1, personnel entry into the tunnel storage area for purposes of labeling would be inconsistent with ALARA guidelines. However, during future storage of material containing lead the railcars will be labeled in accordance with WAC 173-303-395(6) and WAC 173-303-630(3).

4.2.3 Protection of Extremely Hazardous Waste in Containers

The present amount of mixed waste stored in the PUREX Storage Tunnels is sufficient to characterize this material as extremely hazardous waste. Because the PUREX Storage Tunnels are enclosed totally, protective covering from the elements and from run-on is provided for the storage of extremely hazardous waste. Periodic inspection of the equipment stored in the PUREX Storage Tunnels is not feasible and cannot be justified under ALARA guidelines. Safe management of this waste is based on the following considerations.

- The operation of the PUREX Storage Tunnels is passive, i.e., once a storage position is filled, the storage position remains undisturbed until closure.
- The extremely hazardous waste is compatible with its storage container and the storage environment.

4.2.4 Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste in Containers

There is no reactive or incompatible waste known to be stored in the PUREX Storage Tunnels. The only mixed waste stored in the PUREX Storage Tunnels considered an ignitable waste is the silver nitrate in Tunnel Number 2. The silver nitrate fraction of the silver salts, within the silver reactors, exhibits the characteristic of ignitability as defined in 49 CFR 173.127(a). Therefore, the silver salts are managed as an ignitable dangerous waste in accordance with WAC 173-303-395.

- The risk of fire associated with the storage of silver nitrate in the PUREX Storage Tunnels is considered to be extremely low. This conclusion is based on the following considerations.
- The operation of the PUREX Storage Tunnels is passive; i.e., once a storage position is filled, the storage position remains undisturbed until closure.
- The silver nitrate is contained within large, heavy-walled stainless steel vessels that isolate the silver nitrate from contact with any combustibles that might be in the tunnels.
- The silver nitrate is dispersed over a large surface area on a ceramic packing substraight and is not conducive to build-up of heat that could lead to spontaneous combustion.
- Personnel access to the occupied areas of the tunnels is not permitted, thereby precluding activities that could present a fire hazard (e.g., smoking, flame cutting, welding, grinding, and other electrical activities).

Although ignitable waste storage units are required by WAC 173-303-395(1)(d) to have inspections conducted at least yearly by a fire marshall or professional fire inspector familiar with the requirements of the uniform fire code, the ALARA concerns within the PUREX Storage Tunnels make such inspections impractical. These inspections are not considered appropriate or necessary for the safe operation of the unit because of the nature of the ignitable waste, the means of storage, and ALARA concerns (Attachment 28, Chapter 6.0, §6.2).

4.3 ENGINEERING DRAWINGS

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H-2-55588	Structural Sections and Details: Disposal Facility for Failed Equipment
H-2-55589	Structural Sections and Details: Disposal Facility for Failed Equipment
H-2-55590	Door and Hoist Details
H-2-55591	Door and Hoist Details
H-2-55592	Door and Hoist Details
H-2-55593	Electrical Details
H-2-55594	Shielding Door Fill and Drain Lines Arrangement: Disposal Facility for Failed Equipment
H-2-55599	Electrical Door Control Plan, Elementary Diagram and Miscellaneous Details: Disposal Facility for Failed PUREX Equipment
H-2-58134	Ventilation Details; Sheet 1, Sheet 2, Sheet 3, Sheet 4
H-2-58175	PUREX Tunnel
H-2-58193	Sump Details
H-2-58194	Sump Details
H-2-58195	Structural Sections and Details: Equipment Disposal - PUREX
H-2-58206	Sump Details
H-2-58208	Fan Details; Sheet 1, Sheet 2, Sheet 3
H-2-94756	Filter Details; Sheet 1, Sheet 2

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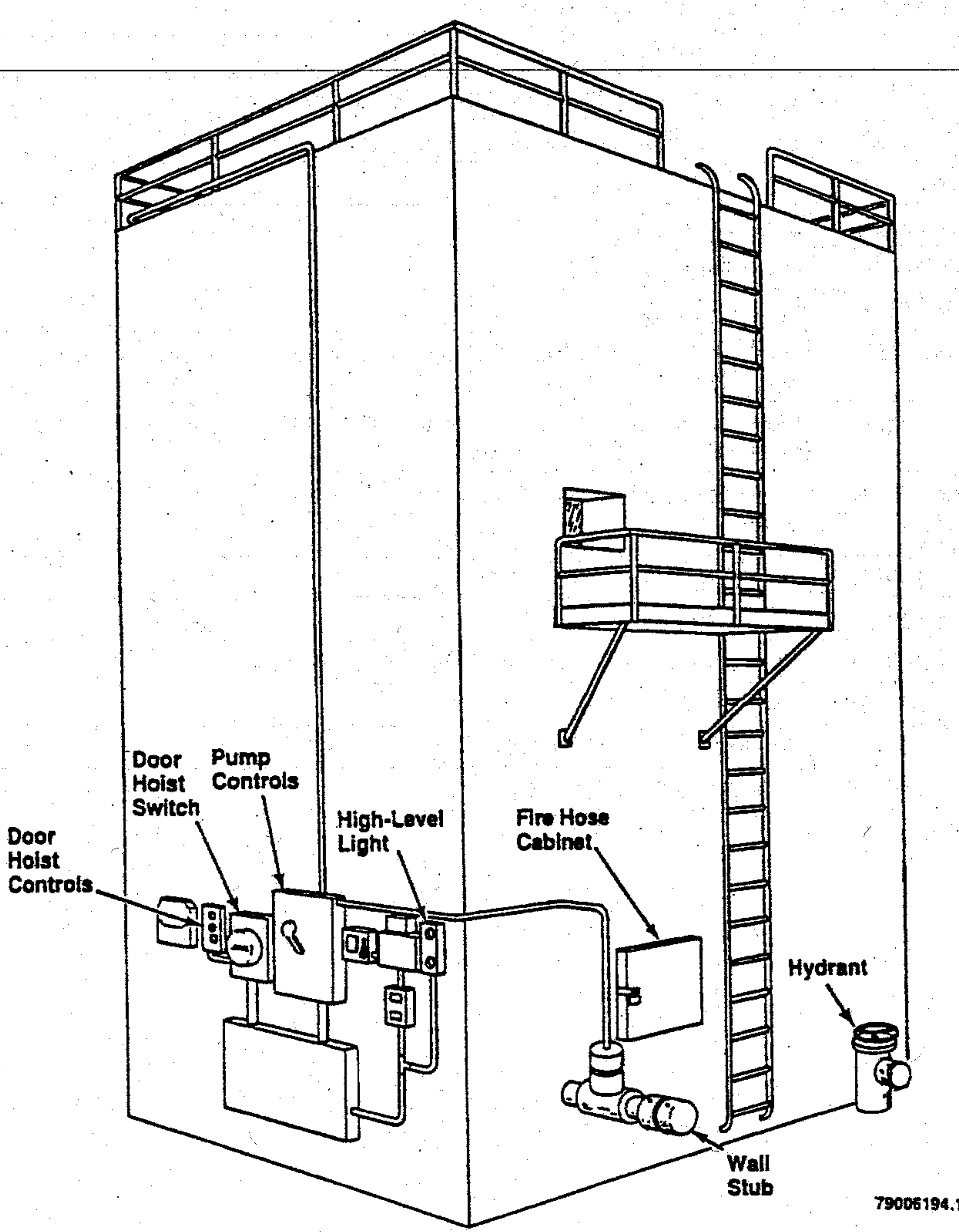

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11.0 CLOSURE AND FINANCIAL ASSURANCE

Closure of the PUREX Storage Tunnels requires coordination with closure of the PUREX Plant to ensure a cost effective closure for both units. In addition, the nature of the mixed waste located within the PUREX Plant and PUREX Storage Tunnels precludes the determination of the type of treatment and/or disposition of the waste at this time.

The PUREX Storage Tunnels will be managed as a RCRA storage unit until closure can be coordinated with the final closure plan for the PUREX Plant. The PUREX Storage Tunnels closure plan will be submitted after any required National Environmental Policy Act of 1969 documentation and land usage agreements, which initiate disposition and aid in identifying or developing necessary disposition activities, have been adopted. The PUREX Storage Tunnels closure plan will be submitted for Ecology approval with the PUREX Plant closure plan.

The PUREX Storage Tunnels closure plan will be written to meet the requirements of WAC 173-303-140 and WAC 173-303-610. This closure plan might consider but will not be limited to the following options for either in situ disposal or retrieval/clean closure of this unit.

Federal facilities are not required to comply with WAC 173-303-620 as is stated in the regulations and as described in Permit Condition II.H.3 of the Hanford Facility RCRA Permit (Ecology 1994).

11.1 IN SITU DISPOSAL OPTIONS

This closure plan might consider but will not be limited to the following options for in situ disposal of waste in this unit.

11.1.1 Backfilling the PUREX Storage Tunnels with Gravel

This option could involve backfilling the tunnels with gravel to eliminate void space and prevent ground subsidence. A modified commercially available centrifugal rock-throwing device could be placed in newly constructed risers evenly spaced along each tunnel roof. Fill material could be supplied and dispersed into the tunnels by automated controls. Following the fill process, all equipment could be removed from the tunnel roofs and all means of access to the tunnels could be permanently sealed. Final activities could involve the construction of a final surface barrier that meets RCRA landfill cover requirements to prevent water from leaching mixed waste contained in the tunnels.

11.1.2 Injecting the PUREX Storage Tunnels with Grout

This option could involve the injection of grout material into each tunnel to stabilize and immobilize contained materials and prevent ground subsidence. A grout injector could be alternately placed in newly constructed risers evenly spaced along each tunnel roof. Grout material could be supplied and dispersed into the tunnels by automated controls. The grout material could be injected in lifts to accommodate curing and heat dissipation normally associated with the use of this type of material. Final activities could involve the construction of a final surface barrier that meets RCRA landfill cover requirements to prevent water from leaching mixed waste contained in the tunnels.

11.1.3 Combination of Grout Injection and Backfilling

This option combines grout injection with gravel backfilling similar to the processes discussed previously. Grout could be injected first to fill void spaces under the railcars and provide a basal structure. Gravel could be dispersed to fill remaining void space and prevent ground subsidence. Final activities could involve the construction of a final surface barrier that meets RCRA landfill cover requirements to prevent water from leaching mixed waste contained in the tunnels.

11.2 RETRIEVAL/CLEAN CLOSURE OPTIONS

This closure plan might consider but will not be limited to the following options for retrieval/clean closure of this unit.

11.2.1 Retrieval and Disposal in the PUREX Plant

Railcars stored in both tunnels could be remotely retrieved one at a time and moved beneath the horizontal door of the railroad tunnel extension for remote viewing, and if possible, characterization. Transfer procedures could be initiated to move waste material from the railcars to the PUREX Plant canyon deck area. Following transfer of the waste material, the railcars could be decontaminated and removed for final disposition at other onsite units. Final disposition of the waste transferred to the canyon deck area could be in accordance with PUREX Plant closure documentation. The PUREX Storage Tunnels could be closed after submittal and implementation of a PUREX Storage Tunnels closure plan in conjunction with PUREX Plant closure documentation. The PUREX Storage Tunnels closure plan will detail verification sampling and analysis to be performed as a part of closure activities.

11.2.2 Retrieval and Physical Processing (size reduction) in the PUREX Plant and Subsequent Disposal

Retrieval of waste material stored in the tunnels could be similar to that described in the previous section. Once the waste material was transferred to the PUREX Plant canyon deck area, characterization and size reduction of waste material could proceed. An area located on the canyon deck or in a process cell could be modified to include all necessary equipment to perform characterization and size reduction activities. Size reduction could be performed through various technologies that include, but are not limited to, flame cutting, water jet cutting, sawing, or other technologies. Final disposition of the processed waste material either onsite or offsite could be in accordance with regulations and procedures in place at that time. The PUREX Storage Tunnels could be closed after submittal and implementation of a PUREX Storage Tunnels closure plan in conjunction with PUREX Plant closure documentation. The PUREX Storage Tunnels closure plan will detail verification sampling and analysis to be performed as a part of closure activities.

11.2.3 Construction of a New Facility for Retrieval, Processing, and Treatment of Equipment for Disposal

This option involves the construction of a new unit that is either mobile or stationary to excavate, retrieve, and treat waste material stored in the tunnels. The unit could be constructed in a manner consistent with the retrieval and handling requirements for large, contaminated waste material. Following retrieval, the waste material could be treated in accordance with final onsite or offsite disposition requirements identified at such time. The excavated tunnels could have a temporary surface barrier placed in position until verification and sampling analysis could be performed as a part of closure activities to be performed in conjunction with PUREX Plant closure.

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12.0 REPORTING AND RECORDKEEPING

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- Hanford Facility Contingency Plan and incident records (as identified in the General Information Portion):
  - Immediate reporting
  - Written reporting
  - Shipping paper discrepancy reports.
- Unit-specific permit documentation and associated plans
- Personnel training records
- Inspection records (unit)
- Onsite transportation documentation
- Land disposal restriction records
- Waste minimization and pollution prevention.

In addition, the following reports prepared for the Hanford Facility will contain input, when appropriate, from the PUREX Storage Tunnels:

- Quarterly Hanford Facility RCRA Permit modification report
- Anticipated noncompliance
- Required annual reports.

Annual reports updating projections of anticipated costs for closure and postclosure will be submitted when the PUREX Storage Tunnels closure plan is submitted with the PUREX Plant closure plan for Ecology approval (Attachment 28, Chapter 11.0).

The PUREX Tunnels Operating Record 'records contact' is kept on file in the General Information file of the Hanford Facility Operating Record (refer to Attachment 33, General Information Portion, Chapter 12.0 [DOE/RL-91-28]).

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13.0 OTHER FEDERAL AND STATE LAWS

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Attachment 34
Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility

Replacement Chapters

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Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility

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3.0 WASTE ANALYSIS [C]

METRIC CONVERSION CHART

Into metric units			Out of metric units		
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	0.76456	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
Force			Force		
pounds per square inch	6.895	kilopascals	kilopascals	1.4504×10^{-4}	pounds per square inch

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

3.1 INTRODUCTION

In accordance with the federal and state regulations set forth in 40 Code of Federal Regulations (CFR) 264.13 and in Washington State Department of Ecology (Ecology) *Dangerous Waste Regulations*, Washington Administrative Code (WAC) 173-303-300, this waste analysis plan (WAP) has been prepared for operation of the Liquid Effluent Retention Facility (LERF) and the 200 Area Effluent Treatment Facility (ETF) located in the 200 East Area on the Hanford Site, Richland, Washington.

The Permittees shall comply with all the requirements, subsections, figures, tables, and appendices, included in the "Waste Analysis Plan for Liquid Effluent Retention Facility and 200 Area Effluent Treatment Facility, except that the "Wastewater Profile Sheet Form" is included as an example only. The actual Wastewater Profile Sheet format may vary, but will contain the same substantive information as the example form.

The purpose of this WAP is to document the sampling and analytical methods, and describe the procedures used for all dangerous waste managed in the specific treatment storage, and disposal (TSD) units identified in the Part A, Form 3, for the LERF and ETF. This WAP also documents the requirements for generators sending aqueous waste to the LERF or ETF for treatment. Throughout this WAP, the term generator includes any Hanford Site unit, including TSD units, whose process produces an aqueous waste.

The TSD units include a surface impoundment (LERF), which provides treatment and storage, a tank system at ETF, which provides treatment and storage, and a container management area at ETF, which provides drum storage and treatment. Additionally, this WAP discusses the sampling and analytical methods for the treated effluent (treated aqueous waste) that is discharged from ETF as a non-dangerous, delisted waste to the State-Approved Land Disposal Site (SALDS). Specifically, the WAP delineates the following:

- Influent Waste Acceptance Process - determines the acceptability of a particular aqueous waste at the LERF or ETF pursuant to applicable permit conditions, regulatory requirements, and operating capabilities prior to acceptance of the waste at the LERF or ETF for treatment or storage. Refer to Section 3.2.
- Special Management Requirements - identifies the special management requirements for aqueous wastes managed in the LERF or ETF. Refer to Section 3.3.
- Influent Aqueous Waste Sampling and Analysis - describes influent sampling and analyses used to characterize an influent aqueous waste to ensure proper management of the waste and for compliance with the special management requirements. Also includes rationale for analyses. Refer to Section 3.4.
- Treated Effluent Sampling and Analysis - describes sampling and analyses of treated effluent (i.e., treated aqueous waste) for compliance with State Waste Discharge Permit (Ecology 1995a) and Final Delisting [40 CFR 261, Appendix IX, Table 2 (EPA, 1995)] limits. Also includes rationale for analyses. Refer to Section 3.5.
- ETF Generated Waste Sampling and Analysis - describes the sampling and analyses used to characterize the secondary waste streams generated from the treatment process and to characterize waste generated from maintenance and operations activities. Also includes rationale for analyses. Refer to Section 3.6.
- Quality Assurance and Quality Control - ensures the accuracy and precision of sampling and analysis activities. Refer to Section 3.7.

This WAP meets the specific requirements of the following:

- Land Disposal Restrictions Treatment Exemption for the LERF under 40 CFR 268.4, U.S. Environmental Protection Agency, December 6, 1994 (Appendix C)
- Final Delisting for ETF, 40 CFR 261, Appendix IX, Table 2 (EPA 1995)
- Washington State Waste Discharge Permit, No. ST 4500, as amended, (Ecology 2000)
- *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste*, Hanford Facility Permit WA7890008967, September 28, 1994 (Ecology 1994).

This plan also includes the specific elements of a WAP, as identified in the *Dangerous Waste Permit Application Requirements* (Ecology 1996a). Attachment 34, Chapter 5.0, Groundwater Monitoring addresses groundwater monitoring.

The conditions of the Washington State Discharge Permit, Number ST 4500 (Discharge Permit) are included in this WAP for completeness, although they are not within the scope of RCRA or WAC 173-303. Therefore, revisions of this WAP that are not governed by the requirements of WAC 173-303 will not be considered as a modification subject to review or approval by Ecology. However, any revisions to this WAP will be incorporated into the Hanford Dangerous Waste Permit at least annually through the modification process.

3.1.1 Liquid Effluent Retention Facility and Effluent Treatment Facility Description

The LERF and ETF comprise an aqueous waste treatment system located in the 200 East Area (Figure 3.1). Both LERF and ETF may receive aqueous waste through several inlets. ETF generally receives aqueous waste directly from the LERF. However, aqueous waste can be transferred from the Load-In Station to ETF. The Load-In Station is located just east of ETF and currently consists of two 37,854-liter storage tanks and a pipeline that connects to either LERF or ETF through fiberglass pipelines with secondary containment.

The LERF can receive aqueous waste through four inlets. First, aqueous waste can be transferred to LERF through a pipeline from the 200 West Area. Second, aqueous waste can be transferred through a pipeline that connects LERF with the 242-A Evaporator. Third, aqueous waste also can be transferred to LERF from a pipeline that connects LERF to the Load-In Station at ETF. Finally, aqueous waste can be transferred into LERF through a series of sample ports located at each basin.

The LERF consists of three lined surface impoundments with a nominal capacity of 29.5 million liters each. Aqueous waste from LERF is pumped to ETF through a double-walled fiberglass pipeline. The pipeline is equipped with leak detection located in the annulus between the inner and outer pipes. Each basin is equipped with six available sample risers constructed of 6-inch-perforated pipe. A seventh sample riser in each basin is dedicated to influent waste receipt piping, and an eighth riser in each basin contains liquid level instrumentation. Each riser extends along the sides of each basin from the top to the bottom of the basin. Detailed information on the construction and operation of the LERF is provided in Attachment 34, Chapter 4.0.

ETF was designed to treat the contaminants anticipated in process condensate (PC) from the 242-A Evaporator and other aqueous wastes from the Hanford Site. Section 3.1.2 provides more information on the sources of these wastes.

The capabilities of ETF were confirmed through pilot plant testing. A pilot plant was used to test surrogate solutions that contained constituents of concern anticipated in aqueous wastes on the Hanford Site. The pilot plant testing served as the basis for a demonstration of the treatment capabilities of ETF in the *200 Area Effluent Treatment Facility Delisting Petition* (DOE/RL-92-72).

ETF consists of a primary and a secondary treatment train (Figure 3.2). The primary treatment train removes or destroys dangerous and mixed waste components from the aqueous waste. In the secondary treatment train, the waste components are concentrated and dried into a powder. This waste is containerized, and transferred to a waste treatment, storage, and/or disposal (TSD) unit.

Each treatment train consists of a series of operations. The primary treatment train includes the following:

- Surge tank
- Rough filter
- Ultraviolet light oxidation (UV/OX)
- pH adjustment
- Hydrogen peroxide decomposer
- Fine filter
- Degasification
- Reverse osmosis (RO)
- Polisher [ion exchange (IX) column]
- Final pH adjustment and verification.

The secondary treatment train uses the following systems:

- Secondary waste receiving tanks
- Evaporator (mechanical vapor recompression)
- Concentrate tank
- Thin film dryer
- Container handling
- Supporting systems.

A dry powder waste is generated from the secondary treatment train, from the treatment of an aqueous waste. The secondary waste treatment system typically receives and processes by-products generated from the primary treatment train. However, in an alternate operating scenario, some aqueous wastes may be fed to the secondary treatment train before the primary treatment train. Detailed information on the treatment trains and the unit operations is provided in Attachment 34, Chapter 4.0 for the LERF and ETF.

The treated effluent is contained in verification tanks where the effluent is sampled to confirm that the effluent meets the 'delisting' criteria. Under 40 CFR 261, Appendix IX, Table 2, the treated effluent from ETF is considered a delisted waste; that is, the treated effluent is no longer a dangerous or hazardous waste subject to the hazardous waste management requirements of RCRA. The treated effluent is discharged under the Discharge Permit as a nondangerous, delisted waste to the SALDS, located in the 600 Area, north of the 200 West Area (Figure 3.1). Some delisted wastewater is recycled in the treatment process. Verification tank water is used to dilute bulk acid and caustic to meet processing needs reducing the demand for process water.

3.1.2 Sources of Aqueous Waste

ETF was intended and designed to treat a variety of mixed wastes. However, PC from the 242-A Evaporator was the only mixed waste identified for storage and treatment in the LERF and ETF. As cleanup activities at Hanford progress, many of the aqueous wastes generated from site remediation and waste management activities will be sent to the LERF and ETF for treatment and storage.

The PC is a dangerous waste because it is derived from a listed, dangerous waste stored in the Double-Shell Tank (DST) System and because of the ammonia content. The DST waste is transferred to the 242-A Evaporator where the waste is concentrated through an evaporation process. The concentrated slurry waste is returned to the DST System, and the evaporated portion of the waste is recondensed, collected, and transferred as PC to the LERF.

Other aqueous wastes that will be treated and stored at the LERF and ETF include, but are not limited to the following Hanford wastes: contaminated groundwater from pump-and-treat remediation activities such as groundwater from the 200-UP-1 Operable Unit; water from deactivation activities such as water from the spent fuel storage basins at deactivated reactors (e.g., N Reactor); laboratory aqueous waste from unused samples and sample analyses; and leachate from landfills, such as the Environmental Restoration Disposal Facility.

Most of these aqueous wastes will be accumulated in batches in a LERF basin for interim storage and treatment through pH and flow equalization before final treatment in ETF. However, some aqueous wastes, such as 200-UP-1 Groundwater, may flow through LERF en route to ETF for final treatment. The constituents in these aqueous wastes are common to the Hanford Site and were considered in pilot plant testing or in vendor tests, either as a constituent or as a family of constituents.

3.2 INFLUENT WASTE ACCEPTANCE PROCESS

Throughout the acceptance process, there are certain criteria that must be met for an influent waste (i.e., aqueous waste) to be accepted. These criteria are identified in the following sections and summarized in Table 3.2. It should be noted that if an aqueous waste initially does not meet these criteria, it is not necessarily rejected. In many instances, ETF process or the LERF and ETF permits can be modified to accommodate the treatment and storage of that waste. A discussion of the reevaluation process is provided in Section 3.2.3.

The first step in the waste acceptance process is for the generator to provide information on the influent waste stream. At this stage, the generator will work with LERF/ETF personnel to define what information must be provided to determine the acceptability of an aqueous waste for the treatment, storage, or disposal at the LERF and ETF. At a minimum, the information required by WAC 173-303-300(2) will be obtained, which includes sampling and analysis of the aqueous waste stream. The LERF/ETF management will evaluate, on a case-by-case basis, whether the aqueous waste stream is acceptable for storage and treatment. The waste acceptance process contains the following steps.

<u>Acceptance Process</u> is performed as follows.

- <u>Waste information</u>--the generator of an aqueous waste works with LERF/ETF personnel to provide detailed information on the waste stream, i.e., a waste characterization.
- <u>Waste management decision process</u>--LERF/ETF management decision is based on a case-by-case evaluation of whether an aqueous waste stream is acceptable for treatment or storage, or whether to reject a stream. In addition, any special management practices required for an accepted stream may be specified at this time. The evaluation is divided into two categories.
  - Regulatory acceptability--a review to determine if there are any, regulatory concerns that would prohibit the storage or treatment of an aqueous waste in the LERF or ETF; e.g., treatment would meet permit conditions that would comply with applicable regulations.
  - Operational acceptability--an evaluation to determine if there are any operational concerns that would prohibit the storage or treatment of an aqueous waste in the LERF or ETF; e.g., determine treatability and compatibility or safety considerations.

  Specific waste acceptance criteria are defined within the individual discussions on regulatory and operational acceptability.

<u>Re-evaluation Process</u> is performed to ensure the characterization is accurate and current. This process also provides a mechanism for re-evaluating an aqueous waste stream that does not meet the waste acceptance criteria.

Record Information/Decision Process provides that information used in the decision. The evaluation and the decision are documented as part of ETF Operating Record.

3.2.1 Acceptance Process

When an aqueous waste stream is identified for treatment or storage in the LERF or ETF, the generator is required to characterize the waste and document the characterization on an aqueous waste profile sheet (WPS). This requirement is the first waste acceptance criterion. The LERF and ETF personnel work with the generators to ensure that the necessary information is collected for the characterization of a waste stream (i.e., the appropriate analyses or adequate process knowledge), and that the information provided on the WPS is complete. The completed WPS is maintained at ETF.

3.2.1.1 Waste Characterization

Because the constituents in the individual aqueous waste streams vary, each stream is characterized and evaluated for acceptability on a case-by-case basis. The generator is required to designate an aqueous waste, which generally will be backed up by analytical data. However, a generator may use process knowledge to substantiate the waste designation, or for general characterization information. Examples of acceptable process knowledge include the following:

- Documented data or information on processes similar to that which generated the aqueous waste stream
- Information/documentation that dangerous waste constituents are from specific, well documented processes, e.g., F-listed wastes
- Information/documentation that sampling/analyzing a waste stream would pose health and safety risks to personnel
- Information/documentation that the waste does not lend itself to collecting a laboratory sample.

When a generator submits process knowledge for the characterization of a dangerous and/or mixed waste stream, LERF and ETF personnel review the process knowledge as part of the waste acceptance process. Specifically, LERF and ETF personnel review the generator's processes to verify the integrity of the process knowledge, and determine whether the process knowledge is current and consistent with current regulations. LERF/ETF management or their designee determines the final decision on the adequacy of the process knowledge. The persons reviewing generator process knowledge and those making decisions on the adequacy of process knowledge are trained according to the requirements of the Dangerous Waste Training Plan, Attachment 34, Chapter 8.0 for the LERF and ETF.

Figure 3.1. Location of the LERF, 200 Area ETF, and the State Approved Land Disposal Site

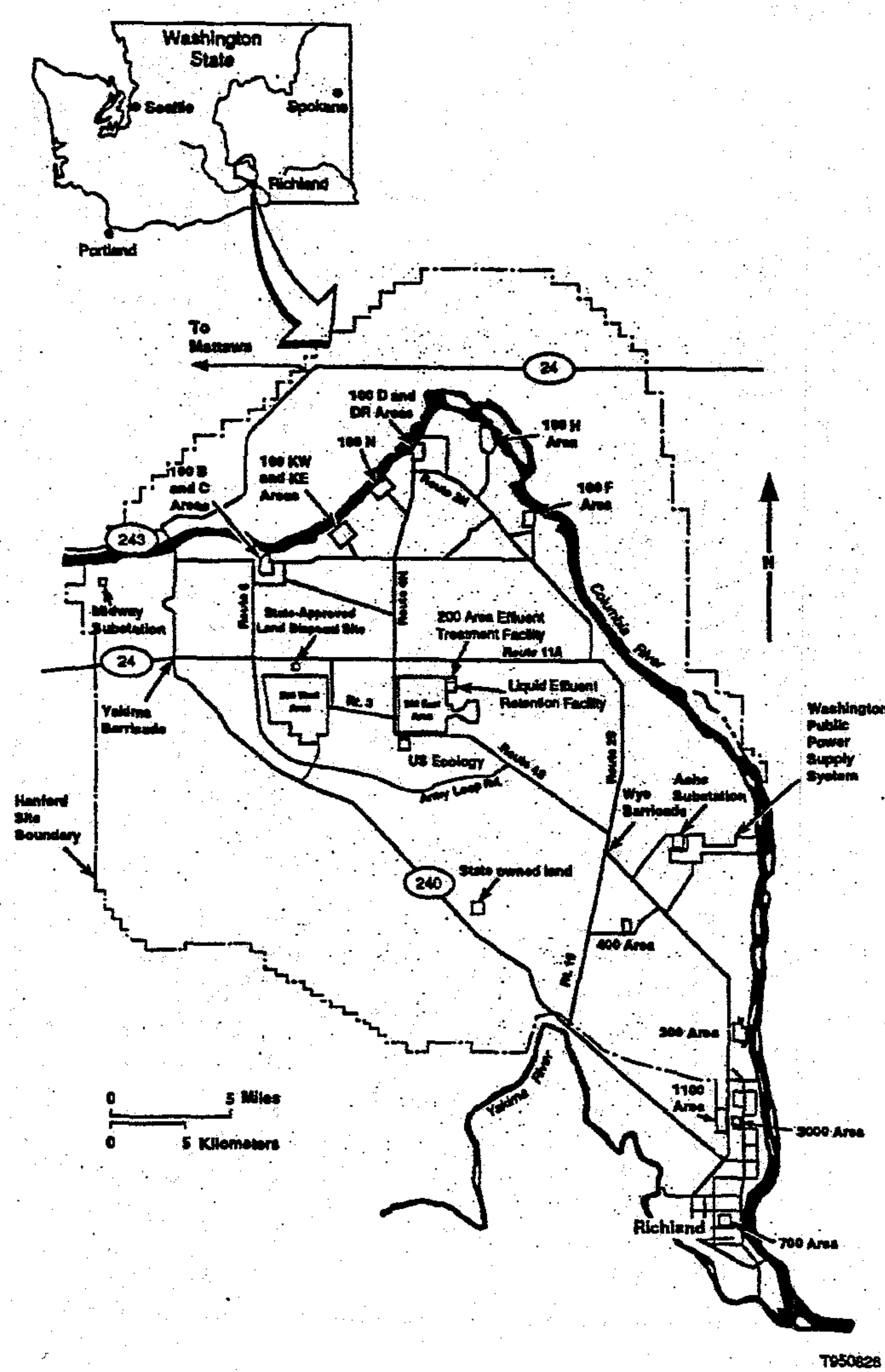
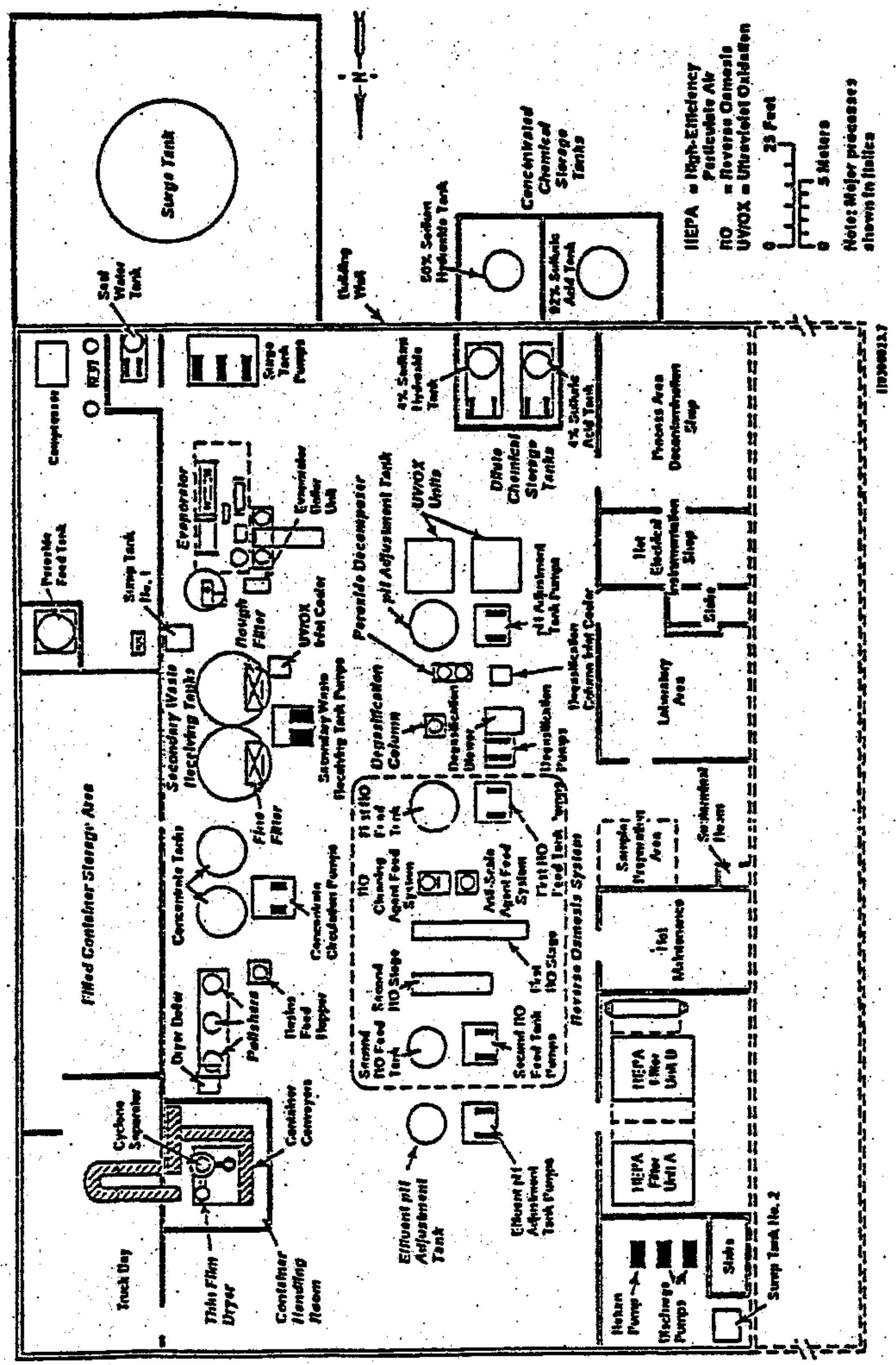


Figure 3.2. 200 Area Effluent Treatment Facility Floor Plan.



The generator is also responsible for identifying Land Disposal Restrictions (LDRs) that would be applicable to the influent aqueous waste as part of the characterization, as require under 40 CFR 268.40 and WAC 173-303-140. Because ETF is a Clean Water Act - equivalent TSD unit (40 CFR 268.37(a)), the generator is not required to identify the underlying hazardous constituents (40 CFR 286.48).

When analyzing an aqueous waste stream for characterization, a generator is required to use the target list of parameters identified in Table 3.3. Refer to Figure 3.3 for the corresponding analytical methods. The generator may use process knowledge in lieu of some analyses, as determined by LERF/ETF management or their designee, if the process knowledge is adequate (as described above). For example, if a generator provides information that, the process generating an aqueous waste does not include or involve organic chemicals; analyses for organic compounds likely would not be required. Additional analyses could be required if historical information and/or process knowledge indicate that an aqueous waste contains constituents not included in the target list of parameters.

The LERF and ETF personnel will work with the generator to determine which analyses are appropriate for the characterization. This approach ensures that the waste analyses adequately characterize the aqueous waste and defines the constituents of concern in a cost effective manner. The characterization and historical information are documented in the WPS, which is discussed in the following section.

3.2.1.2 Aqueous Waste Profile Sheet

The WPS documents the characterization of each new aqueous waste stream. The profile includes a detailed description of the volume, source, regulatory history, and the chemical and physical nature of the aqueous waste. For an aqueous waste to be accepted for treatment or storage in the LERF or ETF, each new waste stream generator is required to complete and provide this form to LERF and ETF management. Each generator also is required to provide the analytical data and process knowledge used to designate the aqueous waste stream, and to determine the chemical and physical nature of the waste. This form could be modified to accommodate changes in regulations, operational concerns at the LERF or ETF, Hanford Facility needs, or other needs. However, the basic elements of the example form (e.g., waste source information) will be maintained in any future revision.

The LERF and ETF management determine whether the information on the WPS is sufficient. The LERF and ETF management use this information to evaluate the acceptability of the aqueous waste for storage and treatment in the LERF and ETF, and to determine if the aqueous waste can be handled properly.

3.2.2 Waste Management Decision Process

All aqueous waste under consideration for acceptance must be characterized using analytical data and process knowledge. This information is used to determine the acceptability of an aqueous waste stream. The LERF and ETF Facility Manager or their designee is responsible for making the decision to accept or reject an aqueous waste stream. The management decision to accept any aqueous waste stream is based on an evaluation of regulatory acceptability and operational acceptability. Each evaluation uses acceptance criteria, which were developed to ensure that an aqueous waste is managed in a safe, environmentally sound, and compliant manner. The following sections provide detail on the acceptance evaluation and the acceptance criteria.

In many instances, an aqueous waste that does not meet one of the waste acceptance criteria is not necessarily rejected. Section 3.2.3 discusses the process for re-evaluating an aqueous waste that does not initially meet the waste acceptance criteria. However, the final decision to reject an aqueous waste is made by LERF and ETF management. An aqueous waste stream could be rejected for one of the following reasons:

- The paperwork and/or laboratory analyses from the generator are insufficient
- Discrepancies with the regulatory and operational acceptance criteria cannot be reconciled, including:
  - An aqueous waste is not allowed under the current Discharge Permit or Final Delisting, and LERF/ETF management elect not to pursue an amendment, or the permit and Delisting cannot be amended (Section 3.2.2.1)
  - An aqueous waste is incompatible with LERF liner materials or with other aqueous waste in LERF and no other management method is available (3.2.2.2).
- Adequate storage or treatment capacity is not available.

3.2.2.1 Regulatory Acceptability

Each aqueous waste stream is evaluated on a case-by-case basis to determine if there are any regulatory concerns that would preclude the storage or treatment of a waste in the LERF or ETF. Before an aqueous waste can be stored or treated in either the LERF or ETF, the regulatory history must be determined. Information on the regulatory history of an aqueous waste is documented in the WPS. This information is used to confirm that treating or storing the aqueous waste in the LERF or ETF is allowed under and in compliance with WAC 173-303, RCRA Permit Attachment 34, Final Delisting for ETF, and the Discharge Permit for ETF.

3.2.2.1.1 Dangerous Waste Regulations/Permits

Before an aqueous waste stream is sent to the LERF or ETF, the generator will characterize and designate the stream with the appropriate dangerous/hazardous waste numbers according to WAC 173-303-070. The Part A, Form 3, for the LERF and ETF, and the Final Delisting for ETF identify the specific waste numbers for dangerous/mixed waste that can be managed in the LERF and ETF. Dangerous waste designated with waste numbers not specified in the Part A, Form 3, cannot be treated or stored in the LERF or ETF, until the Part A, Form 3, is modified.

Additionally, aqueous wastes designated with listed waste numbers identified in the Final Delisting will be managed in accordance with the conditions of the delisting, or an amended delisting. Accordingly, the acceptance criteria in this evaluation are satisfied through compliance with the Part A, Form 3, and the Final Delisting.

3.2.2.1.2 State Waste Permit Regulations/Permit

Compliance with the Discharge Permit constitutes another waste acceptance criterion. In accordance with the conditions of the Discharge Permit, the constituents of concern in each new aqueous waste stream must be identified. The regulatory history and characterization data provided by the generator are used to identify these constituents. A constituent of concern, under the conditions of the Discharge Permit, in an aqueous waste stream is defined as any contaminant with a maximum concentration greater than one of the following:

- Any limit in the Discharge Permit (Ecology 1995a)
- Groundwater Quality Criteria (WAC 173-200)
- Final Delisting levels (EPA 1995)
- Background groundwater concentrations as measured at ETF disposal site.

The conditions of the Discharge Permit also require a demonstration that ETF can treat the constituents of concern to below discharge limits.

3.2.2.2 Operational Acceptability

Because the operating configuration or operating parameters at the LERF and ETF can be adjusted or modified, most aqueous waste streams generated on the Hanford Site can be effectively treated to below Delisting and Discharge Permit limits. Because of this flexibility, it would be impractical to define numerical acceptance or decision limits. Such limits would constrain the acceptance of appropriate aqueous waste streams for treatment at the LERF and ETF. The versatility of the LERF and ETF is better explained in the following examples:

- The typical operating configuration of ETF is to process an aqueous waste through the UV/OX unit first, followed by the RO unit. However, high concentrations of nitrates may interfere with the performance of the UV/OX. In this case, ETF could be configured to process the waste in the RO unit prior to the UV/OX unit.
- For a small volume aqueous waste with high concentrations of some anions and metals, the approach may be to first process the waste stream in the secondary treatment train. This approach would prevent premature fouling or scaling of the RO unit. The liquid portion (i.e., untreated overheads from ETF evaporator and thin-film dryer) would be sent to the primary treatment train.
- An aqueous waste with high concentrations of chlorides and fluorides may cause corrosion problems when concentrated in the secondary treatment train. One approach is to adjust the corrosion control measures in the secondary treatment train. An alternative may be to blend this aqueous waste in a LERF basin with another aqueous waste, which has sufficient dissolved solids, such that the concentration of the chlorides in the secondary treatment train would not pose a corrosion concern.
- Some metal salts (e.g., barium sulfate) tend to scale the RO membranes. In this situation, descalants used in the treatment process may be increased.
- Any effluent that does not meet these limits in one pass through ETF treatment process is recycled to ETF for re-processing.

There are some aqueous wastes whose chemical and physical properties preclude that waste from being treated or stored at the LERF or ETF. Accordingly, an aqueous waste is evaluated to determine if it is treatable, if it would impair the efficiency or integrity of the LERF or ETF, and if it is compatible with materials in these units. This evaluation also determines if the aqueous waste is compatible with other aqueous wastes managed in the LERF.

The waste acceptance criteria in this category focus on determining treatability of an aqueous waste stream, and on determining any operational concerns that would prohibit the storage or treatment of an aqueous waste stream in the LERF or ETF. The chemical and physical properties of an aqueous waste stream are determined as part of the waste characterization, and are documented on the WPS and compared to the design of the units to determine whether an aqueous waste stream is appropriate for storage and treatment in the LERF and ETF.

3.2.2.2.1Treatability

The process of determining treatability involves two steps. The first step is to establish the treatment efficiencies for the constituents of concern in an influent aqueous waste. The treatment efficiencies must be sufficient such that the treated effluent will meet the Discharge Permit and Delisting limits. The pilot plant testing provided destruction and removal (i.e., treatment) efficiencies for most of the anticipated constituents in aqueous waste streams at the Hanford Site, and are documented in the *200 Area Effluent Treatment Facility Delisting Petition* (DOE/RL-92-72). Information or studies from the vendors of the individual treatment units' studies may also be used on a case-by-case basis to develop treatment efficiencies for ETF or for the individual treatment units. Attachment 34, Chapter 4.0 for the LERF and ETF provides a detailed discussion of the individual treatment units. Treatment efficiencies also may be determined or confirmed by ETF operating data.

The second step in determining treatability is to identify those physical and chemical properties in an aqueous waste that would interfere with, or foul ETF treatment process. This step focuses on the potential of a waste stream to interfere with the destruction efficiency of organic compounds in the UV/OX system, rejection rates of the RO membranes, or foul the filtration systems. Generally, the operating parameters or operating configuration at the LERF or ETF can be adjusted or modified to accommodate these properties. However, in those cases where a treatment process or operating configuration cannot be modified, the aqueous waste stream will be excluded from treatment or storage at the LERF or ETF.

Additionally, an aqueous waste stream is evaluated for the potential to deposit solids in a LERF basin (i.e., an aqueous waste that contains sludge). This evaluation will also consider whether the blending or mixing of two or more aqueous waste streams will result in the formation of a precipitate. However, because the waste streams managed in the LERF and ETF are generally dilute, the potential for mixing waste streams and forming a precipitate is low; no specific compatibility tests are performed. If necessary, filtration at the waste source could be required before acceptance into LERF.

To determine if an aqueous waste meets the criterion of treatability, specific information is required. Treatment efficiencies will be developed from characterization data provided by the generator. Generators will also provide characterization data to identify those physical and chemical properties that would interfere with, or foul ETF treatment process. In some instances, process knowledge may be adequate to identify a chemical or physical property that would be of concern. For example, the generator could provide process knowledge that the stream has two phases (an oily phase and an aqueous phase). In this case, if the generator could not physically separate the two phases, the aqueous waste stream would be rejected because the oily phase could compromise some of the treatment equipment. Typically, analyses for the following parameters are required to evaluate treatability and operational concerns:

- total dissolved solids
- total organic carbon
- total suspended solids
- magnesium
- potassium
- barium
- nitrate
- sulfate
- manganese
- bromide
-
- specific conductivity
- pH
- calcium
- sodium
- silica
- iron
- chloride
- aluminum
- phosphate
-
-

These constituents are identified in Table 3.2.

3.2.2.2.2Compatibility

Corrosion Control. Because of the materials of construction used in ETF, corrosion is generally not a concern with new aqueous waste streams. Additionally, these waste streams are managed in a manner that minimizes corrosion. To ensure that a waste will not compromise the integrity of ETF tanks and process equipment, each waste stream is assessed for its corrosion potential as part of the compatibility evaluation. This assessment usually focuses on chloride and fluoride concentrations; however, the chemistry of each new waste also is evaluated for other parameters that could cause corrosion.

Compatibility with Liquid Effluent Retention Facility Liner and Piping. As part of the acceptance process, the criteria of compatibility with the LERF liner materials are evaluated for each aqueous waste stream. The evaluation for liner compatibility is documented as part of the waste acceptance process. The chemical parameters or constituents considered for liner compatibility are identified in Table 3.1. The analytical methods for these parameters and constituents are provided in Section 3.10.

The high-density polyethylene liners in the LERF basins potentially are vulnerable to the presence of certain constituents that might be present in some aqueous waste. Using EPA Method 9090 (EPA 1996), the liner materials were tested to evaluate compatibility between aqueous waste stored in the LERF and synthetic liner components. Based on the data from the compatibility test and vendor data on the liner materials, several constituents and parameters were identified as potentially harmful (at high concentrations) to the integrity of the liners. From these data and the application of safety factors, concentration limits in Table 3.1 were established.

Except for PC, the strategy for protecting the integrity of a LERF liner is to establish upfront that an aqueous waste is compatible before the waste is accepted into LERF. Characterization data on each new aqueous waste stream are compared to the limits outlined in Table 3.1 to ensure compatibility with the LERF liner material before acceptance into the LERF.

PC from each 242-A Evaporator campaign is sampled and analyzed, and the results compared to the limits in Table 3.1 to ensure continued compatibility with the liner. Additionally, before a waste stream is processed at the 242-A Evaporator, DST analytical data are reviewed and administrative and process controls developed and implemented to ensure that PC is compatible with the LERF liner. For flow-through aqueous wastes like the 200-UP-1 Groundwater, characterization data will be reviewed quarterly to ensure that liner compatibility is maintained.

In some instances, process knowledge may be adequate to determine that an aqueous waste is compatible with the LERF liner. In those instances where process knowledge is adequate, the waste characterization would likely not require analysis for these parameters and constituents.

Compatibility with Other Waste. Some aqueous wastes, especially small volumes, are accumulated in the LERF with other aqueous waste. Before acceptance into the LERF, the aqueous waste stream is evaluated for its compatibility with the resident aqueous waste(s). The evaluation focuses on the potential for an aqueous waste to react with another waste (40 CFR 264, Appendix V, *Examples of Potentially Incompatible Wastes*). However, the potential for problems associated with commingling aqueous wastes is very low; this evaluation confirms the compatibility of two or more aqueous wastes from different sources. No specific analytical test for compatibility is performed.

If it is determined that an aqueous waste stream is incompatible with other aqueous waste streams, alternate management scenarios are available. For example, another LERF basin that contains a compatible aqueous waste(s) might be used, or the aqueous waste stream might be fed directly into ETF for treatment. In any case, potentially incompatible waste streams are not mixed, and all aqueous waste is managed in a way that precludes a reaction, degradation of the liner, or interference with ETF treatment process.

3.2.3 Re-Evaluation Process

In accordance with 40 CFR 264.13 and WAC 173-303-300(4)(a), an influent aqueous waste will be re-evaluated as necessary to ensure that the characterization is accurate and current. At a minimum, an aqueous waste stream will be re-evaluated in the following situations.

- The LERF and ETF management have been notified, or have reason to believe that the process generating the waste has changed.
- The LERF and ETF management note an increase or decrease in the concentration of a constituent in an aqueous waste stream, beyond the range of concentrations that was described or predicted in the waste characterization.

In these situations, LERF and ETF management will review the available information. If existing analytical information is not sufficient, the generator may be asked to review and update the current waste characterization, to supply a new WPS, or re-sample and re-analyze the aqueous waste, as necessary. Other situations that might require a re-evaluation of a waste stream are discussed in the following sections.

3.2.3.1 Re-Evaluation for Aqueous Wastes not Meeting Waste Acceptance Criteria

An aqueous waste that does not meet one of the acceptance criteria is not necessarily rejected. Several options are available in the event that an aqueous waste is not acceptable following an initial evaluation. For example, a more extensive evaluation could be required to determine if ETF process can be modified to treat an aqueous waste to required discharge levels. Additionally, a more extensive evaluation might be required to determine if a modification of the Discharge Permit or the Final Delisting is required and is feasible (e.g., to treat waste with new listed waste numbers).

3.2.3.2 Re-Evaluation for Treated Effluent not Meeting 200 Area Effluent Treatment Facility Permit Limits

If the treated effluent does not meet the Discharge Permit and Delisting limits in one pass through ETF treatment process, the acceptability of the influent aqueous waste would be re-evaluated. This situation generally would apply to large volumes of aqueous waste (such as 200-UP-1 Groundwater) or to aqueous waste that is sent to the LERF or ETF in batches on some frequency (such as monthly transfers of an aqueous waste). Small volumes of aqueous waste generally would be reprocessed until permit limits are met.

3.2.3.3 Re-Evaluation Requirements for Flow-Through Aqueous Waste

Aqueous waste like the 200-UP-1 Groundwater is unique because of the constant-flow source, and because the waste is pumped into a LERF basin throughout the lifetime of the pump-and-treat remediation activity. Also, rather than being accumulated in the LERF in a batch mode, this aqueous waste will generally flow through the LERF to ETF for final treatment. Though this aqueous waste has been characterized upfront for acceptability, special sampling and analysis requirements must be met during the pump-and-treat operation to ensure that it continues to meet acceptance criteria.

Accordingly, flow-through wastes like the 200-UP-1 Groundwater are, and will be sampled quarterly to update the initial characterization. The LERF and ETF personnel monitor this on-going characterization. If the data from a sampling event suggest that contaminant concentrations have increased beyond that described in the initial characterization, the acceptability of the waste stream will be re-evaluated. Details on the sampling and analysis of flow-through aqueous waste, like the 200-UP-1 Groundwater, are provided in Section 3.4.

3.2.4 Record/Information and Decision

The information and data collected throughout the acceptance process, and the evaluation and decision on whether to accept an influent aqueous waste stream for treatment or storage in the LERF or ETF are documented as part of ETF Operating Record, which is maintained at ETF. Specifically, the Operating Record contains the following components on a new influent aqueous waste stream:

- The signed WPS for each aqueous waste stream and analytical data
- Process knowledge used to characterize a dangerous/mixed waste (under WAC 173-303), and information supporting the adequacy of the process knowledge
- The evaluation on whether an aqueous waste stream meets the waste acceptance criteria, including:
  - The evaluation for regulatory acceptability including appropriate regulator approvals
  - The evaluation for liner compatibility and for compatibility with other aqueous waste

Table 3.1. General Limits for Liner Compatibility

Chemical Family	Constituent(s) or Parameter(s)[a]	Limit (mg/L)[b] (sum of constituent concentrations)
Alcohol/glycol	benzyl alcohol, 1-butanol	500,000
Alkanone[c]	acetone, 2-hexanone, methyl ethyl ketone, methyl isobutyl ketone, and 2-pentanone	200,000
Alkenone[d]	none targeted	NA
Aromatic/cyclic hydrocarbon	acetophenone, benzene, chlorobenzene, cresol, 1,4-dichlorobenzene, 2,4-dinitrotoluene, di-n-octyl phthalate, naphthalene, tetrahydrofuran, toluene, xylene	2000
Halogenated hydrocarbon	carbon tetrachloride, chloroform, 1,2-dichloroethane, 1,2-dichloroethene, 1,1-dichloroethylene, methylene chloride, tetrachloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, vinyl chloride	2000
Aliphatic hydrocarbon	hexachloroethane	500,000
Ether	2-butoxyethanol	2000
Other hydrocarbons	dimethylnitrosamine, tributyl phosphate	2000
Oxidizers	none targeted	NA
Acids, Bases, Salts	ammonium	100,000
pH	pH	$0.5 < pH < 13.0$

[a] Analytical methods for the parameters and constituents are provided in Section 3.10.

[b] Analytical data for a chemical family (as indicated) are summed using the following 'sum of the fraction technique'. The individual constituent concentration, sum concentration (for families), and pH values for a waste stream are then evaluated against the compatibility limit.

$$\sum_{n=1}^{i}\left(\frac{Conc_n}{LIMIT_n}\right) \le 1$$

Where i is the number of organic constituents detected

[c] Ketone containing saturated alkyl group(s).

[d] Ketone containing unsaturated alkyl group(s).

mg/L = milligrams per liter.

Table 3.2. Waste Acceptance Criteria

General criteria category	Criteria description
1. Characterization	A. Each generator must provide an aqueous waste profile.
	B. Each generator must designate the aqueous waste stream.
	C. Each generator must provide analytical data and/or process knowledge.
2. Regulatory acceptability	A. The LERF and ETF can store and treat influent aqueous wastes with waste numbers identified in the Part A, Form 3, for the LERF and ETF, and the Final Delisting for ETF.
	B. The aqueous waste must comply with conditions of the Discharge Permit.
3. Operational acceptability	A. Determine whether an aqueous waste stream is treatable, considering: 1. Whether the removal and destruction efficiencies on the constituents of concern will be adequate to meet the Discharge Permit and Delisting levels 2. Other treatability concerns; analyses for this evaluation may include: total dissolved solids; silica total organic carbon; potassium total suspended solids; sodium specific conductivity; barium calcium; nitrate magnesium; chloride manganese; phosphate bromide; sulfate iron aluminum
	B. Determine whether an aqueous waste stream is compatible, considering: 1. Whether an aqueous waste stream presents corrosion concerns; analysis may include chloride and fluoride 2. Whether an aqueous waste stream is compatible with LERF liner materials, compare characterization data to the liner compatibility limits (Table 3.1). 3. Whether an aqueous waste stream is compatible with other aqueous waste(s). (A 40 CFR 264 Appendix V type of comparison will be employed).

3.3 SPECIAL MANAGEMENT REQUIREMENTS

Special management requirements for aqueous wastes that are managed in the LERF or ETF are discussed in the following sections.

3.3.1 Monitoring the Variability of Process Condensate

The Discharge Permit (Ecology 1995a, Section S5) requires sampling of PC in the LERF basins until sufficient data are collected, which adequately assess the variability of ammonia and total Kjeldahl nitrogen (TKN). The PC will be analyzed for these parameters to assess the range of concentrations present in the PC and the results reported to Ecology. In addition, the 10 highest concentrations of tentatively identified compounds (TICs) will be reported from each PC sampling event, as required by the discharge permit. Tentatively identified compounds are non-targeted organic compounds or fragments of compounds with unique chromatographic spectra that are qualitatively identified by comparing them to standard databases of spectra. Because these compounds are identified qualitatively, their concentration only can be estimated.

Reports have been submitted to Ecology that included the results of ammonia and TKN analysis, and the 10 highest TICs. The data in these reports suggested that there is very little variability in the PC.

3.3.2 Conditions on Process Condensate for Newly Identified Waste Numbers

In January 1995, the U.S. Department of Energy, Richland Operations Office (DOE-RL) notified Ecology and the U.S. Environmental Protection Agency that small amounts of listed waste might have been introduced to the DST System, upstream of the LERF and ETF. This listed waste previously had not been identified in the Dangerous Waste Part A, Form 3, for the DST System, LERF, or ETF. In a March 7, 1995 letter from Ecology to DOE-RL (Ecology 1995b), Ecology exercised its enforcement discretion with respect to the designation of this waste so long as several conditions are met. As long as these conditions are met, the waste numbers will not be included in the Part A, Form 3s, for the LERF or ETF. These conditions only apply to PC. The constituent's vanadium, formate, and cyanide will be analyzed in the PC to meet these conditions.

3.3.3 Land Disposal Restriction Compliance at Liquid Effluent Retention Facility

Because LERF provides treatment through flow and pH equalization, a surface impoundment treatment exemption from the land disposal restrictions was granted in accordance with 40 CFR 268.4 (EPA 1994 and Ecology 1996b). This treatment exemption is subject to several conditions, including a requirement that the WAP address the sampling and analysis of the treatment 'residue' [40 CFR 268.4(a)(2)(i) and WAC 173-303-300(5)(h)(i) and (ii)] to ensure the 'residue' meets applicable treatment standards. Though the term 'residue' is not specifically defined, this condition further requires that sampling must be designed to represent the "sludge and the supernatant" indicating that a residue may have a sludge (solid) and supernatant (liquid) component.

Solid residue is not anticipated to accumulate in a LERF basin for the following reasons:

- Aqueous waste streams containing sludge would not be accepted into LERF under the acceptance criteria of treatability (Section 3.2.2.2.1)
- No solid residue was reported from PC discharged to LERF in 1995
- The LERF basins are covered and all incoming air first passes through a breather filter
- No precipitating or flocculating chemicals are used in flow and pH equalization.

Therefore, the residue component subject to this condition is the supernatant (liquid component). As indicated above, solids are not anticipated to accumulate in a LERF basin. Additionally, an aqueous waste stream is evaluated for the potential to deposit solids in a LERF basin (i.e., an aqueous waste that contains sludge). If necessary, filtration at the waste source could be required before acceptance into LERF. The contingency for removal of solids will be addressed during closure [as indicated in the Attachment 34, Chapter 11.0, Closure Plan, for LERF and ETF.

The conditions of the treatment exemption also require that treatment residues (i.e., aqueous wastes), which do not meet the LDR treatment standards "must be removed at least annually" [40 CFR 268.4(a)(2)(ii)]. To address the conditions of this exemption, an influent aqueous waste is sampled and analyzed and the LDR status of the aqueous waste is established as part of the acceptance process. The LERF basins are then managed such that any aqueous waste(s), which exceeds an LDR standard, is removed annually from a LERF basin, except for a heel of approximately 1 meter. A heel is required to stabilize the LERF liner. The volume of the heel is approximately 1.9 million liters.

3.4 INFLUENT AQUEOUS WASTE SAMPLING AND ANALYSIS

The following sections provide a summary of the sampling procedures, frequencies, and analytical parameters that will be used in the characterization of influent aqueous waste (Section 3.2) and in support of the special management requirements for aqueous waste in the LERF (Section 3.3).

3.4.1 Sampling Procedures

With a few exceptions, generators are responsible for the characterization, including sampling and analysis, of an influent aqueous waste. PC is either sampled at the 242-A Evaporator or accumulated in a LERF basin following a 242-A Evaporator campaign and sampled. Flow-through aqueous wastes, such as the 200-UP-1 Groundwater, will be characterized before acceptance; however, these aqueous wastes will also be sampled at LERF quarterly. Other exceptions will be handled on a case-by-case basis and the operating record will be maintained at the unit for inspection by Ecology. The following section discusses the sampling locations, methodologies, and frequencies for these aqueous wastes. Aqueous waste generators are referred to WAC 173-303-110(2) (40 CFR 261, Appendix I) for the sampling procedures that are applicable to their waste. For samples collected at the LERF and ETF, unit-specific sampling protocol is followed. The sample containers, preservation materials, and holding times for each analysis are listed in Section 3.10.

3.4.1.1 Batch Samples

In those cases where an aqueous waste is sampled in a LERF basin, samples are collected from four of the six available sample risers located in each basin, i.e., four separate samples. Though there are eight sample risers at each basin, one is dedicated to liquid level instrumentation and another is dedicated as an influent port. Operating experience indicates that four samples adequately capture the variability of an aqueous waste stream. Specifically, sections of stainless steel (or other compatible material) tubing are inserted into the sample riser to an appropriate depth. Using a portable pump, the sample line is flushed with the aqueous waste and the sample collected. The grab sample containers typically are filled for volatile organic compounds (VOC) first, followed by the remainder of the containers for the other parameters.

Several sample ports are also located at ETF, including a valve on the recirculation line at ETF surge tank, and a sample valve on a tank discharge pump line at ETF Load-In Station. All samples are obtained at the LERF or ETF are collected in a manner consistent with SW-846 procedures (EPA 1986).

3.4.1.2 Flow-Through Samples at the Liquid Effluent Retention Facility

Flow-through samples are collected from a valve located at a transfer pipeline connection to the LERF. Samples of flow-through aqueous wastes, such as 200-UP-1 Groundwater, are collected quarterly or more frequently if there is change in the source (e.g., a change in the well-head), or if it is determined that there is an increase in the concentration of contaminants beyond the range described in the initial characterization. For flow-through grab samples, VOC sample containers are typically filled first, followed by the remainder of the containers for the other parameters.

3.4.2 Analytical Rationale

As stated previously, each generator is responsible for designating and characterizing an aqueous waste stream. Accordingly, each generator samples and analyzes an influent waste stream using the target list of parameters (Table 3.3) for the waste acceptance process. At the discretion of the LERF and ETF management, a generator may provide process knowledge in lieu of some analyses as discussed in Section 3.2.1.1. The LERF and ETF personnel will work with the generator to determine which parameters are appropriate for the characterization.

The analytical methods for these parameters are provided in Section 3.10. All methods are EPA methods. Additional analyses may be required if historical information and process knowledge indicate that an influent aqueous waste contains constituents not included in the target list of parameters. For example, if process knowledge indicates that an aqueous waste contains a parameter that is regulated by the Groundwater Quality Criteria (WAC 173-200), that parameter(s) would be added to the suite of analyses required for that aqueous waste stream.

The analytical data for the parameters presented in Table 3.3, including VOC, SVOC, metals, anions, and general chemistry parameters are used to define the physical and chemical properties of the aqueous waste to:

- Set operating conditions in the LERF and ETF (e.g., to determine operating configuration - refer to Section 3.2.2.2)
- Identify concentrations of some constituents which may also interfere with, or foul ETF treatment process (e.g., fouling of the RO membranes - refer to Section 3.2.2.2)
- Evaluate LERF liner and piping material compatibility
- Determine treatability to evaluate if applicable constituents in the treated effluent will meet Discharge Permit and Delisting limits
- Estimate concentrations of some constituents in the waste generated in the secondary treatment train (i.e., dry powder waste).

Some analyses also are required to address special conditions (Section 3.3) or for other specific purposes as indicated below:

- Formate analysis is required for compliance with special conditions for PC (refer to Section 3.3.2).
- Total Kjeldahl nitrogen (TKN) analysis required under the Discharge Permit to meet special conditions for PC (until discharge permit is modified, refer to Section 3.3.1).
- Total dissolved solids analysis to predict volume of powder waste from the secondary treatment train.
-

Table 3.3. Target Parameters for Influent Aqueous Waste Analyses

VOLATILE ORGANIC COMPOUNDS	SEMIVOLATILE ORGANIC COMPOUNDS
Acetone Benzene 1-Butyl alcohol (1-Butanol) Carbon tetrachloride Chlorobenzene Chloroform 1,2-Dichloroethane (total) 1,1-Dichloroethylene 2-Hexanone Methyl ethyl ketone (2-Butanone) Methyl isobutyl ketone (Hexone, 4-Methyl-2-pentanone) 2-Pentanone Tetrachloroethylene Tetrahydrofuran Toluene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene Vinyl chloride	Acetophenone Benzyl alcohol 2-Butoxyethanol Cresol (o, p, m) 1,4-Dichlorobenzene Dimethylnitrosamine (N-Nitrosodimethylamine) Di-n-octyl phthalate Hexachloroethane Naphthalene Tributyl phosphate
TOTAL METALS	
Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Copper Iron Lead Magnesium Manganese Mercury Nickel Potassium Selenium Silicon Silver Sodium Uranium Vanadium Zinc	

Table 3.3. Target Parameters for Influent Aqueous Waste Analyses

ANIONS	GENERAL CHEMISTRY PARAMETERS
Bromide	Ammonia
Chloride	Total Kjeldahl nitrogen
Fluoride	Cyanide
Formate[1]	pH
Nitrate	Total suspended solids
Nitrite	Total dissolved solids
Phosphate	Total organic carbon
Sulfate	Specific conductivity

[1] Parameter only required for 242-A Evaporator process condensate (refer to Section 3.3.2).

3.5 TREATED EFFLUENT SAMPLING AND ANALYSIS

The treated aqueous waste, or effluent, from ETF is collected in three 2,540,000-liter verification tanks before discharge to the SALDS. To determine whether the Discharge Permit early warning values, enforcement limits, and the Delisting criteria are met, the effluent routinely is sampled at or before the verification tanks. The sampling and analyses performed are described in the following sections.

3.5.1 Rationale for Effluent Analysis Parameter Selection

The parameters measured in the treated effluent are required by the following regulatory documents:

- Delisting criteria from the Final Delisting (EPA 1995)
- Effluent limits from the State Waste Discharge Permit (Ecology 1995a)
- Early warning values from the State Waste Discharge Permit (Ecology 1995a).

The Final Delisting provides two testing regimes for the treated effluent. Under the initial verification-testing regime, the first three verification tanks must be sampled and analyzed, and the data submitted to the U.S. Environmental Protection Agency (EPA). Following EPA approval, the subsequent verification-testing regime is implemented, where every 10th tank is analyzed for the delisting constituents. If the concentration of any analyte is found to exceed a Discharge Permit enforcement limit or a Delisting criterion, the contents of the verification tank are reprocessed and/or re-analyzed. If the concentration of any analyte exceeds an early warning value, as a monthly average from treated effluent that is discharged, an early warning value report is prepared and submitted to Ecology.

3.5.2 Effluent Sampling Strategy: Methods, Location, Analyses, and Frequency

Effluent sampling methods and locations, the analyses performed, and frequency of sampling are discussed in the following sections.

3.5.2.1 Effluent Sampling Method and Location

Samples of treated effluent are collected and analyzed to verify the treatment process using ETF-specific sampling protocol. These verification samples can be collected at two locations. At the first sampling location, a representative grab sample is collected from a sampling port on the verification tank recirculation line. The second sampler is located upstream of the verification tanks where flow proportional composite samples are collected for all analyses except VOC analysis. For VOCs, a zero-headspace, time proportional sampler capable of collecting a sample over a multiple-day period is used. Section 3.10 presents the sample containers, preservatives, and holding times for each parameter monitored in the effluent.

3.5.2.2 Analyses of Effluent

The parameters required by the current Discharge Permit and Delisting conditions are presented in Table 3.4. The analytical methods and PQLs associated with each parameter are provided in Section 3.10. The methods and PQLs are equivalent to those used in the analysis of influent aqueous waste. With the exception of formic acid (analyzed as formate), analyses for the constituents associated with the newly listed waste numbers (Section 3.3.2) already are required analyses for the effluent. An analysis for formate is not required unless this constituent is identified in the influent aqueous waste.

3.5.2.3 Frequency of Sampling

Treated effluent is tested for all parameters listed in Table 3.4 on a frequency consistent with the conditions of the Discharge Permit and the Final Delisting. This effluent must meet the Discharge Permit and Delisting limits associated with these parameters. Under normal operating conditions, grab samples are collected from each verification tank. When a composite sample is called for, the sample is collected over the period required to fill one verification tank.

During operation of ETF, if one or more of the constituents exceeds a Delisting criterion, the Delisting conditions require the analysis of samples from the following two verification tanks volumes before effluent can be discharged. Treated effluent that does not meet Delisting criteria and Discharge Permit is not discharged to the SALDS and is recycled for further treatment.

3.6 EFFLUENT TREATMENT FACILITY GENERATED WASTE SAMPLING AND ANALYSIS

The wastes discussed in this section include the wastes generated at ETF and are managed in the container storage areas of ETF. This section describes the characterization of the following secondary waste streams generated within ETF:

- Secondary waste generated from the treatment process, including the following waste forms:
  - dry powder waste
  - concentrate tanks slurry
  - sludge removed from process tanks.
- Waste generated by operations and maintenance activities
- Miscellaneous waste generated within ETF.

For each waste stream, the waste is described, a characterization methodology and rationale are provided, and sampling requirements are addressed.

Table 3.4. Rationale for Parameters to Be Monitored in Treated Effluent

Parameter	Final Delisting[1]	Discharge Permit[2]	
		Enforcement Limit	Early Warning Value
VOLATILE ORGANIC COMPOUNDS			
Acetone	X		
Benzene	X		X
1-Butyl alcohol	X		
Carbon tetrachloride	X	X	
Chlorobenzene	X		
Chloroform	X		X
1,2-Dichloroethane	X		
1,1-Dichloroethylene	X		
Methyl ethyl ketone (2-Butanone)	X		
Methyl isobutyl ketone (4-methyl-2-Pentanone)	X		
Tetrachloroethylene	X	X	
Tetrahydrofuran			X
Toluene	X		
1,1,1-Trichloroethane	X		
1,1,2-Trichloroethane	X		X
Trichloroethylene	X		
Vinyl chloride	X		
SEMIVOLATILE ORGANIC COMPOUNDS			
Acetophenone			X
Benzyl alcohol	X		
Cresol (total)	X		
1,4-Dichlorobenzene	X		
Dimethylnitrosamine		X	
Di-n-octyl phthalate	X		
Hexachloroethane	X		
Naphthalene	X		
Tributyl phosphate	X		
TOTAL METALS[3]			
Antimony	X		
Arsenic	X	X	
Barium	X		
Beryllium	X		X
Cadmium	X		X
Chromium	X	X	
Copper			X
Lead	X		X
Mercury	X		X
Nickel	X		
Selenium	X		
Silver	X		
Vanadium	X		
Zinc	X		

Table 3.4. Rationale for Parameters to Be Monitored in Treated Effluent

Parameter	Final Delisting[1]	Discharge Permit[2]	
		Enforcement Limit	Early Warning Value
ANIONS			
Fluoride	X		
Nitrate (as N)		X	
Nitrite (as N)			X
Sulfate			X
OTHER ANALYSES			
Ammonia[4] (as N)	X		X
Total Kjeldahl nitrogen (as N)			X
Cyanide	X		
Total dissolved solids			X
Total organic carbon			X
Total suspended solids			X
Specific conductivity		M	

1 Parameters required by the current conditions of the Final Delisting, 40 CFR 261, Appendix IX, Table 2 (EPA 1995).
2 Parameters required by the current conditions of the State Waste Discharge Permit, No. ST 4500 (Ecology 1995a).
3 Metals reported as total concentrations.
4 Although the Final Delisting lists "ammonium" (NH_4^+), the standard analytical methods measure ammonia (NH_3). Ammonia is assumed the contaminant of concern.
X Rationale for measuring this parameter in treated effluent.
M Monitor only; no limit defined.

3.6.1 Secondary Waste Generated from Treatment Processes

The following terms used in this Section, including powder, dry powder, waste powder, and dry waste powder, are equivalent to the term 'dry powder waste'.

A dry powder waste is generated from the secondary treatment train, from the treatment of an aqueous waste. Waste is received in the secondary treatment train in waste receiving tanks where it is fed into an evaporator. Concentrate waste from the evaporator is then fed to a concentrate tank. From these tanks, the waste is fed to a thin film dryer and dried into a powder, and collected into containers. The containers are filled via a remotely controlled system. The condensed overheads from the evaporator and thin film dryer are returned to the surge tank to be fed to the primary treatment train.

Occasionally, salts from the treatment process (e.g., calcium sulfate and magnesium hydroxide) accumulate in process tanks as sludge. Because processing these salts could cause fouling in the thin film dryer, and to allow uninterrupted operation of the treatment process, the sludge is removed and placed in containers. The sludge is dewatered and the supernate is pumped back to ETF for treatment.

The secondary treatment system typically receives and processes the following by-products generated from the primary treatment train:

- Concentrate from the first RO stage
- Backwash from the rough and fine filters
- Regeneration waste from the ion exchange system
- Spillage or overflow collected in the process sumps.

In an alternate operating scenario, some aqueous wastes may be fed to the secondary treatment train before the primary treatment train. A more complete description of these processes can be found in Attachment 34, Chapter 4.0 for LERF and ETF.

3.6.1.1 Rationale for Selection of Parameters for Analysis

ETF secondary waste is anticipated to consist primarily of sulfate salts minor amounts of metals and mixed waste. The designation of ETF secondary waste is based on influent characterization data. These data are used to assign applicable listed waste numbers to the secondary waste and to determine if the secondary waste would designate as a characteristic waste because of toxic metals.

Concentrations of metals in the secondary waste are projected by comparing the influent metals data to the removal efficiencies of ETF treatment process. When the influent data indicate that the secondary waste will not designate as a characteristic waste, the secondary waste, as slurry, sludge, or dry powder, is not sampled and analyzed for metals.

The influent data, in conjunction with knowledge of ETF treatment processes, also are used to determine the LDR status of ETF secondary waste. Knowledge of the treatment process indicates that VOCs and SVOCs (i.e., listed waste constituents) are not expected in the secondary waste because of the organic destruction capability of the UV/OX and the temperatures of the thin film dryer. Accordingly, when the influent data indicate that the secondary waste meets the LDR treatment standards, the secondary waste, as slurry, sludge, or dry powder, is not sampled and analyzed for VOCs or SVOCs.

The parameters for analysis of ETF secondary waste are provided in Table 3.5. The specific analytical methods for these analyses are provided in Section 3.10. Additionally, samples of slurry or sludge undergo a total solids analysis to convert the analytical data on other parameters to dry weight concentrations.

3.6.1.2 Sampling Methods

The dry powder waste and containerized sludge are sampled from containers using the principles presented in SW-846 (EPA 1986) and ASTM Methods (American Society for Testing Materials), as referenced in WAC 173-303-110(2). The sample container requirements, sample preservation requirements, and maximum holding times for each of the parameters analyzed in either matrix are presented in Section 3.10.

Concentrate tank waste samples are collected from recirculation lines, which provide mixing in the tank during pH adjustment and prevent caking. The protocol for concentrate tank sampling prescribes opening a sample port in the recirculation line to collect samples directly into sample containers. The sample port line is flushed before collecting a grab sample. The VOC sampling typically is performed first for grab samples. Each VOC sample container will be filled such that cavitation at the sample valve is minimized and the container has no headspace. The remainder of the containers for the other parameters will be filled next.

3.6.1.3 Sampling Frequency

ETF secondary waste is sampled at a frequency of two containers per batch. A batch is defined as any volume of aqueous waste that is being treated under consistent and constant process conditions. The secondary waste will be resampled under the following changes in process conditions:

- Change in an influent source (e.g., change in well-head)
- Change in process chemistry.

Up to a maximum of three representative samples will be collected from the concentrate tanks, if waste from the concentrate tanks is used for characterization of a batch of influent waste. These samples will be analyzed for the appropriate parameters identified in Table 3.5 based on the needs identified from evaluating influent sampling and analysis data. When personnel exposures are of concern, analytical results from concentrate tank samples will be used to represent the powder waste generated from the treatment of that aqueous waste(s). The dry powder or concentrate tanks will be re-sampled in the following situations:

- The LERF and ETF management have been notified, or have reason to believe that the process generating the waste has changed (for example, a source change such as a change in the well-head for groundwater that significantly changes the aqueous waste characterization).
- The LERF and ETF management note an increase or decrease in the concentration of a constituent in an aqueous waste stream, beyond the range of concentrations that was described or predicted in the waste characterization.

3.6.1.4 Special Requirements Pertaining to Land Disposal Restrictions

Containers of ETF secondary waste are transferred to a storage or final disposal unit, as appropriate (e.g., the Central Waste Complex or to the Environmental Restoration Disposal Facility). ETF personnel provide the analytical characterization data and necessary process knowledge for the waste to be tracked by the receiving staff, and for the appropriate LDR documentation.

The following information on the secondary waste is included on the LDR documentation provided to the receiving unit:

- Dangerous waste numbers (as applicable)
- Determination on whether the waste is restricted from land disposal according to the requirements of 40 CFR 268/WAC 173-303-140 (i.e., the LDR status of the waste)
- The waste tracking information associated with the transfer of waste

- Waste analysis results.

3.6.2 Operations and Maintenance Waste Generated at the 200 Area Effluent Treatment Facility

Operation and maintenance of process and ancillary equipment generates additional routine waste. These waste materials are segregated to ensure proper handling and disposition, and to minimize the commingling of potentially dangerous waste with nondangerous waste. The following waste streams are anticipated to be generated during routine operation and maintenance of ETF. This waste might or might not be dangerous waste, depending on the nature of the material and its exposure to a dangerous waste.

- Spent lubricating oils and paint waste from pumps, the dryer rotor, compressors, blowers, and general maintenance activities
- Spent filter media and process filters
- Spent ion exchange resin
- HEPA filters
- UV light tubes
- RO membranes
- Equipment that cannot be returned to service
- Other miscellaneous waste that might contact a dangerous waste (e.g., plastic sheeting, glass, rags, paper, waste solvent, or aerosol cans).

These waste streams are stored at ETF before being transferred for final treatment, storage, or disposal as appropriate. This waste is characterized and designated using process knowledge (from previously determined influent aqueous waste composition information); analytical data; and material safety data sheets (MSDS) of the chemical products present in the waste or used (the data sheets are maintained at ETF). Sampling of these waste streams is not anticipated; however, if an unidentified or unlabeled waste is discovered, that waste is sampled. This 'unknown' waste is sampled and analyzed for the parameters in Table 3.5 as appropriate, and will be designated according to Washington state regulatory requirements. The specific analytical methods for these analyses are provided in Section 3.10.

3.6.3 Other Waste Generated at the 200 Area Effluent Treatment Facility

There are two other potential sources of waste at ETF: spills and/or overflows, and discarded chemical products. Spilled material that potentially might be dangerous waste generally is routed to ETF sumps where the material is transferred either to the surge tank for treatment or to the secondary treatment train. A spilled material also could be containerized and transferred to another TSD unit. In most cases, process knowledge and the use of MSDSs are sufficient to designate the waste material. If the source of the spilled material is unknown and the material cannot be routed to ETF sumps, a sample of the waste is collected and analyzed according to Table 3.5, as necessary, for appropriate characterization of the waste. Unknown wastes will be designated according to Washington State regulatory requirements. The specific analytical methods for these analyses are provided in Section 3.10.

A discarded chemical product waste stream could be generated if process chemicals, cleaning agents, or maintenance products become contaminated or are otherwise rendered unusable. In all cases, these materials are appropriately containerized and designated. Sampling is performed, as appropriate, for waste designation.

Table 3.5. 200 Area Effluent Treatment Facility Generated Waste - Sampling and Analysis

Parameter[1]	Rationale
• Total solids or percent water[2]	• Calculate dry weight concentrations
• Volatile organic compounds[3]	• LDR - verify treatment standards
• Semivolatile organic compounds[3]	• LDR - verify treatment standards
• Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver)	• Waste designation • LDR - verify treatment standards
• Nitrate	• Address receiving TSD waste acceptance requirements
• pH	• Waste designation

[1] For concentrate tank samples, the total sample (solid plus liquid) is analyzed and the analytical result is expressed on a dry weight basis. The result for toxicity characteristic metal and organic is divided by a factor of 20 and compared to the toxicity characteristic (TC) constituent limits [WAC 173-303-090(8)]. If the TC limit is met or exceeded, the waste is designated accordingly. All measured parameters are compared against the corresponding treatment standards.

[2] Total solids or percent water are not determined for unknown waste and dry powder waste samples and are analyzed in maintenance waste and sludge samples, as appropriate (i.e., percent water might not be required for such routine maintenance waste as aerosol cans, fluorescent tubes, waste oils, batteries, etc., or sludge that has dried).

[3] VOC and/or SVOC analysis of secondary waste is required unless influent characterization data and process knowledge indicate that the constituent will not be in the final secondary waste at or above the LDR.

LDR = land disposal restrictions.

3.7 QUALITY ASSURANCE/QUALITY CONTROL

The following quality assurance/quality control (QA/QC) information for ETF and LERF is provided as required by WAC 173-303-810(6). The sampling and analysis activities at ETF and LERF conform to the requirements of an ETF/LERF-specific quality assurance project plan and are in accordance with the following EPA guidance documents:

- *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, as amended, U.S. Environmental Protection Agency, Washington, DC, July 1992, as referenced in WAC 173-303-110.

- *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-7-020, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, March 1993.

3.7.1 Sampling Program

Typically, generators are responsible for the sampling and analysis of an influent aqueous waste. However, samples of influent aqueous waste can be collected at the LERF or the Load-In Station. Samples of treated effluent are collected at the verification tanks. Secondary waste generated from the treatment process generally is sampled in the dry powder form; however, the secondary waste also could be sampled while in slurry form for characterization. Sampling of influent aqueous waste, treated effluent, and secondary waste is discussed in Sections 3.4, 3.5, and 3.6, respectively, of the WAP.

Specific information on sample holding times, preservatives, and sample containers is provided in Section 3.10. The selection of the sample collection device depends on the type of sample, the sample container, the sampling location, and the nature and distribution of the waste components. In general, the methodologies used for specific materials correspond to those referenced to WAC 173-303-110(2). The selection and use of the sampling device is supervised or performed by a person thoroughly familiar with the sampling requirements. Samples are collected according to ETF/LERF-specific sampling protocol.

Sampling equipment is constructed of nonreactive materials such as glass, plastic, aluminum, or stainless steel, as indicated by the nature and matrix of the waste. Care is taken in the selection of the sampling device to prevent contamination of the sample and to ensure compatibility of materials. For example, plastic bottles are not used to collect some organic wastes.

3.7.2 Analytical Program

The onsite laboratory employed by ETF and LERF organization is required to have a program of quality control practices and procedures to ensure that precision and accuracy are maintained. The QA/QC program for sampling complies with the applicable Hanford Site standard requirements and the regulatory requirements. All analytical data are defensible and traceable to specific, related QC samples and calibrations. Offsite laboratories employed by ETF and LERF must meet the same QA/QC requirements as onsite laboratories and must demonstrate quality control practices that are comparable to the onsite laboratory's program. A review of an offsite laboratory may be conducted to ensure that the quality control of ETF and LERF data is maintained. The SW-846 analytical methods are followed (as indicated in Section 3.10). However, other methods may be substituted for a parameter if the PQL can be met.

The chemical parameters and associated analytical methods identified in Section 3.10 are used to characterize an influent aqueous waste, effluent waste, and ETF secondary waste. The analytical data on these parameters are also used to establish that key decision limits pertinent to proper waste management are met. These key decision limits are numerical thresholds, which include:

- liner compatibility limits for an influent aqueous waste as managed in LERF (may include blending a waste with other wastes to meet these limits)
- the LDR status of ETF secondary waste
- delisting limits for treated effluent

Where analytical data are used in key decision-making, the PQL of an analytical parameter (or sum of the PQLs, as indicated by the decision) must be at or below the key decision limit.

Good laboratory practices, which encompass sampling, sample handling, housekeeping, and safety, are maintained at all laboratories. The following section describe the specific practices which are implemented at the onsite laboratory to maintain the precision and accuracy goal of ± 20 percent for quality control samples which include method blank, quality control check, matrix spike, and duplicate samples.

The decision to re-analyze if the stated precision and accuracy goals are not met will depend on the use of the analytical results. Generally, only analytical results used in key decisions would require re-analysis if precision and accuracy goals were not met. For example, if the precision and accuracy goals are not met in a liner compatibility analysis, the sample would generally be re-analyzed if the results were close to a compatibility limit. However, if the analytical results suggested that concentrations were an order of magnitude below a liner compatibility limit, generally re-analysis would not be required. The decision to re-analyze a waste in a key decision situation will be made on a case-by-case basis.

3.7.2.1 Contamination Evaluation

Method blank samples are prepared with each batch of samples (at least 1 in a batch of 20) and analyzed to ensure sample contamination has not occurred.

3.7.2.2 Quality Control Check Sample

A quality control check sample is analyzed with each batch (at least 1 in a batch of 20) for each analytical parameter determined. The results show that analytical procedures are properly performed and that calibration and standardization of instrumentation are within acceptable limits per the method.

3.7.2.3 Matrix Spike Analyses

Matrix spike samples are employed to monitor recoveries and demonstrate accuracy. Matrix spike samples are periodically analyzed to provide information about the effect of the sample matrix on the analyte in question. Typically, a ratio of one spike for each analytical batch of samples, or 1 in 20, is maintained.

3.7.2.4 Duplicate Analyses

A laboratory sample duplicate or a matrix spike duplicate is analyzed to assess analytical precision in the laboratory. Typically, a ratio of one duplicate sample for each analytical batch of samples, or 1 in 20, is maintained.

3.7.3 Conclusion

The aforementioned sampling and analytical quality practices help ensure that the data obtained are precise and accurate for the waste stream being sampled. The analytical results are used by ETF and LERF management to decide whether to accept a particular waste stream and, upon acceptance, to determine the appropriate method of treatment, storage, and disposal. Results are also important to ensure that wastes are managed properly by ETF and LERF and those incompatible wastes are not inadvertently combined. Just as these results are important, so is the quality of these results. Thus, the quality of the analytical data, the thoroughness and care with which the sampling and analyses are performed and reported, provides an important basis for day-to-day operational decisions.

3.8 REFERENCES

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3.9 ANALYTICAL METHODS, SAMPLE CONTAINERS, PRESERVATIVE METHODS, AND HOLDING TIMES

Table 3.6. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent

Parameter	Analytical method[a]	Method PQL[b]	Accuracy/ Precision for Method[i] (percent)	Sample container[c]/ Preservative[c]/ Holding time[d]
VOLATILE ORGANIC COMPOUNDS				
Acetone	8260A	40	50-100	Sample container 2 x 40-mL amber glass with septum [1] Preservative 1:1 HCl to pH<2; 4°C [1] Holding time 14 days
Benzene		5	40-150	
1-Butyl alcohol (1-Butanol)		500	40-150	
Carbon tetrachloride		5	65-130	
Chlorobenzene		5	40-150	
Chloroform		5	50-130	
1,2-Dichloroethane		5	50-150	
1,2-Dichloroethene		5	50-150	
1,1-Dichloroethylene		5	60-130	
2-Hexanone		50	60-130	
Methylene chloride[f]		5	50-150	
Methyl ethyl ketone (2-Butanone)		100	65-130	
Methyl isobutyl ketone (Hexone, 4-Methyl-2-pentanone)		50	50-160	
2-Pentanone		10	50-160	
Tetrachloroethylene		5	65-140	
Tetrahydrofuran		100	47-150	
Toluene		5	50-160	
1,1,1-Trichloroethane		5	50-150	
1,1,2-Trichloroethane		5	50-150	
Trichloroethylene		5	70-155	
Xylene		5	50-150	
Vinyl chloride		10	40-130	
SEMIVOLATILE ORGANIC COMPOUNDS				
Acetophenone	8270B	10	70-110	Sample container 4 x 1-liter amber glass Preservative 4°C Holding time 7 days for extraction; 40 days for analysis after extraction
Benzyl alcohol		20	70-120	
2-Butoxyethanol		1000	65-105	
Cresol (o, p, m)		10	55-115	

Table 3.6. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent

Parameter	Analytical method[a]	Method PQL[b]	Accuracy/ Precision for Method[i] (percent)	Sample container[c]/ Preservative[c]/ Holding time[d]
1,4-Dichlorobenzene		10	45-95	
Dimethylnitrosamine		10	50-120	
2,4-Dinitrotoluene		10	65-100	
Di-n-octyl phthalate		10	70-130	
Hexachloroethane		10	50-110	
Naphthalene		10	60-120	
Tributyl phosphate		100	75-125	
TOTAL METALS				
Aluminum	6010A/EPA-600 200.7	450	75 - 125	Sample container 1 x 0.5-liter plastic/glass Preservative 1:1 HNO_3 to pH<2 Holding time 180 days; mercury 28 days
Antimony	EPA-600 200.8	30	75 - 125	
Arsenic	EPA-600 200.8	15	75 - 125	
Barium	6010A/EPA-600 200.7	20	75 - 125	
Beryllium	6010A/EPA-600 200.7	40	75 - 125	
Cadmium	EPA-600 200.8	5	75 - 125	
Calcium	6010A/EPA-600 200.7	100	75 - 125	
Chromium	7191/EPA-600 200.8	20	75 - 125	
Copper	6010A/EPA-600 200.7	70	75 - 125	
Iron	6010A/EPA-600 200.7	100	75 - 125	
Lead	EPA-600 200.8	10	75 - 125	
Magnesium	6010A/EPA-600 200.7	300	75 - 125	
Manganese	6010A/EPA-600 200.7	50	75 - 125	
Mercury	EPA 245.1/EPA-600 200.8	2	75 - 125	
Nickel	6010A/EPA-600 200.7	75	75 - 125	
Potassium	6010A/EPA-600 200.7	10,000	75 - 125	
Selenium	EPA-600 200.8	20	75 - 125	
Silicon	6010A/EPA-600 200.7	580	75 - 125	
Silver	6010A/EPA-600 200.7	70	75 - 125	
Sodium	6010A/EPA-600 200.7	290	75 - 125	
Uranium	EPA-600 200.8	5	75 - 125	
Vanadium	6010A/EPA-600 200.7	80	75 - 125	
Zinc	6010A/EPA-600 200.7	20	75 - 125	
GENERAL CHEMISTRY				
Bromide	EPA-600 300.0	2000	75 - 125	Sample container 1 x 1-liter glass Preservative 4°C Holding time 28 days
Chloride		1000	75 - 125	
Fluoride		500	75 - 125	
Formate[i]		1250	75 - 125	
Nitrate		100	75 - 125	
Nitrite		100	75 - 125	

Table 3.6. Sample and Analysis Criteria for Influent Aqueous Waste and Treated Effluent

Parameter	Analytical method[a]	Method PQL[b]	Accuracy/ Precision for Method[i] (percent)	Sample container[c]/ Preservative[c]/ Holding time[d]
Sulfate		10,000	75 - 125	
Phosphate		1500	75 - 125	
Ammonia[e]	EPA-600 350.3/350.1	40	75 - 125	Sample container 250 mL glass Preservative H_2SO_4 to pH<2; 4°C Holding time 28 days
Total Kjeldahl nitrogen	EPA-600 351.2	600	75 - 125	
Cyanide	9010A / EPA-600 335.3	100	75 - 125	Sample container 500 mL polyethylene Preservative 6M NaOH to pH>12; 4°C Holding time 14 days
Total dissolved solids	EPA-600 160.1	RL 10,000	75 - 125	Sample container 1 L glass Preservative None Holding time 7 days for pH - as soon as practical
Total suspended solids	EPA-600 160.2	RL 4,000	75 - 125	
Specific conductivity	EPA-600 120.1 (in lab)	RL 10[g]	75 - 125	
pH[h]	EPA-600 150.1/9040	RL +/- 0.1	75 - 125	
Total organic carbon	9060A	RL 1,000	75 - 125	Sample container 250 mL glass Preservative HCl or H_2SO_4 to pH<2; 4°C Holding time 28 days

[a] SW-846 methods are presented unless otherwise noted. Other methods might be substituted if the applicable PQL can be met.
[b] PQL is determined from method detection level (MDL), where PQL = 10 x MDL (for reagent-grade water); however, PQL is affected by sample matrix. PQL units are parts per billion unless otherwise noted.
[c] Sample bottle and preservatives could be adjusted, as applicable, to minimize sample volume.
[d] Holding time = time between sampling and analysis.
[e] Although the Final Delisting lists "ammonium" (NH_4^+), the standard analytical methods measure ammonia (NH_3). Ammonia is assumed the contaminant of concern.
[f] Conductivity reported in micromhos per centimeter
[g] pH monitored in influent aqueous waste only.
[h] Analysis for formate only required if detected in the influent aqueous waste.
[i] Accuracy/precision used to confirm or re-establish MDL.
[j] VOC refrigerated composite sampler with syringe requires no chemical preservative.

mL = milliliter.
RL = reporting limit.
MDL = method detection level.
PQL = practical quantitation limit
NA = not applicable.
ND = not determined.

Table 3.7. Sample Containers, Preservative Methods, and Holding Times for ETF Generated Waste

Parameter	Analytical Method[a]	PQL[b]	Accuracy/ Precision for Method[c] (percent)	Container[d]	Preservative	Holding time[f]
Total Solids	EPA-600 160.3	10,000	75 - 125	1-liter glass	None	180 days
pH	WAC 173-303-110 (3)(a)(ii)[g]/ EPA-600 150.1/9040	±0.1				as soon as practical
Nitrate	EPA-600 300.0/9056	Refer to Table 3.6				28 days
Volatile organic compounds (combined method target compound lists)	8240 or 8260A	Refer to Table 3.6	Refer to Table 3.6	2-40 ml amber glass w/septum	None	7 days
Semivolatile organic compounds (method target compound list)	8270B	Refer to Table 3.6	Refer to Table 3.6	4-1,000 ml amber glass	None	Extract within 7 days; analyze extract within 40 days
Mercury	EPA-600 200.8, 245.1/6020	Refer to Table 3.6	75 - 125	500 ml plastic/glass	None	Mercury 28 days; 6 months all others
Selenium	EPA-600 200.8/6020	Refer to Table 3.6				
Arsenic	EPA-600 200.8/6020	Refer to Table 3.6				
Cadmium	EPA-600 200.8/6020	Refer to Table 3.6				
Total metals (method target list)	EPA-600 200.8 6020/6010A/7000 Series	Refer to Table 3.6				
Toxicity Characteristic Leaching Procedure[h]	1311	NA	NA	NA	NA	NA

[a] SW-846 methods are presented unless otherwise noted. Other methods might be substituted if the applicable PQL can be met.

[b] PQL is determined from method detection level (MDL), where PQL = 10 x MDL (may vary depending on matrix). PQL units are parts per billion unless otherwise noted.

[c] Container size and type could be changed as directed by the laboratory, or as required by the analytical method.

[d] No preservatives are added to containers because of the anticipated high concentrations of salts.

[e] Holding time equals time between sampling and analysis.

[f] For solid waste.

[g] Extraction procedure, as applicable; extract analyzed by referenced methods [WAC 173-303-110(3)(c)].

PQL = practical quantitation limit
MDL = method detection level
mL = milliliter

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12.0 REPORTING AND RECORDKEEPING

Reporting and recordkeeping requirements that could be applicable to the Hanford Facility are described in Attachment 33, Chapter 12.0 (DOE/RL-91-28). Not all of these requirements and associated reports and records identified in Attachment 33, Chapter 12.0 are applicable to the LERF and the ETF. Those reporting and recordkeeping requirements determined to be applicable to the LERF and the ETF are summarized as follows:

- Hanford Facility Contingency Plan and incident records (as identified in the General Information Portion):
  - Immediate reporting
  - Written reporting
  - Shipping paper discrepancy reports.
- Unit-specific permit documentation and associated plans
- Personnel training records
- Groundwater monitoring records
- Inspection records (unit)
- Onsite transportation documentation
- Land disposal restriction records
- Waste minimization and pollution prevention.

In addition, the following reports prepared for the Hanford Facility will contain input, when appropriate, from the LERF and the ETF:

- Quarterly Hanford Facility RCRA Permit modification report
- Anticipated noncompliance
- Required annual reports.

Annual reports updating projections of anticipated costs for closure and postclosure will be submitted when the LERF and the ETF closure plan is submitted to Ecology (Attachment 34, Chapter 11.0).

The LERF and the ETF Operating Record 'records contact' is kept on file in the General Information file of the Hanford Facility Operating Record (refer to Attachment 33, Chapter 12.0, DOE/RL-91-28).

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13.0 OTHER FEDERAL AND STATE LAWS [J] .... Att 34.13.1

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13.0 OTHER FEDERAL AND STATE LAWS [J]

Applicable federal, state, and local laws applicable to the LERF and the ETF are discussed in Attachment 33, Chapter 13.0 (DOE/RL-91-28). Generally, the laws applicable to the LERF and the ETF include, but might not be limited to, the following:

Atomic Energy Act of 1954
Federal Facility Compliance Act of 1992
Clean Air Act of 1977
Safe Drinking Water Act of 1974
Emergency Planning and Community Right-to-Know Act of 1986
Toxic Substances Control Act of 1976
National Historic Preservation Act of 1966
Endangered Species Act of 1973
Fish and Wildlife Coordination Act of 1934
Federal Insecticide, Fungicide, and Rodenticide Act of 1975
Hazardous Materials Transportation Act of 1975
National Environmental Policy Act of 1969
Washington Clean Air Act of 1967
Washington Water Pollution Control Act of 1945
Washington Pesticide Control Act of 1971
New Source Construction Permits
Model Toxics Control Act
Benton Clean Air Authority Regulation 1
State Environmental Policy Act of 1971.

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Attachment 35
242-A Evaporator

Replacement Chapters

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2.0 UNIT DESCRIPTION

The 242-A Evaporator unit description and general provisions were provided in the Part B permit application, Chapter 2.0 (DOE/RL-90-42, Rev 0). Washington Administrative Code (WAC) 173-303 was used to prepare the Part B permit application and does not require this information to be included in the unit-specific operating Permit. The exception to this is the topographic map (refer to Section 2.1). DOE/RL-90-42, Chapter 2.0 was used for the sole purpose of permitting the 242-A Evaporator and as such has not been updated since the time of permit issuance. A brief unit description is provided in Attachment 35, Chapter 1.0 and further detail is provided in Attachment 35, Chapter 4.0, Process Description of this Permit. Seismic consideration information is provided in Attachment 33, Chapter 2.0, §2.3 (DOE/RL-91-28, General Information Portion). Traffic information is provided in Attachment 33, Chapter 2.0, §2.4 (DOE/RL-91-28, *General Information Portion*).

2.1 TOPOGRAPHIC MAP

Topographic map Drawing H-13-000039, Rev 2, 200 Area Liquid Waste Processing Facilities, 242-A Evaporator, Liquid Effluent Retention Facility, Effluent Treatment Facility, Sheet 1 of 2, and Sheet 2 of 2.

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12.0 REPORTING AND RECORDKEEPING ....Att 35.12.1

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12.0 REPORTING AND RECORDKEEPING

Reporting and recordkeeping requirements that could be applicable to the Hanford Facility are described in Attachment 33, General Information Portion, Chapter 12.0 (DOE/RL-91-28). Not all of these requirements and associated reports and records identified in Chapter 12.0 of the General Information Portion are applicable to the 242-A Evaporator. Those reporting and recordkeeping requirements determined to be applicable to the 242-A Evaporator are summarized as follows:

- Hanford Facility Contingency Plan and incident records (as identified in the General Information Portion):
  - Immediate reporting
  - Written reporting.
- Unit-specific permit documentation and associated plans
- Personnel training records
- Inspection records (unit)
- Land disposal restriction records
- Waste minimization and pollution prevention.

In addition, the following reports prepared for the Hanford Facility will contain input, when appropriate, from the 242-A Evaporator:

- Quarterly Hanford Facility RCRA Permit modification report
- Anticipated noncompliance
- Required annual reports.

Annual reports updating projections of anticipated costs for closure and postclosure will be submitted when the 242-A Evaporator closure plan is submitted to Ecology (Attachment 35, Chapter 11.0).

The 242-A Evaporator Operating Record 'records contact' is kept on file in the General Information file of the Hanford Facility Operating Record (refer to Attachment 33, Chapter 12.0 [DOE/RL-91-28]).

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2 13.0 OTHER FEDERAL AND STATE LAWS ....Att 35.13.1

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13.0 OTHER FEDERAL AND STATE LAWS

Applicable federal, state, and local laws applicable to the 242-A Evaporator are discussed in Attachment 33, General Information Portion, Chapter 13.0 (DOE/RL-91-28). Generally, the laws applicable to the 242-A Evaporator include, but might not be limited to, the following:

Atomic Energy Act of 1954
Federal Facility Compliance Act of 1992
Clean Air Act of 1977
Safe Drinking Water Act of 1974
Emergency Planning and Community Right-to-Know Act of 1986
Toxic Substances Control Act of 1976
National Historic Preservation Act of 1966
Endangered Species Act of 1973
Fish and Wildlife Coordination Act of 1934
Federal Insecticide, Fungicide, and Rodenticide Act of 1975
Hazardous Materials Transportation Act of 1975
National Environmental Policy Act of 1969
Washington Clean Air Act of 1967
Washington Water Pollution Control Act of 1945
Washington Pesticide Control Act of 1971
New Source Construction Permits
Model Toxics Control Act
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State Environmental Policy Act of 1971.

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Attachment 36
325 Hazardous Waste Treatment Units

<u>Replacement Chapters</u>

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GLOSSARY

325 HWTUs	325 Hazardous Waste Treatment Units consists of the HWTU, SAL, and RLWS tank system subunits)
AA	atomic absorption
ALARA	as low as reasonably achievable
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
BED	Building Emergency Director
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
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
g	gram
gal	gallon
GC/MS	gas chromatography/mass spectroscopy
h	hour
HWTU	Hazardous Waste Treatment Unit
ICP	inductively coupled plasma
in.	inch
kg	kilogram
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)
psf	pounds per square foot
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

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. 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 Land Disposal Restrictions 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).

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. Information must also be provided to demonstrate that the waste meets the operational parameters of the disposal facility, such as liner compatibility information.

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).

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.

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.

Container Failure
A waste container for which a manifest discrepancy has been identified.

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.

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.

Customer
The generator or TSD unit who ships waste to another TSD unit, the current custodian of the waste.

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

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).

Effective Date of Regulation
The date when mixed waste became subject to regulation in Washington State (August 19, 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).

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.

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.

General Waste Stream
Waste from a single customer and Waste-Management Group.

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.

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

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. State-only dangerous wastes are not subject to the federal LDR requirements.

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.

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.

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.

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. Process knowledge for dangerous waste may also include information obtained from surrogate material.

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.

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.

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.

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.

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.

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. This also includes a discrepancy in the number of inner containers in a labpack.

Storage Unit
A TSD unit on the Hanford Facility permitted to store dangerous waste.

Treatment Unit
A TSD unit on the Hanford Facility permitted to treat dangerous waste.

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.

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, and/or chemical screening/fingerprint analysis.

Waste-Acceptance Criteria

The minimum requirements imposed by a TSD unit to ensure that a dangerous waste is managed properly.

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).

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. 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.

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.

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3.0 WASTE ANALYSIS PLAN

This chapter provides information on the chemical, biological, and physical characteristics of the waste treated and stored in the 325 HWTUs, including waste descriptions, designations, and a waste-analysis plan.

3.1 CHEMICAL, BIOLOGICAL, AND PHYSICAL ANALYSIS

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
- hazardous or mixed 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).

3.1.1 Listed Waste from Specific and Nonspecific Sources

Waste from specific and nonspecific sources consists of listed waste identified in WAC 173-303-9904. Attachment 36, 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; no still bottoms are managed. 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) is not generated at PNNL. Small quantities of

K-listed waste, however, have been generated from treatability studies at PNNL in the past; the residues from these tests could be treated at the 325 HWTUs.

The F-listed waste is designated on the basis of the process knowledge (e.g., information from container labels, material safety data sheets [MSDS], or process information). Sampling might be performed if additional information is needed to document the composition and characteristics of the waste. The generator 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 that generated the waste. The F001- and F002-listed waste types are designated according to WAC 173-303-70 through WAC 173-303-100.

The K-listed waste in Attachment 36, Chapter 1.0, 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.

3.1.2 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 (i.e., 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.

3.1.3 Discarded Commercial Chemical Products

Discarded chemical products consist of those products listed in WAC 173-303-081. Attachment 36, Chapter 1.0, 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. Attachment 36, Chapter 1.0, lists all of the waste types, 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 a 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 land-disposal restriction (LDR) regulations under 40 CFR 268 and WAC 173-303-140, including disposal prohibitions and treatment standards.

3.1.4 Hazardous or Mixed Waste from Chemicals Synthesized or Created in Research Activities Using Radioactive Isotopes

Waste from research activities may contain radioactive isotopes in addition to RCRA regulated constituents. In such cases the wastes are designated as mixed waste. Typically such wastes are generated in small quantities, ranging from a few grams to a few liters. 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, 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. Attachment 36, Chapter 1.0, includes all categories of toxic, persistent, and carcinogenic 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 Attachment 36, Chapter 1.0, includes the characteristic dangerous-waste categories D001 through D043 (i.e., ignitable, corrosive, reactive, and toxicity characteristics leaching procedure [TCLP] toxics caused by metals or organics content).

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

3.1.5 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 Attachment 36, Chapter 1.0, 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. Because 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.

3.1.6 Waste Analysis Plan

The 325 HWTUs Waste-Analysis Plan describes the procedures used to obtain the information necessary to manage waste in accordance with the requirement of WAC 173-303. The following are described: sampling methods; analytical parameters and rationale; quality-control and quality-assurance procedures; requirements for incoming waste; storage requirements for ignitable, reactive, and incompatible waste; and the waste-tracking and record-keeping procedures.

3.1.7 Manifest System

Onsite waste shipments are manifested pursuant to Hanford Facility RCRA Permit (Permit) Condition 11.P.2. Offsite waste shipments are manifested in accordance with the requirements of WAC 173-303-370 and -180.

3.1.7.1 Procedures for Receiving Shipments

The onsite generator is responsible for identifying waste composition accurately and arranging for the transport of the waste. A copy of all other pertinent operating records are maintained by the 325 HWTUs for 5 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 (e.g., free of holes and punctures).

Inspection of Container Labeling – Transfer documentation is used to verify 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), a Uniform Hazardous Waste Manifest will be prepared identifying the 325 HWTUs as the receiving unit. 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 record for 5 years.

3.1.7.2 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 can be 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 as to resolving the noncompliant condition, then the issue will be referred to the U.S. Department of Energy-Richland Operations Office (DOE-RL) and the Washington State Department of Ecology (Ecology) for resolution. Ecology will be notified if a discrepancy is not resolved within 15 days after receiving a noncompliant shipment. Such waste packages, although not accepted, might be placed in the 325 HWTUs pending resolution. The package will be segregated from other waste and labeled in accordance with instructions in the unit contingency plan in the "Event Scenarios" section.

3.1.7.3 Provisions for Nonacceptance of Shipment

Provisions for nonacceptance of waste transfers are discussed in the following sections.

3.1.7.4 Nonacceptance of Undamaged 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.

3.1.7.5 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 Attachment 36, Chapter 7.0.

3.1.8 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 within 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, readily accessible for 5 years (refer to Attachment 36, Chapter 6.0, §6.2.2).

3.2 325 HAZARDOUS WASTE TREATMENT UNITS WASTE ANALYSIS PLAN

The 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 two units; all within the 325 Building, located in the 300 Area on the Hanford Facility (refer to Attachment 36, Chapter 1.0). Attachment 36, Chapter 2.0 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 (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 HWTU is located in Rooms 520, 524 and 528. Figures 3.1 through Figure 3.2 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.

3.3 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 Attachment 36, Chapter 4.0, containers are managed in accordance with WAC 173-303-630; the SAL tank is managed and operated in accordance with WAC 173-303-640.

At the SAL, dangerous waste liquid is stored in a tank in Room 32.

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 Attachment 36, Chapter 1.0.

Specific waste-treatment processes are found in the list of treatments in Attachment 36, Chapter 1.0. Attachment 36, Chapter 1.0, 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 is 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 moves 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 does not perform the operations, covered by a procedure, until they are formally trained on the procedure. All 325 HWTU staff is 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 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 land filling. 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.

3.3.1 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 hazardous or mixed 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).

3.3.2 Listed Waste from Specific and Nonspecific

Waste from specific and nonspecific sources consists of listed waste identified in WAC 173-303-9904. Attachment 36, 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 in Attachment 36, Chapter 1.0).

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 according to WAC 173-303-70 through WAC 173-303-100.

The K-listed waste in Attachment 36, Chapter 1.0, 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.

3.3.3 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.

3.3.4 Discarded Commercial Chemical Products

Discarded chemical products consist of those products listed in WAC 173-303-081. Attachment 36, Chapter 1.0, 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. Attachment 36, Chapter 1.0, 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.

3.3.5 Hazardous or Mixed 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 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. Attachment 36, Chapter 1.0, 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, Attachment 36, Chapter 1.0, 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.

3.3.6 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 Attachment 36, Chapter 1.0, 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.

3.4 DESCRIPTION OF CONFIRMATION PROCESS

325 HWTUs staff requires 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 3.1.

3.4.1 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.

All process knowledge and analytical data that are used for waste characterization, LDR determination, and/or treatment activities at this TSD unit shall be documented and placed in the Operating Record.

3.4.1.1 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.

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.

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.

3.4.1.2 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.

3.4.2 Verification

Where potential deficiencies exist in the information provided or where additional waste constituents might be expected to be present that do not appear in the supporting documentation, the generator is contacted by 325 HWTUs personnel for resolution. Upon approval, the 325 HWTUs personnel review the data package to determine whether or not the information is sufficient to complete the following:

- 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 3.1.

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 mixed 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 percent of current waste receipts).
- Waste which cannot be verified at the 325 HWTUs must be verified at the generating unit (e.g., large components, containers which cannot be opened, for ALARA reasons, 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.

3.5 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 waste 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 percent 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.

3.5.1 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).

3.5.2 Criteria and Rationale for Parameter Selection

Waste-testing parameters and the rationale for these parameters are summarized in Table 3.1. 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 (LDR) (refer to Section 3.7.2), 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.

3.6 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 3.1.

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 3.2. 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 3.2.

Table 3.1. 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 3.2. 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 3.1 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), and reactivity.
- 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. If ALARA practices allow, 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 tape and are custody-sealed along the front and back edges of the lids. Samples are transported to offsite laboratories by overnight courier to ensure delivery within 24 hours of sample collection as allowed or dependent upon sample holding times. 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.

3.6.1 Sample Custody

The generators or 325 HWTUs personnel are responsible for initiating and following chain-of-custody form. 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.

3.6.2 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.

3.7 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.

3.7.1 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.

3.7.1.1 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 re-designate 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.

3.7.2 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 LDRs. Information presented below describes how generators and 325 HWTUs personnel characterize, document, and certify waste subject to LDR requirements.

3.7.2.1 Waste Characterization

Shipments of waste shall not be accepted from any off-site generator without LDR certification, if applicable, accompanying each shipment. For waste received from off-site generators, the TSD unit shall receive the information pursuant to 40 CFR 268 regarding LDR wastes. The generator must sign the LDR certification.

Before being received at 325 HWTUs, the RCRA waste characteristics, the level of toxicity characteristics, and the presence of listed, wastes 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.

3.7.2.2 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.

3.7.2.3 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 disposal request 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.

3.7.2.4 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 requires 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.

3.7.3 Waste Analysis for Spills and Unknowns

In the event of a spill or release of dangerous waste 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 Disposal Request number.
3. The hard copy of the Disposal Request 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 Attachment 36, Chapter 7.0.
4. Respond to the spill in accordance with the requirements of Attachment 36, Chapter 7.0. The Attachment 36, Chapter 7.0, Contingency Plan is implemented if there is a threat to human health or the environment.
5. A new Disposal Request will be filled out using the information from the original Disposal Request 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 Attachment 36, Chapter 7.0, *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 Attachment 36, Chapter 7.0, 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 Disposal Request for the waste cleanup will be filled out. The waste will then be designated and characterized.

3.8 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.

3.8.1 Testing and Analytical Methods

325 HWTUs customers will need to conduct analyses to provide information to fill out Disposal Requests, 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 treatment or storage at one of the Hanford Facility-permitted treatment/storage/disposal areas or that of the offsite TSD facility. 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 mixed waste nature of the samples handled.

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

3.8.2 Quality Assurance and Quality Control

PNNL 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 PNNL 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 current 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., Attachment 36, Chapter 1.0, listing is restricted from storage at 325 HWTUs).

3.8.3 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 QA/QC control program for sampling and analysis related to this TSD unit must, at a minimum, comply with the applicable Hanford Site standard requirements and regulatory requirements. All analytical data shall be defensible and shall be traceable to specific, related quality control samples and calibrations.

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.

3.8.4 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 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.

3.8.5 Data Collection/Sampling Objectives

For determining the toxicity characteristics, SW-846 Method 1311 should be followed wherever possible. The Permittee may use the total metals test and assumption of complete extractability as described in Method 1311. A reduced sample size may also be utilized for As Low As Reasonably Achievable purposes as recommended by the *Joint NRC/EPA Guidance on Testing Requirements of Mixed Radioactive and Hazardous Waste* (62 FR 62079).

For a given parameter, analytical methods are selected and may be modified as long as the applicable precision, accuracy, and quantitation limit (or minimum detectable activity) necessary to meet the regulatory or decision limit can be met or improved.

For a given parameter, analytical methods are selected and may be modified as long as the applicable precision, accuracy, and quantitation limit (or minimum detectable activity) necessary to meet the regulatory or decision limit can be met or improved.

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.

3.8.6 Analytical Objectives

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

3.8.7 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 percent of the total number of field samples taken. The five percent 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.

3.8.8 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 percent 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 percent 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.

3.8.8.1 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.

3.8.8.2 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, nonconformances, and corrective actions maintained by PNNL or other Hanford Facility contractors.

3.8.9 Record-Keeping

Records associated with the waste-analysis plan and waste-verification program are maintained by the waste-management organization. A copy of the Disposal Request 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.

3.9 SELECTING WASTE RE-EVALUATION FREQUENCIES

Some analysis will be needed to verify that waste streams received by the 325 HWTUs conform to the information on the Disposal Request and or the waste analysis sheet supplied by the generator. If discrepancies are found between information on the Disposal Request, 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 re-designating 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 mixed 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 percent 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, for ALARA reasons, 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.

3.10 SPECIAL PROCEDURAL REQUIREMENTS

3.10.1 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 5 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 (Permit Condition II.Q.1). 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.

For all shipments of dangerous waste to or from the 325 HWTUs, the Permittees shall comply with the applicable information in Permit Conditions II.Q.1.h. and II.Q.2. For clarification, all dangerous waste must be transported in accordance with the unit specific provisions as outlined in the PNNL Operating Procedure for the 325 Building, in effect at the date of the transfer. With exception to, and in addition to, the packaging and transporting operations, shall be as follows:

The acceptance of all dangerous waste received at the 325 TSD Units will be dependent upon their packaging. Liquid waste containers accepted from other buildings to the 325 HWTUs shall have secondary containment with absorbent materials packed around the contents.

3.10.2 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.

3.10.3 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.

3.10.4 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 Attachment 36, Chapter 7.0.

3.10.5 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 3.1 are recommended.

1 **Table 3.3. 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

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Figure 3.1. Floor Plan of SAL

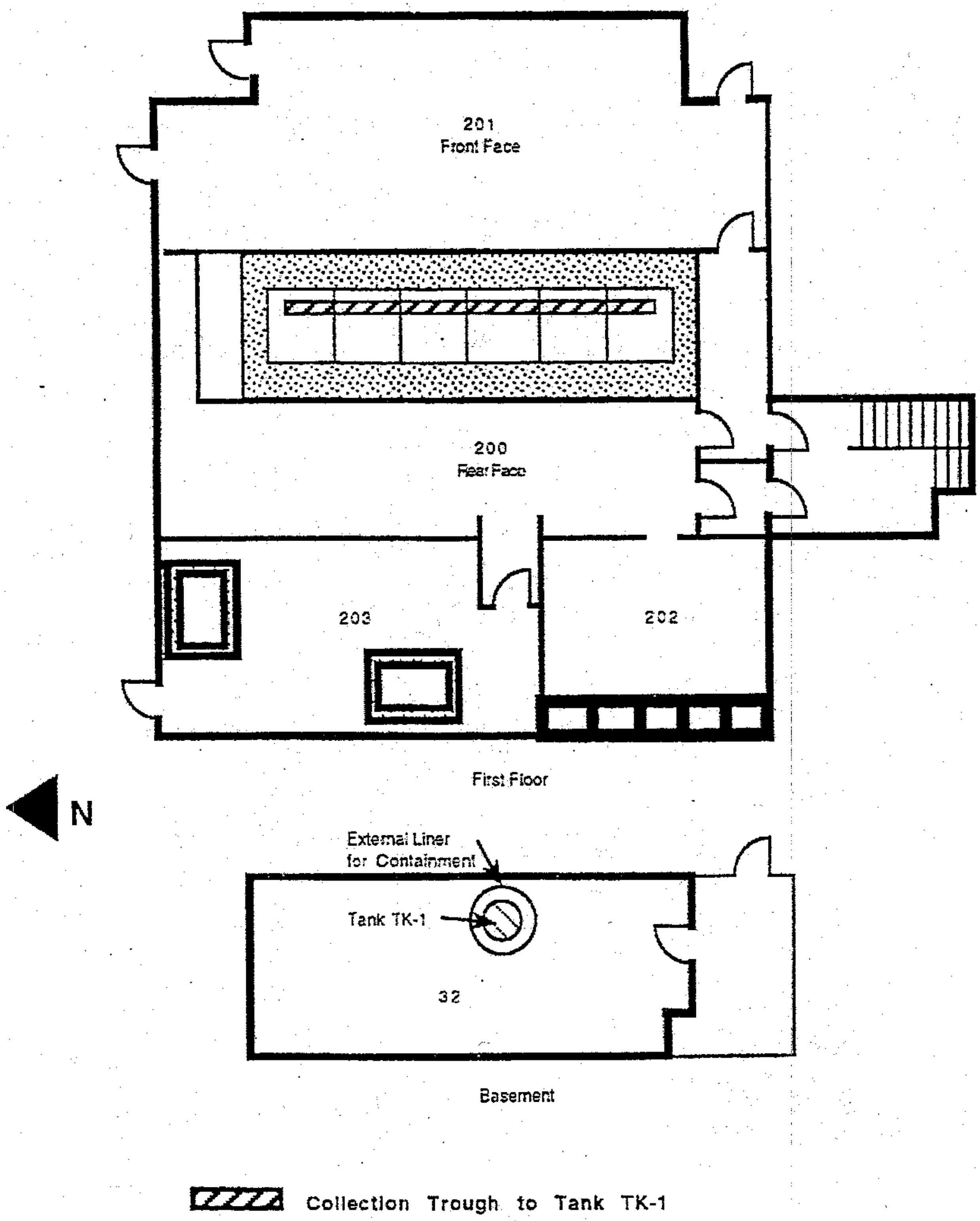
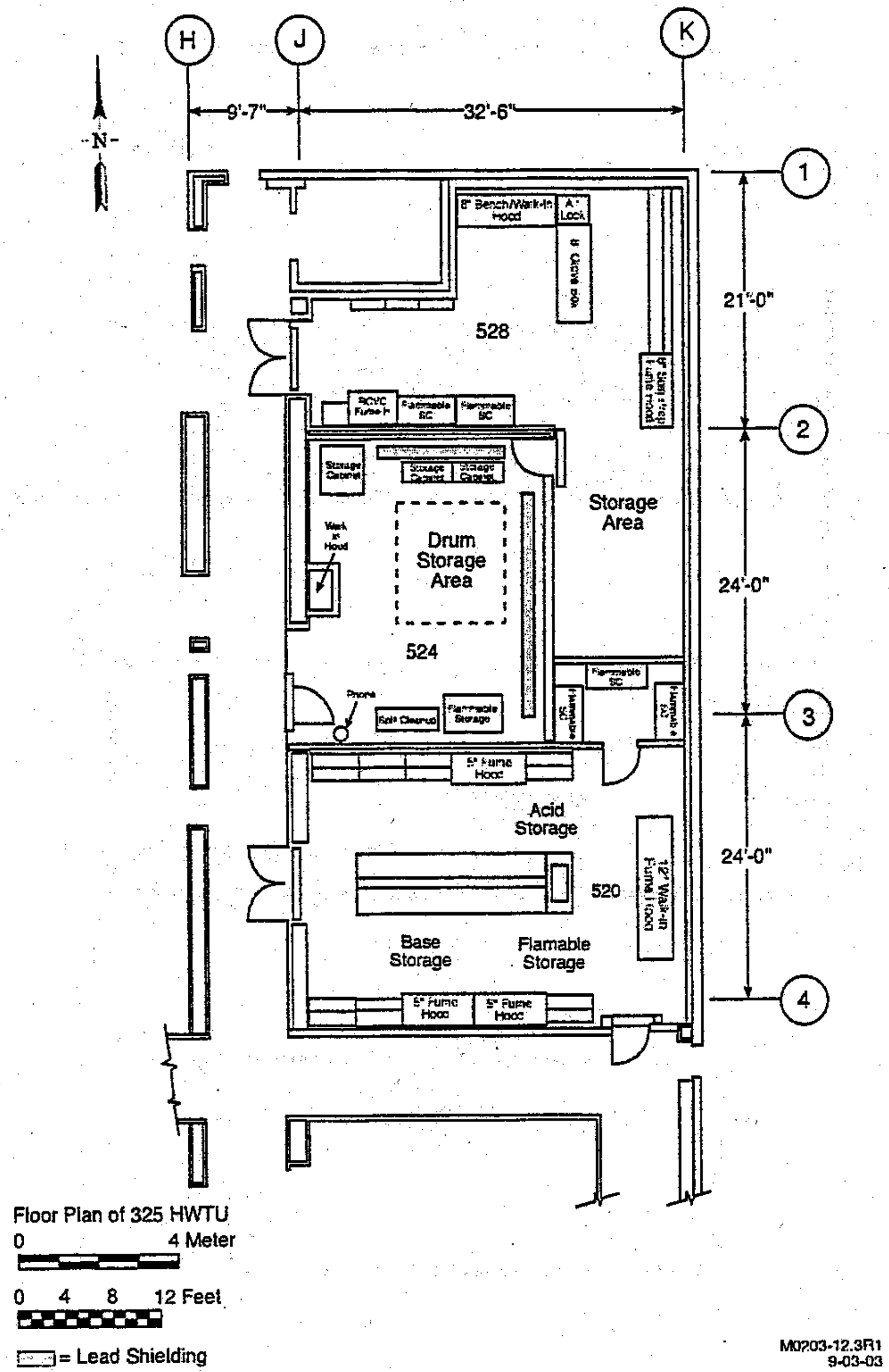


Figure 3.2. Drawings of the TSD Units



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4.0 PROCESS INFORMATION

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

The 325 HWTUs receive and treat and/or store wastes described in Chapter 3.0 (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 SAL tank is containerized for further management as described in Section 4.2.1. Containers are repackaged for shipment as necessary and manifested for shipment to a permitted onsite or offsite TSD facility for any necessary further treatment and compliant disposal.

4.1 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 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.

4.1.1 Containers Located in the Hazardous Waste Treatment Unit

Rooms 520, 524 and 528 of the HWTU are 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 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 or in drums in specifically designated areas based on the hazard classification.

4.1.1.1 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, 201, 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 mixed 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 be 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.

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

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, 524 and 528 is either 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 are hand carried or moved on a platform or handcart, as appropriate, to Rooms 520, 524 or 528. 325 HWTUs staff moves the dangerous containers in accordance with 325 HWTUs collection procedures that address safety and hazard consideration. These procedures cover various waste types and transportation modes. Unsupervised 325 HWTUs staff does 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, 524 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 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 of 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, monthly, and yearly inspections are in place to ensure container integrity, and to check for proper storage location, prevent capacity overrun, etc. Inspections are detailed in Attachment 36, §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 is instructed in proper container handling and spill prevention safeguards as part of their training (Attachment 36, 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. 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 are not 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 isle space in front of the doors; 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. 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, monthly, and yearly inspections are in place to ensure container integrity, and to check for proper storage location, prevent capacity overrun, etc. Inspections are detailed in Attachment 36, §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 (Attachment 36, 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 ALARA concerns with 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 §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

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

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 firewater containment system (Figure 4.1).

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 may be stored in a hood located along the east wall of the room or on the floor of the unit, as noted below. 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 20 liters or less is stored in Room 524 in steel storage cabinets or DOT approved containers providing secondary containment awaiting packaging. Flammable liquids will be stored in the flammable storage cabinet located along the south wall. Larger waste containers that contain liquids are stored in DOT approved containers providing secondary containment. These containers are then placed in a portable secondary containment system. Containers holding waste not subject to containment system requirements will be stored on the floor.

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 eight storage cabinets, four for flammable waste and four for corrosive waste. Two cabinets (one flammable storage cabinet and one corrosive storage cabinet) are located along the north wall of the room. Two cabinets for corrosive waste are located along the east wall. Two cabinets for flammable waste are also 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.

Liquid wastes in containers from 65 to 328 liters (17 to 85 gallons) capacity will be placed within drip pans or similar secondary containment devices. 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 if 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.

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.

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 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 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 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 firewater 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-meters. 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 §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, and 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

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, 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 (Attachment 36, Chapter 6.0). Floor coating assessment is 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 are 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, the liquid drains into the firewater 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 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.

4.1.5.2 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 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 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 be cleaned up expeditiously to ensure that no damage occurs to the stainless steel. As was previously discussed, a stainless steel tank provides the secondary containment system for the six cells. Liner and base requirements for the SAL tank are discussed in §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. Room 200 concrete slab is painted, and has a trap door in the painted 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.

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. Either all containers of dangerous waste are 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 throughout 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 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

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 firewater containment tank provides secondary containment for both HWTU rooms. 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).

4.1.7.2 Containment System Capacity for the Shielded Analytical Laboratory

The SAL tank is considered 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 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 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.

4.1.8 Control of run-on

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 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.

4.1.8.2 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.

4.1.9 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.

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 (Attachment 36, 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, 524 or Room 528 floor or within the firewater 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 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 described in Attachment 36, Chapter 3.0, 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.

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 §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 (Attachment 36, 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

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 wastes 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 wastes 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

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. Attachment 36, §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 Attachment 36, §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 (Attachment 36, §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. 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 is segregated in separate secondary containment.

4.2 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 §4.2.1.

4.2.1 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. As noted in Attachment 36, §3.3, storage in containers and bench-or small-scale treatment of dangerous waste also occurs in the SAL. This work is conducted in six inter-connected hot cells. Liquid waste generated during these operations is 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 is treated as needed and batch transferred from the SAL tank to containers for disposal. The SAL tank volume is 1,218 liters and has a throughput of 10,000 kilograms per year.

4.2.1.1 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.

4.2.1.1.1 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 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 is 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 is staffed 24 hours a day, 7 days a week. If a high-alarm situation occurs after normal working hour's 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 (Attachment 36, Chapter 6.0).

4.2.1.1.2 Integrity Assessments

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

Within three (3) months of final installation of the new tank, the Permittee shall submit to Ecology a written integrity assessment, which has been reviewed and certified by an independent, qualified, registered professional engineer, in accordance with WAC 173-303-810 (13)(a).

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

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; and; 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 drainpipe 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. 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 or 527A. The HWTU will have the option of either keeping the camera/monitor controls in Room 527, 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 (SAIC 1996). 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 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 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 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 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 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 is 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 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 (Attachment 36, Chapter 7.0). Measures are in place to inspect the system daily.

4.2.1.3 Tank Management Practices

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 containers. After waste characterization is completed, the transfer is initiated.

4.2.1.4 Marking or Labeling

Due to the ALARA concerns associated with the SAL tank, the tank itself is not labeled. The tank is located in a locked room to comply with ALARA standards. 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 hazard concerns.

4.2.1.5 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 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 mixed waste, 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.

4.3 AIR EMISSIONS CONTROL

The TSD unit shall comply with all applicable Subpart AA and BB requirements of the Air Emission Standards. 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).

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

Figure 4.1. Hazardous Waste Treatment Unit Secondary Containment System

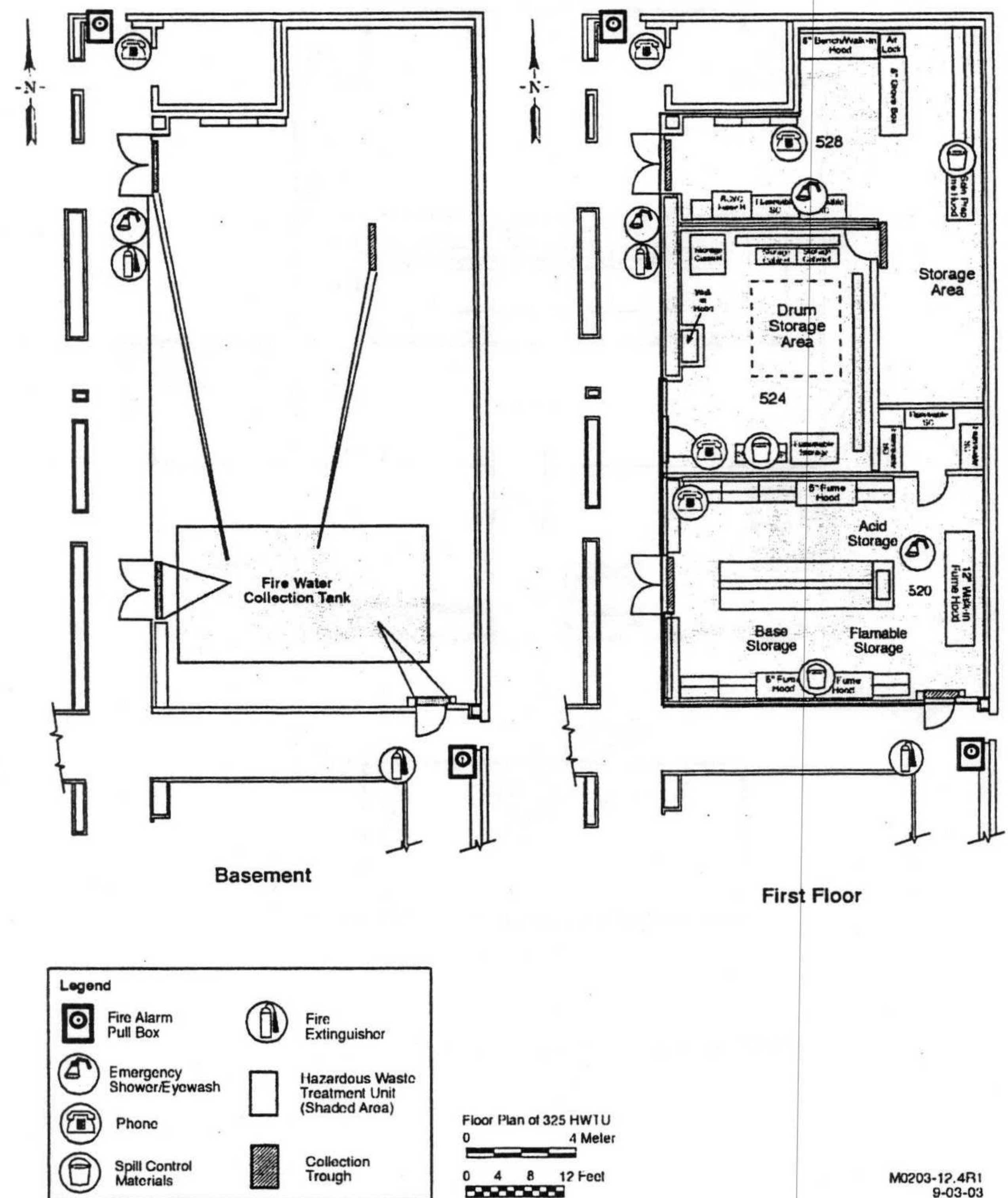
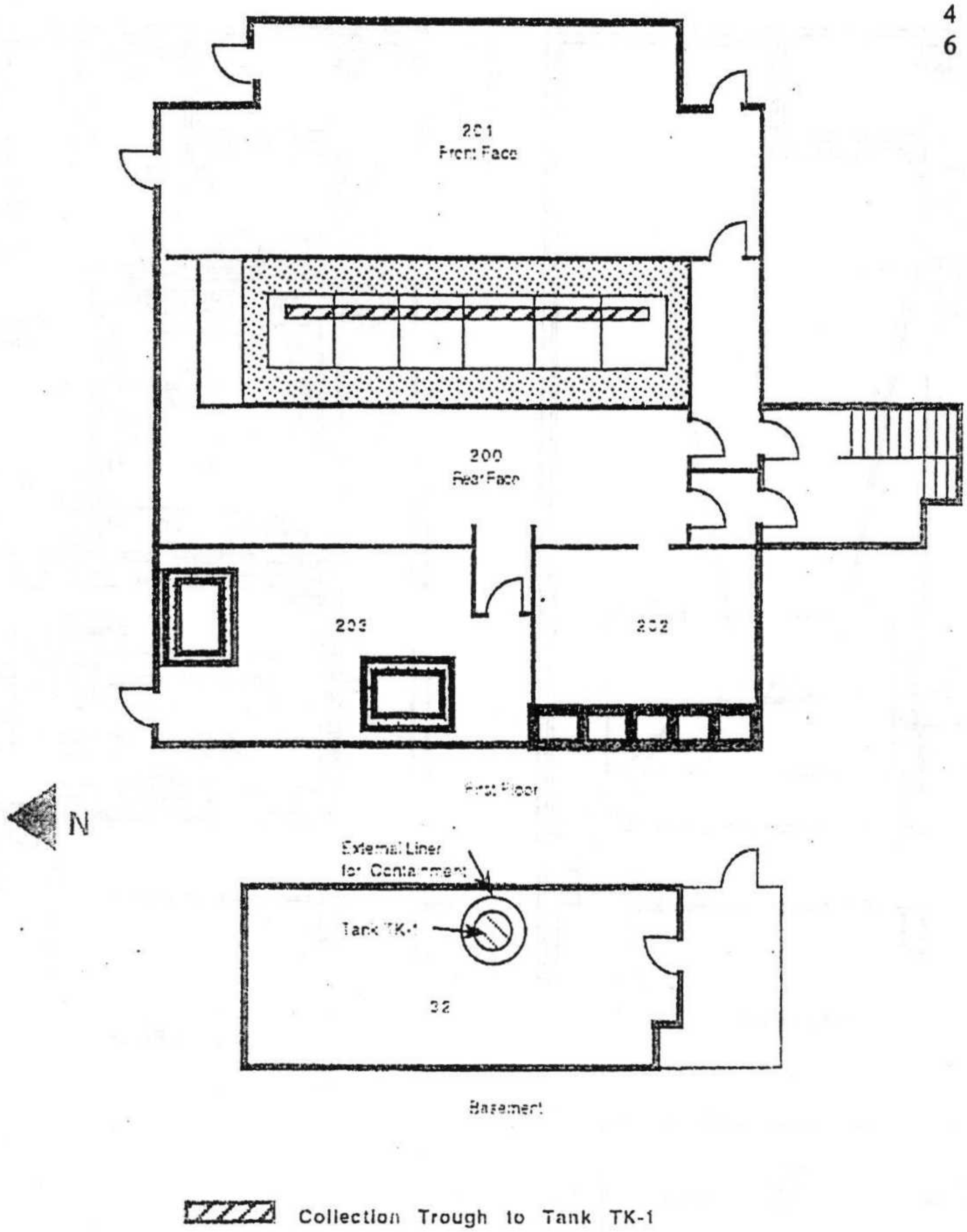


Figure 4.2. Hot Cell Secondary Containment System



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FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/State I.D.. No.

W	A	7	8	9	0	0	0	8	9	6	7

:R OFFICIAL USE ONLY

Application Approved	Date Received (month/ day / year)	Comments

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or If this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. First Application (place an "X" below and provide the appropriate date)

☐ **1. Existing Facility** (See instructions for definition of "existing" facility. Complete item below.)

MO	DAY	YEAR
03	22	1943

*For existing facilities, provide the date (mo/day/yr) operation began or the date construction commenced. (use the boxes to the left)

*The date construction of the Hanford Facility commenced

☐ **2. New Facility** (Complete item below.)

MO	DAY	YEAR

For new facilities, provide the date (mo/day/yr) operation began or is expected to begin

B. Revised Application (Place an "X" below and complete Section I above)

☒ **1. Facility has an interim Status Permit**

☒ **2. Facility has a Final Permit**

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. **Process Code** – Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the codes(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the (Section III-C).

B. **Process Design Capacity** – For each code entered in column A enter the capacity of the process.

1. Amount – Enter the amount.
2. Unit of Measure – For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
STORAGE:		
Container (barrel, drum, etc.)	S01	Gallons or liters
Tank	S02	Gallons or liters
Waste pile	S03	Cubic yards or cubic meters
Surface impoundment	S04	Gallons or liters
	S06	Cubic yards or cubic meters*
DISPOSAL:		
Injection well	D80	Gallons or liters
Landfill	D81	Acre-feet (the volume that would cover one acre to a Depth of one foot) or hectare-meter
Land application	D82	Acres or hectares
Ocean disposal	D83	Gallons per day or liters per day
Surface impoundment	D84	Gallons or liters
TREATMENT:		
Tank	T01	Gallons per day or liters per day
Surface impoundment	T02	Gallons per day or liters per day
Incinerator	T03	Tons per hour or metric tons per hour; gallons per hour or liters per hour
Other (use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	Gallons per day or liters per day

Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code
Gallons	G	Liters Per Day	V	Acre-Feet	A
Liters	L	Tons Per Hour	D	Hectare-Meter	F
ubic Yards	Y	Metric Tons Per Hour	W	Acres	B
Cubic Meters	C	Gallons Per Hour	E	Hectares	Q
Gallons Per Day	U	Liters Per Hour	H		

III. PROCESS – CODES AND DESIGN CAPACITIES (continued)

Example for Completing Section III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks; one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

Line No.	A. Process Code *(from list above)*			B. process Design Capacity 1. Amount *(Specify)*	2. Unit of Measure *(enter code)*			For Official Use Only			
X-1	S	0	2	600		G					
X-2	T	0	3	20		E					
1	D	8	1	4,320,000		U					
2											
3											
4											
5											
6											
7											
8											
9											
10											

C. Space for additional process codes or for describing other process (code "T04"). For each process entered here include design capacity.

D81
The 1301-N Liquid Waste Disposal Facility (LWDF) was used from 1963 to September 1985. The LWDF received mixed waste process and cooling waste water from N Reactor. The LWDF also received dangerous waste generated from laboratories, and may have received waste from spills within the N Reactor Building, which were discharged through the mixed waste drain system. The dangerous waste discharges consisted of less than 0.002% of the total volume of the waste discharged to the LWDF. The 1301-N LWDF was a percolation unit designed for the disposal of liquid waste through the soil column. The process design capacity for the LWDF was 16,352,900 liters (4,320,000 gallons) a day. The process design capacity reflects the maximum volume of water discharged on a daily basis rather than the physical capacity of the unit. The influent pipes up to the face of the 105-N building facility are considered to be included within the treatment, storage, and disposal unit boundary.

IV. DESCRIPTION OF DANGEROUS WASTES

Dangerous Waste Number – Enter the digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four-digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. Estimated Annual Quantity - For each listed waste entered in column A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. Unit of Measure - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate odes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
Pounds	P	Kilograms	K
Tons	T	Metric Tons	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. Processes

1. Process Codes:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. Process Description: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

Example for completing Section IV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste.

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes				
									1. Process Codes *(enter)*				2. Process Description *(if a code is not entered in D(1))*
X-1	K	0	5	4	900		P		T03	D80			
X-2	D	0	0	2	400		P		T03	D80			
X-3	D	0	0	1	100		P		T03	D80			
X-4	D	0	0	2					T03	D80			*Included with above*

Photocopy this page before completing if you have more than 26 wastes to list.

I.D. Number *(enter from page 1)*	
W A 7 8 9 0 0 0 8 9 6 7	

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

Line No.	A. Dangerous Waste No. *(enter code)*				B. Estimated Annual Quantity of Waste	C. Unit of Measure *(enter code)*			D. Processes				
									1. Process Codes *(enter)*				2. Process Description *(if a code is not entered in D(1))*
1	F	0	0	3	6,200		P		D81				Percolation
2	D	0	0	2	20,600		P		D81				Percolation
3	D	0	0	6	100		P		D81				Percolation
4	D	0	0	7	10,000		P		D81				Percolation
5	D	0	0	8	150		P		D81				Percolation
6	D	0	0	9	6,200		P		D81				Percolation
7	W	C	0	2	4,000		P		D81				Percolation
8	W	T	0	2	15,000		P		D81				Included with above
9													
10													
11													
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IV. DESCRIPTION OF DANGEROUS WASTE (continued)

Use this space to list additional process codes from Section D(1) on page 3.

The 1301-N LWDF was used for the disposal of liquid waste from N reactor. The waste consisted of waste from nonspecific sources and listed waste (F003), toxicity characteristic waste (D006, D007, D008, and D009), characteristic waste (D002), state-only carcinogenic waste (WC02), and state-only toxic waste (WT02).

V. FACILIITY DRAWING Refer to attached drawing(s).

All existing facilities must include in the space provided on page 5 a scale drawing of the facility (see instructions for more detail).

VI. PHOTOGRAPHS Refer to attached photograph(s).

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos.

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

☒ A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information," place an "X" in the box to the left and skip to Section XI below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. Name of Facility's Legal Owner	2. Phone Number *(area code & no.)*

3. Street or P.O. Box	4. City or Town	5. St.	6. Zip Code

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Name *(print or type)*	Signature	Date Signed
John D. Wagoner, Manager U.S. Department of Energy Richland Operations Office	John D. Wagoner	2/25/97

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Name *(Print Or Type)*	Signature	Date Signed
See attachment		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

John D. Wagoner — 2/25/97

Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
Richland Operations Office

Date

RM Little — 2/7/97

Co-operator
R. Michael Little, President
Bechtel Hanford, Inc.

Date