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222-S Laboratory Complex Dangerous Waste Permit Application

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THE 222-S LABORATORY COMPLEX DANGEROUS WASTE PERMIT APPLICATION

FOREWORD

The Hanford Site is owned by the U.S. Government and operated by the U.S. Department of Energy, DOE Richland Field Office. The Hanford Site manages and produces dangerous waste and mixed waste (containing both radioactive and dangerous components). The dangerous waste is regulated in accordance with the *Resource Conservation and Recovery Act of 1976* and the *State of Washington Hazardous Waste Management Act of 1976* [as administered through the Washington State Department of Ecology *Dangerous Waste Regulations*, Washington Administrative Code 173-303]. The radioactive component of mixed waste is interpreted by the U.S. Department of Energy to be regulated under the *Atomic Energy Act of 1954*; the nonradioactive dangerous component of mixed waste is interpreted to be regulated under the *Resource Conservation and Recovery Act of 1976* and Washington Administrative Code 173-303.

For purposes of the *Resource Conservation and Recovery Act* and the Washington State Department of Ecology *Dangerous Waste Regulations*, the Hanford Site is considered to be a single facility. The single dangerous waste permit identification number issued to the Hanford Site by the U.S. Environmental Protection Agency and the Washington State Department of Ecology is U.S. Environmental Protection Agency/State Identification Number WA7890008967. This identification number encompasses over 60 treatment, storage, and/or disposal units within the Hanford Site, hereinafter referred to as the Hanford Facility when cited in the context of the *Resource Conservation and Recovery Act* and the Washington State Department of Ecology *Dangerous Waste Regulations*. All waste management activities carried out under the assigned identification number are considered to be 'onsite'.

Westinghouse Hanford Company is a major contractor to the U.S. Department of Energy, DOE Richland Field Office and serves as co-operator of the 222-S Laboratory Complex. The 222-S Laboratory Complex contains the two treatment and/or storage units addressed in this permit application. These units are the 219-S Waste Handling Facility, a waste treatment and storage unit, and the 222-S Dangerous and Mixed Waste Storage Area, a waste storage unit.

Westinghouse Hanford Company is identified in the permit application as a "co-operator" and signs in that capacity. Any identification of Westinghouse Hanford Company as an 'operator' elsewhere in this application is not meant to conflict with Westinghouse Hanford Company's designation as a co-operator but rather is based on Westinghouse Hanford Company's contractual status (i.e., as an operations and engineering contractor) for the U.S. Department of Energy.

The *222-S Laboratory Complex Dangerous Waste Permit Application* (Revision 0) consists of both a Part A and a Part B permit application. An explanation of the Part A Revision (Revision 1) submitted with this document is provided at the beginning of the Part A section.

The Part B consists of 15 chapters addressing the organization and content of the Part B Checklist prepared by the Washington State Department of Ecology (Ecology 1987). For ease of reference, the checklist section number, in brackets, follows the chapter headings and subheadings.

The *222-S Laboratory Complex Dangerous Waste Permit Application* contains information current as of November 1, 1991.

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ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	Code of Federal Regulations
DOE-RL	U.S. Department of Energy, DOE Richland Field Office
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
HEPA	high-efficiency particulate air (filter)
NA	not applicable
pH	negative logarithm of the hydrogen-ion concentration
PUREX	plutonium-uranium extraction (plant)
RCRA	*Resource Conservation and Recovery Act of 1976*
TC	toxicity characteristic
TCLP	toxicity characteristics leaching procedure
TSD	treatment, storage, and/or disposal
222-S Complex	222-S Laboratory Complex
WAC	Washington Administrative Code

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PART A

The Part A, Form 1, included in this permit application was submitted to the Washington State Department of Ecology on May 19, 1988. The Part A, Form 1, consists of three pages.

The 222-S Laboratory Complex consists of two waste management units, the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area. The original 222-S Laboratory Complex Part A, Form 3, (Revision 0) was submitted to the Washington State Department of Ecology on November 28, 1987. Revision 1 of the Part A, Form 3, (this submittal) consists of the addition of three storage tanks 101, 102 and 103 (tank 102 is used for treatment and storage); an increase in design capacity; the addition of 11 dangerous waste codes; and an increase in the annual quantity of waste treated and stored in the 219-S Waste Handling Facility. Revision 1 also includes a decrease in the design capacity, and the addition of 38 dangerous waste codes for waste that is stored in the 222-S Dangerous and Mixed Waste Storage Area.

The Part A, Revision 1, submitted with this permit application consists of seven pages, four drawings, and three photographs.

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1.0 INTRODUCTION

This chapter describes the permitting approach for the 222-S Laboratory Complex (222-S Complex) and provides an overview of the contents of the 222-S Complex Part B permit application. The 222-S Complex contains the two treatment and/or storage units addressed by this permit application. These two units are the 219-S Waste Handling Facility, a waste treatment and storage unit, and the 222-S Dangerous and Mixed Waste Storage Area, a waste storage unit.

1.1 222-S LABORATORY COMPLEX PERMITTING

The 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area within the 222-S Complex will be permitted for the treatment and/or storage of dangerous and mixed waste under the Washington State Department of Ecology (Ecology) *Dangerous Waste Regulations*, Washington Administrative Code (WAC) 173-303-806. The 222-S Complex consists of several buildings including the 222-S Analytical Laboratory, the 222-SA Standards Laboratory, and the two treatment and/or storage units.

The 222-S Complex provides analytical support for several activities on the Hanford Site and consists of a main laboratory building and several auxiliary buildings. The main building is identified as the 222-S Analytical Laboratory and contains equipment for laboratory operations. Auxiliary buildings support operations in the 222-S Analytical Laboratory and include several office buildings, a standards laboratory, and the two units addressed by this permit application. The 219-S Waste Handling Facility is a tank system consisting of three tanks (tanks 101, 102, and 103) used for treatment and storage of radioactively contaminated aqueous waste (liquid waste that does not contain organics). The 219-S Waste Handling Facility is located in an belowground concrete vault adjacent to the 219-S Building. The tank system and the 219-S Building are collectively referred to in this application as the 219-S Waste Handling Facility. The 222-S Dangerous and Mixed Waste Storage Area consists of two metal storage structures used for storage of containerized mixed and dangerous waste. These two metal storage structures rest on a portion of a concrete pad adjacent to the 222-S Analytical Laboratory Building.

1.2 222-S LABORATORY COMPLEX PART B PERMIT APPLICATION CONTENTS

The 222-S Complex Part B permit application consists of 15 chapters:

- Introduction (Chapter 1.0)
- Facility Description and General Provisions (Chapter 2.0)
- Waste Characteristics (Chapter 3.0)
- Process Information (Chapter 4.0)

- Groundwater Monitoring (Chapter 5.0)
- Procedures to Prevent Hazards (Chapter 6.0)
- Contingency Plan (Chapter 7.0)
- Personnel Training (Chapter 8.0)
- Exposure Information Report (Chapter 9.0)
- Waste Minimization Plan (Chapter 10.0)
- Closure and Postclosure Requirements (Chapter 11.0)
- Reporting and Recordkeeping (Chapter 12.0)
- Other Relevant Laws (Chapter 13.0)
- Certification (Chapter 14.0)
- References (Chapter 15.0).

A brief description of each chapter is provided in the following sections.

1.2.1 Facility Description and General Provisions (Chapter 2.0)

This chapter provides a general description of the 222-S Complex. A brief description of the Hanford Site and the Hanford Facility also are provided.

1.2.2 Waste Characteristics (Chapter 3.0)

This chapter describes the physical, chemical, and biological characteristics of the waste types treated and stored in the 222-S Complex. Waste analysis plans for the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area are included and provide the methodologies for determining waste types and proper waste handling, storage, and disposition. Although radionuclide components are not within the scope of this permit application, the information is provided for general knowledge where appropriate.

1.2.3 Process Information (Chapter 4.0)

This chapter provides a detailed discussion of the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area. The information provided includes a description of the design of primary and secondary containment, leak detection, ventilation systems, and the treatment and storage processes.

1.2.4 Groundwater Monitoring (Chapter 5.0)

This chapter explains that the 222-S Complex will not be operated as a dangerous waste surface impoundment, waste pile, land treatment unit, or landfill. Therefore, groundwater monitoring is not required.

1.2.5 Procedures to Prevent Hazards (Chapter 6.0)

This chapter discusses hazard prevention and emergency preparedness equipment, structures, and procedures.

1.2.6 Contingency Plan (Chapter 7.0)

This chapter provides information on contingency planning to ensure that the 222-S Complex has measures in place to lessen the potential impact on public health and the environment in the event of an emergency.

1.2.7 Personnel Training (Chapter 8.0)

This chapter outlines the training program developed and implemented for 222-S Complex employees whose primary duties are identified as being associated with dangerous waste management.

1.2.8 Exposure Information Report (Chapter 9.0)

This chapter explains that the 222-S Complex does not treat, store, or dispose of dangerous waste in a surface impoundment or landfill. Therefore, exposure information is not required.

1.2.9 Waste Minimization Plan (Chapter 10.0)

This chapter discusses the program to minimize the volume or quantity and toxicity of waste generated at the 222-S Complex. The regulatory basis for, and objectives of, the waste minimization program are discussed, waste generation is described, and specific measures for minimizing waste are discussed.

1.2.10 Closure and Postclosure Requirements (Chapter 11.0)

This chapter describes the planned activities for closing the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area at the 222-S Complex. The 222-S Complex units are to be clean closed; therefore, no postclosure plan is included.

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1.2.11 Reporting and Recordkeeping (Chapter 12.0)

This chapter summarizes commitments for reporting and recordkeeping that are applicable to the 222-S Complex.

1.2.12 Other Relevant Laws (Chapter 13.0)

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1.2.13 Certification (Chapter 14.0)

This chapter contains the required certification signed by officials of the U.S. Department of Energy (DOE), DOE Richland Field Office (DOE-RL) and Westinghouse Hanford Company, indicating that the information provided is true, accurate, and complete.

1.2.14 References (Chapter 15.0)

References used throughout this Part B permit application are listed in this chapter. All references listed here, which generally are not available from other sources, will be made available for review, upon request, to any regulatory agency or public commentor. References can be obtained by contacting the following:

Administrative Records Specialist
Public Access Room H4-22
Westinghouse Hanford Company
P. O. Box 1970
Richland, Washington 99352.

1.3 ACRONYMS AND ABBREVIATIONS

Acronyms and abbreviations used throughout this Part B permit application are located at the beginning of the document between the Foreword and the Part A permit application.

1.4 DEFINITIONS

Definitions specific to this permit application are provided in this section. These definitions supplement those provided in WAC 173-303-040.

Contractor--Firm under contract to the U.S. Department of Energy to provide Hanford Site services. Currently, there are the following four onsite, prime contractors:

- An Operations and Engineering Contractor
- A Research and Development Contractor
- An Engineer and Constructor Contractor
- A Medical and Health Services Contractor.

Throughout the remainder of this permit application, the term contractor, except where specified, is used to refer to the operations and engineering contractor.

Dangerous or hazardous waste--In addition to the definition in WAC 173-303-040, means the nonradioactive dangerous component of waste commonly called mixed waste (i.e., waste that is both dangerous and radioactive). Dangerous waste commonly is used to refer to hazardous, dangerous, or extremely hazardous waste within this permit application.

DOE Richland Field Office--Formerly referred to as 'Richland Operations Office' and 'DOE Field Office, Richland'. Usage of either term within the text should be considered as equivalent to the 'DOE Richland Field Office'.

Facility--Dependent on context, the term 'facility', as used in this permit application, could refer to:

- The Hanford Facility (refer to definition)
- A facility as defined in WAC 173-303-040
- Building nomenclature commonly used at the Hanford Facility. In this context, the term 'facility' remains as part of the title for various treatment, storage, and/or disposal (TSD) units (e.g., 616 Nonradioactive Dangerous Waste Storage Facility, Grout Treatment Facility).

Generating Unit--Term inferred to have the same meaning as 'generator' as defined in WAC 173-303-040. For purposes of RCRA and the *Dangerous Waste Regulations*, the Hanford Facility is considered to be a single generator consisting of a number of generating units.

Hanford Facility--A single RCRA facility identified by the EPA/State Identification Number WA7890008967 that consists of over 60 TSD units conducting dangerous waste management activities. These TSD units are included in the *Hanford Facility Dangerous Waste Part A Permit Application* (DOE-RL 1988b). Also, the contiguous portion of the Hanford Site that contains these TSD units and, for the purposes of the RCRA, is owned and operated by the U.S. Department of Energy (excluding lands north and east of the Columbia River, river islands, state owned or leased lands, lands owned by the Bonneville Power Administration, lands leased to the Washington Public Power Supply System, and the Ashe Substation). The Hanford Facility is a single site for purposes of provisions regulating 'offsite' or 'onsite' waste handling.

Hanford Site--The approximately 560 square miles (1,450 square kilometers) in southeastern Washington State owned by the United States Government and commonly known as the Hanford Reservation.

Offsite Shipments--Shipments not considered to be onsite.

Onsite Shipments--Shipments (1) from waste generating units to TSD units operated by the DOE-RL or (2) between TSD units operated by the DOE-RL.

Treatment, Storage, and/or Disposal Unit--A unit used for treatment, storage, and/or disposal of dangerous waste that is required to be permitted and/or closed pursuant to RCRA requirements as determined in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) Action Plan (Ecology et al. 1990). Also refers to a grouping of TSD units for the purpose of preparing and submitting a permit application pursuant to the requirements under RCRA, as determined in the Tri-Party Agreement Action Plan.

Tri-Party Agreement--The term Tri-Party Agreement means the *Hanford Federal Facility Agreement and Consent Order*, dated May 1989, as amended, and as it may be amended from time to time, including the Action Plan incorporated in the Tri-Party Agreement.

Waste Management Unit--Term inferred to have the same meaning as 'dangerous waste management unit' as defined in WAC 173-303-040. Also inferred to have the same meaning as TSD unit.

1.5 PERMIT MODIFICATIONS

All modifications to the 222-S Laboratory Complex Dangerous Waste Permit will be made in accordance with the requirements identified in WAC 173-303-830, with the following exception. The notifications required by WAC 173-303-830(4)(a)(i)(A) and (B) for Class 1 changes will be submitted on an annual basis to the required regulatory agencies, appropriate units of state and local government, and individuals on the facility mailing list maintained by Ecology. These notifications will be submitted by March 1 of each year.

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2.0 FACILITY DESCRIPTION AND GENERAL PROVISIONS [B]

This chapter briefly describes the Hanford Site and Hanford Facility. In addition, the chapter describes the 222-S Complex location and operational information, including the following:

- General description
- Topography
- Location information
- Traffic information
- Performance standards
- Buffer monitoring zones
- Spills and discharges
- Manifest system.

2.1 GENERAL DESCRIPTION [B-1]

This section discusses the general Hanford Facility operating areas and provides an introduction to the 222-S Complex. A brief description of the Hanford Facility also is provided. A more detailed discussion of the waste types and known characteristics of the waste that the 222-S Complex treats and stores, and the identification of the methods of treatment and storage, are provided in Chapters 3.0 and 4.0, respectively.

2.1.1 Hanford Site

The Hanford Site covers approximately 560 square miles (1,450 square kilometers) of semiarid land that is owned by the U.S. Government and managed by the DOE-RL. The Hanford Site is located northwest of the city of Richland, Washington (Figure 2-1). The city of Richland adjoins the southeasternmost portion of the Hanford Site boundary and is the nearest population center. In early 1943, the U.S. Army Corps of Engineers selected the Hanford Site as the location for reactor, chemical separation, and related activities for the production and purification of special nuclear materials and other nuclear activities. The mission of the Hanford Site recently has focused on environmental remediation and restoration.

Activities at the Hanford Site are centralized in numerically designated areas (Drawing H-6-958 in Appendix 2A). The reactors are located along the Columbia River in the 100 Areas. The reactor fuel reprocessing units are in the 200 Areas, which are on a plateau approximately 7 miles (11 kilometers) from the Columbia River. The 300 Area, located adjacent to and north of

Richland, contains the reactor fuel manufacturing plants and the research and development laboratories. The 400 Area, 5 miles (8 kilometers) northwest of the 300 Area, contains the Fast Flux Test Facility used for testing liquid metal reactor systems. The 600 Area covers all locations not specifically given an area designation. Adjacent to and north of Richland, the 1100 Area contains offices associated with administration, maintenance, transportation, and materials procurement and distribution. The 3000 Area, between the 1100 Area and the 300 Area, contains engineering offices and administrative offices. Administrative offices also are located in the 700 Area, which is in downtown Richland.

Drawing H-6-958 in Appendix 2A provides a general overview of the Hanford Site and contiguous area. This drawing illustrates the following:

- Legal boundary
- Contours [at 20-foot (6.01-meter) intervals] sufficient to show surface water flow
- Fire control services
- Access roads, internal roads, railroads, perimeter gates, and barricades
- Longitudes and latitudes.

2.1.2 Hanford Facility

The Hanford Facility is defined as a single RCRA facility, identified by the EPA/State Identification Number WA7890008967, that consists of over 60 TSD units conducting dangerous waste management activities. These TSD units are included in the *Hanford Facility Dangerous Waste Part A Permit Application* (DOE-RL 1988b). The Hanford Facility consists of the contiguous portion of the Hanford Site that contains these TSD units and, for the purposes of the RCRA, is owned and operated by the U.S. Department of Energy (excluding lands north and east of the Columbia River, river islands, state owned or leased lands, lands owned by the Bonneville Power Administration, lands leased to the Washington Public Power Supply System, and the Ashe Substation). The Hanford Facility is a single site for purposes of provisions regulating 'offsite' or 'onsite' waste handling.

2.1.3 222-S Laboratory Complex

The 222-S Complex (Figure 2-2) is made up of the following components:

- The 219-S Waste Handling Facility, a treatment and storage unit
- The 222-S Dangerous and Mixed Waste Storage Area, a storage unit
- The 222-S Analytical Laboratory

- The 222-SA Standards Laboratory

- 296-S-23 Stack and 219-S-16 Stack.

The two TSD units, the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area (Figure 2-2), are described in Sections 2.1.3.1 and 2.1.3.2, respectively. The 222-S Analytical Laboratory and 222-SA Standards Laboratory are described in Sections 2.1.3.3 and 2.1.3.4, respectively.

The 222-S Complex buildings were constructed in 1950 and 1951 to provide analytical support for the reduction-oxidation (REDOX) Plant. Through the years, the mission of the 222-S Complex has changed, and modifications have been made in response to new requirements. Access to the 222-S Complex is restricted and is under 24-hour surveillance.

The current mission of the 222-S Complex is to provide quality analytical chemistry services in support of Hanford Site processing units with emphasis on waste management, chemical processing, and environmental monitoring programs for B Plant, U Plant, Tank Farms, 242-A and 242-S Evaporators, Grout Treatment Facility, Waste Encapsulation Storage Facility, PUREX (plutonium-uranium extracting) Plant, Plutonium Finishing Plant, for general process development/upset activities, and for essential materials.

2.1.3.1 219-S Waste Handling Facility. Aqueous (liquid containing no organic compounds) mixed waste is transferred to the Double-Shell Tank System for storage, by way of the 219-S Waste Handling Facility. All waste transferred to the 219-S Waste Handling Facility is in a liquid form. The path for disposal of aqueous mixed waste is through the specially designed hot disposal sinks in the 222-S Analytical Laboratory. The aqueous mixed waste flows by gravity from sink drains through all-welded, corrosion-resistant piping to corrosion-resistant tanks located in an belowground concrete vault in the 219-S Waste Handling Facility. In addition to the hot sinks, there are hot cell drains so that aqueous hot cell waste can be discharged directly from the hot cells to waste tanks in the 219-S Waste Handling Facility. The underground portion of the transfer piping and the few piping connections, where welding was not practical, are enclosed in concrete casing to ensure aqueous mixed waste containment should a leak occur. Heavy concrete shielding blocks are used to cover the concrete vault. Piping connections to the tanks are above maximum liquid levels to avoid potential tank leaks.

The equipment that makes up the 219-S Waste Handling Facility is listed in Table 2-1. In addition to the equipment listed, the 219-S Waste Handling Facility has an operating gallery aboveground that contains instrumentation and controls. The 222-S Analytical Laboratory generates low-level aqueous mixed waste that is classified by laboratory personnel as intermediate-activity (exhibiting a radiation level of less than 10 millirems per hour) and high-activity (exhibiting a radiation level of greater than 10 millirems per hour but less than 100 millirems per hour) mixed waste. High-activity aqueous mixed waste goes to tank 103, and intermediate-activity aqueous mixed waste goes to tank 101. A schematic of the 219-S Waste Handling Facility is shown in Figure 2-3. The waste flows by gravity to the 219-S Waste Handling

Facility vault by way of 4-inch (10.2-centimeter) stainless steel lines encased in a concrete pipe trench. Any leakage from the waste lines in the concrete trench drains to sumps in the 219-S Waste Handling Facility vault (sump 6 in cell B and sump 7 in cell A), which have liquid-level alarms for leak detection. Leakage to sumps sets off an alarm in room 3-B of the 222-S Analytical Laboratory and the 219-S Waste Handling Facility operating gallery control panel. Steam jets are available to transfer waste from the sump back to the respective tank.

Waste batches in tanks 101 and 103 are transferred to tank 102, which acts as a treatment and storage tank and a transfer point to the appropriate storage tank in the Double-Shell Tank System. The waste is treated with sodium hydroxide to a pH greater than or equal to 12 and with sodium nitrite to a concentration greater than 600 parts per million to protect the Double-Shell Tank System tanks and lines from corrosion. The waste is analyzed for radioactivity (total alpha and total beta), pH, nitrate, nitrite, plutonium, and other parameters outlined in the *Double-Shell Tank Waste Analysis Plan* (WHC 1990d) before being transferred to the Double-Shell Tank System.

Sampling is performed with a portable bayonet sampler that is designed to seal the sample riser during operation. The sample is obtained by the vacuum created in the pipe during the sampling. The sample boxes are enclosed by an exhaust hood that is operated during sampling for containment of any airborne radioactivity that could be present.

The treated waste is batch transferred through cell D of the 202-S REDOX Building to the 241-S-151 diversion box or by tank trailer to the Double-Shell Tank System. A water flush of 500 gallons (1,893 liters) at a minimum, usually is employed after a transfer to the Double-Shell Tank System. The water flush also is routed to the Double-Shell Tank System.

Overflows from tank 103 are collected in sump 6, and overflows from tanks 101 and 102 are collected in sump 7.

2.1.3.2 222-S Dangerous and Mixed Waste Storage Area. The 222-S Dangerous and Mixed Waste Storage Area, shown in Figures 2-4 and 2-5, consists of two metal storage structures 19 feet 10 inches (6.0 meters) by 8 feet (2.4 meters) by 8 feet 6 inches (2.6 meters). The storage structures have wooden floors and are situated on top of a portion of a concrete pad. One static-flow roof vent is centered in the top of each structure. Each storage structure has a full-width double door at one end. Each storage structure also employs a secondary containment flooring consisting of a stainless steel containment basin covered with a nonslip fiberglass grate that overlies the wooden flooring.

The 222-S Dangerous and Mixed Waste Storage Area receives waste from laboratory operations consisting of both liquid and solid dangerous and mixed waste. Waste from other TSD units on the Hanford Facility is not accepted at the 222-S Dangerous and Mixed Waste Storage Area. Containerized liquid waste is packed in polyethylene-lined 55-gallon (208-liter) drums. Solid waste is segregated from liquid waste and packed in the same manner. The liquid-bearing waste packed in the drums is surrounded by a minimum 2-to-1 ratio

(by volume) of absorbent (WHC 1990e). Each storage structure can hold a maximum of 18 drums. The storage structures remain locked except during inspections, waste deposition, or waste removal (WHC 1990c).

2.1.3.3 222-S Analytical Laboratory. The design of the 222-S Analytical Laboratory provides for all laboratory work to be done within the building. The laboratory is a two-story building, 322 feet (98 meters) long and 107 feet (33 meters) wide, located in the southeast corner of the 200 West Area. The first floor, shown in Figure 2-6, is divided into three general areas. The west end contains the lunchroom, offices, and locker rooms, which are maintained free of radioactive and dangerous materials. The central section contains laboratories and service areas for work with radioactive and/or dangerous materials. The east end, commonly referred to as the multicurie section, contains laboratories, hot cells, and service areas for work with radioactive samples. The central and east sections contain laboratory benches and hoods that are supplied with services such as electrical outlets, sanitary and distilled water, propane, compressed air, and a process vacuum. The 222-S Analytical Laboratory Building is designed with its own waste removal system, decontamination system, fire protection and alarm systems, ventilation systems, radiation monitoring systems, and gas monitoring systems.

The supply water for the 222-S Analytical Laboratory consists of raw and sanitary water and steam. Following use, the water is routed to the 207-SL Retention Basin. The raw water is used in the fire sprinkler system and contributes less than 1 percent of the waste stream flow to the 207-SL Retention Basin. Sanitary water is used as the primary water supply to the laboratory and contributes 85 percent to the waste stream flow to the 207-SL Retention Basin. Steam condensate contributes the remaining 15 percent of this waste stream flow.

The second floor contains the ventilation supply fans, supply and exhaust ductwork, the ventilation system operation and control room, a glass shop, and storage areas. This area is a radiologically controlled area, with the exception of the glass shop, which is radiologically clean. The sinks and drains from the glass-blowing shop on the second floor empty into the 207-SL Retention Basin. The second floor distilled water overflow and drain, the backwash and drain from the deionized water unit, a floor drain near the unit, and the flash tank overflow and drain lines all empty into the 207-SL Retention Basin. Lines into the flash tank include cooling water from the supply fans, condensate from booster coils, and condensate from the reheat and preheat coils on supply fans. Overflow and drain lines from the overhead bulk nitric acid storage tank empty into the main nitric acid storage tank located outside of the 222-S Analytical Laboratory Building. The overhead bulk nitric acid storage tank and the main nitric acid storage tank are not regulated tanks.

The basement contains service piping, vacuum pumps, a counting room, an instrument maintenance shop, and a scanning electron microscope laboratory. This area is also a radioactive surface contamination zone. All effluent generated in the basement of the 222-S Analytical Laboratory is discharged to the 207-SL Retention Basin.

The 222-S Analytical Laboratory personnel currently use the hot cells and fume hoods to support several programs and operations including PUREX Plant technology, waste fractionization and encapsulation, waste concentration, grout processing, and other activities associated with Double-Shell Tank System operations and single-shell tank waste characterization.

All first floor laboratory sinks, hood drains, drinking water fountains, service sinks, bathroom sinks, distilled water supplies, equipment cooling water, and steam condensate from radioactive areas that are nondangerous drain to the 207-SL Retention Basin. This includes the laboratory sink and hood drains from the multicurie section areas of the first floor. Mixed waste effluents are segregated from nonradioactive and nondangerous effluents and drain to the 219-S Waste Handling Facility.

The 207-SL Retention Basin serves as a temporary holding area for potentially radioactive liquid effluents before discharge to the 216-S-26 Crib. Waste water from the 222-S Analytical Laboratory that normally is free of radioactive and dangerous chemical contamination, is routed to the 207-SL Retention Basin. When the waste in the 207-SL Retention Basin has been verified to be nondangerous, the waste is transferred to the 216-S-26 Crib.

Both solid waste and liquid waste are generated at the 222-S Analytical Laboratory, as shown in Figure 2-7. Liquid waste that is known to be mixed waste is segregated as aqueous and organic. Aqueous mixed waste is generated at the 222-S Analytical Laboratory during the radiochemical separation processes. Liquid organic mixed waste is accumulated in bottles inside the laboratory hoods where the analytical processes occur (i.e., the satellite accumulation area for that specific analytical process). When these bottles are full, the bottles are transferred to the less-than-90-day storage area. When sufficient quantities of waste are accumulated [i.e., 55 gallons (208 liters) of dangerous waste, or 1 quart (0.95 liter) of acutely dangerous waste], the waste is packaged in drums. These drums are stored at the 222-S Dangerous and Mixed Waste Storage Area north of the 222-S Analytical Laboratory before shipment to other onsite storage and/or disposal areas. Mixed or radioactive waste is sent to the Hanford Central Waste Complex, while nonradioactive dangerous waste is sent to the 616 Nonradioactive Dangerous Waste Storage Facility.

Aqueous mixed waste includes aqueous-phase waste from radiochemical separation processes, discarded aqueous samples, and liquid decontamination waste. Aqueous-phase separation waste is accumulated in bottles in laboratory hoods where the separation process occurs. When full, these bottles are transferred to the less-than-90-day storage area for transfer to the treatment and storage tanks located in an belowground concrete vault at the 219-S Waste Handling Facility. Discarded aqueous samples also are sent to these tanks. Samples containing organic liquids routinely are returned to the originator. Samples can be vacuum transferred into the tanks or can reach the tanks through drains in laboratories or hot cells. Decontamination waste is drained into the storage tanks.

Radioactively contaminated lead is waste generated solely at the 222-S Analytical Laboratory and not at the 222-SA Standards Laboratory. Mixed

waste containing lead is segregated from other solid radioactive waste and stored at the 222-S Dangerous and Mixed Waste Storage Area before shipment to the Hanford Central Waste Complex.

Solid mixed waste generated at the 222-S Analytical Laboratory also includes outdated or off-specification laboratory chemicals. Laboratory chemical waste is accumulated with other solid and liquid mixed waste in satellite areas before being packaged for disposal. The outdated or off-specification chemicals are checked for radioactivity and, if determined to be radioactive, are labpacked, stored at the 222-S Dangerous and Mixed Waste Storage Area and, transferred to the Hanford Central Waste Complex. If such chemicals are nonradioactive, these chemicals are labpacked at the 222-S Dangerous and Mixed Waste Storage Area before transfer to the 616 Nonradioactive Dangerous Waste Storage Facility.

Solid nondangerous low-level waste routinely is segregated into compactible and noncompactible waste. This waste is stored at the 222-SD Storage Pad (Figure 2-2) until shipment to the 200 West Area low-level burial grounds.

Nonradioactive dangerous waste includes outdated or off-specification laboratory chemicals and laboratory chemical waste. This waste, generated at the 222-S Analytical Laboratory, is accumulated at satellite areas before packaging in labpack drums for shipment to the 616 Nonradioactive Dangerous Waste Storage Facility.

Discarded waste aerosol cans from the 222-S Analytical Laboratory and other buildings at the 222-S Complex are another form of solid waste. Aerosol cans from within radiological control zones are considered to be low-level dangerous waste unless all constituents of the cans are nondangerous. Aerosol cans identified to be nondangerous are disposed of as low-level solid waste.

2.1.3.4 222-SA Standards Laboratory. The 222-SA Standards Laboratory is a five-wide trailer located southeast of the 222-S Analytical Laboratory (Figure 2-2). The 222-SA Standards Laboratory prepares nonradioactive standards for other analytical laboratories on the Hanford Site and is used for nonradioactive development work. Waste generated from operations of the 222-SA Standards Laboratory is nonradioactive dangerous waste as described in Chapter 3.0, Section 3.1.2.3. The waste is similar to that described for the 222-S Analytical Laboratory in the previous section. This waste is accumulated at satellite areas before packaging in drums for shipment to the 616 Nonradioactive Dangerous Waste Storage Facility.

2.1.3.5 296-S-23 Stack and 296-S-16 Stack. Two gaseous emissions containing both radioactive and nonradioactive components have been identified at the 222-S Complex. These emissions are handled by two stacks, the 296-S-23 Stack and the 296-S-16 Stack.

The 296-S-23 Stack is the stack from the 219-S Waste Handling Facility sample gallery. This stack handles exhaust air from the sample gallery hood, which is operated on an as-needed basis. The air from the sample gallery hood

which is operated on an as-needed basis. The air from the sample gallery hood has a very low potential for contamination with radionuclides or dangerous chemicals. Because of the low potential for contamination, the stack is not monitored or sampled. This stream does, however, go through a high-efficiency particulate air (HEPA) filter before being discharged to the atmosphere.

The 296-S-16 Stack handles air vented from the aqueous mixed waste tanks in the vaults of the 219-S Waste Handling Facility. The stream is sampled weekly for total alpha and total beta. The exhaust air from the vaults goes through a deentrainment tank and HEPA filters before being discharged to the atmosphere (WHC 1991d).

2.1.3.6 Expected Modifications to the 222-S Complex. Several modifications currently are planned for the 222-S Complex. These modifications are aimed at maintaining the 222-S Complex in compliance with federal and state regulations, and of increasing the capacity of the 222-S Complex to support environmental restoration activities. The 222-S Complex will be expanded by the addition of a new hot cell on the east end of the 222-S Analytical Laboratory. Analysis of radioactive and mixed waste samples will be conducted in the new hot cell. Waste from the new hot cell addition will be routed through containment piping to the 219-S Waste Handling Facility. Both the primary and secondary containment piping will be stainless steel. Leak detection and cathodic protection will be provided.

Tanks 101, 102, and 103 in the 219-S Waste Handling Facility will be replaced with double-shell steel tanks. Upgrades are planned for the waste transfer piping from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility. The existing waste piping between the 222-S Analytical Laboratory and the 219-S Waste Handling Facility and the piping between the 219-S Waste Handling Facility and the Double-Shell Tank System consists of stainless steel piping in an underground concrete encasement. The piping will be replaced with stainless-steel-encased piping with leak detection and cathodic protection.

Planned modifications also include installation of automatic sprinkler systems in the storage structures at the 222-S Dangerous and Mixed Waste Storage Area to comply with fire code requirements.

Modifications or amendments required as a result of operational requirements or changing regulations will be submitted to the regulatory authority and added to the permit application or permit as required.

2.2 TOPOGRAPHIC MAP [B-2]

A topographic map, showing a distance of at least 1,000 feet (305 meters) around the 222-S Complex, is located in Appendix 2A. The map is at a scale of 1 centimeter equals 20 meters (1:2,000). The contour interval on the map is 1.5 feet (0.5 meter) and clearly shows the pattern of surface water flow in the vicinity of and from each component of the 222-S Complex. The map contains the following information:

- Map scale
- Date
- Prevailing wind speed and direction
- A north arrow
- Surrounding land use
- Access road locations
- Access control.

A legal description of the 222-S Complex is provided in Appendix 2A.

2.3 LOCATION INFORMATION [B-3]

This section describes the location of the 222-S Complex in relation to seismic, floodplain, and shoreline considerations.

2.3.1 Seismic Consideration [B-3a]

The 222-S Complex is located in Benton County, Washington and has been identified as being in Zone 2B in accordance with the *Uniform Building Code* (ICBO 1991). The 219-S Waste Handling Facility has been reviewed for seismic considerations as detailed in the *219-S Aqueous Waste Disposal Facility Tank System Integrity Assessment Report* (WHC 1990a). The integrity report stated that the storage tanks and vault structure are adequate to resist a seismic event as defined in the *Design Load for Structures* (DOE-RL 1988a). This plant standard provides seismic load criteria specific to the Hanford Site.

The 219-S tanks 101 and 102 recently were modified to improve resistance to seismic events. The design of the seismic restraints is provided in Chapter 4.0.

2.3.2 Floodplain Standard [B-3b]

Three sources of potential flooding of the 222-S Complex were considered: (1) the Columbia River, (2) the Yakima River, and (3) storm-induced run-off in ephemeral streams draining the Hanford Site. No perennial streams occur in the central part of the Hanford Site.

The Federal Emergency Management Agency has not prepared floodplain maps for the Columbia River through the Hanford Site. The flow of the Columbia River largely is controlled by several upstream dams that are designed to reduce major flood flows. Based on a U.S. Army Corps of Engineers study of the flooding potential of the Columbia River that considered historic data and water storage capacity of the dams on the Columbia River (COE 1969), the

U.S. Department of Energy (ERDA 1976) has estimated the probable maximum flood (Figure 2-8). The estimated probable maximum flood would have a larger floodplain than either the 100- or 500-year floods. The 222-S Complex is well above the elevation of the Columbia River probable maximum flood and therefore is not within the 100- or 500-year floodplain.

The 100-year floodplain for the Yakima River, as determined by the Federal Emergency Management Agency (FEMA 1980), is shown in Figure 2-9. The 222-S Complex is not within the 100-year floodplain.

The only other potential source of flooding of the 222-S Complex is run-off from a large precipitation event in the Cold Creek watershed. This could result in flooding of the ephemeral Cold Creek. Skaggs and Walters (1981) have given an estimate of the probable maximum flood using conservative values of precipitation, infiltration, surface roughness, and topographic features. The resulting flood area (Figure 2-10) would not affect the 222-S Complex. The 100-year flood would be less than the probable maximum flood.

2.3.2.1 Demonstration of Compliance [B-3b(1)]. The 222-S Complex is not located within a 100-year floodplain. Therefore, no demonstration of compliance is required.

2.3.2.1.1 Flood Proofing and Flood Protection Measures [B-3b(1)(a)]. The 222-S Complex is not located within a 100-year floodplain. Therefore, no demonstration of compliance is required.

2.3.2.1.2 Flood Plan [B-3b(1)(b)]. The 222-S Complex is not located within a 100-year floodplain. Therefore, no demonstration of compliance is required.

2.3.2.2 Plan for Future Compliance with Floodplain Standard [B-3b(2)]. The 222-S Complex is not located within a 100-year floodplain. Therefore, no demonstration of compliance is required.

2.3.3 Shoreline Standard [B-3c]

The 222-S Complex is not located within regulated 'shorelines' of the state or 'wetlands' as defined in the *Shoreline Management Act of 1971*. The 222-S Complex is located on the Hanford Site, which is owned by the U.S. Government and operated by the DOE-RL. The Hanford Site is not classified as natural, conservancy, rural, or residential.

2.3.4 Sole Source Aquifer Criteria [B-3d]

The 222-S Complex is not located over a sole source aquifer as defined in Section 1424(e) of the *Safe Drinking Water Act of 1974*. Therefore, no demonstration of compliance is required.

2.4 TRAFFIC INFORMATION [B-4]

The regional public highway network traversing the Hanford Site (Washington State Highways 24 and 240 and Route 10 and that portion of Route 4S located south of the Wye Barricade) and the restricted access roadways are shown in Figure 2-11.

Roadways on the Hanford Site north of the Wye Barricade and within the 300 and 400 Areas are restricted to authorized personnel. The 222-S Complex is located approximately 1.5 miles (2.4 kilometers) from the nearest roadway (Washington State Highway 240) that has unrestricted public access. Estimated traffic volumes, in vehicles per day, are shown in Figure 2-11. The majority of traffic is passenger vehicles used for commuting and conducting company business. Approximately 10 percent of the traffic volume is trucks, and these trucks are mainly delivery, construction, and maintenance vehicles.

Liquid mixed waste from the 222-S Complex is transported by way of underground pipelines or tanker trucks. Waste stored in drums is transported routinely by truck.

2.4.1 Hanford Site Roadways

Drawing H-6-958 in Appendix 2A and Figure 2-11 show the major roads through the Hanford Site. These roads are classified as either primary or secondary routes. The primary routes include Routes 4N, 4S, 10, 2N, 3, 6, and 11A, as well as various avenues within each area. The primary routes are constructed of bituminous asphalt [usually 2 inches (5 centimeters) thick, but the thickness of the asphalt layer will vary with each road] with an underlying aggregate base in accordance with U.S. Department of Transportation requirements. The secondary routes are constructed of layers of oil and rock mixture with an underlying aggregate base. The aggregate base consists of various types and sizes of rock found onsite. Currently, no load-bearing capacities of these roads are available; however, loads as large as 140 pounds per square inch (9.7 kilograms per square centimeter) have been transported without observable damage to road surfaces. All roads meet the requirements for the American Association of State Highway and Transportation Officials HS-20-44 rating (AASHTO 1983). An HS-20-44 loading represents a two-axle tractor [front axle loading of 8,000 pounds (3,628 kilograms) and rear axle loading of 32,000 pounds (14,515 kilograms)] plus a single-axle trailer with a 32,000-pound (14,515-kilogram) axle loading.

Waste from the 219-S Waste Handling Facility is transported to the Double-Shell Tank System by truck and enters the Double-Shell Tank System at the 204-AR Waste Unloading Station in the 200 East Area. The waste enters the 200 East Area through Gates 808, 810, 814, or 815. The 204-AR Waste Unloading Station is located approximately 400 feet (120 meters) northwest of the 241-AW Double-Shell Tank Farm.

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2.4.2 Traffic Control Signs, Signals, and Procedures

Standard traffic control signs are used throughout the Hanford Site (e.g., hexagonal stop signs, triangular yield signs). Speed limits are posted throughout the Hanford Site; the maximum posted speed is 55 miles per hour (88 kilometers per hour) on major thoroughfares. Inside the 200 East and 200 West Areas, posted speeds are reduced to a maximum of 35 miles per hour (56 kilometers per hour) and held to speeds as low as 15 miles per hour (24 kilometers per hour).

2.5 PERFORMANCE STANDARDS [B-5]

The 222-S Complex is designed to minimize the exposure of personnel to radioactive, dangerous, and/or mixed waste and to prevent waste from reaching the environment. In addition, measures are taken to ensure that the 222-S Complex is maintained and operated in a manner that prevents the following:

- Degradation of groundwater quality
- Degradation of air quality by open burning or other activities
- Degradation of surface water quality
- Destruction or impairment of flora or fauna outside of the 222-S Complex
- Excessive noise
- Negative aesthetic impacts
- Unstable hillsides or soils
- Use of processes that do not treat, detoxify, recycle, reclaim, and recover waste material to the extent economically feasible
- Endangerment to the health of employees or the public near the 222-S Complex.

The measure taken to prevent each of these negative effects from occurring are described in the following sections.

2.5.1 Measures to Prevent Degradation of Groundwater Quality

Degradation of groundwater quality is prevented primarily through tank and ancillary equipment secondary containment, with leak detection between the primary and secondary containment systems. Degradation of groundwater quality is prevented by storing waste containers inside enclosed metal storage structures. Additionally, the ground surface in the vicinity of the 222-S Complex is maintained almost level, and there are no hills near the

222-S Complex that channel water into the area (Drawing H-6-958 in Appendix 2A).

2.5.2 Measures To Prevent Degradation of Air Quality by Open Burning or Other Activities

No open burning occurs at the 222-S Complex to degrade the air quality. The arid climate limits vegetation within the boundaries of the Hanford Site. The vegetation is removed routinely so that almost no potential exists for accidental open burning. Transfer lines are underground and would not be impacted by accidental open burning. Ventilation systems (described in Chapter 4.0) control air emissions from the tanks and ancillary equipment.

2.5.3 Measures To Prevent Degradation of Surface Water Quality

The potential for degradation of surface water is extremely low because no natural surface water near the 222-S Complex. The Columbia River is more than 5 miles (8 kilometers) from the 222-S Complex and Cold Creek (ephemeral) runs across the southwest corner of the 200 West Area more than 1 mile (1.6 kilometers) away. Rainwater soaks into the sandy soil rather than flowing on the soil surface. Small pools can be observed after rapid snowmelt, but these usually dissipate within 72 hours.

2.5.4 Measures To Prevent Destruction or Impairment of Flora or Fauna Outside of the Units

The activities associated with dangerous and mixed waste generated at the 222-S Complex do not appear to have altered the flora and fauna outside the 222-S Complex since the system has been in operation. The security fence in the 200 West Area serves as a barrier to large land animals and, therefore, limit these animals from accessing the 222-S Complex operations.

2.5.5 Measures To Prevent Excessive Noise

The 222-S Complex is sufficiently removed from residential and offsite industrial areas (Figure 2-1 and Drawing H-6-958 in Appendix 2A) to preclude excessive noise impacts. Noise generated by operations is not heard off the Hanford Facility. Heavy equipment and vehicles used intermittently within the 222-S Complex are equipped with standard noise-reducing equipment such as mufflers.

2.5.6 Measures To Prevent Negative Aesthetic Impacts

The 222-S Complex is within the restricted area of the Hanford Facility and is not visible offsite. The onsite aesthetic impact of the 222-S Complex is minimal because waste is placed in belowground tanks and storage

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structures. The principal visual impact is the presence of pit covers, riser pipes, small control buildings, and storage structures.

2.5.7 Measures To Prevent Unstable Hillsides or Soils

There are no naturally unstable hillsides or soils near the 222-S Complex (Drawing H-6-958 in Appendix 2A). The climate is arid to semiarid as a result of being in the rain shadow of the Cascade mountain range. The Hanford Site is blanketed by a thin veneer of wind-blown sediments. Vegetation on the site consists of sagebrush and other common central Washington desert plant species. The soil is classified as sandy gravel with excellent drainage characteristics. Water erosion on the plateau is minor because of the minimal precipitation, high soil porosity, and relatively flat topography.

2.5.8 Measures To Prevent the Use of Processes That Do Not Treat, Detoxify, Recycle, Reclaim, and Recover Waste Material to the Extent Economically Feasible

The two units of the 222-S Complex (the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area) function primarily as storage units. Treatment is limited to adjusting pH and adding sodium nitrite in the 219-S Waste Handling Facility tanks to prevent corrosion in the Double-Shell Tank System. This treatment ensures that the waste is compatible with the Double-Shell Tank System and that corrosion is inhibited to the maximum extent possible.

2.5.9 Measures To Prevent Endangerment of the Health of Employees or the Public Near the Units

Public health and safety are protected primarily by the use of double containment, the isolation of the treatment and storage units, and the distance groundwater must travel to reach drinking water supplies. Employee and public protection are enhanced further by administrative controls over the timing, routing, and loading of waste shipments.

The overall goal is to limit radiation and chemical exposure to levels as low as reasonably achievable (ALARA). A combination of features is used in the design and operation of the 222-S Complex to ensure stringent confinement of radioactive and dangerous materials, protection against radiation and chemical exposure of personnel, process safety, and adequate protection of operating personnel and the general public. The principal preventive measures include using shielding, maximizing the distance from radiation sources, restricting the time of occupancy in radiation zones, and using protective clothing. Employees are trained to handle waste transfers, maintenance, and packages. The training includes dangerous materials and waste awareness, emergency response, and workplace safety (Chapter 8.0). Protective equipment, safety data, and hazardous materials information are readily available for employee use.

A building emergency plan is in place for spill prevention, containment, and countermeasures to reduce safety and health hazards to employees, the environment, and the public. The *Building Emergency Plan for the 222-S Laboratory Complex* (WHC 1990c) is provided in Appendix 7A.

2.6 BUFFER MONITORING ZONES [B-6]

Buffer monitoring zone requirements in WAC 173-303-640(9)(b) for tanks storing ignitable or reactive waste do not apply to the 219-S Waste Handling Facility. Therefore, no discussion of the checklist items under buffer monitoring zones [B6] is included in this permit application.

2.7 SPILLS AND DISCHARGES INTO THE ENVIRONMENT [B-7]

The actions that are followed to ensure immediate response to a nonpermitted spill or discharge of radioactive and/or mixed waste from the 222-S Complex to the environment are detailed in the building emergency plan (Appendix 7A).

2.7.1 Notification [B-7a]

The following are details of notification of the DOE-RL, Ecology, and the National Response Center.

- The building emergency director or line management documents all emergencies on an occurrence report (Figure 2-12), which must be completed within 24 hours. The occurrence report is used to provide management with facts about an unplanned event and to disseminate information to those responsible for preventing recurrence of similar events. The DOE-RL is notified either by line management or the assigned overview organization, depending on the consequences of the event. Copies of the occurrence reports will be retained at the 222-S Complex.

- All detectable spills into the environment and/or the atmosphere will be reported immediately to the Occurrence Notification Center. The Occurrence Notification Center notifies Ecology of the release of dangerous waste.

- Upon detection, immediate notification will be made to Ecology at (509) 546-2977 of all spills as required under applicable regulations.

- In addition, if a spill exceeds the reportable quantities established under the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA), according to 40 CFR 302, the Occurrence Notification Center will notify the National Response Center at 800-424-8802.

- The report to Ecology and the National Response Center will contain the following information:

  - Name and telephone number of reporter
  - Name and address of the TSD unit or zone
  - 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 and the environment outside the Hanford Facility boundary.

- All detectable releases of dangerous waste, including those that do not exceed a CERCLA limit, are reported to the Hanford Fire Department and the contractor's environmental protection organization. The contractor's environmental protection organization compiles a report for submittal to the DOE-RL. The reports are kept on file at the 222-S Complex and are available for review by the appropriate regulatory agencies. The DOE-RL submits the report to the following address:

  Washington State Department of Ecology
  7601 West Clearwater, Suite 102
  Kennewick, Washington 99336
  Phone: (509) 546-2990.

- All detectable spills or releases that occur during transportation will be reported by the transporter to the Occurrence Notification Center. In addition, a written report will be submitted to the following address:

  Director, Office of Hazardous Material Regulations
  Materials Transport Bureau
  Department of Transportation
  Washington, D.C. 20990.

2.7.2 Mitigation and Control [B-7b]

Actions taken to protect human health and the environment in the event of a nonpermitted spill or discharge are detailed in the building emergency plan (Appendix 7A).

2.7.2.1 Cleanup of Released Wastes or Substances [B-7b(1)]. Actions taken to clean up all released hazardous/dangerous waste or hazardous substances and the criteria used to determine the extent of removal are addressed in contingency plan documents noted in Chapter 7.0

2.7.2.2 Management of Contaminated Soil, Waters, or Other Materials [B-7b(2)]. Actions taken to demonstrate that all soil, waters, or other materials contaminated by a spill or discharge are treated, stored, or disposed of in accordance with WAC 173-303 are addressed in contingency plan documents noted in Chapter 7.0.

2.7.2.3 Restoration of Impacted Area [B-7b(3)]. Because of the remote location of the 222-S Complex [near the center of the Hanford Site (Figure 2-1)], spills or discharges occurring on property that is not owned by the U.S. Government are unlikely. A description of the actions to be taken to restore the impacted area and to replenish resources is not required.

2.8 MANIFEST SYSTEM [B-8]

The Hanford Facility handles dangerous waste from onsite sources and mixed waste from both onsite and offsite sources. This section briefly discusses the system that is in place to track waste shipments.

2.8.1 Onsite Waste Shipments

The Hanford Site has one EPA/State identification number as required by WAC 173-303-060, and all TSD units on the Hanford Facility are part of a single dangerous waste facility. Therefore, onsite shipments of dangerous or mixed waste are not subject to the manifesting requirements specified in WAC 173-303-370 and -180. However, all onsite waste shipments are conducted in a manner to ensure protection of onsite workers, the environment, and the public. Four onsite waste tracking systems, similar to a manifest system, are voluntarily used for waste transported on the Hanford Facility in the following manners:

- Liquid mixed waste via underground pipelines
- Liquid mixed waste via railroad tank car or tank truck or via barrels transported by truck
- Containerized mixed waste (e.g., rags, failed equipment, contaminated soil) via trucks and railroad cars
- Containerized nonradioactive dangerous waste via truck before being shipped offsite for treatment, storage, and/or disposal at a permitted facility.

Waste typically is transported from the 222-S Complex by the following methods:

- Aqueous mixed waste is transferred to the Double-Shell Tank System from the 219-S Waste Handling Facility using underground pipelines or tanker trucks.
- Organic mixed waste in drums is transported by truck from the 222-S Dangerous and Mixed Waste Storage Area to the Hanford Central Waste Complex.
- Solid mixed waste in drums is transported by truck from the 222-S Dangerous and Mixed Waste Storage Area to the Hanford Central Waste Complex.

- Nonradioactive dangerous waste in drums is transported by truck from the 222-S Dangerous and Mixed Waste Storage Area to the 616 Nonradioactive Dangerous Waste Storage Facility before being shipped offsite to a permitted TSD facility.

2.8.2 Offsite Waste Shipments

Waste stored or treated in the 222-S Complex is not received from offsite sources and is not shipped off the Hanford Facility directly from the 222-S Complex.

2.8.3 Procedures for Receiving Shipments [B-8a]

A tracking system is in place to manage transfers and to ensure that the waste sent to the Double-Shell Tank System from the 222-S Complex has been received.

Waste tracking documentation for Double-Shell Tank System waste transferred via pipeline includes a waste transfer record form. Each transfer requires a waste transfer record form and other supporting data records such as laboratory analysis sheets. These records document individual sources, volumes, and composition of waste transfers and provide a control system for the movement of mixed waste. Onsite radioactive shipping records accompany tanker truck transfers.

The Double-Shell Tank System personnel are responsible for the movement of waste by way of underground pipelines. The Double-Shell Tank System personnel also are responsible for documenting transfers and ensuring that transferred waste arrives at the specified destination. A file of the original copy of transfer documentation and other pertinent operating records are maintained by the Double-Shell Tank System. The waste transfer originator is responsible for accurately identifying the waste composition and arranging for the transport of the waste.

2.8.4 Response to Significant Discrepancies [B-8b]

Discrepancies in the quantity of waste are determined using the material balance calculations required on the data sheet. A significant discrepancy exists when there is a volumetric difference between the quantity of waste sent and the quantity received that cannot be explained by the volume held within the process equipment. Waste transferred to the Double-Shell Tank System is characterized before the transfer. The analyses of these samples provide a final verification that the waste routed to the double-shell tanks meets the Double-Shell Tank System operational requirements.

Actions taken to deal with significant discrepancies are as follows:

- Transfer records are checked and examined
- Other tanks in the system are checked for an incorrectly routed transfer
- Leak detectors, interlocks, and alarms are checked to ensure that the equipment functions properly.

The occurrence of an underground pipeline leak into the environment is very unlikely. However, if an underground pipeline leak is detected, the appropriate tank farm contingency or emergency plan is implemented. The leak is repaired, and the contaminated soil is removed.

2.8.5 Provisions for Nonacceptance of Shipment [B-8c]

Provisions for nonacceptance of shipments are discussed in the following sections. Waste from offsite sources is not accepted at the 222-S Complex.

2.8.5.1 Nonacceptance of Undamaged Shipment [B-8c(1)]. Most routine shipments to the Double-Shell Tank System cannot be returned once the waste has been transferred to the Double-Shell Tank System. Thus, administrative measures are in place to help ensure that transfers are made without error.

2.8.5.2 Activation of Contingency Plan for Damaged Shipment [B-8c(2)]. Damaged shipments are not possible in pipeline transfers. The building emergency plan (Appendix 7A) would be activated if some failure of the tanker truck transfer system were detected.

1

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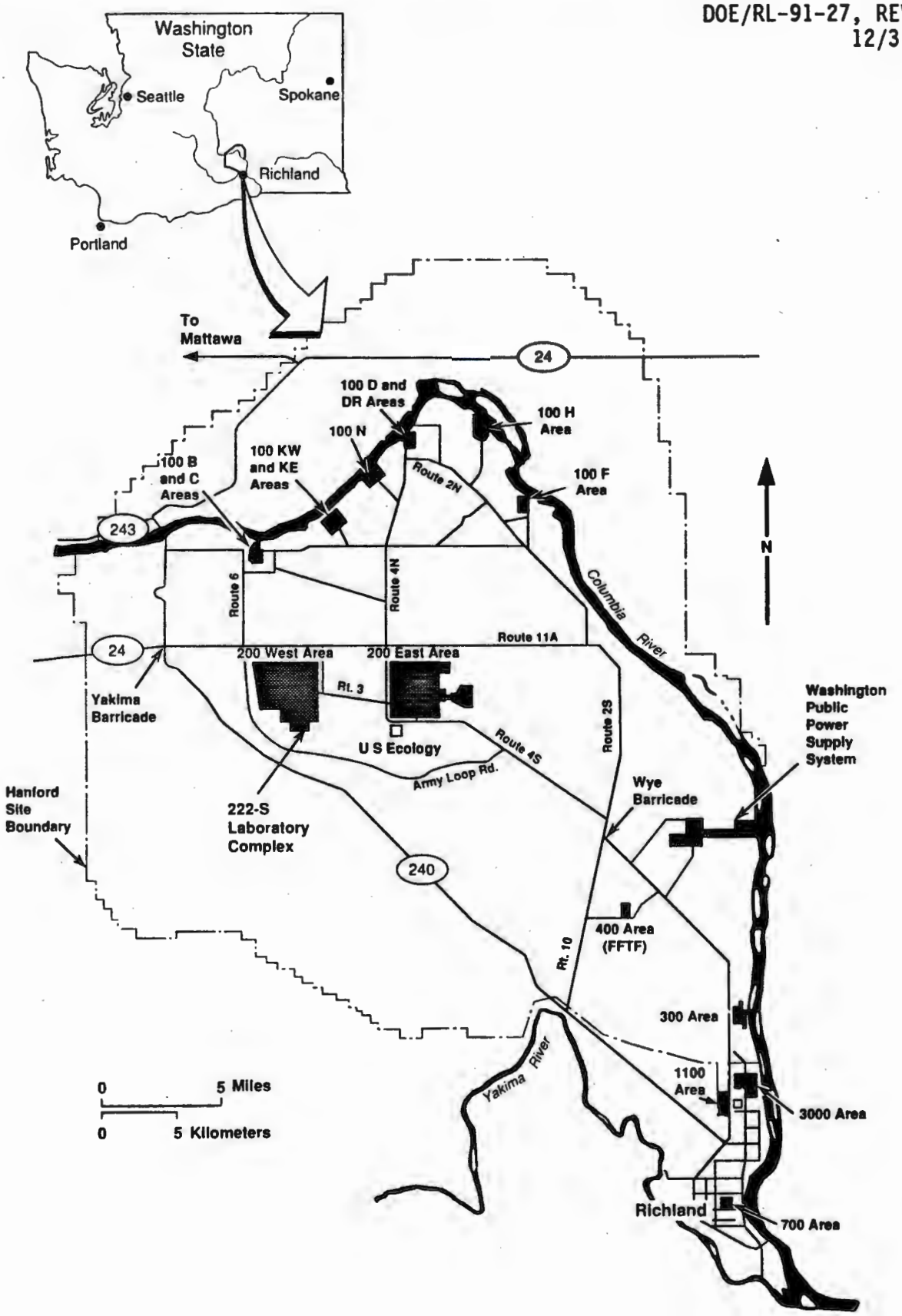

Figure 2-1. Hanford Site Location.

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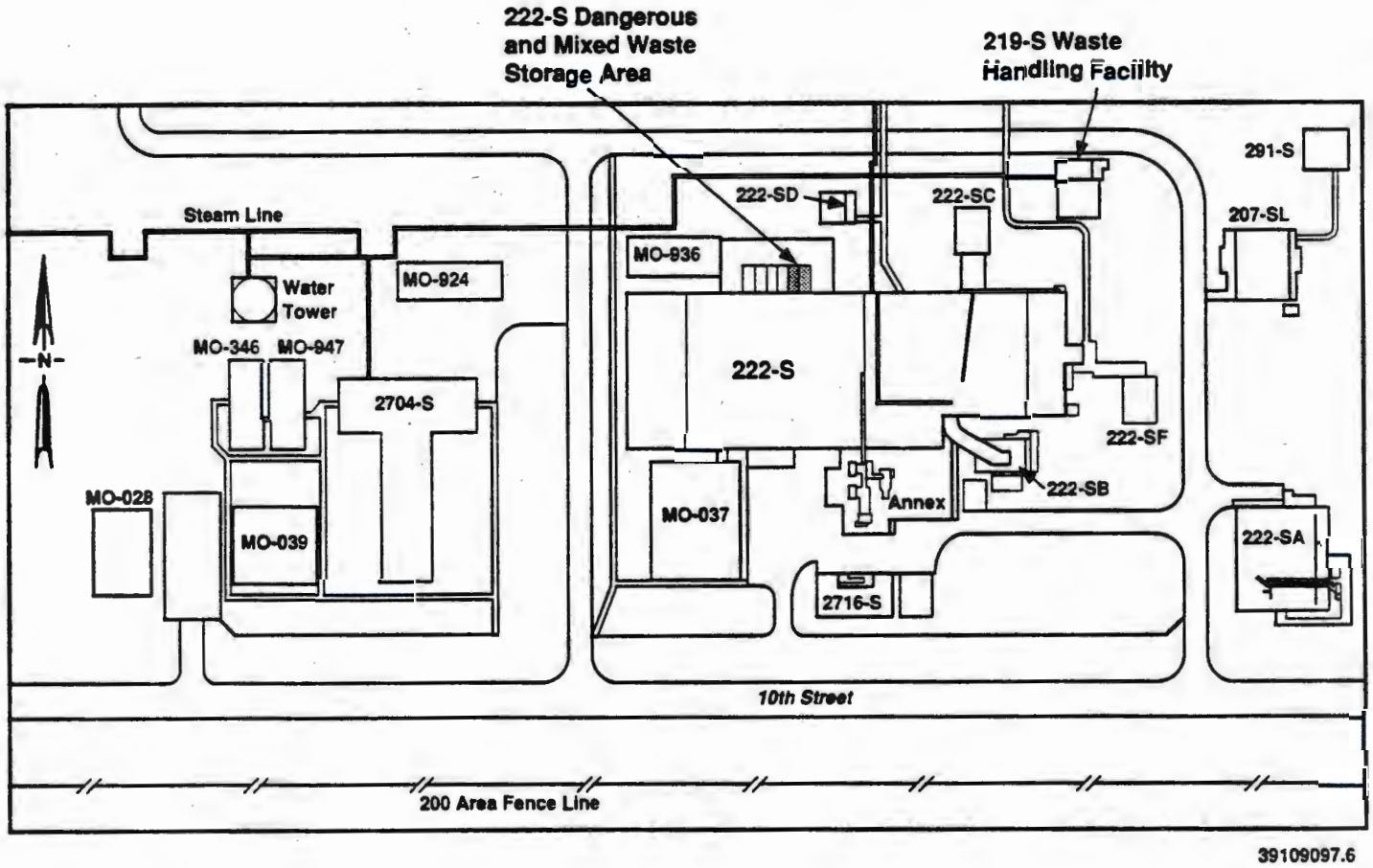

Figure 2-2. 222-S Laboratory Complex.

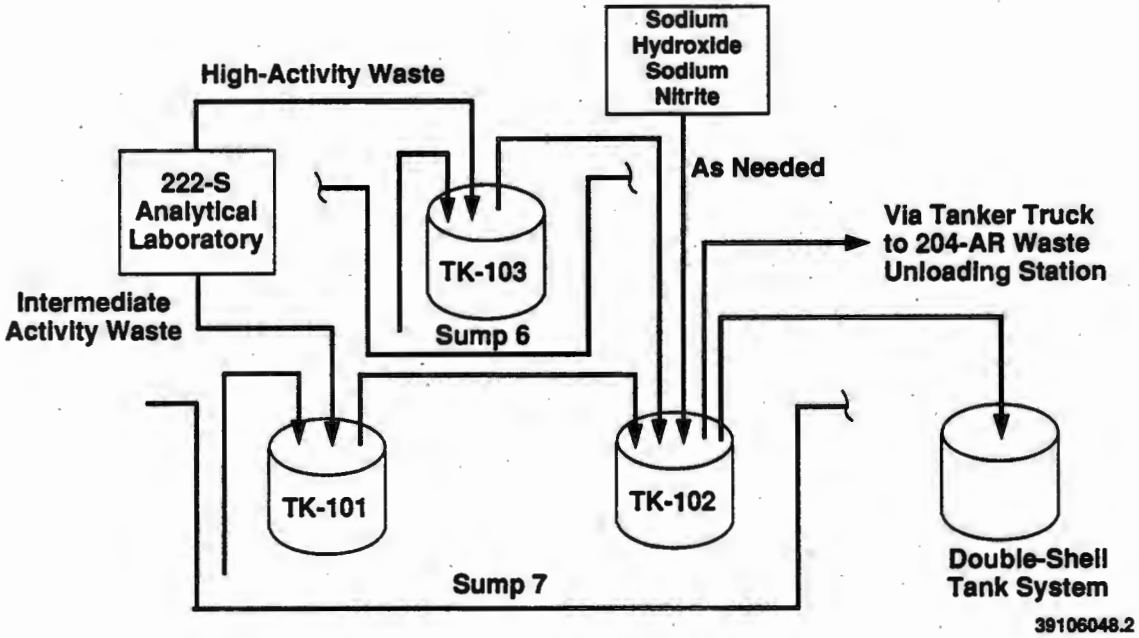

Figure 2-3. Schematic of the 219-S Waste Handling Facility.

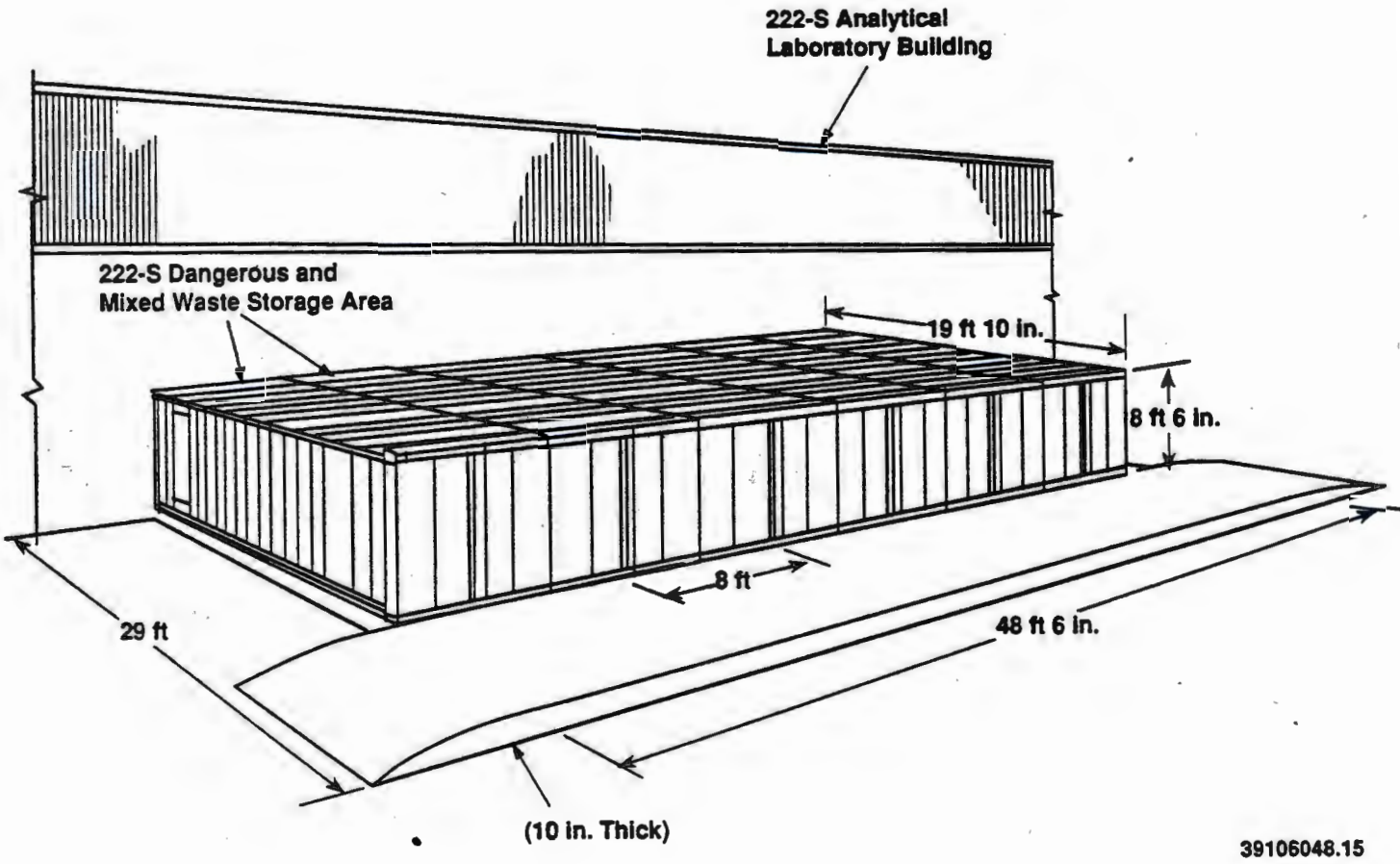

Figure 2-4. 222-S Dangerous and Mixed Waste Storage Area.

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(PHOTO TAKEN 1991)

Figure 2-5. Photograph of the 222-S Dangerous and Mixed Waste Storage Area - Doors Closed and Locked.

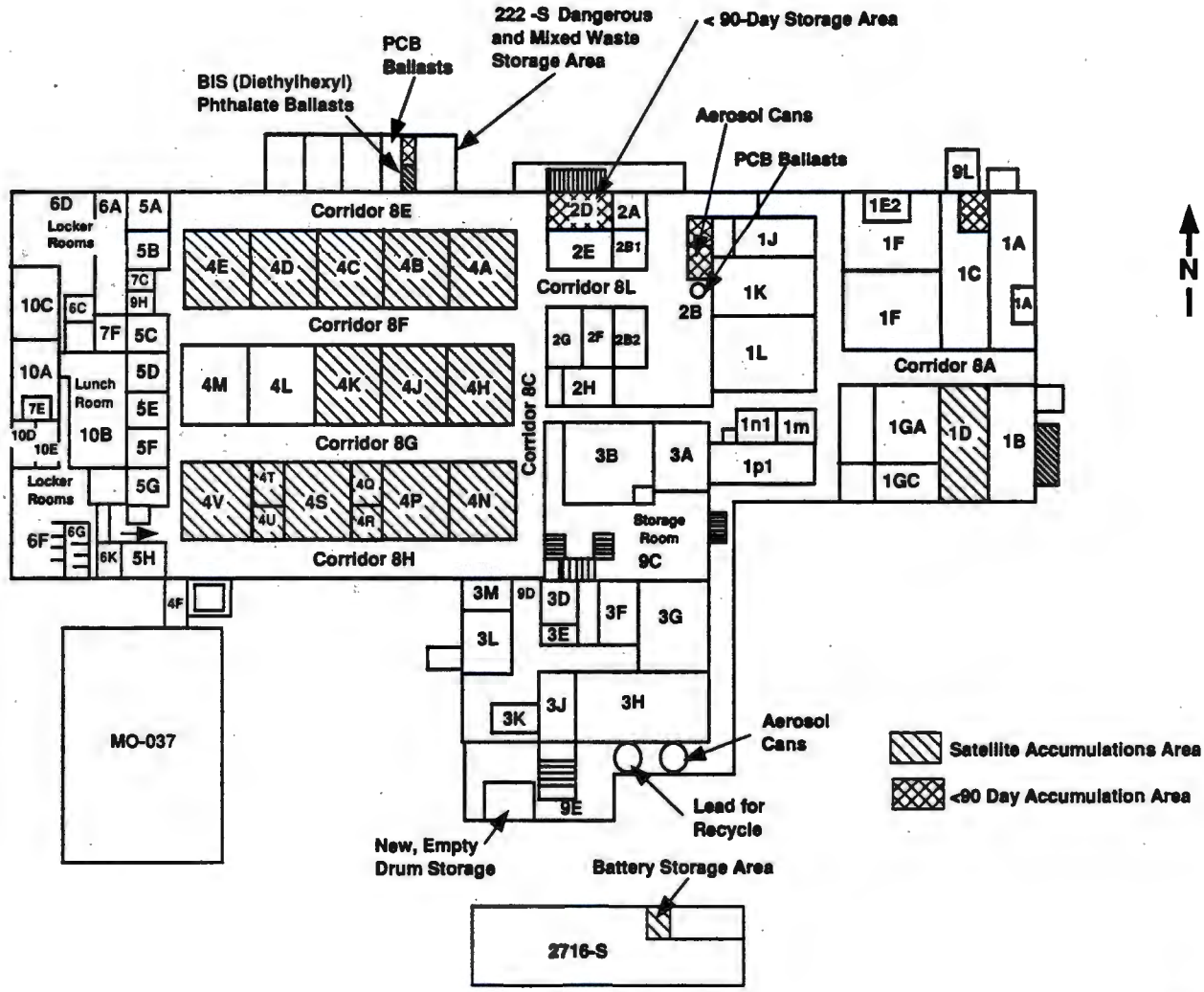

Figure 2-6. 222-S Analytical Laboratory First Floor Plan.

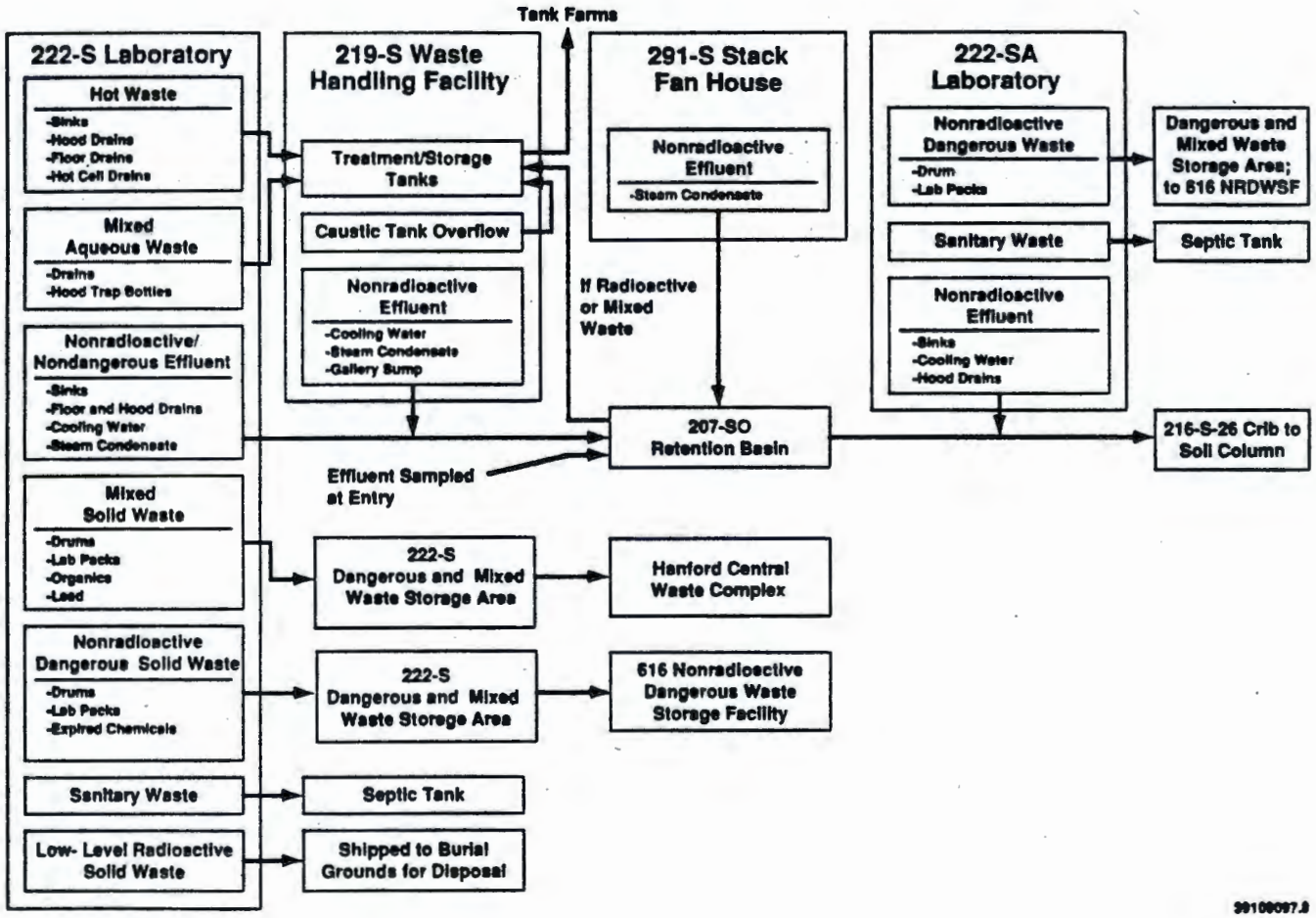

Figure 2-7. Solid and Liquid Waste Flow Diagram of 222-S Analytical Laboratory Facilities.

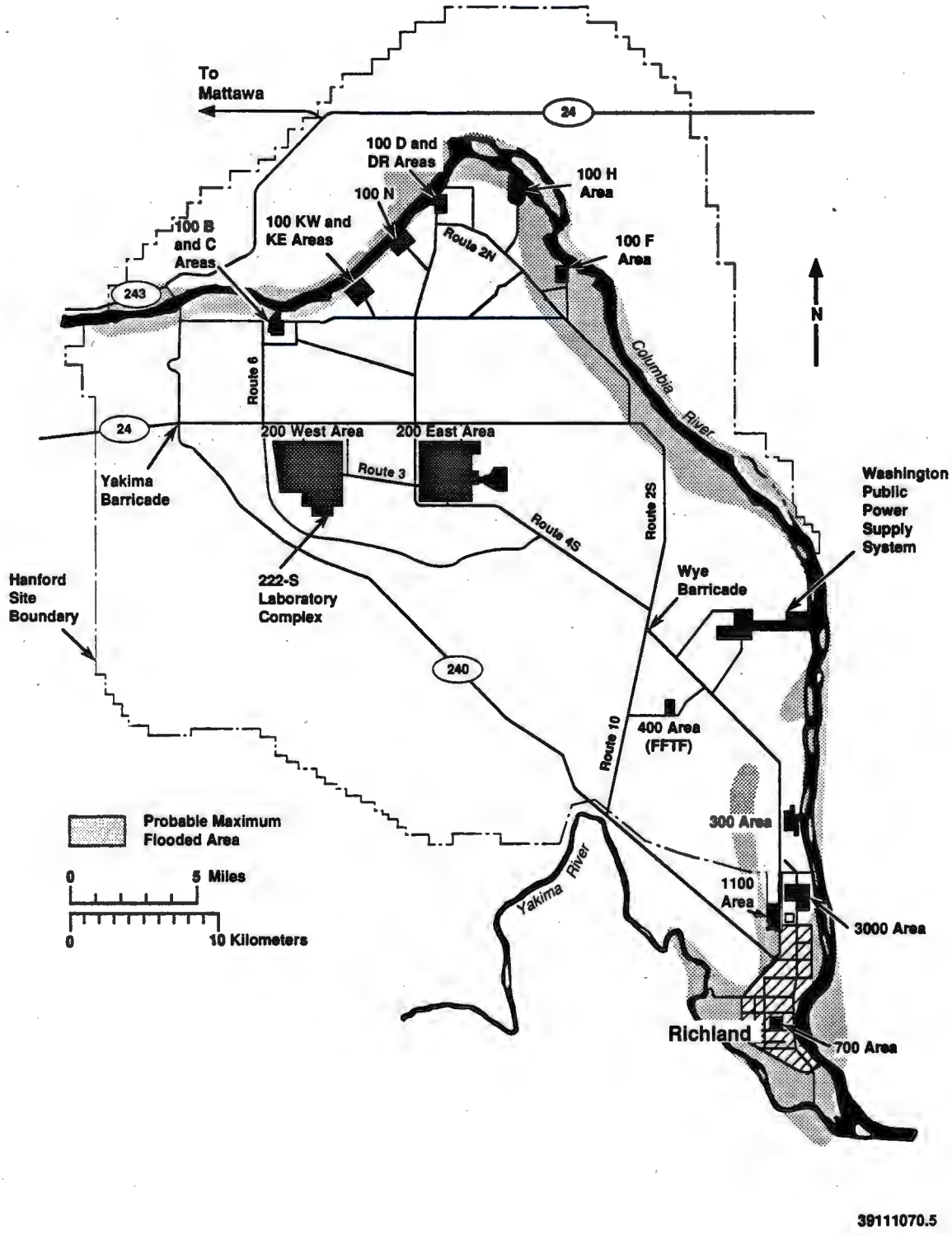

Figure 2-8. Columbia River Floodplain (probable maximum flood).

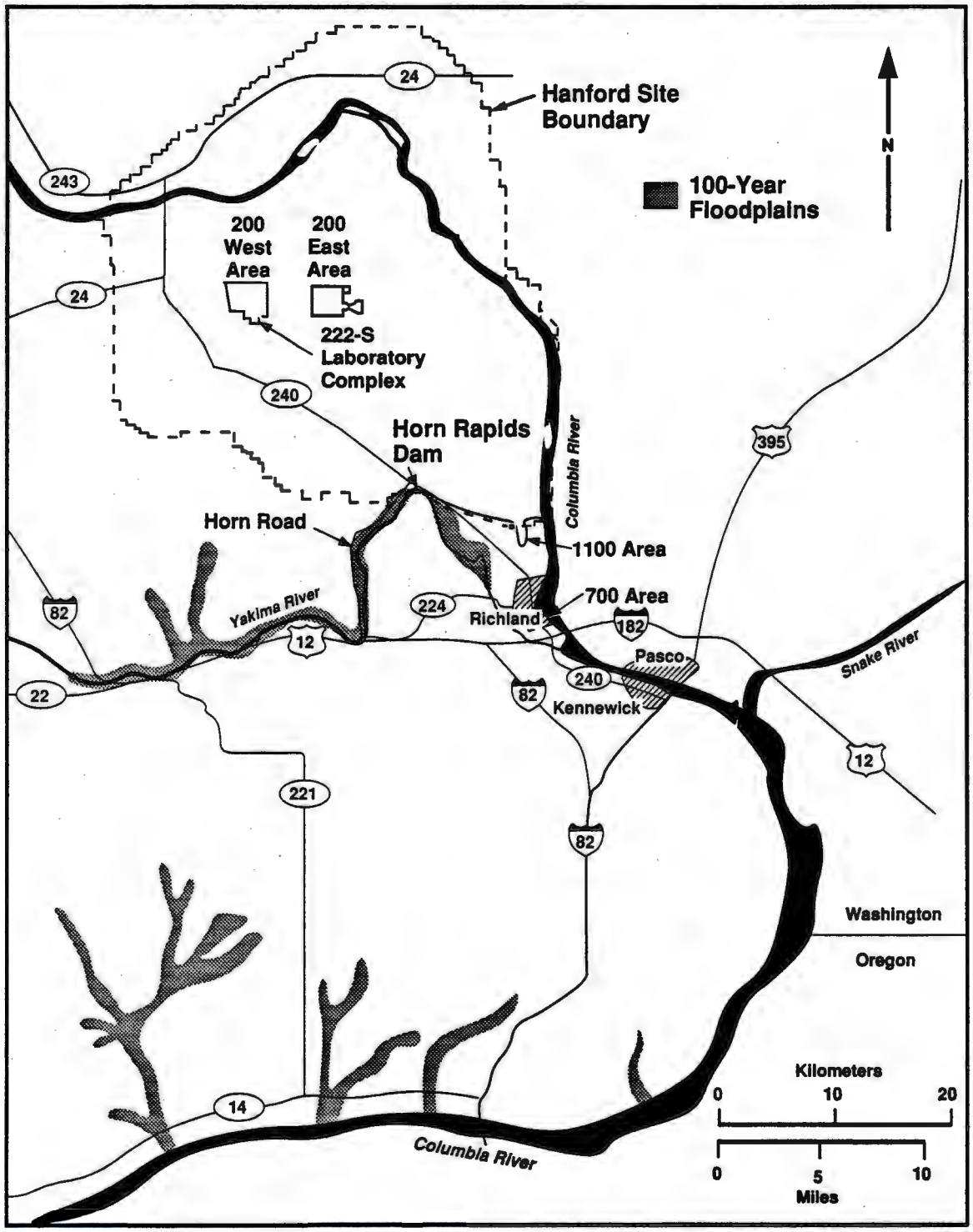

Figure 2-9. Yakima River Floodplain.

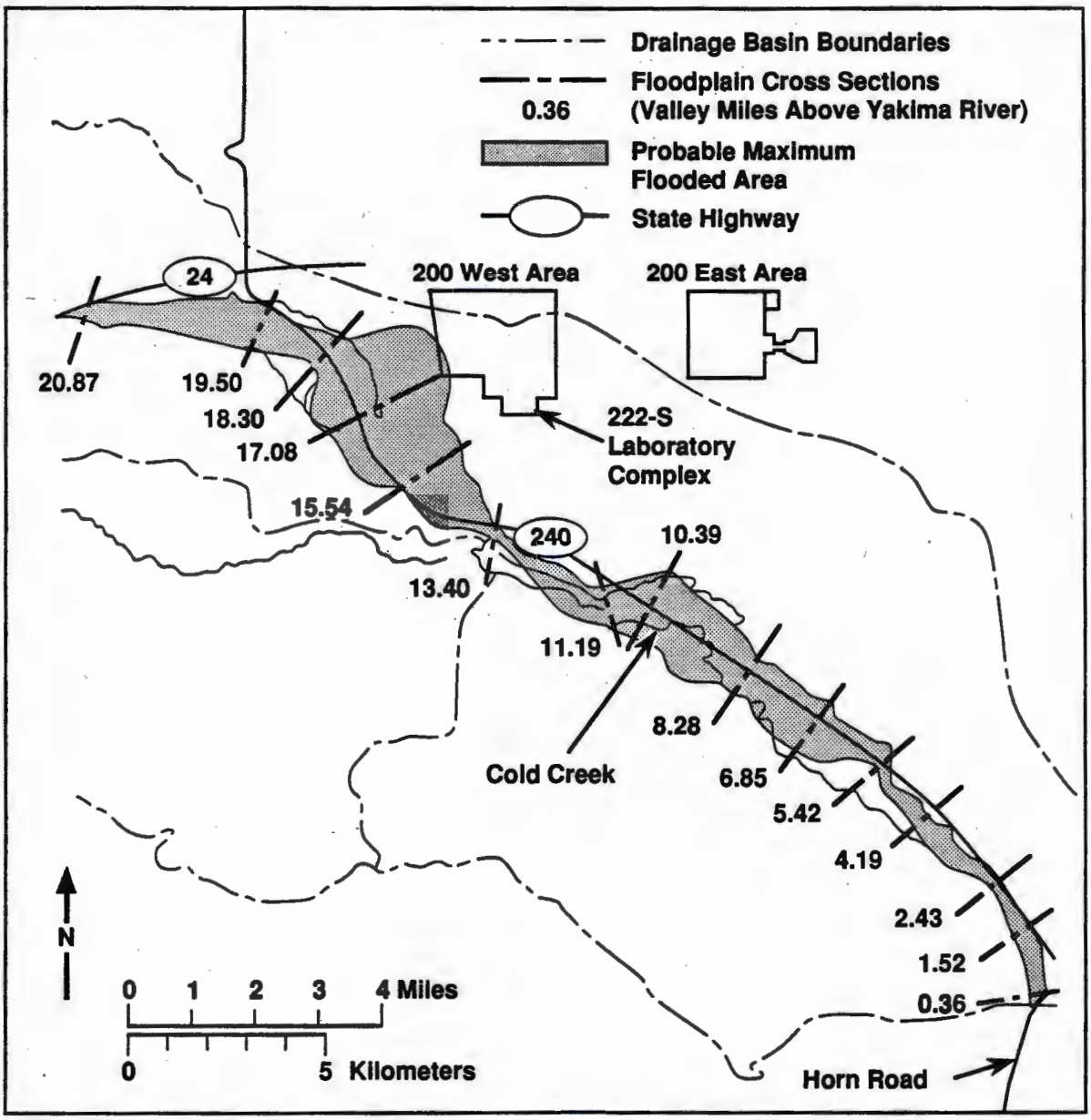

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Figure 2-10. Cold Creek Watershed Floodplain (probable maximum flood).

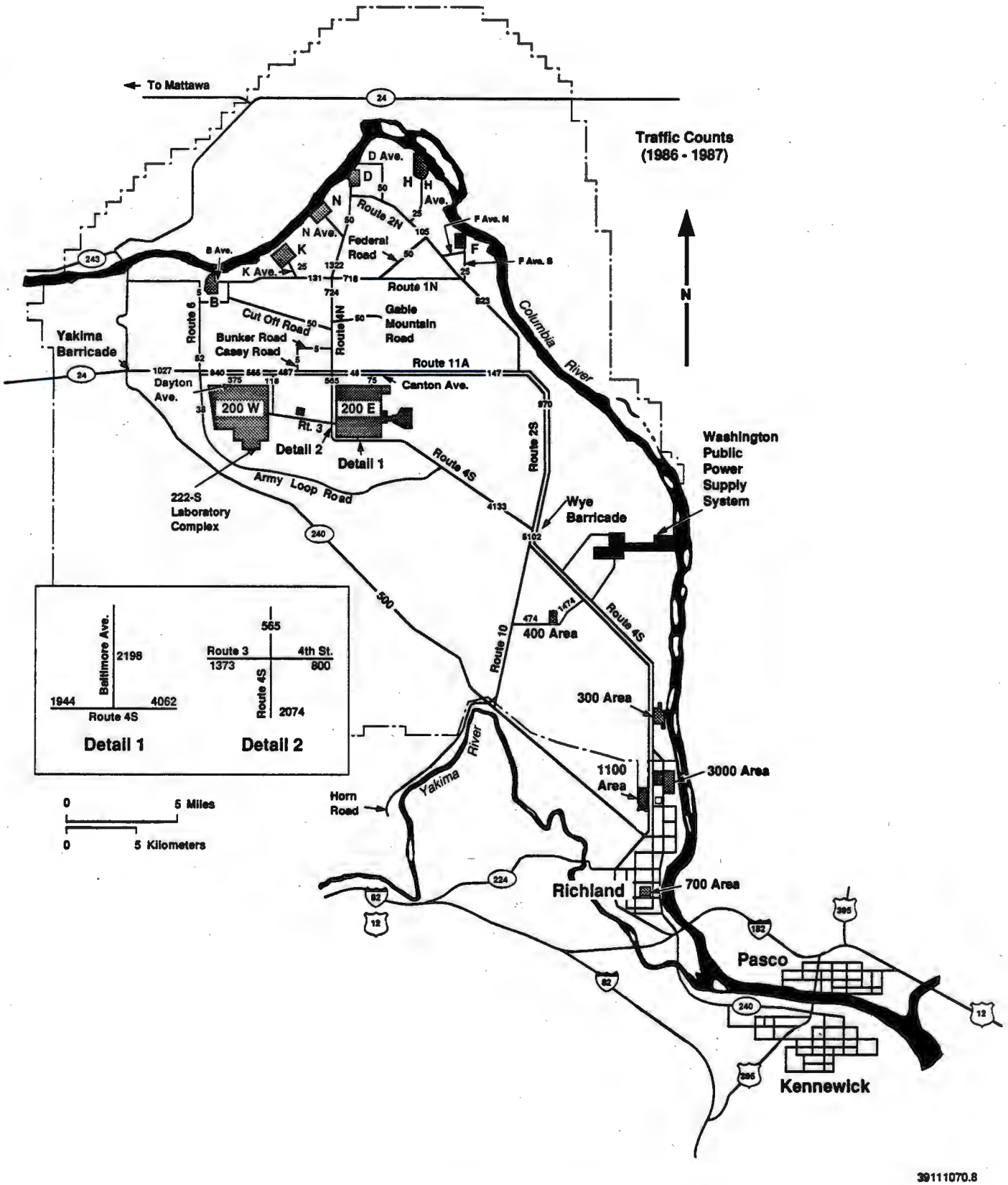

Figure 2-11. Estimated Traffic Volumes (vehicles per day).

OCCURRENCE REPORT

Facility/Personnel Information

1. OCCURRENCE REPORT NUMBER:

2. REPORT TYPE AND DATE: DATE TIME

[] Notification Report
[] 10-Day Report
[] Latest 10 Day Update
[] Final

(Name of Facility)

Balance of Plant
(Facility Function Involved)

(Name of Laboratory Site or Organization)

(Facility Manager/Designee) (Org. Code)

(Job Title) (Phone No.)

(Originator) (Title)

(Organization) (Phone No.)

3. OCCURRENCE CATEGORY: []

4. CONTRACTOR DIVISION OR PROJECT: []

5. DOE PROGRAM OFFICE: []

6. SYSTEM, BLDG., OR EQUIPMENT: 7. UNCI:8. PLANT AREA

Figure 2-12. Typical Occurrence Report. (sheet 1 of 4)

9. DATE AND TIME DISCOVERED:

10. DATE AND TIME CATEGORIZED:

DATE	TIME	PERSON NOTIFIED	ORG.

11. DOE-HQ NOTIFICATIONS:

12. OTHER NOTIFICATIONS:

13. SUBJECT OR TITLE OF OCCURRENCE:

14. NATURE OF OCCURRENCE: []

15. DESCRIPTION OF OCCURRENCE:

16. OPERATING CONDITIONS OF FACILITY AT TIME OF OCCURRENCE:

17. ACTIVITY CATEGORY: []

18. IMMEDIATE ACTIONS TAKEN AND RESULTS:

END OF NOTIFICATION REPORT

19. DIRECT CAUSE: []
20. CONTRIBUTING CAUSE(S): []
21. ROOT CAUSE: []

22. DESCRIPTION OF CAUSE:

23. EVALUATION: (By Facility Manager/Designee)

Figure 2-12. Typical Occurrence Report. (sheet 2 of 4)

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24. IS FURTHER EVALUATION REQUIRED? [] Yes [] No
IF YES, BEFORE FURTHER OPERATION? [] Yes [] No
BY WHOM:
BY WHEN:

25. CORRECTIVE ACTIONS:

TARGET COMPLETION DATE: COMPLETION DATE:

26. IMPACT ON ENVIRONMENT, SAFETY AND HEALTH:

27. PROGRAMMATIC IMPACT:

28. IMPACT UPON CODES AND STANDARDS:

29. FINAL EVALUATIONS AND LESSONS LEARNED:

30. SIMILAR OCCURRENCE REPORT NUMBERS:

31. DOE FACILITY REPRESENTATIVE INPUT:

32. DOE FACILITY REPRESENTATIVE NAME AND POSITION:

APPROVED BY: _____

Balance of Plant Facility Manager Signature Approval required for all 10-Day and 10-Day Update Reports.

Figure 2-12. Typical Occurrence Report. (sheet 3 of 4)

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OCCURRENCE REPORT NUMBER:

OCCURRENCE REPORT TYPE:

OCCURRENCE REPORT DATE:

33. QUEST SUBJECT CODE:

34. QUEST CONTRIBUTING FACTOR CODE:

35. QUEST ROOT CAUSE CODE:

36. PRIORITY/SEVERITY CATEGORY:

37. FACILITY MANAGERS ORGANIZATION CODE:

38. SIGNATURES:

Approved by: _____ Date: _____
Facility Manager

Reviewed by: _____ Date: _____
Impacted Oversight Organization

Reviewed by: _____ Date: _____
Impacted Oversight Organization

Reviewed by: _____ Date: _____
Impacted Oversight Organization

Reviewed by: _____ Date: _____
ADC/UCNI

Figure 2-12. Typical Occurrence Report. (sheet 4 of 4)

Table 2-1. 219-S Waste Handling Facility Equipment Description.

Equipment	Description
Tank 101	SS*; 4,000-gallon (15,142-liter) capacity; 3,600-gallon (13,627-liter) working volume High-level alarm = 3,560 gallons (13,476 liters)
Tank 102	SS; 4,000-gallon (15,142-liter) capacity; 3,600-gallon (13,627-liter) working volume High-level alarm = 3,560 gallons (13,476 liters)
Tank 103	SS; 1,500-gallon (5,678-liter) capacity; 1,250-gallon (4,732-liter) working volume High-level alarm = 1,335 gallons (5,054 liters)
Tank 201	CS**; 700-gallon (2,650-liter) capacity
Sump 6	18 inches by 18 inches by 10 inches (46 centimeters by 46 centimeters by 25 centimeters); reinforced concrete; 14-gallon (53-liter) volume High-level alarm = 6 inches (15 centimeters)
Sump 7	12 inches by 12 inches by 12 inches (31 centimeters by 31 centimeters by 31 centimeters); reinforced concrete; 7.6-gallon (29-liter) volume High-level alarm = 6 inches (15 centimeters)
Steam jets	75 gallons per minute (284 liters per minute) capacity 20 gallons per minute (16 liters per minute) capacity in Sumps 6 and 7
Tank 105	SS; demister/deentrainer

*SS: Stainless steel
**CS: Carbon steel

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3.0 WASTE CHARACTERISTICS [C]

This chapter provides information on the chemical, biological, and physical characteristics of the waste treated and stored in the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area within the 222-S Complex, including waste descriptions, designations, and a waste analysis plan for each unit.

3.1 CHEMICAL, BIOLOGICAL, AND PHYSICAL ANALYSIS [C-1]

This section describes the chemical, biological, and physical characteristics of the waste generated by the 222-S Complex and transferred to the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area. This discussion includes the following:

- A description of the waste types, including an estimate of the chemical and physical composition from representative samples of the waste

- A description of the characteristics of the dangerous waste and a basis for the designation of the waste as dangerous.

Additional information on sampling methods is provided in the 219-S Waste Handling Facility Waste Analysis Plan (Appendix 3A) and the 222-S Dangerous and Mixed Waste Storage Area Waste Analysis Plan (Appendix 3B).

3.1.1 219-S Waste Handling Facility

The 219-S Waste Handling Facility, consisting of tanks 101, 102, and 103, receives low-level aqueous mixed waste that is generated by the 222-S Analytical Laboratory and is either intermediate- or high-activity waste (defined respectively as exhibiting a radiation level of less than 10 millirems per hour, or between 10 and 100 millirems per hour). All low-level mixed waste received by the 219-S Waste Handling Facility is aqueous. Liquid organic waste is stored at the 222-S Dangerous and Mixed Waste Storage Area (Section 3.1.2). The 219-S Waste Handling Facility treats and stores aqueous mixed waste before transfer of the waste to the Double-Shell Tank System. The waste is designated as dangerous primarily due to the waste characteristic of corrosivity. The following paragraphs describe the source of the waste treated and stored in tanks 101, 102, and 103. Specific information on the waste in the 219-S Waste Handling Facility tank system is provided in Section 3.1.4. Process information is provided in Chapter 4.0, Section 4.2.

Waste treated and stored at the 219-S Waste Handling Facility is generated from activities within the 222-S Analytical Laboratory. Currently, the 222-S Analytical Laboratory conducts process support analyses, environmental analyses, and research and development activities. Typical waste includes unused portions of process samples, inorganic nonlisted

chemicals, decontamination solutions of nitric acid, and aqueous mixed waste generated inside laboratory hoods during sample analysis. Laboratory personnel classify waste as intermediate-activity or high-activity radioactive waste for disposal purposes. Liquid organic waste generated by the 222-S Analytical Laboratory is not accepted in the 219-S Waste Handling Facility tank system and is packaged separately for storage in the 222-S Dangerous and Mixed Waste Storage Area (Section 3.1.2.4). Detailed information on the waste treated and stored at the 219-S Waste Handling Facility is provided in Section 3.1.4.

The intermediate-activity aqueous mixed waste received at tank 101 is generated from laboratory operations that discharge to hot (i.e., radioactive) cell drains, laboratory sinks, and the inductively coupled plasma analyzer drains. The high-activity aqueous mixed waste received at tank 103 is generated from laboratory operations that discharge into hot cell drains, from the manipulator repair hood, from the atomic absorption spectrophotometer, from the aspirators of the decontamination hood, and from the tunnel sumps T-4, T-7, and T-8. A floor plan showing the relative locations of rooms within the 222-S Analytical Laboratory is shown in Chapter 2.0, Figure 2-6. Detailed drawings of the drain systems are provided in Appendix 4A.

Waste from tanks 101 and 103 are transferred on a batch basis to tank 102 for treatment. The contents of tank 102 are transferred to the Double-Shell Tank System. A waste flow diagram is shown in Chapter 2.0, Figure 2-7. Refer to Section 3.1.4 for additional information.

Waste identification occurs in the generating laboratory where specific analytical methods are conducted in assigned hoods. Waste is collected in the laboratory hoods in approved accumulation bottles. Some bottles are maintained on vacuum during waste collection. Each hood is subject to a specific standard analytical method that requires use of the same chemicals. The chemicals transferred to collection bottles are characterized through (1) knowledge of the standard analytical methods and the chemicals known to be used in the methods or (2) information recorded on an inventory sheet during waste collection from multiple methods or activities.

When full, aqueous collection bottles approved for discharge to the 219-S Waste Handling Facility are taken to a hood drain that discharges into the storage tanks (tanks 101 and 103). Waste that has less than 10 millirems per hour of activity (intermediate-activity waste) is decanted to tank 101, and waste that has greater than 10 millirems per hour of activity (high-activity waste) is jetted to tank 103 by way of hood drain lines. All drain lines and underground transfer pipelines are flushed with water following transfer of waste to tanks 101 and 103.

Waste collected in tanks 101 and 103 is transferred to tank 102 for treatment before being discharged to the Double-Shell Tank System. Because the aqueous mixed waste from the two tanks (tanks 101 and 103) is acidic (pH of less than 2), the acidic mixed waste is treated in tank 102 to raise the pH to greater than 12 and the nitrite content to greater than 600 parts per million to protect the Double-Shell Tank System and to ensure

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compatibility of the waste that is already in storage. The treatment process is described in detail in Chapter 4.0, Section 4.2.

3.1.2 222-S Dangerous and Mixed Waste Storage Area

This section provides information on the chemical, biological, and physical characteristics of the waste stored at the 222-S Dangerous and Mixed Waste Storage Area. The waste received at the 222-S Dangerous and Mixed Waste Storage Area consists of mixed waste and nonradioactive dangerous waste, (described in Sections 3.1.2.1 through 3.1.2.6) generated from daily laboratory operations. Waste from other TSD units on the Hanford Facility is not accepted at the 222-S Dangerous and Mixed Waste Storage Area. The discussion of waste characteristics is based on a review of 222-S Complex generating records.

In accordance with WAC 173-303-070, waste generating units are responsible for identifying and providing waste designations. The hazardous materials coordinator for the 222-S Complex and the Solid Waste Engineering organization perform waste designation based on generating unit information, identify proper packaging methods, and determine waste handling methods.

All records providing a description of the waste, dangerous characteristics, basis for waste designation, and laboratory reports are maintained by the 222-S Complex hazardous materials coordinator. The laboratory reports include chemical, biological, and physical sample analyses.

Table 3-1 presents a summary of the types of waste accepted for storage. As shown in Table 3-1, waste accepted at the 222-S Dangerous and Mixed Waste Storage Area is characterized as 'F', 'D', 'WT', 'WP', or 'WC' waste using product information, material safety data sheets, and laboratory analysis (DOE-RL 1988b; WHC 1990b). The potential exists for the 222-S Analytical Laboratory and the 222-SA Standards Laboratory to generate discarded chemical products ('U' and 'P' waste codes). However, any discarded chemical products are stored for less than 90 days and are transported to either the Hanford Central Waste Complex or the 616 Nonradioactive Dangerous Waste Storage Facility.

Waste generated from operations of the 222-S Analytical and 222-SA Standards Laboratories and stored in the 222-S Dangerous and Mixed Waste Storage Area consists of the following waste categories, as described in the following sections:

- Lead waste
- Chemicals from the 222-SA Standards Laboratory
- Nonradioactive dangerous waste
- Liquid organic waste

- Occasional waste

- Returned samples.

3.1.2.1 Lead Waste. Lead waste consists of radioactively contaminated lead shielding, scrap lead, and flat lead sheets. A smear of the lead is taken and tested for radioactivity (Figure 3-1). If measured radioactivity is less than 50 picocuries per gram, the lead is designated as 'excess lead' and transferred to an onsite recycling area. If radioactivity is greater than 50 picocuries per gram, the lead is designated an extremely hazardous mixed waste (D008). During calendar year 1990, 4,224 pounds (1,920 kilograms) of lead waste were stored at the 222-S Dangerous and Mixed Waste Storage Area.

3.1.2.2 Chemicals from the 222-S Analytical Laboratory. The 222-S Analytical Laboratory maintains an inventory of chemicals used in analytical methods and research. As laboratory chemicals become outdated or off-specification, the chemicals are managed as a dangerous waste (Figure 3-2). These laboratory chemicals (both liquid and solid) are accumulated at the point of generation in the 222-S Analytical Laboratory in collection bottles or the original containers.

The chemicals comprising this waste are first segregated into a mixed waste category or a nonradioactive dangerous waste category based on the results of radiological screening (Figure 3-2). The portion of chemicals that are nonradioactive are managed in the same way as chemical waste from the 222-SA Standards Laboratory, as described in Section 3.1.2.3. Mixed waste containing radioactively contaminated laboratory chemicals, which are discarded or are off-specification and are not a part of the organic waste described in Section 3.1.2.4, are generated very infrequently. During calendar year 1990, discarded laboratory chemical mixed waste was not generated at the 222-S Complex.

Mixed waste from the 222-S Analytical Laboratory is regulated as a mixed dangerous waste or mixed extremely hazardous waste because individual waste chemicals could be classified as: (1) discarded chemical products (WAC 173-303-081); (2) toxic, persistent, or carcinogenic dangerous or extremely hazardous waste (WAC 173-303-101,-102,-103,-104); or (3) characteristic waste as defined in WAC 173-303-090. If any discarded chemical products ('U' and 'P' waste codes) are generated, the products will not be stored in the 222-S Dangerous and Mixed Waste Storage Area for more than 90 days.

3.1.2.3 Nonradioactive Dangerous Waste. Waste that is part of the nonradioactive waste includes laboratory chemicals from the 222-SA Standards Laboratory and nonradioactive off-specification chemicals from the 222-S Analytical Laboratory (Figure 3-3). Although the chemicals potentially comprising this waste are varied, small quantities of chemicals used in daily laboratory methods typically make up the majority of the waste. The quantity of nonradioactive dangerous waste stored in the 222-S Dangerous and Mixed Waste Storage Area throughout calendar year 1990 was 770 pounds (350 kilograms).

The chemical and physical characteristics of this waste can include the following:

- Solid or liquid
- Reactive with water
- Ignitable
- Reactive to form toxic gases
- Oxidizer
- Cyanide or sulfide bearing
- Corrosive
- Toxic.

This waste is regulated as dangerous waste because individual waste chemicals might exhibit the properties listed and might be classified as: (1) discarded chemical products (WAC 173-303-081); (2) toxic, persistent, or carcinogenic dangerous or extremely hazardous waste (WAC 173-303-101, -102, -103, -104); or (3) characteristic waste as defined in WAC 173-303-090. Discarded chemical products are generated infrequently (two waste codes, U080 and U133, were generated in calendar year 1990) and are transferred out of the 222-S Dangerous and Mixed Waste Storage Area in less than 90 days. Designation of waste is performed by the Solid Waste Engineering organization based on documentation such as a chemical waste disposal request submitted by the hazardous materials coordinator. These methods are further described in Appendix 3B.

3.1.2.4 Liquid Organic Waste. Liquid organic waste results from radiochemical separation methods and organic analyses of volatile, semivolatile, pesticide, and polychlorinated biphenyl compounds during daily laboratory operations. This liquid organic waste includes liquid scintillation cocktails, consisting primarily of 1,2,4-trimethylbenzene (pseudocumene); discarded environmental and process characterization samples; and outdated or off-specification chemical reagents (Appendix 3C).

Organic analytical capabilities currently are being expanded to include volatile and semivolatile organic compounds, pesticides, and polychlorinated biphenyl analyses. Solvents, reagents, and standards used for these methods are being added to the current inventories of the 222-S Complex. As with other analytical methods, these analyses are performed in dedicated fume hoods within dedicated satellite accumulation areas. Waste is designated by accounting for all contributions, including spent organic solvents (F-series listed waste) where applicable.

The liquid organic waste stream contains both nonradioactive and radioactive organic components (Figure 3-4). The nonradioactive organic components (standards and solutions from the 222-SA Standards Laboratory) are

grouped with the nonradioactive waste described in Section 3.1.2.3. The radioactive organic components, primarily scintillation liquids and spent samples (unused samples are returned to the generating unit for disposition), totaled 836 pounds (380 kilograms) during calendar year 1990.

Some of the organic solvents used within the 222-S Complex are F-series listed dangerous waste as defined in WAC 173-303-082. Additionally, components of this waste might be designated as toxic, persistent, or carcinogenic dangerous or extremely hazardous waste in accordance with WAC 173-303-101, -102, -103, -104. Finally, organic solvents could be ignitable, and as such, could be designated D001 (WAC 173-303-090). However, this waste is not corrosive (D002) or reactive (D003) as defined in WAC 173-303-090. In some cases, the concentrations of organic constituents might render the liquid organic waste toxicity characteristic (TC) toxic as defined in WAC 173-303-090(8). All waste designation is performed by the Solid Waste Engineering organization upon receipt of waste characterization documentation supplied by the hazardous materials coordinator.

3.1.2.5 Occasional Waste. Occasional waste includes mixed and nonradioactive dangerous waste such as rags, paper towels, disposable pipettes, contaminated gloves, and other miscellaneous materials associated with the performance of analytical methods. This type of waste is collected separately, segregated from nondangerous dry waste, and managed as an F-series listed dangerous waste (WAC 173-303-082).

A second example of occasional waste is waste oil generated from maintenance of vacuum pump systems, entrainer units, elevator blower fans, and continuous oilers. This oil is batched, sampled, and analyzed. In calendar year 1990, one 55-gallon (208-liter) drum containing 352 pounds (160 kilograms) of waste oil from elevator maintenance was packaged by hazardous materials personnel and was stored in the 222-S Dangerous and Mixed Waste Storage Area before transfer for disposal. Sample analysis indicated that lead, cadmium, and polychlorinated biphenyls were present in the oil.

Other examples of occasional waste generated in calendar year 1990 are asphalt contaminated with spilled potassium hydroxide [2,332 pounds (1,060 kilograms)]; mercury-contaminated materials such as bulbs, absorbents, and thermometers [110 pounds (50 kilograms)]; and copying machine toner and materials associated with cleanup of a toner spill [55 pounds (25 kilograms)].

Occasional waste is analyzed and designated in accordance with WAC 173-303-070. Waste that is not permitted for storage in the 222-S Dangerous and Mixed Waste Storage Area is not kept at the 222-S Complex for more than 90 days, in accordance with WAC 173-303-200.

3.1.2.6 Returned Samples. Environmental and process samples collected throughout the Hanford Facility could be sent offsite for laboratory analysis. The unused portions of the samples are returned by the offsite laboratory to the generator (the Hanford Facility). As described in WAC 173-303-071, returned samples are considered waste and subject to all reporting, handling, and disposal regulations. All samples submitted for offsite analysis are

currently returned to the 222-S Complex for segregation and temporary storage before final disposition.

Returned samples are designated in accordance with WAC 173-303-070 using the results of laboratory sample analysis and process knowledge to identify dangerous constituents. Waste that is not permitted for storage in the 222-S Dangerous and Mixed Waste Storage Area is not kept at the 222-S Complex for more than 90 days, in accordance with WAC 173-303-200.

3.1.3 Containerized Waste [C-1a]

The 222-S Dangerous and Mixed Waste Storage Area structure incorporates a secondary containment system as described in Chapter 4.0, Section 4.1.1.4. Therefore, the requirements of this section are not applicable to the 222-S Dangerous and Mixed Waste Storage Area.

3.1.4 Waste in Tank Systems [C-1b]

A detailed description of the 219-S Waste Handling Facility and associated processes is provided in Chapter 4.0, Section 4.2. Information is summarized in this section. The 219-S Waste Handling Facility is an belowground concrete vault divided into two cells measuring 27 feet (8.1 meters) by 25.5 feet (7.7 meters). The vault contains three stainless steel tanks (tanks 101, 102, and 103), and a deentrainer or demister tank (tank 105). Tanks 101 and 103 store intermediate- and high-activity aqueous mixed waste, respectively.

The waste is transferred to the storage tanks by way of 4-inch (10.2-centimeter) stainless steel pipelines running underground from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility. The 4-inch (10.2-centimeter) lines are encased in concrete pipe trenches from the point of exit at the 222-S Analytical Laboratory to the point of entry into the 219-S Waste Handling Facility tank vault. After waste is discharged into the lines from waste collection bottles, the lines are flushed with water.

The 219-S Waste Handling Facility belowground concrete vault is attached to a pipe trench and operating gallery, a concrete-walled sample gallery that accesses tanks 102 and 103, and an aboveground 22-foot (6.7-meter) by 13-foot (3.96-meter) transite building. Tanks 101, 102, and 103 are vented by an electrical exhaust fan through deentrainer tank 105 and a HEPA filter into the atmosphere by way of the 296-S-16 Stack (Section 3.1.4.3).

The estimated quantity of mixed waste treated at the 219-S Waste Handling Facility is 49,000 gallons (185,484 liters) per year. This quantity is expected to increase over the next 25 years, reaching a maximum waste volume of 75,000 gallons (283,905 liters) in the year 2015 (WHC 1990b). This increase in waste volume will result in more frequent batch transfers of treated waste to the Double-Shell Tank System. Waste stored in tanks 101 and 103 is steam jetted to tank 102 for treatment with sodium hydroxide and sodium nitrite (Chapter 2.0, Figure 2-7). Treated waste in tank 102 is transferred

to the Double-Shell Tank System. Normal working volumes for tanks 101, 102, and 103 are 3,600 gallons (13,630 liters), 3,600 gallons (13,630 liters), and 1,250 gallons (4,700 liters), respectively. Additional process information is provided in Chapter 4.0, Section 4.2. Characterization information on the waste transferred to the tanks is provided in the following section.

3.1.4.1 Waste Characterization. The chemical composition of waste treated and stored at the 219-S Waste Handling Facility is based on process knowledge and analytical results. Samples are collected from tank 102 to characterize the waste and to determine quantities of chemical additives for treatment. Constituents from one batch sample are shown in Table 3-2. Aqueous mixed waste treated in tank 102 is primarily water and nitric acid, with small amounts of inorganic cations, inorganic anions, small amounts of organic constituents (F003 and F005) and, finally, low-molecular-weight alcohols from laboratory glassware cleaning. The aqueous stream contains quantities of nitric acid (D002) before treatment, and sodium hydroxide (D002) and sodium nitrite (WT01) following treatment. Other sources of dangerous waste constituents include decontamination waste from lead-shielded sample carriers (D008), listed (F003 and F005) characterization samples from the Single-Shell Tank and Double-Shell Tank Systems, and inorganic laboratory standards containing arsenic (D004), barium (D005), cadmium (D006), chromium (D007), lead (D008), mercury (D009), selenium (D010), and silver (D011). The basis for designating this waste as dangerous is described in the following section. Table 3-3 summarizes these discussions.

3.1.4.2 Waste Designation. The 219-S Waste Handling Facility mixed waste is designated as toxic, listed, and as a characteristic dangerous mixed waste according to WAC 173-303-070. Table 3-2 summarizes a typical batch designation of this waste.

Aqueous mixed waste treated in tank 102 is a dangerous waste primarily due to the waste characteristic of corrosivity. The presence of sodium nitrite causes the waste to be designated a toxic mixture (WT01) under Ecology regulations (WAC 173-303-104). The addition of sodium nitrite is required to protect the double-shell tanks from corrosion. The minute quantities of organic waste in the aqueous mixed waste do not contribute to the toxicity of the dangerous waste mixture.

Waste is designated using the method outlined in WAC 173-303-070. The waste categories considered include the following:

- Discarded chemical products
- Dangerous waste sources
- Infectious dangerous waste
- Dangerous waste mixtures
- Dangerous waste characteristics.

Each of these categories is discussed in the following sections with respect to the waste managed in the 219-S Waste Handling Facility tanks.

3.1.4.2.1 Discarded Chemical Products. The first category for waste designation is comparison of the waste constituents to the "Discarded Chemical Products List" (WAC 173-303-9903). The 222-S Analytical Laboratory contains many chemicals that are needed to perform laboratory analyses. When chemicals become outdated or off-specification, the chemicals are labpacked and removed from the laboratory as waste. No pure chemical products appearing on the "Discarded Chemical Products List" are discarded to the 219-S Waste Handling Facility. Administrative controls, personnel training, and operating methods ensure that such discharges are prevented. Discarded chemicals are managed in the 222-S Dangerous and Mixed Waste Storage Area, as discussed in Section 3.1.2.2.

3.1.4.2.2 Dangerous Waste Sources. The second category for waste designation is comparison of the waste sources to the "Dangerous Waste Sources List" (WAC 173-303-9904). The waste is designated as F003 and F005 from the introduction of two sources into the 219-S Waste Handling Facility. The first source is Double-Shell Tank System characterization samples containing hexone. The double-shell tank samples are the only source contributing to the F005 designation. The second source is xylene and ethylbenzene from organic and aqueous phase separations inside laboratory hoods during liquid-liquid extractions. Ethylbenzene is an impurity in xylene reagents and is not listed on the 222-S Analytical Laboratory chemical inventory. Although the 222-S Analytical Laboratory uses many solvents that are necessary to perform laboratory analyses, laboratory solvents are not discharged into the 219-S Waste Handling Facility. Administrative controls, personnel training, and operating methods prevent the discharge of solvents to the 219-S Waste Handling Facility. All liquid organic solutions are labpacked and stored in the 222-S Dangerous and Mixed Waste Storage Area, as discussed in Section 3.1.2.

3.1.4.2.3 Infectious Dangerous Waste. The third category for waste designation is "Infectious Dangerous Wastes" (WAC 173-303-083). As of yet, neither Ecology nor the EPA have incorporated any language for regulation of infectious dangerous waste. Urine samples are received within the 222-S Complex for radioactivity determination. It is not known whether urine will be designated as an infectious waste. When Ecology or EPA establishes requirements, these samples will be reviewed for appropriate designation and management practice.

3.1.4.2.4 Dangerous Waste Mixtures. The fourth category for waste designation is "Dangerous Waste Mixtures" (WAC 173-303-084). Tank 102 is known to have constituents that are identified in 40 CFR 264, EPA Spill Table 302, and in the *Registry of Toxic Effects of Chemical Substances* (NIOSH 1990). Toxicity, persistence, and carcinogenicity are the three criteria considered in dangerous waste mixture designation, as discussed in the following sections.

3.1.4.2.4.1 Toxicity. To determine tank 102 waste toxicity, the following assumption was made. Cations and anions appearing in the waste were

conservatively paired based on chemicals that are added for waste treatment and chemicals that are used frequently in the laboratory for analysis (e.g., sodium hydroxide and sodium nitrite). Laboratory analyses of the waste from tank 102 are reported as cations and anions in solution, and specific compound analyses are not identified. The compounds formed from a batch analysis and the concentrations of the compounds are reported in Table 3-4. The equivalent concentration is calculated from the weight percent values using the equation given in WAC 173-303-084(5)(b). Using a waste batch of 3,350 gallons (12,681 liters) or 28,600 pounds (12,970 kilograms) and the dangerous waste mixtures graph in WAC 173-303-9906, results indicate that tank 102 waste is a toxic, extremely hazardous waste (WT01).

3.1.4.2.4.2 Persistence. The 222-S Analytical Laboratory does not discharge any persistent dangerous waste to the 219-S Waste Handling Facility. Halogenated hydrocarbons are labpacked for storage in the 222-S Dangerous and Mixed Waste Storage Area and eventual disposal. The 222-S Analytical Laboratory does not use, treat, store, or dispose of polycyclic aromatic hydrocarbons. Therefore, the waste managed at the 219-S Waste Handling Facility is not designated a persistent dangerous waste mixture.

3.1.4.2.4.3 Carcinogenicity. The third category in designating a dangerous waste mixture relates to positive or suspected carcinogens. Each of the constituents listed in Table 3-5 was compared to the *Registry of Toxic Effects of Chemical Substances* (NIOSH 1990). No substances were identified as positive or suspected carcinogens for humans or animals as defined by the International Agency for Research on Cancer. Therefore, this waste is not designated a carcinogenic dangerous waste mixture.

3.1.4.2.5 Dangerous Waste Characteristics. The fifth category for waste designation is "Dangerous Waste Characteristics" (WAC 173-303-090). The four characteristics, ignitability, corrosivity, reactivity, and toxicity, are discussed in the following sections.

3.1.4.2.5.1 Ignitability. Waste in the 219-S Waste Handling Facility does not meet any of the definitions of ignitability defined in WAC 173-303-090(5). The waste contains less than 24 percent alcohol by volume. The waste is not an oxidizer as defined in 49 CFR 173.151. The waste contains nitrates and nitrites. However, the solution concentration is less than 40 weight percent of combined anions listed in 49 CFR 173.151 and does not readily yield oxygen to support combustion of organic matter.

3.1.4.2.5.2 Corrosivity. The 219-S Waste Handling Facility aqueous mixed waste frequently has a pH of less than 2 before treatment, and could have a pH greater than 12.5 following addition of sodium hydroxide. Therefore, this waste is designated as corrosive (D002).

3.1.4.2.5.3 Reactivity. Waste in the 219-S Waste Handling Facility does not meet any of the definitions of reactivity defined in WAC 173-303-090 (7). The waste is not unstable, nor does it react violently with water, form an explosive mixture, or generate toxic gases. The waste is not explosive in any manner. Therefore, the waste is not designated a reactive waste.

3.1.4.2.5.4 Toxicity. Sample results have shown that the 219-S Waste Handling Facility aqueous mixed waste exhibits toxicity for lead (D008) and for mercury (D009). The 222-S Analytical Laboratory discharges expired aqueous mixed waste from inductively coupled plasma/atomic adsorption standards into the 219-S Waste Handling Facility. These standards contain regulated concentrations of arsenic (D004), barium (D005), cadmium (D006), chromium (D007), lead (D008), mercury (D009), selenium (D010), and silver (D011), which might be reflected in future sample results.

3.1.4.3 219-S-23 and 219-S-16 Stacks. The 219-S Waste Handling Facility has two sources of gaseous emissions. The 219-S-23 Stack vents the 219-S Waste Handling Facility sample gallery. The 219-S-16 Stack vents exhaust air from the tanks and vault. Each of these sources is described in this section. The 219-S Waste Handling Facility does not handle extremely hazardous waste that is acutely or chronically toxic by inhalation. Waste treatment through mixing and slow chemical addition, coupled with the ventilation system, prevents the generation and release of vapors, fumes, and other emissions to the air. Information specific to this process is provided in Chapter 4.0, Section 4.2.7.

3.1.4.3.1 296-S-23 Stack. The 296-S-23 Stack exhausts the sample gallery hood in the 219-S Waste Handling Facility, which is operated on an as-needed basis. The only source of dangerous or radioactive materials is the sample box in the 219-S Waste Handling Facility vault. The sample box contains liquid samples drawn from the tanks. The exhaust passes through a HEPA filter before discharging into the atmosphere. The 296-S-23 Stack is not monitored or sampled because of the low potential for contamination with radionuclides or dangerous chemicals.

3.1.4.3.2 296-S-16 Stack. The 296-S-16 Stack exhausts tanks 101, 102, and 103 and the belowground concrete vault in the 219-S Waste Handling Facility. The initial concentration of chemicals is low and is diluted further by the addition of large quantities of water used to flush waste transfer lines after transfer of radioactive material to the tanks. This water flush in the transfer lines is used to deter corrosion of the piping and not as a method of diluting the waste. The resulting liquid solution is 95 percent or more water. The concentration of toxic constituents is very low and should not contribute measurably to the gaseous flow. Theoretical emissions calculations (Chapter 4.0, Section 4.2.7.1.2) indicate that concentrations are below occupational exposure limits. Any evaporation that occurs is primarily water. A demister in the tank vault deentrains water droplets and aerosols (and any entrained contaminants) in the gaseous effluent. The exhaust air also passes through a HEPA filter to capture radionuclides before discharge into the atmosphere.

The exhaust gas discharged is monitored for radionuclides and analyzed weekly for total alpha and total beta activity. The calendar year 1989 air emissions are reported as: gross alpha less than 6.59×10^{-9} curies and gross beta of 3.22×10^{-8} curies (Brown et al. 1990). The process, exhaust system, and emission control devices used by the 219-S Waste Handling Facility are described in Chapter 4.0, Section 4.2.

3.1.5 Waste in Piles [C-1c]

Operation of the 222-S Complex does not involve the placement of dangerous waste in piles. Therefore, the requirements of WAC 173-303-660 are not applicable to the 222-S Complex.

3.1.6 Landfilled Wastes [C-1d]

Operation of the 222-S Complex does not involve the placement of dangerous waste in landfills. Therefore, the requirements of WAC-173-303-665 are not applicable to the 222-S Complex.

3.1.7 Wastes Incinerated and Wastes Used in Performance Tests [C-1e]

Operation of the 222-S Complex does not involve the incineration of dangerous waste or waste used in performance tests. Therefore, the requirements of WAC 173-303-670 are not applicable to the 222-S Complex.

3.1.8 Waste to be Land Treated [C-1f]

Operation of the 222-S Complex does not involve the land treatment of dangerous waste. Therefore, the requirements of WAC 173-303-655 are not applicable to the 222-S Complex.

3.2 WASTE ANALYSIS PLAN [C-2]

The waste analysis plans for the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area are provided as Appendix 3A and Appendix 3B, respectively. The plans describe actions used to comply with WAC 173-303 to characterize dangerous waste accepted at the 219-S Waste Handling Facility and at the 222-S Dangerous and Mixed Waste Storage Area before final disposition. Information on waste designation, sampling, and recordkeeping is included in the waste analysis plans.

3.3 LAND DISPOSAL RESTRICTIONS

Storage of land disposal restricted waste is allowed if the generating unit stores such waste in tanks or containers for the purpose of accumulation of sufficient quantities for subsequent treatment or disposal, and if the requirements of 40 CFR 262.34 are met (40 CFR 268.50). Land disposal restricted waste will not be stored at the 219-S Waste Handling Facility or the 222-S Dangerous and Mixed Waste Storage Area for more than 1 year. Adequate analysis, either through process information reviews or analytical testing, is performed on waste generated at the 222-S Complex to determine land disposal restrictions. Waste stored at the 219-S Waste Handling Facility is transferred to the Double-Shell Tank System for storage. Land disposal

restriction notifications are completed with each shipment of the waste if the waste is restricted or does not meet applicable treatment standards.

All waste stored in the 222-S Dangerous and Mixed Waste Storage Area is transferred to either the 616 Nonradioactive Dangerous Waste Storage Facility or the Hanford Central Waste Complex. Waste transferred to the 616 Nonradioactive Dangerous Waste Storage Facility is documented and shipped offsite to a permitted TSD facility. Land disposal restriction notifications are completed by the 616 Nonradioactive Dangerous Waste Storage Facility and accompany the waste as part of the documentation. Waste transferred to the Hanford Central Waste Complex is placed in long-term storage until appropriate treatment and/or disposal technology is developed. Land disposal restriction notifications will be completed by the Hanford Central Waste Complex.

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TABLE

4-1. Typical Equipment Used in Containerizing Waste for Storage in the 222-S Dangerous and Mixed Waste Storage Area T4-1

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4.0 PROCESS INFORMATION [D]

This chapter discusses the processes and equipment used for treating and storing dangerous and mixed waste at the two TSD units in the 222-S Complex. Storage of mixed waste occurs at the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area; treatment of mixed waste occurs only at the 219-S Waste Handling Facility. Any discussion of the methodology and requirements pertaining to treatment or storage of radionuclides in this permit application is included for information only.

4.1 CONTAINERS [D-1]

The 222-S Dangerous and Mixed Waste Storage Area consists of two enclosed metal storage structures with wooden floors that are located adjacent to the 222-S Analytical Laboratory Building on the north side. Each storage structure measures 19 feet 10 inches (6.0 meters) long by 8 feet (2.4 meters) wide by 8 feet 6 inches (2.6 meters) high. Double doors are located on the north ends of each of the two storage structures. The doors remain locked except during transfers in or out of the storage structures and during inspections. The doors are posted with "POSITIVELY NO SMOKING OR OPEN FLAMES ALLOWED," "CAUTION RADIATION AREA," "DANGER UNAUTHORIZED PERSONNEL KEEP OUT," and "DANGEROUS AND MIXED WASTE STORAGE AREA" signs. Inside the 222-S Dangerous and Mixed Waste Storage Area, drums rest on a nonskid fiberglass grate 6 inches (15 centimeters) above a stainless steel secondary containment basin, which covers the entire floor of each storage structure.

The following sections describe the management practices for the containers of waste stored at the 222-S Dangerous and Mixed Waste Storage Area.

4.1.1 Containers with Free Liquids [D-1a]

Bottles containing free liquids or other liquid waste are packed in U.S. Department of Transportation-specified steel drums, lined with a 90-mil (2.3-millimeter) polyethylene liner, and packed with a sufficient quantity of absorbent to completely absorb all of the liquid contents of the inside containers [minimum ratio of absorbent to liquid is 2:1 (WHC 1990e)]. The containers, container management practices, and features of the secondary containment system are described in the following sections.

4.1.1.1 Description of Containers [D-1a(1)]. Liquid waste is contained in liquid-tight bottles that have a capacity of 1 to 4 liters (0.26 to 1.06 gallons). These bottles are placed in an approved U.S. Department of Transportation 17-C or 17-H, 55-gallon (208-liter) steel drum lined with a 90-mil (2.3-millimeter) polyethylene liner. No more than 14 4-liter (1.06-gallon) bottles are packed into a single 55-gallon (208-liter) drum, and typically only 8 to 10 4-liter bottles are packed, because of the shape of the bottles and the need for maintaining the bottles in an upright position. Absorbent material is added, as described in Section 4.1.1.3.1, to fill all

void spaces, to cushion the bottles, and to provide sufficient absorbent capacity for all of the bottled liquid in the drum.

A maximum number of 18 drums is stored in a single layer within each storage structure. There is no stacking of drums. The total capacity of the 222-S Dangerous and Mixed Waste Storage Area is 36 55-gallon (208-liter) drums.

Table 4-1 lists the containers, absorbents, lining materials, and labels used in containerizing the waste stored in the 222-S Dangerous and Mixed Waste Storage Area.

All bottles and drums used for storing waste in the 222-S Dangerous and Mixed Waste Storage Area are new and in sound condition for each waste type. All drums are inspected before use for the following types of damage:

- Drum walls out of round
- Scratches, abrasions, dents, holes, and coating on the surface of walls, bottom, lid/cover, rims of drum
- Scoring on lid and drum gasket
- Cracked and inflexible or missing gasket
- Bent lock ring
- Damaged lock ring bolt
- Damage to wall and bottom seal
- Surface damage to drum coating (steel drums)
- Defects or damage to seams.

The inspection results for each drum are recorded on an inspection checklist. Quality Control personnel stamp "Approval" on drums that have passed inspection. Drums not passing the inspection are not used for regulated waste. Inspection checklists are maintained in the 222-S Complex files for a period of 5 years (Chapter 12.0, Section 12.4.2.2.5).

Following inspection, each drum is assigned a package identification number (PIN) from the drum logbook. The PIN is marked in black paint or indelible ink on the lid and side of the drum, in 2- to 3-inch- (5- to 7.6-centimeter-) high characters. This PIN is recorded on the drum inspection checklist.

4.1.1.2 Labeling System. Liquid waste is accumulated only in the 222-S Complex laboratories in prelabeled collection bottles. A blank preprinted hazardous waste label, bearing the words "HAZARDOUS WASTE", is completed with the following information before the label is affixed to a new, empty bottle:

- Satellite accumulation area (i.e., room number and hood number or work area)

- Hazard class (e.g., flammable, corrosive, etc.)

- Procedure number (analytical method from which waste was generated).

For collection bottles that receive similar waste from multiple methods, a waste inventory is maintained on a satellite accumulation area logsheet, which includes the method generating the waste, constituents of the waste, approximate volume, the date the solution was added, and the initials of the technician.

Waste is collected in a dedicated waste collection bottle identified by a hazardous waste label on the bottle. The waste generated is identified by the known analytical methods performed at that specific hood, and an inventory logsheet is not required.

Specific laboratory methods are assigned to specific hoods; therefore, waste is essentially hood-specific. The accumulation bottle is placed in the appropriate hood in the laboratory room. When waste is not being added or removed from the bottle, the bottle is kept closed. When the bottle is approximately 90 percent full and about 1 inch (2.5 centimeters) of head space remains, if gas is not being generated within the bottle (i.e., no visible bubbles or vapors), the cap is sealed tightly and the date is recorded on the label. The bottle is placed in the temporary (less-than-90 day) storage area. When enough waste has accumulated to fill a drum [typically 8 to 10 gallons (30 to 38 liters) of dangerous waste], bottles of waste are packaged in drums for storage in the 222-S Dangerous and Mixed Waste Storage Area.

Laboratory packaging is performed by 222-S Complex hazardous materials personnel using only preinspected drums. These drums are marked with individual PINs that have been recorded on the drum inspection checklist. Waste tracking forms are used by the hazardous materials coordinator and the Solid Waste Engineering organization to document the physical, chemical, and radiological characteristics of the waste, and to specify waste packaging, container, and labeling requirements. A hazardous waste label with the appropriate waste code(s) is affixed to a drum before the drum is sealed. A typical hazardous waste label is shown in Figure 4-1.

General labeling and marking criteria for waste containers are outlined in the acceptance criteria manual (WHC 1989b). This manual addresses label types and sizes, how markings are applied to drums, and what information the labels and markings include.

Containers are not reused on the Hanford Facility, and only new drums are used for laboratory packing of waste. Therefore, removal of old labels routinely is not performed. However, if a label is damaged or new information needs to be added, the old label is completely removed, and a new label is affixed to the drum.

4.1.1.3 Container Management Practices [D-1a(2)]. The following sections describe various aspects of container management practices, including packaging waste in containers, transporting containers to and from the 222-S Dangerous and Mixed Waste Storage Area, separating incompatible waste types, configuration of containers within the storage structures, and handling and storage methods.

Waste handling, storage, and transfer methods are designed to ensure that dangerous waste containers remain closed during storage, and that containers are not opened, handled, or stored in an unsafe manner. Weekly inspections of the satellite accumulation areas in the 222-S Complex laboratory rooms, temporary storage areas, and the 222-S Dangerous and Mixed Waste Storage Area are performed by hazardous materials personnel (Chapter 6.0). In addition, weekly inventories are made of the containers in the 222-S Dangerous and Mixed Waste Storage Area. A damaged or leaking container would be placed in an overpack drum. Spilled waste is managed according to the building emergency plan (Appendix 7A). Documentation of these activities is maintained in the 222-S Complex files.

4.1.1.3.1 Packaging Waste in Containers. As described in Section 4.1.1.2, liquid waste is accumulated in prelabeled bottles under specific hoods in laboratory rooms. Once filled to a level that allows 1 inch (2.5 centimeters) of head space to remain, the bottle is closed and the lid is sealed. The bottle is moved to the designated temporary (less-than-90-day) storage area. Each bottle moved to the temporary storage area is documented in the area logbook. Outdated or contaminated laboratory chemicals also are collected in the temporary storage area and similarly documented in the logbook. All bottles containing incompatible waste are separated spatially and/or by separate secondary containment trays.

In the temporary storage area, hazardous materials personnel prepare the bottled waste for storage in the 222-S Dangerous and Mixed Waste Storage Area. Each bottle of mixed waste is double-bagged in 4-mil (0.10-millimeter) plastic bags and sealed. Nonradioactive waste is not bagged. Each bottle is weighed, taring the weight of the bottle using an identical empty bottle. Flash point, chemical characteristics, and other information regarding the waste is referenced in material safety data sheets or in the *Handbook of Laboratory Safety* (CRC 1990) and recorded on the appropriate document, such as a chemical waste disposal request. The hazardous materials coordinator completes the documentation and sends the documentation to the Solid Waste Engineering organization. The Solid Waste Engineering organization responds with documentation containing waste designation information, packaging instructions, and compatibility requirements.

According to these instructions, the hazardous materials coordinator obtains the number and types of drums and polyethylene liners that will be needed to package the waste. Personnel verify that a PIN and quality control stamp have been affixed to the tops and sides of drums, and that the drum inspections were recorded in the logbook. Liners are checked visually to ensure integrity, and any defective liners are discarded. A polyethylene liner is placed in a drum for packaging liquid waste. A hazardous waste label is completed with the correct U.S. Department of Transportation shipping name,

United Nations or North American numbers, waste codes, and accumulation date (i.e., the oldest date on the containers to be packaged in the drum), and any additional requirements stated in the waste designation and packaging instructions. The label is affixed to the drum. The appropriate U.S. Department of Transportation hazard class sticker(s) (if applicable) and U.S. Department of Transportation radioactive sticker(s), if needed, are affixed to the drum according to the storage/disposal approval record. Information on the drum is recorded on a drum packaging checklist.

Documentation regarding designation and packaging of the waste contains a physical and chemical description of the waste, type and size of packaging material required, labeling and marking requirements, a list of administrative control requirements, storage or disposal information, and a space for requesting further information. The documentation directs the specific segregation and packaging of waste materials. Waste is separated into groups for packaging; incompatible materials are packaged in separate drums. Personnel assemble necessary packaging materials and begin by placing absorbent material on the bottom of the polyethylene liner per the instructions. As bottles of waste are placed in the drum, absorbent material is packed completely around the bottles, filling all the voids within the drum, and supporting the bottles in an upright position. According to 222-S Complex guidelines, the total quantity of liquids in each 55-gallon (208-liter) drum cannot exceed 15 gallons (57 liters). Sufficient absorbent is included to absorb at least twice the maximum amount of liquids present in the drum (WHC 1990e).

Some scintillation liquid generated in the 222-S Analytical Laboratory contains xylene or pseudocumene, which is land disposal restricted waste. Such waste requires special packaging and documentation when accepted for storage by the Hanford Central Waste Complex. Scintillation liquid is packaged in the following manner. The scintillation vials are sealed and placed in glass collection bottles, with capacities not exceeding 1 gallon (3.8 liters) each. The collection bottles are closed with Teflon*-lined polyethylene lids and taped. Each collection bottle is labeled with its contents (WHC 1990e).

The collection bottles are placed upright in a U.S. Department of Transportation-specified steel drum, lined with a plastic liner. Not more than 15 1-gallon (3.8-liter) bottles are placed in a 55-gallon (208-liter) drum. A sufficient amount of absorbent material is packed around the bottles to absorb twice the amount of liquid present and to fill all void spaces.

A hazardous material drum inventory logsheet is completed as the waste is being loaded into the drum. After all the waste to be packaged in the drum (per the waste packaging instructions) has been emplaced, the drum is filled to the top with absorbent material. The polyethylene liner is closed, and the steel lid is placed on the drum, ensuring that the seal is in place. The drum enclosure ring is placed around the lid, the bolt is inserted through the lug, and the lock nut is threaded onto the bolt. The ring bolt and lock nut are

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* Teflon is a trademark of E.I. duPont de Nemours & Company.

torqued to 40 foot-pounds (5.5 kilogram-meters). The drum is weighed, and the gross weight is marked on the top and side of the drum. Labeling is checked to ensure all labels are correct and in place. The drum packaging checklist is completed and signed by the hazardous materials coordinator.

Incompatible waste typically is not accumulated in the same hood. In the rare instance where this might occur, waste accumulation bottles are spatially segregated and rest on separate containment trays. Occasional discarded chemical waste or waste from research activities could be incompatible, in which case the bottle of waste is segregated in the temporary storage area. Incompatible waste is never placed in the same labpack drum.

4.1.1.3.2 Moving Containers into the 222-S Dangerous and Mixed Waste Storage Area. Sealed and labeled drums (Section 4.1.1.3.1) are moved individually to the 222-S Dangerous and Mixed Waste Storage Area. A health physics technician runs a radioactivity survey (smear test) on the top, sides, and bottom of the drum, and marks the result on the drum before the drum leaves the 222-S Analytical Laboratory. Should an unacceptable level of radioactivity be detected, the drum is decontaminated by wiping the drum down, and the drum is resurveyed.

4.1.1.3.3 Storage Configuration within 222-S Dangerous and Mixed Waste Storage Area. Drums are stored in each of the storage structures along the long sides of the structures (Figure 4-2). Figure 4-2 shows both storage structures and drums stored along the outside walls of each structure. A total of 9 drums can be stored on each side, or 18 in each storage structure. The drums are not stacked. This storage configuration provides a central aisle space in each structure of approximately 3.5 feet (1.1 meters) to allow adequate access for inspection and emergency action (Chapter 6.0, Section 6.3.2). Incompatible waste types are packaged in separate labpack drums. Drums containing incompatible waste are placed over separate secondary containment basins and separated spatially or by a physical barrier from other drums in the structure (Figure 4-2).

4.1.1.3.4 Moving Containers out of the 222-S Dangerous and Mixed Waste Storage Area to Transfer Vehicle. Transfer of nonradioactive dangerous waste containers from the 222-S Dangerous and Mixed Waste Storage Area to the 616 Nonradioactive Dangerous Waste Storage Facility or of mixed waste to the Hanford Central Waste Complex is performed by transportation personnel. Each drum is smear tested by a health physics technician and released for shipment before loading. Transportation personnel also inspect the drums to ensure that the drums are properly labeled for transport and are in sound condition. The drums are loaded into the truck or van, continuously maintained in an upright position, and are not stacked during transport.

Total load weight is not permitted to exceed truck capacity. The drums are packed closely together and are restrained by rope or other means across the end of the vehicle. Maximum loaded vehicle speed is 35 miles per hour (56 kilometers per hour).

4.1.1.3.5 Transfer Documentation. Several forms accompany a shipment of mixed or dangerous waste from the 222-S Dangerous and Mixed Waste Storage

Area. For each onsite shipment, an onsite waste transfer form is completed and accompanies the waste to its ultimate location. In addition, the hazardous waste coordinator completes an onsite radioactive shipment record for mixed waste and, if necessary, a solid waste storage/disposal record (Chapter 3.0)

4.1.1.4 Secondary Containment System Design and Operation [D-1a(3)]. The design of the secondary containment system is shown in Drawing H-2-80856 in Appendix 4A. Within the 222-S Dangerous and Mixed Waste Storage Area, secondary containment consists of two 7.5 feet (2.3 meters) wide by 9 feet (2.7 meters) long stainless steel containment basins that cover the wooden floors of the structures. The sides of the basins rise 8 inches (20 centimeters) above the basin bottoms. Resting on the sides of the steel basins is a nonskid fiberglass grate, extending the full length and width of the containment basins, on which the drums are placed.

Should a leak or spill occur, the spilled waste would be contained in one of the 2.5-foot- (0.76-meter-) wide compartments that extend the length of each 9-foot- (2.7-meter-) long containment basin. The waste would be removed using absorbent pads or a pump, depending on the volume of the leak or spill.

This secondary stainless steel containment system provides an extra measure of protection because the liquid waste already is double-contained within the drums. Waste in the original collection bottle is placed inside a steel drum protected by a polyethylene liner and stored over a stainless steel containment basin. Incompatible waste is stored over separate sections of the containment basins, effectively isolating any potential spillage from other waste (Figure 4-2).

4.1.1.5 Requirement for Base or Liner to Contain Liquids [D-1a(3)(a)]. The floors of the storage structures are constructed of an exterior steel frame and interior wood flooring. As described previously, secondary containment within the structures consists of two stainless steel containment basins in each storage structure. These containment basins are welded, 11-gage stainless steel, free of cracks, gaps, holes, or other imperfections. The containment basins are not combustible or flammable. Because of extra packaging measures applied to the waste containers, it is unlikely that a spill would occur. The stainless steel containment basins are of such thickness that the integrity of the containment basins would not be threatened in the event of a spill or leak.

Each basin is divided into three compartments by welded steel barriers that serve as support for the nonskid fiberglass grate. The containment basins are not equipped with drains. Any spillage into the containment system would be removed by absorbents or hand pumps.

The base of the 222-S Dangerous and Mixed Waste Storage Area is made of 10-inch- (25-centimeter-) thick reinforced concrete (Chapter 2.0, Figure 2-4). No piping penetrates the base. Although the base functionally is not part of the secondary containment system, serving primarily as the foundation for the storage structures, the concrete from which the base is made is essentially an inert material with respect to caustic, oxidizing, combustible, and flammable

materials. Therefore, no compatibility problems are anticipated to occur between the base and the waste stored at the 222-S Dangerous and Mixed Waste Storage Area.

4.1.1.6 Containment System Drainage [D-1a(3)(b)]. Each containment basin has three separate compartments (Figure 4-2). Should a drum leak while stored in the 222-S Dangerous and Mixed Waste Storage Area, the leaking waste would be collected and contained in one part of the containment basin 6 inches (15 centimeters) below the nonskid fiberglass grate on which the drums rest. Containers are prevented, by virtue of the elevated grate, from contacting any accumulated liquids. Containers also are protected from precipitation because the 222-S Dangerous and Mixed Waste Storage Area is enclosed totally. A steel roof extends the full length and width of each structure.

4.1.1.7 Containment System Capacity [D-1a(3)(c)]. The secondary containment system is designed to contain over 10 percent of the total volume of containers that can be stored in each storage structure. Two containment basins with dimensions of 7.5 feet (2.3 meters) wide by 9 feet (2.7 meters) long by 8 inches (20 centimeters) deep each provide a total capacity of 505 gallons (1,912 liters) per storage structure (252 gallons per basin) or a total of 1,010 gallons (3,823 liters) for the entire 222-S Dangerous and Mixed Waste Storage Area. This capacity exceeds 10 percent of the 1,980-gallon (7,495-liter) total drum volume of the 222-S Dangerous and Mixed Waste Storage Area. Based on the actual volume of liquid present in the labpack drums, the secondary containment volume requirement would be only 10 percent of 540 total gallons (2,044 total liters) [calculated using 36 drums containing 15 gallons (57 liters) each] or 54 gallons (204 liters). Thus, the capacity of the secondary containment system exceeds the regulatory requirement. Complete calculations demonstrating storage and containment capacity are provided in Appendix 4B.

Because the 222-S Dangerous and Mixed Waste Storage Area is a covered storage area, precipitation is prevented from entering the structure and is therefore not included in these calculations.

4.1.1.8 Control of Run-On [D-1a(3)(d)]. The only major run-on foreseen would be a flood or a water main break. No floods are predicted to affect the 222-S Dangerous and Mixed Waste Storage Area (Chapter 2.0, Section 2.3.2) because the 222-S Dangerous and Mixed Waste Storage Area is located above the Columbia River floodplain. Furthermore, the 222-S Dangerous and Mixed Waste Storage Area is elevated 10 inches (25 centimeters) above the asphalt apron by the concrete pad on which it rests.

4.1.1.9 Removal of Liquids from Containment System [D-1a(3)(e)]. The equipment used for removal of large quantities of liquid spilled in the containment basins will be a hand-held pump or vacuum truck. Absorbents will be used for removal of small quantities of liquid. In the event of a spill, a recovery plan will be developed based on input from the building emergency director and the hazardous waste coordinator. The building emergency director will determine if the hazardous materials response team is called. Within 24 hours of discovery of the spill, the spilled material will be removed from the containment system according to the 222-S Complex building emergency plan

(Appendix 7A). If the spilled material is unidentified, sampling will be performed and the waste material will be stored in container(s) at the 222-S Dangerous and Mixed Waste Storage Area until analytical results are received. Either before or after waste removal, appropriate documentation describing the waste material will be submitted to the Solid Waste Engineering organization for waste designation. In response, the Solid Waste Engineering organization will issue instructions describing the regulatory status and proper packaging, labeling, and marking requirements for the waste.

4.1.2 Containers Without Free Liquids That Do Not Exhibit Ignitability or Reactivity [D-1b]

The following sections discuss the handling procedures for solid types of dangerous and mixed waste that are stored at the 222-S Dangerous and Mixed Waste Storage Area. A variance for secondary containment is not being requested. The information presented in this section is for informational purposes only. The waste without free liquids includes four categories:

- Solid, radioactively contaminated lead waste, including lead shot, scrap, and shielding lead
- Solid chemical waste
- Occasional waste used in laboratory methods, e.g., paper, rags, vials, pipettes, gloves, cleanup materials, etc.
- Maintenance activity waste, such as spent HEPA filters, analytical equipment, hoods, and assorted repair materials.

The waste is labpacked separately, but is not segregated from other drums of waste in the 222-S Dangerous and Mixed Waste Storage Area, unless the waste types are incompatible.

In addition, compactible and noncompactible nondangerous radioactive waste is segregated from dangerous and mixed waste, packaged, and shipped from the 222-S Complex. All compactible solid waste (e.g., paper, dry rags, gloves, clothing, plastic wraps, rubber, and other dry, low density items) generated within a hood is handled as mixed waste, as described in the following sections. Any waste item that has come in contact with a listed waste is considered listed waste and handled by the methods described in the following sections. The only exception to this is for containers defined as empty (i.e., containing less than 1 percent of the container's total individual capacity); or, if containers had contained acutely hazardous waste, those containers had been rinsed at least three times with an appropriate solvent. These empty containers are disposed of as nondangerous solid waste in an onsite solid waste landfill.

4.1.2.1 Test for Free Liquids [D-1b(1)]. The 222-S Dangerous and Mixed Waste Storage Area stores drums containing small bottles filled with free liquids packed in absorbent material as described in Section 4.1.1.3.1. Solid waste readily is identified as radioactively contaminated lead waste or as solid

chemicals, which are labeled. None of the occasional waste managed at the 222-S Dangerous and Mixed Waste Storage Area contains free liquids, and therefore no testing of free liquids is conducted.

4.1.2.2 Description of Containers [D-1b(2)]. Solid, radioactively contaminated lead waste is packed in new, U.S. Department of Transportation-specified 17-C or 17-H 55-gallon (208-liter) steel drums, typically lined with polyethylene liners. Solid discarded chemical waste is contained in small polyethylene or glass bottles and packed in U.S. Department of Transportation-specified 17-C or 17-H 55-gallon (208-liter) steel drums lined with 90-mil (2.3-millimeter) polyethylene liners, with absorbent filling all the void space. Smaller outer containers are used if an insufficient quantity of waste is available to fill a 55-gallon (208-liter) drum. Table 4-1 lists the materials used for packaging waste from the 222-S Analytical and 222-SA Standards Laboratories.

Miscellaneous materials and maintenance waste also are packaged in U.S. Department of Transportation-specified steel drums. Nonliquid items are double-bagged before placement in the drums, and void spaces are filled with absorbent packaging material.

Labeling of drums is conducted according to general labeling and marking criteria for waste containers outlined in the waste acceptance criteria manual (WHC 1989b). This manual addresses label types and sizes, how markings are applied to containers, and what information the labels and markings include. Contents of interior containers are identified by their original labels, if off-specification chemicals, or by a label that identifies the waste and waste code.

4.1.2.3 Container Management Practices [D-1b(3)]. The following sections describe various aspects of container management practices, including packaging waste in containers, transporting containers to and from the 222-S Dangerous and Mixed Waste Storage Area, separating incompatible waste types, configuring containers within the storage structures, and proper handling and storage methods.

All waste handling, storage, and transfer procedures are designed to ensure that dangerous waste containers remain closed during storage, and are not opened, handled, or stored in an unsafe manner. Weekly inspections of the 222-S Dangerous and Mixed Waste Storage Area are performed by the hazardous materials coordinator (Chapter 6.0). In addition, weekly inventories are made of the containers in the 222-S Dangerous and Mixed Waste Storage Area.

4.1.2.3.1 Packaging Waste in Containers. Solid mixed waste is accumulated in approved containers in satellite accumulation areas in the 222-S Analytical Laboratory. Under the direction of the hazardous materials coordinator, waste containers are prepared for the type of waste material to be collected and labeled. Information on the label includes: laboratory room and hood number, as applicable, the words "HAZARDOUS WASTE," and the waste hazard (e.g., flammable, corrosive, etc.). A logsheet is mounted on or adjacent to the container for recording information about the waste placed in the accumulation container. The waste is placed in plastic bags and sealed

before being placed in a container. Hazardous materials personnel transport the waste container to the temporary storage area, and the waste is recorded in the area log.

Methods for packaging solid chemical waste are very similar to methods used for liquid waste, described in Section 4.1.1.3.1. According to instructions from the Solid Waste Engineering organization, bottles of waste are placed in labpack drums with polyethylene liners. Absorbent material is packed below, around, and above the bottles to prevent breakage. There is no required absorbent-to-waste ratio, and no limit on the quantity of solid dangerous waste that can be packed in a drum, except for spatial constraints.

4.1.2.3.2 Moving Containers into the 222-S Dangerous and Mixed Waste Storage Area. Moving containers packed with solid waste into the 222-S Dangerous and Mixed Waste Storage Area is performed in the same manner as moving containers packed with liquid waste, as described in Section 4.1.1.3.2.

4.1.2.3.3 Moving Containers out of the 222-S Dangerous and Mixed Waste Storage Area to Transfer Vehicle. Drums are moved from the 222-S Dangerous and Mixed Waste Storage Area to the transfer vehicle as described in Section 4.1.1.3.4, and loaded into a truck.

4.1.2.3.4 Transfer Documentation. Documentation that accompanies shipments of waste from the 222-S Dangerous and Mixed Waste Storage Area is described in Section 4.1.1.3.5.

4.1.2.4 Container Storage Area Drainage [D-1b(4)]. Each containment basin has three separate compartments as described in Section 4.1.1.6 and depicted on Figure 4-2. Should a drum leak while stored in the 222-S Dangerous and Mixed Waste Storage Area, the leaking waste would be collected and contained in the catch basin 6 inches (15 centimeters) below the nonskid fiberglass grate on which the drums rest. Containers are protected, by virtue of the elevated grate, from contact with any accumulated liquids.

4.1.3 Protection of Extremely Hazardous Waste in Containers [D-1c]

All containers are completely enclosed within the 222-S Dangerous and Mixed Waste Storage Area storage structures, providing complete protection from the weather. The storage structures are described in Section 4.1. All 222-S Dangerous and Mixed Waste Storage Area doors are kept locked (Chapter 2.0, Figure 2-5) except during drum transfers and inspections. Therefore, no extremely hazardous waste stored in the 222-S Dangerous and Mixed Waste Storage Area is exposed to the elements. Extremely hazardous waste is not transferred in or out of the 222-S Dangerous and Mixed Waste Storage Area during inclement weather.

4.1.4 Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste in Containers [D-1d]

The following sections provide information on the management of reactive, ignitable, and incompatible waste in containers.

4.1.4.1 Management of Reactive Waste in Containers [D-1d(1)]. Reactive cyanide- and sulfide-bearing waste could be generated occasionally at the 222-S Complex. This waste is separated from other waste by maintaining the reactive waste in hoods separately from other waste types. Such reactive waste is packaged according to specific directions provided in documentation from the Solid Waste Engineering organization. Separate overpack containers are used, and no other waste is packed with reactive materials in the drum. Drums containing reactive waste stored in the 222-S Dangerous and Mixed Waste Storage Area are separated from other drums by a minimum of 3 feet (0.9 meter) or separated by a physical barrier, and placed over separate compartments of the containment system.

4.1.4.2 Management of Ignitable and Reactive Waste in Containers [D-1d(2)]. The 222-S Analytical Laboratory generates ignitable waste, including scintillation cocktails and other mixtures. This waste is maintained in separate hoods in the laboratories. Ignitable waste is packaged according to specific directions provided in the storage/disposal approval record. Separate labpack containers are used, and other waste types are not packed in drums containing ignitable waste. Special absorbents are used to pack ignitable waste. (Eventual offsite disposal of these materials could be by incineration; therefore, the absorbents also are combustible.) Ignitable waste is separated spatially from drums of other waste types in the 222-S Dangerous and Mixed Waste Storage Area and placed over separate containment sections (Figure 4-2).

The 222-S Dangerous and Mixed Waste Storage Area currently adjoins the north wall of the 222-S Analytical Laboratory. A discussion of current fire suppression equipment is provided in Chapter 6.0, Section 6.3.1.3. Installation of an automatic sprinkler system in the two storage structures is planned to provide fire suppression as required by fire code for the storage of ignitable materials. It is planned that the new fire suppression system will be installed in the two storage structures by September 1992. A schedule for installation of the sprinkler system will be provided when available and submitted as a permit modification.

4.1.4.3 Management of Incompatible Wastes in Containers [D-1d(3)]. Incompatible waste is identified by the hazardous waste coordinator using a standard chart that lists compounds and their incompatible counterparts. This information is provided on the documentation sent by the hazardous waste coordinator to the Solid Waste Engineering organization. Hazardous waste personnel receive instructions from Solid Waste Engineering for packaging the waste. No incompatible waste is packed in the same drum. Drums containing incompatible waste are separated in the 222-S Dangerous and Mixed Waste Storage Area, either with a physical barrier or by allowing at least 3 feet (0.9 meter) of space between drums, and are placed over separate sections of the containment basins (Figure 4-2). Transportation personnel inspect the

containers for proper packaging, labeling, marking, and waste tracking forms before transporting the containers to the 616 Nonradioactive Dangerous Waste Storage Facility or the Hanford Central Waste Complex.

4.2 TANK SYSTEM [D-2]

This section describes the design and operation of the 219-S Waste Handling Facility for treatment and storage of mixed and dangerous waste. Major topics discussed in this section include the following:

- Design of tanks and ancillary equipment
- Secondary containment system including leak detection
- Tank corrosion and erosion prevention
- Tank management practices
- Ventilation system to control air emissions.

This section also describes the current equipment at the 219-S Waste Handling Facility. In anticipation of the new mission of the 222-S Complex as an environmental support laboratory, several upgrades to the 219-S Waste Handling Facility are in various stages of study. These potential upgrades include replacement of the waste treatment and storage tanks, replacement of the pipelines from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility, and replacement of the pipelines from the 219-S Waste Handling Facility to the Double-Shell Tank System (WHC 1991b and 1991c).

A general description of the 219-S Waste Handling Facility is included in Chapter 2.0, Section 2.1.3.1, and a list of the major equipment is given in Chapter 2.0, Table 2-1. Figure 4-3 shows a plan view of the 219-S Waste Handling Facility. North of the vault containing the tanks are the aboveground operating gallery and sample gallery. The operating gallery is a 22-foot (6.7-meter) by 13-foot (3.96-meter) aboveground metal building. The sample gallery is attached to the eastern side of the operating gallery. The sample gallery structure is constructed of 6-inch- (15 centimeter-) thick concrete and is approximately 12.5 feet (3.7 meters) by 13 feet (4.0 meters). The three mixed waste treatment and/or storage tanks are contained in a 27-foot (8.1-meter) by 25.5-foot (7.7-meter) belowground concrete vault. Also underground are the pipe trench and offgas demister (tank 105). The 219-S Waste Handling Facility is inspected daily by 222-S Complex personnel, as described in Chapter 6.0.

4.2.1 Underground Tanks [D-2a]

The 222-S Complex will not use any underground tanks according to the definition in WAC 173-303-040.

4.2.2 Design of Tanks [D-2b]

The 219-S Waste Handling Facility was constructed in 1951 in accordance with the 1949 edition of the Uniform Building Code. The information in this section was obtained from the results of a tank-system integrity assessment program carried out at the 219-S Waste Handling Facility in 1990 (WHC 1990a). This was a pilot program to refine the methods for assessment of tanks on the Hanford Facility. The assessment program included visual inspection of the 219-S Waste Handling Facility tanks and vaults, leak testing, corrosion assessment, and structural evaluation. The report from the assessment program was submitted to Ecology in July 1990 (WHC 1990a). A statement from an independent registered professional engineer is included in Appendix 4C.

4.2.2.1 Design Specifications [D-2b(1)], [D-2b(2)], [D-2b(3)]. This section describes the design details of tanks 101, 102, and 103. Included are the measurements, operating capacity, and working capacity of each tank. In addition, the results of the tank integrity testing program are presented.

4.2.2.1.1 Tank 101. Tank 101 is a flat-bottomed steel tank that is 9 feet (2.7 meters) in diameter by 9 feet (2.7 meters) tall. The tank rests on a series of 12 evenly spaced 5-inch- (12.7-centimeter-) diameter by 1-inch- (2.5-centimeter-) thick carbon steel shim stock pads stacked three high. The shim stock pads are not attached to the tank. The tank is constructed of 0.5-inch- (1.3-centimeter-) thick niobium-stabilized type 347 stainless steel. The tank was fabricated in 1943 and was not used until installation at the 219-S Waste Handling Facility in 1951.

Tank 101 is a 4,000-gallon (15,150-liter) tank with a normal working volume limit for waste of 3,600 gallons (13,630 liters). The working volume limits are established to prevent overflows and to enable any necessary chemical additions after transfer of the contents to tank 102 for treatment. The tank is equipped with a liquid level control system. The typical allowable tank operating level is 3,600 gallons (13,630 liters), although the high-level set point normally is set slightly below this value for an additional measure of safety.

Based on results of leak testing and a visual inspection, tank 101 is not leaking and has no evidence of past leaks (WHC 1990a). The shell is in good condition, with some discoloration on the sides and top from corrosion of supports. The welded joints and seams of the tank appear to be in good condition. The position guides are severely corroded and will not provide any lateral support in the event of seismic activity. Based on these findings, an analysis of the system to determine if the tanks would overturn or slide during a design-basis earthquake was performed (WHC 1990a). The results of the analysis show that the tank would not overturn but would probably slide without lateral restraint. Therefore, wooden restraints were installed in 1990 around the tank base to prevent sliding during an earthquake. The restraints abut the tank and concrete vault wall at the floor level of the tank. A description of the restraint design is provided in Appendix 4A (Drawing H-2-5233-ECN 107679).

The in-depth seismic analysis considered the potential for tank overturning, tank uplift, and tank sliding, shell stresses, and the need for nozzle reinforcement and anchoring (WHC 1990a). All factors examined were acceptable with the exception of sliding. The analysis was performed using the 1988 *Uniform Building Code* for seismic evaluation guidance (ICBO 1988). Criteria of the American Society of Mechanical Engineers were used for calculating the shell stresses, required shell and head thicknesses, and nozzle reinforcement. The restraints installed to prevent sliding were designed to meet the *Uniform Building Code* requirements for seismic resistance.

The transfer lines from tank 101 to tank 102 and the vault penetrations to and from tank 101 were inspected externally with particular attention given to welds, joints, and seams. The vault penetration lines were bright, shiny steel and showed no signs of corrosion. The tank 101 to tank 102 transfer line showed some corrosion at a flange and a lap joint. The piping from the 222-S Analytical Laboratory to tanks 101 and 103 is type 309 stainless steel. The steam-jet transfer lines are type 304 L stainless steel. The remaining liquid transfer piping is specified as type 347 stainless steel, although the cell penetrations are a black alloy that appears different than type 347 stainless steel. Steam, water, and instrumentation piping and ancillary equipment are constructed of stainless steel (WHC 1990a).

During transfer of several hundred liters of water through the piping system, visual monitoring of the lines was performed and no indication of leaks was observed. Theoretical design-basis seismic event evaluation indicated the piping and associated flanges are acceptable for withstanding the design-basis seismic effects and operating conditions.

4.2.2.1.2 Tank 102. Tank 102 is a 4,000-gallon (15,150-liter) steel tank with a working volume of 3,600 gallons (13,630 liters). The tank is flat-bottomed and is 9 feet (2.74 meters) in diameter and 9 feet (2.74 meters) in height. The typical working volume of the tank is 3,600 gallons (13,630 liters), although the liquid high-level point is set slightly below this level to ensure that the tank is not overfilled. The tank is constructed of 0.5-inch- (1.3-centimeter-) thick niobium-stabilized type 347 stainless steel. Tank 102 is contained in cell A of the vault along with tank 101. The tank rests on the same type of carbon steel shim stock pads as does tank 101 (described in Section 4.2.2.1.1). The tank is not attached to the shim stock pads.

The discussion regarding the tank integrity assessment for tank 101 also applies to tank 102 because the tanks were determined to be in similar condition. Tank 102 was fabricated in 1943, and was not used until installation at the 219-S Waste Handling Facility in 1951. Based on results of leak testing and a visual inspection, the tank is not leaking and no past leakage is evident. The shell and welded joints and seams of the tank appear to be in good condition. The position guides are severely corroded and will not provide adequate lateral support for seismic activity. As with tank 101, the analyses show that the tank would not overturn during a seismic event, but would probably slide without lateral restraint. Therefore, wooden restraints

were installed around the tank base to prevent sliding during a seismic event. A description of the seismic restraints is provided in Appendix 4A.

The in-depth seismic analysis evaluated the potential of the tank to overturn, uplift, or slide, plus the shell stresses and the need for anchoring and nozzle reinforcement (WHC 1990a). All factors examined were acceptable with the exception of sliding. The analysis was performed using the 1988 *Uniform Building Code* for seismic evaluation guidance (ICBO 1988). The American Society of Mechanical Engineers criteria were used for calculating the shell stresses, required shell and head thicknesses, and nozzle reinforcement. The restraints installed to prevent sliding were designed to meet *Uniform Building Code* requirements for seismic resistance (Appendix 4A).

The transfer lines within the vault from tank 102 were inspected externally with particular attention given to welds, joints, and seams. During transfer of several hundred liters of water through the piping system, a visual monitoring of the lines was performed and no indication of leaks was observed. The theoretical design-basis seismic evaluation of the piping determined piping and associated flanges to be acceptable for withstanding the design-basis seismic effects and operating conditions.

4.2.2.1.3 Tank 103. Tank 103 is a 1,500-gallon (5,700-liter) steel tank with a working volume of 1,250 gallons (4,700 liters). This tank is equipped with a liquid level control system. The high-level point is set slightly below the working volume as an added safety precaution. Tank 103 is located in cell B of the vault, and is not readily accessible for visual inspection because the tank is suspended from a steel plate with a poured-in-place concrete cover block. The tank is constructed of stabilized type 309 stainless steel with a 0.25-inch (6.4-millimeter) shell thickness. Ancillary piping and instrumentation lines also are constructed of stainless steel. The tank was fabricated in 1950 specifically for installation at the 219-S Waste Handling Facility.

A section of the hot waste line to tank 103 was removed and inspected. The inspection showed the general degradation of the interior of the pipe to be superficial. The piping between tanks 102 and 103 also was determined to be acceptable based on the theoretical evaluations for the design-basis seismic event and operating conditions.

A visual inspection of the tank and lines within the vault was not possible because of concerns about excessive personnel radiation exposure and because the tank is sealed in the vault and is not accessible. This tank was assumed to be in a condition similar to that observed for tank 101 (WHC 1990a) given comparable age, construction, and use.

4.2.2.2 Secondary Containment Requirements For New Tanks [D-2c]. This section presents a discussion of the secondary containment of the waste managed in the tanks, containment system design, containment system capacity, control of run-on, and the leak detection system. The secondary containment system consists of structures, equipment, and operating methods designed to prevent the release of mixed waste to the environment. As discussed in this section, the mixed waste treatment and storage tanks are located in an

belowground concrete vault. In addition, leak detection and overfill equipment are fitted in the tanks and vault.

4.2.2.2.1 Aboveground Tanks [D-2c(1)]. There are no aboveground waste tanks at the 219-S Waste Handling Facility.

4.2.2.2.2 Wastes Managed in Tanks [D-2c(2)]. The mixed waste treated and stored at the 219-S Waste Handling Facility is all aqueous waste. The waste is corrosive, contains metals, and contains very low concentrations of some organic compounds. No separable-phase organic liquids or emulsions are allowed in the liquid waste sent to the 219-S Waste Handling Facility. To protect the piping and the tanks, no hydrochloric acid or materials detrimental to type 304 stainless steel are allowed in the liquid waste without prior neutralization or thorough flushing of the transfer lines with water for at least 2 minutes after waste discharge to the tanks. Permission must be granted before any strong oxidizing or reducing chemicals can be released into the liquid waste. Liquids with exotherms below 450 °F (232 °C) or flash points below 150 °F (65.6 °C) are not allowed in the liquid waste. The temperature of the waste should never exceed 200 °F (93.3 °C). Before the waste can be transferred to the Double-Shell Tank System, the pH must be greater than 12.5, and the nitrite concentration must be at least 600 parts per million. These pH and nitrite conditions slow the rate of corrosion in the Double-Shell Tank System and tank 102.

The volume of waste treated at the 219-S Waste Handling Facility has been estimated at approximately 49,000 gallons (183,660 liters) in calendar year 1990. The volume is anticipated to increase to 60,000 gallons (227,124 liters) per year for calendar years 1991 through 1994, and is anticipated to increase to 75,000 gallons (283,905 liters) per year thereafter until calendar year 2015. A discussion of the waste types and quantities also is presented in Chapter 3.0.

4.2.2.2.3 Containment System Design [D-2c(3)]. Tanks 101, 102, and 103 are contained in a belowground concrete vault that is 27 feet (8.1 meters) by 25.5 feet (7.7 meters). The vault is divided into two cells, A and B. Tanks 101 and 102 are contained in cell A, and tank 103 is contained in cell B of the vault. Cell A is shown in Drawing H-2-5234, sheet 4, in Appendix 4A, and cell B is depicted in Drawing H-2-5234, sheet 3, in Appendix 4A. As shown, cell B is divided into two chambers: one containing tank 103 and one deliberately left empty for future expansion. The concrete vault is constructed of 3,000-pound-per-square-inch (211-kilogram-per-square-centimeter), 28-day strength concrete. The vault floor varies from 1.5 to 2.0 feet (0.5 to 0.6 meter) in thickness, with the top 5 inches (12.7 centimeters) composed of grout. The vault wall varies from 1.5 to 3.5 feet (0.5 to 1.1 meters) thick. Interior surfaces of the vault were originally covered with a vinyl copolymer coating compatible with the waste in the tanks.

Sump 7, located in cell A, is 12 by 12 by 12 inches (30.5 by 30.5 by 30.5 centimeters). The sump is equipped with a liquid level control system. The liquid high-level point of the sump is set at 6 inches (15.2 centimeters)

above the vault floor, which equates to an approximately 180-gallon (681-liter) capacity. The floor of cell A is sloped to drain to sump 7.

Cell B contains tank 103 and sump 6. Sump 6 is 18 by 18 by 12 inches (45.7 by 45.7 by 30.5 centimeters), and equipped with a liquid level control system with the high-level set point at 6 inches (15.2 centimeters) above the vault floor, which equates to an approximately 180-gallon (681-liter) capacity. Sump 6 is located between tank 103 and the empty chamber in cell B, and the floors are sloped to drain to sump 6. The sumps and vault floors are designed to ensure that leakage will drain to the sumps.

A visual inspection of cell A indicated that the structure appeared to be sound (WHC 1990a); however, the walls show several gouges and are spalled around many of the penetrations where piping enters the cells. There is one long vertical crack along the west wall that could indicate an underlying problem. The crack runs vertically above piping penetration number 91, which is located above the top of tanks 101 and 102 (WHC 1990a). If a tank were to leak, the release volume would be insufficient to reach the height in the vault wall at which the crack is located. The coating is cracked and bubbled and can no longer be considered leakproof. Inspection of cell B was not possible; however, the cell is assumed to be in a condition similar to that of cell A (WHC 1990a). Seismic and other theoretical evaluations were performed on the vaults as for the tanks according to the appropriate building codes. The seismic evaluation of the vault structure concluded that the vault could withstand a seismic event sufficiently to maintain its structural integrity. Upgrades to address the deficiencies in the secondary containment system identified during the integrity assessment are planned. These upgrades are discussed in Section 4.2.2.2.7.

4.2.2.2.4 Containment System Capacity [D-2c(4)]. Cell A of the containment vault is 21 feet (6.4 meters) wide by 12 feet (3.7 meters) long by 20 feet (6.1 meters) high and has a capacity of approximately 37,700 gallons (142,726 liters), which exceeds the absolute combined tank capacities (tanks 101 and 102) of 8,000 gallons (30,283 liters). Cell B is divided into two chambers, one containing tank 103 [(6.9 feet by 6.9 feet by 9 feet (2.1 meters by 2.1 meters by 2.7 meters)]. The other chamber [(7.1 feet by 18.6 feet by 9 feet (2.13 meters by 5.6 meters by 2.7 meters)] has been left empty for future use, and has a containment capacity of 11,500 gallons (43,532 liters). The two chambers of cell B are joined by sump 6.

4.2.2.2.5 Control of Run-on [D-2c(5)]. Run-on of precipitation into the vault is controlled by the concrete cover blocks, which also serve as radiation shielding. At the present time, the cover blocks are not completely leakproof and some precipitation does seep into the vault. Precipitation that enters into the vault is collected in either sump 6 or 7. When the level in the sump reaches the high-level set point, an alarm sounds and supervision immediately is notified of the situation. Any moisture collected in the vaults is jetted to tanks 101 or 103 according to specified operating methods. It is planned that the cover blocks will be sealed to prevent run-on of precipitation into the vaults.

The amount of precipitation that seeps into the vaults has been measured in relation to the capability of the vault and sump collection system to handle the seeped precipitation of the 25-year, 24-hour storm criteria. The total precipitation for such a storm would be 1.56 inches (3.96 centimeters) in 24 hours (DOE 1987). Thus, if all of the precipitation that fell on the 27-foot (8.1-meter) by 25.5-foot (7.7-meter) cover blocks were to seep into the vault, the volume accumulated in the vault would be 89.5 cubic feet or 670 gallons (2,535 liters) of water. This total volume is well within the capacity of the vault (Section 4.2.2.2.4).

4.2.2.2.6 Leak Detection System [D-2c(6)]. In addition to the secondary containment system, a process control system is in place to detect leaks in the tanks and to ensure proper operation of the system. An instrumentation diagram for the system is shown in Drawing H-2-93452 in Appendix 4A. Modifications to various parts of the system are shown in Drawing H-2-37620 in Appendix 4A. All tanks, the hot tunnel sumps, and the 219-S Waste Handling Facility sumps have level probes, are lighted, and have audible alarms to indicate when the liquid level limit is exceeded. The alarms sound when the liquid level set point in a tank is exceeded or when enough liquid accumulates in a sump to exceed the liquid level set point. The sump liquid level detectors are calibrated and tested every 90 days. The sump monitoring system is calibrated monthly. The tank liquid level indicators are calibrated and tested monthly. Calibration records are maintained in the 222-S Complex files.

The alarms for the tanks and the 219-S Waste Handling Facility sumps are located in room 3-B of the 222-S Analytical Laboratory and in the 219-S Waste Handling Facility operating gallery. The 222-S Analytical Laboratory operates 24 hours per day, ensuring that any alarm will be observed and responded to within 24 hours. The leak detection system allows for detection and removal of any accumulated waste within 24 hours. The alarms in both vault sumps are activated before 5 gallons (19 liters) have accumulated within the sump or 180 gallons (681 liters) have accumulated in the vault. These alarms indicate leakage into the vaults from the tanks, piping, or cover blocks.

4.2.2.2.7 Upgrades Planned for the Containment System. Several upgrades are planned for the 219-S Waste Handling Facility to improve the secondary containment system. There have been no leaks or incidents at the 219-S Waste Handling Facility that indicated failure of the secondary containment. However, based on visual inspections of the vaults, the integrity of the secondary containment is in question. Therefore, a plan has been developed to replace the tanks and pipelines from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility with double-walled tanks and pipelines (WHC 1991b and 1991c). Tanks 101 and 102 will be removed and replaced with doubled-walled tanks, tank 103 will be emptied and left in place, and a new double-walled tank will be installed in the empty chamber of cell B. The goal of these modifications is to ensure the integrity of the waste tanks and secondary containment of the 219-S Waste Handling Facility and the associated transfer pipelines.

A conceptual schedule for the replacement of the waste transfer piping from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility is

provided in Appendix 4E. A schedule for the remaining upgrades planned for the 219-S Waste Handling Facility is being developed but is currently not available.

4.2.3 Tank Corrosion and Erosion [D-2d]

Corrosive solutions routed to the 219-S Waste Handling Facility tanks include acids, bases, oxidizing agents in dilute solution, and dilute salt solutions. Protection against corrosion in the 219-S Waste Handling Facility equipment is provided by waste disposal guidelines outlining waste composition limits on nitrite, nitrate, and hydroxide ions, and by proper selection of construction material and application of protective coatings. Through these means, surface corrosion and stress cracking are inhibited (WHC 1990a). Because of the different types of corrosive waste handled and processed in the 219-S Waste Handling Facility, passive (equipment and piping design) and active (waste disposal methods) corrosion-prevention measures are used to minimize potential adverse effects from corrosive waste.

An integrity and corrosion-protection assessment for the 219-S Waste Handling Facility has been completed and was submitted to Ecology in July 1990 (WHC 1990a). As part of this assessment, the type and design of the 219-S Waste Handling Facility equipment and piping were analyzed to verify the adequacy of the corrosion-prevention design measures. The waste transfer piping and tanks are constructed of stainless steel or other alloys, which are resistant to acidic, caustic, and salt solutions. Specifically, tanks 101 and 102 are constructed of niobium-stabilized type 347 stainless steel. Tank 103 is constructed of stabilized type 309 stainless steel. Stabilized stainless steels are alloyed to resist a variety of chemical conditions, including the acidic and caustic conditions at the 219-S Waste Handling Facility. The nominal wall thickness of tanks 101 and 102 is 0.50 inch (1.3 centimeters). The nominal wall thickness of tank 103 is 0.25 inch (0.6 centimeter).

A visual inspection and leak test of the 219-S Waste Handling Facility system were performed (WHC 1990a). The visual inspection indicated that the external surfaces of tanks 101 and 102 were not corroded; tank 103 was not accessible for inspection. The results of the leak test revealed that tanks 101 and 102 do not leak. In addition, there is no visual evidence of leakage from tanks 101 and 102. A mass balance was performed on tank 103, and sump 6 was monitored during operation. No evidence that tank 103 is leaking was found (WHC 1990a).

The waste transfer piping is constructed of continuously welded, 3-inch (7.6-centimeter), Schedule 40 stabilized type 347 stainless steel. Waste is transferred by gravity drainage; therefore, erosion of the pipeline is not anticipated to occur. The waste transfer piping is rinsed with water following each waste transfer from the 222-S Analytical Laboratory. This decreases the concentration of corrosive residuals in the piping and minimizes long-term corrosive effects from the waste. The piping is encased in a concrete trench designed to contain and route the leakage to the 219-S Waste Handling Facility sump. The concrete encasement is uncoated. Piping between tanks is constructed of stainless steel. It is planned that the transfer

piping from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility will be replaced with double-walled piping, as discussed in Section 4.2.2.2.7 (WHC 1991b).

Ventilation ductwork and filter housings are constructed of stainless steel to minimize corrosion from tank vapors and to facilitate decontamination. Instrumentation subject to contact with corrosive solutions or vapors is constructed of stainless steel.

Interior surfaces of cells A and B of the 219-S Waste Handling Facility vault originally were coated with three coats of a vinyl copolymer coating following construction. The coating is compatible with and resistant to liquids with corrosive properties similar to the waste in the 219-S Waste Handling Facility tanks. An examination of the current coating condition revealed that it exhibits bubbling and cracking (WHC 1990a), which compromises its leak-proofing capability. This condition will be addressed by upgrades planned for the 219-S Waste Handling Facility, as discussed in Section 4.2.2.2.7.

Waste disposal methods are used to limit the types of solutions routed to the 219-S Waste Handling Facility. Operating specifications are in place to maintain concentrations of chemical species within established limits for waste routed to the Double-Shell Tank System.

Upgrades to the 219-S Waste Handling Facility are planned. Corrosion prevention methods will be inherent in the design of the system. Materials selection, administrative controls, and operating specifications will be used to limit degradation of system components and to prolong the life of the 219-S Waste Handling Facility. The concrete-encased piping will be replaced with a stainless steel pipe-in-pipe system. Cathodic protection and a leak detection system will be installed. The 219-S Waste Handling Facility tanks will be replaced with new double-walled tanks. The new tanks will be constructed of stainless steel and will have leak detection and cathodic protection systems.

The tanks are located in a belowground concrete vault. Therefore, erosion controls are not required.

4.2.4 Tank Management Practices [D-2e]

Information included in this section is intended to identify the equipment involved in waste transfer, demonstrate that the equipment is clearly labeled for easy identification, and identify information available to facilitate operations. Personnel are trained before carrying out operations and are supervised during operations. Waste transfer methods are designed to prevent spills and overflows, prevent misrouting of waste, monitor the waste, provide records of activities at the 219-S Waste Handling Facility, and ensure the safety of operating personnel.

Controls to prevent overfilling of tanks include instrumentation within the tanks, and operating guidelines to monitor the amount of waste in the

tanks and to ensure a sufficiently low operating level to maintain a margin of safety. Waste overflows are regulated by use of weight factor recorders, liquid level indicators, and photohelics. Charts have been developed to show the correlation between the weight factor readings and the gallons of waste in the tank. Because the capacity of the tanks is known, the charts are used to avoid overflows.

Tanks 101 and 103 receive waste from the 222-S Analytical Laboratory. Waste batches are transferred from tank 101 and/or tank 103 to tank 102 for treatment. The contents of tank 101 could be used to dilute the contents of tank 103 (by mixing in tank 102). The waste is segregated to maintain control over the radiological levels in tank 102. Treatment with sodium hydroxide and sodium nitrite occurs in tank 102 before the transfer of the tank 102 contents to the Double-Shell Tank System. The waste is treated with sodium hydroxide to a pH greater than 12.5, and with sodium nitrite to attain a nitrite concentration of greater than 600 parts per million. The purpose of these treatment steps is to protect the Double-Shell Tank System from corrosion. The treated waste is sampled and analyzed for radioactivity (total alpha and total beta), pH, nitrate, nitrite, and plutonium before being transferred from tank 102 to the Double-Shell Tank System.

Low-level aqueous waste transferred to the 219-S Waste Handling Facility is classified by laboratory personnel as either intermediate-activity or high-activity waste (DOE Order 5820.2A). Intermediate-activity waste exhibits a radiation level of less than 10 millirems per hour. High-activity waste exhibits a radiation level of greater than 10 millirems per hour but less than 100 millirems per hour.

The 222-S Analytical Laboratory has standard operating guidelines for the use of laboratory hoods, sinks, and floor drains, and for the vacuum transfer of radioactive liquid waste. In addition, signs are posted at each hood and sink indicating the proper methods to be followed or the allowable level of activity of waste that can be disposed of in a sink.

4.2.4.1 Tank 101. Tank 101 receives intermediate-activity liquid waste from the 222-S Analytical Laboratory. The hot-waste drain system from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility tanks is shown in Drawing H-2-93451 in Appendix 4A. Waste routed to tank 101 is generated from hood drains, decontamination hoods, hot laboratory sinks, and the inductively coupled plasma instrument. The waste is routed to tank 101 by way of two 4-inch- (10.2-centimeter-) diameter stainless steel lines. The 4-inch (10.2-centimeter-) diameter lines are encased in a concrete pipe trench from the point of exit from the 222-S Analytical Laboratory to the point of entry into the 219-S Waste Handling Facility vault.

The contents of tank 101 are transferred to tank 102 for treatment. The engineering flow diagram for the 219-S Waste Handling Facility is shown in Drawing H-2-93452 in Appendix 4A. This diagram details the connections between tanks 101, 102, and 103. Transfer of radioactive solutions between tanks is accomplished remotely by using a 75-gallon-per-minute (284-liter-per-minute) steam-motivated transfer jet (Drawing H-2-93452 in Appendix 4A). The transfer jet creates a negative pressure on a dip leg (submersed transfer

line) in the tank. The steam jet has few maintenance requirements, and thus minimizes personnel exposure to radiation. The transfer jet is supplied with steam and air by way of a gang valve. The instrument panel for the system is located in the operating gallery and is shown in Figure 4-4.

A surveillance/transfer log is prepared for transfer of waste from tank 101 to tank 102. The controls and indicators that must be monitored during waste transfer, including a calculated weight factor, tank level, and radiation level of the gang valve to indicate proper separation during transfers, are recorded in the log.

4.2.4.2 Tank 103. Tank 103 receives high-activity liquid mixed waste generated during 222-S Analytical Laboratory operations from the hot-cell drains, the manipulator repair hood, the atomic absorption spectrophotometer, the vacuum transfer devices in decontamination hoods, and from tunnel sumps (Drawing H-2-93451 in Appendix 4A). This waste is routed to tank 103 by way of a 4-inch (10.2-centimeter) stainless steel line. This 4-inch (10.2-centimeter) line is encased in the concrete pipe trench described in Section 4.2.2.1 (Drawing H-2-5387 in Appendix 4A). Nonhazardous waste collected in tunnel sump T-7 also can be diverted to the 207-SL Retention Basin, and sumps T-4 and T-8 waste can be diverted to tank 101, but waste normally is diverted to tank 103.

The contents of tank 103 are transferred into tank 102 using a 75-gallon-per-minute (284-liter-per-minute) steam-motivated jet. This transfer jet is designed and operated in the same manner as the steam jet at tank 101. The transfer is similar to that described for tank 101 in Section 4.2.4.1.

Tank 103 is equipped with remote sampling capabilities so that samples can be taken before transfer of the tank contents to tank 102. This sampling step is performed to determine the proper mixture of tank 101 and tank 103 contents to be transferred to tank 102 if a mixture of the two tanks is to be treated. Tank 103 is designed to serve as the back-up treatment tank and therefore is equipped with an agitator (Drawing H-2-93452 in Appendix 4A).

4.2.4.3 Tank 102. Tank 102 is the primary treatment tank for the 219-S Waste Handling Facility and receives batches of waste from tank 101 and/or tank 103. The volume of waste treated in tank 102 and the frequency of treatment vary depending on the laboratory workload and decontamination activities. Treatment occurs on a batch basis when sufficient volume has accumulated in tank 101 and/or tank 103. Before treatment, the waste collected in tank 102 is analyzed to determine the proper amount of sodium hydroxide and sodium nitrite required for treatment. Before transfer from tank 102, the waste is analyzed to determine if Double-Shell Tank System waste acceptance criteria are met.

Based on sample analysis, the laboratory determines the caustic ratio (pounds of sodium hydroxide required per gallon of waste in tank 102) to achieve a pH greater than or equal to 12.5. After the amount of caustic necessary has been calculated and added to the tank, a second sample is taken to ensure that the solution is above the required pH. The correct amount of sodium nitrite (to achieve greater than or equal to 600 parts per million) is

added. The caustic is transferred from tank 201, the caustic storage tank, in the operating gallery. The caustic storage tank is shown in Drawing H-2-93452 in Appendix 4A.

The volume of the caustic storage tank 201 can be read in gallons from the gage on instrument panel number 3 (Figure 4-4) or in feet from the digital level monitor mounted on the north wall above the caustic pump. The tank level in feet can be converted to gallons by using the conversion table provided in the operating gallery.

Samples are collected in the sample gallery from a lead sample box, which contains a sample riser, a 4-milliliter sample-cup air jet, and a pH probe. The pH probe has a digital readout located on the north wall of the sample gallery and a chart recorder on panel 1 in the operating gallery. Solutions of known pH can be fed into the pH probe to check the operation of the probe. Tank 102 normally is sampled and pH adjusted at the 3,000-gallon (11,356-liter) level. The working volume in the tank after pH adjustment is 3,600 gallons (13,630 liters). The high-level alarm is set slightly below the working volume as an added safety precaution.

Sampling is performed with a portable bayonet sampler that is designed to seal the sample riser during operation and to create a vacuum in a sample pipette during the sampling. The sample box is enclosed by a hood to contain any airborne radioactivity that might be present. The hood exhaust is operated during sampling. The sample gallery is monitored continuously by a beta-gamma continuous air monitor, which is equipped with a beacon and audible alarm to alert personnel to the presence of airborne contamination in the sample gallery.

The first step in the treatment of the contents in tank 102 is the collection of a sample to determine the proper amount of caustic and nitrite to be added. A second sample is taken after chemical addition to demonstrate that the contents meet the requirements for transfer to the Double-Shell Tank System. The tank agitator operates during pH adjustment to prevent spot heating or boiling caused by the addition of large quantities of caustic to an acid solution. A tank 102 transfer record is completed before shipment. The information required includes the amount of chemicals added during treatment, laboratory analytical results, transfer time, weight factor, and the volume of water used for flushing.

Following treatment, the contents in tank 102 are transferred to the Double-Shell Tank System by way of a tank trailer or underground piping. Waste transfer to the Double-Shell Tank System must occur within 16 hours after analysis of the contents, or a new sample must be obtained and analyzed. Timely transfer of tank 102 contents ensures that the nitrite concentration is within specifications before delivery to the Double-Shell Tank System.

4.2.4.4 Tank Trailer Transfer. A 5,000-gallon (18,900-liter) stainless steel tank trailer is used for the transfer of waste from tank 102 to the Double-Shell Tank System. Tank trailer transfers are made during daylight hours only when wind speed is less than 15 miles per hour (24 kilometers per hour), and

are not made during inclement weather. Sufficient time is allowed for transportation and receipt at the Double-Shell Tank System during daylight.

A laboratory waste transfer data sheet is used to initiate the transfer of the contents of tank 102 to the tank trailer. This data sheet summarizes the laboratory analytical results reported on the tank 102 transfer record and records the amount of waste received in the tank trailer and the receiving tank volume. This form also specifies the Double-Shell Tank System waste acceptance criteria that each transfer volume must meet before transfer. A land disposal restriction notification also is completed before transfer. A minimum of two operations personnel and a health physics technician must be present during the transfer. A diagram of the tank trailer valving is shown in Figure 4-5.

Following the transfer of waste to the tank trailer, but before the tanker can depart for the Double-Shell Tank System, a tank trailer liquid waste survey sheet is completed. This survey is performed by health physics technicians and is required to determine whether the radiation levels at the tanker surface are within health and safety specifications. This survey visually confirms the integrity of the tanker structure and that there have been no spills of tank 102 contents on the tank trailer.

4.2.4.5 Transfer by Underground Piping. Liquid waste from tank 102 also is transferred through underground piping to the Double-Shell Tank System. A steam jet provides the motive force for the transfer. A laboratory waste transfer data sheet is used to initiate the transfer to the Double-Shell Tank System through the underground pipeline. This sheet summarizes the laboratory analytical results reported on the tank 102 transfer record and records the amount of waste received in the Double-Shell Tank System. A land disposal restriction notification also is completed before transfer.

The waste is transferred from tank 102 using the steam jet. Following transfer of the liquid waste from tank 102, the transfer piping is blown down with air and flushed with water to remove waste residuals from the pipeline.

4.2.5 Secondary Containment Requirements for Tanks Storing or Treating Waste F020, F021, F022, F023, F026, F027 [D-2f]

The tanks are not used to store or treat waste F020, F021, F022, F023, F026, and F027. Therefore the requirements of WAC 173-303-640 are not applicable to the 219-S Waste Handling Facility.

4.2.6 Labels or Signs [D-2g]

The tanks used to treat and/or store mixed waste are belowground vaulted tanks. The abovegrade portions of the 219-S Waste Handling Facility have signs posted regarding the presence of corrosive and radioactive waste. The area of the cover blocks is roped off with radiation markers and is posted with a "CORROSIVE" sign and a hazardous waste label on the cover blocks. In

addition, there are "NO SMOKING", and "DANGER UNAUTHORIZED PERSONNEL KEEP OUT" signs posted on the operating gallery doors.

4.2.7 Air Emissions [D-2h]

The 219-S Waste Handling Facility has two air emission sources, the 296-S-23 and 296-S-16 stacks. In the following sections, waste characterization and design information is presented for the 219-S Waste Handling Facility ventilation systems and emission sources. Waste characterization information is included as it relates to the ventilation system design. Any discussion of the methodology and requirements pertaining to treatment or storage of radionuclides in this permit application is included for information only.

4.2.7.1 Waste Characterization. Ecology regulations require that tank systems containing extremely hazardous waste that is acutely or chronically toxic by inhalation be designed to prevent the escape of vapors, fumes, or other emissions into the air [WAC 173-303-640(5)(e)]. Although the airborne emissions from the 219-S Waste Handling Facility are not acutely nor chronically toxic by inhalation, information on the ventilation system design is presented in the following sections.

4.2.7.1.1 Radioactive Waste. Two airborne radioactive waste streams are generated at the 219-S Waste Handling Facility. The airborne effluent streams result from ventilation of the 219-S Waste Handling Facility tanks and vaults and the sample gallery (WHC 1990d). Emissions from 219-S Waste Handling Facility are treated using HEPA filters before discharge into the atmosphere. Normal operation of the 219-S Waste Handling Facility ventilation systems does not result in airborne effluents in excess of the guidelines in U.S. Department of Energy Order 5400.5 ($2x10^{-11}$ microcuries per liter alpha and $9x10^{-9}$ microcuries per liter beta).

4.2.7.1.2 Nonradioactive Waste. Phase-separated organics are not allowed in the 219-S Waste Handling Facility radioactive waste system. Therefore, the low concentrations of volatile and semivolatile organics present in the 219-S Waste Handling Facility are not expected to be released through the ventilation system in regulated quantities. Theoretical emissions for volatile organics from the 296-S-16 Stack have been calculated and are provided in Appendix 4D. Conservative assumptions were used to estimate emissions from a typical aqueous waste containing hexone, xylene, ethylbenzene, propanol, and ethanol (Chapter 3.0, Table 3-3). Based on the conservative theoretical calculations, the concentration of these compounds are significantly below National Institute of Occupational Safety and Health occupational exposure limits. The airborne emissions would not pose a health risk to workers at the 222-S Complex or to offsite receptors. Because the theoretical calculations indicate that the emissions are at safe levels, monitoring of the airstream for organic pollutants is not warranted.

4.2.7.2 Ventilation System Design. Air emissions from the 219-S Waste Handling Facility originate from the tank ventilation system and the sample gallery fume hood. The 219-S Waste Handling Facility sample gallery hood

discharges to the 296-S-23 Stack. The tank ventilation system discharges through the 296-S-16 Stack. The ventilation systems are designed, constructed, and maintained to remove radioactive particulate materials and entrained droplets from gaseous effluent so that the emissions meet specified concentration guidelines (DOE Order 5480.1A). A discussion of the design of the ventilation and effluent control systems for these sources is provided in the following sections.

4.2.7.2.1 The 296-S-23 Stack. This stack exhausts the sample gallery hood in the 219-S Waste Handling Facility. Air is drawn through the sample gallery into the hood and exhausted to the 296-S-23 Stack. Mixed waste materials are present in the sample gallery only during sampling of the 219-S Waste Handling Facility tanks. The only source of mixed waste materials is the sample box in the 219-S Waste Handling Facility vault. The sample box contains liquid drawn from the tanks as samples. The air exhausted from the sample box is similar in composition to the air exhausted from the tanks into the 296-S-16 Stack.

Hood design is such that a minimum velocity of 125 feet (38.1 meters) per minute is maintained across the face of the sample gallery hood during operation. This results in a normal flow rate of 800 cubic feet (22.7 cubic meters) per minute through the system. The hood is operated from 1 to 4 hours per month when samples from the 219-S Waste Handling Facility tanks are being collected. The hood normally is not operated except during sampling.

The sample gallery hood exhaust is treated using a HEPA filter before discharge. The effluent properties should be similar to the properties of the 296-S-16 Stack emissions (Section 4.2.7.2.2), as the hood ventilates a representative sample from the 219-S Waste Handling Facility tanks, and the liquid sample is the only source of contamination in the tanks and sample gallery. The sample gallery hood exhaust does not use a demister to remove entrained liquid because no mist is generated in the sample box.

Because of its low annual discharge rate, the sample gallery exhaust stream is not sampled or monitored. The HEPA filter system is tested using dioctylphthalate (or an equivalent) annually to ensure that the particulate-removal efficiency is at least 99.95 percent for particulates 0.3 micron or greater in size. Filters that do not meet this criterion are replaced. New filters are tested in place for particulate removal efficiency before being used.

4.2.7.2.2 The 296-S-16 Stack. The 219-S Waste Handling Facility tanks are maintained at a negative pressure with respect to atmospheric pressure. This requires that the tanks be ventilated. Exhaust air from tank ventilation is discharged through the 296-S-16 Stack.

The tanks are ventilated using a single fan. Normal flow through the 219-S Waste Handling Facility tank ventilation system is 140 cubic feet (4 cubic meters) per minute. Supply air is prefiltered and routed to each tank. A single effluent duct at the top of each tank is used to route the effluent to the tank 105 demister. The effluent passes through the

tank 105 demister, which removes entrained droplets from the gaseous stream to prevent damage to the downstream HEPA filter. The gaseous effluent passes through a single HEPA filter before being discharged into the atmosphere through the 296-S-16 Stack.

The effluent is monitored for radionuclides and analyzed weekly for total alpha and total beta activity. Volumetric flow rate and pressure are monitored. Other chemical species are not sampled in this effluent stream. Release limits of total alpha and total beta activity are based on plutonium-239 and strontium-90, respectively. The allowable discharge concentration of total alpha (based on plutonium-239) is $2x10^{-11}$ microcuries per liter. The allowable discharge concentration of total beta (based on strontium-90) is $9x10^{-9}$ microcuries per liter. If these limits are exceeded, the potential sources of excess contamination are investigated. The ventilation system can be shut down manually.

All HEPA filters are tested annually for removal efficiency using dioctylphthalate or an equivalent. Filters that fail to meet the removal-efficiency criterion of 99.95 percent of particulates 0.3 micron or greater in size are replaced with new filters. New filters are tested in place before being used during normal operations.

4.2.8 Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste in Tanks (D-2i)

The measures to prevent the reaction of ignitable, reactive, or incompatible wastes are described in the following sections.

4.2.8.1 Management of Ignitable or Reactive Waste in Tanks [D-2i(1)]. Mixed waste managed in the 219-S Waste Handling Facility does not exhibit the characteristics of ignitability. Further, the waste does not fulfill the requirements of the reactivity characteristic. It is stable and, because of its aqueous nature, does not react with water.

4.2.8.2 Management of Incompatible Waste in Tanks [D-2i(2)]. The waste-feed types treated at the 219-S Waste Handling Facility are compatible. The 219-S Waste Handling Facility tank waste is sampled and analyzed before transfer to the Double-Shell Tank System to ensure that the waste will be compatible with the waste stored in the Double-Shell Tank System.

4.3 WASTE PILES [D-3]

Operation of the 222-S Complex does not involve the placement of dangerous waste in piles. Therefore, the requirements of WAC 173-303-660 are not applicable to the 222-S Complex.

4.4 SURFACE IMPOUNDMENTS [D-4]

Operation of the 222-S Complex does not involve the placement of dangerous waste in surface impoundments. Therefore, the requirements of WAC 173-303-650 are not applicable to the 222-S Complex.

4.5 INCINERATORS [D-5]

Operation of the 222-S Complex does not involve incineration of dangerous waste. Therefore, the requirements of WAC 173-303-670 are not applicable to the 222-S Complex.

4.6 LANDFILLS [D-6]

Operation of the 222-S Complex does not involve the placement of dangerous waste in landfills. Therefore, the requirements of WAC 173-303-665 are not applicable to the 222-S Complex.

4.7 LAND TREATMENT [D-7]

Operation of the 222-S Complex does not involve the land treatment of dangerous waste. Therefore, the requirements of WAC 173-303-655 are not applicable to the 222-S Complex.

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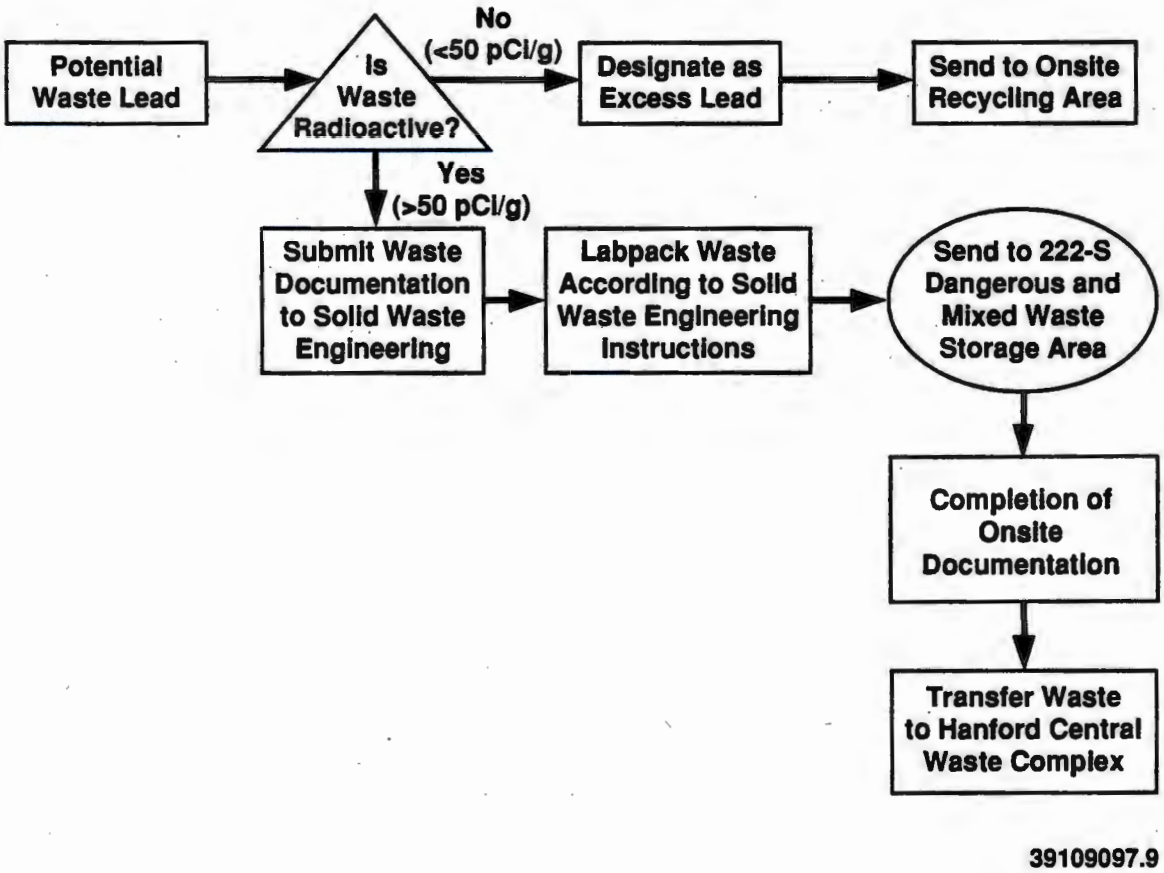

Figure 3-1. Waste Handling for Solid Mixed Waste - Lead Waste.

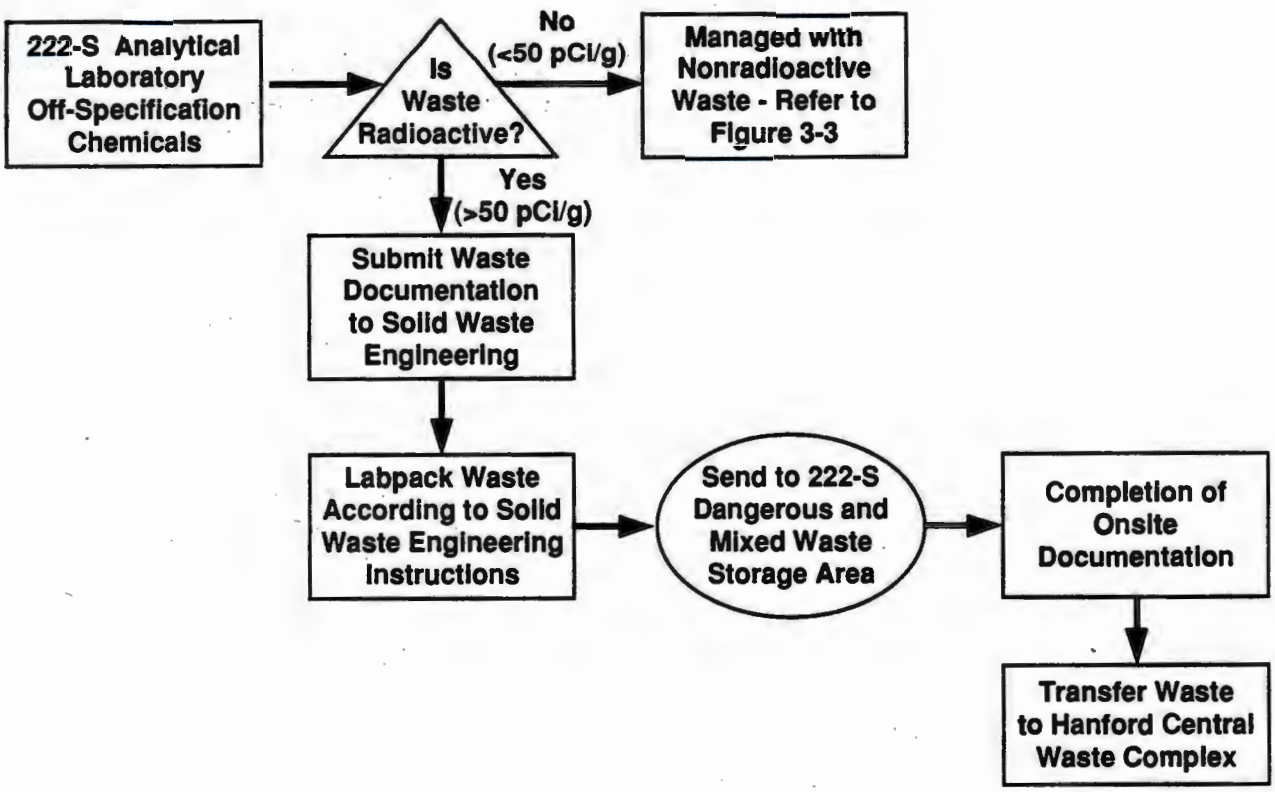

Figure 3-2. Waste Handling for Solid Mixed Waste - Laboratory Chemicals.

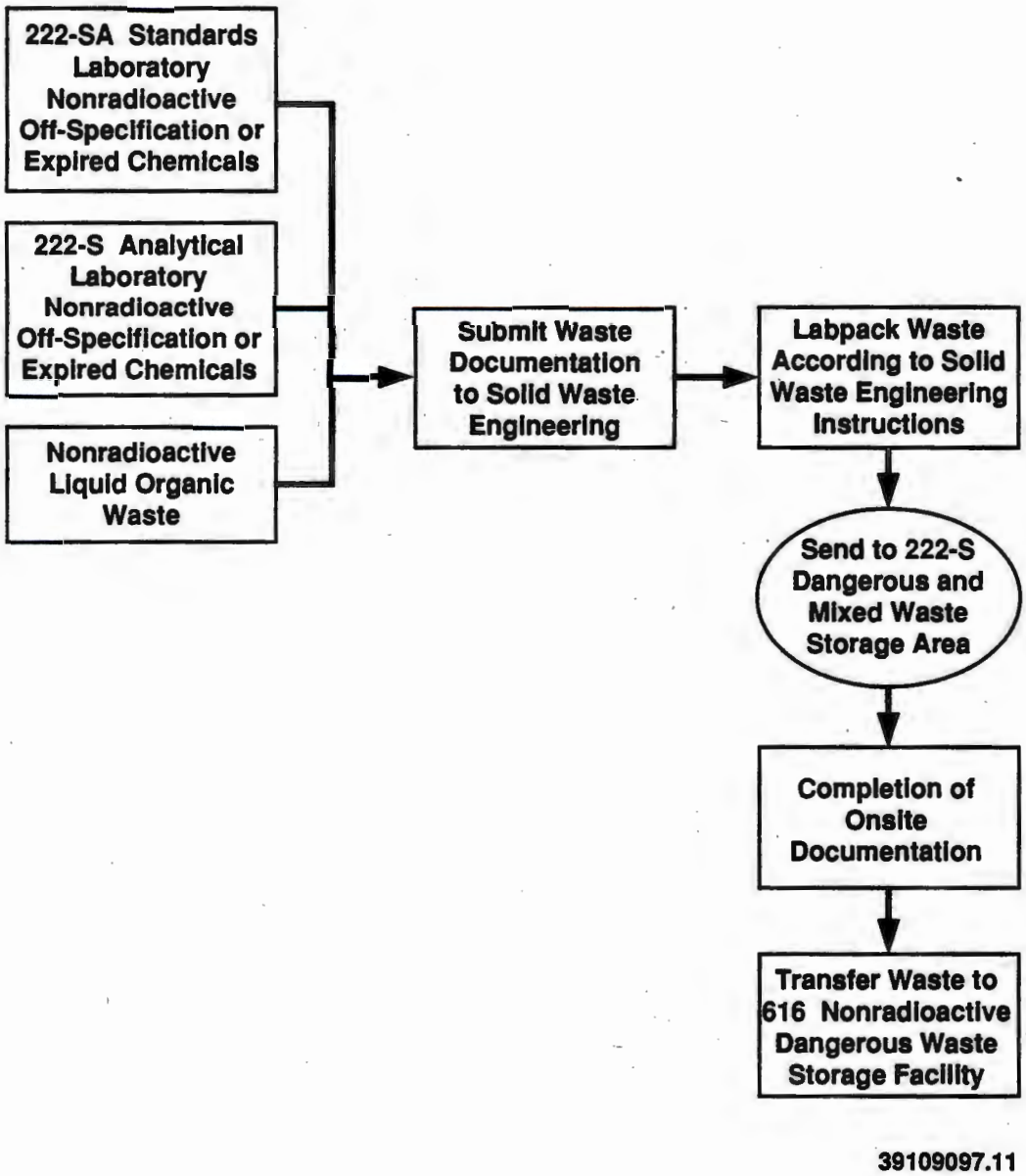

Figure 3-3. Waste Handling for Nonradioactive Dangerous Waste.

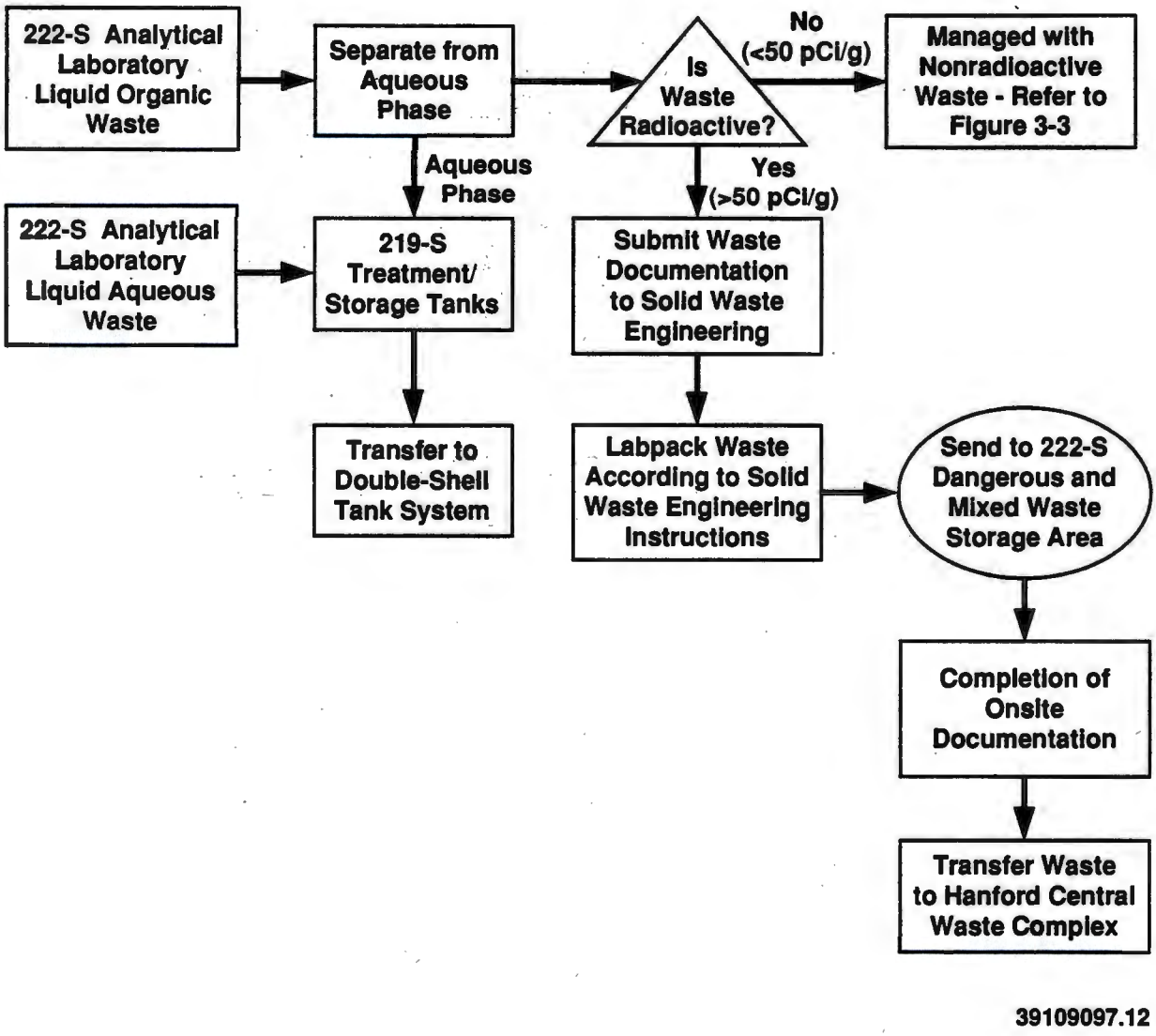

Figure 3-4. Waste Handling for Mixed Liquid Organic Waste.

Table 3-1. Waste Codes of Materials Stored at the 222-S Dangerous and Mixed Waste Storage Area.

Waste code	Reference	Waste type
F numbers	WAC 173-303-082/9904	Dangerous waste sources
WT01/WT02	WAC 173-303-101/104	Toxic
WP01	WAC 173-303-102/104	Persistent
WC01/WC02	WAC 173-303-103/104	Carcinogenic
D001	WAC 173-303-090(5)	Ignitable
D002	WAC 173-303-090(6)	Corrosive
D003	WAC 173-303-090(7)	Reactive
D004-D038	WAC 173-303-090(8)	Toxicity characteristic

Table 3-2. Sample Results for One Waste Batch from Tank 102 of the 219-S Waste Handling Facility.

Constituent	WAC Code	Concentration (parts per million)
Hexone	F003	1.220
Xylene	F003	0.085
Acetone	F003	0.108
Ethyl benzene	F003	0.007
Propanol		0.094
Ethanol		0.860
Strontium		3.270
Zinc		12.200
*Calcium		14.000
Sodium		5,276.000
*Nickel		0.314
*Copper		0.491
*Vanadium		0.116
Aluminum		5.730
*Manganese		1.716
Potassium		14.300
Iron		11.100
*Magnesium		3.590
*Chromium		0.569
Lead	D008	13.300
Boron		1.120
Nitrite	WT01	1,999.000
Nitrate		540.000
Sulfate		250.000
Fluoride		15.450
Chloride		320.800
Hydroxide	D002	1,700.000

* Source of cation from raw water impurities.

Source: Waste Analysis Plan for the 219-S Waste Handling Facility (Appendix 3A).

Table 3-3. 219-S Waste Handling Facility Waste Stream Designation Summary.

WAC code	Reason
F003	Nonhalogenated spent solvents
F005	Methyl isobutyl ketone
D002	Corrosive/caustic
D008	Toxic lead
WT02	Toxic waste mixture
D004	Toxic arsenic
D005	Toxic barium
D006	Toxic cadmium
D007	Toxic chromium
D009	Toxic mercury
D010	Toxic selenium
D011	Toxic silver

Table 3-4. 219-S Waste Handling Facility Tank 102 Dangerous Waste Mixture Constituents from One Waste Batch (Inorganics).

Compound	Toxic category[a]	Concentration (molarity)	Weight (percent)
Sodium hydroxide ($NaOH$)	C	1.0 E-01	0.394
Sodium nitrite ($NaNO_2$)	X	2.9 E-02	0.197
Sodium chloride ($NaCl$)	D	8.8 E-03	0.0507
Sodium fluoride (NaF)	C	4.4 E-04	0.00182
Sodium sulfate (Na_2SO_4)	-	2.0 E-03	0.0279
Sodium nitrate ($NaNO_3$)	D	8.7 E-02	0.728
Aluminum sulfate ($Al_2 (SO_4)_3$)	-	1.0 E-04	0.0014788
Strontium nitrate ($SrNO_3$)	D	3.7 E-05	0.000542
Zinc fluoride (ZnF_2)	C	1.8 E-04	0.001834
Iron (III) chloride ($FeCl_3$)	C	1.9 E-04	0.00303
Potassium sulfate (K_2SO_4)	-	1.8 E-04	0.00309
Water (H_2O)	-	-	98.59
Total			100

[a] As defined in WAC 173-303-084(5)(a)
Source: Waste Analysis Plan for the 219-S Waste Handling Facility (Appendix 3A).

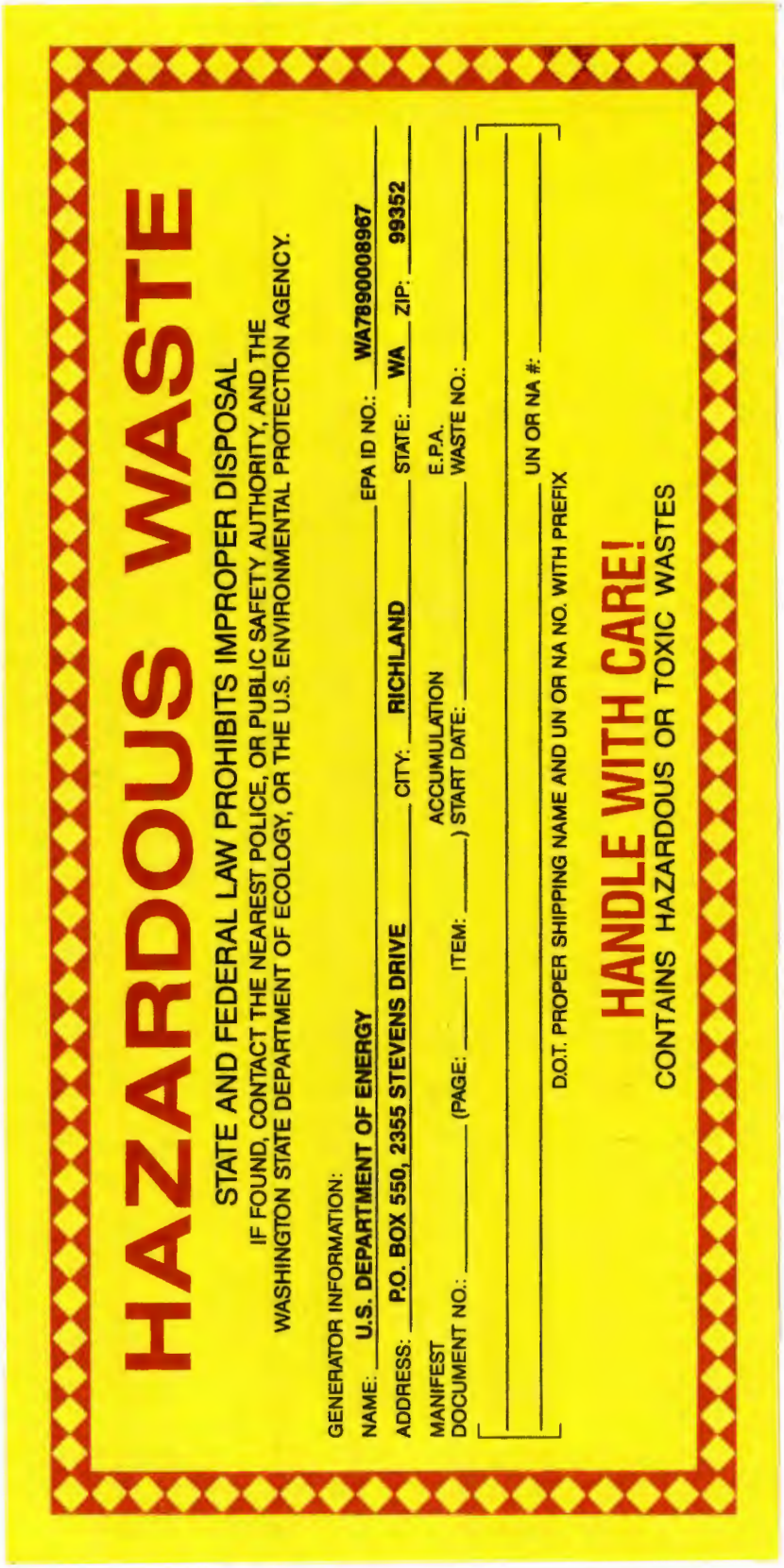

Figure 4-1. Typical Hazardous Waste Label.

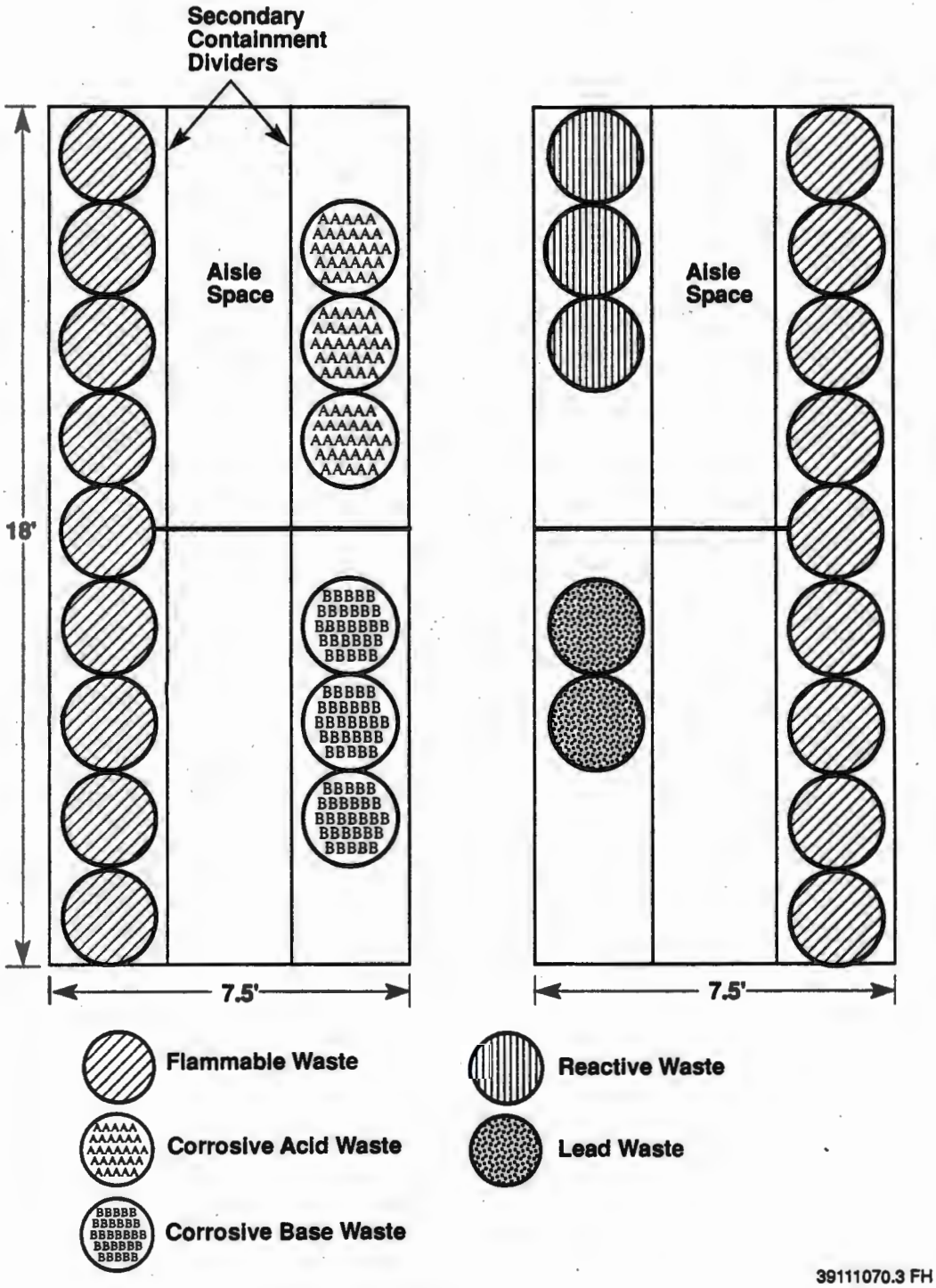

Figure 4-2. Typical Incompatible Waste Storage Configuration.

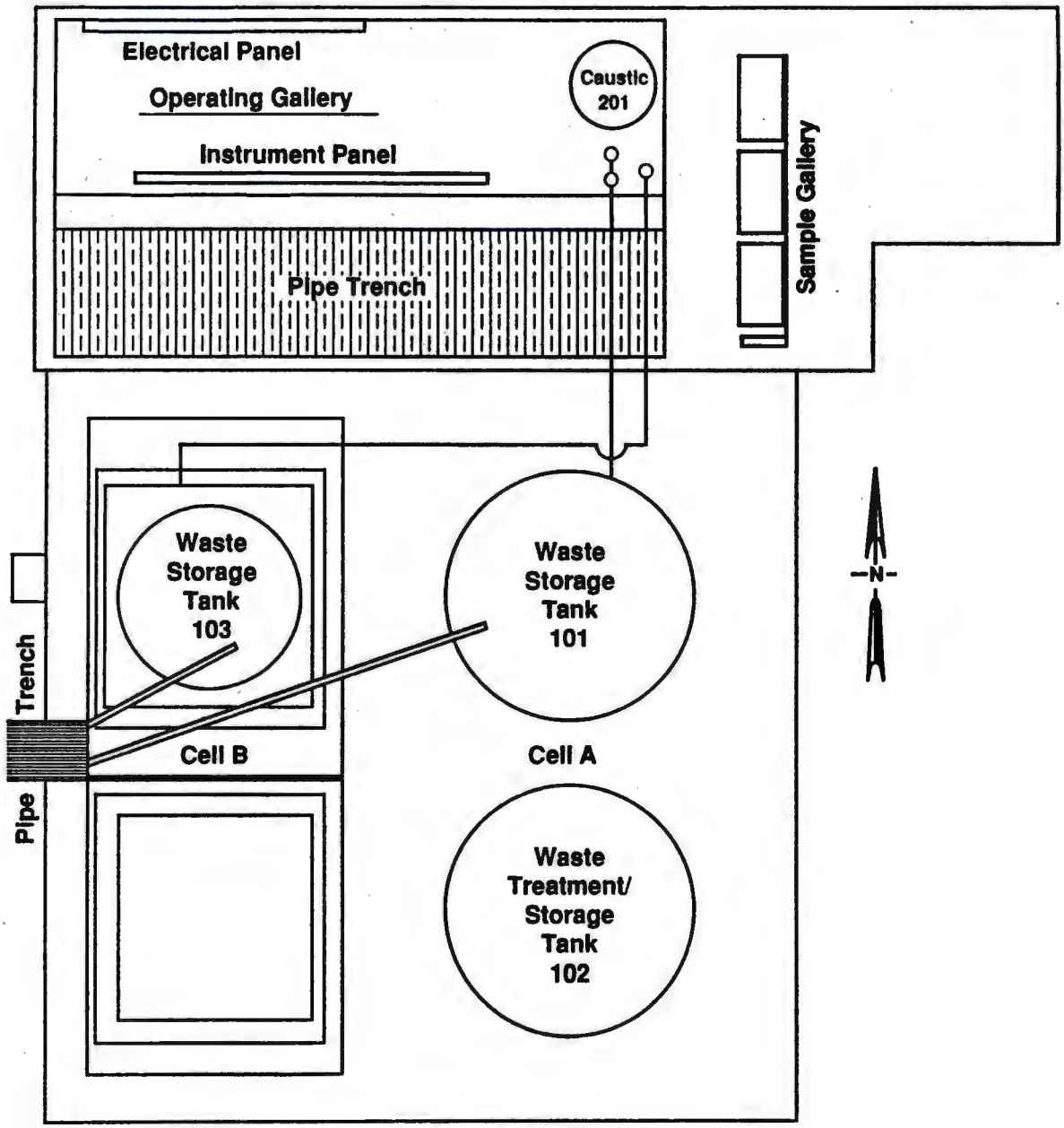

Figure 4-3. Plan View of 219-S Waste Handling Facility.

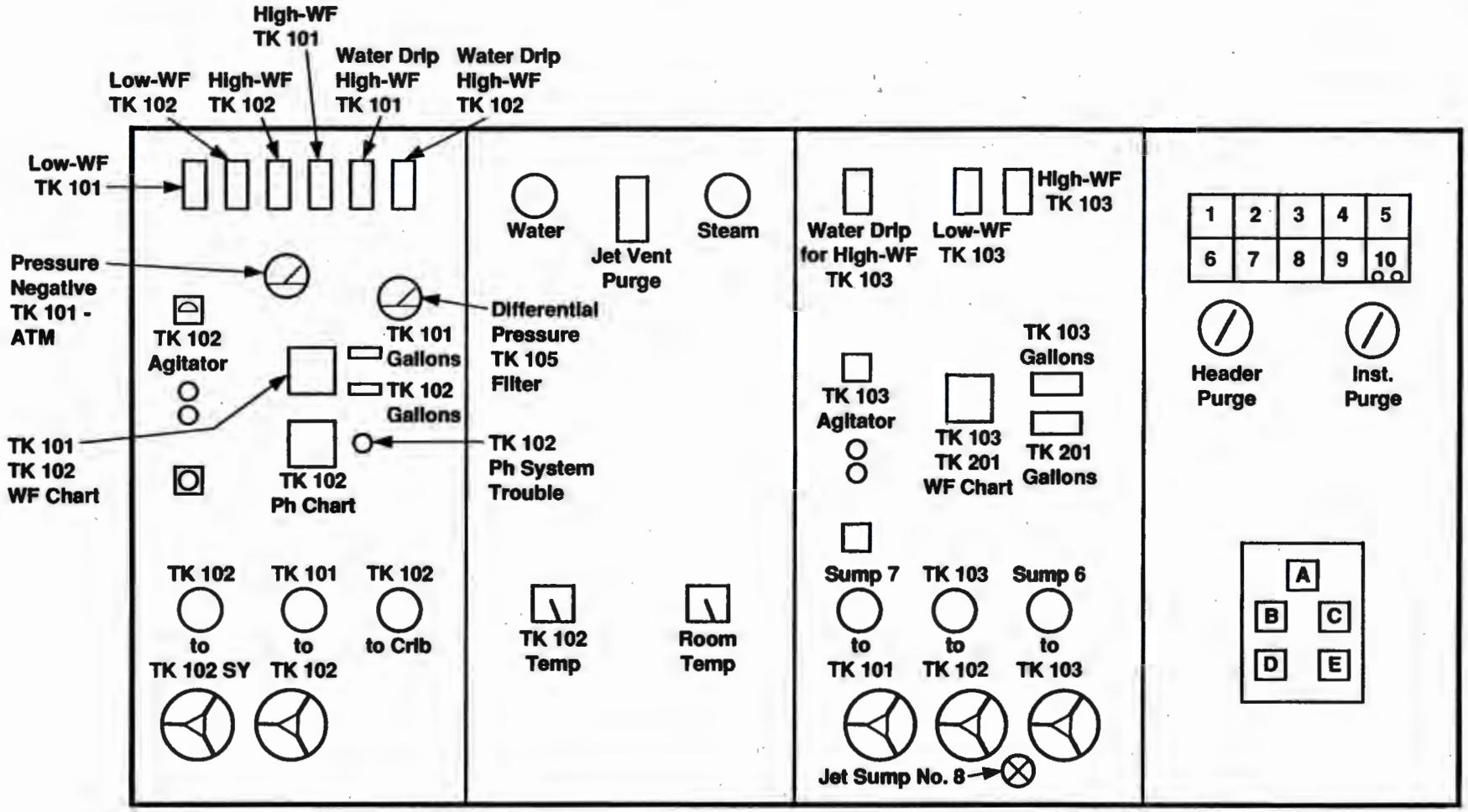

Figure 4-4. Instrument Panel Diagram.

LEGEND

1. Sump No. 8 High Liquid Level
2. TK 102 High Liquid Level
3. TK 103 High Liquid Level
4. Cell A High Liquid Level
5. Cell B High Liquid Level
6. Emergency Assistance Alarm 219-S
7. TK 105 Filter High D/P
8. TK 101 High Liquid Level
9. 219-5-16 Stack Record Sampler Low Flow
10. Test Buttons (Silence/Test)

A. 207-SL Retention Basin Waste Transfer
B. 207-SL to Tank Farms (Open)
C. 102 to Tank Farms (Open)
D. Valve 2V-103-1 (Closed)
E. Valve 2V-141-1 (Closed)

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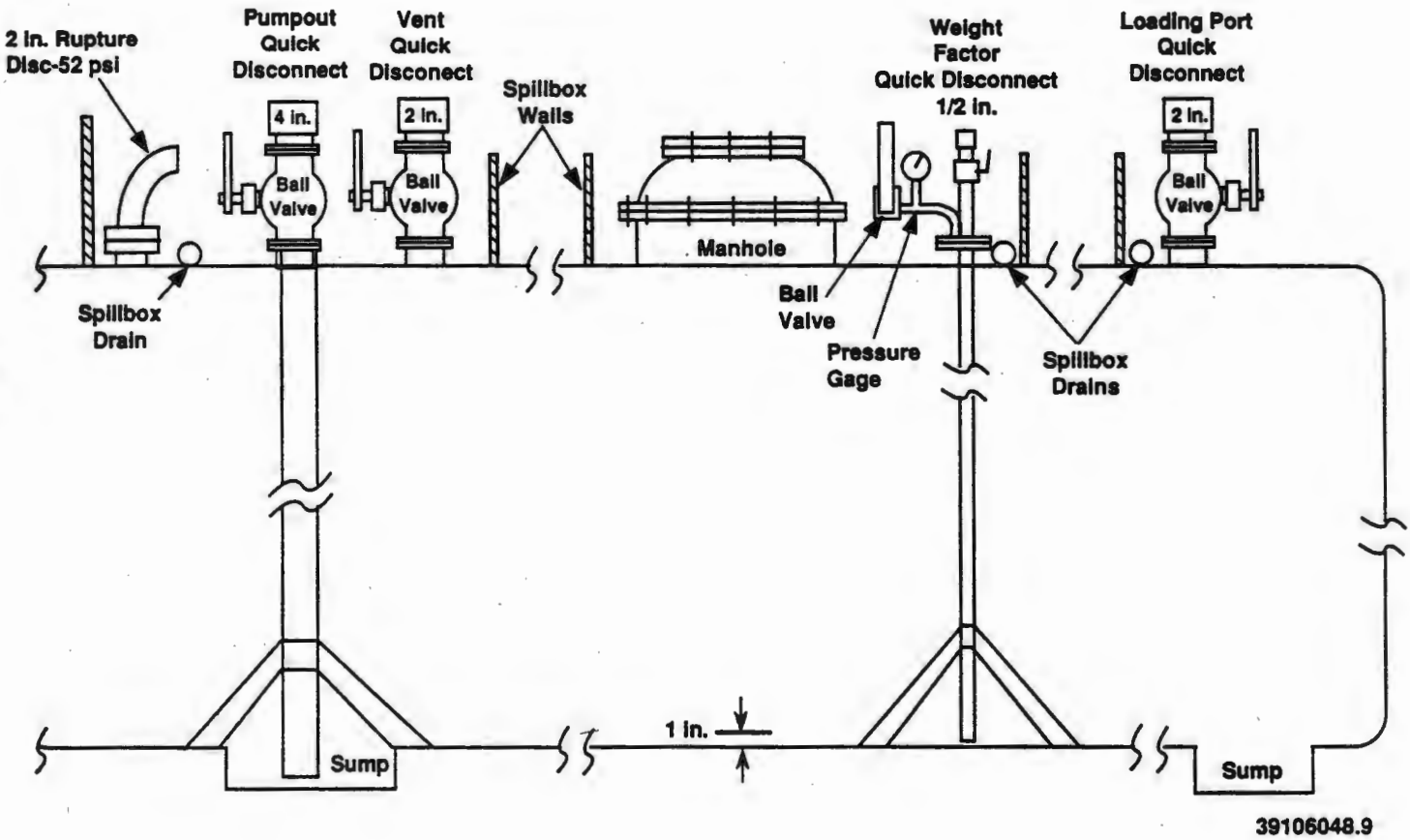

Figure 4-5. Tank Trailer Valving Diagram.

Table 4-1. Typical Equipment Used in Containerizing Waste for Storage in the 222-S Dangerous and Mixed Waste Storage Area.

Inner Containers
• Polyethylene bottles with liquid-tight screw-on lids • Glass bottles with liquid-tight screw-on lids • Polyethylene bags • 2-inch- (5-centimeter-) wide reinforced cloth tape • Slip-lid cans
Absorbent Materials
• Absorbent pads (for organics): cotton batting woven into mesh, 1-quart (1-liter) capacity each • Absorbent material (for aqueous or organics): gray polyethylene absorbent material, 1-quart (1-liter) capacity each • Fine clay granular absorbent (for aqueous materials primarily) • Diatomaceous earth (for inorganics, especially acids) • Amorphous silicate for organic or inorganic liquids other than acids) • Fine-grained pillow (for inorganics) • Nontreated clay-based absorbents (for inorganics)
Outer Containers
• DOT 17-C steel drums with solid lid, seal ring, locknut, and bolt • DOT 17-H steel drums with solid lid, seal ring, locknut, and bolt • 10-gallon (38-liter) steel drums with lids and closures • 30-gallon (114-liter) steel drums with lids and closures • 55-gallon (208-liter), 90-mil (2.3 millimeter) polyethylene liners
Labels
• Bottle identification labels • DOT radioactive labels • EPA hazardous waste labels • DOT hazard class diamond-shaped labels

DOT = U.S. Department of Transportation.
EPA = U.S. Environmental Protection Agency.

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5.0 GROUNDWATER MONITORING [E]

The 219-S Waste Handling Facility, a waste treatment and storage unit, and the 222-S Dangerous and Mixed Waste Storage Area, a waste storage unit, are contained within the 222-S Complex. These units are 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, groundwater monitoring is not required.

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6.0 PROCEDURES TO PREVENT HAZARDS [F]

This chapter discusses security, inspection schedules, preparedness and prevention requirements, preventive procedures, structures, equipment, and prevention of reaction of ignitable, reactive, and incompatible waste treated and/or stored in the 222-S Complex.

6.1 SECURITY [F-1]

The following sections describe security measures, equipment, and warning signs used to control entry to the 222-S Complex and the two associated treatment and/or storage units.

6.1.1 Security Procedures and Equipment [F-1a]

The following sections describe the 24-hour surveillance system, barrier, and warning signs used to provide security and control access to the entire 222-S Complex, including the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area.

6.1.1.1 24-Hour Surveillance System [F-1a(1)]. The entire Hanford Facility is a controlled access area and is expected to remain so for the foreseeable future. The Hanford Facility maintains around-the-clock surveillance for protection of government property, classified information, and special nuclear material. The Hanford Patrol maintains a continuous presence of armed guards to provide Hanford Facility security.

6.1.1.2 Barrier and Means to Control Entry [F-1a(2),(2a),(2b)]. Manned barricades are maintained around the clock at checkpoints on vehicular access roads leading to the operational areas of the Hanford Facility. All personnel accessing these areas must have a U.S. Department of Energy-issued security identification badge indicating the appropriate authorization. Personnel also might be subject to a search of items carried into or out of these areas.

Within the Hanford Facility are operational areas to which access is further restricted. The 222-S Complex is located in one such operational area, the 200 West Area. Access to the 200 West Area is gained through one of two manned barricades. All personnel entering or leaving the 200 West Area are required to have a U.S. Department of Energy-issued security identification badge indicating authorization to enter the area, and must submit to a search of vehicles and personal items carried into and out of the area.

The treatment and storage areas within the 222-S Complex also are secured. The 222-S Dangerous and Mixed Waste Storage Area structures are kept locked. The doors to the 219-S Waste Handling Facility operating gallery and sample gallery also are kept locked. There is no ready access to the tank

vaults, which are covered with concrete cover blocks that are removable only by crane.

6.1.1.3 Warning Signs [F-1a(3)]. The 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area are posted with several warning signs. The signs are visible from all angles of approach, are legible from a distance of 25 feet (7.6 meters), and are printed in English.

The 219-S Waste Handling Facility operating gallery door is posted with the following signs:

- "NO SMOKING"
- "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"
- "219-S WASTE HANDLING FACILITY."

In addition, the cover blocks over the treatment and storage tanks are labeled with "HAZARDOUS WASTE" and "CORROSIVE" signs. "RADIATION ZONE" and "SURFACE CONTAMINATION" warning signs and safety roping have been placed around the tank vaults.

The doors of the 222-S Dangerous and Mixed Waste Storage Area are posted with the following signs:

- "POSITIVELY NO SMOKING OR OPEN FLAMES ALLOWED"
- "CAUTION - RADIATION AREA"
- "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"
- "DANGEROUS AND MIXED WASTE STORAGE AREA."

6.1.2 Waiver [F-1b]

Waiver of the security procedures and equipment requirements for the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area will not be requested. Therefore, the requirements of WAC 173-303-310(1)(a) and (b) are not applicable to the units at the 222-S Complex.

6.2 INSPECTION SCHEDULE [F-2]

This section describes the method and schedule for inspection of the 222-S Complex. The purpose of inspections at the 222-S Complex is to help ensure that situations do not exist that might cause or lead to the release of radioactive, dangerous, and/or mixed waste into the environment or pose a threat to human health. Abnormal conditions identified by inspections must be corrected on a schedule that prevents hazards to workers, the public, and the environment.

6.2.1 General Inspection Requirements [F-2a]

The content and frequency of inspections are described in this section. The inspection checklists and schedule are kept in the inspection log books, which are maintained in the 222-S Complex files. Inspection checklists are retained for a minimum of 5 years. The inspection checklists consist of a listing of items that are to be visually assessed during each inspection. A yes/no response is made for each listed item. A "yes" response means that the item is in compliance with the conditions stated on the checklist. Any problems identified during the inspection, as indicated by a "no" response on the checklist, are immediately reported to the 222-S Complex management. All monitoring equipment, including liquid level alarms and gages; safety and emergency equipment such as spill kits; locks and other security devices; and other operating and structural equipment that help prevent, detect, or respond to potential hazards to public health or the environment, are included on the inspection checklists.

6.2.1.1 Types of Problems [F-2a(1)]. The 219-S Waste Handling Facility is inspected to assess the following conditions:

- Condition of the sample gallery and operating gallery--Are the entrances secured? Is there any sign of steam or water leaks? Are the required warning signs present?

- Condition of the process control equipment--Are the chart recorders operating? Do the panel lights illuminate when tested?

- Condition of emergency equipment--Is the proper fire extinguisher nearby? Has it been inspected recently? Is the appropriate chemical spill kit or emergency spill cleanup equipment nearby?

The 222-S Dangerous and Mixed Waste Storage Area is inspected to assess the following three major conditions associated with each storage structure:

- Condition of storage structure--Is the 222-S Dangerous and Mixed Waste Storage Area locked correctly? Is there any sign of release within the 222-S Dangerous and Mixed Waste Storage Area? Are the required warning signs present?

- Condition of containers--Are the drums in good condition? Are the drums properly labeled? Are all drum lids properly secured?

- Condition of emergency equipment--Are fire extinguishers nearby? Have fire extinguishers been inspected recently? Is there a chemical spill kit or other emergency spill cleanup equipment nearby?

Observations made and deficiencies and corrective actions noted during an inspection are recorded on the inspection checklist. The inspector signs the completed inspection checklist, which is reviewed and approved. Once approved, the checklist is kept in the 222-S Complex files. The inspection records and dates are used to help determine any necessary corrective action and problem resolution. Problems identified during the inspections are

prioritized and addressed in a timely fashion as appropriate to mitigate health risks to workers, and maintain integrity of containers.

6.2.1.2 Frequency of Inspections [F-2a(2)]. The 219-S Waste Handling Facility is inspected daily, and the 222-S Dangerous and Mixed Waste Storage Area is inspected weekly. Inspection frequencies are indicated on the respective inspection checklists.

6.2.2 Specific Process Inspection Requirements [F-2b]

The following sections detail the specific process inspections to be performed at the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area.

6.2.2.1 Container Inspection [F-2b(1)]. The inspection checklist delineates the inspection items associated with containers. Specifically, containers within the 222-S Dangerous and Mixed Waste Storage Area are visually inspected for structural integrity, proper labeling, and lid security. Signs of release from containers and the availability of emergency response items such as fire extinguishers and spill kits are noted.

6.2.2.2 Tank Inspection [F-2b(2),(2)a-(2)f]. For personnel protection reasons, it is not possible to regularly inspect the 219-S Waste Handling Facility tanks. These tanks are not readily accessible and are contained in vaults that are covered with cover blocks that require a crane for removal. Consequently, the tank system has extensive process controls and a process monitoring system that are monitored during daily inspections. The controls are linked to a computer control system that is equipped with automated alarms. Any leakage in the tank vault or transfer lines drains to either sump 6 or sump 7. Each sump has a liquid level probe that causes an alarm to sound in the 222-S Analytical Laboratory and in the operating gallery of the 219-S Waste Handling Facility. Liquid collected in sumps is jetted back into the tanks. In addition, level probes in the tanks are set well below the maximum capacity of the tanks to prevent overflows, as discussed in Chapter 4.0, Section 4.2.2.2.

6.2.2.3 Waste Pile Inspection [F-2b(3),(3)a-(3)d]. Operation of the 222-S Complex does not involve the placement of dangerous waste in piles. Therefore, the inspection requirements of WAC 173-303-660 are not applicable to the 222-S Complex.

6.2.2.4 Surface Impoundment Inspection [F-2b(4)]. Operation of the 222-S Complex does not involve the placement of dangerous waste in surface impoundments. Therefore, the inspection requirements of WAC 173-303-650 are not applicable to the 222-S Complex.

6.2.2.5 Incinerator Inspection [F-2b(5), (5)a-(5)b]. Operation of the 222-S Complex does not involve the incineration of dangerous waste. Therefore, the inspection requirements of WAC 173-303-670 are not applicable to the 222-S Complex.

6.2.2.6 Landfill Inspection [F-2b(6), (6)a-(6)d]. Operation of the 222-S Complex does not involve the placement of dangerous waste in landfills. Therefore, the inspection requirements of WAC 173-303-665 are not applicable to the 222-S Complex.

6.2.2.7 Land Treatment Facility Inspection [F-2b(7), (7)a-(7)b]. Operation of the 222-S Complex does not involve the land treatment of waste. Therefore, the inspection requirements of WAC 173-303-655 are not applicable to the 222-S Complex.

6.3 WAIVER OR DOCUMENTATION OF PREPAREDNESS AND PREVENTION REQUIREMENTS [F-3]

The following sections document the preparedness and prevention measures used at the 222-S Complex and specifically at the the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area.

6.3.1 Equipment Requirements [F-3a]

The following sections describe the internal and external communications systems and the emergency equipment required.

6.3.1.1 Internal Communication [F-3a(1)]. Most of the 222-S Complex is equipped with internal communication systems to relay emergency or other information to personnel working in controlled areas. The internal communication systems provide immediate emergency instruction to personnel. The onsite internal communication system at the 222-S Complex includes telephones, various alarms systems, and hand-held or vehicle-mounted two-way radios. The telephone system provides internal and external communication. Telephones are available at various locations throughout the 222-S Complex. Alarm systems exist at various locations throughout the 222-S Complex to allow personnel to appropriately respond to various emergencies, including the following emergency situations: building and tank farm evacuations, take-cover events, and fire and/or explosion (Appendix 7A). Hand-held or vehicle-mounted two-way radios are used during work assignments to maintain internal communication with shift supervisors located in nearby operations support buildings.

At both the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area, private automatic exchange system telephones are used for internal communication. The private automatic exchange system telephone in the 219-S Waste Handling Facility is located on the north wall of the operating gallery. Private automatic exchange system telephones are located near doors 13 and 16 of the 222-S Analytical Laboratory. Both telephones are within 100 feet of the 222-S Dangerous and Mixed Waste Storage Area.

6.3.1.2 External Communication [F-3a(2)]. The 222-S Complex is equipped with devices for summoning emergency assistance from the Hanford Fire Department, and/or emergency response teams, as necessary. External communication is made

via a telephone communication system or two-way radios (hand-held and vehicle-mounted radios). Both these means can be used to access a supervisor, who contacts the Hanford Site emergency network if assistance is needed.

Telephones are located throughout the 222-S Complex to provide external communication capabilities. At remote locations, two-way radios can be used to access a supervisor. The supervisor contacts the Hanford Site emergency network if assistance is needed. In addition, the following external communication systems are available for notifying personnel assigned to emergency response organizations:

- Fire alarm pull boxes--connected to a system monitored around the clock by the Hanford Fire Department

- Telephone number 811--contact point for the Hanford Site; on notification, the Hanford Patrol Operations Center notifies and/or dispatches required emergency responders

- Telephone number 3-3800--single point of contact for the emergency duty officer; this number can be dialed from any Hanford Site telephone

- Crash alarm telephone system--consists of selected telephones automatically connected to control stations

- Two-way radio system--consists of hand-held or vehicle radios; the system accesses the Hanford Site emergency network and can summon the Hanford Fire Department, Hanford Patrol, and/or any other assistance requested to handle emergencies.

A private automatic exchange telephone and an outside-line telephone are located on the inside north wall of the operating gallery of the 219-S Waste Handling Facility. The private automatic exchange system is designed to enable both internal and external communication. The following phone numbers are posted on the private automatic exchange telephones:

- Telephone number 811--contact point for the Hanford Site; on notification, the Hanford Patrol Operations Center notifies and/or dispatches required emergency responders

- Telephone number 3-3800--single point of contact for the emergency duty officer; this number can be dialed from any Hanford Facility telephone

- Telephone number 990 or 991--allows private automatic exchange telephone to access public address system. This enables the caller to page other personnel located within the 222-S Complex.

At the 222-S Dangerous and Mixed Waste Storage Area, private automatic exchange telephones and an outside-line telephone are used for external communication.

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6.3.1.3 Emergency Equipment [F-3a(3)]. Emergency equipment is available for use throughout the 222-S Complex. The Hanford Facility relies primarily on the Hanford Fire Department to control fires. The Hanford Fire Department is capable of providing rapid response (less than 10 minutes) to fires within the 200 West Area. Portable fire extinguishers are provided on motorized equipment and vehicles, and within the 222-S Complex. Personnel are trained in the use of emergency equipment (Chapter 8.0 contains training information). The Hanford Facility maintains a sufficient inventory of heavy equipment (i.e., bulldozers, cranes, road graders) for emergency response.

At the 219-S Waste Handling Facility, a hand-held fire extinguisher is located on the inside north wall of the operating gallery. A safety shower is located on the outside of the north wall and is shown in Figure 6-1. A spill kit is located on the inside west wall of the operating gallery.

Emergency equipment, including an emergency spill kit, one ABC-type fire extinguisher, and two self-contained breathing apparatuses are kept on the east exterior wall of the 222-S Dangerous and Mixed Waste Storage Area. A safety shower is located approximately 100 feet (30 meters) east of the 222-S Dangerous and Mixed Waste Storage Area. Figure 6-2 shows the location of this emergency equipment. Figure 6-3 is a photograph of the 222-S Dangerous and Mixed Waste Storage Area showing the emergency equipment on the unit's east wall. Spill control equipment consists of absorbent pillows and neutralizing agents to counter the release of caustic, corrosive, or organic material; acid suits; escape packs; and filtered masks. These supplies are available in the spill response kit on the east exterior wall of the 222-S Dangerous and Mixed Waste Storage Area.

6.3.1.4 Water for Fire Control [F-3a(4)]. Water for fire control at the 222-S Complex is supplied by either Hanford Fire Department trucks or a fire main system within the 200 West Area. In the event that water pressure is lost, the Hanford Fire Department normally has a truck equipped with a hydraulically operated aerial ladder, and one backup fire engine without a boom that is used if the aerial ladder is inoperable. Fire engines have a pumping capacity of at least 1,500 gallons (5,605 liters) of water per minute.

Automatic sprinkler systems will be added to each storage structure at the 222-S Dangerous and Mixed Waste Storage Area.

6.3.2 Aisle Space Requirements [F-3b]

Aisle spacing for the 222-S Dangerous and Mixed Waste Storage Area storage structure is sufficient to allow the movement of personnel and fire protection equipment in and around the containers. This aisle spacing meets the requirements of the National Fire Protection Association and the Life Safety Code (NFPA 1989) for the protection of personnel and the environment.

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

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

6.4.1 Unloading Operations [F-4a]

All transfers to the 219-S Waste Handling Facility are made by way of an underground pipeline contained in a concrete trench. Transfers from the 219-S Waste Handling Facility to the tank trailer are monitored by two operations personnel and a health physics technician.

Releases from 222-S Dangerous and Mixed Waste Storage Area containers are unlikely, given the packing process and materials used. The packing process and materials are described in detail in Chapter 4.0, Section 4.1.1.3.1. Containerized waste is placed within drums, and an appropriate absorbent is added. Drums meet U.S. Department of Transportation specifications. For example, organics are placed in U.S. Department of Transportation-specified type 17C drums with a 90-mil polyethylene liner. Should a drum tip or fall, the contents are likely to be contained by the smaller container within the drum or, should the container or container and drum rupture, by absorbent. Drum damage is unlikely because drums are moved into and removed from the 222-S Dangerous and Mixed Waste Storage Area individually, using a drum hand truck designed to securely hold the drum while in transit. Drum transportation is normally by flatbed truck. The trucks have a hydraulic lift gate to ensure safe drum loading and unloading.

6.4.2 Run-Off [F-4b]

Transfer piping from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility and between tanks at the 219-S Waste Handling Facility are contained in concrete trenches or vaults below ground surface. Any liquid waste that might spill during transfer to the tank trailer is prevented from running off and is cleaned up according to applicable methods. The entire area surrounding the transfer point drains to a french drain system for collection of run-off. These french drains are routed to another set of french drains near the 207-SL Retention Basin, and the contents are released into the soil column. The french drains are protected with absorbent pillows during tank transfer to prevent a spill from reaching the drains.

The 222-S Dangerous and Mixed Waste Storage Area structures are completely roofed structures that rest on an underlying concrete pad. The concrete pad raises the 222-S Dangerous and Mixed Waste Storage Area about 10 inches (25.4 centimeters) above ground level, minimizing the likelihood of overland run-on reaching the 222-S Dangerous and Mixed Waste Storage Area. The roof prevents precipitation from entering the storage structures. The metal containment basins within each storage structure prevent run-off of any release within the 222-S Dangerous and Mixed Waste Storage Area. Each basin has a containment capacity of approximately 252 gallons (956 liters). Containment capacity within each storage structure is 505 gallons

(1,912 liters), providing a total containment capacity of 1,010 gallons (3,823 liters) for the entire 222-S Dangerous and Mixed Waste Storage Area. An asphalt apron around the 222-S Dangerous and Mixed Waste Storage Area causes run-off to flow around the building onto gravel to the north.

6.4.3 Water Supplies [F-4c]

Raw water is supplied to the 222-S Complex by way of underground (export) water lines that transport Columbia River water. Raw water is filtered to prevent organisms and other debris from clogging valves, fire hydrants, and other related equipment. The Columbia River water is withdrawn near the 100 N Area. The water is pumped by way of a 24-inch- (61-centimeter-) diameter pipeline to the 200 Areas. Sanitary (potable) water also is derived from the Columbia River. Sanitary water is filtered and treated before being distributed for use in the 200 Areas.

Potential contamination of the raw water supply at the 222-S Complex is prevented through the use of reduced pressure backflow devices, which ensure that contaminated water cannot flow back into the raw water system. The backflow preventers are installed on all raw water lines at the 222-S Complex.

6.4.4 Equipment and Power Failure [F-4d]

Loss of electricity will result in the loss of power to sump pumps, exhaust pumps, agitators, and automated indicators and alarms at the 219-S Waste Handling Facility. In the event of a loss of electricity, all pH adjustments, neutralization, and transfer operations will be stopped. The tank level gages in the operating gallery will be monitored to confirm that transfer operations are halted.

Instruments and equipment are inspected daily and calibrated monthly if necessary. Backup mechanical gages are available onsite if the existing gages fail or in the event of a power failure.

Operation of the 222-S Dangerous and Mixed Waste Storage Area requires no power source. A power outage will not affect the storage of waste within the 222-S Dangerous and Mixed Waste Storage Area because no heating or cooling is necessary or provided. The use of the fire extinguisher, sprinklers, or spill response equipment requires no power source.

6.4.5 Personnel Protection Equipment [F-4e]

At a minimum, all personnel are required to wear radiation-protection coveralls, cloth shoe covers plus rubber boots or other shoe covers, gloves, and a cloth cap when working in sections of the 222-S Complex contaminated by radioactive, dangerous, and/or mixed waste. Suits capable of protecting workers from dermal exposure to dangerous liquids are available if a substantial risk of skin exposure exists. In addition, various types of respiratory devices are available if required. Personnel are directed to use

a particular type of respiratory device, depending on the specific respiratory hazard that might exist. Available respiratory protection equipment includes the following:

- Two self-contained breathing apparatuses (located at the 222-S Dangerous and Mixed Waste Storage Area)
- Filter masks with a graphite filter (for removing particulates)
- Face masks with cartridges that react with various chemical fumes for use in special circumstances
- Full-face masks with hoses attached to an air compressor or air cylinders are located in the 222-S Complex and made available when needed.

Personnel are required to be trained in using the various respiratory devices and must be checked routinely for mask fit (Chapter 8.0).

Before the start of any operation that might expose employees to the risk of injury or illness, a review of the operation is performed to ensure proper consideration of the hazards that might be encountered and appropriate selection of protective gear. Employees are instructed to wear personal protective equipment in accordance with training, posting, and instructions.

Policies and procedures dictate the use of leather gloves and safety shoes when drums are handled. Protective clothing is donned in the general change room located near the entrance to the 222-S Analytical Laboratory.

6.5 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTE [F-5]

No ignitable or reactive waste is treated and/or stored at the 219-S Waste Handling Facility, as described in Chapter 4.0, Section 4.2.8. At the 222-S Dangerous and Mixed Waste Storage Area, waste is managed to prevent the reaction of ignitable or reactive waste in the following two ways:

- Waste is packaged in drums in accordance with the overpack container requirements of WAC 173-303-161. Waste is containerized within individual bottles before placement in U.S. Department of Transportation-specified steel drums. Sufficient absorbent is added to completely absorb all liquid contents of the bottles. All void spaces around the bottles are filled with absorbent. Incompatible waste, as defined in WAC 173-303-040, is not placed within the same outer container.
- Storage within the locked 222-S Dangerous and Mixed Waste Storage Area prevents exposure of the containerized drummed waste to sources of ignition or reaction such as open flames, smoking, or welding operations. No smoking is permitted at the 222-S Dangerous and Mixed Waste Storage Area and signs reading, "POSITIVELY NO SMOKING OR OPEN

FLAMES ALLOWED," are posted on the doors of the 222-S Dangerous and Mixed Waste Storage Area. No open flames or other potential ignition sources (e.g., water for reactives) are present.

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Figure 6-1. Photograph of Safety Shower at the 219-S Waste Handling Facility.

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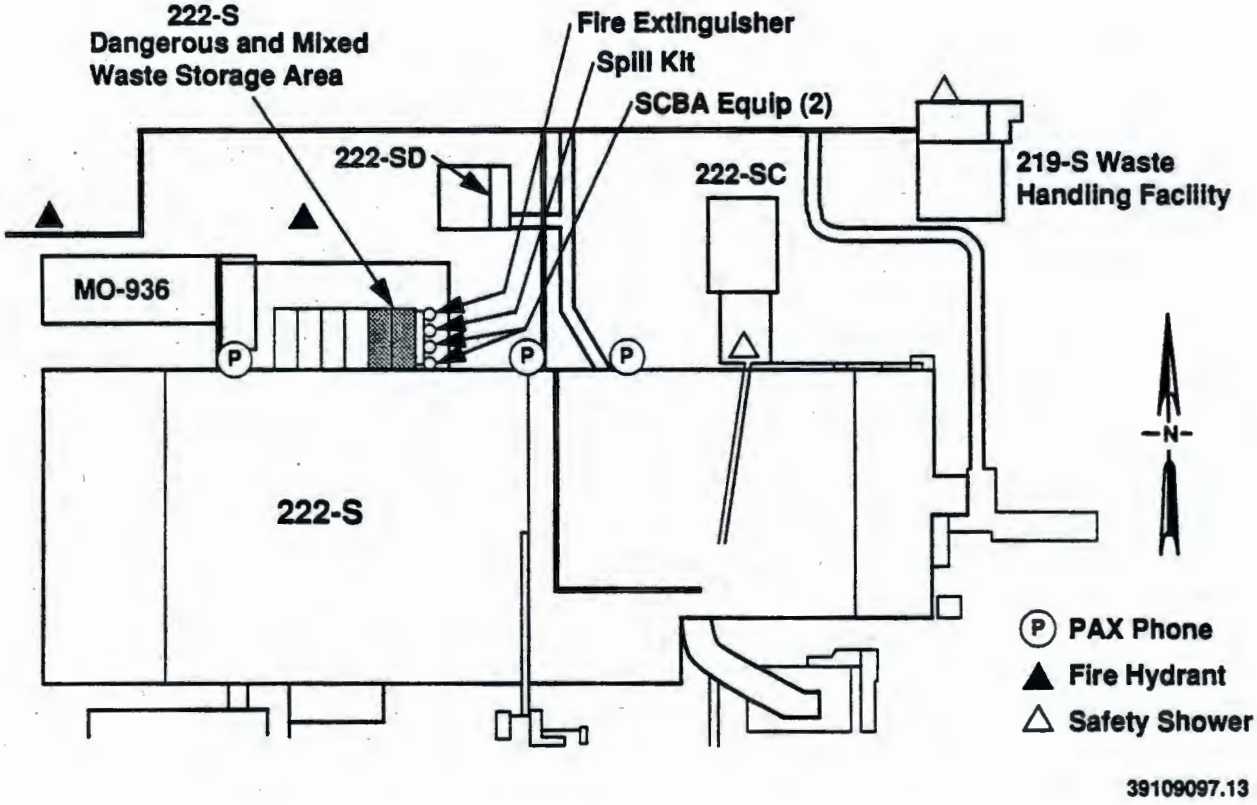

Figure 6-2. Location of Emergency Equipment at the 222-S Dangerous and Mixed Waste Storage Area.

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Figure 6-3. Emergency Equipment at the 222-S Dangerous and Mixed Waste Storage Area.

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7.0 CONTINGENCY PLAN [G]

The WAC 173-303 requirements for contingency plans are satisfied in the following documents: the DOE-RL emergency plan and procedures manual, the *Emergency Plan* (WHC 1989a), and the *Building Emergency Plan for 222-S Laboratory Complex* (WHC 1990c). The DOE-RL emergency plan and procedures manual and the *Emergency Plan* (WHC 1989a) are available for review upon request. The *Building Emergency Plan for 222-S Laboratory Complex*, which includes contingency plans for the two units, is provided as Appendix 7A. This emergency plan (Appendix 7A) is reviewed and updated at least annually.

The cited contingency planning documents also serve to satisfy a broad range of other requirements (e.g., Occupational Safety and Health Administration and U.S. Department of Energy Orders). Therefore, revisions made to portions of the contingency plan documents 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.

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8.0 PERSONNEL TRAINING [H]

This chapter outlines the training program developed and implemented for the employees whose duties are identified as being associated with dangerous waste management at the 222-S Complex.

The training program uses existing courses. The program was designed to ensure that the 222-S Complex (219-S Waste Handling Facility and the Dangerous and Mixed Waste Storage Area) is operated and maintained in accordance with requirements of the EPA, Ecology, the Occupational Safety and Health Administration, and the U.S. Department of Energy.

8.1 OUTLINE OF THE TRAINING PROGRAM [H-1]

The training program is designed to prepare employees to operate and maintain the 222-S Complex in a safe, efficient, and environmentally sound manner. In addition to preparing employees to operate and maintain the 222-S Complex under normal conditions, the program ensures that employees are prepared to respond in a prompt and effective manner should abnormal or emergency conditions occur. Emergency response training is consistent with emergency responses outlined in the contingency plan (Appendix 7A).

The training program includes training courses that cover training requirements for chemical technologist, scientist, and managers who operate the 222-S Complex. Processing and Analytical Laboratories, in cooperation with Technical Training; Occupational Health and Safety; Fleet Operations, Transportation, and Maintenance Services; and other applicable organizations, are responsible for the development and administration of the training program for employees assigned to, or involved with, the 222-S Complex. Processing and Analytical Laboratories management is responsible for identifying training requirements for 222-S Complex personnel and for ensuring that personnel complete appropriate training. The responsibilities of the various organizations are discussed in Section 8.1.3.

An initial job analysis process was completed that resulted in identifying the required training to operate the 222-S Complex in a safe and effective manner. A job analysis process will be used to guide reevaluations of the training program to ensure that operational and dangerous waste training requirements continue to be met. These reevaluations could result in modifying or adding new material to the current training program.

8.1.1 Job Titles and Descriptions [H-1a]

Each employee is assigned a job title (from the salaried nonexempt or bargaining unit classifications) or position (from the exempt classifications). Job titles and positions for Processing and Analytical Laboratories employees who are associated with managing dangerous and/or mixed waste at the 222-S Complex are listed in the following sections with brief descriptions of associated responsibilities.

8.1.1.1 Processing and Analytical Laboratories Manager. Responsibilities of the Processing and Analytical Laboratories manager include the following:

- Operating and maintaining the areas managed by Processing and Analytical Laboratories in compliance with U.S. Department of Energy directives and applicable policies and procedures

- Managing, coordinating, and directing the activities of assigned personnel to attain safe and efficient operation of analytical laboratories

- Complying with all hazardous and dangerous waste policies, procedures, and regulations

- Recruiting and developing a trained cadre of managers, professionals, nonexempt, and bargaining unit employees

- Ensuring safe and disciplined operations by trained personnel who implement policies and procedures

- Ensuring that the Processing and Analytical Laboratories documents relating to the safe operation and maintenance of the areas managed by Processing and Analytical Laboratories are accurate and up to date

- Ensuring the proper allocation of resources required to support the operation, maintenance, modification, and installation of new equipment required for safety to meet production schedules

- Providing operational requirements for support organizations to plan and provide services and resources when needed

- Promoting safe operations of the areas managed by Processing and Analytical Laboratories

- Authorizing (or delegating authority to authorize) the release of data

- Responding to offnormal and/or emergency conditions according to established procedures.

8.1.1.2 222-S Laboratories Operations Manager. Responsibilities of the 222-S Laboratories Operations manager include the following:

- Managing overall 222-S Laboratories operation

- Planning, organizing, and coordinating the operation activities for 222-S Complex

- Promoting safe operations of the areas managed by 222-S Laboratories operations

- Maintaining control over 222-S Laboratories operations in accordance with established operating procedures, applicable policies, U.S. Department of Energy Orders, and federal and state regulations

- Enforcing safety, housekeeping, and general operating rules

- Conducting operations according to established procedures

- Meeting quality assurance requirements

- Statusing and resolving action items arising from audits, inspections, and unusual occurrences

- Supervising emergency response and recovery actions

- Maintaining administrative controls

- Supervising procedure compliance

- Minimizing injuries and/or equipment damage

- Ensuring compliance with operating limits and specifications

- Ensuring that staff levels and training are adequate for safe and effective operations

- Directing, controlling, and coordinating the receipt, transfer, and processing of dangerous and mixed waste

- Directing and coordinating the recovery from, and measuring and reestablishing control of unplanned releases to the environment and other emergency conditions

- Responding to and providing remedial guidance and decisions for operations anomalies, offnormal conditions, and equipment malfunctions

- Notifying Processing and Analytical Laboratories management of any unplanned releases to the environment

- Ensuring that radiation exposure and dangerous waste exposure are maintained ALARA

- Responding to offnormal and/or emergency conditions according to established procedures

- Performing the duties of the building emergency director during emergencies

8.1.1.3 Building Operations Manager. Responsibilities of the Building Operations manager include the following:

- Supervising, coordinating, and directing the activities of chemical technologists
- Promoting safe operations of the laboratory areas
- Enforcing safety, housekeeping, and general operating rules
- Maintaining control over 222-S Laboratory Building operations in accordance with established operating procedures, applicable policies, U.S. Department of Energy Orders, and federal and state regulations
- Recognizing offnormal conditions and taking appropriate action
- Conducting building operations according to established procedures
- Statusing and resolving action items arising from audits, inspections, and unusual occurrences
- Training and/or arranging training for personnel
- Supervising emergency response and recovery actions
- Maintaining administrative controls
- Maintaining essential records
- Supervising procedure compliance
- Minimizing injuries and/or equipment damage
- Ensuring compliance with operating limits and specifications
- Directing, controlling, and coordinating the receipt, transfer, and processing of dangerous and mixed waste
- Conducting pre-job safety and planning meetings with personnel involved with the dangerous and mixed waste
- Ensuring that chemical technologists are trained
- Ensuring that radiation exposure and dangerous waste exposure are maintained ALARA
- Notifying Solid Waste Management of any unplanned releases to the environment
- Responding to and providing remedial guidance and decisions for operations anomalies, offnormal conditions, and equipment malfunctions

- Coordinating the recovery from, and measuring and reestablishing control of, unplanned releases to the environment and other emergency conditions

- Serving as designated alternate to the building emergency director and the staging area manager

- Responding to offnormal and/or emergency conditions according to established procedures

- Assuming charge during emergencies until properly relieved by upper management or the building emergency director

- Performing the duties of the building emergency director during emergencies.

8.1.1.4 Shift Manager. Responsibilities of the Shift Managers include the following:

- Supervising, coordinating, and directing the activities of the chemical technologists

- Promoting safe operation of laboratory areas

- Enforcing safety, housekeeping, and general operating rules

- Conducting operations according to established procedures

- Maintaining control over 222-S Laboratories operations in accordance with established operating procedures, applicable policies, U.S. Department of Energy Orders, and federal and state regulations

- Recognizing offnormal conditions and taking appropriate action

- Meeting quality assurance requirements

- Training and/or arranging training for personnel

- Ensuring that chemical technologists are trained

- Maintaining essential records

- Supervising emergency response and recovery actions

- Maintaining administrative controls

- Supervising procedure compliance

- Conducting pre-job safety and planning meetings with personnel involved with dangerous and mixed waste

- Notifying Processing and Analytical Laboratories management of any unplanned releases to the environment

- Minimizing injuries and/or equipment damage

- Ensuring compliance with operating limits and specifications

- Ensuring that radiation exposure and dangerous waste exposure are maintained ALARA

- Responding to and providing remedial guidance and decisions for operations anomalies, offnormal conditions, and equipment malfunctions

- Coordinating the recovery from and measuring and reestablishing control of unplanned releases to the environment and other emergency conditions

- Serving as designated alternate to the building emergency director and the staging area manager

- Responding to offnormal and/or emergency conditions according to established procedures

- Assuming charge during emergencies until properly relieved by upper management or the building emergency director.

8.1.1.5 **Scientist.** Responsibilities of the scientists include the following:

- Setting up, testing, and monitoring performance of analytical methods and instruments

- Providing dangerous waste analysis support and analysis oversight and training chemical technologists to laboratory procedures

- Developing routine and nonroutine sample characterization procedures as well as modifying or updating procedures as necessary

- Verifying and checking reported data

- Responding to offnormal and/or emergency conditions according to established procedures

- Directing activities outside routine procedures during offnormal operating conditions.

8.1.1.6 **Chemical Technologist.** Responsibilities of the chemical technologists include the following:

- Performing analytical analyses on a variety of samples by chemical, physical, instrumentation, and radiochemical methods using a variety of laboratory instrumentation and equipment

- Performing sampling as required

- Setting up and testing analytical instrumentation under the direction of a chemist

- Performing repetitive and nonroutine analyses for characterization of methodology, equipment, or samples

- Training other technicians, scientists, and other less experienced personnel in radiation practices and methodology

- Performing various assignments and ancillary duties as requested or required by management

- Reporting data

- Inspecting, labeling, and documenting dangerous waste

- Collecting, combining, and packaging dangerous waste

- Performing logsheet and checklist inspections to verify information

- Performing drum inspection

- Performing inspection of truck for proper hazard placards

- Recording the following inspection information on logsheets and checklists:

  - 219-S Waste Handling Facility daily inspection sheet
  - 222-S Dangerous and Mixed Waste Storage Area weekly inspection checkoff list
  - Satellite accumulation area weekly inspection
  - Temporary area weekly inspection sheet.

- Making entries in satellite logsheet as chemicals are added or removed and indicating total volume of current waste

- Filling out waste storage/disposal request form to remove waste from 90-day storage

- Filling out inventory for all dangerous liquid and solid waste

- Providing documentation of drum contents, volume, weight, and hazard category for shipment

- Assisting in loading drums onto truck for shipment

- Transporting new drums to laboratories

- Transporting organic and dangerous liquid waste from satellite to 90-day temporary accumulation areas

- Performing 222-S Laboratories operations work activities in accordance with current operating procedures

- Attending 222-S Laboratories operations work plan and pre-job safety meetings

- Escorting supporting craftsmen and visitors entering 222-S Complex

- Conducting routine inspections

- Handling dangerous and mixed waste for storage and/or shipment

- Supporting the transfer of 219-S Waste Handling Facility tank contents to tanker truck for transport to Double-Shell Tank System

- Performing work activities at the 219-S Waste Handling Facility

- Providing surveillance for offnormal conditions

- Responding to leaks or spills of dangerous and mixed waste

- Responding to alarms at 222-S Laboratories operations units

- Responding to offnormal and/or emergency conditions according to established procedures.

8.1.1.7 Hazardous Material Coordinator. Responsibilities of the hazardous material coordinator include the following:

- Overseeing the administrative functions involved in the segregating, minimizing, collecting, disposing, and shipping of hazardous materials and/or dangerous waste

- Responding to offnormal and/or emergency conditions.

8.1.1.8 222-S Laboratory Engineering Manager/Environmental Compliance Officer and Engineer. Responsibilities of the 222-S Laboratory Engineering manager/environmental compliance officer and engineers include the following:

- Preparing, issuing, and approving environmental waste handling procedures

- Assessing environmental waste handling problem areas and implementing corrective action

- Ensuring compliance with environmental regulations

- Reviewing and approving environmental data for 222-S Complex

- Ensuring EPA and Ecology reporting requirements are adhered to

- Reviewing and approving of new or revised permits

- Serving as a single point of contact for environmental related matters

- Managing environmental program corrective actions status to comply with dangerous waste permits

- Coordinating the review and submittal of environmental data for

  - Annual dangerous waste report
  - Waste minimization report
  - Waste volume projections (solid and liquid)
  - *Superfund Amendments and Reauthorization Act* (SARA) *of 1986* Section 312 reporting inventory forms
  - The SARA 313 releases
  - EPA surveys

- Preparing and providing input to reporting of

  - Spill information
  - Interim compliance status
  - EPA and Ecology reporting requirements

- Coordinating the development and review of new or revised permits

  - Part A notifications
  - Part B permits
  - Closure plans
  - Clean Air permits
  - National Pollution Discharge Elimination System permits and well registrations

- Ensuring implementation of permitting requirements, conducting periodic surveillances of compliance assessment with permits, and maintaining areas through interface with the applicable environmental organizations, DOE-RL, Ecology, EPA, and other health departments.

8.1.1.9 222-S Laboratory Waste Handling Control Group Manager. Responsibilities of the 222-S Laboratory waste handling group manager includes the following:

- Overseeing the packaging and shipping of laboratory waste in accordance with established procedures and regulations

- Responding to offnormal and/or emergency conditions according to established procedures

- Approving waste container control.

8.1.1.10 Health Physics Supervisor. Responsibilities of the Health Physics supervisor include the following:

- Providing health physics support for the 222-S Complex operations
- Providing current radiation work permits for all personnel working in the areas managed by the 222-S Complex
- Overseeing on-the-job training for health physics technicians
- Providing direction and guidance to the 222-S Complex management concerning radiological conditions
- Providing immediate health physics support in an emergency
- Responding to offnormal and/or emergency conditions according to established procedures.

8.1.1.11 Health Physics Technician. Health physics technicians include health physics technician-trainees, health physics technicians, and senior health physics technicians. Responsibilities of the health physics technicians include the following:

- Operating radiation and contamination sampling systems
- Issuing supplemental dosimeters
- Providing dose rate monitoring support
- Surveying personnel leaving radiation areas
- Maintaining all radiation equipment records
- Prescribing protective clothing necessary to perform work in radiation and contamination areas
- Responding to radiation alarms
- Collecting air samples
- Locating radiation and contamination boundary perimeters for nuclear operators when fences and barriers are being erected
- Performing routine surveillance
- Documenting all support provided for personnel in the areas managed by 222-S Complex management
- Overseeing work activities to ensure that exposure of personnel to radiation is ALARA

- Responding to offnormal and/or emergency conditions according to established procedures.

8.1.1.12 The Waste Sampling Characterization Facility Startup and Sampling and Mobile Laboratories Manager. Responsibilities of the Waste Sampling Characterization Facility startup and sampling and mobile laboratories manager include the following:

- Managing, coordinating, and directing the activities of assigned personnel to attain safe and efficient operation of mobile laboratories
- Managing overall mobile laboratories operations
- Supervising chemists/scientists and scientific technicians who provide radioactive and dangerous waste sampling support for 222-S Complex
- Providing quality sampling results in a timely manner
- Ensuring all personnel are trained and qualified for the tasks being performed
- Training and/or arranging training for personnel
- Promoting safe operations of mobile laboratories
- Enforcing safety, housekeeping, and general operating rules
- Conducting operations according to established procedures
- Maintaining essential records
- Supervising emergency response and recovery actions
- Ensuring that radiation exposure and dangerous waste exposure are maintained ALARA
- Complying with all hazardous and dangerous waste policies, procedures, and regulations
- Minimizing injuries and/or equipment damage
- Responding to offnormal and/or emergency conditions.

8.1.1.13 Sampling Team Scientist. Responsibilities of the sampling team scientists include the following:

- Reviewing readings of samples taken
- Verifying and checking reported data
- Ensuring the field sample notebook is accurate and up-to-date

- Interfacing with customers requesting sampling support
- Prioritizing and scheduling sampling work activities
- Evaluating site locations requesting sampling support
- Developing sampling equipment
- Developing sample characterization procedures as well as modifying or updating procedures as necessary
- Directing sampling activities outside routine procedures during offnormal operating conditions
- Planning, organizing, and coordinating the operation activities for the mobile laboratories
- Minimizing injuries and/or equipment damage
- Responding to offnormal and/or emergency conditions.

8.1.1.14 Scientific Technician. Responsibilities of the scientific technician include the following:

- Providing radiological and dangerous waste sampling support for 222-S Complex
- Setting up sampling equipment under the direction of a chemist/scientist
- Training other scientific technicians, chemist/scientists, and less experienced personnel
- Reporting data
- Recognizing nonstandard conditions and taking appropriate action
- Conducting sampling operations according to established procedures
- Participating in pre-job safety and planning meetings with personnel involved with 222-S Complex
- Assisting chemists/scientists in the development of sampling equipment
- Maintaining field notebook, chain-of-custody receipts, and sample shipping documents
- Ordering equipment and supplies
- Packaging and labeling of radioactive and/or dangerous waste samples

- Handling of radioactive and/or dangerous waste for storage and shipment

- Maintaining sample integrity

- Ensuring samples are placed in approved temporary storage

- Responding to leaks or spills of radioactive, dangerous, and/or mixed waste

- Responding to offnormal and/or emergency conditions.

8.1.1.15 Quality Assurance Manager and Quality Assurance Engineer. Responsibilities of the Quality Assurance manager and Quality Assurance engineer include the following:

- Providing quality planning to ensure that requisite quality is attained and ensuring compliance with technical requirements, including all U.S. Department of Energy-approved requirements and applicable codes and standards

- Investigating, analyzing, and evaluating (in concert with environmental and engineering organizations) all reported nonconformances from approved technical nonconformance reports for all nonconforming items

- Reviewing supplier and contractor status reports, audit reports, inspection reports, nonconformance reports, and unusual occurrence reports to determine existing or potential problems

- Establishing inspection procedures and controls that provide the data necessary to resolve disposition of nonconformance or other quality problems. Obtaining commitments from supplier and management to take corrective action to solve root causes of problems and following up to ensure the effectiveness of actions taken

- Reviewing and approving engineering drawings, specifications, and other technical documents specifying design and fabrication requirements, and changes thereto, to ensure adequacy of definition of quality provisions

- Planning and performing quality assurance surveillance of contractors and individual organizations to assess compliance with quality requirements and issuing reports of findings, and following up as required to effect timely implementation of necessary corrective actions

- Performing quality engineering tasks and activities as related to design, procurement, program and project planning, procedures, event reporting, readiness reviews, surveillance and assessments, audits, trend analysis, corrective actions, and documentation

- Assisting in studies, development, testing, and analysis of designs, processes, and procedures

- Collecting and compiling technical information for review and assisting in the preparation of technical specifications, reports, procedures, and other quality related documents

- Performing cognizant quality engineering duties within the scope of the incumbents' abilities and the technical complexity of the system.

8.1.1.16 Quality Control Manager and Quality Control Inspector. Responsibilities of the Quality Control manager and Quality Control inspector include the following:

- Managing and directing the conduct of compliance and conformance verification activities by quality control personnel to ensure consistent application with requirements

- Selecting and assigning qualified personnel to implement the quality assurance and quality control procedures, management of information, and quality plans

- Establishing standards and goals for quality control personnel and implementing procedures and instructions for their accomplishment

- Implementing a quality control surveillance program to monitor and ensure that all critical characteristics are reviewed for strict compliance with policies and procedures

- Developing and implementing systems to identify, control, and monitor nonconforming conditions and activities and providing investigative and verification support to include sound recommendations leading to prompt corrective actions

- Performing scheduled and unscheduled surveillances and inspections and documenting results for followup actions

- Participating in the planning and performance of complex surveillances and inspections of maintenance, fabrication, and operation activities and verifying compliance with engineering and quality assurance parameters

- Performing source inspection and acceptance of procured equipment, materials, or assemblies

- Assisting quality engineers in tabulating, charting, and analyzing quality assurance data

- Researching and compiling information to evaluate quality performance trends.

8.1.1.17 Occupational Health and Safety Manager and Engineer. Responsibilities of the Occupational Health and Safety manager and engineer include the following:

- Supporting operations and activities through the provision of industrial hygiene, industrial safety, fire protection, and radiation safety expertise, assistance, and services

- Providing guidance for consistent, effective implementation of occupational health and safety requirements

- Assisting the line organizations in developing cost-effective occupational health and safety plans, systems, controls, procedures, and training

- Assisting the line organizations in preparing designs, specifications, work packages, incident and occurrence reports, corrective action plans, procurement documents and specifications; in conducting hazard evaluations, risk analyses and self-assessments; and in determining and resolving of unreviewed safety questions

- Supplying or assisting in the procurement of services for health and safety engineering, dosimetry, radiological and chemical monitoring, respiratory protection, safety training resources, and medical scheduling

- Administering programs to control and minimize radiological, chemical, and industrial hazard exposures, and promoting improved occupational health and safety performance throughout operations

- Administering work permitting systems and approving hazardous and radiation work permits; excavation permits; coredrill permits; and welding, cutting, and braising permits

- Directing, advising, and assisting in the investigation and resolution of health and safety related complaints, employee concerns, accidents, occurrences, and conditions

- Assisting in the identification and application of lessons learned

- Conducting or assisting in inspections and walkthroughs, pre-occupancy inspections, etc., and administering the Safety Observer Program

- Maintaining and coordinating active ALARA and safety awareness programs to minimize hazard exposures, increasing health and safety awareness, alerting personnel to known hazards, and recognizing positive safety performance

- Providing expertise and administrative support to the President's Safety Council, Accident Prevention Council, and similar unit or organization-specific activities

- Monitoring health and safety experience, providing performance and trend reports, and maintaining employee health and safety records

- Representing management in interfaces with DOE-RL and other contractors regarding occupational health and safety programs, experience, and records

- Preparing and issuing health and safety performance measures, indicators, and trend analyses

- Preparing and submitting health and safety experience reports as required by the U.S. Department of Energy and other governmental agencies

- Developing and submitting to Pacific Northwest Laboratory the Hanford Environmental Health Foundation employee radiation and chemical exposure records

- Maintaining occupational health and safety records as required by the U.S. Department of Energy and applicable management.

8.1.1.18 Health and Safety Assurance Manager and Engineer. Responsibilities of the Health and Safety Assurance manager and engineer include the following:

- Supporting activities and programs through the performance and conduct of independent safety review and surveillance to ensure compliance with the letter and intent of applicable health, safety, and fire protection regulations, standards, directives, and recognized good practices

- Developing and interpreting policy, standards, and programs to assist in achieving and maintaining full compliance with occupational health and safety requirements

- Reviewing external standards, public laws, and U.S. Department of Energy Orders and directives

- Incorporating the appropriate requirements into policy, standards, and programs for health, safety, and fire protection

- Reviewing TSD unit documents, operations, and programs to ensure compliance

- Maintaining an organization staffed and qualified to interpret and apply the U.S. Department of Energy Orders and other mandated requirements or recommended practices relative to fire protection, industrial hygiene, occupational safety, radiation protection, and nuclear safety

- Establishing and interpreting safety policies, standards, and limits, and originating safety manuals to be used in operations, activities, and TSD units

- Providing and conducting independent audits, appraisals, assessments and surveillances in the technical safety areas for the purpose of determining compliance with U.S. Department of Energy Orders, other agency standards, and other applicable requirements, as appropriate

- Identifying deficiencies that require corrective action and following up corrective actions taken

- Conducting multidiscipline safety design and document reviews for the purpose of verifying compliance with mandated statutory safety requirements, standards, and recommended practices

- Administering and coordinating contract 'work for others' relative to health and safety support requests

- Representing management in interfaces with the U.S. Department of Energy, other contractors, federal, state, and local agencies relative to health and safety regulation and compliance

- Eliciting and facilitating program improvements

- Directing that work be stopped or TSD units be shut down to protect personnel or property from imminent danger

- Interfacing with management, the U.S. Department of Energy, and other organizations and personnel in the conduct of assigned responsibilities.

8.1.1.19 **Programmatic Maintenance Services Manager and Plant Engineer.** Responsibilities of the Programmatic Maintenance Services manager and Plant engineer include the following:

- Ensuring compliance with requirements, applicable policies, programs, regulations, and U.S. Department of Energy directives to ensure personnel safety, environmental compliance, and public safety

- Assisting in detailed planning of schedules and budgets to ensure that work is performed in accordance with established schedules and within budget

- Evaluating and modifying maintenance procedures and work plans, and ensuring that procedures are current and accurate

- Providing assistance to equipment and system efforts through direct support to maintenance and providing person-in-charge services for complex maintenance and/or installation activities

- Ensuring that requirements are identified for each assigned area, giving particular attention to items supporting safety systems

- Identifying preventive maintenance requirements and deficiencies

- Conducting equipment and TSD unit walkdowns and providing recommendations for reliability improvements

- Providing direct technical guidance support to the maintenance performance group in conjunction with the cognizant system engineer

- Supervising, coordinating, and directing the activities of the 222-S Complex operations

- Promoting safe maintenance practices in the areas managed by 222-S Complex operations

- Enforcing safety, housekeeping, and general rules

- Conducting maintenance activities according to established procedures

- Identifying offnormal conditions and taking appropriate action

- Ensuring that supervisors and crafts are trained

- Arranging training for personnel

- Supervising emergency response and recovery actions

- Maintaining administrative controls

- Conducting pre-job safety and planning meetings with personnel involved with the areas managed by 222-S Complex operations

- Ensuring that radiation exposure and dangerous waste exposure are maintained ALARA

- Responding to offnormal and/or emergency conditions according to established procedures

- Assuming charge during emergencies until properly relieved by upper management or the building emergency director.

8.1.1.20 222-S Laboratories Operations Maintenance Supervisor. Responsibilities of the 222-S Laboratories operations supervisor include the following:

- Supervising, coordinating, and directing the activities of maintenance crafts

- Promoting safe maintenance practices in the areas managed by 222-S Complex operations

- Enforcing safety, housekeeping, and general rules

- Conducting maintenance activities according to established procedures

- Identifying offnormal conditions and taking appropriate action
- Training and/or arranging training for personnel
- Ensuring that maintenance crafts are trained
- Maintaining essential records
- Supervising emergency response and recovery actions
- Maintaining administrative controls
- Conducting pre-job safety and planning meetings with personnel involved with areas managed by 222-S Complex
- Minimizing injuries and/or equipment damage
- Ensuring that radiation exposure and dangerous waste exposure are maintained ALARA
- Responding to offnormal and/or emergency conditions according to established procedures
- Assuming charge during emergencies until properly relieved by upper management or the building emergency director.

8.1.1.21 Maintenance Crafts. Crafts include electricians, instrument technicians, iron workers and riggers, millwrights, pipefitters, and welders. Responsibilities of the maintenance crafts include the following:

- Providing routine schedule and emergency maintenance services
- Connecting and unconnecting the 219-S Waste Handling Facility tank to the tanker truck transfer hose
- Responding to offnormal and/or emergency conditions according to established procedures.

8.1.1.22 Road, Delivery, and Equipment Operations Manager. Responsibilities of the Road, Delivery, and Equipment Operations manager include the following:

- Supervising and coordinating the activities of Road, Delivery, and Equipment Operations supervisors and other employees
- Promoting safe operations of heavy-duty trucks and equipment
- Ensuring that operations are conducted according to established procedures
- Statusing and resolving action items arising from audits, inspections, and unusual occurrences

- Supervising emergency response and recovery actions
- Maintaining administration controls
- Enforcing safety and general operating rules
- Ensuring proper response to truck radioactive, dangerous, and/or mixed waste spills
- Implementing training requirements for supervisors and heavy-duty truck drivers
- Ensuring that essential training and qualification records are maintained
- Ensuring that radiation exposure and dangerous waste exposure are maintained ALARA.

8.1.1.23 Road, Delivery, and Equipment Operations Supervisor. Responsibilities of the Road, Delivery, and Equipment Operations supervisors include the following:

- Supervising, coordinating, and directing the activities of heavy-duty truck drivers and other employees
- Maintaining control over heavy-duty truck operations (including the transport of radioactive, dangerous, and/or mixed waste) in accordance with established operating procedures, applicable policies, U.S. Department of Energy Orders, and federal and state regulations
- Recognizing offnormal conditions and taking appropriate action
- Training and/or arranging training for personnel
- Maintaining essential records
- Supervising emergency response and recovery actions
- Ensuring procedure compliance
- Conducting safety and planning meetings with personnel involved with radioactive, dangerous, and/or mixed waste transport and loading and unloading operations
- Ensuring that the heavy-duty truck drivers are trained and qualified to operate heavy-duty trucks and to transport hazardous material or dangerous waste
- Enforcing safety and general operating rules

- Ensuring compliance with operating limits and government regulations for operating trucks and transporting hazardous material or dangerous waste

- Ensuring that radioactive exposure and dangerous waste exposure are maintained ALARA

- Reviewing completed truck pre-trip inspection forms before hazardous material or dangerous waste is transported

- Ensuring that transport of radioactive, dangerous, and/or mixed waste is in accordance with the schedule list provided by customer

- Reviewing and distributing hazardous material transport manifest and daily log

- Ensuring proper response to radioactive, dangerous, and/or mixed waste spills

- Ensuring that Road, Delivery, and Equipment Operations management is notified of radioactive, dangerous, and/or mixed waste spills.

8.1.1.24 **Road, Delivery, and Equipment Operations Heavy-Duty Truck Driver.** Responsibilities of Road, Delivery, and Equipment Operations heavy-duty truck drivers include the following:

- Performing work activities in accordance with current operation procedures

- Attending Road, Delivery, and Equipment Operations pre-job safety meetings

- Observing all safety precautions related to transport operations

- Responding to a spill or emergency in accordance with current procedures

- Notifying Road, Delivery, and Equipment Operations management in the event of a spill or emergency

- Ensuring that transport of radioactive, dangerous, and/or mixed waste is in accordance with the schedule list provided by customer

- Completing pre-inspection of truck at the beginning of a shift or whenever drivers are changed

- Reviewing radioactive, dangerous, and/or mixed waste shipping manifest

- Inspecting radioactive, dangerous, and/or mixed waste drums for proper labeling

- Inspecting integrity of radioactive, dangerous, and/or mixed waste drums

- Signing the radioactive, dangerous, and/or mixed waste shipping manifest

- Loading the truck

- Ensuring proper hazard placards are mounted and visible on the truck and trailer

- Transporting radioactive, dangerous, and/or mixed waste drums

- Observing standard safe driving practices for truck operations

- Unloading truck at TSD units

- Providing a copy of the shipping manifest to customer

- Completing the daily logsheet

- Providing copies of radioactive, dangerous, and/or mixed waste shipping manifest and daily log to Road, Delivery, and Equipment Operations supervisor.

8.1.1.25 Crane and Rigging Services Manager. Responsibilities of the Crane and Rigging Services manager include the following:

- Supervising and coordinating the activities of Crane and Rigging Services supervisors and other employees

- Promoting safe operations of heavy-duty trucks and equipment

- Ensuring that operations are conducted according to established procedures

- Statusing and resolving action items arising from audits, inspections, and unusual occurrences

- Supervising emergency response and recovery actions

- Maintaining administration controls

- Enforcing safety and general operating rules

- Ensuring proper response to truck radioactive, dangerous, and/or mixed waste spills

- Implementing training requirements for supervisors and heavy-duty truck drivers

- Ensuring that essential training and qualification records are maintained

- Ensuring that radiation exposure and dangerous waste exposure are maintained ALARA.

8.1.1.26 **Crane and Rigging Services Supervisor.** Responsibilities of the Crane and Rigging Services supervisor include the following:

- Supervising, coordinating, and directing the activities of heavy-duty truck drivers and other employees

- Maintaining control over heavy-duty truck operations (including the transport of radioactive, dangerous, and/or mixed waste) in accordance with established operating procedures, policies, U.S. Department of Energy Orders, and federal and state regulations

- Recognizing offnormal conditions and taking appropriate action

- Training and/or arranging training for personnel

- Maintaining essential records

- Supervising emergency response and recovery actions

- Ensuring procedure compliance

- Conducting safety and planning meetings with personnel involved with radioactive, dangerous, and/or mixed waste transport and loading/unloading operations

- Ensuring that the heavy-duty truck drivers are trained and qualified to operate heavy-duty trucks and to transport hazardous material or dangerous waste

- Enforcing safety and general operating rules

- Ensuring compliance with operating limits and government regulations for operating trucks and transporting hazardous material or dangerous waste

- Ensuring that radioactive exposure and dangerous waste exposure are maintained ALARA

- Reviewing completed truck pre-trip inspection form before hazardous material or dangerous waste is transported

- Ensuring that transport of radioactive, dangerous, and/or mixed waste is in accordance with the schedule list provided by customer

- Reviewing and distributing hazardous material transport manifest and daily log

- Ensuring proper response to radioactive, dangerous, and/or mixed waste spills

- Ensuring that Crane and Rigging Services management is notified of radioactive, dangerous, and/or mixed waste spills.

8.1.1.27 Crane and Rigging Services Heavy-Duty Truck Driver. Responsibilities of the Crane and Rigging Services heavy-duty truck driver include the following:

- Performing work activities in accordance with current operation procedures

- Attending applicable pre-job safety meetings

- Observing all safety precautions related to transport operations

- Responding to a spill or emergency in accordance with current procedures

- Notifying Crane and Rigging Services management in the event of a spill or emergency

- Ensuring that transport of radioactive, dangerous, and/or mixed waste is in accordance with the schedule list provided by customer

- Completing preinspection of truck at the beginning of a shift or whenever drivers are changed

- Reviewing radioactive, dangerous, and/or mixed waste shipping forms

- Signing the radioactive, dangerous, and/or mixed waste shipping forms

- Loading the tanker truck

- Recording gallon totalizer meter reading in the meter reading log

- Observing the loading operation for leaks

- Completing the transport log datasheet

- Transporting dangerous and mixed waste

- Observing standard safe driving practices for tanker truck operations

- Ensuring proper hazard placards are mounted and visible on the truck and tanker trailer

- Transporting radioactive, dangerous, and/or mixed waste liquid in tanker truck

- Observing standard safe driving practices for tanker truck operations

- Unloading truck at Double-Shell Tank Farms
- Observing the unloading operations for leaks
- Notifying the Double-Shell Tank Farms operations representative of any leaks
- Notifying the Double-Shell Tank Farms operations representative when the tanker is empty
- Providing a copy of the shipping form to Double-Shell Tank Farms operations
- Providing the Double-Shell Tank Farms operations representative a copy of the transport log
- Completing the daily logsheet
- Providing copies of radioactive,, dangerous, and/or mixed waste shipping form and daily log to the Crane and Rigging Services supervisor.

8.1.1.28 Hanford Fire Department. Responsibilities of the Hanford Fire Department personnel include the following:

- Responding to emergencies
- Providing fire suppression for fires and explosions
- Assisting in the control and containment of radioactive, dangerous, and/or mixed waste and hazardous material accidents or incidents when applicable
- Providing emergency medical attention for injured personnel.

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

This section provides an overview of job-specific training provided to personnel in job positions discussed in the previous sections. In addition to normal operating conditions, personnel with these job positions are instructed on communications and alarm systems and on the proper response to offnormal conditions and emergencies such as fire, radiological incidents, dangerous waste incidents, and shutdown of operations.

8.1.2.1 Overview of Training for Specific Positions. All Processing and Analytical Laboratories personnel receive applicable general, unit-specific, and job-specific training. The courses are given in classroom settings, on-the-job training, self-study units, and computer-based training. Tables 8-1 through 8-5 consist of matrices that relate job position to the individual training courses. Table 8-6 provides employee work categories

definitions. The following sections provide an overview of job-specific training.

8.1.2.1.1 Processing and Analytical Laboratories Solid Waste Manager Training. The Processing and Analytical Laboratories manager completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment.

8.1.2.1.2 222-S Laboratories Operations Manager Training. The 222-S Laboratories operations manager completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment and how to cut off waste feed.

8.1.2.1.3 Building Operations Manager Training. The Building Operations manager completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment and how to cut off waste feed. The Building Operations manager is required to be qualified for the assigned jobs through a systematic process as determined by management.

8.1.2.1.4 Shift Manager Training. The shift manager completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment and how to cut off waste feed. The shift managers are required to be qualified for the assigned jobs through a systematic process as determined by management.

8.1.2.1.5 Scientist Training. The scientist completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment. Scientists are required to be qualified for assigned jobs through a systematic process as determined by management.

8.1.2.1.6 Chemical Technologist Training. The chemical technologist completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan, routine inspections, and use of emergency and monitoring equipment, and how to cut off waste feed.

Chemical technologists are required to be qualified for assigned jobs. Those who are qualified complete appropriate hazardous and dangerous waste training annually. Chemical technologists requalify for assigned jobs at least biennially and emergency procedures and abnormal plant conditions training annually.

Chemical technologist is the entry level for laboratory technologists who perform basic laboratory analysis following approved laboratory procedures. Senior chemical technologist is the advanced level for laboratory technologists who perform more complex laboratory analyses requiring full knowledge of laboratory techniques and procedures. Advancement from chemical technologist to senior chemical technologist is based on seniority within the bargaining unit and the availability of senior chemical technologist position vacancies.

The combination of requalification tests and/or performance checklists, emergency procedures and abnormal plant conditions tests, and hazardous and dangerous waste tests and/or performance checklists ensures that the chemical technologist continue to comply with the annual emergency training requirement.

8.1.2.1.7 Hazardous Material Coordinator Training. The Hazardous Material Coordinator completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment.

8.1.2.1.8 222-S Laboratory Manager and Environmental Compliance Officer and Engineer Training. The 222-S Laboratory Engineering manager/environmental compliance officer and engineers complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment.

8.1.2.1.9 222-S Laboratory Waste Handling Control Group Manager Training. The 222-S Laboratory Waste handling control group manager completes specific courses in preparation for work assignments, including hazardous

material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment.

8.1.2.1.10 Health Physics Supervisor Training. The health physics supervisors complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment.

8.1.2.1.11 Health Physics Technician Training. The health physics technicians complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use of emergency and monitoring equipment.

The health physics technicians are required to be certified for assigned jobs. The health physics technicians must certify for the level at which they are assigned work (i.e., health physics technician or senior health physics technician). They must complete their next-level certification tests between 15 and 18 months after they arrive at the current level. Once health physics technicians reach the senior health physics technician level, they must recertify at least biennially thereafter. The health physics technicians also must complete corresponding general and specific on-the-job training for each level.

The health physics technicians must complete the appropriate on-the-job training at least every 4 years thereafter. All health physics technicians must comply with the emergency procedures and offnormal plant conditions requirements and must complete the hazardous worker training refresher course at least annually. Compliance is accomplished by health physics technicians completing the requirement with a written test or an on-the-job training checklist in alternating years.

8.1.2.1.12 Waste Sampling Characterization Facility Startup and Sampling and Mobile Laboratories Manager Training. The Waste Sampling Characterization Facility startup and sampling and mobile laboratories manager completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of applicable contingency plans and use of emergency and monitoring equipment.

8.1.2.1.13 Sampling Team Scientist Training. The sampling team scientist completes specific courses in preparation for work assignments,

including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of applicable contingency plans and use of emergency and monitoring equipment.

8.1.2.1.14 Scientific Technician Training. The scientific technician completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of applicable contingency plans and use of emergency and monitoring equipment. Scientific technicians are required to be qualified for assigned jobs through a systematic process of 6 months on-the-job training based on assigned work.

8.1.2.1.15 Quality Assurance Manager and Quality Assurance Engineer Training. The Quality Assurance manager and Quality Assurance engineer complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address applicable waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of applicable contingency plans and use of emergency and monitoring equipment.

8.1.2.1.16 Quality Control Manager and Quality Control Inspector Training. The Quality Control manager and Quality Control inspector complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address applicable waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of applicable contingency plans and use of emergency and monitoring equipment.

8.1.2.1.17 Occupational Health and Safety Manager and Engineer Training. The Occupational Health and Safety manager and engineer complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address applicable waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of applicable contingency plans and use of emergency and monitoring equipment.

8.1.2.1.18 Health and Safety Assurance Manager and Engineer Training. The Health and Safety Assurance manager and engineer complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address applicable waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of applicable contingency plans and use of emergency and monitoring equipment.

8.1.2.1.19 Programmatic Maintenance Services Manager and Plant Engineer Training. The Programmatic Maintenance services manager and plant engineer complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address applicable waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of applicable contingency plans and use, inspection, repair, and replacement of emergency and monitoring equipment.

8.1.2.1.20 222-S Laboratories Maintenance Supervisor Training. The 222-S Laboratories Maintenance supervisor completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plan and use, inspection, repair, and replacement of emergency and monitoring equipment.

8.1.2.1.21 Maintenance Crafts Training. Maintenance crafts complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Processing and Analytical Laboratories waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and state regulations. The courses include the implementation of the 222-S Complex contingency plans and use, inspection, repair, and replacement of emergency and monitoring equipment.

8.1.2.1.22 Road, Delivery, and Equipment Operations Manager Training. The Road, Delivery, and Equipment Operations manager completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Fleet Operations, Transportation, and Maintenance Services waste management procedures (including implementation of applicable contingency plans), and use of emergency and monitoring equipment.

8.1.2.1.23 Road, Delivery, and Equipment Operations Supervisor Training. The Road, Delivery, and Equipment Operations supervisor completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Fleet Operations, Transportation, and Maintenance Services waste management procedures (including implementation of applicable contingency plans), and use of emergency and monitoring equipment.

8.1.2.1.24 Road, Delivery, and Equipment Operations Heavy-Duty Truck Driver Training. The Road, Delivery, and Equipment Operations heavy-duty truck drivers complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address Fleet Operations, Transportation, and Maintenance Services waste management procedures (including implementation of applicable contingency plans), and routine inspections and use of emergency and monitoring equipment.

The Road, Delivery, and Equipment Operations heavy-duty truck drivers are required to be qualified for assigned jobs (e.g., hazardous material carrier/driver and valid Washington State commercial drivers license, Class A, with hazardous material endorsement). Those who are qualified complete appropriate dangerous waste training. Drivers must requalify for their assigned jobs at least biennially. Drivers must renew their commercial drivers licenses every 4 years, complete a U.S. Department of Transportation physical, be medically certified biennially, and complete the Washington State hazardous material endorsement test annually. The combination of requalification courses and renewing the Washington State commercial drivers license, Class A, with hazardous material endorsement, ensures that drivers continue to comply with the annual emergency training requirements.

8.1.2.1.25 Crane and Rigging Services Manager Training. The Crane and Rigging Services manager completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address waste management procedures (including implementation of applicable contingency plans), and use of emergency and monitoring equipment.

8.1.2.1.26 Crane and Rigging Services Supervisor Training. The Crane and Rigging Services supervisor completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address waste management procedures (including implementation of applicable contingency plans), and use of emergency and monitoring equipment.

8.1.2.1.27 Crane and Rigging Services Heavy-Duty Truck Driver Training. The Crane and Rigging Services heavy-duty truck driver completes specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address waste management procedures (including implementation of applicable contingency plans), and routine inspections and use of emergency and monitoring equipment.

The Crane and Rigging Services heavy-duty truck drivers are required to be qualified for assigned jobs (e.g., hazardous material carrier/driver and valid Washington State commercial drivers license, Class A, with hazardous material endorsement). Those who are qualified complete appropriate dangerous waste training. Drivers must requalify for their assigned jobs at least biennially. Drivers must renew their commercial drivers licenses every 4 years, complete a U.S. Department of Transportation physical, be medically certified biennially, and complete the Washington State hazardous material endorsement test annually. The combination of requalification courses and renewing the Washington State commercial drivers license, Class A, with hazardous material endorsement, ensures that drivers continue to comply with the annual emergency training requirements.

8.1.2.1.28 Hanford Fire Department Training. The Hanford Fire Department personnel complete specific courses in preparation for work assignments, including hazardous material and dangerous waste training courses. The courses address applicable waste management procedures, U.S. Department of Energy directives, applicable policies, and federal and

state regulations. The courses include the implementation of applicable contingency plans and use of emergency and monitoring equipment.

Hanford Fire Department firefighters meet the requirements of the National Firefighters Protection Association [NFPA 472 and 1001 (NFPA 1989)], 29 CFR 1910.1200 and 1910.120 (paragraph Q), and the Washington State requirements for emergency medical personnel response.

8.1.2.1.29 Nonessential Personnel Training. Employees not identified as essential personnel and other U.S. Department of Energy-contractor personnel who must enter the 222-S Complex operation areas are required to complete "222-S Facility Orientation" or must be escorted. Non-U.S. Department of Energy-contractor personnel must complete a security and safety orientation before working in or around the 222-S Complex.

8.1.2.2 Training Matrix: Job Positions and Training. The training program encompasses general, unit-specific, and job-specific training courses. Tables 8-1 through 8-5 consist of matrices that relate job title to the individual training courses applicable to the 222-S Complex. The matrices indicate if the courses are introductory or continuing and also if the course is part of a qualification or certification program required for specific personnel or required only for new employees.

Some courses are introductory and must be completed one time only (often referred to as orientation) and other introductory courses are the first course in a program. Continuing courses are those that must be repeated according to a specified frequency.

8.1.2.3 Training Course Descriptions. Appendix 8A contains brief descriptions of selected courses, including course description, the target audience, instructional delivery, evaluation method, length of course, and frequency of retraining.

8.1.3 Training Director [H-1c]

There is no one individual designated as training director. This responsibility is shared among Processing and Analytical Laboratories Technical Training; Occupational Health and Safety; and Fleet Operations, Transportation, and Maintenance Services. This distribution of training responsibilities is provided in Figure 8-1. Using the system noted in Figure 8-1, 222-S Complex management can access training resources and experts in many different areas of hazardous material, dangerous waste, and industrial safety, rather than relying on the knowledge of one person or a small number of individuals. General responsibilities for training are discussed in the following sections.

8.1.3.1 Processing and Analytical Laboratories Training Responsibilities. Training responsibilities for the organization include the following:

- Establishing laboratory personnel training requirements
- Reviewing and approving training materials
- Requesting and/or conducting on-the-job training
- Maintaining field training records and qualifications
- Tracking retraining
- Providing instructors for selected classes
- Consulting with Technical Training and other organizations in the development and reevaluation of current training programs.

8.1.3.2 Technical Training Responsibilities. Section groups with technical training responsibilities are listed in the following sections.

8.1.3.2.1 Training Support and Accreditation. Training Support and Accreditation is responsible for the following:

- Conducting job analysis
- Designing training programs
- Developing training programs
- Providing consultation to other training organizations regarding training development
- Providing training program accreditation assistance.

8.1.3.2.2 Safety and Quality Technical Training. Safety and Quality Technical Training is responsible for the following:

- Developing and implementing general training courses to comply with federal and state regulations
- Conducting safety training courses
- Developing and providing health physics technician classroom certification training
- Conducting radiation safety training courses
- Conducting respiratory protection classes.

8.1.3.2.3 Environmental Training. Environmental training is responsible for the following:

- Developing and implementing environmental training courses to comply with U.S. Department of Energy directives and federal and state regulations

- Conducting hazardous and dangerous waste-handling and management courses.

8.1.3.2.4 Training Records. Training Records is responsible for the following:

- Operating and maintaining central training record files

- Notifying management of retraining requirements for employees

8.1.3.2.5 Health Physics Technical Training. Health Physics Technical Training is responsible for the following:

- Establishing health physics personnel training requirements

- Developing and conducting health physics on-the-job training

- Maintaining health physics technician field training records and certifications

- Tracking health physics technician retraining.

8.1.3.2.6 Fundamentals Training. Fundamentals Training is responsible for the following:

- Developing training courses/programs for 222-S Complex employees

- Developing and providing study material and examinations

- Tracking retraining

- Preparing and administering examinations

- Conducting laboratory fundamentals training for new hires

- Coordinating classes and other training requirements to complete and maintain qualifications or certifications

- Conducting laboratory on-the-job training

- Developing and maintaining on-the-job training requirements

- Providing instructors for selected courses.

8.1.3.2.7 Maintenance Training. Maintenance training is responsible for developing training materials and providing instruction for maintenance personnel.

8.1.3.3 Occupational Health and Safety Responsibilities. Training responsibilities for this organization include the following:

- Maintaining current knowledge of Occupational Safety and Health Administration regulations
- Ensuring compliance with Occupational Safety and Health Administration regulations through audits, design and procedure reviews, and surveillances
- Providing instructors for selected classes
- Consulting with Technical Training and 222-S Complex management in the development and reevaluation of current training programs.

8.1.3.4 Fleet Operations, Transportation, and Maintenance Services Responsibilities. Training responsibilities for Fleet Operations, Transportation, and Maintenance Services include the following:

- Maintaining current knowledge of Washington State commercial drivers license requirements and U.S. Department of Transportation regulations for transporting hazardous material or dangerous waste
- Ensuring drivers compliance with Washington State commercial drivers license requirements and U.S. Department of Transportation regulations
- Establishing drivers training requirements
- Providing qualified instructors to administer driver proficiency tests for drivers with less than 2 years of driving experience and a clean driving record
- Issuing a commercial drivers license certification for waiver of skill examination for drivers with 2 or more years of driving experience and a clean driving record
- Requesting and/or conducting training
- Maintaining field training, physical, and certification records
- Tracking retraining.

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

The training program for the 222-S Complex was developed after an initial job analysis was completed. Tasks performed by the responsible organizations were identified and evaluated to determine training requirements. In

addition, training needs are assessed in relation to current federal and state regulations on a continual basis. These evaluations could result in modifying or adding new material to the current training program.

Qualification is required for the shift managers, building managers, scientists, and chemical technologists who work in the 222-S Complex. To become qualified, an employee must successfully complete classroom training and on-the-job training. Classroom instruction is designed to provide employees with fundamental knowledge required to perform work safely at TSD units managed by Processing and Analytical Laboratories.

On-the-job training requires personnel to gain experience with what is contained in the operating procedures. All work that involves hazardous material and dangerous waste is performed according to approved laboratory procedures; therefore, an understanding of procedures is crucial to ensure the proper and safe operation of areas managed by Processing and Analytical Laboratories. Understanding is accomplished by having individuals perform, simulate, and/or describe a particular task as specified by the appropriate operating procedure. The individual demonstrating the required skills and knowledge is observed by another qualified chemical technologist or scientist and the building operations manager or shift manager before being qualified.

Additionally, management must complete their own qualification requirements, which include self-study and on-the-job training.

8.1.5 Training to Emergency Response [H-1e]

Effective response to emergencies, and familiarity with emergency equipment and emergency systems, are covered under the classroom and on-the-job training requirements as outlined in Tables 8-1 through 8-5 and Appendix 8A.

Federal and state regulations require that personnel be able to respond effectively to emergencies and that personnel be familiar with emergency procedures, emergency equipment, and emergency systems. Specific topics addressed include the following:

- Building emergency director's training
- Building emergency plan checklist training
- 222-S Complex-specific training
- 222-S Complex orientation
- 222-S Complex chemical technologist emergency procedures and offnormal plant conditions training

- 222-S Complex manager emergency procedures and offnormal plant conditions training

- 222-S Complex health physics technician emergency procedures and offnormal plant conditions training.

8.2 IMPLEMENTATION OF TRAINING PROGRAM [H-2]

The Processing and Analytical Laboratories training program is in place and has been fully implemented. Qualification for the 222-S Complex is required before working without supervision. Qualification requires personnel to successfully complete identified classroom and on-the-job training requirements. Qualification requires management to successfully complete self-study, classroom, and on-the-job training requirements. Training content is reviewed and updated as appropriate.

General training of new employees is to be completed within the first 6 months of assignment to the 222-S Complex. After the initial training, employees are required to requalify annually or biennial as applicable. Unqualified employees are not permitted to work at the 222-S Complex without the supervision of a qualified employee. The 222-S Complex operations manager is responsible for ensuring that new employees are trained and that qualifications are maintained.

Official training record files for 222-S Complex employees are stored in the Training Records Information System. This database is managed by the Technical Training Records organization. Technical Training Records inputs the completed training records into a computer file. The computer file is accessible on a local area network to allow remote accessing of employee training records via a computer terminal. A tickler file is available from the database to inform the 222-S Complex operations manager when training is within 90 days of expiration. A computerized copy of completed training and qualifications for 222-S Complex employees is available at the 222-S Complex. Training records for supporting organizations also are stored in the Training Records Information System, and copies of completed training and qualifications are available at their respective organization's locations. Training records on former employees will be kept for 3 years from the date the employee last worked at the 222-S Complex.

Specific employee training records are available, at reasonable times, to the regulators on a demonstrated need-to-know basis. Copies of these records will be marked *Sensitive Information* and are expected to be handled in accordance with the *Privacy Act of 1974*.

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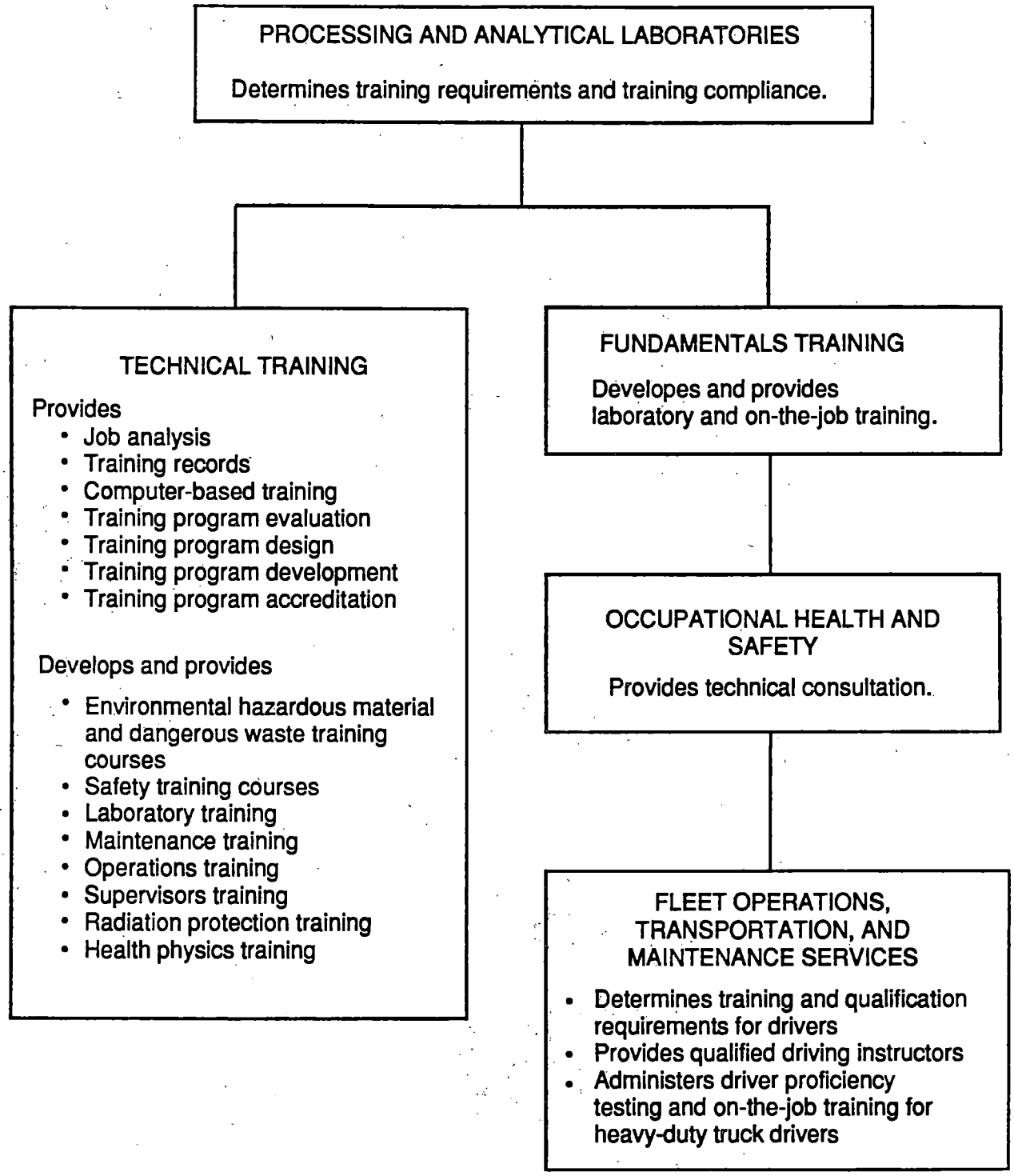

Figure 8-1. Distribution of Training Responsibility for Processing and Analytical Laboratories Training.

Table 8-1. General Training Matrix. (sheet 1 of 2)

Course	Type	Target audience																		
		PM	PO	OM	NO	MM	CM	PE	PC	HP	HPT	LM	CT	QA	QC	SF	HZ	FD	RD	HD
Radiation safety training	I	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Radiation safety requalification	C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
General employee training	C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
New employee safety training	I	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
On-the-job training instructor training	I	-	-	3	3	3	3	-	3	3	3	3	3	-	3	-	-	-	3	3
Environmental and hazardous material safety training requirements (Tables 8-4, 8-5)	I,C	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Building emergency director training	C	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Light-duty hoist training	C	-	-	X	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
Orientation to DOE Order 5000.3A occurrence reporting	I	X	X	X	-	X	-	X	X	X	-	X	-	X	X	X	X	-	X	-
Managers and first-line managers conduct of operations, DOE Order 5480.19	I	X	X	X	-	X	-	X	X	X	-	-	-	X	X	X	X	-	X	-
Basic crane and rigging training	C	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Fork truck operator training	I	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
Fork truck operator requalification	C	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-

Target audience abbreviations				Legend	
PM	Processing and Analytical Laboratories manager	HPT	Health physics technicians	I	Introductory course
PO	222-S Laboratories operations manager	LM	Scientists	C	Continuing course
OM	Building operations manager and shift managers	CT	Chemical technologists	X	Required course

Table 8-6. Employee Work Categories Definitions. (sheet 1 of 2)

Employee category	Definition
1. All employees	All employees and unescorted contract personnel.
2. General worker	Any employee who is or has the potential to be exposed to hazardous chemicals in the work place. Also, any employee who generates, packages, stores, or ships hazardous waste or who directly affects the management of hazardous chemicals or hazardous waste.
3. General Supervisor or Manager	Supervisor or manager who qualifies under the definition of General Worker (No. 2) or who has subordinates who qualify as general workers.
4. General Nonradiological Dangerous Waste Shippers	Employees who are responsible for preparing and signing the Uniform Hazardous Waste Manifests.
5. General Hazardous Material (Radiological) Shippers	Employees who certify the compliance of radioactive Hanford Site hazardous material shipments.
Categories 6 through 8 as defined in OSHA 29 CFR 1910.120 *Hazardous Waste Operations and Emergency Response*, are as follows:	
6a. Hazardous Waste Site Worker - hazards known	Employees who work within or require entry into RCRA-permitted portions of hazardous waste TSD units.
	Examples at the Hanford Site: PUREX aqueous makeup; PUREX sampling gallery; PUREX operating and pipe gallery.
6b. Hazardous Waste Site Worker - hazards unknown	Employees who work within or require entry into CERCLA/RCRA remediation sites or units where cleanup work could present unknown hazards or where there is potential for conditions to change and present unknown hazards.

FORM 1

State of Washington Department of Ecology

WASHINGTON STATE

DANGEROUS WASTE PERMIT GENERAL INFORMATION

(Read "Form 1 Instructions" before starting)

I. EPA/STATE I.D. NUMBER: WA7890008967

II. NAME OF FACILITY
U.S. DEPARTMENT OF ENERGY-HANFORD SITE

III. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)	B. PHONE (area code & no.)
LAWRENCE, MICHAEL J., MANAGER	509 376 7395

IV. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX	B. CITY OR TOWN	C. STATE	D. ZIP CODE
P.O. BOX 550	RICHLAND	WA	99352

V. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER	B. COUNTY NAME	C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
HANFORD SITE	-NTON	RICHLAND	WA	99352	005

VI. SIC CODES (4-digit, in order of priority)

A. FIRST	B. SECOND
9711 (specify) NATIONAL SECURITY	8922 (specify) NUCLEAR NONCOMMERCIAL DEVELOPMENT AND EDUCATION
C. THIRD	**D. FOURTH**
9611 (specify) ADMINISTRATION AND GENERAL ECONOMICS PROGRAM	4911 (specify) STEAM-ELECTRIC GENERATION

VII. OPERATOR INFORMATION

A. NAME (DOE-RL)
DEPARTMENT OF ENERGY-RICHLAND OPERATIONS
WESTINGHOUSE HANFORD COMPANY (WHC)

B. Is the name listed in Item VII-A also the owner? ☒ YES ☐ NO **

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)
F = FEDERAL, S = STATE, P = PRIVATE, M = PUBLIC (other than federal or state), O = OTHER (specify)
F (specify)

D. PHONE (area code & no.): 509 376 7395

509 376 7803

E. STREET OR P.O. BOX	F. CITY OR TOWN	G. STATE	H. ZIP CODE
PO BOX 550/PO BOX 1970	RICHLAND	WA	99352

VIII. INDIAN LAND
Is the facility located on Indian lands? ☐ YES ☒ NO

**DOE-RL: OWNER/CO-OPERATOR; WHC: CO-OPERATOR FOR CERTAIN UNITS ON THE HANFORD SITE.
COMPLETE BACK PAGE

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SCLA -STP-

IX. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids undergound. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

X. NATURE OF BUSINESS *(provide a brief description)*

- NATIONAL DEFENSE NUCLEAR MATERIAL PRODUCTION
- ENERGY RESEARCH AND TECHNOLOGY DEVELOPMENT
- DEFENSE NUCLEAR WASTE MANAGEMENT
- BYPRODUCT STEAM, SOLD FOR ELECTRIC POWER GENERATION

AND SIC 15: BUILDING CONSTRUCTION - GENERAL CONTRACTORS AND OPERATIVE BUILDERS

XI. CERTIFICATION *(see instructions)*

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the 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.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
SEE ATTACHMENT		

9 8 1 2 4 1 7 0 1 9 2

WA7890008967

FORM 1

DANGEROUS WASTE PERMIT GENERAL INFORMATION

XI. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments, 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.

Michael J. Lawrence — 5-19-88
Date

Michael J. Lawrence
Manager, Richland Operations
United States Department of Energy

W. M. Jacobi — 5/13/88
Date

William M. Jacobi
President
Westinghouse Hanford Company
Co-operator

9 2 1 2 4 1 7 0 1 9 3

Please print or type in the unshaded areas only
(Shaded areas are spaced for elite type, i.e., 12 characters/inch)

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (mo. day & yr.)	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 06 DAY 01 YR 51 — FOR EXISTING FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED (use the boxes to the left)

☐ 2. NEW FACILITY (Complete item below.)

MO DAY YR — 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 code(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
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

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
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
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE FEET	A
HECTARE METER	F
ACRES	O
HECTARES	Q

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 NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	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	S02	600	G		5				
X-2	T03	20	E		6				
1	S02	9,500	G		7				
2	T01	206	U		8				
3	S01	540	G		9				
4					10				

CONTINUE ON REVERSE

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Continued from the front.

III. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04") FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

The 222-S Laboratory Complex consists of following two waste management units, the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area. Processes associated with these two units are described as follows:

S02,T01 - The 219-S Waste Handling Facility is located northeast of the 222-S Analytical Laboratory Building. The 219-S Waste Handling Facility contains three stainless steel tanks: 101 (4,000 gallon), 102 (4,000 gallon), and 103 (1,500 gallon) located in a belowground concrete vault (S02). Tanks 101 and 103 are used for the primary and backup storage of mixed waste from the 222-S Analytical Laboratory. The mixed waste is transferred from tanks 101 and 103 to tank 102 for treatment (T01) and storage before transfer to the Double-Shell Tank (DST) System. The mixed waste is treated in tank 102 with sodium hydroxide (NaOH) to a pH greater than or equal to 12.0 and with sodium nitrite ($NaNO_2$) to a concentration of 600 parts per million. This treatment process makes the mixed waste more amenable for storage in the DST System. The maximum process design capacity of the three storage tanks is 9,500 gallons. The maximum treatment process design capacity for tank 102 is 206 gallons per day (75,000 gallons per year).

S01 - The 222-S Dangerous and Mixed Waste Storage Area is located on the north side of the 222-S Analytical Laboratory Building. The 222-S Dangerous and Mixed Waste Storage Area consists of two metal storage structures resting on a concrete pad. The 222-S Dangerous and Mixed Waste Storage Area stores a total of 36 55-gallon U.S. Department of Transportation-specified drums of mixed waste and nonradioactive dangerous waste (S01). Each metal storage structure holds a total of 18 drums of waste. The drums are stored at the 222-S Dangerous and Mixed Waste Storage Area until transferred to the Hanford Central Waste Complex (mixed waste) or the 616 Nonradioactive Dangerous Waste Storage Facility (nonradioactive dangerous waste) for storage and/or disposal. The maximum design capacity of the 222-S Dangerous and Mixed Waste Storage Area is 540 gallons (15 gallons per drum).

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER — Enter the four 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 codes 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 800 pounds per year of chrome shavings from leather tanning and finishing operations. 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. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. (enter one)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K054	900	P	T03 D80	
X-2	D002	400	P	T03 D80	
X-3	D001	100	P	T03 D80	
X-4	D002			T03 D80	included with above

Continued from page 2.
NOTE: *Photocopy this page before completing if you have more than 26 wastes to list.*

I.D. NUMBER (*enter from page 1*): WA7890008967

IV. DESCRIPTION OF DANGEROUS WASTES (*continued*)

LINE NO.	A. DANGEROUS WASTE NO. (enter codes)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
1	D002	626,000	P	S02	T01			Storage - Tank/Treatment - Tank
2	D004							
3	D005							
4	D006							
5	D007							
6	D008							
7	D009							
8	D010							
9	D011							
10	F003							
11	F005							
12	WT01							Included With Above
13	D001	12,000	P	S01				Storage - Container
14	D002							
15	D003							
16	D004							
17	D005							
18	D006							
19	D007							
20	D008							
21	D009							
22	D010							
23	D011							
24	D012							
25	D013							
26	D014							

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Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER (enter from page 1): WA7890008967

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)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D015	12,000 (continued)	P	S01				Storage - Container (continued)
2	D016							
3	D017							
4	D018							
5	D019							
6	D020							
7	D021							
8	D022							
9	D023							
10	D024							
11	D025							
12	D026							
13	D027							
14	D028							
15	D029							
16	D030							
17	D031							
18	D032							
19	D033							
20	D034							
21	D035							
22	D036							
23	D037							
24	D038							
25	F001							
26	F002							

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Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER (enter from page 1): WA7890008967

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. (enter codes)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	F003	12,000 (continued)	P	S01				Storage - Container (continued)
2	F005							
3	F027							
4	WC01							
5	WC02							
6	WP01							
7	WT01							
8	WT02							Included With Above
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

9212417019198

Continued from the front.

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

C. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The mixed waste from the 222-S Analytical Laboratory flows by gravity through underground pipelines to the 219-S Waste Handling Facility for treatment and storage. The mixed waste is considered corrosive (D002) because of the presence of nitric acid and is treated before transfer to the DST System. The treated mixed waste consists of toxicity characteristics (D004 through D011), spent nonhalogenated solvents (F003 and F005), and state-only waste (WT01).

The mixed waste and nonradioactive dangerous waste drums that are stored at the 222-S Dangerous and Mixed Waste Storage Area consists of characteristic waste (D001, D002, and D003), toxicity characteristic waste (D004 through D038), spent halogenated and nonhalogenated solvents (F001, F002, F003, F005, and F027), and state-only waste (WC01, WC02, WP01, WT01, and WT02).

V. FACILITY DRAWING

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

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

[X] 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 IX 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 NO. (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 United States Department of Energy DOE Richland Field Office	Edward A. Goldberg	12/20/91

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		

CONTINUE ON PAGE 6

9212417019 9

X. OPERATOR CERTIFICATION

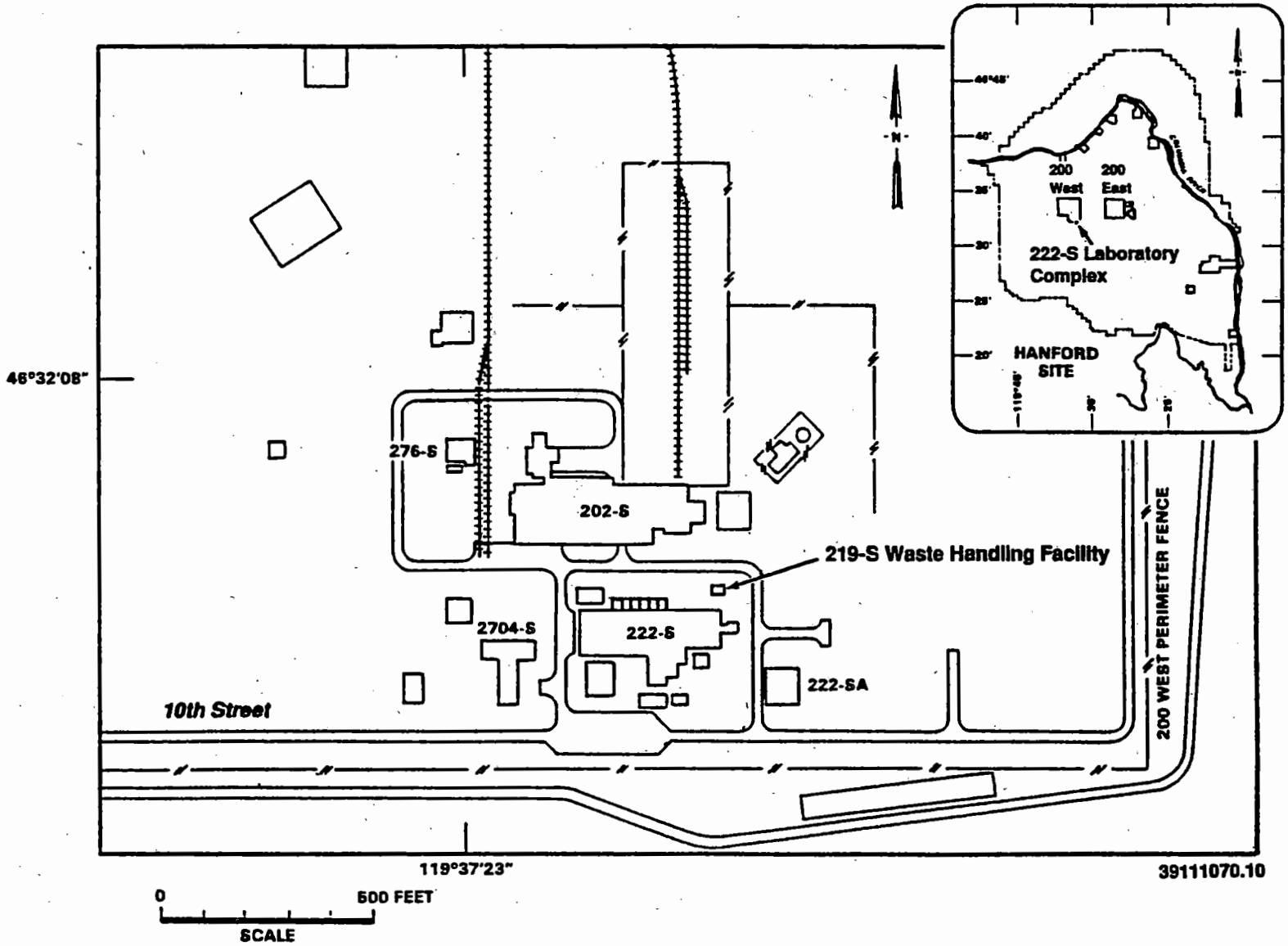
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true,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

Edward A. Gulley — 12/20/91
Owner/Operator — Date
John D. Wagoner, Manager
U.S. Department of Energy
DOE Richland Field Office

Thomas M. Anderson — 11/26/91
Co-operator — Date
Thomas M. Anderson, President
Westinghouse Hanford Company

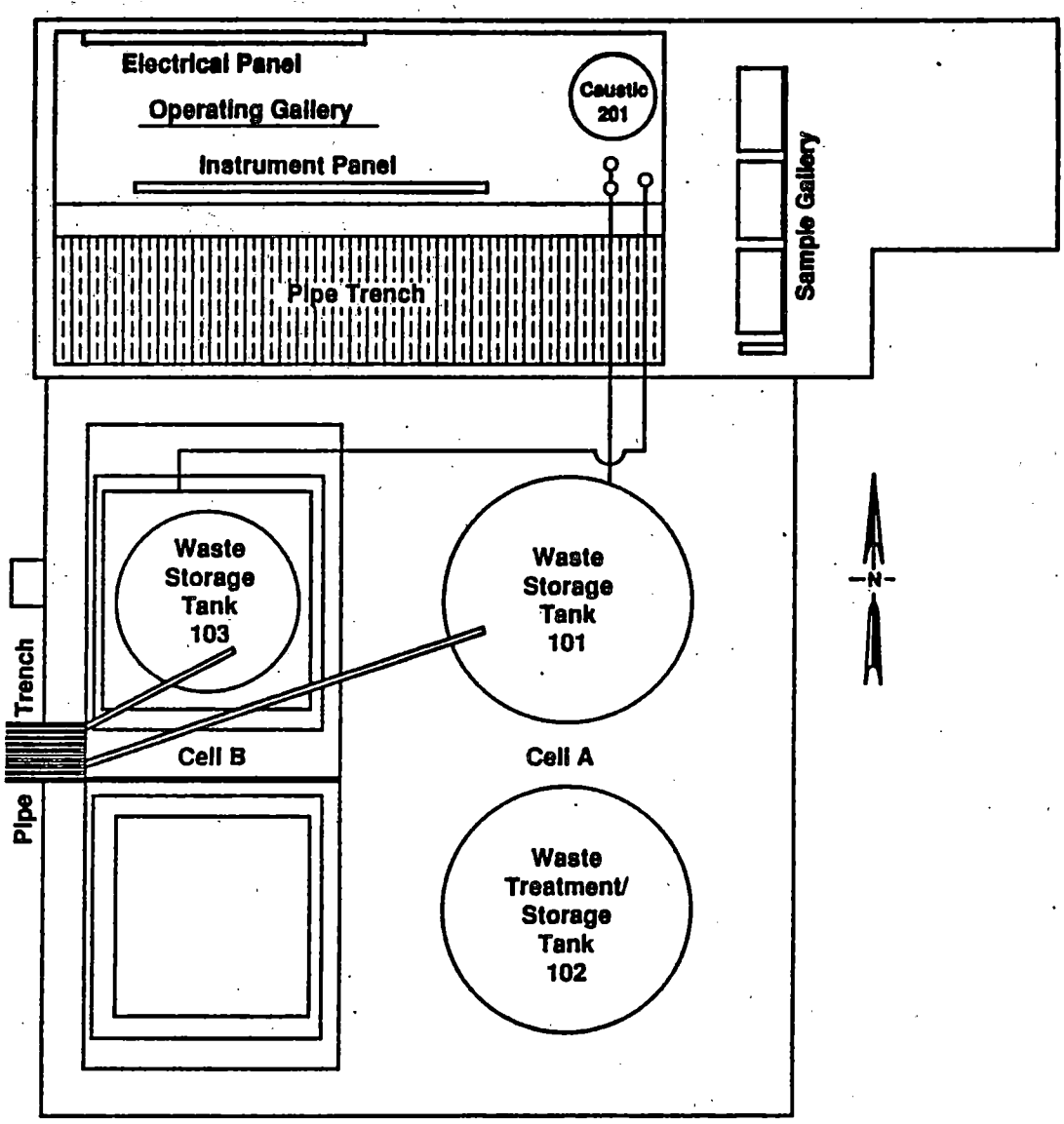
9212417020 0

222-S Laboratory Complex
219-S Waste Handling Facility Tanks 101,102, and 103
Site Plan



WA7890008967

222-S LABORATORY COMPLEX



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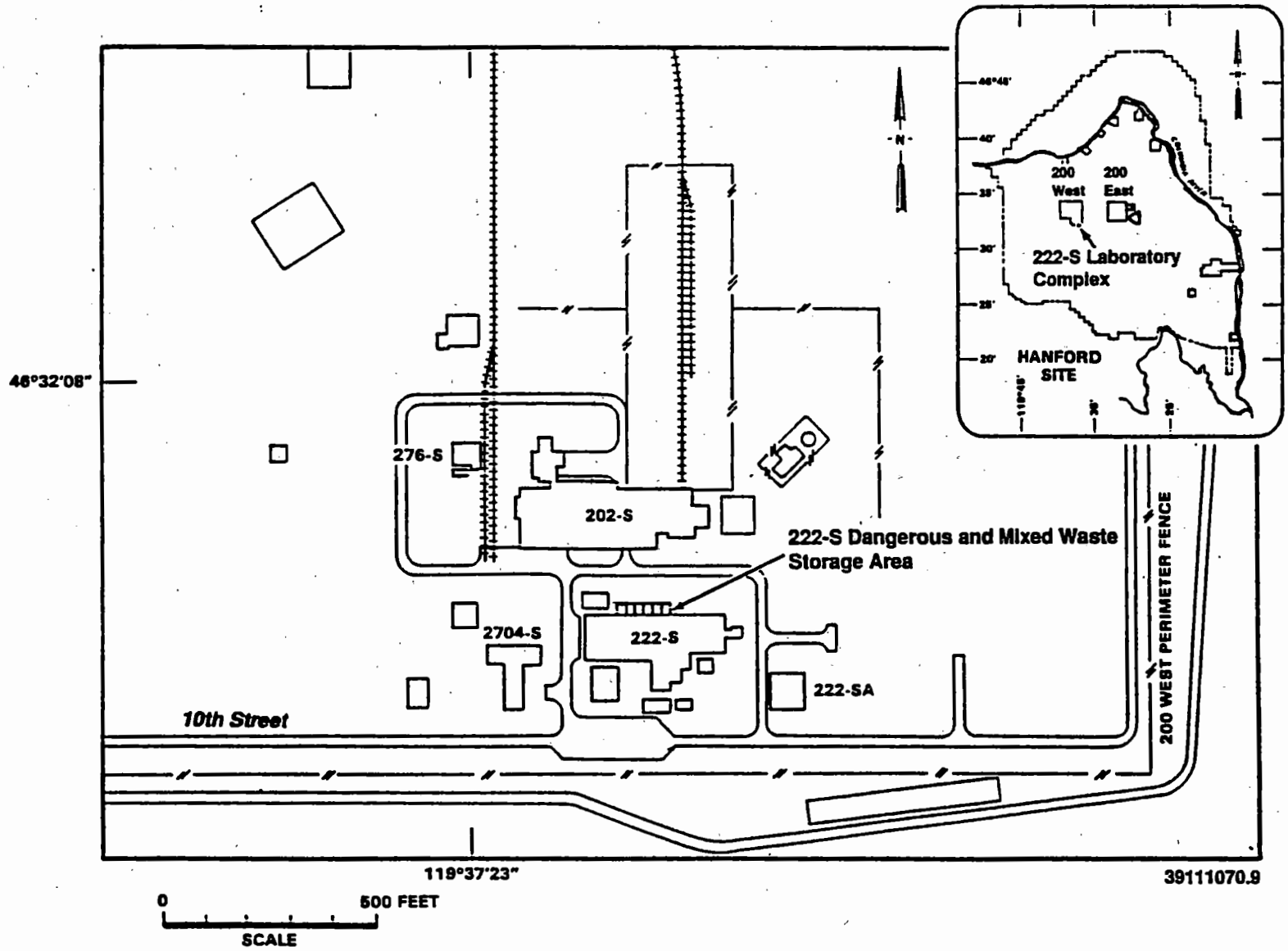
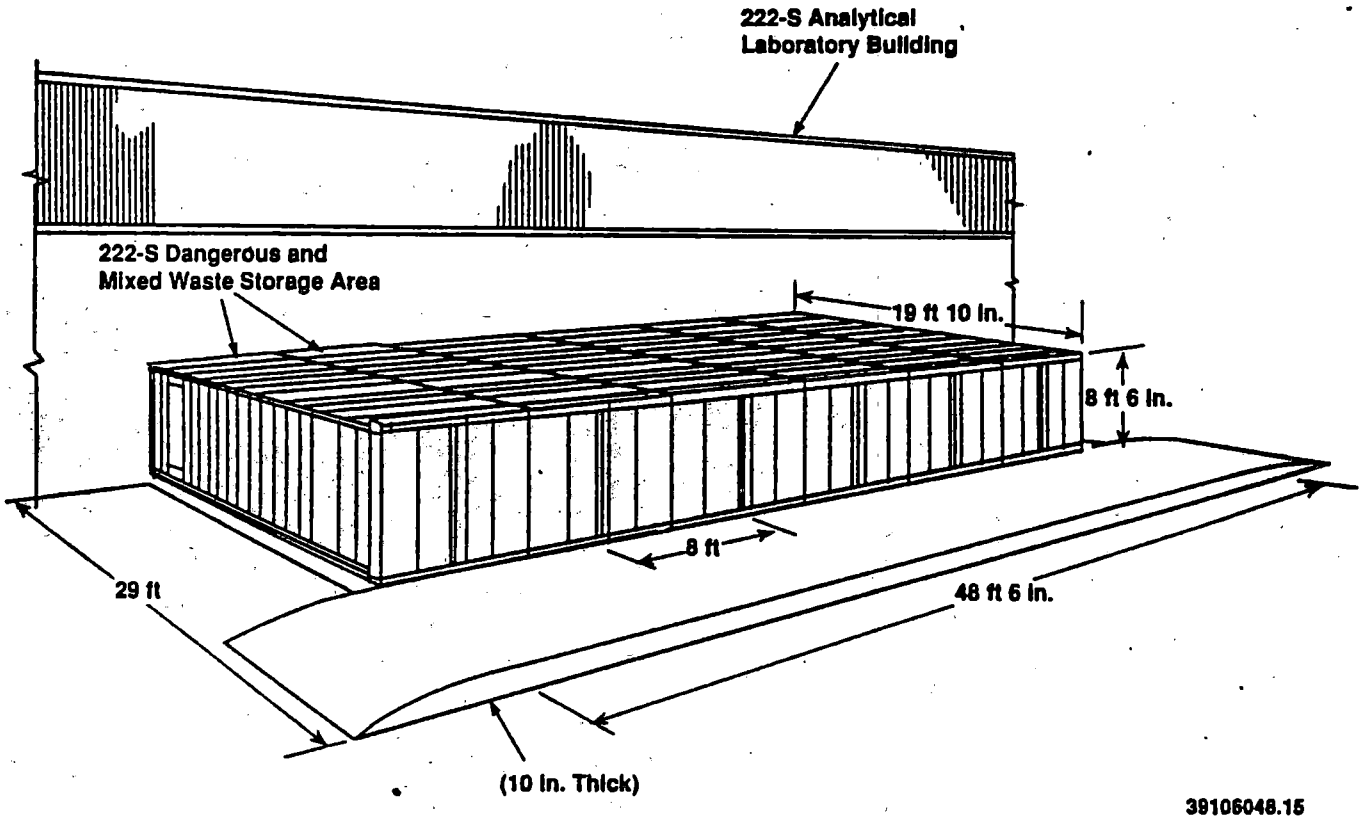
219-S WASTE HANDLING FACILITY
TANKS 101, 102, AND 103

222-S Laboratory Complex
222-S Dangerous and Mixed Waste Storage Area Site Plan



WA7890008967

222-S LABORATORY COMPLEX



222-S DANGEROUS AND MIXED WASTE STORAGE AREA

9212417020 4

222-S LABORATORY COMPLEX

219-S Waste Handling Facility

46°32'02"
119°37'12"

91092605-2CN
(PHOTO TAKEN 1991)

9 2 1 2 4 1 7 0 2 0 5

222-S LABORATORY COMPLEX DANGEROUS AND MIXED WASTE STORAGE AREA

Metal Storage Structures on Storage Pad

46°32'02"
119°37'12"

9102217-24CN
(PHOTO TAKEN 1991)

9 2 1 2 4 1 7 0 2 0 6

222-S LABORATORY COMPLEX DANGEROUS AND MIXED WASTE STORAGE AREA

Metal Storage Structure Internal View

46°32'02"
119°37'12"

9102217-27CN
(PHOTO TAKEN 1991)

9 2 1 2 4 1 7 0 2 0 7

Table 8-1. Company-General Training Matrix. (sheet 2 of 2)

Target audience abbreviations				Legend	
NO	Scientific technicians and sampling team scientist	QA	Quality Assurance manager and engineers	-	Not applicable
MM	Programmatic Maintenance services manager and plant engineers and 222-S Laboratories Maintenance supervisor	QC	Quality Control manager and inspectors	1	Not applicable
CM	Maintenance crafts	SF	Occupational Health and Safety manager and engineers, Health and Safety Assurance manager and engineers	2	Required only for new employees
PE	222-S Laboratory waste handling control group manager and 222-S Laboratory engineering manager/environmental compliance officer and engineers	HZ	Hazardous material coordinator	3	Required as determined by management for designated personnel
PC	Waste Sampling Characterization Facility startup and sampling and mobile laboratories manager	FD	Hanford Fire Department		
HP	Health physics supervisor	RD	Road, Delivery, and Equipment Operations manager and supervisor and Crane and Rigging Services manager and supervisor		
		HD	Road, Delivery, and Equipment Operations heavy-duty truck driver and Crane and Rigging Services heavy-duty druck drivers		

Table 8-2. Specific Training Matrix.

Course	Type	Target audience																		
		PM	PO	OM	NO	MM	CM	PE	PC	HP	HPT	LM	CT	QA	QC	SF	HZ	FD	RD	HD
222-S Facility orientation*	I	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Building emergency plan checklist	C	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Target audience abbreviations				Legend	
PM	Processing and Analytical Laboratories manager	HPT	Health physics technicians	I	Introductory course
PO	222-S Laboratories operations manager	LM	Scientists	C	Continuing course
OM	Building Operations manager and shift manager	CT	Chemical technologists	X	Required course
NO	Scientific technicians and sampling team scientists	QA	Quality Assurance manager and engineer	-	Not applicable
MM	Programmatic Maintenance Services manager and plant engineers and 222-S Laboratories Maintenance supervisor	QC	Quality Control manager and inspector	4	Required only for personnel assigned to unit
CM	Maintenance crafts	SF	Occupational Health and Safety manager and engineers, Health and Safety Assurance manager and engineer	*	All other operations contractor personnel in a supporting capacity, other than visitors, must complete this course
PE	222-S Laboratory Waste Handling Control Group manager and 222-S Laboratory Engineering manager/environmental compliance officer and engineers	HZ	Hazardous Material Coordinator		
PC	Waste Sampling Characterization Facility startup and sampling and mobile laboratories manager	FD	Hanford Fire Department		
HP	Health physics supervisor	RD	Road, Delivery, and Equipment Operations manager and supervisor and Crane and Rigging Services manager and supervisor		
		HD	Road, Delivery, and Equipment Operations heavy-duty truck drivers and Crane and Rigging Services heavy-duty truck drivers		

Table 8-3. Job-Specific Training Matrix. (sheet 1 of 3)

Course	Type	Target audience																		
		PM	PO	OM	NO	MM	CM	PE	PC	HP	HPT	LM	CT	QA	QC	SF	HZ	FD	RD	HD
Laboratory Technologist Training Plan	I	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
222-S Laboratories unit-specific training	C	-	-	X	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-
Chemical technologist qualification	C	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-
Hazardous material and waste handling-job specific	C	-	X	X	X	X	X	X	-	-	X	X	X	-	-	-	X	-	-	-
222-S Complex chemical technologist emergency procedures and abnormal plant conditions training	C	-	-	-	X[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Laboratory managers qualification program	C	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
222-S Laboratory manager emergency procedures and abnormal plant conditions training	C	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Laboratory scientist qualification program	C	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-
Hazardous material-carrier/driver course	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X
Washington State commercial drivers license-Class A with hazardous materials endorsement	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X
Scientific technician qualification program	I	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Health physics technician trainee certification	I	-	-	-	-	-	-	-	-	-	X[b]	-	-	-	-	-	-	-	-	-
Health physics technician trainee general on-the-job training	C	-	-	-	-	-	-	-	-	-	X[c]	-	-	-	-	-	-	-	-	-

Table 8-3. Job-Specific Training Matrix. (sheet 2 of 3)

Course	Type	Target audience																		
		PM	PO	OM	NO	MM	CM	PE	PC	HP	HPT	LM	CT	QA	QC	SF	HZ	FD	RD	HD
Health physics technician trainee 222-S Laboratory operations on-the-job training	C	-	-	-	-	-	-	-	-	-	X[c]	-	-	-	-	-	-	-	-	-
Health physics technician certification	C	-	-	-	-	-	-	-	-	-	X[d]	-	-	-	-	-	-	-	-	-
Health physics technician general on-the-job training	C	-	-	-	-	-	-	-	-	-	X[e]	-	-	-	-	-	-	-	-	-
Health physics technician 222-S Laboratory operations on-the-job training	C	-	-	-	-	-	-	-	-	-	X[e]	-	-	-	-	-	-	-	-	-
Senior health physics technician certification	C	-	-	-	-	-	-	-	-	-	X[f]	-	-	-	-	-	-	-	-	-
Senior health physics technician general on-the-job training	C	-	-	-	-	-	-	-	-	-	X[f]	-	-	-	-	-	-	-	-	-
Senior health physics technician 222-S Laboratory operations on-the-job training	C	-	-	-	-	-	-	-	-	-	X[f]	-	-	-	-	-	-	-	-	-
222-S Laboratory operations health physics technicians (all) emergency procedures and abnormal plant conditions training	C	-	-	-	-	-	-	-	-	-	X[g]	-	-	-	-	-	-	-	-	-

Table 8-3. Job-Specific Training Matrix. (sheet 3 of 3)

Target audience abbreviations				Legend	
PM	Processing and Analytical Laboratories manager	HPT	Health physics technicians	I	Introductory course
PO	222-S Laboratories Operations manager	LM	Scientists	C	Continuing course
OM	Building Operations manager and shift managers	CT	Chemical technologists	X	Required course
				-	Not applicable
NO	Scientific technicians and sampling team scientist	QA	Quality Assurance manager and engineers		
MM	Programmatic Maintenance Services manager and plant engineers and 222-S Laboratories Maintenance supervisor	QC	Quality Control manager and inspectors	X[a]	Chemical technologists must complete this course annually in conjunction with normal requalification on procedures biennially
CM	Maintenance crafts	SF	Occupational Health and Safety manager and engineers, Health and Safety Assurance manager and engineers	X[b]	Required only for those health physics technicians hired at the junior health physics technician level
PE	222-S Laboratory waste handling control group manager and 222-S Laboratory engineering manager/environmental compliance officer and engineers	HZ	Hazardous material coordinator	X[c]	Required for junior health physics technicians, health physics technicians, and senior health physics technicians
PC	Waste Sampling Characterization Facility startup and sampling and mobile laboratories manager	FD	Hanford Fire Department	X[d]	Required only for health physics technicians hired at the health physics technician level or who progress from the junior health physics technician level
HP	Health physics supervisor	RD	Road, Delivery, and Equipment Operations manager and supervisor and Crane and Rigging Services manager and supervisor	X[e]	Required for health physics technicians and senior health physics technicians
		HD	Road, Delivery, and Equipment Operations heavy-duty truck drivers and Crane and Rigging Services heavy-duty truck drivers	X[f]	Required for senior health physics technicians only
				X[g]	Required for health physics technician-trainees, health physics technicians, and senior health physics technicians

Table 8-4. Environmental and Hazardous Material Safety Initial Training Matrix.

Employee category (category definitions are in Table 8-6)	Course title (length/frequency)														
	Hazardous Communication and Waste Orientation (1 hour)	Generator Hazards Safety Training (4 hours)	Hazardous Materials Waste Job-Specific Training (length varies with each TSD unit)	Radiation Worker Training (8 hours)	Waste Site Basic (16 hours)	Scott SKA-PAK* Training (2 hours)	Cardiopulmonary Resuscitation (4 hours)	Fire Extinguisher Safety (1 hour)	Waste Site Advanced (24 hours)	Waste Site Field Experience (24 hours)	Hazardous Waste Shipment Certification (24 hours)	Certification of Hazardous Material Shipments (8 hours)	Hazardous Waste Site Supervisor/Manager (8 hours)	Compliance Category**	Total hours
1. All employees	X														1
2. General worker		X	X											1	5 + unit-specific training
3. General supervisor/manager		X	X											1	5 + unit-specific training
4. General nonradiological shipper		X	X								X			1,2	29 + unit-specific training
5. General hazardous material shipper		X	X									X		1,2	13 + unit-specific training
6a. Hazardous waste worker (known hazards)		X	X	X	X									1,3	28 + unit-specific training + field experience
6b. Hazardous waste worker (unknown hazards)		X	X	X		X	X	X	X	X				1,4	44 + unit-specific training + field experience
7. Hazardous waste supervisor/manager		X	X	X		X	X	X	X	X			X	1,5	52 + unit-specific training + field experience
8. Hazardous waste shipper		X	X	X		X	X	X	X	X	X	X		1,2,4	76 + unit-specific training + field experience

* Scott SKA-PAK is a trademark of Figgie International, Incorporated.
** Compliance categories:
1 WAC 173-303, 29 CFR 1910.1200
2 49 CFR 173
3 29 CFR 1910.120 (24-hour requirement)
4 29 CFR 1910.120 (40-hour requirement)
5 29 CFR 1910.120 (40-hour plus 8-hour requirement).

Table 8-5. Environmental and Hazardous Material Safety Retraining Matrix.

Employee category (category definitions are in Table 8-6)	Course title (length/frequency)				
	Generator Hazards Safety Training (4 hours/2 years)	Hazardous Materials Waste Job-Specific Training [(length varies with each unit)/1 year]	Hazardous Waste Site Retraining (8 hours/1 year)	Hazardous Waste Shipment Certification (24 hours/1 year)	Certification of Hazardous Material Shipments (8 hours/2 years)
1. All employees	Not required				
2. General worker	X	X			
3. General supervisor/manager	X	X			
4. General nonradiological shipper	X	X		X	
5. General hazardous material shipper	X	X			X
6a. Hazardous waste worker (known hazards)	X	X	X		
6b. Hazardous waste worker (unknown hazards)	X	X	X		
7. Hazardous waste supervisor/manager	X	X	X		
8. Hazardous waste shipper	X	X	X	X	X

Table 8-6. Employee Work Categories Definitions. (sheet 2 of 2)

	Employee category	Definition
		Examples at the Hanford Site: decontamination and decommissioning work/operations; tank farms; Grout Treatment Facility; crib/ditch/pond work including, but not limited to, the following; characterization, monitoring, sampling, and maintenance.
7.	Hazardous Waste Site Supervisor or Manager	Supervisors or managers who oversee work of employees who qualify as Hazardous Waste Site Workers (6a and 6b).
8.	Hazardous Waste Site Shipper	Employees who are responsible for certifying shipments of nonradioactive hazardous waste, hazardous and radioactive material, and/or mixed waste.

CONTENTS

9.0 EXPOSURE INFORMATION REPORT 9-1

1

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9 2 1 2 4 1 7 3 2 1 7

9.0 EXPOSURE INFORMATION REPORT

The 222-S Complex does not treat, store, or dispose of dangerous waste in a surface impoundment or a landfill as defined in 40 CFR 270.10 and RCRA, Section 3019. Therefore, exposure information is not required.

1

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CONTENTS

10.0 WASTE MINIMIZATION PLAN 10-1

10.1 REGULATORY BASIS 10-1

10.2 222-S COMPLEX WASTE MINIMIZATION OBJECTIVES 10-1

10.3 WASTE MINIMIZATION PLAN 10-2

APPENDIX

10A 222-S LABORATORY COMPLEX WASTE MINIMIZATION PLAN . . . . . APP 10A-i

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9 2 1 2 4 1 7 0 2 1

10.0 WASTE MINIMIZATION PLAN

This chapter discusses the program to minimize the volume or quantity and toxicity of waste generated at the 222-S Complex. The regulatory basis for, and objectives of, the waste minimization program are discussed. The waste minimization program implemented at the 222-S Complex is included as Appendix 10A.

10.1 REGULATORY BASIS

The *Hazardous And Solid Waste Amendments of 1984* to RCRA require that, whenever feasible, the generation of hazardous waste be reduced or eliminated as expeditiously as possible. Section 3002(b) of RCRA requires certification of the following:

- The generator of the hazardous waste has in place a program to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable.

- The proposed method of treatment, storage, and/or disposal is that practicable method currently available to the generator that minimizes the present and future threat to human health and the environment.

This chapter provides the means to certify that a waste minimization program is in place for the 222-S Complex.

10.2 222-S COMPLEX WASTE MINIMIZATION OBJECTIVES

The 222-S Complex waste minimization program is tied to the overall waste minimization program for the Hanford Facility. The 222-S Complex waste minimization program includes all practices that reduce, avoid, or eliminate dangerous waste generation.

The following are the 222-S Complex waste minimization program objectives:

- Minimize the volume of waste generated.

- Generate nondangerous or less dangerous forms of waste if practical.

- Segregate dangerous waste from nondangerous waste if practical.

Annually a certification, as required by 40 CFR 264.73(b)(9), is placed in the 222-S Complex operating record stating that a waste minimization program is in place. In addition, a Hanford Facility biennial report is submitted to Ecology that contains a description of efforts made to minimize waste and a certification that a waste minimization program is in place. The report includes information on the 222-S Complex waste minimization program (Chapter 12.0).

10.3 WASTE MINIMIZATION PLAN

The 222-S Laboratory Complex Waste Minimization Plan is included as Appendix 10A.

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11.0 CLOSURE AND POSTCLOSURE REQUIREMENTS [I]

This chapter describes the planned activities and performance standards for closing the two TSD units within the 222-S Complex. These units are the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area. No postclosure activities are applicable or required for the closure of these units because these units will be clean closed. Clean closure requires that all dangerous waste be removed and disposed of in accordance with applicable regulations.

The words contaminated and decontaminated as used in this chapter refer to contamination by dangerous waste regulated by Ecology. The words dangerous or extremely hazardous used in this chapter are in the context of Ecology-regulated waste.

Clean closure is contingent on verification that constituents originating from the units are not present in concentrations that represent a threat to human health or the environment. This verification will be made using data obtained from sampling activities. The closure activities that will be performed include the following:

- Removal and disposal of dangerous waste from all components of the regulated units and accessory structures
- Decontamination or removal and disposal of the components of the regulated units and accessory structures
- Verification sampling and analysis of building surfaces, tanks, equipment, pads, and underlying shallow soil (if necessary)
- Certification of closure.

Clean closure will be accomplished by demonstrating that dangerous waste in the 222-S Complex is not present above action levels. Action levels are the constituent concentration levels that will prompt an action, including additional evaluation, cleanup, or deferral to the CERCLA process. Action level values include concentrations based on risk to human health and the environment, baseline threshold concentrations, background, or other appropriate cleanup criteria. For purposes of this permit application, the action levels for all contaminants of concern will be background and/or health- and environmental-based risk (regulatory threshold) levels for each of the medium types.

11.1 CLOSURE PLAN [I-1]

Final closure of the 219-S Waste Handling Facility and 222-S Dangerous and Mixed Waste Storage Area will begin when the laboratory services provided by the 222-S Complex are no longer needed. Activities that are planned to achieve clean closure are presented in the following sections.

Closure of the 219-S Waste Handling Facility, in part, requires the decontamination and removal of all equipment, piping, and tanks currently present within the 219-S Waste Handling Facility. This plan describes the methods of decontamination and equipment disposal for the following portions of the 219-S Waste Handling Facility, ancillary equipment, and structures:

- Process tanks and piping
- Ancillary equipment in the operating gallery and the sample gallery
- The 219-S Waste Handling Facility Building structure (includes the operating gallery and the sample gallery)
- Belowground concrete vault structure
- Underground piping and concrete trenches.

Equipment, piping, and materials that cannot be decontaminated will be removed from the 219-S Waste Handling Facility and transported to an appropriate TSD unit for final disposition.

The pipes contained in concrete trenches from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility are included in this closure plan. Future design projects, discussed in Chapter 4.0, include pipe installations from the 219-S Waste Handling Facility tanks to the Double-Shell Tank System. Transfer pipes leading from the 219-S Waste Handling Facility tanks to the Double-Shell Tank System will be closed in accordance with the *Double-Shell Tank System Dangerous Waste Permit Application* (DOE-RL 1991a).

Closure of the 222-S Dangerous and Mixed Waste Storage Area will consist of the following:

- Removal of all containerized waste present within the 222-S Dangerous and Mixed Waste Storage Area storage structures
- Check of operating record for documented incident(s) of spillage
- Visual inspection of the interiors and exteriors of the storage structures for signs of spillage or contamination
- Decontamination, if visual signs or recorded incidents of release are found
- Performance of verification sampling if necessary
- Decontamination of equipment if necessary
- Disposal of contaminated equipment and any generated waste if necessary.

11.1.1 Closure Performance Standard [I-1a]

The following sections address closure performance standards, waste removal, and decontamination standards.

11.1.1.1 Performance Standard [I-1a(1)]. This closure plan has been developed to close the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area in a manner that meets the following closure performance standards of WAC 173-303-610(2)(a):

- Minimize the need for future site maintenance

- Control, minimize, or eliminate to the extent necessary to protect human health and the environment, postclosure escape of dangerous waste, dangerous waste constituents, leachate, contaminated run-off, or dangerous waste decomposition products to the ground, surface water, groundwater, or atmosphere

- Return the land to the appearance and use of surrounding land areas to the greatest degree possible.

These standards will be achieved by closing the units at the 222-S Complex in accordance with WAC 173-303-610(2)(b). All equipment, structures, and other material associated with closure of the 219-S Waste Handling Facility and 222-S Dangerous and Mixed Waste Storage Area also will be decontaminated or removed in accordance with WAC 173-303-610(2)(b). Because of the design and operation of the 222-S Dangerous and Mixed Waste Storage Area (waste stored in its original collection containers, inside two sealed plastic bags, inside a polyethylene liner, inside a steel drum, which is stored over a stainless steel containment basin) and its location [on a 10-inch- (25-centimeter-) thick reinforced concrete pad], soil contamination resulting from 222-S Dangerous and Mixed Waste Storage Area operations is not anticipated. Therefore, no soil sampling will be performed as part of 222-S Dangerous and Mixed Waste Storage Area closure.

The specific steps to be used during the closure period to ensure minimal escape of dangerous waste constituents and minimal exposure of the public to dangerous waste constituents are the following.

- Access to the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area will be controlled during the closure period to prevent contact with waste constituents by people and animals. During the closure period, access will be limited to personnel required to support the closure of the units. Personnel will be trained in accordance with the requirements of Chapter 8.0 before being granted access.

- When the removal of all contaminated equipment has been completed and the units are believed to be decontaminated to appropriate action levels, a sampling program will be conducted to verify that no contaminants exceeding action levels exist in the 219-S Waste Handling Facility or in the 222-S Dangerous and Mixed Waste Storage Area

storage structures. When this sampling program confirms that concentrations of dangerous constituents are not detectable in excess of action levels, the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area will be considered clean closed. The closed units will no longer be designated as dangerous waste units and will be released for future use.

11.1.1.2 Removal or Decontamination Standard [I-1a(2)]. Clean closure of the units at the 222-S Complex requires removal and disposal of all dangerous waste present, removal and disposal of all process equipment and contaminated structural components, decontamination of all building surfaces, and remediation of any contaminated soil attributable to the units and within the TSD unit boundaries. Materials, equipment, structures, etc., removed from each unit will be designated according to contaminants present and disposed of accordingly. The disposition of the contaminated equipment is discussed in Section 11.1.4.3. The units will be considered clean when sampling and analysis of the structures and the surrounding soil, conducted in accordance with Section 11.1.4, confirms that all constituents analyzed are present at concentrations at or below the local or site-wide background levels and/or health- and environmental-based risk level. Soil background levels will be based on established and accepted Hanford Site soil background information (WHC 1991a) or established by soil sampling per SW-846 (EPA 1986).

11.1.1.2.1 219-S Waste Handling Facility. Clean closure of the 219-S Waste Handling Facility requires that all structures and equipment be decontaminated to a level at which the structures and equipment do not evidence any substantial contamination with dangerous waste constituents above permissible action levels, including background and/or health- and environmental-based risk levels. As an alternative, the contaminated items or structures could be removed. The decontamination levels for process equipment will be determined based on the final disposition of the equipment. The possible dispositions for removed equipment are discussed in Section 11.1.4.3.

Background levels for concrete and soil will be determined by analyzing a statistically appropriate number of samples collected from areas of similar composition that are known to be unaffected by the 219-S Waste Handling Facility operations. These samples will be analyzed for the known dangerous waste constituents in the waste processed at the 219-S Waste Handling Facility. Health- and environmental-based risk levels for concrete and soil will be based on published literature at the time of closure.

Concrete slabs have wide variations in concentrations of inorganic elements, depending on the origin of the cement and aggregate. As a result of this variation, all samples, including background samples, must be collected from the same pour.

The operating gallery in the 219-S Waste Handling Facility has never been used for the processing of dangerous or mixed waste or the storage of dangerous materials. A background sample will be obtained by removing a core of the concrete floor slab from the operating gallery in an area where contamination is least likely and away from cracks or other potential pathways of contaminant migration. The concrete will be core drilled until fill or

soil is encountered. To ensure that the background samples are not contaminated, each core sample drilled will be divided into four horizontal sections and each section analyzed. Any contamination at the top or bottom of the slab would be detected by the analyses.

The area to be sampled will be divided into 3.28-foot- (1-meter-) square grids. To determine sample locations, 5 percent of the grids will be used. The locations to be sampled will be identified using a random number generator and the selection criterion that no two adjacent grids can be sampled. This criterion will ensure that the samples will be well separated and will be an accurate representation of the background concrete composition.

Analyses of background samples from the operating gallery and all other 219-S Waste Handling Facility samples will be conducted using identical methods. The results will be recorded in the field sampling record.

Unless the Hanford Site-wide background has been established (WHC 1991a), background soil composition samples will be collected for comparison with the 219-S Waste Handling Facility soil samples. Samples will be collected from appropriate areas determined at the time of closure to not have been used for any chemical processing or waste management activity.

The area to be used for background soil sampling will be divided into square grids. To determine sample locations, 5 percent of the grids will be used. The locations to be sampled will be identified using a random number generator and the selection criterion that no two adjacent grids can be sampled. This criterion will ensure that the samples will be well separated and will be an accurate representation of the background soil composition.

Grab samples of undisturbed near-surface soil will be collected and prepared using the most appropriate techniques available. A number of duplicate samples will be collected to enable assessment of the sampling and analytical error associated with background level determinations.

The action levels for the constituents will form the basis for determining adequate decontamination of the 219-S Waste Handling Facility. The adequacy of decontamination for compliance with the closure performance standard will be determined using the following technique.

Structures and equipment will be decontaminated to a level at which the structures and equipment do not evidence any substantial contamination with dangerous materials above permissible action levels, including background levels and/or health- and environmental-based risk levels. The decontamination levels for process equipment will be determined based on the final disposition of the equipment as described in Section 11.1.4.3.

The chemical data obtained from the soil sampling will be analyzed statistically according to EPA guidelines applicable at the time of sampling. Field duplicate, equipment blank, and trip blank samples will be analyzed as a check on field sampling procedures, cross-contamination of samples, contamination from sample handling, and laboratory contamination.

The analytical data obtained from the sampling of each area will be averaged, and the resulting average and standard deviation will be used to compare the concentration of the identified constituents in the area with the corresponding background sample. If this comparison supports the conclusion that the area does not contain substantially greater contaminant concentrations than the action levels, the area will be considered decontaminated. If sample results from a particular area do not meet the decontamination criteria, the following actions will be taken:

- Particular constituents that exceed the action levels will be identified, and further evaluations of the success of decontamination efforts will be limited to these constituents.

- If sample results indicate that concentrations of contaminants are localized at particular depths and layers, the analytical data will be divided into the identified layers, and each layer treated as an individual area as described previously. Each defined layer will include a minimum of three sampling points. A series of sampling points will be considered to be part of a layer only if all of the sampling points contained within the contamination layer have similar characteristics (e.g., all samples are lower in cadmium concentration than the surrounding samples).

- If evidence indicates no localized contamination, the entire area will be decontaminated again. A new series of sampling locations will be selected, and the sampling and data analysis process will be repeated.

11.1.1.2.2 222-S Dangerous and Mixed Waste Storage Area. If no visual signs of spillage are present and the operating record contains no incidents of spillage, all containerized regulated waste will be removed and the 222-S Dangerous and Mixed Waste Storage Area will be considered clean.

If visual signs of spillage are present and/or the operating record indicates spills have occurred in the 222-S Dangerous and Mixed Waste Storage Area, the affected area will be decontaminated. The method of decontamination used will depend on the nature of the suspected contaminant. Wipe samples will be collected and analyzed for the dangerous waste constituents present in the spilled material, if known, or for all contaminants of concern if the source of the spilled material is unknown. Collection of wipe samples is described in Section 11.1.4.4. For organic constituents, decontamination will be considered complete and successful if no organics are present above analytical detection limits given in SW-846 (EPA 1986).

For metals, decontamination will be considered complete if no substantial contamination above background levels is present. To determine background concentrations of metals on steel surfaces, wipe samples will be collected from the outside wall of one of the storage structures, as described in *A Compendium of Superfund Field Operations Methods*, Section 13.1 (EPA 1987). The area to be sampled will be divided into 3.28-foot- (1-meter-) square grids; to determine sample locations, 5 percent of the grids will be used. The locations to be sampled will be identified using a random number generator and the additional criterion that no two adjacent grids will be sampled. This

criterion will ensure that the samples will be well separated and will be an accurate representation of the background concentration of metals on steel.

11.1.2 Partial Closure Activities [I-1b]

Closure of the two units, either in part or before closure of the 222-S Complex as a whole, is not anticipated. Therefore, the requirements of WAC 173-303-610(3)(a) are not applicable. If partial closure activities become necessary in the future, this closure plan will be revised accordingly.

11.1.3 Maximum Waste Inventory [I-1c]

The maximum waste inventory at the 219-S Waste Handling Facility at any one time is 9,500 gallons (36,000 liters), as presented in Table 11-1. This inventory represents an upper limit based on the total volume of the three waste tanks at the 219-S Waste Handling Facility. Total operating capacity of the tanks is 8,450 gallons (31,960 liters). Waste inventory will not exceed this operating capacity during the life of the 219-S Waste Handling Facility.

Each storage structure at the 222-S Dangerous and Mixed Waste Storage Area has the capacity to store 18 55-gallon (208-liter) drums. The combined maximum potential storage volume for both storage structures is estimated to be 1,980 gallons (7,495 liters). Because most of the drums are labpacks consisting of waste and absorbent material, the actual maximum waste volume is much less (Appendix 4B).

11.1.4 Inventory Removal, Disposal or Decontamination of Equipment, and Structures [I-1d]

This section discusses inventory removal, handling of uncontaminated equipment, and process equipment decontamination or removal for the two 222-S Complex TSD units.

11.1.4.1 Inventory Removal. The dangerous waste inventory contained within the 219-S Waste Handling Facility will be removed using the existing process equipment and pumps. The waste contained in the tanks will be documented and transferred to the Double-Shell Tank System for storage using the existing transfer pump to deliver waste from tank 102 to a tank trailer. The existing transfer jets will be used to transfer waste from tanks 101 and 103 to tank 102.

At the start of closure, all waste will be removed from within the 222-S Dangerous and Mixed Waste Storage Area and transported to an appropriate TSD unit(s). The drum removal process and transfer documentation presently used at the 222-S Dangerous and Mixed Waste Storage Area are described in Chapter 4.0, Sections 4.1.1 and 4.1.2.

11.1.4.2 Uncontaminated Equipment. The 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area might contain some

uncontaminated equipment and structures, such as the walls and ceiling of the operating gallery and the metal storage structures, the control panel, and the rinsed caustic tank. These are not expected to become contaminated because of functional and physical separation from the waste treatment and storage areas. These components, however, will be sampled, and laboratory analyses will be performed to ensure that no contamination has occurred. The uncontaminated equipment and structures will either be left in place for future use or disassembled, dismantled, and/or removed from the site as required.

11.1.4.3 Process Equipment Decontamination and/or Removal. The following sections describe the process equipment decontamination and/or removal methods for the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area.

11.1.4.3.1 219-S Waste Handling Facility. After the waste inventory has been transferred from the 219-S Waste Handling Facility, the tanks and piping will be triple-rinsed with water. Decontamination solutions containing water, nitric acid, and/or citric acid will be used as required to remove any dangerous waste constituents. The rinsate will be sampled and characterized by laboratory testing for dangerous waste constituents. Rinsing will continue until the rinsate is a nondangerous waste as defined in WAC 173-303. Rinsate that contains dangerous waste will be handled as a dangerous waste and treated and disposed of at a permitted TSD unit. All decontamination solutions will be designated, documented, and transferred to the Double-Shell Tank System for storage until ultimate disposal.

The process piping in the 219-S Waste Handling Facility will be removed in two stages. During the first stage, the process pipe jumpers will be removed remotely through the vault covers. During the second stage, the hard piping will be removed. Some of the hard piping might be left in place after this process and removed with the associated tanks. The piping removed will be packaged for transport to an appropriate TSD unit for further decontamination and disposal. The final disposition of the process piping will be determined based on the criteria described below.

Piping from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility is encased in a concrete trench. This trench contains the following 4-inch (10.2-centimeter) pipelines: hot waste line, hot waste storage line, cribbing line, and cribbing storage line. This piping will be excavated using heavy equipment and disposed of in the manner described below for other equipment to be removed. Pipeline corridor decontamination and verification sampling are discussed in Section 11.1.4.6.

In conjunction with piping removal, the excavated soil and pipe trench will be sampled for mixed waste contamination. Should contamination be detected above permissible action levels, the contaminated areas will be defined and remediation of the soil will be deferred to the CERCLA operable unit cleanup.

The process tanks in the 219-S Waste Handling Facility will be removed in two stages. The smaller pieces of equipment will be removed first, and the tanks will be removed second. The removal of each piece of equipment will be

under the specific methods prepared at the time of removal. The equipment removed will be disposed of as described in Section 11.1.4.3.

Process equipment contained in the sample gallery, pipe gallery, and vault of the 219-S Waste Handling Facility is assumed to be contaminated or potentially contaminated. Equipment in these areas either has been in contact with the waste or has been in close proximity to the waste. All major equipment used in these areas is listed in Chapter 4.0 and will be removed from the 219-S Waste Handling Facility and disposed of by one of three methods.

The three methods that will be used to dispose of the contaminated equipment from the 219-S Waste Handling Facility, listed by order of preference, are the following:

- Decontamination and offsite recycling and/or reuse
- Burial as mixed waste
- Storage as mixed waste.

The selection of the disposal method will be made individually for each piece of equipment removed. The decision will be made based on the classification of the piece of equipment (e.g., mixed waste, dangerous waste, or uncontaminated), the level of contamination associated with each piece of equipment, and the estimated quantity of waste that would be generated during decontamination. Final disposal methods for each piece of equipment will be determined using the most appropriate techniques available at the time of closure.

If equipment and piping are contaminated, the equipment and piping will be decontaminated, as much as possible, disassembled, and packaged for disposal at a permitted disposal unit. Depending on the type of contamination (e.g., dangerous or mixed waste), appropriate treatment and/or disposal units will be selected.

The equipment decontamination process will be performed using appropriate technologies such as washing with water or other liquid solvents, steam cleaning, sandblasting, and high-pressure water jet scarifiers. The particular equipment used will consist of an appropriate combination of equipment that is the most effective, as determined by sample analysis results and testing of the decontamination methods. During the decontamination process, a sampling and testing effort will be conducted to monitor the effectiveness of the decontamination work.

11.1.4.3.2 222-S Dangerous and Mixed Waste Storage Area. There is no process equipment associated with the 222-S Dangerous and Mixed Waste Storage Area. Liquid and solid waste resulting from decontamination operations will be separated and characterized into the following waste categories:

- Nondangerous and nonradioactive
- Nondangerous and radioactive
- Dangerous and nonradioactive
- Mixed.

Depending on the classification of the waste, disposal might include additional processing at a treatment unit.

11.1.4.4 Structure Decontamination. Methods for structure decontamination and for verifying the effectiveness of the decontamination for the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area are described in the following sections.

11.1.4.4.1 219-S Waste Handling Facility. Locations to be sampled on each of the building surfaces in the 219-S Waste Handling Facility are described in the following paragraphs. The specific sampling plans to be used to verify that all dangerous materials that might have been present in the building structure have been removed to or below action levels are also described.

Each of the surfaces of the operating gallery, sample gallery, and vault (floor, ceiling, and walls) will be gridded by evenly dividing the surfaces into approximately 3.28-foot (1-meter) by 3.28-foot (1-meter) blocks (or the nearest approximation) for sampling purposes. Sample locations will be determined by vertical and horizontal grid lines for walls and north-south and east-west grid lines for floors and ceilings. A total of 5 percent of the gridded area will be selected for sampling. The sample locations will be selected randomly with the additional constraint that no two sample grid locations can share a common side. Areas of suspected contamination, such as visibly stained areas, will be subject to authoritative sampling, and these locations will be identified at the time of grid sampling. All concrete areas will be inspected visually before sample collection to identify cracked areas and other areas of potential contamination. Cracked areas will be mapped, and sampling in these areas will be biased to include the cracked areas. In addition to cracked areas, any potential migration pathway through the concrete, such as seams and expansion joints, will be sampled. The concrete will be cored to sample the underlying soil to a depth of 1 foot (0.30 meter) in areas evidencing visible cracks or stains.

Samples will be collected from each sample point by chipping a prism-shaped piece of concrete from the center of the sample grid. This piece of concrete will be extracted from the surface by cutting a set of parallel grooves in the surface about 1.63 inches (4.14 centimeters) to 2 inches (5.1 centimeters) apart and 10.5 inches (26.7 centimeters) long. The grooves will be cut approximately 2 inches (5.1 centimeters) deep with one groove angled at about 30 degrees toward the other to yield a narrow, triangular sample segment between the bottom of the grooves. Cross-grooves cut perpendicular to the ends of the sample grooves will enable the sample to be pried from the surface, yielding a prism-shaped sample piece with an intact

surface layer. For cutting grooves, commercial equipment which operates dry by pneumatic-driven bits will be used. The bits can be easily cleaned to eliminate cross-contamination between samples. A minimum of 5 grams (0.18 ounce) of sample material will be collected from each sample location.

To ensure that the sampling process will be performed correctly, an equivalent of 10 percent of the samples will be trip, equipment, and duplicate quality assurance samples. The results of the sampling program will be statistically analyzed. If these analyses indicate that the number of samples collected from each wall, floor, etc., is too few, additional sampling will be initiated.

The execution of this sampling and analysis plan will provide data to determine if structural components are contaminated and to determine the effectiveness of decontamination of these areas. This effectiveness will be evaluated using the criteria of Section 11.1.1.2.

11.1.4.4.2 222-S Dangerous and Mixed Waste Storage Area. A visual assessment of whether spills have occurred within the 222-S Dangerous and Mixed Waste Storage Area will be performed after all waste has been removed. The visual inspection also will include evaluation of the stainless steel containment basins, storage structure wooden floors, and the concrete pad on which the 222-S Dangerous and Mixed Waste Storage Area rests. If evidence of spillage is observed on the concrete pad (outside of the storage structures' secondary containment), appropriate action to decontaminate and/or remove the pad in accordance with WAC 173-303-610(2) will be taken. Evidence of spillage will include but will not be limited to discoloration or material degradation, such as pitting due to corrosion, wetness, and odor. If signs of spillage are evident, the affected areas, including the nonskid fiberglass grate, containment basins, and wooden floors, will be marked off for investigation. Indelible markers, paint, and dimensions from some fixed point will be methods used to delineate affected areas. The method of delineating an affected area will be such that the area can be identified to verify decontamination.

Contamination scenarios other than surficial contamination are unlikely because the exposed interior surfaces of the storage structures are steel, and waste is containerized within the drums. Also, the 222-S Dangerous and Mixed Waste Storage Area is inspected on a regular basis for contamination, which is promptly removed. The method of decontamination will be steam cleaning or the best method available at the time of closure.

The nonskid fiberglass grates will be surface wiped while still in place over the containment basins. Following initial grate cleaning, rinse water will be applied to the grate over the delineated area of contamination and will be collected within the containment basin. Following initial decontamination, the grate either will be removed or raised to enable access to the underlying containment basin, which also will be decontaminated. Accumulated decontamination rinsate will be removed from the containment basin by sponges, mops, pump, or vacuum truck, depending on the quantity of rinsate generated. Solid decontamination residue will be swept up, and the affected area will be vacuumed before final rinsing. The grate will be repositioned

over the containment basin, and the delineated area of contamination of the grate and containment basin will be flushed with a final water rinse.

All decontamination residue, solid or liquid, will be managed in accordance with methods in effect at the time of closure. All water used for decontamination activities will be potable water. Sampling, sample management, and subsequent analysis will be performed using procedures and protocols established in the most recent version of SW-846 (EPA 1986). The samples will be analyzed for the dangerous waste constituents present in the material (if known) or for all contaminants of concern if the source of the material is unknown. All rinsate will be containerized and stored temporarily on pallets placed outside of the 222-S Dangerous and Mixed Waste Storage Area.

If the 222-S Dangerous and Mixed Waste Storage Area cannot be successfully decontaminated, the 222-S Dangerous and Mixed Waste Storage Area will be dismantled and disposed of as described in Section 11.1.4.5.

For metals, background levels will form the basis for determining adequate decontamination of the 222-S Dangerous and Mixed Waste Storage Area. For organics, analytical detection limits as provided in SW-846 (EPA 1986) will form the basis for determining adequate decontamination.

The 222-S Dangerous and Mixed Waste Storage Area will be decontaminated to a level at which the storage structures do not show evidence of any substantial contamination with dangerous waste constituents above the permissible action levels (background for metals, detection limit for organics). Wipe sampling of the inside surfaces of the steel storage structures, the overlying nonskid fiberglass grate, and the containment basins will be conducted. Each of the surfaces to be sampled will be gridded by evenly dividing the surfaces into approximately 3.28-foot- (1-meter-) by 3.28-foot- (1-meter-) blocks (or the nearest approximation) for sampling purposes. Sample locations will be determined by vertical and horizontal grid lines for walls and north-south and east-west grid lines for floors and ceilings. A total of 10 percent of the gridded area will be selected for sampling or at least one sample per side of the storage structure. The sample locations will be selected randomly with the additional constraint that no two sample grid locations can share a common side. Areas of suspected contamination, such as visibly stained areas, also will be sampled; these locations will be identified before grid sampling. Wipe samples will be collected as described in *A Compendium of Superfund Field Operations Methods*, Section 13.1 (EPA 1987).

To ensure that the sampling process is performed correctly, quality assurance samples equivalent to 10 percent of the equipment samples (or at least one sample) will be collected as described in Section 11.1.4.7. The analytical data from the sampling of each area will be averaged, and the resulting average and standard deviation will be used to compare the concentration of metals in the area with background levels. If this comparison supports the conclusion that the area does not contain substantially greater contaminant concentrations than the background level for metals, and if no organics were detected, the area will be considered decontaminated. If sample results from a particular area do not meet the

decontamination criteria, further decontamination will be performed, or the storage structures will be disposed of as appropriate.

Any waste spills associated with 222-S Dangerous and Mixed Waste Storage Area closure are noted in the operating record. The time, date, location, nature of spill material, and estimated volume of spillage are specified within the operating record. Any spills are cleaned up in accordance with the building emergency plan (Appendix 7A).

11.1.4.5 Closure Equipment Decontamination. Equipment used during the closure activities for both units will be cleaned three times with a steam cleaner. The equipment cleaning will be performed over a solid sheet of durable plastic. The plastic will be at least 8 mils (0.2 millimeter) thick. The thickness will depend on the equipment and the abrasion expected from cleaning activities. The edges of the plastic will be elevated to prevent the escape of rinsate. The rinsate from steam cleaning will be collected, pumped into new bung-type 17-H 55-gallon (208-liter) drums, and sampled. The pump will be flushed three times with water that will be managed as rinsate. The plastic liner will be removed and disposed of in a manner to be determined based on contaminants detected in the rinsate.

A formal decontamination station is not anticipated to be necessary for closure of the 219-S Waste Handling Facility and 222-S Dangerous and Mixed Waste Storage Area storage structures. Donning and removal of protective clothing and footgear and temporary storage of decontamination equipment will be done over 10-foot- (3-meter-) square polyethylene sheeting laid on the concrete pad just outside storage structure access doors. The polyethylene sheeting and protective clothing will be containerized and disposed of as dangerous waste.

Equipment involved in closure decontamination efforts might include:

- Swabs, brushes, rags, towels, mops
- Absorbent material
- Plastic bags
- Protective clothing
- Cleaning compounds
- Steam cleaner
- Pressure washer
- Grit blaster
- Collection drums.

11.1.4.6 Soil Sampling and/or Removal. Soil sampling and/or removal for the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area is described in the following sections.

11.1.4.6.1 219-S Waste Handling Facility. The purpose of the soil sampling effort will be to verify that no contamination of the soil occurred as a result of the operation of the 219-S Waste Handling Facility. The soil surrounding the 219-S Waste Handling Facility is relatively porous, as is most of the soil at the Hanford Site. However, if contaminants are present, the contaminants are unlikely to move substantially below the soil surface, because average annual precipitation is low [approximately 6.25 inches (15.9 centimeters) per year (Stone et al. 1983)]. No liquid discharge has occurred in the vicinity of the 219-S Waste Handling Facility. Thus, it is assumed that any contaminants released to the soil likely will not migrate down through the soil column, but rather will be held in the upper soil profile.

The soil sampling locations along the pipe corridor trenches will be selected by dividing the trench into segments of 10 feet (3 meters) in length and randomly selecting intervals for sampling from within the length. The deepest parts of the trenches are assumed to be the areas that would have the highest level of contamination. Therefore, soil in the bottom of the excavated pipe trench will be sampled during the soil sampling effort. The soil will be sampled randomly along the length of the pipe within the selected 10-foot (3-meter) interval.

To ensure that the sampling process will be performed correctly, a minimum of 10 percent of the samples will be trip, equipment, and duplicate quality assurance samples as described in Section 11.1.4.7. The results of the sampling program will be subjected to statistical analyses. If these analyses indicate that the number of samples from the pipe corridor is too few, testing of additional samples will be initiated.

The execution of this sampling and analysis plan will provide data to determine whether the soil in the pipe corridor area is contaminated and to determine the effectiveness of decontamination of this area. The results of this analysis will be evaluated using the criteria described in Section 11.1.1.2.

If the analytical results are above action levels (Section 11.1.1.2 provides a method of comparison), the contaminated areas will be defined and the contaminated soil remediation will be deferred to the CERCLA operable unit cleanup process.

If soil is remediated or removed from any area adjacent to the trenches, verification samples will be collected from the excavation to determine the effectiveness of the remediation or removal. The number of samples collected will depend on the areal extent of contamination encountered. No less than one soil sample will be taken from the remediated section.

Soil also will be sampled in a perimeter around the 219-S Waste Handling Facility. For sampling purposes, the area will be divided into four segments

corresponding to the sides of the building. The east, west, and south sides of the building will include the concrete vault. For each segment, sampling locations will be selected randomly on a sampling grid. At each of the sample locations, samples will be collected from the surface and at depths of 1 foot (0.30 meter), 5 feet (1.5 meters), and 10 feet (3 meters). Samples from the same sampling depth in each segment will be analyzed separately.

The soil samples will be compared to background soil samples collected near the 219-S Waste Handling Facility or to established Hanford Site-wide background. Background samples are discussed in Section 11.1.1.2.1. At each soil sampling location, a precleaned, hand-held mechanical soil auger will be placed in each hole, and soil will be removed to a depth of 1 foot (0.30 meter). At the 1-foot (0.30-meter) depth, a soil sample will be removed with a clean, stainless steel sampling spoon. Extreme care will be used to avoid displacing soil along the side of the borehole and from the surface into the bottom, which might contaminate the sample. Once sampling is complete at the 1-foot (0.30-meter) depth, the soil auger will be decontaminated and reintroduced in the hole. Soil removal will continue down to 10 feet (3 meters) below the surface. Samples from 5- and 10-foot (1.5- and 3.0-meter) depth intervals will be removed as previously described.

Pending analysis, the soil removed with the auger from each hole will be placed in a preconditioned 17-H open-headed 55-gallon (208-liter) drum(s). The drum(s) will be stored at the 219-S Waste Handling Facility until analyses are completed and evaluated.

If soil is contaminated above action levels, the contaminated areas will be defined, the area isolated from access, and all remediation will be deferred to the CERCLA operable unit cleanup process.

11.1.4.6.2 222-S Dangerous and Mixed Waste Storage Area. Soil sampling and/or removal is not required for the 222-S Dangerous and Mixed Waste Storage Area because the storage structures rest on a concrete base. A contamination migration pathway between the storage structures and the soil does not exist.

11.1.4.7 Sampling Quality Control. The required quality control procedures will be followed to the extent necessary to adequately control sampling activities. The various quality control methods are described in the following sections.

11.1.4.7.1 Data Quality. To ensure quality data, all of the sampling procedures will be conducted in conformance with applicable methods described in the *Hanford Facility Dangerous Waste Permit Application* (DOE-RL 1991b). All laboratory analyses will be performed in accordance with standard EPA methods described in the most recent edition of SW-846 (EPA 1986). The analytical laboratory will submit all analytical and quality assurance/quality control methods to the contractor for approval before samples are analyzed. The EPA guidelines for reporting accuracy, precision, and practical quantification limit specified in the analytical methods will be met.

Quality control of sampling will be ensured through the use of field duplicates, equipment blanks, and field blanks. Quality control of records

and documentation will be accomplished by following applicable procedures described in the *Hanford Facility Dangerous Waste Permit Application* (DOE-RL 1991b).

Sampling records to be kept on file will include field notes, daily memoranda, records of meetings and activities concerning the sampling program, and chain-of-custody records. In addition, quality control will be implemented through the recording of field memoranda and field notes. Before sampling begins, a quality assurance project plan for sampling and analysis at the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area will be completed.

11.1.4.7.2 Field Quality Control. Field quality control will be accomplished through the use of various sampling duplicates and blanks, as described in the following paragraphs.

Field duplicate samples will be taken for concrete chips and underlying soil. Duplicate samples are two separate samples collected from the same sampling point and placed into separate containers. The duplicate samples will be used as an indication of the reproducibility of the analytical data.

Equipment blanks will serve as a check on sampling device cleanliness. An equipment blank will consist of distilled water which is transported to the site, opened in the field, poured over or through the sample collection device, collected in a sample container, and returned to the laboratory for analysis. These samples will be collected daily.

Wipe sample blanks will consist of filter paper that has been laboratory prepared with the appropriate solution. The wipe sample blanks will be placed in a sample container in the field. Blanks will be submitted for analysis with the wipe samples to determine if contaminants were introduced by the paper, preparation solution, or sampling environment.

Trip blanks will be used to identify any possible contamination originating from container preparation methods, shipment, handling, storage, or site conditions. Trip blanks will consist of pure deionized, distilled water in a clean sample container that will accompany each batch of containers shipped to the field. Trip blanks will be returned unopened to the laboratory for analysis.

Field blanks will consist of pure deionized, distilled water that is transferred to a sample container at the site and preserved with the reagent specified for the analyses of interest. Field blanks will be used to check for possible contamination originating with the reagent or in the sampling environment and will be collected daily.

11.1.4.7.3 Laboratory Quality Control. The contractor laboratory will ensure the integrity and validity of test results through implementation of an internal quality control program. The program will meet the quality control criteria of SW-846 (EPA 1986). A system of reviewing and analyzing the results of these samples will be maintained to detect problems caused by contamination, inadequate calibrations, miscalculations, improper methods, or

other factors. Standard methods will be used, and alternative methods that are developed or adapted will be tested and documented. All methods and method changes will be approved by a contractor contract representative.

The quality control procedures for hazardous chemical analyses will include [as appropriate to each analysis and as specified in Section 1.2 of SW-846 (EPA 1986)] evaluation of blanks, random matrix spikes (for 10 percent of the samples), internal standards, surrogates, and standard calibration curves. Spikes will be added in amounts comparable to the amount of analyte present in the sample. The quality control procedures specific to individual methods will be detailed in the laboratory's documented analytical procedures and will be included with each batch of samples analyzed.

11.1.4.8 Closure of Containers [I-1d(1)]. At closure all containers will be removed from the 222-S Dangerous and Mixed Waste Storage Area. Closure of the 222-S Dangerous and Mixed Waste Storage Area is discussed in Sections 11.1 and 11.1.1 through 11.1.3.

11.1.4.9 Closure of Tanks [I-1d(2)]. Closure of the tanks in the 219-S Waste Handling Facility is discussed in Sections 11.1 and 11.1.1 through 11.1.3.

11.1.4.10 Closure of Waste Piles [I-1d(3)]. Operation of the 222-S Complex does not involve the placement of dangerous waste in waste piles. Therefore, the requirements of WAC 173-303-660 are not applicable to the 222-S Complex.

11.1.4.11 Closure of Surface Impoundments [I-1d(4)]. Operation of the 222-S Complex does not involve the placement of dangerous waste in surface impoundments. Therefore, the requirements of WAC 173-303-650 are not applicable to the 222-S Complex.

11.1.4.12 Closure of Incinerators [I-1d(5)]. Operation of the 222-S Complex does not involve the incineration of dangerous waste. Therefore, the requirements of WAC 173-303-670 are not applicable to the 222-S Complex.

11.1.4.13 Closure of Land Treatment Facilities [I-1d(6)]. Operation of the 222-S Complex does not involve the land treatment of dangerous waste. Therefore, the requirements of WAC 173-303-655 are not applicable to the 222-S Complex.

11.1.4.14 Closure of Disposal Units [I-1e Through I-1e(8)]. The 222-S Complex does not include any waste piles, landfills, or surface impoundments. In addition, the dangerous waste or contaminated materials will not remain at the 222-S Complex closure site. Therefore, this section is not applicable to the 222-S Complex.

11.1.5 Schedule for Closure [I-1f]

Closure of the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area will take place after closure of the 222-S Complex. A date for closure of the 222-S Complex has not been included in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1990). Because

use of the 222-S Analytical Laboratory is required for environmental restoration activities, a date for closure of the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area will depend on the schedule for these activities. A schedule for the conclusion of restoration activities has not yet been defined.

11.1.6 Extension for Closure Time [I-1g]

A petition for extension of closure time will be filed with Ecology because final closure activities at the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area will exceed 180 days.

11.1.7 Amendments to Closure Plan

Should changes be required to the approved closure plan, an amended plan will be prepared and submitted to Ecology for approval in accordance with 40 CFR 264.112(c) and WAC 173-303-610(3)(a).

11.1.8 Certification of Closure and Survey Plat

Within 60 days of the final closure, the DOE-RL will submit to Ecology a certification of closure. This certification will be signed by both the DOE-RL and an independent professional engineer registered in the state of Washington, stating that the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area have been closed in accordance with the approved closure plan. The certification will be submitted by registered mail or an equivalent delivery service. Documentation supporting the independent professional engineer's certification will be retained and furnished to Ecology upon request. This documentation will be maintained by the DOE-RL contact (or the successor) identified in Section 11.9 of this closure plan.

11.1.8.1 Closure Certification. The DOE-RL and the independent professional engineer registered in the state of Washington will certify that closure of the units at the 222-S Complex is complete with a document similar to that shown in Figure 11-1.

11.1.8.2 Survey Plat. The 222-S Complex is planned to be clean closed. Because dangerous and/or mixed waste will not be left in place following closure, the requirement for producing a survey plat is not applicable to the 222-S Complex.

11.1.9 Notice to Local Land Authority

The 222-S Complex is planned to be clean closed. Because dangerous and/or mixed waste will not be left in place following closure, the requirement for a notification to the local land authority is not applicable to the 222-S Complex.

11.2 POSTCLOSURE PLAN [I-2]

The 222-S Complex is planned to be clean closed. Because dangerous and/or mixed waste will not be left in place following the operational period, the requirement for postclosure activities is not applicable to the 222-S Complex.

11.3 NOTICE IN DEED [I-3]

The 222-S Complex is planned to be clean closed. Because dangerous and/or mixed waste will not be left in place following the operational period, the requirement for a notice in deed is not applicable to the 222-S Complex.

11.4 CLOSURE COST ESTIMATE [I-4]

In accordance with 40 CFR 264.140(c) and WAC 173-303-620(1)(c), this estimate is not required for federal facilities. The Hanford Facility is a federally owned facility for which the federal government is the operator, and this estimate is therefore not applicable to the 222-S Complex.

An annual report updating projections of anticipated closure and postclosure costs for the Hanford Facility TSD units having final status will be submitted to Ecology in accordance with WAC 173-303-390 by October 30 (beginning in 1992).

11.5 FINANCIAL ASSURANCE MECHANISM FOR CLOSURE [I-5]

In accordance with 40 CFR 264.140(c) and WAC 173-303-620(1)(c), this section is not required for federal facilities. The Hanford Facility is a federally owned facility for which the federal government is the operator, and this section is therefore not applicable to the 222-S Complex.

11.6 POSTCLOSURE COST ESTIMATE [I-6]

In accordance with 40 CFR 264.140(c) and WAC 173-303-620(1)(c), this estimate is not required for federal facilities. The Hanford Facility is a federally owned facility for which the federal government is the operator, and this section is therefore not applicable to the 222-S Complex.

An annual report updating projections of anticipated closure and postclosure costs for the Hanford Facility TSD units having final status will be submitted to Ecology in accordance with WAC 173-303-390 by October 30 (beginning in 1992).

11.7 FINANCIAL ASSURANCE MECHANISM FOR POSTCLOSURE CARE [I-7]

In accordance with 40 CFR 264.140(c) and WAC 173-303-620(1)(c), this section is not required for federal facilities. The Hanford Facility is a federally owned facility for which the federal government is the operator, and this section is therefore not applicable to the 222-S Complex.

11.8 LIABILITY REQUIREMENTS [I-8]

In accordance with 40 CFR 264.140(c) and WAC 173-303-620(1)(c), this section is not required for federal facilities. The Hanford Facility is a federally owned facility for which the federal government is the operator, and this section is therefore not applicable to the 222-S Complex.

11.9 CLOSURE CONTACT

The following office (or its successor) is the official contact for the 222-S Complex:

Office of Environmental Assurance,
Permits and Policy
U.S. Department of Energy
DOE Richland Field Office
P.O. Box 550
Richland, Washington 99352
(509) 376-5441.

CLOSURE CERTIFICATION
FOR

_____

Hanford Facility
U.S. Department of Energy, DOE Richland Field Office

We, the undersigned, hereby certify that all _____ _____ closure activities were performed in accordance with the specifications in the approved closure plan.

_____
Owner/Operator Signature DOE-RL Representative Date
(Typed Name)

_____ P.E.# _____
Signature Independent Registered Professional Engineer Date
(Typed Name and Washington State Professional Engineer license number)

Figure 11-1. Typical Closure Certification Document.

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Table 11-1. Tank Capacities at the 219-S Waste Handling Facility.

Equipment	Size gallons (liters)	Working capacity gallons (liters)
Tank 101	4,000 (15,150)	3,600 (13,630)
Tank 102	4,000 (15,150)	3,600 (13,630)
Tank 103	1,500 (5,700)	1,250 (4,700)
Total	9,500 (36,000)	8,450 (31,960)

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12.0 REPORTING AND RECORDKEEPING

This chapter summarizes the 222-S Complex reporting and recordkeeping requirements. General reporting requirements applicable to all dangerous waste treatment, storage, and/or disposal units (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 222-S Complex are summarized in Table 12-1. The reports are submitted to Ecology and/or the EPA as required by applicable regulations, and required records are maintained by the 222-S Complex or other Hanford Facility organizations as appropriate.

Required reports and records will be accessible through a centralized Hanford Facility Regulatory File index, currently under development. This index, once fully developed, can be used to provide regulatory agency access to the 222-S Complex regulatory compliance records required by WAC 173-303. The Regulatory File is maintained by the Environmental Data Management Center. Each unit will undergo a periodic review by an Environmental Data Management Center Regulatory File Custodian to ensure standardized collection and maintenance of a unit-specific reports and records (operating records) (DOE-RL 1991b).

12.1 NOTIFICATION OF DANGEROUS WASTE ACTIVITIES

Regulations require that facilities involved in the generation or transportation of dangerous waste, or the owner or operator of a TSD facility, have a current EPA/State identification number. The Hanford Facility is a single RCRA facility operating under EPA/State Identification Number WA7890008967. The 222-S Complex units, the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area, operate under this same EPA/State identification number.

12.2 GENERATOR REQUIREMENTS

The Hanford Facility complies with the generator reporting and recordkeeping regulations. Hanford Facility waste generation records and required reports (e.g., annual reports) are compiled and issued as single records or reports for the entire Hanford Facility. Information on waste generated by the 222-S Complex is compiled and provided together with other Hanford Facility generator records and reports. The regulations governing recordkeeping and reporting are discussed in the following sections.

I2.2.1 Recordkeeping

Generator records maintained by the Hanford Facility 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 40 CFR 262.40 and WAC 173-303-210.

12.2.2 Reporting

Generator reports required by 40 CFR 262, Subpart D, and WAC 173-303-220 that are submitted by the Hanford Facility include the annual report, exception reports, and required additional reports.

The Hanford Facility submits an annual report of waste generation activities to Ecology. The annual report is submitted on the "Generator Annual Dangerous Waste Report--Form 4."

If a copy of the Uniform Hazardous Waste Manifest is not returned within 45 days with the signature of the owner/operator of a permitted facility designated to receive waste shipped offsite, the Solid Waste Engineering organization prepares and submits an exception report to Ecology. The report includes 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 waste from the 222-S Complex are retained by the 222-S Complex. Any additional reports deemed necessary by Ecology or the EPA will be furnished by the Hanford Facility on request.

12.3 TRANSPORTER REQUIREMENTS

The Hanford Facility does not transport dangerous waste offsite. Transporters having their own EPA/State identification numbers are used to transport dangerous waste from the Hanford Facility to a permitted offsite TSD facility. Waste transfers onsite, including waste transfers to and from the 222-S Complex, are recorded and tracked in accordance with Hanford Facility procedures described in Chapter 2.0, Section 2.8. Therefore, transporter records required by 40 CFR 263.22 and WAC 173-303-260 are not maintained by either the 222-S Complex or by the Hanford Facility. Reports such as discharge reports required by 40 CFR 263.30 and WAC 173-303-270 are not applicable.

12.4 TREATMENT, STORAGE, AND/OR DISPOSAL REQUIREMENTS

The reporting and recordkeeping procedures for TSD units are discussed in this section. The TSD reports are described, the operating record and miscellaneous support records contents are described, and plans submitted with this permit application and maintained at the 222-S Complex are described.

12.4.1 Reports

This section discusses the reporting requirements of WAC 173-303 and applicable parts of Title 40, Code of Federal Regulations, relating to aspects of dangerous waste. The following are included in the reporting requirements:

- Waste manifest reports
- Annual reports
- Biennial reports
- Groundwater monitoring reports
- Contingency plan incident notifications
- Spills, discharges, and leaks reports
- Closure reports
- Postclosure reports.

Additional details of these reports are provided in the following sections. Copies of these reports are maintained by the 222-S Complex or other Hanford Facility organizations as appropriate.

12.4.1.1 Waste Manifest Reports. The waste manifest is the source of two possible reports, the manifest discrepancy report and the unmanifested waste report. The 222-S Complex does not directly ship waste off the Hanford Facility. Therefore, this section does not apply.

The 222-S Complex has methods in place for documenting onsite waste shipments. The 222-S Complex waste tracking system and methods of dealing with discrepancies are described in Chapter 2.0, Section 2.8. Records documenting waste transfers are retained by the 222-S Complex.

12.4.1.2 Annual Reports. The state of Washington, pursuant to WAC 173-303-390, requires an overall annual report for each facility that holds an active EPA identification number. The report for the Hanford Facility is due to Ecology on March 1 of each year. The report contents for the 222-S Complex include the following:

- The EPA/State identification number
- Name and address of the Hanford Facility
- Calendar year covered by the report
- Sources of the waste treated and/or stored in the 222-S Complex
- Description and quantity of the waste treated and/or stored in the 222-S Complex
- TSD methods
- Certification statement signed by an authorized representative.

The report form and instructions in the "Treatment, Storage, or Disposal Facility Annual Dangerous Waste Report--Forms 4 and 5" are used for this report.

A report updating projections of anticipated closure and postclosure costs for the Hanford Facility TSD units having final status is due to Ecology by October 30 (beginning in 1992).

12.4.1.3 Biennial Reports. 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. Ecology has been extended administrative responsibilities for biennial reporting as required by 40 CFR 264.75. A specific biennial report is not prepared and submitted because reporting requirements are satisfied by submittal of the annual report to Ecology.

12.4.1.4 Groundwater Monitoring Reports. Neither the 219-S Waste Handling Facility nor the 222-S Dangerous and Mixed Waste Storage Area is 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 these units.

12.4.1.5 Contingency Plan Incident Notifications. The building emergency director, 222-S Complex line management, and the contractor's environmental protection organization are responsible for making the appropriate notifications (Chapter 2.0, Section 2.7.1). Notifications of all emergency situations requiring contingency plan implementation are made as required by 40 CFR 264.56, WAC 173-303-360, and U.S. Department of Energy Order 5000.3A.

In the event of a fire or an explosion, the building emergency director or the 222-S Complex line management immediately must notify the Patrol Operations Center by telephone at 811. All emergency incident calls to the emergency number (811) are reported by the Patrol Operations Center to the Hanford Fire Department and the Occurrence Notification Center. In the event of an unplanned release of hazardous or dangerous waste or material, the building emergency director immediately notifies the contractor's environmental protection organization who notifies the DOE-RL and the

Occurrence Notification Center. The DOE-RL must be notified by telephone as soon as possible on the day of the incident. The building emergency director or the 222-S Complex line management must document the incident on an occurrence report to the DOE-RL within 24 hours of categorization of the incident. A copy of the occurrence report is retained at the 222-S Complex as part of the operating record.

If the 222-S Complex stops operations in response to a fire, an explosion, or a release that could present a hazard to human health or the environment, the building emergency director notifies DOE-RL, via line management, that the 222-S Complex is operational and emergency 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 in the following sections.

12.4.1.5.1 Immediate Notification. The Occurrence Notification Center (376-2900) immediately will notify affected county emergency management, Ecology, and the individual designated as the on-scene coordinator for the southeastern Washington area of the National Response Center (800-424-8802) if the 222-S Complex has had a fire, an explosion, or a release that could threaten human health or the environment outside the 222-S Complex boundaries.

The report will contain the following information:

- Name and telephone number of reporter
- Name and address of the TSD 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 TSD unit
- Actions already taken to mitigate the situation.

12.4.1.5.2 Incident Assessment Report. The DOE-RL will provide a written report to Ecology within 15 days of any incident that requires implementation of the contingency plan. The report includes the following:

- Name, address, and telephone number of the owner or operator
- Name, address, and telephone number of the TSD 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 incident

- Description of corrective action taken to prevent recurrence of the incident.

12.4.1.5.3 Unit Restart Notification. If the 222-S Complex stops operations in response to a fire, an explosion, or a release that could present a hazard to human health or the environment, the DOE-RL will notify Ecology and the appropriate local authorities before operations are resumed in the affected area(s). The notification will indicate that cleanup procedures are complete and that emergency equipment is clean and fit for its intended use.

12.4.1.6 Spills, Discharges, and Leaks Reports. This section discusses the reports prepared as a result of unpermitted spills and discharges to the environment.

In the event of an unplanned release of dangerous materials, the building emergency director immediately notifies the contractor's environmental protection organization. The building emergency director will document the incident on an occurrence report form. A copy of the occurrence report is retained by the 222-S Complex. The contractor's environmental protection organization immediately will notify the Occurrence Notification Center. The following information is transmitted to the Occurrence Notification Center:

- Name and telephone number of the reporter

- Name and address of the TSD 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 TSD unit.

The Occurrence Notification Center immediately will notify Ecology of all reportable spills to the environment or atmosphere in accordance with the requirements of WAC 173-303-145.

12.4.1.7 Closure Reports. Reports regarding the closure of the two units within the 222-S Complex will be made in accordance with the requirements of 40 CFR 264.115 and .116 and WAC 173-303-610(6) and (9). These reports include notification of beginning of closure and certification of closure.

12.4.1.7.1 Notification of Closure. Ecology will be notified in writing at least 45 days before the date on which closure of the two units within the 222-S Complex is expected to begin.

12.4.1.7.2 Certification of Closure. Within 60 days of completion of closure of either of the two units within the 222-S Complex, a certification signed by the DOE-RL and an independent registered professional engineer will be submitted to the regulatory authority. The certification will be sent by registered mail or an equivalent delivery service. The certification will state that the 222-S Complex units were closed in accordance with the approved closure plan. Documentation supporting the independent registered engineer's certification will be supplied upon request of the regulatory authority.

12.4.1.7.3 Survey Plat. The two units within the 222-S Complex are not disposal units. This determination eliminates the requirement for producing a survey plot.

12.4.1.8 Postclosure Reports. Postclosure reports required by 40 CFR 264.119 and .120 and WAC 173-303-610(9), (10), and (11) will not be required, because the 222-S Complex units are not disposal units.

12.4.2 Recordkeeping Requirements

Records retained by the 222-S Complex include plans described in other portions of this permit application, operating records, miscellaneous support records, and records of reports made to the regulatory authority. These records are described in the following sections. Copies of these records are accessible by contacting the Environmental Data Management Center Regulatory File Custodian (509-376-2530).

12.4.2.1 Permit Application Plans. Plans described in other portions of this permit application and retained by the 222-S Complex include the following:

- Waste analysis plan
- Contingency plan and amendments
- Training plans
- Closure plans
- Inspection plans.

Copies of these plans are maintained for the life of the 222-S Complex, with the exception of inspection plans, which are maintained for 5 years. Modifications or amendments required as a result of changing regulatory or

operational requirements will be submitted to the regulatory authority and added to the plans maintained by the 222-S Complex as required.

12.4.2.2 Operating Records. Operating records maintained by the 222-S Complex include the following:

- Description and quantity of the dangerous waste placed in the 222-S Complex units for treatment and/or storage and the method(s) and date(s) of storage and/or treatment as required by 40 CFR 264, Appendix I and WAC 173-303-380
- Location of dangerous waste stored within the 222-S Complex and the quantity at each location
- Waste analysis results
- Contingency plan incident notifications
- Inspection records
- Groundwater monitoring records
- Waste minimization certification
- Land disposal restriction records.

12.4.2.2.1 Waste Description and Quantity. A description and quantity of dangerous waste treated and/or stored in the 222-S Complex units is maintained in the 222-S Complex records. Records describing the types and quantities of waste are maintained as part of the operating record.

12.4.2.2.2 Waste Location. The location of dangerous waste stored in the 222-S Complex is documented and maintained by the 222-S Complex.

12.4.2.2.3 Waste Analysis Data. Records of chemical analyses and waste designation data generated to comply with the waste analysis plan are maintained as part of the operating record.

12.4.2.2.4 Contingency Plan Incident Report. Records documenting the details of any incidents requiring the implementation of the contingency plan, as described in Section 12.4.1.5, are maintained as part of the 222-S Complex operating record as required by 40 CFR 264.73 and WAC 173-303-380. In addition to these records, occurrence reports are generated to document incidents. The occurrence reports describe all incidents, including those that are judged too minor to require the implementation of the contingency plan but that are identified as offnormal events, unusual occurrences, or emergencies.

12.4.2.2.5 Inspection Records. Records of the 222-S Complex general inspections are maintained by the 222-S Complex for a period of at least 5 years from the inspection date. The records include the following:

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

12.4.2.2.6 Groundwater Monitoring Records. No groundwater monitoring is required for the 222-S Complex. Therefore, no groundwater monitoring records will be generated.

12.4.2.2.7 Waste Minimization Certification. Annual certification by the DOE-RL that the Hanford Facility is in compliance with the waste minimization requirements is inserted into the Hanford Facility operating record as required by 40 CFR 264.73(b)(9).

12.4.2.2.8 Land Disposal Restriction Records. Records related to the generation or treatment and disposal of waste subject to land disposal prohibitions specified in 40 CFR 264.73(b)(10) and (16) are not required for the two units within the 222-S Complex. All dangerous waste treated and/or stored at the 222-S Complex is transferred to another TSD unit before disposal.

12.4.2.3 Miscellaneous Support Records. Miscellaneous support records include the following:

- Training documentation
- Liability coverage documentation
- Closure cost estimates
- Report records.

12.4.2.3.1 Training Documentation. The name of each employee and the waste management position held are maintained by the 222-S Complex. Training records document that employees have received the training or have the job experience required for that position. Training records on current employees are kept until closure of that unit. Training records on former employees are kept for 3 years from the date the employee last worked at the 222-S Complex. Copies of these records are maintained by the contractor's training organizations. Specific employee training records are available on a demonstrated need-to-know basis. Copies of these records will be marked Sensitive Information and are expected to be handled in accordance with the *Privacy Act* (Chapter 8.0, Section 8.2).

12.4.2.3.2 Liability Coverage Documentation. In accordance with 40 CFR 264.140(c) and WAC 173-303, this documentation is not required for federal facilities. The Hanford Facility is a federally owned facility for which the federal government is the operator, and this documentation is therefore not applicable to the 222-S Complex.

12.4.2.3.3 Closure and Postclosure Cost Estimates. In accordance with 40 CFR 264.140(c) and WAC 173-303, these estimates are not required for federal facilities. The Hanford Facility is a federally owned facility for which the federal government is the operator. Therefore, these estimates are not applicable to the 222-S Complex.

An annual report updating projections of anticipated closure and postclosure costs for the Hanford Facility TSD units having final status will be submitted in accordance with WAC 173-303-390 to Ecology by October 30 (beginning in 1992).

12.4.2.3.4 Report Records. The reports described in Sections 12.1 and 12.4.1 are contained in records maintained either by the 222-S Complex or by other Hanford Facility organizations as noted in Table 12-1. Copies of the reports will be made available upon request of Ecology or the EPA.

Table 12-1. Reports and Records. (sheet 1 of 4)

Item	Storage	
	Retention time	Location[a]
Notification of dangerous waste activities	Life of 222-S Complex	Hanford Facility
GENERATOR REPORTS AND RECORDS:		
Annual report	Life of 222-S Complex	Hanford Facility
Exception report	Life of 222-S Complex	Hanford Facility
Additional reports and records as required (i.e., inspection logs)	Life of 222-S Complex	Hanford Facility
Test and Waste Analysis Results:		
Waste generated onsite	Life of 222-S Complex	222-S Complex
Waste packaged for offsite shipment	Life of 222-S Complex	222-S Complex
Waste Manifest Reports and Records:		
Manifests	Not required	NA[b]
Manifest discrepancy	Not required	NA
Unmanifested waste	Not required	NA
Land Disposal Restriction Records:		
Extension to an effective date	Life of 222-S Complex	Hanford Facility
Petition for a variance	Life of 222-S Complex	Hanford Facility
Notice and certification of treatment standards	Life of 222-S Complex	222-S Complex
Demonstration and certification for a temporary extension to the effective date	Life of 222-S Complex	Hanford Facility

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Table 12-1. Reports and Records. (sheet 2 of 4)

Item	Storage	
	Retention time	Location[a]
TRANSPORTER REPORTS AND RECORDS:		
None required	NA	NA
TREATMENT, STORAGE, AND/OR DISPOSAL REPORTS AND RECORDS:		
Permit Application Plans:		
Waste analysis plan	Life of 222-S Complex	222-S Complex
Contingency plan and amendments	Life of 222-S Complex	222-S Complex
Training plan	Life of 222-S Complex	222-S Complex
Closure plan	Life of 222-S Complex	222-S Complex
Inspection plans	Varies from 5 years from inspection date to life of 222-S Complex	222-S Complex
Operating Reports and Records:		
Waste description and quantity	Life of 222-S Complex	222-S Complex
Waste location	Life of 222-S Complex	222-S Complex
Waste analysis data	Life of 222-S Complex	222-S Complex
Inspection records	Varies from 5 years from inspection date to life of 222-S Complex	222-S Complex

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Table 12-1. Reports and Records. (sheet 3 of 4)

Item	Storage	
	Retention time	Location[a]
Certification of waste minimization efforts	Life of 222-S Complex	222-S Complex
<u>Waste Manifest Reports and Records</u>:		
Manifests	Not required	NA
Manifest discrepancy	Not required	NA
Unmanifested waste	Not required	NA
<u>Groundwater Monitoring Reports and Records</u>:		
None required	NA	NA
<u>Contingency Plan Incident Reports and Records</u>:		
Immediate notification--Occurrence Report	Life of 222-S Complex	222-S Complex
Assessment report	Life of 222-S Complex	222-S Complex
222-S Complex restart notification	Life of 222-S Complex	222-S Complex
<u>Spills, Discharges, and Leaks Reports and Records</u>:		
Immediate notification--Occurrence Reports	Life of 222-S Complex	222-S Complex

Table 12-1. Reports and Records. (sheet 4 of 4)

Item	Storage	
	Retention time	Location[a]
<u>Closure Reports and Records</u>:		
Certification of closure	Life of Hanford Facility	Hanford Facility
Survey plat	Not required	NA
Closure cost estimates	October 30, following inclusion of unit in Hanford Facility Permit	Hanford Facility
<u>Postclosure Reports and Records</u>:		
None required	NA	NA
<u>Miscellaneous Support Reports and Records</u>:		
Annual report	Life of 222-S Complex	222-S Complex
Biennial report	Not required	NA
Training documentation	Life of 222-S Complex	222-S Complex
Liability coverage documentation	Not required	NA

[a] Located at the 222-S Complex for 5 years from the date of origination, then transferred to Hanford Facility Central retention area for the remainder of the retention period. At the time of closure, all 222-S Complex environmental records will be transferred to a Hanford Facility retention area.

[b] NA = Not applicable.

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13.3 CLEAN WATER ACT OF 1977 13-2

13.4 ENDANGERED SPECIES ACT OF 1973 13-2

13.5 FISH AND WILDLIFE COORDINATION ACT OF 1934 13-3

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13.8 WILD AND SCENIC RIVERS ACT OF 1968 13-3

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13.0 OTHER RELEVANT LAWS [J]

The 222-S Complex is operated in compliance with applicable laws and regulations. Relevant environmental laws and regulations have been reviewed, necessary notifications have been made, and necessary approvals or permits have been obtained. No additional approvals or permits for the two units within the 222-S Complex that would require action by either Ecology or the EPA have been identified.

This chapter provides a summary of the regulatory review performed to assist Ecology in determining that the two units within the 222-S Complex have met their obligations with respect to other federal or state laws. The major environmental laws evaluated include the following, all as amended:

- *Atomic Energy Act of 1954*
- *Clean Air Act of 1977*
- *Clean Water Act of 1977*
- *Endangered Species Act of 1973*
- *Fish and Wildlife Coordination Act of 1934*
- *National Historic Preservation Act of 1966*
- *Toxic Substances Control Act of 1976*
- *Wild and Scenic Rivers Act of 1968.*

In addition, a summary of other requirements that might apply is provided. Full references for each of these acts are included in Chapter 15.0.

13.1 ATOMIC ENERGY ACT OF 1954

The *Atomic Energy Act* provides that the U.S. Atomic Energy Commission (succeeded by the U.S. Department of Energy for conducting nuclear defense and research and development activities at the Hanford Site) is authorized to develop and implement regulations to govern activities related to the design, location, and operation of U.S. Department of Energy sites, to protect health, and to minimize danger to life or property. The radioactive component of mixed waste is interpreted by the U.S. Department of Energy to be regulated under the *Atomic Energy Act*; the nonradioactive dangerous component of mixed waste is interpreted to be regulated under the RCRA and WAC 173-303.

The U.S. Department of Energy has issued several orders to govern the activities of its sites and to manage the health protection aspects of mixed waste. These orders provide for a consistent approach to managing waste that results from U.S. Department of Energy activities. The orders set radiation

exposure limits and concentration guidelines to minimize exposure to radiation and detail the standards and procedures for managing mixed waste. The 222-S Complex operations are and will be carried out in accordance with these orders.

13.2 CLEAN AIR ACT OF 1977

The *Clean Air Act* establishes national ambient air quality standards and sets standards for abating air pollution and preventing further deterioration of air quality. Air standards are implemented and enforced primarily by state and local authorities. The 222-S Complex will comply with the applicable federal, state, and local requirements to control and abate air pollution, including the following:

- *National Emission Standards for Hazardous Air Pollutants* (40 CFR 61) and *National Emission Standards for Radionuclide Emissions from U.S. Department of Energy Facilities* (40 CFR 61, Subpart H)
- Air pollution control regulations (WAC 173-400 through 495) issued under the authority of the *Washington Clean Air Act of 1967*
- *Radiation Protection-Air Emissions* (WAC 246-247), which promulgates the policies set forth in Chapter 70.98 of the *Revised Code of Washington, Nuclear Energy and Radiation*, issued under the authority of the *Washington Clean Air Act*.
- Benton-Franklin-Walla Walla Counties Air Pollution Control Authority general regulation 80-7 (1980).

The 222-S Complex complies with pollution control standards established by General Regulation 80-7 of the Benton-Franklin-Walla Walla Counties Air Pollution Control Authority (1980).

13.3 CLEAN WATER ACT OF 1977

Operation of the two units within the 222-S Complex will not result in the discharge of any liquid effluents that would require a National Pollutant Discharge Elimination System permit; therefore, no permits or reviews pursuant to the *Clean Water Act* are applicable.

13.4 ENDANGERED SPECIES ACT OF 1973

The 222-S Complex is located in the 200 West Area of the Hanford Site (Chapter 2.0, Section 2.3 provides location information). The 200 West Area has been developed extensively during past construction activities and during nuclear fuel and chemical reprocessing activities. The site of the 222-S Complex cannot be considered an undisturbed area or a major habitat for native plant and animal species. Also, this area is a very small fraction of the Hanford Site and hence would not play a significant role in the ecology of

the Hanford Site. No listed or proposed endangered or threatened species or their habitats are expected to be affected by activities related to the 222-S Complex.

13.5 FISH AND WILDLIFE COORDINATION ACT OF 1934

Activities associated with the 222-S Complex will not involve the impoundment, diversion, or other control or modification of any body of water. Therefore, no permits or reviews pursuant to this statute are applicable.

13.6 NATIONAL HISTORIC PRESERVATION ACT OF 1966

Activities associated with the 222-S Complex affect no areas that are eligible for nomination to the National Register of Historic Places. In addition, the area was reviewed for cultural resources.

Sites used as material 'borrow areas' for construction, replacement, and/or disposal of 222-S Complex equipment will be reviewed for the presence of archaeological resources in accordance with regulations issued pursuant to, or other requirements of, the *American Antiquities Preservation Act of 1906*; the *American Indian Religious Freedom Act of 1978*; the *Historic Sites, Buildings and Antiquities Act of 1935*; the *Archaeological and Historic Preservation Act of 1960*; and the *Archaeological Resources Protection Act of 1979*. No known cultural resource impacts have occurred from the 222-S Complex activities.

13.7 TOXIC SUBSTANCES CONTROL ACT OF 1976

The *Toxic Substances Control Act* was enacted to protect human health and the environment by requiring that specific chemicals be tested and that regulations restricting their processing and use be implemented. The objectives of the act include the development of adequate data to determine the human health and environmental effects of chemicals and to control any chemicals that present an unreasonable risk of injury. The section of the act most relevant to the 222-S Complex involves the storage and handling of chemical substances or mixtures that might present an unreasonable risk of injury to human health or the environment, specifically polychlorinated biphenyls. The regulation promulgated to prescribe the *Toxic Substances Control Act* methods for storage and handling of polychlorinated biphenyls is 40 CFR 761. The 222-S Complex will meet all the requirements as determined applicable by the EPA.

13.8 WILD AND SCENIC RIVERS ACT OF 1968

The 222-S Complex does not affect any rivers presently designated under the *Wild and Scenic Rivers Act*.

13.9 OTHER REQUIREMENTS

The application of insecticides and herbicides on or in the immediate vicinity of the 222-S Complex will be conducted in compliance with the *Federal Insecticide, Fungicide, and Rodenticide Act of 1975*, the *Toxic Substances Control Act*, and the applicable provisions of the Washington State water quality standards, WAC 173-201.

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14.0 CERTIFICATION [K]

The following certification, required by WAC 173-303-810(13), for all applications and reports submitted to Ecology is hereby included:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Edward D. Gaddis — 12/20/91
Owner/Operator — Date
John D. Wagoner, Manager
U.S. Department of Energy
DOE Richland Field Office

Thomas M. Anderson — 11/26/91
Co-operator — Date
Thomas M. Anderson, President
Westinghouse Hanford Company

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40 CFR 262, *Standards Applicable to Generators of Hazardous Waste*, Code of Federal Regulations, U.S. Environmental Protection Agency, Washington, D.C.

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15.3 FEDERAL AND STATE ACTS

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American Indian Religious Freedom Act of 1978, 42 USC 1996.

Archaeological and Historic Preservation Act of 1960, 16 USC 469.

Archaeological Resources Protection Act of 1979, 16 USC 470aa.

Atomic Energy Act of 1954, 42 USC 2011 et seq.

Clean Air Act of 1977, 42 USC 7401 et seq.

Clean Water Act of 1977, 33 USC 1251 et seq.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 26 USC 1 et seq.

Endangered Species Act of 1973, 16 USC 1531 et seq.

Federal Insecticide, Fungicide, and Rodenticide Act of 1975, 7 USC 136 et seq.

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15.5 THE U.S. DEPARTMENT OF ENERGY ORDERS

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APPENDIX 2A

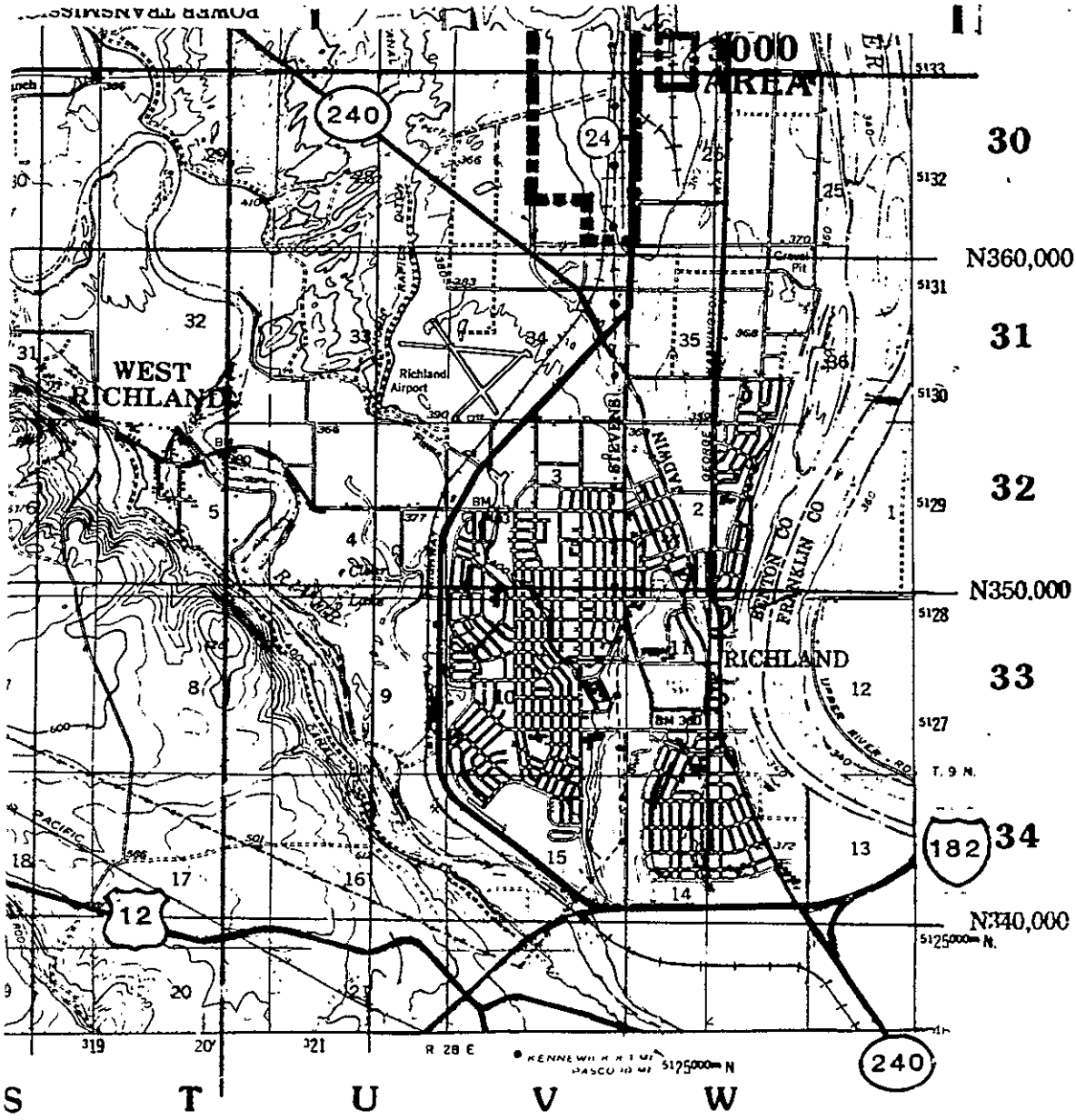
HANFORD SITE MAPS

APPENDIX 2A

CONTENTS

H-6-958	OVERALL HANFORD FACILITIES
H-13-000006	TOPOGRAPHIC MAP 222-S LABORATORY COMPLEX
H-13-000019	222-S LABORATORY COMPLEX RECORD OF SURVEY (LEGAL DESCRIPTION)

9 2 1 2 4 1 7 1 2 2 4



DRAWING APPROVALS	DATE
APPD FOR QUALITY ASSURANCE	
APPD	3/27
APPD	
APPD	
RESPONSIBLE ENGINEER R.L. MARTELL	3/27
DRAFTING APPD	
CHECKED	3/27
DRAWN K.D. JUNT	3/27

U. S. Department of Energy
Richland Operations Office

Westinghouse Hanford Company

OVERALL HANFORD FACILITIES

SCALE	DWG NO	INDEX NO.
AS SHOWN	600 GEN	0100

CLASSIFICATION	BY	DRAWING NO	SHEET NO.	SHEETS
NONE	NOT REQ'D	H-6-958	1	1

LAST REV. 3

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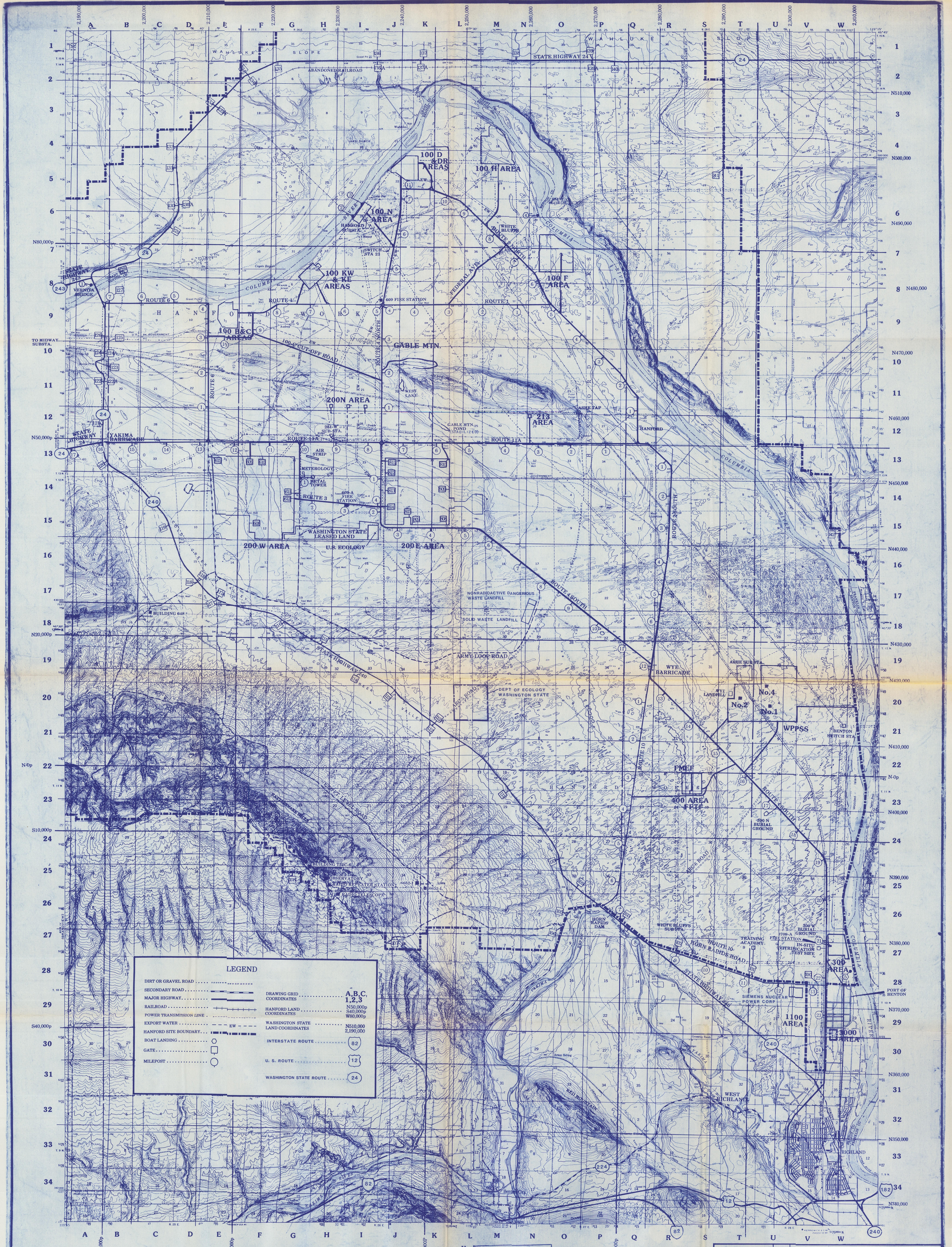

LEGEND

- DIRT OR GRAVEL ROAD
- SECONDARY ROAD
- MAJOR HIGHWAY
- RAILROAD
- POWER TRANSMISSION LINE
- EXPORT WATER — EW
- HANFORD SITE BOUNDARY
- BOAT LANDING
- GATE
- MILEPOST
- DRAWING GRID COORDINATES — A,B,C, 1,2,3
- HANFORD LAND COORDINATES — N50,000p S40,000p W80,000p
- WASHINGTON STATE LAND COORDINATES — N510,000 2,190,000
- INTERSTATE ROUTE — 82
- U. S. ROUTE — 12
- WASHINGTON STATE ROUTE — 24

SITE PLAN

CONTOUR INTERVAL 20 FEET DATUM IS MEAN SEA LEVEL

1 1/2 0 1 2 3 4 MILES

3,000 0 3,000 6,000 9,000 12,000 15,000 18,000 21,000 FEET

THIS MAP WILL NOT BE USED FOR DETERMINING EXACT LOCATIONS

OFFICIAL RELEASE BY WHC EDT-10111 DATE MAR 17 1989

REVISION APPROVALS							DESCRIPTION	LAST REV
RS		JCE 11-21-91	RJA 11-20-91	GL 11-20-91	DT 11/18/91	RL 11-18-91	REV. PER ECN-170550	3
MICRO FPD			ENGINEER	DRAFTING	CHKD BY DATE	REV BY DATE		

REVISIONS

DRAWING STATUS

DRAWING APPROVALS	DATE
APPD FOR QUALITY ASSURANCE	
APPD	7/89
APPD	
APPD	
RESPONSIBLE ENGINEER R.L. MARTELL	3/89
DRAFTING APPD	
CHECKED	3/31/89
DRAWN K.D. JUNT	3/87
CLASSIFICATION NONE	BY NOT REQ'D

U. S. Department of Energy
Richland Operations Office

Westinghouse Hanford Company

OVERALL HANFORD FACILITIES

SCALE	BLDG NO.	INDEX NO.
AS SHOWN	600 GEN	0100

DRAWING NO.	SHEET NO.	SHEETS
H-6-958	1	1

NEXT USED ON: END ITEM

NOTE

APPROVAL TO CHANGE THIS MAP MUST BE OBTAINED FROM THE ENVIRONMENTAL DIVISION, RCRA PERMITS SECTION BECAUSE THIS MAP WAS SUBMITTED WITH PERMIT APPLICATIONS TO THE WASHINGTON DEPARTMENT OF ECOLOGY.

AL NOTES

WN ON 6-24-89. THE TOPOGRAPHIC MAP WAS PREPARED
NATIONAL MAP ACCURACY STANDARDS.
OW THE CERTIFICATE ARE LOCATED IN THE WESTINGHOUSE
9476 SHEET 1 AND H-2-79477 SHEET 1 THRU 37.
E BLOCK OF THE H-13-000201 THROUGH H-13-000237
COMPANY.

TATE PLANE COORDINATE SYSTEM AS DEFINED BY THE
RD SITE LIES WITHIN THE WASHINGTON COORDINATE SYSTEM.
E AND USES X (EASTINGS) AND Y (NORTHINGS) COORDINATES.

ONS

ITS INITIAL POINT NORTHEAST OF THE 400 AREA IT
GENERAL SITE WORK SUCH AS WELLS AND BURIAL GROUNDS

PELINES THAT TRANSFER WASTE FROM THE 222-S ANALYTICAL
CILITY. THERE ARE TWO 2 INCH UNDERGROUND PIPELINES
TRANSFERS WASTE TO THE DOUBLE-SHELL TANK SYSTEM.

AT A. NASH	DATE 10-21-91
B. Tilley	10-23-91
Wilson	10-23-91
R. Coulson	10-23-91
IMPLEMENTATION	
DATE	

EDT 145753

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Westinghouse Hanford Company

TOPOGRAPHIC MAP 222-S LABORATORY COMPLEX

SIZE	BLDG NO	INDEX NO	DWG NO	REV
F	222-S	0103	H-13-000006	0

SCALE 1:2000 SHEET 1 OF 1

CHK PRINT ☐ DATE COMMENT PRINT ☐ DATE 10-23-91

DWG NO H-13-000006 SH 1 OF 1 REV 0

A

2 1

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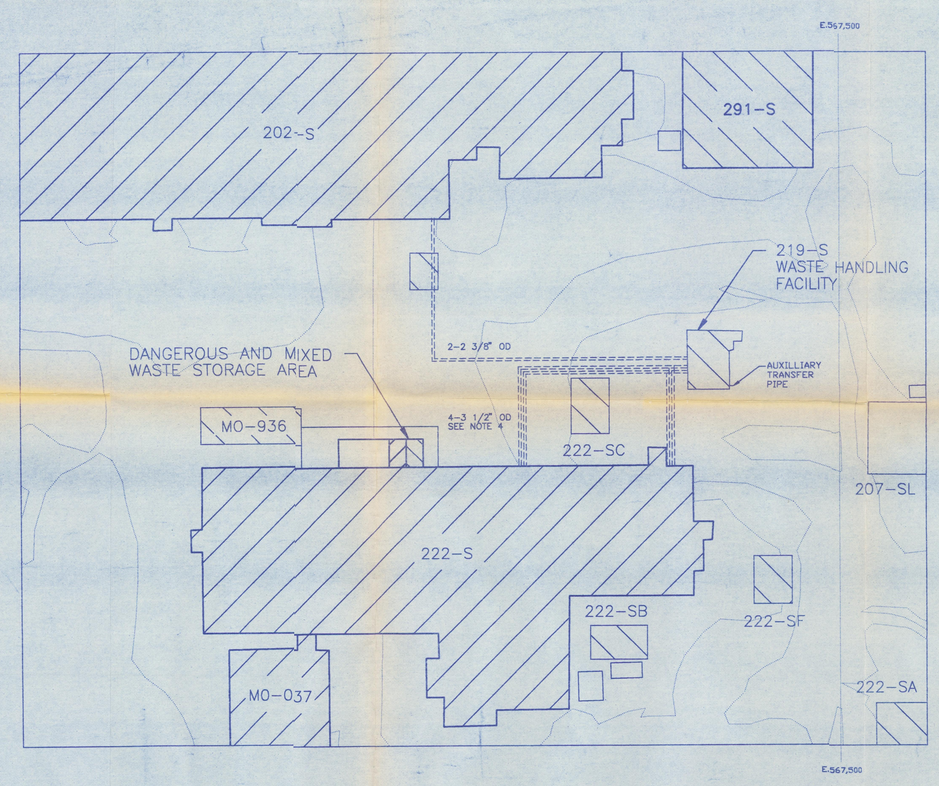
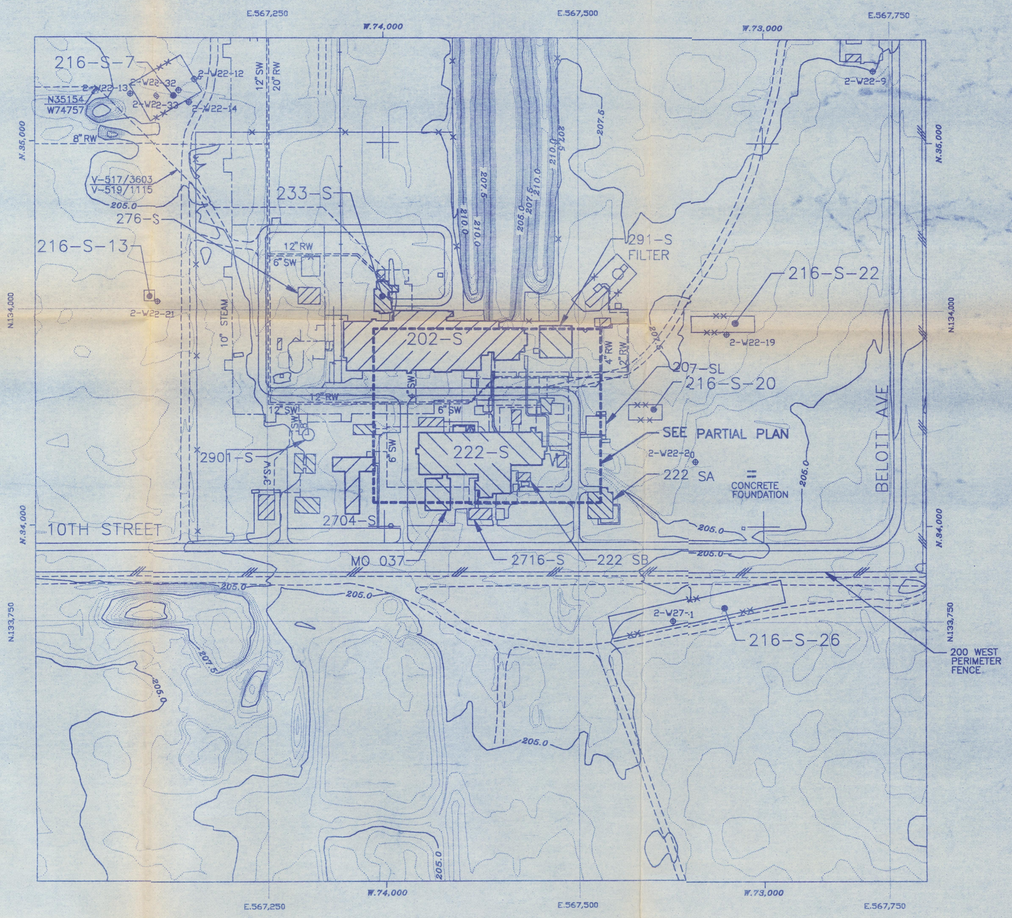


PARTIAL PLAN

SCALE: 1:500

0 5 10 20 30 40 METERS

1 cm = 5 meters
PHOTO DATE: 6-24-89
CONTOUR INTERVAL: 0.5 meter

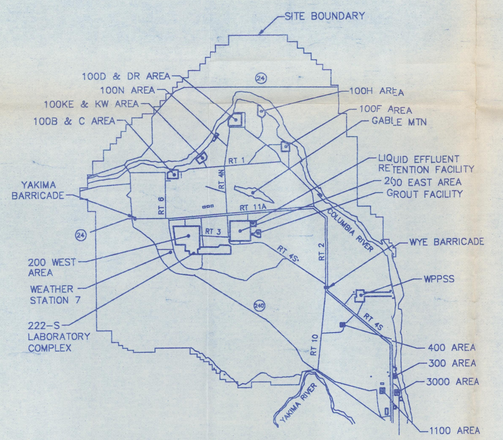


SITE PLAN

SCALE: 1:2000

0 20 40 80 120 160 METERS

1 cm = 20 meters
PHOTO DATE: 6-24-89
CONTOUR INTERVAL: 0.5 meter

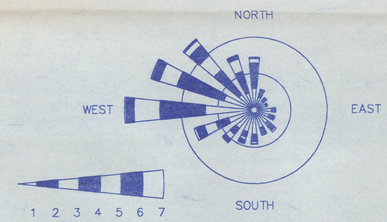


HANFORD AREA MAP

SCALE: NONE

WIND ROSE FOR: 200E AREA
% CALM WINDS = .9

PERIOD COVERED
12/01/85 – 12/31/87
STATION NO.7



PADDLES INDICATE DIRECTION WIND IS COMING FROM.
RADIAL GRIDS REPRESENT 5.0% AND 10.0% OCCURRENCE.

WIND CLASS	MILES/HOUR
1--------	>1.0 – 3.0
2--------	4.0 – 7.0
3--------	8.0 – 12.0
4--------	13.0 – 18.0
5--------	19.0 – 24.0
6--------	25.0 – 31.0
7--------	32.0 +

WIND ROSE

LEGEND

W.47,000 N.43,000	HANFORD PLANT COORDINATES (FEET)	216-A-42	CRIB
E.576,250 N.136,000	WASHINGTON STATE COORDINATES (METERS)	218-E-10	BURIAL GROUND
	FIELD CONTROL (METERS)	242-A	BUILDING
	INTERMEDIATE CONTOUR	2-E25-25	WELL
215.0	INDEX CONTOUR (METERS)	299-E25-25	POWER/ UTILITY POLE
	EDGE OF PAVEMENT		SIGNS
	FENCE		MANHOLE
	POST & CHAIN FENCE		CATCH BASIN
	PERIMETER FENCE		MISCELLANEOUS POST
	DIRT ROAD OR TRAIL		TREES
	PAVED ROAD		LIGHT POLE
	UNIMPROVED PAVED ROAD		CONCRETE LINE/ SIDEWALK
	BUILDINGS		RAILROAD
	TANKS	24	STATE HIGHWAY

GENERAL NOTES

1. THIS MAP IS BASED ON AERIAL PHOTOGRAPHY FLOWN ON 6-24-89. THE TOPOGRAPHIC MAP WAS PREPARED BY MERRICK & COMPANY AND CERTIFIED TO MEET NATIONAL MAP ACCURACY STANDARDS. OFFICIAL COPIES OF THE MERRICK MAPS THAT SHOW THE CERTIFICATE ARE LOCATED IN THE WESTINGHOUSE ENGINEERING FILES AS DRAWING NUMBERS H-2-79476 SHEET 1 AND H-2-79477 SHEET 1 THRU 37. THE NAMES OF PHYSICAL FEATURES AND THE TITLE BLOCK OF THE H-13-000201 THROUGH H-13-000237 MAPS WERE ADDED BY WESTINGHOUSE HANFORD COMPANY.

2. WASHINGTON COORDINATE SYSTEM: THE OFFICIAL STATE PLANE COORDINATE SYSTEM AS DEFINED BY THE REVISED CODE OF WASHINGTON (RCW). THE HANFORD SITE LIES WITHIN THE WASHINGTON COORDINATE SYSTEM, SOUTH ZONE. THIS GRID COVERS THE ENTIRE SITE AND USES X (EASTINGS) AND Y (NORTHINGS) COORDINATES.

   HORIZONTAL DATUM: NAD-83 LAMBERT PROJECTIONS

   VERTICAL DATUM: NATIONAL GEODETIC SURVEY
   DATUM AS PROVIDED BY KAISER
   ENGINEERS – HANFORD.
   COORDINATES ARE SHOWN AS METERS.
   CONTOURS ARE SHOWN AS 1/2 METERS.

3. HANFORD PLANT GRID: A LOCAL GRID SYSTEM WITH ITS INITIAL POINT NORTHEAST OF THE 400 AREA. IT COVERS 200-EAST AND 200-WEST AS WELL AS GENERAL SITE WORK SUCH AS WELLS AND BURIAL GROUNDS COORDINATES ARE SHOWN AS FEET.

4. THE PARTIAL PLAN SHOWS THE UNDERGROUND PIPELINES THAT TRANSFER WASTE FROM THE 222-S ANALYTICAL LABORATORY TO THE 219-S WASTE HANDLING FACILITY. THERE ARE TWO 2 INCH UNDERGROUND PIPELINES FROM THE 219-S WASTE HANDLING FACILITY THAT TRANSFERS WASTE TO THE DOUBLE-SHELL TANK SYSTEM.

OFFICIAL RELEASE BY WHC DATE OCT 24 1991

DWG NO	TITLE
H-2-5387 SHEET 1, 2, 3	222S AQUEOUS WASTE DISPOSAL FACILITIES
H-2-45900	PLOT PLAN 202-S VICINITY
H-2-46138	CIVIL PLAN
H-13-000227	200 AREA TOPOGRAPHIC MAP
H-13-000234	200 AREA TOPOGRAPHIC MAP

DRAWING TRACEABILITY LIST

REF NUMBER	TITLE
NEXT USED ON	H-13-000001

REFERENCES

REV NO	DESCRIPTION	REV BY DATE	CHK BY DATE	DFTG APVD DATE	COG ENGR	OTHER	OTHER

REVISIONS

CADFILE N000006A

CADCODE 1X:IBM:ACD2:10.0:N

		DATE
DRAWN	PAT A. NASH	10-21-91
CHECKED	B. Tilley	10-23-91
DFTG APVD		10-23-91
COG ENGR		
QA		
OTHER	R. Olsen	10-23-91
OTHER		
OTHER		
APVD FOR IMPLEMENTATION BY FOR		DATE

EDT 145753

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Westinghouse Hanford Company

TOPOGRAPHIC MAP 222-S LABORATORY COMPLEX

SIZE	BLDG NO	INDEX NO	DWG NO	REV
F	222-S	0103	H-13-000006	0

SCALE 1:2000 SHEET 1 OF 1

CHK PRINT DATE COMMENT PRINT DATE 10-23-91

H-13-000006 SH 1 OF 1 REV 0

54-6000-027(5/89)

DWG NO H-13-000019 SH 1 OF 1 REV 0

EDT 124623

BR KAMPPI	DATE 12/10/91
D Gary L. Tilby	12/10/91
PVD:	12-10-91
GR:	
	12/10/91
OR IMPLEMENTATION	
DATE	

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Westinghouse Hanford Company

222-S LABORATORY COMPLEX RECORD OF SURVEY

SIZE	BLDG NO	INDEX NO	DWG NO	REV
F	222-S	0103	H-13-000019	0

SCALE 1:2000 SHEET 1 OF 1

CHK PRINT ☐ DATE COMMENT PRINT ☐ DATE

A

2 1

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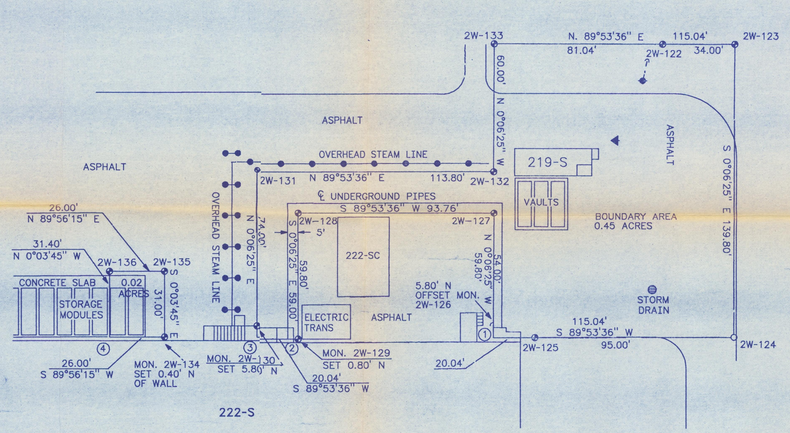
RECORD OF SURVEY

FOR

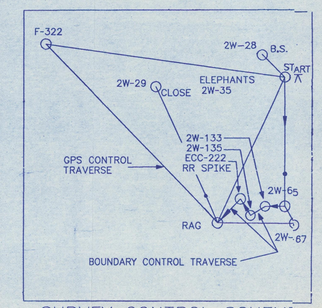
U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE

LOCATED AT THE SE 1/4 SE 1/4 SECTION 12
TOWNSHIP 12 NORTH, RANGE 25 EAST, W.M.,
BENTON COUNTY, WASHINGTON

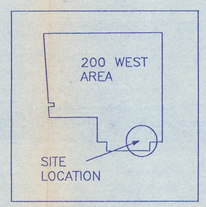


SCALE FACTOR:	0.999915003
ELEVATION FACTOR:	0.999969933

CONTROL MONUMENTS AND CORNER COORDINATES		
2W-122	N 133,943.470	E 567,491.081
2W-123	N 133,909.967	E 567,491.143
2W-124	N 133,909.932	E 567,472.552
2W-125	N 133,900.829	E 567,472.570
① BLDG LINE	N 133,900.818	E 567,466.462
2W-126	N 133,902.585	E 567,466.459
2W-127	N 133,919.043	E 567,466.428
2W-128	N 133,918.989	E 567,437.853
2W-129	N 133,901.008	E 567,437.887
② BLDG LINE	N 133,900.764	E 567,437.887
③ BLDG LINE	N 133,900.753	E 567,431.780
2W-130	N 133,902.521	E 567,431.776
2W-131	N 133,925.073	E 567,431.734
2W-132	N 133,925.138	E 567,466.417
2W-133	N 133,943.424	E 567,466.383
2W-134	N 133,900.782	E 567,418.398
2W-135	N 133,910.230	E 567,418.364
2W-136	N 133,910.202	E 567,410.440
④ BLDG LINE	N 133,900.754	E 567,410.474
2W-65	N 133,948.302	E 567,587.667
2W-28	N 135,807.819,	E 567,720.238
2W-29	N 135,352.357	E 566,063.009
F-322	N 137,273.568	E 564,082.907
RAG	N 133,758.279	E 567,152.333
2W-35	N 135,351.900	E 568,254.709
2W-67	N 133,826.703	E 567,709.900



SURVEY CONTROL SCHEME



VICINITY MAP

SCALE IN FEET

NOTES

COORDINATES AND BASIS FOR BEARINGS ARE FROM GLOBAL POSITIONING SYSTEM MEASUREMENTS ON HANFORD 200E PLANT MONUMENTS 2W-35 AND RAG BASED ON MONUMENT F-322 1947 NGS GEODETIC CONTROL DIAGRAM WALLA WALLA.

SITE BOUNDARY SURVEY MADE WITH A LIETZ SET 2 TOTAL STATION. THE BOUNDARY WAS A CLOSED TRAVERSE THROUGH MONUMENTS 2W-35 AND RAG, HAVING A CLOSURE GREATER THAN 1:60,000. ALL DIMENSIONS ARE GROUND LEVEL DISTANCES MEASURED IN FEET.

ALL COORDINATES ARE BASED ON THE WASHINGTON COORDINATE SYSTEM OF 1983, SOUTH ZONE (WCS 83S) PER 58.20 RCW.

SITE LOCATION WITHIN SECTION OR SECTIONS IS SCALED FROM A 7.5' QUADRANGLE MAP, USING LATITUDE AND LONGITUDE.

INDICATES MAGNETICALLY LOCATABLE 3" ALUMINUM MONUMENT WITH 2.5 FOOT ALUMINUM SHAFT, MARKED WITH SITE DESIGNATION No., CORNER No. AND SURVEYOR IDENTIFICATION.

AUDITOR'S CERTIFICATE

FILED FOR RECORD THIS _____ DAY OF _____, 1991 A.D.
AT _____ MINUTES PAST _____ M. AND RECORDED IN
BOOK _____ OF SURVEY, PAGE _____ RECORDS
OF BENTON COUNTY, WASHINGTON.

FEE No. _____

SURVEY No. _____

BENTON COUNTY AUDITOR

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE UNDER MY DIRECT SUPERVISION IN CONFORMANCE WITH THE REQUIREMENTS OF THE SURVEY RECORDING ACT, CHAPTER 58.09 RCW, OF 1973 AT THE REQUEST OF THE U.S. DEPARTMENT OF ENERGY.

11/20/91
DATE

RICHARD BARNHOUSER
WASHINGTON CERTIFICATE No. 11003
EXPIRES 11/3/93

KAISER ENGINEERS HANFORD CO.

P.O. BOX 888
RICHLAND, WASHINGTON 99352
509-373-2615

SE 1/4 SE 1/4, 12-12-25

DATE: 11/11/91

JOB No: ER 2459

SHEET 1 OF 1

GENERAL NOTES

1. THE RECORD OF SURVEY FOR THE 222-S LABORATORY COMPLEX WAS PREPARED TO SATISFY THE REQUIREMENTS OF THE WASHINGTON ADMINISTRATION CODE (WAC) 173-303-806(4)(a)(xviii)(G) TO DEFINE THE LEGAL BOUNDARIES OF TREATMENT, STORAGE, AND/OR DISPOSAL (TSD) UNITS.
2. THE 222-S LABORATORY COMPLEX CONSISTS OF TWO WASTE MANAGEMENT UNITS. THESE UNITS ARE THE 219-S WASTE HANDLING FACILITY AND 222-S DANGEROUS AND MIXED WASTE STORAGE AREA.
3. THE RECORD OF SURVEY ESTABLISHES THE LEGAL BOUNDARIES OF THE 222-S WASTE HANDLING FACILITY AND THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA.
4. THE RECORD OF SURVEY WILL BE FILED WITH THE COUNTY OF BENTON IN THE STATE OF WASHINGTON WHEN A CERTIFICATION OF CLOSURE HAS BEEN FILED IN ACCORDANCE WITH WAC 173-303-610(9), NOTICE TO LOCAL LAND AUTHORITY.
5. ANY CHANGES TO THE RECORD OF SURVEY SHALL BE APPROVED BY THE RCRA PERMITS SECTION RESPONSIBLE FOR THE 222-S LABORATORY COMPLEX DANGEROUS WASTE PERMIT APPLICATION AND THE REGISTERED SURVEYOR WHO PREPARED THE RECORD OF SURVEY.

OFFICIAL RELEASE BY WHC
DATE DEC 11 1991

DWG NO	TITLE
H-13-000006	TOPOGRAPHIC MAP 222-S LABORATORY COMPLEX

DRAWING TRACEABLILITY LIST — REFERENCES — NEXT USED ON H-13-000006

REV NO	DESCRIPTION	REV BY DATE	CHK BY DATE	DFTG APVD DATE	COG ENGR	OTHER	OTHER

REVISIONS — APPROVALS BY/DATE

CADFILE N000019A — CADCODE 1X:IBM:ACD2:10.0:N

DRAWN BR KAMPPI 12/10/91
CHECKED 12/10/91
DFTG APVD 12/10/91
COG ENGR
CA
OTHER
OTHER
OTHER
APVD FOR IMPLEMENTATION
BY
FOR

EDT 124623

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Westinghouse Hanford Company

222-S LABORATORY COMPLEX RECORD OF SURVEY

SIZE	BLDG NO	INDEX NO	DWG NO	REV
F	222-S	0103	H-13-000019	0

SCALE 1:2000 — SHEET 1 OF 1

CHK PRINT DATE — COMMENT PRINT DATE

DWG NO H-13-000019 SH 1 OF 1 REV 0

54-6000-027(5/89)

APPENDIX 3A

WASTE ANALYSIS PLAN FOR THE 219-S WASTE HANDLING FACILITY

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WHC-SD-WM-EV-058

219-S WASTE HANDLING FACILITY
WASTE ANALYSIS PLAN

DECEMBER 1991

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3.0 WASTE DESIGNATION 2
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3.2 DANGEROUS WASTE SOURCES 3
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METRIC CONVERSION CHART

INTO METRIC		
If you know	Multiply by	To get
Length		
inches	2.54	centimeters
feet	30.48	centimeters
Volume		
gallons	3.786	liters
cubic feet	0.02832	cubic meters
Temperature		
Fahrenheit	Subtract 32 then multiply by 5/9ths	Celsius
Pressure		
inches water	1.87	mm Hg
inches water	249	Paschal (Pa)
OUT OF METRIC		
Length		
centimeters	0.3937	inches
meters	3.28	feet
Volume		
milliliters	1.247×10^{-3}	cubic feet
liters	0.264	gallons
cubic meters	35.31	cubic feet
Temperature		
Celsius	Multiply by 9/5ths, then add 32	Fahrenheit
Pressure		
mm Hg	0.5353	inches water
Paschal (Pa)	4.02×10^{-3}	inches water

219-S WASTE HANDLING FACILITY WASTE ANALYSIS PLAN

1.0 SUMMARY AND CONCLUSIONS

This waste analysis plan describes the methods that will be used to comply with Chapter 173-303 of the Washington Administrative Code (WAC), *Dangerous Waste Regulations*, issued by the Washington State Department of Ecology (Ecology). Waste analysis requirements for interim status facilities are found in WAC 173-303-300(5), WAC 173-303-400, and Title 40 of the Code of Federal Regulations (CFR), Part 265.13. These requirements ensure that dangerous waste accepted at the 219-S Waste Handling Facility will be adequately characterized before being treated, stored, and transferred to Double-Shell Tank (DST) System.

Treatment tank 102 at the 219-S Waste Handling Facility is used to treat aqueous waste from the 222-S Analytical Laboratory before transfer to the DST System. The aqueous mixed waste is designated as a dangerous waste in accordance with WAC 173-303 for characteristic waste (D002), toxicity characteristic waste (D004 through D011), spent nonhalogenated solvents (F003 and F005) and state-only waste WT01 (toxic extremely hazardous waste).

2.0 PROCESS DESCRIPTION

The 219-S Waste Handling Facility consists of two vaults (also called cells), which are enclosed in a belowground concrete structure. These vaults contain three stainless steel tanks (tanks 101, 102, and 103) and a deentrainer or demister tank (tank 105). Tanks 101 and 103 store intermediate- and high-level mixed waste, respectively. The waste is transferred via underground stainless steel pipelines from the 222-S Analytical Laboratory to the 219-S Waste Handling Facility storage tanks. The 4-inch pipelines are encased in concrete pipe trenches from the point of exit at the 222-S Analytical Laboratory to the point of entry into the 219-S Waste Handling Facility vault. The pipelines are flushed with water after waste is discharged through the pipelines from waste collection bottles. Waste stored in tanks 101 and 103 is steam jetted to tank 102 for treatment with sodium hydroxide (NaOH) and sodium nitrite ($NaNO_2$). Waste is stored in tank 102 until a sufficient amount accumulates (typically around 3,000 gallons) to make a transfer to the DST System. The working capacities for tanks 101, 102, and 103 are 3,600 gallons, 3,600 gallons, and 1,260 gallons, respectively. The tank vault is attached to a pipe trench, operating gallery, a concrete-walled sample gallery that accesses tanks 102 and 103, and an aboveground transit building. The three tanks are vented by an electrical exhaust fan, through deentrainer tank 105 and a high-efficiency particulate air filter, to the atmosphere via the 296-S-16 Stack. The estimated quantities processed are 28,000 gallons per year for tank 101 and 10,000 gallons per year for tank 103. An additional 6,000 gallons of water are used annually to flush the waste transfer pipelines to the DST System.

If conditions exist that preclude the use of the normal transfer pipeline to the DST System, provisions will be made to transfer the waste via a 5,000-gallon tank trailer to the 204-AR Waste Unloading Station.

3.0 WASTE DESIGNATION

Waste treated and stored at the 219-S Waste Handling Facility is generated from activities within the 222-S Analytical Laboratory. Typical waste includes unused portions of process samples, inorganic nonlisted chemicals, decontamination solutions of nitric acid, and aqueous waste generated inside laboratory hoods during sample analysis. The waste is classified as intermediate-level (<10mR/h) or high-level (>10mR/h) mixed waste. Organic waste generated by the 222-S Analytical Laboratory is not accepted in the tank system and is disposed of separately in drums packaged in the laboratory. The storage of organic waste drums in the 222-S Analytical Laboratory dangerous mixed waste storage area is addressed in a separate waste analysis plan.

Waste identification occurs in the generating laboratory where specific analytical procedures are conducted in assigned hoods for control of radiation and cross contamination. The chemicals used in a specific hood are well known and seldom changed. Waste is collected in glass bottles while in laboratory hoods. The bottles are kept under vacuum during waste collection. Chemicals involved in each disposal to a bottle are known through process knowledge or recorded on an inventory sheet when waste is collected from multiple procedures or activities. When full the bottle is taken to Hood 16 in room 2B for discharge to tanks 101 and 103. Waste less than 10mR/h is decanted to tank 101, and waste greater than 10mR/h is jetted to tank 103 via Hood 16 drain lines.

Collected waste from tank 102 is treated before being discharged to the DST System. The mixed waste from the two tanks is acidic and has a pH of less than 2. This waste is treated to raise the pH to greater than 12 and the nitrite content to greater than 600 parts per million.

3.1 DISCARDED CHEMICAL PRODUCTS

The first step for waste designation is comparing the waste constituents to the "Discarded Chemical Products List," WAC 173-303-9903. The 222-S Analytical Laboratory contains many chemicals required to perform laboratory analyses. When these chemicals reach their expiration date, the chemicals are recertified for use or labpacked out of the laboratory as waste. No pure chemical products are discarded to the 219-S Waste Handling Facility. Administrative controls, personnel training, and operating procedures ensure that discharges are prevented. No pure chemical products appearing on the "Discarded Chemical Products List," WAC-173-303-9903, are discarded into the 219-S Waste Handling Facility.

3.2 DANGEROUS WASTE SOURCES

The second category for waste designation is comparing the waste constituents to the "Dangerous Waste Sources List," WAC-173-303-9904. The waste is designated as F003 and F005 (DST samples only) from WAC-173-303-9904 as a result of two sources. The first source is characterization samples containing hexone received for analysis. The second source is minute quantities of xylene and ethyl benzene from organic and aqueous phase separations inside laboratory hoods during liquid-liquid extractions. Because of a chemical similarity, ethyl benzene is an impurity in xylene reagents and therefore is not listed on the 222-S Analytical Laboratory chemical inventory. The 222-S Analytical Laboratory contains many solvents that are required in performing laboratory analyses. Solvents are regulated when the solvents are spent or discarded. Laboratory solvents are not discarded into the 219-S Waste Handling Facility. Administrative controls, personnel training, and operating procedures ensure that discharges are prevented. All water immiscible organic solutions are labpacked as mixed waste.

3.3 INFECTIOUS DANGEROUS WASTE

The third category for waste designation is "Infectious Dangerous Wastes," WAC 173-303-083. As of the release of this document, neither Ecology nor the U.S. Environmental Protection Agency (EPA) have language for regulation of infectious dangerous waste. When Ecology or the EPA releases requirements, these requirements will be reviewed for appropriate designation and management practices for applicable waste. Urine samples are received within 222-S Analytical Laboratory for radiological determinations. It is not known whether urine will be an infectious waste.

3.4 DANGEROUS WASTE MIXTURES

The fourth category for waste designation is "Dangerous Waste Mixtures," WAC 173-303-084. Tank 102 is known to have constituents that are identified in 40 CFR, Part 264, EPA Spill Table 302 and the National Institute for Occupational Safety and Health (NIOSH) *Registry of Toxic Effects of Chemical Substances* (NIOSH 1990).

3.4.1 Washington State Toxicity

To determine tank 102 waste toxicity, the following assumption was made. Cations and anions appearing in the waste were paired together based on chemicals added for waste treatment and chemicals that are frequently used in the laboratory for analysis. Laboratory analysis of the waste from tank 102 reports cations and anions found in solution rather than identifying actual compounds. The typical compounds formed and their concentrations are reported in Table 1. From the weight percent values and using the equivalent concentration equation found in WAC 173-303-101(4)(b), the equivalent concentration percent is calculated. Comparing this value to the "Dangerous Waste Mixtures Graph" in WAC 173-303-9906, tank 102 waste is determined to be toxic (WT01).

3.4.2 Persistence

The 222-S Analytical Laboratory does not discharge any persistent dangerous waste to the 219-S Waste Handling Facility. Halogenated hydrocarbons are labpacked out of the laboratory. The 222-S Analytical Laboratory does not use, store, treat, or dispose of polycyclic aromatic hydrocarbons. Therefore, this category is not applicable.

Table 1. Typical Tank 102 Dangerous Waste Mixture Constituents.

Compound	Toxic category	Concentration	Weight percent
NaOH	C	1.0 E-01	0.394
$NaNO_2$	X	2.9 E-02	0.197
NaCl	D	8.8 E-03	0.0507
NaF	C	4.4 E-04	0.00182
Na_2sO_4	-	2.0 E-03	0.0279
$NaNO_3$	D	8.7 E-02	0.728
$Al_2(SO_4)3$	-	1.0 E-04	0.0014788
$SrNO_3$	D	3.7 E-05	0.000542
ZnF_2	C	1.8 E-04	0.001834
$FeCl_3$	C	1.9 E-04	0.00303
K_2SO_4	-	1.8 E-04	0.00309
H_2O	-	-	98.59
Total			100.00

3.4.3 Carcinogen

The final criteria in designating a dangerous waste mixture are positive or suspected carcinogens. Each of the constituents listed in Table 1 was compared to the NIOSH *Registry of Toxic Effects of Chemical Substances* (NIOSH 1990). There were no substances identified as positive or suspected carcinogens for humans or animals as defined by the International Agency for Research on Cancer. Therefore, this category is not applicable.

3.5 DANGEROUS WASTE CHARACTERISTICS

The fifth category for waste designation is "Dangerous Waste Characteristics," WAC 173-303-090. The four characteristics in this category are ignitability, corrosivity, reactivity, and toxicity characteristics leaching procedure.

3.5.1 Ignitability

The 219-S Waste Handling Facility aqueous waste does not meet any of the definitions of ignitability defined in WAC 173-303-090(5). The stream contains less than 24 percent alcohol by volume. The waste is not an oxidizer as defined in 49 CFR 173.151. The waste does contain nitrates (NO_3^-) and nitrites (NO_2^-); however, the solution concentration does not yield oxygen readily to support combustion of organic matter.

3.5.2 Corrosivity

The 219-S Waste Handling Facility aqueous waste frequently exhibits a pH less than 2.0 before treatment and could exhibit a pH greater than 12.5 following addition of sodium hydroxide. Therefore, this waste stream is designated as corrosive (D002).

3.5.3 Reactivity

The 219-S Waste Handling Facility waste does not meet any of the definitions of reactivity defined in WAC 173-303-090(7). The waste is not unstable, does not react violently with water, does not form an explosive mixture, does not generate toxic gases, is not explosive in any manner, and, therefore, is not regulated under this requirement.

3.5.4 Toxicity

Sample results have shown that the 219-S Waste Handling Facility aqueous waste exhibits toxicity for lead and for mercury (D008, D009). The 222-S Analytical Laboratory discharges expired aqueous metal waste from inductively coupled plasma/atomic absorption spectrometer standards into the 219-S Waste Handling Facility. These standards contain regulated concentrations of arsenic (D004), barium (D005), cadmium (D006), chromium (D007), lead (D008), mercury (D009), selenium (D010), and silver (D011). Pesticide standards also are maintained at the laboratory. Administrative controls, personnel training, and operating procedures reduce the potential for water-immiscible organic solutions and pesticide standards from being discharged to the waste tanks.

4.0 SAMPLING

Sampling of the tank system at the 219-S Waste Handling Facility occurs for two reasons. A process sample is taken before every treatment to determine amounts of chemical additives needed and to characterize the waste. A verification sample also is taken to verify the waste designation.

4.1 SAMPLE TYPES

After the waste from tanks 101 and 103 is treated and stirred in tank 102, a sample is taken and analyzed for various parameters listed in Table 2. Sodium hydroxide is added, based on the caustic ratio, to raise the pH to greater than 12. The mixture is agitated 30 to 60 minutes and another sample is taken to check the pH. Nitrite ($NaNO_2$) is added according to a calculation using this pH value, and the solution is agitated for at least 1 hour. A sample is taken to verify the nitrite content and pH.

If the pH is greater than 12, the nitrite concentration is greater than 600 parts per million, and the fissile concentration is less than 0.0132 gram per liter, the waste can be discharged to the DST System. Following this discharge, tank 102 and the lines leading to the DST System are flushed with 500 gallons of raw water.

Based upon frequencies determined from the requirements in the *Double-Shell Tank Waste Analysis Plan* (WHC 1990), a sample is taken to verify the constituents of the 219-S Waste Handling Facility waste. The sample is analyzed by an independent laboratory for the constituents listed in Table 2.

4.2 SAMPLING PARAMETERS AND RATIONALE

The waste treated in the 219-S Waste Handling Facility requires special handling and storage procedures because of the dangerous nature of the waste. For this aqueous waste to be safely transferred to the DST System for storage, the waste must be treated to achieve a pH greater than 12 and a nitrite concentration greater than 600 parts per million. Also, the waste must be monitored to ensure that no separable organic phase exists and the fissile concentration is less than 0.0132 gram per liter. Table 2 provides the rationale for monitoring each of the identified parameters in the process and verification samples.

4.3 TEST METHODS

Process laboratory analyses are conducted by onsite laboratories because the samples are radioactive. The samples are analyzed using contractor approved procedures. These procedures are derived from WAC/EPA methods.

Table 2. Generator Sample Parameter List.

Parameter	SW-846* Reference analytical method	Rationale**	Volume
ICP metals	6010	a	100 mL
Arsenic (As)	7061	a	100 mL
Mercury (Hg)	7470	a	100 mL
Selenium (Se)	7741	a	100 mL
Nitrite (NO_2)	Approved procedure	b	2 mL
Nitrate (NO_3)	9200	b	5 mL
Hydroxide (OH)	9040	a,b	3 mL
Total organic carbon	9060	b	2 mL
Volatile organics	8240	a,c	40 mL
Specific gravity	Approved procedure	c	2 mL
Total plutonium	Approved procedure	b	1 mL
Differential scanning calorimeter	Approved procedure	a,b	.01 mL

Note: A grab sample will be collected in a glass vial with polyseal cap using the bayonet sampler before each transfer.

ICP = inductively coupled plasma.

**Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, 3rd Edition, SW-846, U.S. Environmental Protection Agency, Washington, D.C., 1986.

**Rationale:

a = Verify waste designation
b = Proper waste storage assurance
c = Evaporation process analyte.

4.4 SAMPLING METHODS

Process and verification samples are taken from the same location. Samples are collected from the tank 102 sampling port using the portable bayonet sampler (Figure 1) to withdraw a sample from the sample riser in the lead sample box (Figure 2). The sample is drawn from the bottom of the tank by an electric transfer jet through the sample riser and vacuum-transferred into the bayonet sample during the sampling procedure. This method is necessary to keep the personnel exposure level as low as reasonably achievable during sampling. The sample boxes are enclosed in a hood that is exhausted during sampling. The hood exhaust is equipped with a beta/gamma continuous air monitor with a beacon and audible alarm to alert personnel to the presence of airborne contamination in the sample gallery.

The composite liquid waste sampler (COLIWASA) is recommended in WAC 173-303-110 for liquid waste that is containerized. The bayonet sampler is used because the tanks cannot be accessed with a COLIWASA and the radionuclide content of the waste requires remote sampling to minimize exposure of personnel. A representative sample can be obtained following the approved sampling procedure. Table 2 summarizes the sample volumes and containers for the required analyses.

Process sample collection, transport, and preparation will be conducted in accordance with laboratory approved procedure. The following guidelines will apply to the collection of verification samples.

- Each sample will be identified by a unique code.
- A waste sampling log will be maintained during sampling. This log will include the sample identification code, date and time of sampling, sample code, description of the waste (e.g., color, layers), sampling methods used, volume collected, and any problems encountered during sampling.
- Each collected sample will be placed in the appropriate sample container and have appropriate preservatives added. The sample container will be labeled with the following: sample code, date and time of sampling, preservative used, name of person collecting the sample, and analyses to be performed. The outer surface of all sampling containers will be wiped clean, and the wipes will be disposed of in accordance with contractor solid waste procedures. Each glass container will be wrapped with plastic insulating material ('bubble wrap'). Each sample container will be enclosed in a sealable plastic bag to prevent contact with other sample containers.

Figure 1. Sampler Bayonet.

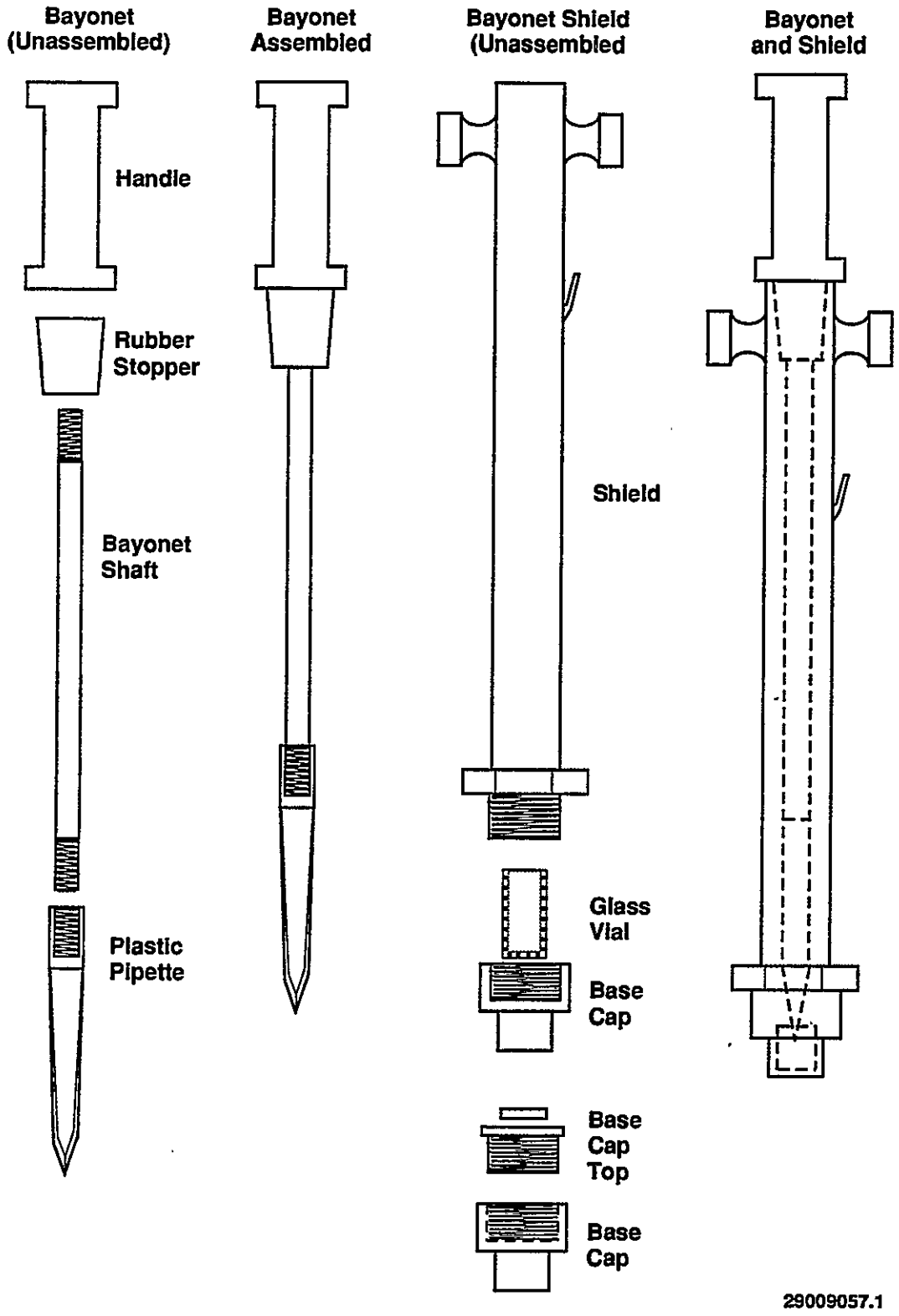
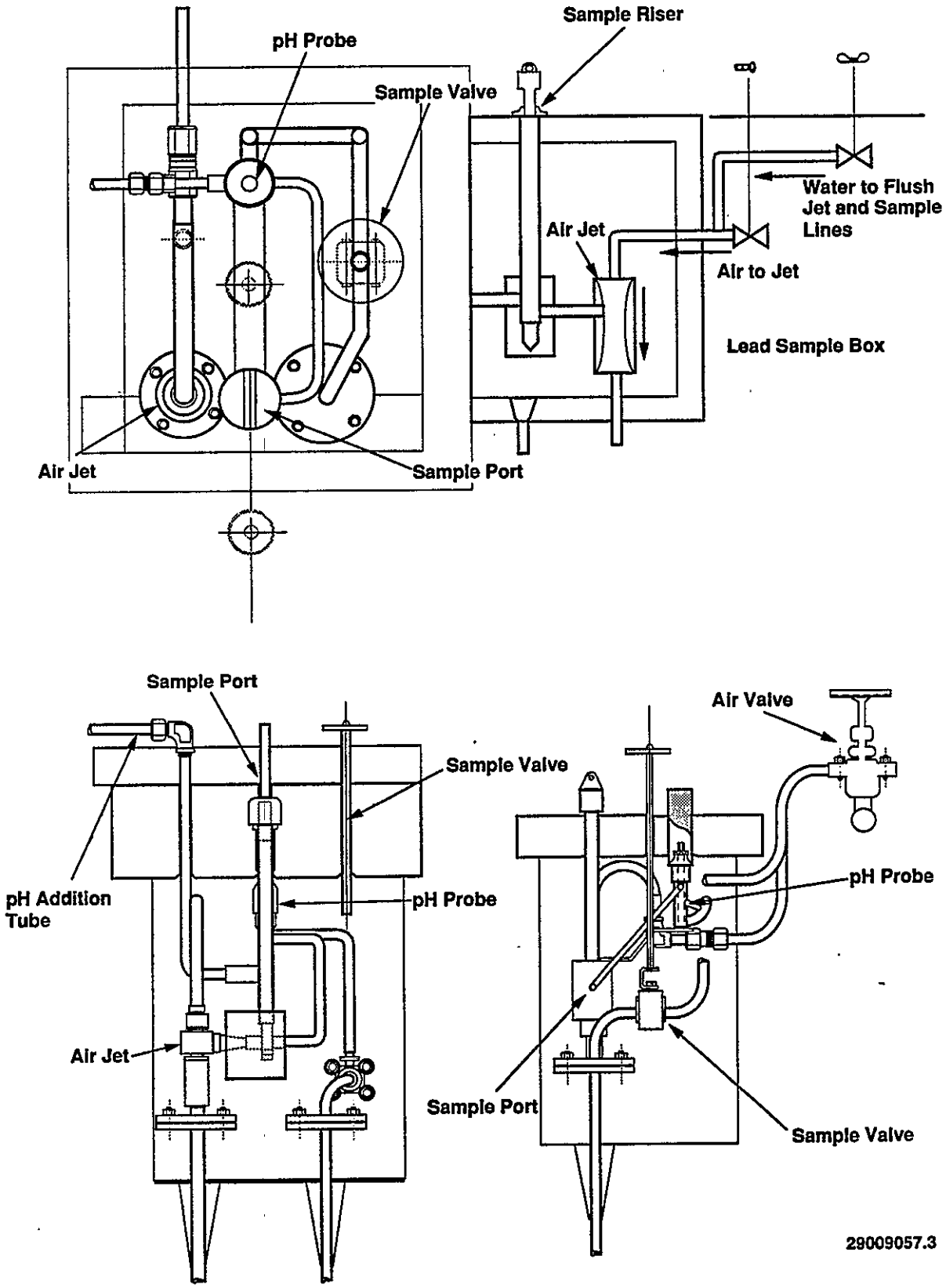


Figure 2. Sampler Box 219-S.



- Samples will be placed in thermally insulated rigid ice chests that contain ice or reusable ice packs so that the temperature of the sample is maintained at 4 °C, if the 222-S Laboratory cannot immediately receive the sample. Otherwise, the sample will be taken inside the laboratory and stored at 4 °C (as specific samples require).

- A chain-of-custody record will be completed and will accompany every sample from the sampling point through completion of analyses at the analytical laboratory. This record will contain the sample number, date and time of collection, place and address of collection, waste type, signature of collector, signature of all persons involved in the chain of possession, appropriate notations relative to sample integrity and handling practices, and inclusive dates and times for each individual's possession.

5.0 RECORDKEEPING

Volumes of waste transferred to the DST System are reported in the U.S. Department of Energy, DOE Richland Field Office Hanford Site annual dangerous waste report series. The information is extracted from the tank 102 transfer record. The DST System performs a verification of incoming waste volumes and verifies this volume with personnel. This information is recorded in the 219-S Waste Handling Facility operating log.

With each waste transfer, the generating unit must supply documentation to meet the waste tracking documentation and land disposal restriction notification requirements. Copies of this documentation will be kept by the DST System for each transfer until closure of the 219-S Waste Handling Facility.

All onsite laboratories that conduct analyses for the contractor are required to have quality assurance and quality control procedures for chain of custody, equipment maintenance and calibration, recordkeeping, personnel training, and internal quality control checks. These procedures are reviewed and approved by the contractor. All laboratory personnel are properly trained in analytical methods, quality assurance and quality control procedures, and hazardous and radioactive materials.

Records of waste characterization and disposition are retained for a minimum of 5 years by the 219-S Waste Handling Facility. These records include the analytical records on waste samples analyzed, the tank 102 transfer record, and the 219-S Waste Handling Facility operating records. Chain-of-custody records and the sampling logs also are maintained with these records.

6.0 REFERENCES

NIOSH, 1990, *Registry of Toxic Effects of Chemical Substances*, as amended, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, Washington, D.C.

WAC 173-303, *Dangerous Waste Regulations*, Washington Administrative Code, as amended, Washington State Department of Ecology, Olympia, Washington.

WHC, 1990, *Double-Shell Tank Waste Analysis Plan*, WHC-SD-WM-EV-053, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

40 CFR 264, *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*, Title 40, Code of Federal Regulations, Part 264, as amended, U.S. Environmental Protection Agency, Washington, D.C.

40 CFR 265, *Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*, Title 40, Code of Federal Regulations, Part 265, as amended, U.S. Environmental Protection Agency, Washington, D.C.

49 CFR 173, *Shippers-General Requirements for Shipments and Packagings*, Title 49, Code of Federal Regulations, Part 173, as amended, U.S. Department of Transportation, Washington, D.C.

APPENDIX 3B

WASTE ANALYSIS PLAN
FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA

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WASTE ANALYSIS PLAN FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA

1.0 SUMMARY AND CONCLUSIONS

This waste analysis plan describes the methods that will be used to comply with Chapter 173-303 of the Washington Administrative Code (WAC) *Dangerous Waste Regulations* issued by the Washington State Department of Ecology (Ecology). Waste analysis requirements for interim status facilities are found in WAC 173-303-300(5), WAC 173-303-400, and Title 40 of the Code of Federal Regulations (CFR), Part 265.13. These requirements ensure that dangerous waste accepted at the 222-S Dangerous and Mixed Waste Storage Area are adequately characterized before the waste is stored.

2.0 FACILITY DESCRIPTION

The 222-S Dangerous and Mixed Waste Storage Area (Figure 1-1), located within the 222-S Complex, consists of two metal storage structures approximately 19 feet 10 inches (6.0 meters) by 8 feet (2.4 meters) by 8 feet 6 inches (2.6 meters). The storage structures rest on a portion of a concrete pad. One static-flow roof vent is centered in the top of each structure. Each storage structure has a full-width double door at one end. These doors remain locked except during transfers in or out of the structure and during inspections. Inside the structures, drums rest on a fiberglass grate 6 inches (15 centimeters) above a steel secondary containment basin, which covers the entire floor of each storage structure.

3.0 PROCESS DESCRIPTION

The main source of waste accepted at the 222-S Dangerous and Mixed Waste Storage Area is generated at the 222-S Complex. In addition to this waste, the 222-S Analytical Laboratory accepts unused sample portions back from offsite laboratories for disposal. These unused samples consist mainly of well water and soil samples taken for site characterization. Table 3-1 shows an example of the typical analytical requirements for soil and water samples. The analytical results of these samples are used for designation of the waste. Characterization of the waste emanating from the 222-S Analytical and 222-SA Standards Laboratories requires identification of physical and chemical properties pertinent to waste disposal and proper Ecology waste code designation and classification as a mixed, dangerous, or extremely hazardous waste. After waste characterization, proper procedures for waste handling, packaging, and labeling are determined, as is the final destination of the waste beyond storage at the 222-S Dangerous and Mixed Waste Storage Area.

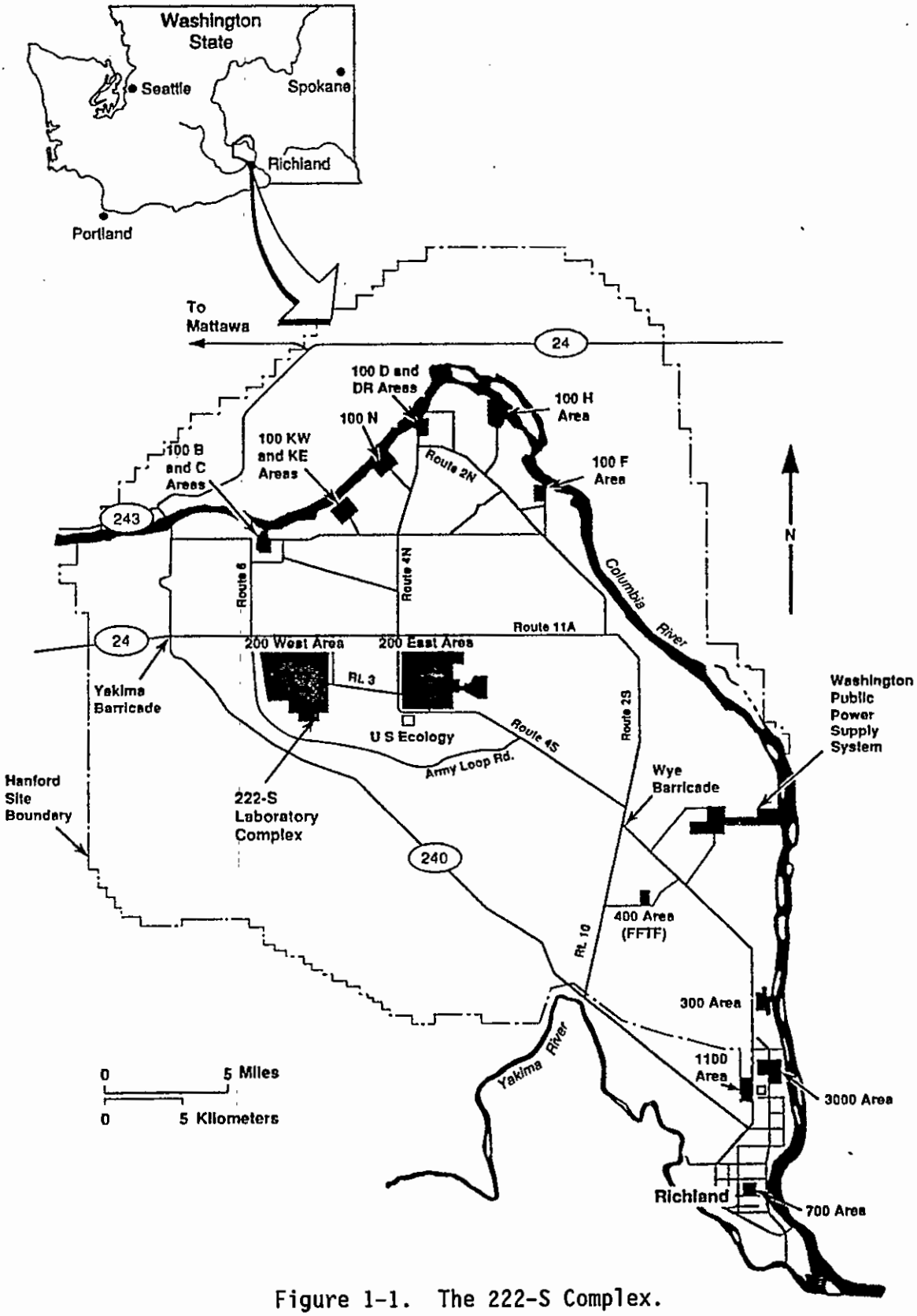

Figure 1-1. The 222-S Complex.

Table 3-1. Analytical Requirements for Soil and Water Samples.

Organic Analytes
Volatile organic analysis
Semivolatile analysis
Pesticides/polychlorinated biphenyls
Total organic carbon
Inorganic Analytes
Anions by inductively coupled plasma quantameter: (NO_3, SO_4, PO_4)
Inductively coupled plasma quantameter/ atomic absorption spectrometer metals (including bismuth)
Total cyanide[4]
Free cyanide[4]
Radiochemical Analytes
Total alpha
Total beta
Strontium-90
Plutonium (by alpha energy analysis)
Cobalt-60
Cesium-137
Ruthenium-106

The analytical procedures performed in the 222-S Analytical and 222-SA Standards Laboratories are documented and controlled. These analytical procedures are carried out routinely in specifically designated chemical hoods, and are not revised frequently. Therefore, waste generated (and points of generation) also is relatively constant. Thus, in nearly all instances, the information needed to adequately characterize the waste is supplied by the generating unit based on process knowledge, manufacturer information (e.g., material safety data sheets), or analytical testing. The procedures for identifying and documenting all the dangerous constituents of the waste have been developed and are covered in the following sections.

3.1 GENERATING UNIT-SUPPLIED INFORMATION

Generating unit-supplied information primarily is collected at certain waste handling points. Waste generated within a laboratory room is collected in marked collection containers located within the chemical fume hood or on the laboratory bench top where the waste-generating laboratory procedure is conducted. In the case of discarded chemical products, materials remain in original containers for disposal.

The hazardous materials unit transfers the waste from the satellite accumulation areas to the less-than-90-day storage area. Additionally, each waste container has a waste sticker that indicates the satellite accumulation area location, the hazard class, procedure number (which identifies the specific chemical components of the waste), and the words "hazardous waste". In the case of waste generated in the 222-SA Standards Laboratory, waste is labpacked in a utility room within the building before being transferred to the 222-S Dangerous and Mixed Waste Storage Area. If the hazardous materials unit manager believes process knowledge (i.e., accompanying waste documentation) is insufficient to identify the dangerous constituents of the waste, the waste can be sampled at the satellite accumulation area to facilitate timely laboratory analysis. If the hazardous materials unit manager confirms process knowledge to be sufficient, waste characterization documentation is completed and submitted to Solid Waste Engineering. All records providing a description of the waste, dangerous characteristics, basis for waste designation, and laboratory reports with chemical, biological, and physical sample analyses for waste are maintained by the Solid Waste Engineering organization and the 222-S Complex hazardous materials unit.

Specific information supplied by the generating unit for each waste type before storage at the 222-S Dangerous and Mixed Waste Storage Area is described in the following sections.

3.1.1 Lead Waste

Lead waste consists of broken lead sample containers, flat lead sheets, and lead bricks. A smear of the lead is taken and tested for radioactivity. If measured radioactivity is less than 50 picocuries per gram, the lead is designated as 'excess lead' and transferred to an onsite recycling area. If radioactivity is greater than 50 picocuries per gram, the lead is designated

an extremely hazardous mixed waste. Generating unit supplied information includes the chemical waste disposal request, the storage/disposal approval record, and results of the smear test.

3.1.2 222-S Analytical Laboratory Chemicals

The 222-S Analytical Laboratory maintains an inventory of chemicals used in analytical procedures and research. As laboratory chemicals become outdated or off-specification, the chemicals are managed as a dangerous waste. The chemical waste is first segregated into a mixed waste category or a dangerous waste category based on the results of radiological screening. The portion of chemicals that is nonradioactive is managed in the same way as chemical waste from the 222-SA Standards Laboratory, as described in Section 3.1.3. Radioactively contaminated laboratory chemicals that are discarded or are off-specification and are not a part of the 'organic waste' described in Section 3.1.4 are generated very infrequently. Off-specification laboratory chemicals are identified by the generating unit through inventory information, procedural information, and material safety data sheets. From this information, the hazardous materials unit manager submits a chemical waste disposal request, or a draft storage/disposal approval record if the waste is radioactive and records the results of radiological screening. If information is insufficient to designate the waste per WAC 173-303-070, the hazardous materials unit manager will require sampling and analysis, as described in Sections 3.4 through 3.6. The additional information is included (either separately or as part of the chemical waste disposal request) with the documents described above and submitted to Solid Waste Engineering for waste designation.

The 222-S Analytical Laboratory chemical waste is regulated as a dangerous waste or extremely hazardous mixed waste because individual waste chemicals could be classified as: (1) discarded chemical products (per WAC 173-303-081), (2) toxic, persistent, or carcinogenic dangerous or extremely hazardous waste (per WAC 171-303-101, -102, -103, -104), or (3) characteristic waste as defined in WAC 173-303-090.

3.1.3 Nonradioactive Dangerous Waste

The dangerous constituents of nonradioactive dangerous waste also are identified primarily through process knowledge. Laboratory chemical data pertinent to waste designation are collated from container information, satellite accumulation area logsheets, and material safety data sheets to assign preliminary waste codes and to submit a chemical waste disposal request. If documentation available to the hazardous materials unit manager is insufficient to properly identify dangerous constituents of the waste, sampling and analysis will be required as described in Sections 3.4 through 3.6.

This waste includes laboratory chemicals from the 222-SA Standards Laboratory and nonradioactive off-specification chemicals from the 222-S Analytical Laboratory. Although the chemicals potentially entering this

waste stream are varied, small quantities of chemicals used in daily laboratory procedures typically make up the majority of the waste. The chemical and physical characteristics of this waste can include the following:

- Solid or liquid
- Reactive with water
- Ignitable
- Reactive to form toxic gases
- Oxidizer
- Cyanide or sulfide bearing
- Corrosive
- Toxicity.

This waste is regulated as dangerous waste because individual waste chemicals might exhibit the properties listed and might be classified as: (1) discarded chemical products (per WAC 173-303-081); (2) toxic, persistent, or carcinogenic dangerous or extremely hazardous waste (per WAC 171-303-101, -102, -103, -104); or (3) characteristic waste as defined in WAC 173-303-090. Discarded chemical products are generated infrequently and are transferred out of the 222-S Complex in less than 90 days.

3.1.4 Liquid Organic Waste

Liquid organic waste results from radiochemical separation procedures and organic analyses of volatile, semivolatile, pesticide, and polychlorinated biphenyl compounds during daily laboratory operations. This organic waste includes: liquid scintillation cocktails, consisting primarily composed of 1,2,4-trimethylbenzene (pseudocumene); discarded environmental and process characterization samples; and outdated or off-specification chemical reagents. Organic waste is collected in assigned hoods based on specific analytical procedures performed in the hoods. The hazardous materials unit manager uses container information, material safety data sheet information, and radiological screening data to submit waste characterization documentation such as chemical waste disposal requests, draft storage/disposal approval records, and radionuclide concentrations to Solid Waste Engineering. Nonradioactive organic compounds are grouped and managed with nonradioactive dangerous waste. If available information is not sufficient to assign preliminary waste code designations, the Hazardous Waste Coordinator requires additional sampling and analytical testing as described in Sections 3.4 through 3.6.

3.1.5 Occasional Waste

Because occasional waste is not generated routinely, generating unit information typically is insufficient to adequately identify the dangerous constituents of the given waste. An example of an occasional waste is waste oil from maintenance of vacuum pump systems, entrainer units, elevator blower fans, and continuous oilers. Sampling and analysis, as described in Sections 3.4 through 3.6, are performed to designate the waste in accordance with WAC 173-303-070. Once analytical results are received, the hazardous

materials unit manager submits waste characterization documentation such as a chemical waste disposal request, or a draft storage/disposal approval record if the waste is radioactive, and any radionuclide concentrations or activity levels to Solid Waste Engineering for formal designation and disposal approval. Waste that is not permitted for storage in the 222-S Dangerous and Mixed Waste Storage Area is not kept at the 222-S Complex for more than 90 days, in accordance with WAC 173-303-200.

3.2 WASTE DISPOSAL ANALYSIS

Waste disposal analysis occurs in two steps. In the first step, analysis is performed by the hazardous material unit manager who reviews the information supplied by the generating unit (and, if necessary, analytical results) to complete waste characterization documentation and assign preliminary waste code designations. These documents are submitted to Solid Waste Engineering for formal waste designation.

In the second step, Solid Waste Engineering receives the supplied documents and designates the waste in accordance with WAC 173-303-070. If the information supplied to Solid Waste Engineering is insufficient to designate the waste, Solid Waste Engineering issues a specific request for additional information. Once the waste is designated, Solid Waste Engineering issues a storage or disposal instruction document to the hazardous materials unit manager. This final documentation is auditable and includes waste code designations, proper packaging and labeling methods and materials, and final disposition information. Packaging information includes segregation of incompatible waste as determined from *A Method for Determining the Compatibility of Hazardous Wastes* (California Department of Health Services 1980). For waste generated within the 222-S Complex, final disposition occurs after the waste is transferred to the Hanford Central Waste Complex or to the 616 Nonradioactive Dangerous Waste Storage Facility.

3.3 WASTE SHIPMENT, INSPECTION, AND VERIFICATION

As described in Sections 1.1 and 1.2, all waste is fully characterized and designated in accordance with WAC 173-303-070, and placed in the temporary (less than 90-day) storage area before packaging and storage at the 222-S Dangerous and Mixed Waste Storage Area. Waste is segregated to prevent commingling of incompatible waste using hazardous waste compatibility charts (California Department of Health Services 1980). Hazardous materials unit personnel package the waste according to Solid Waste Engineering instructions and applicable guidelines. Waste tracking procedures are detailed in the following sections.

3.3.1 Solid Mixed Waste Tracking

The *Hanford Site Solid Waste Acceptance Criteria* manual (WHC 1989) establishes the requirements for waste generating units to track mixed waste

shipments to the Hanford Central Waste Complex. The manual is updated annually. The following summarizes the general waste tracking requirements.

All solid mixed waste shipments must be approved by the Solid Waste Engineering organization before shipment. To receive approval to ship waste, the following is performed:

- The 222-S Complex hazardous materials unit provides Solid Waste Engineering personnel with information needed to properly store or dispose of the waste. This includes information on the physical, chemical, and radiological characteristics of the waste, and waste packaging and container requirements.

- The 222-S Complex hazardous materials unit and Solid Waste Engineering personnel determine the appropriate dangerous waste designation.

- If the waste is determined acceptable, Solid Waste Engineering personnel prepare and issue documentation records. The records list the packaging and labeling requirements, and these records constitute the formal, auditable approval of the storage or disposal request.

After approval has been given to ship the waste, the following steps are performed.

- Hazardous materials unit personnel prepare the required documentation for each final shipping container.

- Onsite radioactive shipment records are prepared for all the shipping containers in one shipment. The onsite radiation shipment record is a form that ensures that onsite transportation of radioactive material has been performed in accordance with Hanford Facility requirements. Onsite radioactive shipment records are required at all Hanford Facility gates before a radioactive shipment can pass through the gates.

- The 222-S Complex hazardous materials unit manager completes appropriate waste tracking forms to accompany the shipment.

- The 222-S Complex hazardous materials unit manager schedules the waste shipment and ensures compliance with the requirements of the waste acceptance criteria (WHC 1989) as applicable.

- The transporter receives the waste and dates and signs the waste tracking forms. The 222-S hazardous materials unit retains a copy of the waste tracking forms.

The waste is transported to the solid waste storage or disposal site using onsite disposal personnel. At the receiving site, the shipment is inspected to ensure the following.

- The waste containers have been received in good condition and are properly labeled.

- The waste tracking forms and other documentation accompany the shipment are completed properly.

- Radiological and other surveys have been completed in accordance with procedures.

The appropriate Solid Waste Operations personnel indicate acceptance of the shipment by dating and signing the waste tracking forms and the other documentation. After accepting the waste, Solid Waste Operations personnel perform the following:

- Note any discrepancies on the waste tracking forms

- Provide the transporter with a dated and signed copy of the waste tracking forms

- Forward a copy of the waste tracking forms to Solid Waste Engineering for distribution within 30 days to 222-S Complex management for records retention.

All waste tracking documentation and all waste characterization data are maintained in a file for the life of the 222-S Dangerous and Mixed Waste Storage Area.

Discrepancies detected in the records or on the containers are documented on the waste tracking forms and brought to the attention of Solid Waste Engineering management. The 222-S Complex hazardous materials unit is contacted to correct any discrepancy in the records or containers. Ecology will be notified if a discrepancy has not been resolved within 15 days after a noncompliant shipment is received.

3.3.2 Nonradioactive Dangerous Waste Tracking

Before nonradioactive dangerous waste is shipped from the 222-S Complex to the 616 Nonradioactive Dangerous Waste Storage Facility, the following occurs.

- The 222-S Complex hazardous materials unit manager identifies the waste from manufacturer data, waste records, or sample analysis.

- The 222-S Complex submits a disposal request form to Solid Waste Engineering.

- A trained designator in Solid Waste Engineering identifies the appropriate waste designation.

- Solid Waste Engineering sends a waste analysis letter to the 222-S Complex hazardous materials unit manager, 616 Nonradioactive Dangerous Waste Storage Facility, transportation personnel, and Solid Waste Disposal Unit personnel.

- The nonradioactive dangerous waste is packaged, marked, and labeled by the 222-S Complex hazardous materials personnel in accordance with the waste analysis letter. An unconditional radiation release is obtained before shipment.

- The 222-S Complex stores the waste in drums in the 222-S Dangerous and Mixed Waste Storage Area.

- The 222-S Complex hazardous materials unit manager prepares an onsite waste tracking form.

- Transportation Logistics personnel inspect the containers for compliance with U.S. Department of Transportation regulations.

- Solid Waste Disposal Unit personnel transport the nonradioactive dangerous waste from the 222-S Complex to the 616 Nonradioactive Dangerous Waste Storage Facility.

- On receipt of the waste shipment, the 616 Nonradioactive Dangerous Waste Storage Facility personnel inspect each container against the onsite waste tracking forms and the chemical disposal letter. Significant discrepancies are noted on the onsite waste tracking form.

- The 616 Nonradioactive Dangerous Waste Facility personnel accept the container for storage until the waste is shipped.

- Following acceptance, the transporter is supplied with a copy of the dated and signed onsite waste tracking form. A copy of the waste tracking form is sent to the 222-S Complex hazardous materials unit manager within 30 days.

Discrepancies detected in the records for containers are documented on the waste tracking forms and brought to the attention of Solid Waste Engineering management. The 222-S Complex is contacted to correct any discrepancy in the records or containers. Ecology will be notified if a discrepancy has not been resolved within 15 days after receiving a noncompliant shipment.

3.4 PARAMETERS AND RATIONALE

Most of the waste generated within the 222-S Analytical and 222-SA Standards Laboratories is chemical mixtures of known content, and as such can be fully characterized for dangerous constituents from product and/or process knowledge. If the waste generating unit demonstrates to the satisfaction of the hazardous materials unit manager and Solid Waste Engineering that the waste information is sufficient to properly and completely designate the waste in accordance with WAC 173-303, no further sampling and analysis is required.

If a waste potentially contains dangerous constituents and process knowledge is insufficient to designate the waste, the generating unit is

required to provide further waste characterization information. Minimum waste characterization parameters and the respective rationales for their selection are given in Table 3-2. This information ensures that all dangerous characteristics are identified for the purposes of safe handling, packaging, and disposition (including radiological screening).

Analysis for polycyclic aromatic hydrocarbons does not occur because this class of compounds is not used, analyzed for, or stored in either of the generating laboratories.

If constituents of a waste are not known and not documented to the satisfaction of the hazardous materials unit manager and Solid Waste Engineering, analytical testing is performed using the methods described in Section 1.5. Dangerous waste toxic mixtures (WT01 and WT02) of known chemical makeup are designated according to toxicity calculations defined in WAC 173-303-101.

3.5 TEST METHODS

Analytical testing could be required by the hazardous materials unit manager or Solid Waste Engineering if generating unit-supplied information does not fully characterize the dangerous constituents of the waste before transport to the 222-S Dangerous and Mixed Waste Storage Area. Not all laboratory analyses are performed at the 222-S Laboratory. Offsite sample analyses are requested through an onsite organization that coordinates sample management.

Table 3-2 provides a list of parameters, criteria for designation, and the analytical methods used by the generating laboratory to identify the dangerous constituents of a waste. The test method is referenced by the procedure number found in the appropriate reference document (WHC 1989).

3.6 SAMPLING METHODS

Representative sampling is required when generating unit-supplied information does not fully characterize the waste. This sampling is requested by the hazardous materials unit manager or Solid Waste Engineering and is performed by an onsite organization specializing in sampling and sample management.

Several waste forms generated at the 222-S Analytical or 222-SA Standards Laboratories might require sampling. Sampling of containerized liquids is performed in accordance with methods prescribed in SW-846 (EPA 1986), using a glass tube thief [WAC 173-303-110(2)(a)(vi) recommends use of a Composite Liquid Waste Sampler (COLIWASA); however, small bottle sizes and limited working space prevent use of a COLIWASA]. The tube thief enables sampling of all stratified layers within a container. Sampling procedures for solid material conform to American Society for Testing and Materials D364-75 (ASTM 1990) using a scoop or tubing. These sampling methods are in accordance

Table 3-2. Parameters and Rationales for Waste Characterization Documentation for Waste Stored at the 222-S Dangerous and Mixed Waste Storage Area. (sheet 1 of 2)

Characterization parameter	Rationale
(1) Chemical Name - International Union of Pure and Applied Chemistry (IUPAC) name and/or common name	Designate waste as Ecology-related dangerous or extremely hazardous waste by comparison to the "Discarded Chemical Products List" (WAC 173-303-9903) and the "Dangerous Waste Source List" (WAC 173-303-9904). Facilitate toxicity calculations using the National Institute for Occupational Safety and Health (NIOSH) *Registry of Toxic Effects of Chemical Substances*
(2) Toxicity	Determine if a waste is an Ecology-regulated dangerous or extremely hazardous waste as determined from the NIOSH *Registry of Toxic Effects of Chemical Substances*.
(3) Halogenated hydrocarbons	Determine if a waste is an Ecology-regulated dangerous or extremely hazardous waste due to persistence.
(4) Carcinogenicity	Determine if a waste is an Ecology-regulated dangerous or extremely hazardous waste due to its carcinogenic constituents as determined by the NIOSH Registry of Toxic Effects of Chemical Substances or the International Agency for Research on Cancer.
(5) Flash Point (ignitability)	Determine conditions of ignitability of waste for proper handling. Determine if waste is a U.S. Department of Transportation- or Ecology-regulated ignitable, flammable, or combustible substance.
(6) pH (corrosivity)	Determine degree of corrosivity of waste for safe handling, treatment, and/or packaging requirements.

Table 3-2. Parameters and Rationales for Waste Characterization Documentation for Waste Stored at the 222-S Dangerous and Mixed Waste Storage Area. (sheet 2 of 2)

Characterization parameter	Rationale
(7) Reactivity	
Water reactivity	Determine if the waste reacts violently with water or produces toxic gases, vapors, fumes, or excessive heat from exothermic reaction with water for the purpose of safe handling and disposal.
Explosivity	Determine if waste is a U.S. Department of Transportation-forbidden explosive, Class A explosive, or Class B explosive (defined in 49 CFR 173.51, 173.53, or 173.88).
Cyanide and/or sulfide	To determine if waste, when exposed to corrosive conditions, can generate toxic gases, vapors, or fumes.
(8) Toxicity characteristics leaching procedure (TCLP)	Determine if the waste is toxic.
(9) Radioactivity (alpha, beta, and gamma)	Determine safe handling, packaging, and disposal requirements.

with WAC 173-303-110(2). Table 3-3 presents sampling methods used for specific test parameters.

Bottles of unknown or uncertain waste will be opened one at a time under a fume hood located in the laboratory where the unknown waste was found and/or generated. The tube thief will be lowered slowly into the waste until the tube contacts the bottom of the waste container. A rubber bulb is attached to the open end. The tube will be withdrawn slowly from the bottle to prevent mixing of stratified layers and loss of sample. The tube will be emptied into a labeled sampling container and the process will be repeated until the necessary volume of sample has been obtained. All necessary protective equipment will be worn by personnel during sampling activities.

The following guidelines apply to the collection of samples.

- Each bottle (or drum) is identified by a unique code that is used consistently to identify the waste container and associated samples (including quality control samples).

- All samples are recorded in a sampling logbook. Data includes sample identification code, sample date and time, physical description of the waste, sample method used, and any sampling problems.

- Samples are labeled with sample date and time, sample collector, drum/bottle code, sample number, preservatives added (if applicable), and requested analyses. Each sample container is sealed in a plastic bag to prevent cross contamination. Samples are stored at 4 °C (39.2 °F) until the time of analysis.

- A new glass tube thief is used for each bottle of waste. Used glass tubes are placed with the unknown waste for disposal.

- An analytical request form is completed and accompanies the samples. This request specifies the sample number, required analyses, date of sample, and routing request for sample information.

- All sampling equipment and sample containers are handled in accordance with quality assurance and quality control protocols to ensure analytical interference with the chemical composition of the waste is precluded. Appropriate chain-of-custody requirements specified in SW-846 (EPA 1986) are used.

3.7 FREQUENCY OF ANALYSIS

Waste constituents and concentrations are known through process knowledge and chemical manufacturers' information. Each request for sampling and subsequent chemical analysis and radionuclide characterization is considered unique. The need for sampling and analysis is identified by the hazardous materials unit manager or Solid Waste Engineering at the time a disposal request is received.

Table 3-3. Sampling Methods for Waste Stored at the 222-S Dangerous and Mixed Waste Storage Area. (sheet 1 of 2)

Test parameter	Sample collection equipment	Sample type	Number of samples	Sample volume	Container type	Test method
Specific Organic Constituents						
Volatile organic compounds	Glass tube thief	Grab	2 samples per drum	40 mL each	Glass, PTFE-lined septum	SW-846, Method 8240
Nonhalogenated volatile organic compounds	Glass tube thief	Grab	2 samples per drum	40 mL each	Glass, PTFE-lined septum	SW-846, Method 8015
Semivolatile compounds	Glass tube thief	Grab	1 per bottle per drum	1,000 mL	Glass or PTFE-lined caps	SW-846, Methods 8250 and 8270
Radionuclides	Glass tube thief	Grab	1 per bottle per drum	100 mL each	Polyethylene or glass	alpha, beta, and gamma
Dangerous waste characteristics						
(1) Ignitability--determined based on analytical data from specific organic constituents tests-- or						
	Glass tube thief	Grab	1 per bottle per drum	50 mL	Polyethylene or glass	SW-846 1010 or 1020
(2) Corrosivity	Glass tube thief	Grab	1 per bottle per drum	500 mL	Polyethylene or glass	WDOE 80-13, Method 1110
(3) Reactivity						
Cyanide	Glass tube thief	Grab	1 per bottle per drum	50 mL	Polyethylene or glass	SW-846, Section 7.3.3.2 with Method 9010

Table 3-3. Sampling Methods for Waste Stored at the 222-S Dangerous and Mixed Waste Storage Area. (sheet 2 of 2)

Test parameter	Sample collection equipment	Sample type	Number of samples	Sample volume	Container type	Test method
Sulfide	Glass tube thief	Grab	1 per bottle per drum	50 mL	Polyethylene or glass	SW-846, Section 7.3.4.1 with Method 9030
Explosivity--determined based on analytical data from specific organics constituents tests--						
(4) TCLP	Glass tube thief	Grab	1 per bottle per drum	200 mL	Polyethylene or glass	WDOE 80-13, SW-846 Methods 1311, 6010, 7060, 7195, 7420 and 7470, 8080, 8150
(5) Toxicity--Determined from generating unit supplied information and analytical data-- WAC 173-303-101						
(6) Persistence						
Halogenated hydrocarbons--determined from generating unit supplied information and analytical data-- WAC 173-303-102						
Carcinogenicity--determined from generating unit supplied information and analytical data-- WAC 173-303-103						

mL = milliliter.
SW-846 = EPA 1986.
WDOE 80-13 = Ecology 1982.
TCLP = toxicity characteristics leaching procedure.

Should analytical procedures performed in the laboratories change, resulting in changes in the generation of waste, process information will be reviewed or sampling and analytical testing will be performed to adequately characterize the dangerous constituents of the waste.

3.8 ADDITIONAL REQUIREMENTS FOR WASTES GENERATED OFFSITE

The 222-S Dangerous and Mixed Waste Storage Area does not accept waste generated offsite. Therefore, the requirements of WAC 173-303-300 do not apply to the 222-S Dangerous and Mixed Waste Storage Area.

3.9 ADDITIONAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTES

Section 1.5 provides the analytical methods used to determine if any waste is ignitable or reactive. As shown in Table 3-4, these methods include a determination of the flashpoint of the waste (either by generating unit-supplied information or results from the Pensky-Marten Closed Cup Test, ASTM D-93-79) and reactivity determinations for explosivity, cyanide (SW-846, method 9010) and sulfide (SW-846, method 9030). Based on the dangerous characteristics identified by the waste generating unit, instructions for specific packaging, labeling, and marking are provided by Solid Waste Engineering in the storage/disposal approval record or waste analysis letter.

Compatibility group analysis is performed by Solid Waste Engineering following the guidelines set forth in *A Method for Determining Hazardous Waste Compatibility* (California Department of Health Services 1980). Potentially incompatible waste is packed in separate containers. Dangerous waste is never placed in an unwashed container that previously held a potentially incompatible waste. A mixture of extremely hazardous waste and dangerous waste is designated as extremely hazardous waste.

Flammable or combustible mixed waste is packaged in nonleaking inner containers and surrounded with absorbent in a minimum 2:1 ratio. Waste that is considered corrosive is packaged in a manner that ensures container integrity. Documentation procedures and waste handling procedures are in compliance with WAC 173-303-395.

Table 3-4. Waste Analysis Test Methods for Waste Stored at the 222-S Dangerous and Mixed Waste Storage Area. (sheet 1 of 3)

Parameter	Criteria for designation	Analysis methods for routinely generated waste	Analysis methods for one-time characterization of unknown waste
Specific organic constituents	Specific listed waste	Generator-supplied information on specific organic chemicals present	SW-846, Methods: 8015, (nonhalogenated volatile organic compounds), 8240 (halogenated volatile organic compounds), 8250 and 8270 (semivolatile organic compounds)
Radioactivity		Alpha and beta detectors Gamma spectroscopy Over-the-top-reading	Alpha and beta detectors, Gamma spectroscopy Over-the-top reading
Dangerous waste characteristics			
(1) Ignitability	Flashpoint <140° F (<60° C)	Generating unit-supplied information on specific organic chemicals present	Information from specific organic constituents testing, or ASTM Method D-93-79 or SW-846 Method 9040
(2) Corrosivity	pH ≤2 pH ≥12.5	Direct pH measurement	WDOE 80-13, Method 1110 (Corrosivity Toward Steel), or EPA-600 Method 150.1
(3) Reactivity		Not applicable	
Explosivity	U.S. Department of Transportation forbidden explosives, Class A explosives, or Class B explosives	Generating unit-supplied information on specific organic chemicals	Based on known physical and chemical properties of waste constituents identified through other tests in this table

Table 3-4. Waste Analysis Test Methods for Waste Stored at the 222-S Dangerous and Mixed Waste Storage Area. (sheet 2 of 3)

Parameter	Criteria for designation	Analysis methods for routinely generated waste	Analysis methods for one-time characterization of unknown waste
Cyanide	≥250mg/kg HCN		SW-846, Section 7.3.3.2 with Method 9010, EPA-600 Methods 335.1 and 335.2
Sulfide	≥500mg/kg H_2S		SW-846, Section 7.3.4.1 with Method 9030, EPA-600 Method 376.2
(4) Toxicity characteristics			WDOE 80-13, SW-846 Method 1311
Arsenic	5-499 mg/l (DW) ≥500mg/l (EHW)		SW-846, Method 7060
Barium	100-9,999 mg/l (DW) ≥10,000mg/l (EHW)		SW-846, Method 6010
Cadmium	1-99 mg/l (DW) ≥100(EHW)		SW-846, Method 6010
Chromium	5-499 mg/l (DW) ≥500mg/l (EHW)		SW-846, Method 6010 (Method 7195 will be used to determine hexavalent chromium concentration if results from 6010 are ≥5.0mg/L total chromium.)
Lead	5-499 mg/l (DW) ≥500mg/l (EHW)		SW-846, Method 6010

Table 3-4. Waste Analysis Test Methods for Waste Stored at the 222-S Dangerous and Mixed Waste Storage Area. (sheet 3 of 3)

Parameter	Criteria for designation	Analysis methods for routinely generated waste	Analysis methods for one-time characterization of unknown waste
Mercury	0.2-19 mg/l (DW) ≥20mg/l (EHW)		SW-846, Method 7470 or 7471
(6) Persistence			
Halogenated hydrocarbons	WAC 173-303-102	Generating unit-supplied information on specific organic chemicals present	Information obtained from Specific Organic Constituents Testing, SW-846, Method 9020, and WAC 173-303-102
(7) Carcinogenicity	WAC 173-303-103	Generating unit-supplied information on specific organic chemicals present	Information obtained through above tests and WAC 173-303-103

mg/kg = milligrams per kilogram.
mg/L = milligrams per liter.
WDOE 80-13 = Ecology 1982.
SW-846 = EPA 1986.

APPENDIX 3C

MATERIAL SAFETY DATA SHEETS FOR SCINTILLATION LIQUIDS

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PACKARD

MATERIAL SAFETY DATA SHEET

HEALTH
FLAMMABILITY
REACTIVITY
PERSONAL PROTECTION

pseudocumene	CASRN	95-63-6
PPO	CASRN	92-71-7
bis-MSB	CASRN	13280-61-0

MSDS # 16538

PACKARD INSTRUMENT CO., INC. • 2200 WARRENVILLE ROAD • DOWNERS GROVE, IL 60515

PREPARER: J.W. van der Weele DATE: 12/01/90 REVISION #: C

CHEMICAL NAME: Blend of pseudocumene with scintillators PPO and bis-MSB and emulsifiers.

SYNONYMS: None CHEMICAL FAMILY: N.A.

FORMULA: N.A. MOLECULAR WEIGHT: N.A.

TRADE NAME AND SYNONYMS: INSTA-GEL XF

PHYSICAL DATA

BOILING POINT, 760 mm. Hg	338°F/170 °C	FREEZING POINT	-47°F/-44 °C
SP. GRAVITY (H_2O=1)@20°C	0.94	VAPOR PRESSURE AT 20°C	3 mm Hg
EVAPORATION RATE (BUTYL ACETATE=1)	N.D.	SOLUBILITY IN WATER, % by wt. at 20°C	Insoluble
% VOLATILES BY VOLUME	55-65	VAPOR DENSITY (AIR=1)	N.D.
APPEARANCE AND ODOR	Clear blue-violet fluorescent liquid with aromatic odor.		

HAZARDOUS INGREDIENTS

MATERIAL	%	OSHA PEL	ACGIH TLV	OTHER LIMITS RECOMMENDATIONS
Pseudocumene	55-65		25ppm	25ppm STEL
(1,2,4-trimethylbenzene)				

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	118°F/48 °C Tag closed cup	AUTOIGNITION TEMPERATURE	968°F/520 °C
FLAMMABLE LIMITS IN AIR, % by volume	LOWER 1	UPPER 6	

EXTINGUISHING MEDIA	Dry chemical, carbon dioxide or foam.
SPECIAL FIRE FIGHTING PROCEDURES	Self-contained breathing apparatus.
UNUSUAL FIRE AND EXPLOSION HAZARDS	None

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EMERGENCY PHONE NUMBERS

DAY: 1-800-445-7426
24 HOUR EMERGENCY CONTACT: CHEMREC 1-800-424-9300

9 2 1 2 4 7 3

HSB-63

3 of 4

HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE (ACUTE AND CHRONIC)	Exposure to vapors: narcosis, headache, dizziness, nausea and irritation to eyes and respiratory system. May cause CNS depression, anemia and bronchitis. Skin contact: prolonged exposure will cause drying and cracking. Harmful if swallowed.
ROUTE(S) OF ENTRY	INHALATION ☒ SKIN ☒ INGESTION ☒
EMERGENCY AND FIRST AID PROCEDURES	Immediately flush eyes with plenty of water for at least 15 minutes. Call a physician. Wash skin with mild soapy water. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If ingested, get medical attention immediately.
CARCINOGENICITY	N.T.P. ☐ I.A.R.C. MONOGRAPHS ☐ OSHA ☐
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE	Anemia

MSDS #16538

REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID	
UNSTABLE ☐ STABLE ☒		Oxidation
INCOMPATIBILITY (materials to avoid)		Strong oxidizers
HAZARDOUS DECOMPOSITION PRODUCTS		None
HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID	None
May Occur ☐ Will not Occur ☒		

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SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Remove all ignition sources, ventilate area. Absorb small spills with paper, diatomaceous earth or equivalent, with evaporation in a fume hood.
WASTE DISPOSAL METHOD	Incinerate in accordance with government regulations.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)		NIOSH/MSHA approved organic vapor chemical cartridge respirator		
VENTILATION	LOCAL EXHAUST	Fume hood preferred	SPECIAL	None
	MECHANICAL (general)	Satisfactory	OTHER	None
PROTECTIVE GLOVES		Chemical proof	EYE PROTECTION	Splash-proof safety goggles
OTHER PROTECTIVE EQUIPMENT		None		
HYGIENIC PRACTICES		No eating, drinking or smoking in area. Wash after use.		

SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	WARNING! CAUSES IRRITATION-MAY BE HARMFUL IF INHALED. Contains pseudocumene. Use only with adequate ventilation. Avoid contact with eyes. Avoid prolonged or repeated breathing of vapor or contact with skin. Do not ingest. Combustible.
OTHER HANDLING AND STORAGE CONDITIONS	Keep tightly closed. Protect from light. Store in cool, dry place with adequate ventilation.

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NOTIFICATION

MSDS # 16538

This product contains a toxic chemical(s) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372. This notification is incorporated by reference into the Material Safety Data Sheet. It must not be detached from the MSDS, and shall be copied and redistributed with the MSDS, should that become necessary.

The subject chemical(s) contained in this product is indicated below, along with its Chemical Abstract Service Registry Number. The percentage by weight of the chemical is listed on the MSDS in the "Hazardous Ingredients" section, and is expressed as an approximate range to protect proprietary interests. When computing the total of a given chemical received, one should assume that the quantity is equal to or less than the highest percentage listed.

_____ methanol (methyl alcohol) 67-56-1
_____ xylene, mixed isomers 1330-20-7
_____ m-xylene 108-38-3
_____ o-xylene 95-47-6
_____ p-xylene 106-42-3
_____ toluene 108-88-3
___X___ 1,2,4 - trimethylbenzene (pseudocumene) 95-63-6
_____ 2-methoxyethanol 109-86-4
_____ diethylene glycol dimethyl ether 111-96-6
_____ copper (as cupric oxide 1317-38-0)
_____ lead 7439-92-1

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Beta Counters	Total Lead Weight (lbs)	Gamma Counters	Total Lead Weight (lbs)
A100000/01	187.7	AE40500/01	52.8
A105000/01	187.7	AE41000/01	63.4
A160000/05	187.7	AE42000/01	84.8
A190000/05	187.7	AE5300D0/D1	495.0
A220000/01	187.7	AE5500D0/D1	496.1
A225000/01	187.7	AE5500D2/D3	169.0
A226000/01	187.7	B500200/01	149.8
B150000/05	187.7	B500300/01	268.4
B155000/05	187.7	B500800/01	101.0
		B501000/01	202.1
		BE40600/01	100.0
		BE41200/01	100.0
		BE42400/01	100.0
		CS30102/D3/00/01	106.5
		CS30202/D3/00/01	106.5
		CS30402/D3/00/01	106.5

MATERIAL SAFETY DATA SHEET OHS20670 MSDS # 2793

OCCUPATIONAL HEALTH SERVICES, INC.
450 SEVENTH AVENUE, SUITE 2407
NEW YORK, NEW YORK 10123
(800) 445-MSDS (212) 967-1100

EMERGENCY CONTACT:
JOHN S. BRANSFORD, JR. (615) 292-1180

SUBSTANCE IDENTIFICATION

CAS-NUMBER 63231-67-4

SUBSTANCE: SILICA GEL

TRADE NAMES/SYNONYMS:
HYDROXYLATED SILICON DIOXIDE: HI-SIL: GASIL: BIOSIL: KIESELGEL:
HYDRATED AMORPHOUS SILICA: MERCKOSORB M.SI.: PARTISIL: POLYPOR:
SYLOID: SORBSIL: SYNTHETIC PRECIPITATED SILICAS: O2SI: OHS20670

CHEMICAL FAMILY:
NON-METALLIC OXIDE: SILICON

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MOLECULAR FORMULA: SI-O2 MOLECULAR WEIGHT: 60.09

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: SILICA GEL PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMIT:
SILICON DIOXIDE, AMORPHOUS (SILICA, AMORPHOUS):
6 MG/M3 OSHA TWA (<1% CRYSTALLINE SILICA)
10 MG/M3 ACGIH TWA (TOTAL DUST, CONTAINING <1% QUARTZ)

PHYSICAL DATA

DESCRIPTION: ODORLESS, COLORLESS TO WHITE, AMORPHOUS HYGROSCOPIC POWDER OR GRANULES.

BOILING POINT: 4046 F (2230 C) MELTING POINT: 3110 F (1710 C)

SPECIFIC GRAVITY: 2.1 SOLUBILITY IN WATER: INSOLUBLE

VAPOR PRESSURE: NIL PH: 2.3-7.4 (AQ SUSP)

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN HYDROFLUORIC ACID, HOT FIXED ALKALI HYDROXIDE SOLUTIONS.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD

NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MSDS #2793

FIREFIGHTING MEDIA:
EXTINGUISH USING AGENT SUITABLE FOR TYPE OF SURROUNDING FIRE.

FIREFIGHTING:
NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING VAPORS OR DUSTS; KEEP UPWIND.

TOXICITY

SILICA GEL:
CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL INADEQUATE EVIDENCE (IARC CLASS-3).
ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.
TARGET EFFECTS: NO DATA AVAILABLE.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH IMPAIRED PULMONARY FUNCTION.

HEALTH EFFECTS AND FIRST AID

INHALATION:
SILICA GEL:
ACUTE EXPOSURE- EXPOSURE TO HIGH CONCENTRATIONS MAY CAUSE, DRYING OF MUCOUS MEMBRANES, COUGHING AND POSSIBLY NOSEBLEEDS.
CHRONIC EXPOSURE- PULMONARY EFFECTS OF LONGTERM EXPOSURE MAY VARY WITH THE FORM OF THE NATURAL OR SYNTHETIC AMORPHOUS SILICA AND, MORE IMPORTANTLY, THE DEGREE OF CONTAMINATION WITH A CRYSTALLINE FORM OF SILICA. STUDIES DONE ON A GROUP OF WORKERS EXPOSED TO A PRECIPITATED SILICA DUST FOR AN AVERAGE OF 8.6 YEARS, REVEALED NO ADVERSE EFFECTS ON THEIR PULMONARY FUNCTION TESTS OR CHEST X-RAYS. IT IS POSSIBLE HOWEVER, THAT X-RAY CHANGES IN THE LUNGS, WITH ONLY EXERTIONAL DYSPNEA OR WITHOUT ANY DISABILITY, MAY OCCUR IN SOME WORKERS, IF THE QUANTITY OF DUST TO WHICH THEY ARE EXPOSED IS GREAT ENOUGH. THE PRESENCE OF CRYSTALLINE SILICA MAY GREATLY INCREASE THE POTENTIAL FOR A MORE DISABLING SILICOSIS TO OCCUR WITH THE POSSIBILITY OF ADVANCED FIBROSIS AND DIFFUSE OBSTRUCTIVE EMPHYSEMA LEADING TO SEVERE RESPIRATORY CRIPPLING AND ULTIMATELY, A FATAL CARDIORESPIRATORY FAILURE. IN ADDITION, EPIDEMIOLOGICAL STUDIES INDICATE LUNG CANCER OCCURS MORE FREQUENTLY AMONG PERSONS WITH SILICOSIS THAN IN THE GENERAL POPULATION. STUDIES IN WHICH RATS, GUINEA PIGS AND MONKEYS WERE EXPOSED TO FUMED, GEL AND PRECIPITATED FORMS OF AMORPHOUS SILICA AT CONCENTRATIONS OF 7-10 MG/M3 (RESPIRABLE DUST) FOR 5.5-6 HOURS A DAY FOR UP TO 18 MONTHS, RESULTED IN SOME FIBROGENIC LUNG CHANGES IN MONKEYS ONLY, PARTICULARILY WITH THE FUMED FORM. ALL THREE FORMS CAUSED MACROPHAGE AND MONONUCLEAR CELL AGGREGATES WITH RETICULIN FIBERS AND A RESULTANT REDUCTION IN THE SIZE OF THE BRONCHIOLE LUMINA IN THE LUNGS OF THE MONKEYS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

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SKIN CONTACT:
SILICA GEL:
ACUTE EXPOSURE- NO HUMAN DATA AVAILABLE. ONE FUMED SILICA, PARTICLE SIZE 0.5-10 MICRONS WAS CONSIDERED INERT TO MILDLY IRRITATING WHEN TESTED ON RABBIT SKIN.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY HAVE A DRYING AND ABRASIVE EFFECT ON THE SKIN.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
SILICA GEL:
ACUTE EXPOSURE- PARTICLES MAY CAUSE IMMEDIATE IRRITATION. ONE FUMED SILICA, PARTICLE SIZE 0.5-10 MICRONS, WAS CONSIDERED INERT TO MILDLY IRRITATING WHEN TESTED IN RABBIT EYES.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
SILICA GEL:
ACUTE EXPOSURE- THE EFFECTS OF INGESTION ARE PURELY MECHANICAL AS THE SUBSTANCE IS INERT CHEMICALLY AND BIOLOGICALLY BY THIS ROUTE.
CHRONIC EXPOSURE- AMORPHOUS SILICA IS PERMITTED IN SOME FORMS AS A FOOD ADDITIVE IN AMOUNTS OF LESS THAN 2% BY WEIGHT.

FIRST AID- GIVE WATER OR FLUIDS. EMESIS IS NOT NECESSARY. TREAT SUPPORTIVELY AND SYMPTOMATICALLY. IF IRRITATION OR DIGESTIVE UPSET OCCURS, GET MEDICAL ATTENTION.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
SILICA GEL:
FLUORINE: FIRE AND EXPLOSION HAZARD.
HYDROCHLORIC ACID: MAY REACT VIOLENTLY DUE TO HEAT OF ADSORPTION.
MAGNESIUM: MAY EXPLODE VIOLENTLY.
MANGANESE TRIFLUORIDE: MAY CAUSE VIOLENT REACTION IF HEATED WITH RELEASE OF SILICON TRIFLUORIDE.
MANGANESE TRIOXIDE: FIRE AND EXPLOSION HAZARD.
OXIDIZERS (STRONG): FIRE HAZARD.
OXYGEN DIFLUORIDE: EXOTHERMIC REACTION WITH POSSIBLE EXPLOSION.
OZONE: POSSIBLE EXPLOSION AT TEMPERATURES BELOW -100 C.
VINYL ACETATE: MAY REACT VIGOROUSLY.
XENON HEXAFLUORIDE: MAY DETONATE WITH THE FORMATION OF XENON TRIOXIDE.

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.100 MPPCF- ANY DUST AND MIST RESPIRATOR.

200 MPPCF- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE AND QUARTER-MASK RESPIRATORS.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

500 MPPCF- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

1000 MPPCF- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

10,000 MPPCF- ANY SUPPLIED-AIR RESPIRATOR WITH A HALF-MASK AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

3 7

OR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

LF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE EMAND OR OTHER POSITIVE PRESSURE MODE.

PPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 05/12/85 REVISION DATE: 02/02/89

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DECOMPOSITION:
AT TEMPERATURES ABOVE 800 C, CALCINING MAY OCCUR AND AMORPHOUS SILICA MAY BE CONVERTED TO FIBROGENIC CRYSTALLINE SILICA.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE-DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

PREVENT DISPERSION OF DUST IN AIR.

SPILLS AND LEAKS

OCCUPATIONAL-SPILL:
RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS; OR DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

SILICON DIOXIDE, AMORPHOUS (SILICA, AMORPHOUS):

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MSDS # 1737

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. EXPOSURE LIMITS: NOT ESTABLISHED.

B. EXPOSURE EFFECTS:
INHALATION: HARMFUL IF INHALED.
SKIN: CAUSES SEVERE BURNS.
EYES: CAUSES SEVERE BURNS.
INGESTION: HARMFUL IF SWALLOWED.

C. FIRST AID:
INHALATION: REMOVE TO FRESH AIR. TREAT SYMPTOMATICALLY. IF SYMPTOMS ARE PRESENT, GET MEDICAL ATTENTION.
SKIN: IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.
EYE: IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES AND GET MEDICAL ATTENTION.
INGESTION: DO NOT INDUCE VOMITING. IF CONSCIOUS, IMMEDIATELY GIVE A GLASS OF MILK OR WATER. CALL A PHYSICIAN IMMEDIATELY.

SECTION VII. VENTILATION AND PERSONAL PROTECTION

A. VENTILATION:
GOOD GENERAL ROOM VENTILATION SHOULD BE USED. LOCAL EXHAUST MAY BE NEEDED.

B. RESPIRATORY PROTECTION:
A NIOSH-APPROVED ORGANIC VAPOR RESPIRATOR SHOULD BE WORN, IF NEEDED.

C. SKIN AND EYE PROTECTION:
PROTECTIVE GLOVES AND CLOTHING SHOULD BE WORN. GOGGLES OR A FACE SHIELD SHOULD BE WORN.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

KEEP FROM CONTACT WITH OXIDIZING MATERIALS.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES
ABSORB MATERIAL IN VERMICULITE OR OTHER SUITABLE ABSORBENT AND PLACE IN IMPERVIOUS CONTAINER. DISPOSE BY INCINERATION OR CONTRACT WITH LICENSED CHEMICAL WASTE DISPOSAL AGENCY. DISCHARGE, TREATMENT, OR DISPOSAL MAY BE SUBJECT TO FEDERAL, STATE OR LOCAL LAWS.

FOR TRANSPORTATION INFORMATION REGARDING THIS PRODUCT, PLEASE PHONE THE EASTMAN KODAK DISTRIBUTION CENTER NEAREST YOU: ROCHESTER, NY (716) 254-1300; OAK BROOK, IL (312) 654-5300; CHAMBLEE, GA (404) 455-0123; DALLAS, TX (214) 241-1611; WHITTIER, CA (213) 945-1253; HONOLULU, HI (808) 833-1661.

THE INFORMATION CONTAINED HEREIN IS FURNISHED WITHOUT WARRANTY OF ANY KIND. USERS SHOULD CONSIDER THESE DATA ONLY AS A SUPPLEMENT TO OTHER INFORMATION GATHERED BY THEM AND MUST MAKE INDEPENDENT DETERMINATIONS OF THE SUITABILITY AND COMPLETENESS OF INFORMATION FROM ALL SOURCES TO ASSURE PROPER USE AND DISPOSAL OF THESE MATERIALS AND THE SAFETY AND HEALTH OF EMPLOYEES AND CUSTOMERS.

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Aliquat-336

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MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 STATE STREET
ROCHESTER, NEW YORK 14650

MSDS # 1737

FOR EMERGENCY HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION, CALL 716-722-5151
FOR OTHER PURPOSES, CALL 800-225-5352 (IN NEW YORK STATE CALL 716-458-4014)

DATE OF PREPARATION: 04/24/86 KODAK ACCESSION NUMBER: 225597

SECTION I. IDENTIFICATION

- PRODUCT NAME: METHYLTRIOCTYLAMMONIUM CHLORIDE
- SYNONYM(S): TRICAPRYLMETHYLAMMONIUM CHLORIDE
- FORMULA: C25 H54 N.CL
- CAT NO(S): 136 8869; 136 8885
- CHEM. NO(S): 14820
- KODAK'S INTERNAL HAZARD RATING CODES: R: 2 S: 3 F: 1 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

COMPONENT(S):	PERCENT	TLV(R)	CAS REG. NO.
METHYLTRIOCTYLAMMONIUM CHLORIDE	APPROX 100	---	5137-55-3

SECTION III. PHYSICAL DATA

- APPEARANCE: CLEAR REDDISH BROWN LIQUID
- BOILING POINT: 225 C (437 F)
- VAPOR PRESSURE: NEGLIGIBLE
- EVAPORATION RATE (N-BUTYL ACETATE = 1): NEGLIGIBLE
- VOLATILE FRACTION BY WEIGHT: NEGLIGIBLE
- SPECIFIC GRAVITY (H2O = 1): NOT AVAILABLE
- SOLUBILITY IN WATER (BY WEIGHT): APPRECIABLE

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- FLASH POINT: 102 C (215 F) SETAFLASH CLOSED CUP
- EXTINGUISHING MEDIA: WATER SPRAY; DRY CHEMICAL; CO2
- SPECIAL FIRE FIGHTING PROCEDURES: WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING.
- UNUSUAL FIRE AND EXPLOSION HAZARDS: FIRE OR EXCESSIVE HEAT MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS.

SECTION V. REACTIVITY DATA

- STABILITY: STABLE
- INCOMPATIBILITY: STRONG OXIDIZERS
- HAZARDOUS DECOMPOSITION PRODUCTS: COMBUSTION WILL PRODUCE CO2 AND PROBABLY CO. HYDROGEN CHLORIDE GAS AND OXIDES OF NITROGEN MAY ALSO BE PRESENT.
- HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

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UNITED TECHNOLOGIES PACKARD

MATERIAL SAFETY DATA SHEET

MSDS #10543

PACKARD INSTRUMENT CO., INC. • 2200 WARRENVILLE ROAD • DOWNERS GROVE, IL 60515

PREPARER: J. Simonin DATE: 4/15/86 REVISION #: 3

CHEMICAL NAME: 2-methoxyethylamine

SYNONYMS: 2-methoxy-1-aminoethane CHEMICAL FAMILY: alkoxyamine

FORMULA: $CH_3OCH_2CH_2NH_2$ MOLECULAR WEIGHT: 75.11

TRADE NAME AND SYNONYMS: (Carbo-Sorb®)

PHYSICAL DATA

BOILING POINT, 760 mm. Hg	91 °C	FREEZING POINT	-50°C
SP. GRAVITY (H_2O = 1) @ 20°C	0.871	VAPOR PRESSURE AT 20°C	40 mm Hg
EVAPORATION RATE (BUTYL ACETATE = 1)	N.D.	SOLUBILITY IN WATER, % by wt. at 20°C	100
% VOLATILES BY VOLUME	100	VAPOR DENSITY (AIR = 1)	1
APPEARANCE AND ODOR	Clear colorless liquid with ammoniacal odor.		

HAZARDOUS INGREDIENTS

MATERIAL	%	OSHA PEL	ACGIH TLV	OTHER LIMITS RECOMMENDATIONS
2-methoxyethylamine	98	None	None	None

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	9 °C Tag closed cup	AUTOIGNITION TEMPERATURE	290 °C
FLAMMABLE LIMITS IN AIR, % by volume	LOWER N.D.	UPPER N.D.	

EXTINGUISHING MEDIA	Dry chemical, carbon dioxide, alcohol foam.
SPECIAL FIRE FIGHTING PROCEDURES	Self-contained breathing apparatus.
UNUSUAL FIRE AND EXPLOSION HAZARDS	Reacts with oxidizing agents and dioxides.

EMERGENCY PHONE NUMBERS

DAY: 312/969-6000 NIGHT: G. MAKVICKA 312/858-0684
S. DE FILIPPIS 312/985-0710

Legal responsibility is assumed only for the facts and data studies reported here and the opinions are those of qualified experts.

N.D. - NOT DETERMINED N.A. - NOT APPLICABLE < LESS THAN > GREATER THAN

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HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE (ACUTE AND CHRONIC)	Severely irritating action of the undiluted product on eyes, skin and mucous membranes. Permanent eye damage may occur. Skin contact results in burns.
ROUTE(S) OF ENTRY	INHALATION X SKIN X INGESTION
EMERGENCY AND FIRST AID PROCEDURES	For inhalation, remove to fresh air. For contact with eyes or skin, wash with large quantity of water for at least 15 minutes, follow with saturated solution of boric acid. Call a physician.
CARCINOGENICITY	N.T.P. I.A.R.C. MONOGRAPHS OSHA
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE	None known.

REACTIVITY DATA

STABILITY: UNSTABLE / STABLE X	CONDITIONS TO AVOID	Oxidation; ignition sources; mineral acids.
INCOMPATIBILITY (materials to avoid)	Oxidizing agents and mineral acids.	
HAZARDOUS DECOMPOSITION PRODUCTS	Nitrogen oxides and carbon monoxide.	
HAZARDOUS POLYMERIZATION: May Occur / Will not Occur X	CONDITIONS TO AVOID	NONE

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Stop all sources of flame or sparks. Ventilate thoroughly. Absorb liquid in diatomaceous earth or equivalent or neutralize with dry sodium bisulfate.
WASTE DISPOSAL METHOD	Neutralize and flush down drain or incinerate waste in accordance with government regulations.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)		NIOSH/MSHA approved amine respirator cartridge.		
VENTILATION	LOCAL EXHAUST	Preferred, lab use	SPECIAL	NONE
	MECHANICAL (general)	Satisfactory	OTHER	NONE
PROTECTIVE GLOVES		Chemical proof	EYE PROTECTION	Splash-proof Safety Goggles
OTHER PROTECTIVE EQUIPMENT		Use face shield and impervious clothing.		
HYGIENIC PRACTICES		No eating, drinking or smoking in area. Wash after use.		

SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	DANGER: FLAMMABLE — CAUSES SEVERE BURNS Keep away from heat, sparks and open flame. Avoid prolonged breathing of vapor. Wear splash proof chemical goggles or face shield. Wash thoroughly after handling.
OTHER HANDLING AND STORAGE CONDITIONS	Store in a dry cool place with adequate ventilation. Keep tightly closed.

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APPENDIX 4A

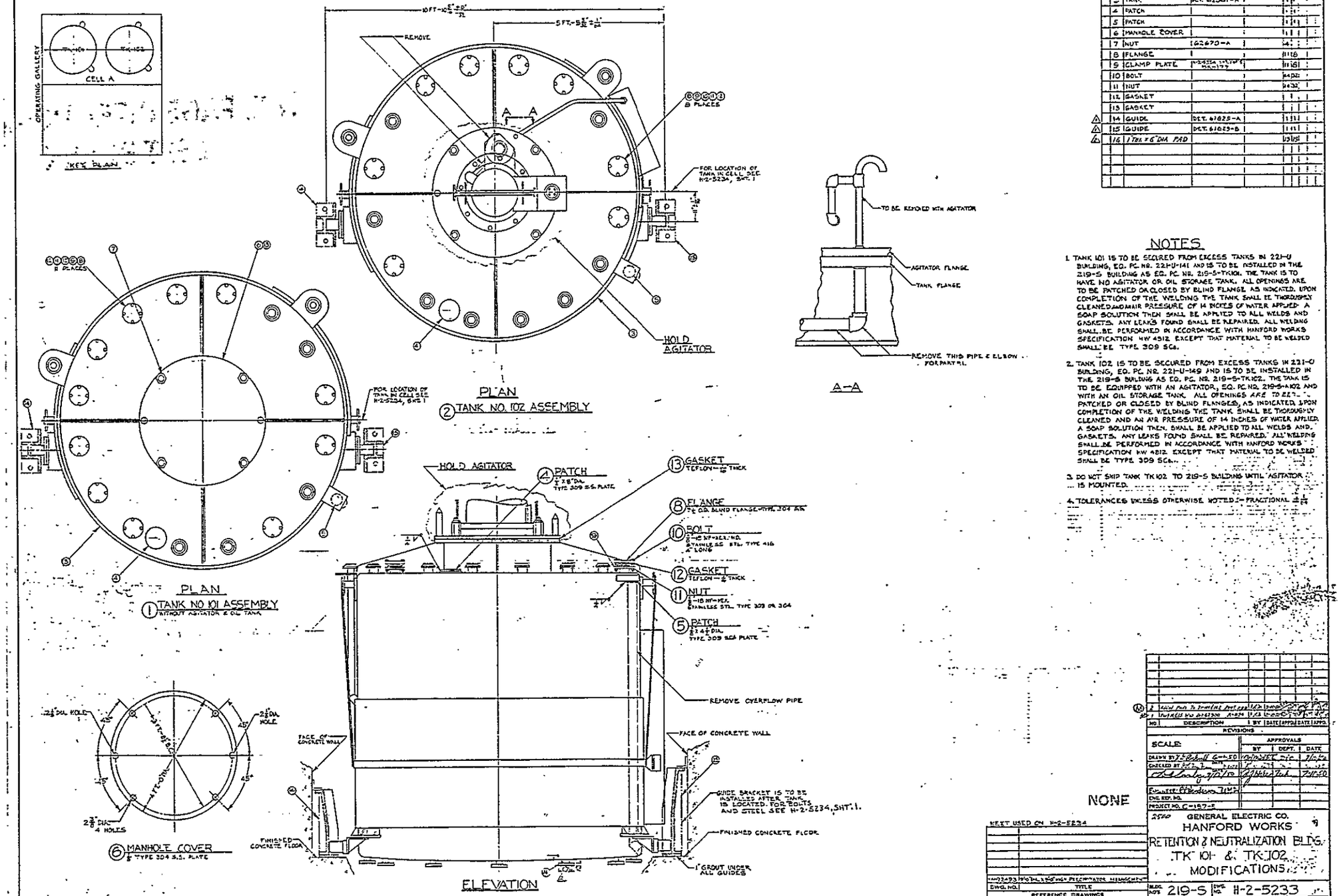
ENGINEERING DRAWINGS

APPENDIX 4A

ENGINEERING DRAWINGS

Drawing number	Revision number	Description
H-2-5233	0	RETENTION & NEUTRALIZATION BLDG TK 101 & TK 102 MODIFICATIONS (ECN 107679)
H-2-5234/3	2	RETENTION & NEUTRALIZATION BLDG PROCESS PIPING & EQUIPMENT ARRANGEMENT ELEVATION (SHEET 3 OF 5)
H-2-5234/4	2	RETENTION & NEUTRALIZATION BLDG PROCESS PIPING & EQUIPMENT ARRANGEMENT ELEVATION (SHEET 4 OF 5)
H-2-5387/1	0	222-S AQUEOUS WASTE, DISPOSAL FACILITY, 216-S-20 CRIB, ACTIVE & STORAGE WASTE SEWERS (SHEET 1 OF 2)
H-2-5387/2	0	222-S AQUEOUS WASTE, DISPOSAL FACILITY, 216-S-20 CRIB, ACTIVE & STORAGE WASTE SEWERS (SHEET 2 OF 2)
H-2-37620	2	INSTRUMENTATION HIGH LIQUID LEVEL ALARMS & TEMPERATURE INDICATOR
H-2-80856/1	0	ALTERED PORTABLE SUMP (SHEET 1 OF 2)
H-2-80856/2	0	ALTERED PORTABLE SUMP (SHEET 2 OF 2)
H-2-93451	1	HOT WASTE DRAIN SYSTEM
H-2-93452/1	1	IEFD 219-S WASTE RETENTION FLOW DIAGRAM (SHEET 1 OF 3)
H-2-93452/2	1	IEFD 219-S WASTE RETENTION FLOW DIAGRAM (SHEET 2 OF 3)
H-2-93452/3	1	IEFD 219-S WASTE RETENTION FLOW DIAGRAM (SHEET 3 OF 3)

ITEM NO	NAME	PART OR DESCRIPTION	MAT'L OF CONST. PC. NO.	NO. REQ'D		
1	TANK NO. 1 ASSEMBLY		TK 101	1		
2	TANK NO. 2 ASSEMBLY		TK102	1		
3	TANK	DET. 62061-A		1		
4	PATCH			1		
5	PATCH			1	1	
6	MANHOLE COVER			1	1	
7	NUT	62670-A		4		
8	FLANGE			1	1	
9	CLAMP PLATE	H-2-5234 SHT. 1 MK-177		1	1	
10	BOLT			4	12	
11	NUT			8	32	
12	GASKET			1	1	
13	GASKET			1	1	
14	GUIDE	DET. 61625-A		1	1	
15	GUIDE	DET. 61625-B		1	1	
16	17 IN x 6 IN DIA PAD			1	1	



NOTES

1. TANK 101 IS TO BE SECURED FROM EXCESS TANKS IN 221-U BUILDING, EQ. PC. NO. 221-U-141 AND IS TO BE INSTALLED IN THE 219-S BUILDING AS EQ. PC. NO. 219-S-TK101. THE TANK IS TO HAVE NO AGITATOR OR OIL STORAGE TANK. ALL OPENINGS ARE TO BE PATCHED OR CLOSED BY BLIND FLANGE AS INDICATED. UPON COMPLETION OF THE WELDING THE TANK SHALL BE THOROUGHLY CLEANED AND AIR PRESSURE OF 14 INCHES OF WATER APPLIED. A SOAP SOLUTION THEN SHALL BE APPLIED TO ALL WELDS AND GASKETS. ANY LEAKS FOUND SHALL BE REPAIRED. ALL WELDING SHALL BE PERFORMED IN ACCORDANCE WITH HANFORD WORKS SPECIFICATION HW 4812 EXCEPT THAT MATERIAL TO BE WELDED SHALL BE TYPE 309 SCa.

2. TANK 102 IS TO BE SECURED FROM EXCESS TANKS IN 221-U BUILDING, EQ. PC. NO. 221-U-149 AND IS TO BE INSTALLED IN THE 219-S BUILDING AS EQ. PC. NO. 219-S-TK102. THE TANK IS TO BE EQUIPPED WITH AN AGITATOR, EQ. PC. NO. 219-S-A102 AND WITH AN OIL STORAGE TANK. ALL OPENINGS ARE TO BE PATCHED OR CLOSED BY BLIND FLANGES, AS INDICATED. UPON COMPLETION OF THE WELDING THE TANK SHALL BE THOROUGHLY CLEANED AND AN AIR PRESSURE OF 14 INCHES OF WATER APPLIED. A SOAP SOLUTION THEN SHALL BE APPLIED TO ALL WELDS AND GASKETS. ANY LEAKS FOUND SHALL BE REPAIRED. ALL WELDING SHALL BE PERFORMED IN ACCORDANCE WITH HANFORD WORKS SPECIFICATION HW 4812 EXCEPT THAT MATERIAL TO BE WELDED SHALL BE TYPE 309 SCa.

3. DO NOT SHIP TANK TK102 TO 219-S BUILDING UNTIL AGITATOR IS MOUNTED.

4. TOLERANCES UNLESS OTHERWISE NOTED:— FRACTIONAL ± 1/64

NO.	DESCRIPTION	BY	DATE	APPD	DATE	APPD
2	[illegible]					
1	[illegible]					

REVISIONS

SCALE: NONE

	BY	DEPT.	DATE
APPROVALS			
DRAWN BY			
CHECKED BY			
ENGINEER			
ENG. REV. NO.			
PROJECT NO. C-157-S			

NEXT USED ON H-2-5234

DWG. NO.	TITLE
H-2-5293	190 TON, 2.5 FT HIGH PRECIPITATOR MEASUREMENT

REFERENCE DRAWINGS

2540 GENERAL ELECTRIC CO.
HANFORD WORKS
RETENTION & NEUTRALIZATION BLDG.
TK 101 & TK 102
MODIFICATIONS

BLDG. NO. 219-S | DWG. NO. H-2-5233

219-S

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ENGINEERING CHANGE NOTICE

1. ECN 107679

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental ☐ Direct Revision ☐ Change ECN ☐ Temporary ☒ Supersedure ☐ Discovery ☐ Cancel/Void ☐	D. A. Moody, Waste Tank Assessments, H5-52, 6-3836		4-25-90
	5. Project Title/No./Work Order No. Temporary Seismic Restraints	6. Bldg./Sys./Fac. No. 219-S	7. Impact Level 3
	8. Document Number Affected (include rev. and sheet no.) H-2-5233, Rev. 2	9. Related ECN No(s).	10. Related PO No.

11a. Modification Work	11b. Work Package Doc. No.	11c. Complete Installation Work	11d. Complete Restoration (Temp. ECN only)
☒ Yes (fill out Blk. 11b) ☐ No (NA Blks 11b, 11c, 11d)		Cog. Engineer Signature & Date	Cog. Engineer Signature & Date

12. Description of Change

1. Remove the existing tank positioning guides from tank 101 and 102 as shown on sheet 3 of this ECN.

2. Install temporary lateral seismic restraints at the base of tanks 101 and 102 as shown on sheets 4, 5 and 6 of this ECN.

3. Temporary restraints qualified for 6 months maximum service.

13a. Justification (mark one)	13b. Justification Details
Criteria Change ☐ Design Improvement ☒ Environmental ☐ As-Found ☐ Facilitate Const. ☐ Const. Error/Omission ☐ Design Error/Omission ☐	Existing tank guides are damaged, therefore the system does not meet seismic requirements. Temporary seismic restraints are required as an interim to installation of permanent restraints.

14. Distribution (include name, MSIN, and no. of copies)		RELEASE STAMP
S.L. BREY	T6-12	
L. GOODWIN	T6-12	
B. OGDEN	T6-29	
D. BLEVINS	T6-22	
R. WARREN	T6-29	
P. OHL	H5-52	
P. HOLMES	H5-52	

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1)

15. Design Verification Required	16. Cost Impact		17. Schedule Impact (days)
	ENGINEERING	CONSTRUCTION	
☒ Yes	Additional ☐ $ NA	Additional ☐ $ N/A	Improvement ☐
☐ No	Savings ☐ $	Savings ☐ $	Delay ☐

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	☐	Seismic/Stress Analysis	☒	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐	HIHE REVIEW	☒
Environmental Report	☐	Inspection Plan	☐		☐
Environmental Permit	☐	Inventory Adjustment Request	☐		☐

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
WHC-SD-WM-ER-066		

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		**ARCHITECT-ENGINEER**	
✓ Cog./Project Engineer	4/26/90	PE	
✓ Cog./Project Engr. Mgr.	4/26/90	QA	
✓ QA	5-2-90	Safety	
✓ Safety (ISSFP)	4/30/90	Design	
Security		Other	
Proj.Prog./Dept. Mgr.			
Def. React. Div.			
Chem. Proc. Div.			
Def. Wst. Mgmt. Div.		**DEPARTMENT OF ENERGY**	
Adv. React. Dev. Div.			
Proj. Dept.			
Environ. Div.		**ADDITIONAL**	
IFM Dept.		N. D. Amanin	4-26-90
Facility Rep. (Ops)			
Other	4-25-90		
	4-25-90		
	4-25-90		

11/20/91 14:50 ☎509 373 1841 270A S 001

(1) Drawing H-2-5233 (2) Doc. No. ECN-107679 (3) Page 3 of 6

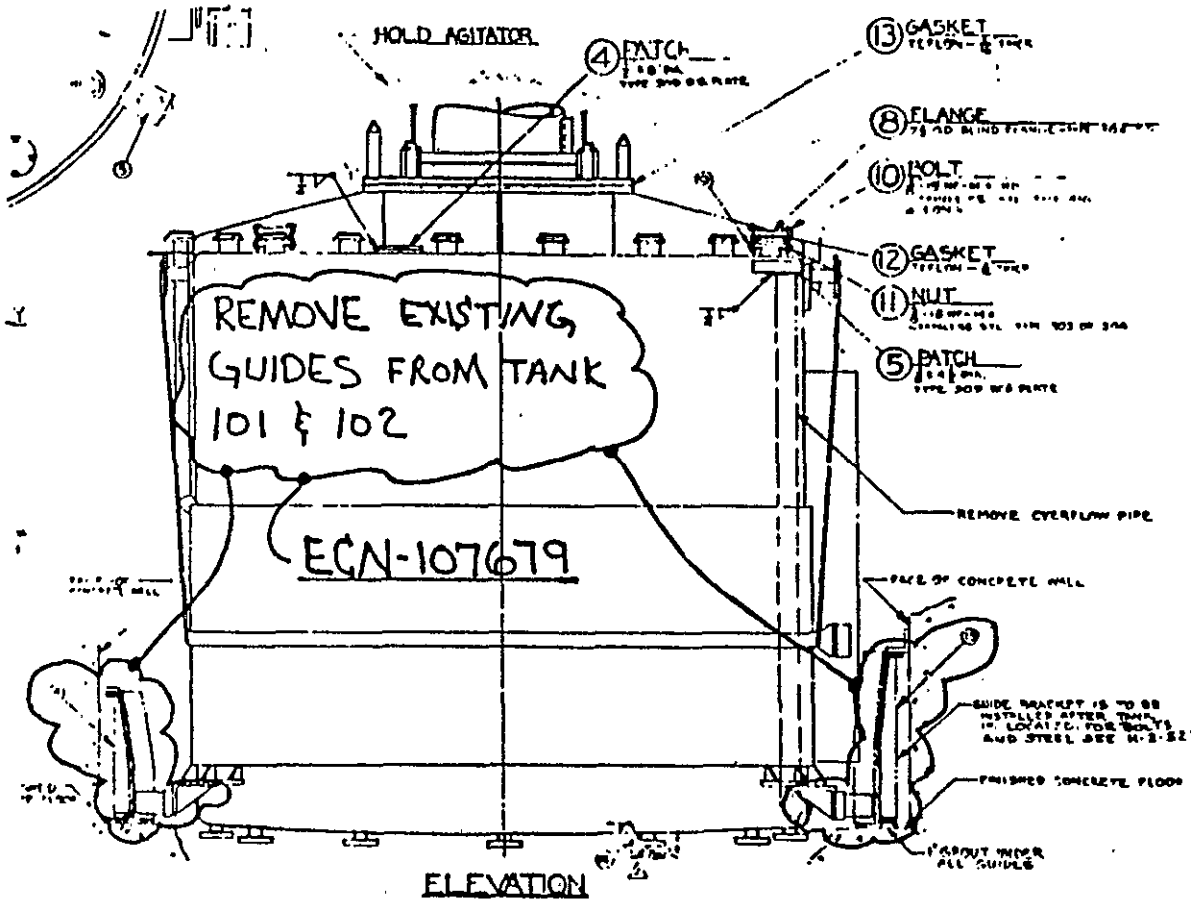
(4) Building 219-S (5) Rev. 0 (6) Job No. —

(7) Subject TEMPORARY, SEISMIC RESTRAINTS, TK-101, 102

(8) Originator [signature] Date 4-23-90

(9) Checker [signature] Date 4-25-90

(10)



2500 GENERAL ELECTRIC CO.
HANFORD WORKS
RETENTION & NEUTRALIZATION BLDG.
TK 101 & TK 102
MODIFICATIONS

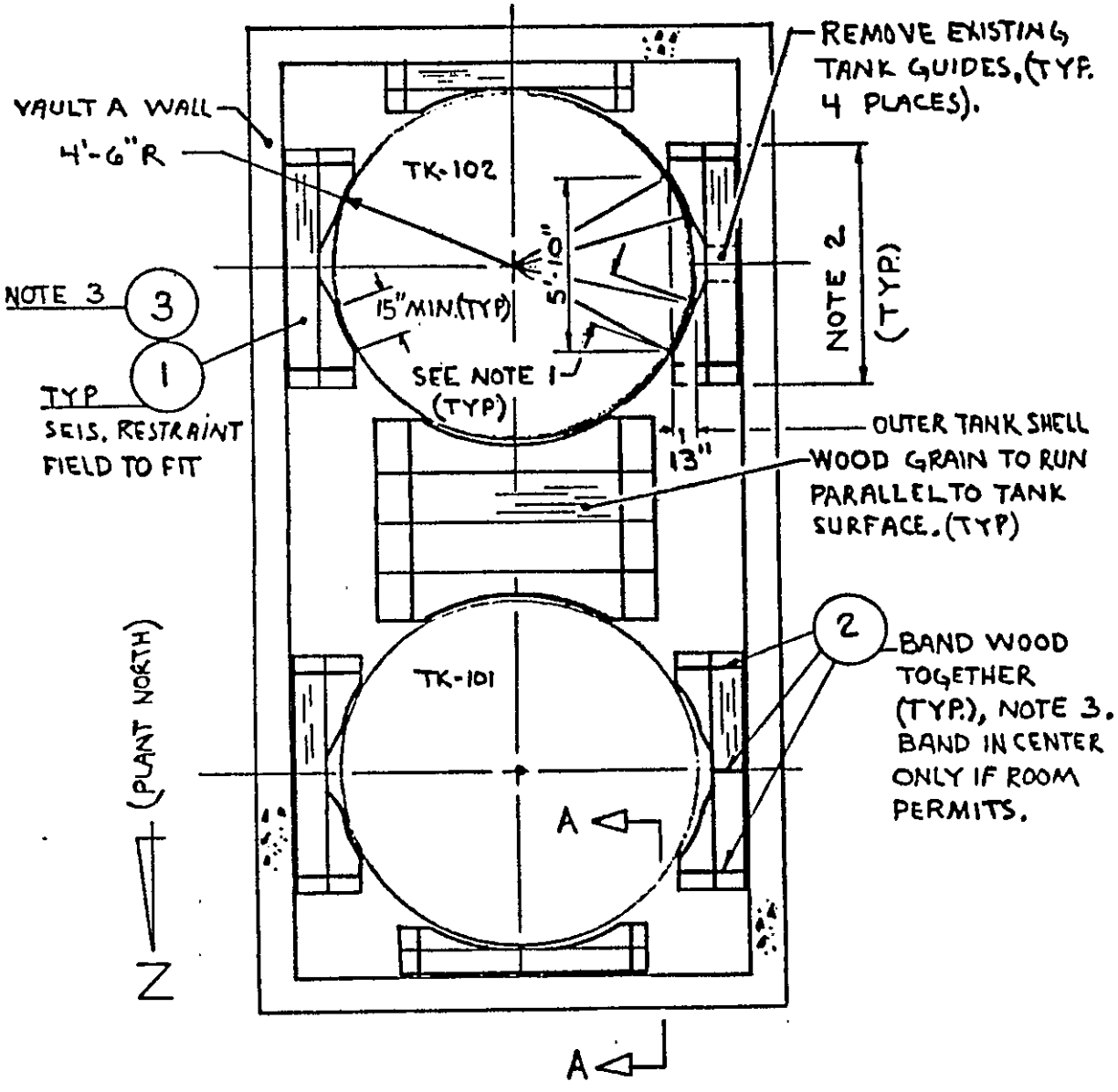
BLDG. NO. 219-S DWG. NO. H-2-5233

(1) Drawing N-2-5233 (2) Doc. No. ECN-107679 (3) Page 4 of 6
(4) Building 219-S (5) Rev. 0 (6) Job No. —
(7) Subject TEMP. SEISMIC RESTRAINTS, TK-101/102
(8) Originator [illegible] Date 4-23-90
(9) Checker [illegible] Date 4-25-90

(10)

ADD SEISMIC RESTRAINTS TO TANK 101, 102 — ECN 107679

PLACE TEMPORARY WOODEN RESTRAINTS 90° APART ON EACH SIDE OF TK-101 & 102. STACK & ASSEMBLE LUMBER TO CREATE TEMPORARY SEISMIC TANK RESTRAINT WHICH BUTTS UP TO THE WALL & PROVIDES A CLOSE FIT WITH THE TANK. PROVIDE CLOSE FIT ASSEMBLY BETWEEN TANKS 101 & 102.



PLAN

RD-6400-060 1 (12/87)

(1) Drawing H-2-5233 (2) Doc. No. ECN-107679 (3) Page 5 of 6
(4) Building 219-S (5) Rev. 0 (6) Job No.
(7) Subject TEMPORARY SEISMIC RESTRAINTS, TK-101/102
(8) Originator D.A. Moore Date 4-23-90
(9) Checker P.A. Holmes Date 4-26-90

(10)

NOTES:

1. The seismic restraint should mate with the tank (a maximum clearance of 1/16 inch between the restraint and the tank is permissible) for the full circumference of the arc, but as a minimum the restraint/wedges must have 15 lineal inches of wood contact with the tank surface for a minimum depth of 6 inches. The mating surface of the restraint/wedges must also contact the lower corner of the tank and the restraint top surface must mate (tight fit) with the underside of the protruding water jacket or tank shell stiffener.

2. Where a lumber assembly is used, provide sufficient length beyond the contact arc to allow for proper banding of the assembly.

3. Where a lumber assembly is used (as opposed to a solid piece of wood) cut 3/4 inch thick plywood top, bottom and end pieces that closely match the shape of the assembly. Box in each lumber assembly with the plywood and band each assembly together with stainless steel bands. Band around the sides of each assembly and around the length of the assembly. Use a minimum of 3 bands around the length and 2 bands around the sides.

4. It is preferred that the section of wood in contact with the tank be one piece.

MATERIAL:

1. Structural lumber, * weather treated, fire retardant, any grade of Douglas or Hemlock Fir listed in Uniform Building Code, 1988, Table 25-A-1 (Cut lumber to suit).

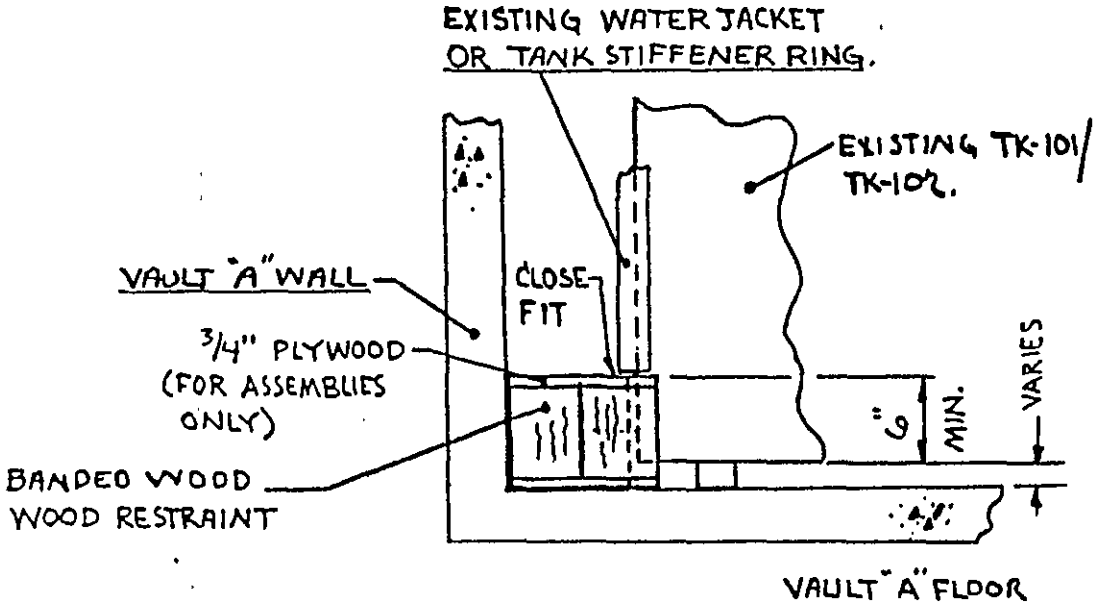
2. 3/4 inch stainless steel banding, with banding buckles.

3. 3/4 inch thick plywood, * weather treated, fire retardant.

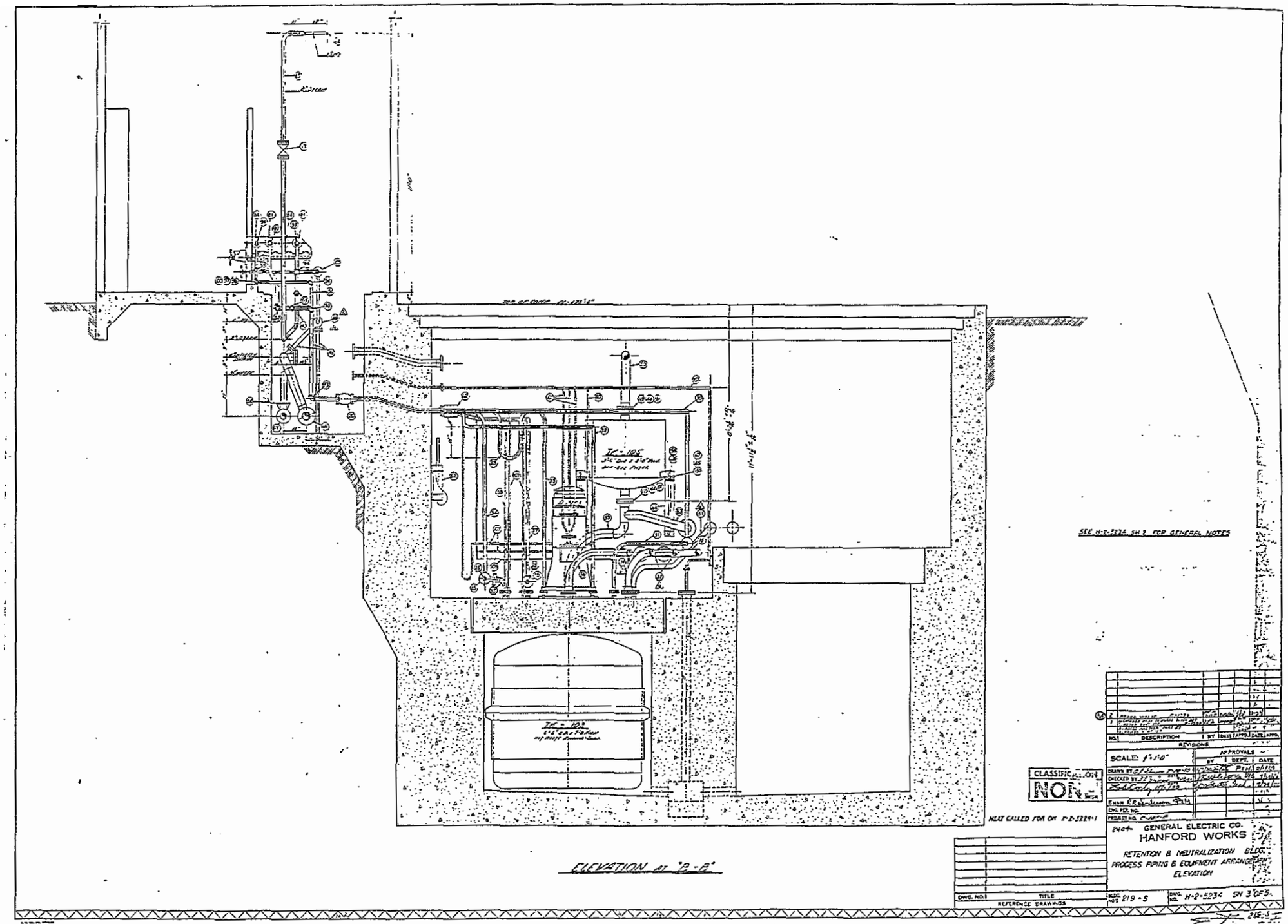
   * Treat wood with a commercially available preservative if weather treated wood is not readily available.

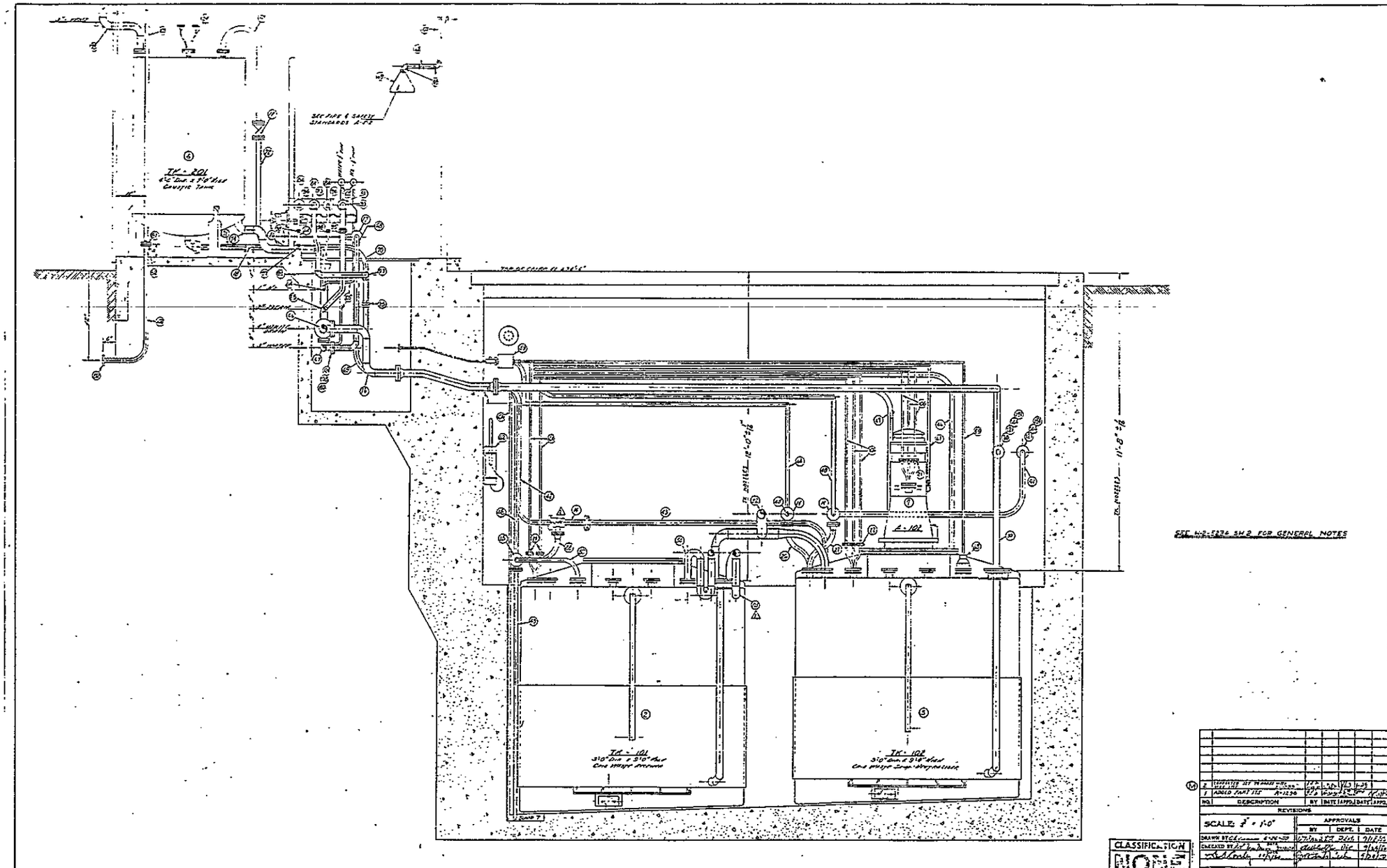
(1) Drawing H-2-5233 (2) Doc. No. ECN-107679 (3) Page 6 of 6
(4) Building 219-S (5) Rev. 0 (6) Job No. —
(7) Subject TEMPORARY SEISMIC SUPPORTS, TK-101, 102
(8) Originator [signature] Date 4-23-90
(9) Checker [signature] Date 4-25-90

(10)



SECTION "A-A"


ELEVATION AT "B-B"
SEE H-2-5234, SH 2 FOR GENERAL NOTES
CLASSIFICATION
NON-
NOT CALLED FOR ON P-2-5224-1
SCALE: 1"=1'-0"
GENERAL ELECTRIC CO.
HANFORD WORKS
RETENTION & NEUTRALIZATION BLDG.
PROCESS PIPING & EQUIPMENT ARRANGEMENT
ELEVATION
DWG. NO. H-2-5234 SH 3 OF 5
BLDG. NOS 219-5
REVISIONS
APPROVALS
REFERENCE DRAWINGS
TITLE
DWG. NO.



ELEVATION AT "A-A"

NO.	DESCRIPTION	BY	DATE	APPD.	DATE	APPD.
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	ADDED PARTIES A-1234	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REVISIONS

SCALE: 3/8" = 1'-0"

	BY	DEPT.	DATE
DRAWN BY [illegible]	[illegible]	[illegible]	[illegible]
CHECKED BY [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

SUBJ. [illegible]
DWG. REF. NO.
PROJECT NO. [illegible]

CLASSIFICATION NONE

NEXT CALLED FOR ON H-2-5226-1

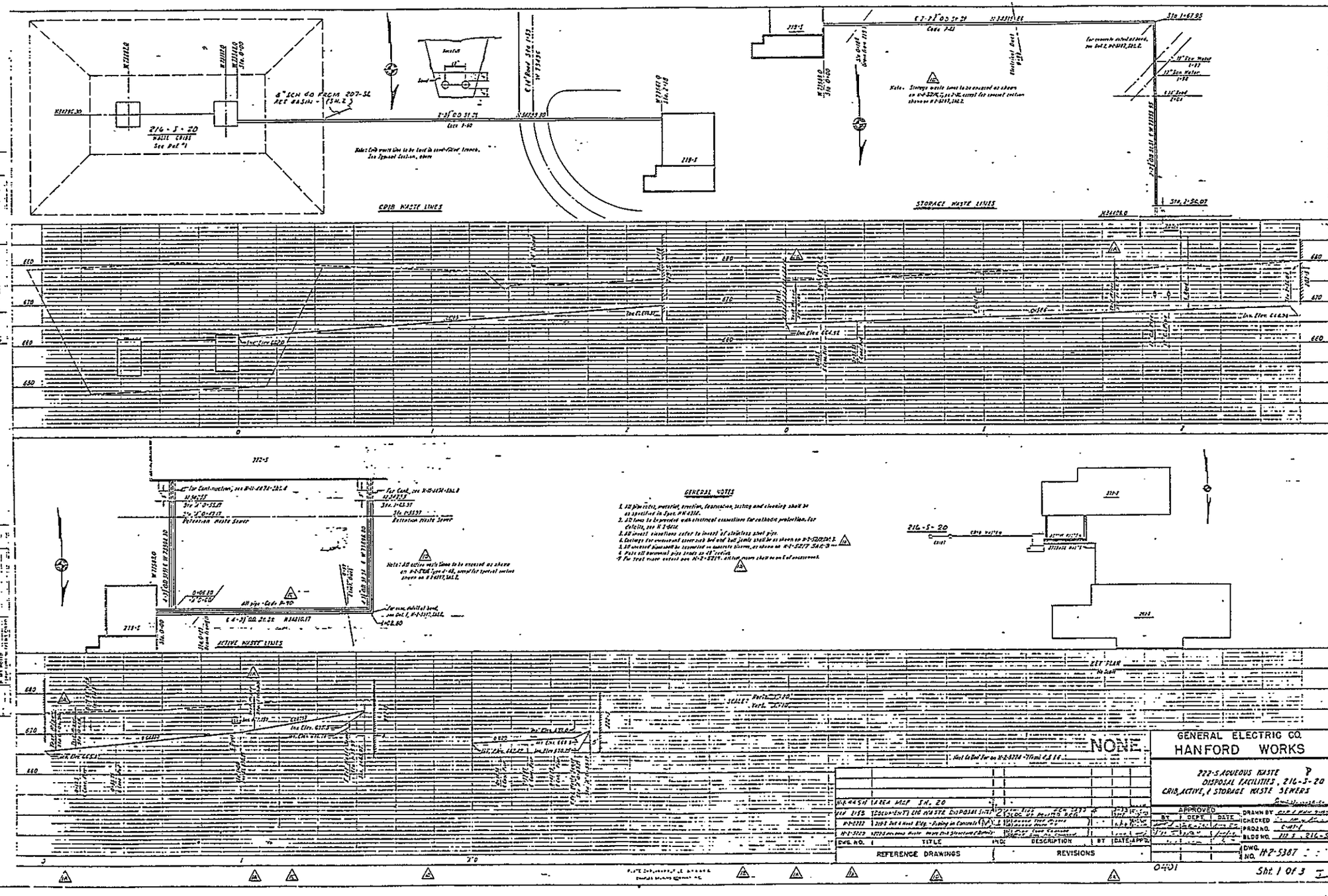
DWG. NO.	TITLE

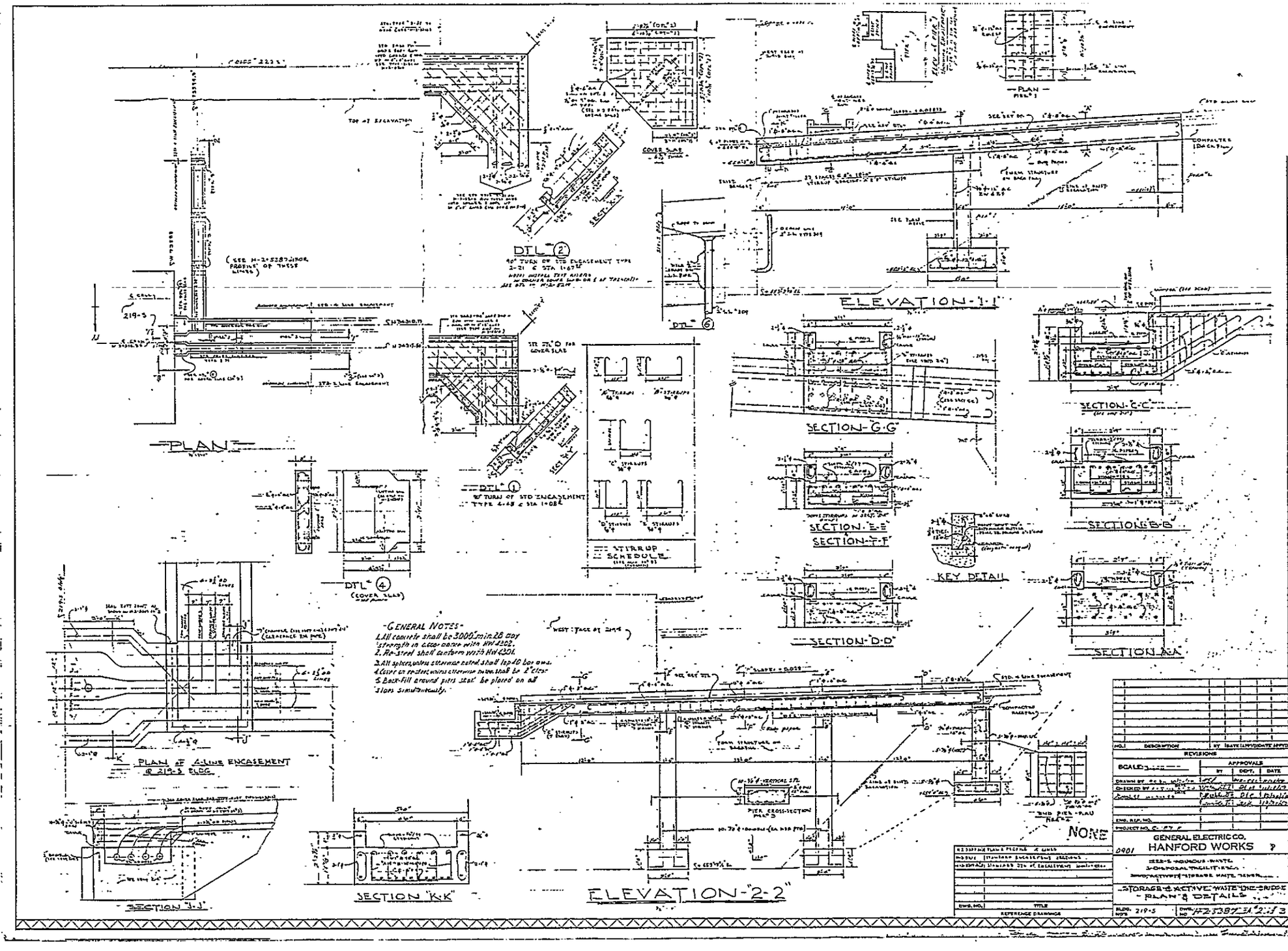
REFERENCE DRAWINGS

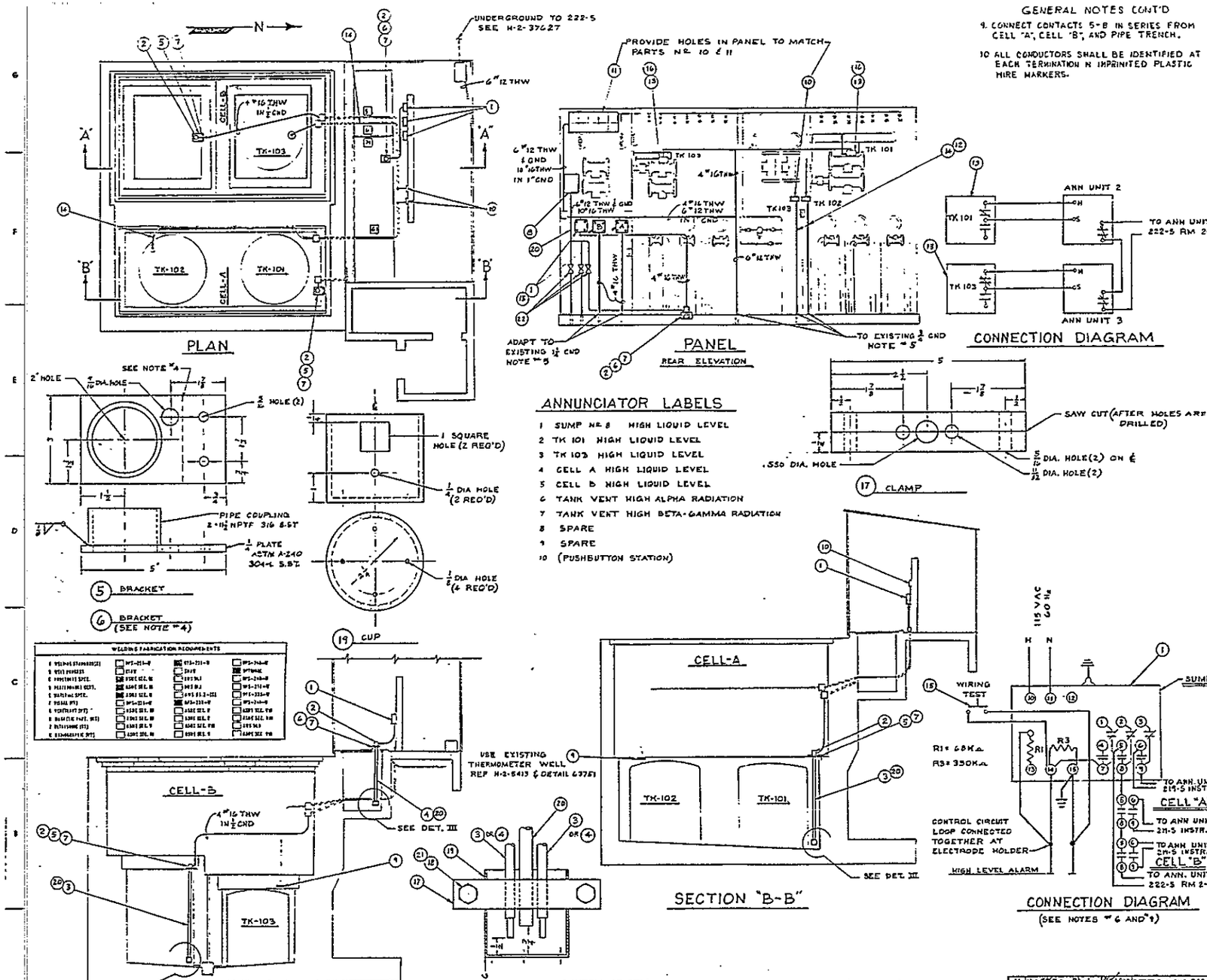
E404 GENERAL ELECTRIC CO.
HANFORD WORKS

RETENTION & NEUTRALIZATION BLDG.
PROCESS PIPING & EQUIPMENT ARRANGEMENT
ELEVATION

NOTS 219-5 DWG. NO. H-2-5234 SH 4 OF 5


CRIB WASTE LINES
STORAGE WASTE LINES
ACTIVE WASTE LINES
GENERAL NOTES
KEY PLAN
NONE
GENERAL ELECTRIC CO.
HANFORD WORKS
222-S AQUEOUS WASTE
DISPOSAL FACILITIES, 216-S-20
CRIB, ACTIVE, & STORAGE WASTE SEWERS
REFERENCE DRAWINGS
REVISIONS
DRAWN BY
CHECKED
PROJ. NO.
BLDG NO.
DWG. NO.
H-2-5387
Sht. 1 of 3


PLAN
DTL 2
DTL 1
DTL 4
(COVER SLAB)
DTL 6
STIRRUP SCHEDULE
ELEVATION-1-1
SECTION-G-G
SECTION-C-C
SECTION-E-E
SECTION-F-F
SECTION-B-B
KEY DETAIL
SECTION-D-D
SECTION-A-A
GENERAL NOTES
1. All concrete shall be 3000# min. 28 day strength in accordance with HW-4202.
2. Re-steel shall conform with HW-4201.
3. All splices unless otherwise noted shall be 40 bar dia.
4. Cover on re-steel unless otherwise noted shall be 2" clear.
5. Back-fill around pier stem be placed on all sides simultaneously.
PLAN OF 4 LINE ENCASEMENT @ 219-5 ELEV.
SECTION "J-J"
SECTION "K-K"
ELEVATION-"2-2"
PIER CROSS-SECTION
NONE
GENERAL ELECTRIC CO.
HANFORD WORKS
STORAGE & ACTIVE WASTE LINE BRIDGE
PLAN & DETAILS
REVISIONS
APPROVALS
REFERENCE DRAWINGS



GENERAL NOTES CONT'D

9. CONNECT CONTACTS 5-8 IN SERIES FROM CELL "A", CELL "B", AND PIPE TRENCH.

10 ALL CONDUCTORS SHALL BE IDENTIFIED AT EACH TERMINATION N IMPRINTED PLASTIC WIRE MARKERS.

ANNUNCIATOR LABELS

1 SUMP Nº 8 HIGH LIQUID LEVEL
2 TK 101 HIGH LIQUID LEVEL
3 TK 103 HIGH LIQUID LEVEL
4 CELL A HIGH LIQUID LEVEL
5 CELL B HIGH LIQUID LEVEL
6 TANK VENT HIGH ALPHA RADIATION
7 TANK VENT HIGH BETA-GAMMA RADIATION
8 SPARE
9 SPARE
10 (PUSHBUTTON STATION)

QTY	ITEM NO.	DESCRIPTION
3	1	CONTROL, HIGH LIQUID LEVEL ALARM, 3 DPDT CONTACTS, (RATED 10 A @ 115 VAC) SENSITIVITY CAPABILITY OVER 100,000 Ω, ELECTRODE CIRCUIT VOLTAGE 12 VAC MAXIMUM, 115 VAC 60 Hz SUPPLY VOLTAGE B/W CONTROLS TYPE 52-1201 OR APPROVED EQUAL
3	2	ELECTRODE FITTING, FOR TWO ELECTRODES, 2"-11½ NPT EXTERNAL PIPE THREAD, 316 S.ST. BODY WITH WATERTIGHT CONSTRUCTION WITH ½"-14 NPT TAPPED BOSS FOR CONDUIT. B/W CONTROLS TYPE E-2 OR APPROVED EQUAL
4	3	ELECTRODE, 316 S.ST. ROD 5/16" O.D. WITH PVC SHEATH, THREADED TO MATCH PT. Nº 2, 10 FT. LENGTH. CUT TO REQUIRED LENGTH AS SHOWN PRIOR TO INSTALLATION.
2	4	ELECTRODE, SAME AS PT. Nº 3 EXCEPT 6 FT. LENGTH BEFORE TRIMMING
2	5	BRACKET, PROBE MOUNTING
1	6	BRACKET, PROBE MOUNTING
AR	7	BOLTS AND CONCRETE ANCHORS SIZE AS REQ'D
1	8	CONTAINER 2 QUART PVC
2	9	THERMOCOUPLE ASSM., TYPE J (I/C), S.ST. SHEATH ¼" ± 1/16" DIA. BY 8'-10' ± ¼" LENGTH, GROUNDED JUNCTION, QUICK DISCONNECT CONNECTORS.
2	10	PYROMETER, FOR TYPE J THERMOCOUPLE, 0-100°C RANGE, FOR T/C RESISTANCE UP TO 1000 OHMS. OMEGA MODEL EPI-5704 OR APPROVED EQUAL
1	11	ANNUNCIATOR, 10 POINTS, (2 HIGH BY 5 WIDE), FOR N.O. OR N.C. INPUTS, WITH ACCESSORIES INCLUDING FLASHER, HORN, AND PUSHBUTTON STATION.
AR	12	CONDUIT ¾" RIGID, WITH BOXES AND FITTINGS
2	13	SWITCH, DIFFERENTIAL PRESSURE ACTIVATED, 0.1 TO 3.75 ADJ. DIFF., SPDT, 316 S.ST. MELETRON Nº 534E6SS-5A, OR APPROVED EQ.
AR	14	THERMOCOUPLE EXTENSION WIRE, TYPE JX, DUPLEX, 20 GAUGE, POLYVINYL INSULATED
2	15	SWITCH-PUSHBUTTON, MOMENTARY CONTACT, SPDT, MICRO IPB11. STORES Nº 16-4050-208
AR	16	½" O.D. COPPER TUBING AND FITTINGS (SWAGELOK)
3	17	CLAMP 1" SQUARE ROD PVC
6	18	HEX NUT ¼"-20 UNC-2B ASTM-A-194 303 S ST. GR 8F
3	19	CUP 5" PVC PIPE WITH BOTTOM
AR	20	½" PVC PIPE AND FITTINGS
6	21	BOLT ¼"-20 UNC-2A × 1½" LONG ASTM-A-193 304 SST GR B8
3	22	VALVE ½" BALL PVC

NOTES

1. O A LEVEL I FOR FUNCTIONAL PT. OF LIQUID LEVEL ALARM SYSTEM LEVEL III ON OTHER ITEMS.
2. INSTALLATION SHALL CONFORM TO THE 1975 EDITION OF THE NATIONAL ELECTRICAL CODE.
3. GROUND PER HANFORD STD. E-12-IL
4. PT. 6 SAME AS PT. 5 EXCEPT BEND DOWN ¼" PL 90° WHERE SHOWN
5. REMOVE ABANDONED WIRE AND CABLE FROM THE EXISTING CONDUITS.
6. CONTACTS 5-8 AND 6-9 OPEN ON HIGH LEVEL, OPEN CONTROL CIRCUIT, CONTROL POWER FAILURE OR RELAY FAILURE.
7. ELECTRODES (PT. Nº 3 & 4) SHALL NOT TOUCH PIPING OR OTHER CONDUCTORS.
8. LABEL EQUIPMENT PER HANFORD STD. I-2-7, REV. 0 EQUIPMENT NAMEPLATES.

△2 QUALITY ASSURANCE LEVEL I

REFERENCE DRAWINGS	
S-2-26797	STA/EFFLUENT ASSY 2-4-G-S-16
H-2-46796	FLOW/MKG DIA 2-4-G-S-16
H-2-46795	PEC. SAMPLE/ 2-4-G-S-16
H-2-37627	LEVEL & RADIATION ALARM

REVISIONS				
2	DIRECT CHG CHG PER DI-E-652			
1	EQUIPMENT ADD WATER TEST (DI. 7023)			
	NONE			

DRAWING STATUS DI. 6592

U. S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATIONS OFFICE
Atlantic Richfield Hanford Company
Richland, Washington 99352

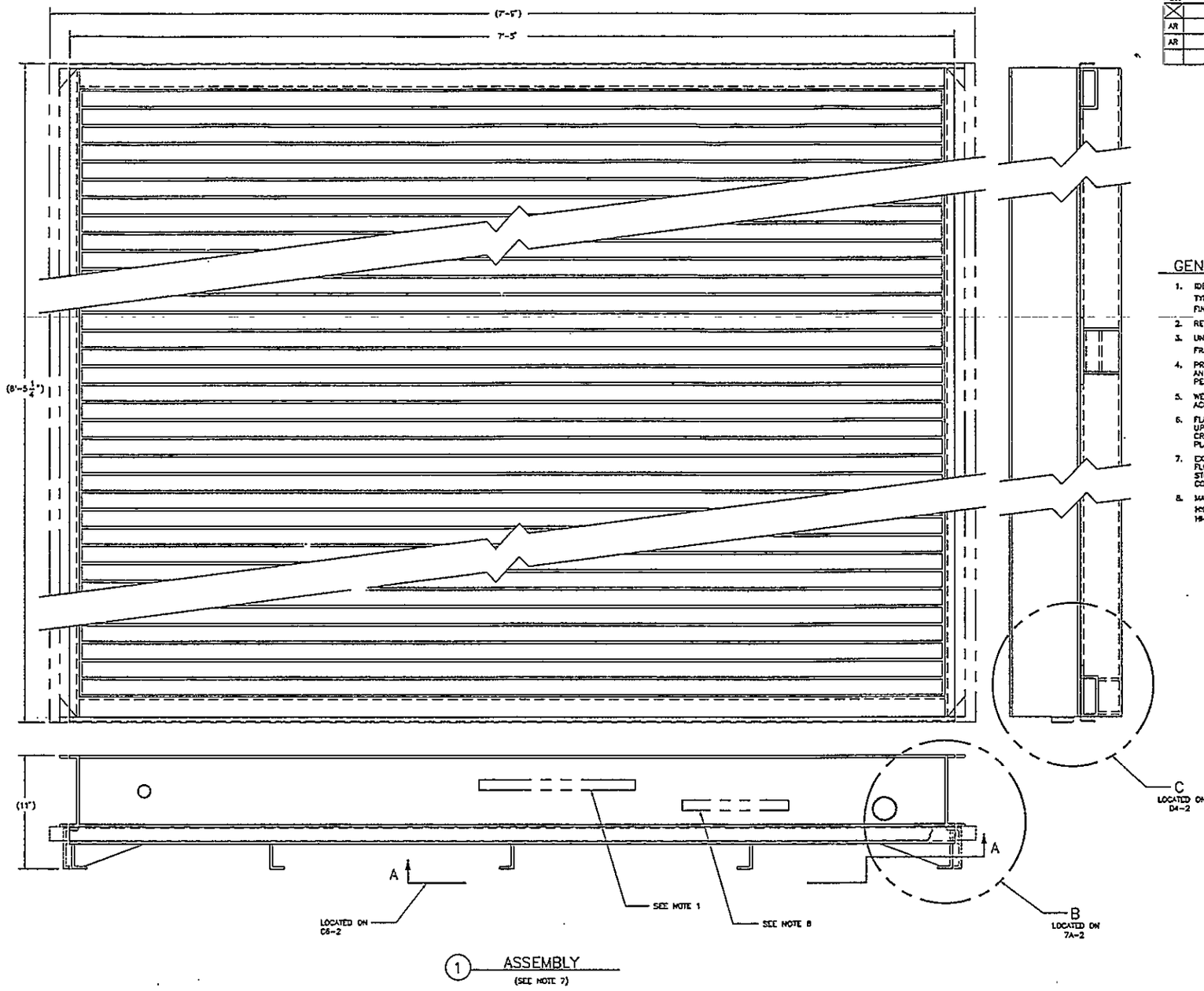
INSTRUMENTATION
HIGH LIQUID LEVEL ALARMS
& TEMPERATURE INDICATORS

219-5 (Nov. 5902)

NONE

H-2-37620

QTY REQD	PART/DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHEET	ITEM NO
X	-010	ASSEMBLY, SUMP, PORTABLE ALTER FROM	SAFETY STORAGE INC. MODEL NO. 75		1
AR		CHANNEL, C4 X 5.4	ASTM A 36 CS		2
AR		PLATE, $\frac{3}{16}$" THK	ASTM A 36 CS		3
					4



1 ASSEMBLY
(SEE NOTE 7)

GENERAL NOTES:

1. IDENTIFY ASSEMBLY WITH PART NUMBER H-2-80856-010 PER HS-BS-0015 TYPE B (PAINTING) IN LOCATION INDICATED, USING $\frac{3}{4}$" HIGH CHARACTERS, FINAL COLOR BLACK.
2. REMOVE ALL BURRS AND BREAK SHARP EDGES.
3. UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ON: FRACTIONS $\pm \frac{1}{4}$".
4. PREPARE AND PAINT ALL EXPOSED CARBON STEEL SURFACES WITH ONE PRIMER AND TWO FINISH COATS OF VALSPAR HI-SOLIDS 75 SERIES, FINAL COLOR GRAY, PER MANUFACTURER'S INSTRUCTIONS.
5. WELD AND INSPECT PER AWS D1.1/D1.3. VT WELDS, FINAL PASS. NO POROSITY ACCEPTED.
6. FLAME CUT ENDS OF SUMP TO 1" FROM EXISTING WELDS PERMITTED. RETAIN UPPER FLANGE SECTIONS OF OLD CHANNEL TO APPROXIMATELY 1" PAST EXISTING CROSS SUPPORT MEMBERS AS SHOWN. COPE NEW CHANNEL (ITEM NO. 2) IN 3 PLACES (BOTH SIDES) AS REQD.
7. EXISTING SUMP IS 250 GALLON CONTAINMENT, "PULTRUSION" TYPE FIBERGLASS FLOORING, 250 PSF UNIFORM LOAD BEARING CAPACITY, FOURTEEN(14) DRUM STORAGE CAPACITY (ONE LEVEL) WELDED, LIQUID TIGHT, 10 GAUGE STEEL WITH CORROSION RETARDANT EPOXY PAINT.
8. MARK PER HS-BS-0015 TYPE B (PAINTING) WITH "WEIGHT 1200 LBS" USING $\frac{3}{4}$" HIGH BLACK CHARACTERS ON A YELLOW BACKGROUND. PAINT SHALL BE VALSPAR HI-SOLIDS 75 SERIES.

OFFICIAL RELEASE BY WHC DATE OCT 30 1992

		HS-BS-0015	IDENTIFICATION METHODS
H-2-46553	DRAWING INDEX	REF NUMBER	TITLE
DWG NO	TITLE	REFERENCES	
DRAWING SPACE/ACTIVITY LIST		NEXT USED ON	END ITEM

REVISIONS

REV	DESCRIPTION	REV DATE	ENG	PROJ	APPROVALS PROJECT

SHEET LEVEL 3 107703

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Westinghouse Hanford Company

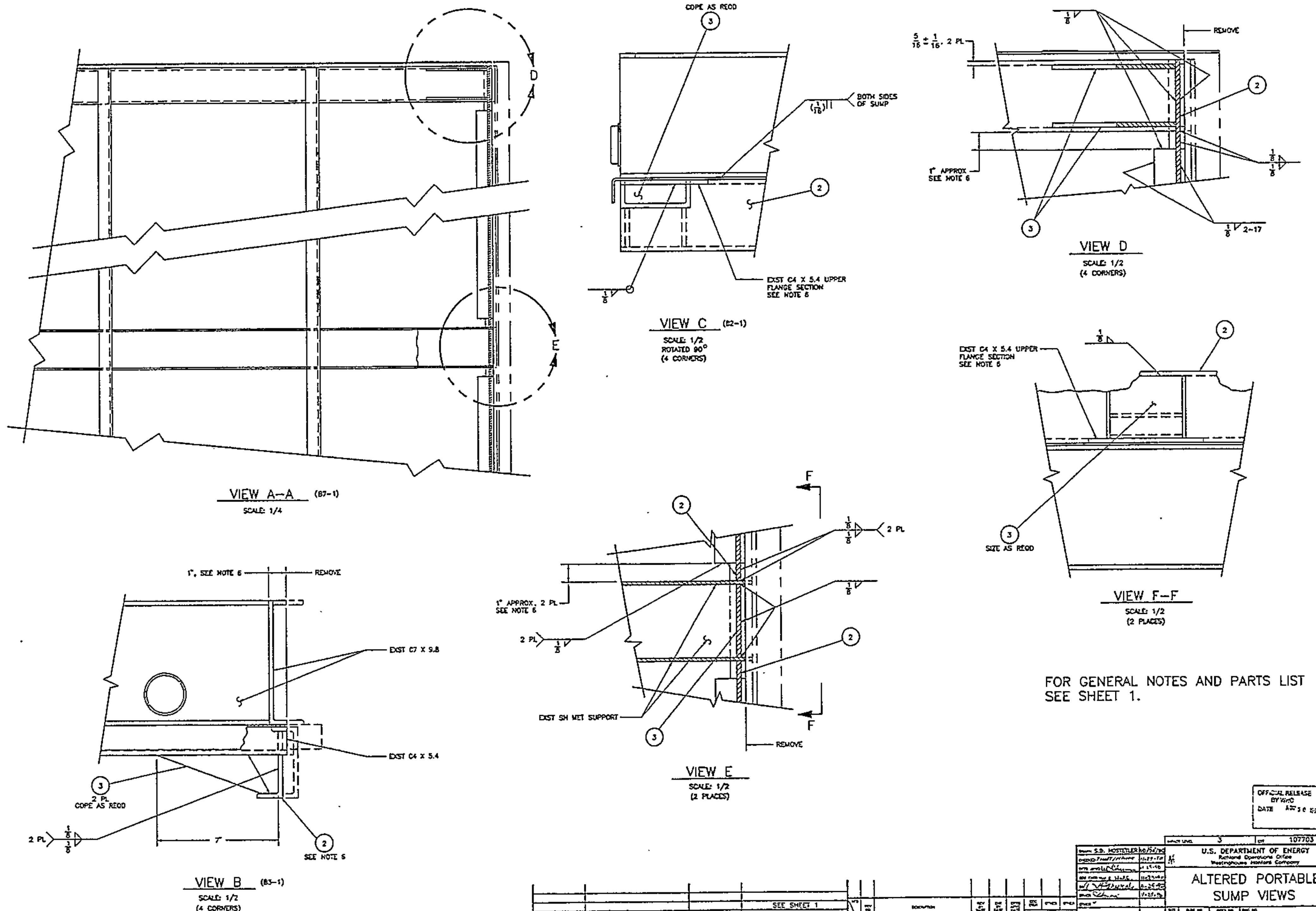
ALTERED PORTABLE SUMP

SIZE	FSCM NO	PROJ NO	DWG NO	REV
F	222-S	2502	H-2-80856	0

SCALE 1/4 SHEET 1 OF 2

H-2-80856

54-6000-027(7/89)



FOR GENERAL NOTES AND PARTS LIST
SEE SHEET 1.

OFFICIAL RELEASE BY WHC DATE APR 30 1992

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Westinghouse Hanford Company

ALTERED PORTABLE SUMP VIEWS

DRAWN S.D. HOSTETLER

IMPACT LEVEL 3 | CN 107703

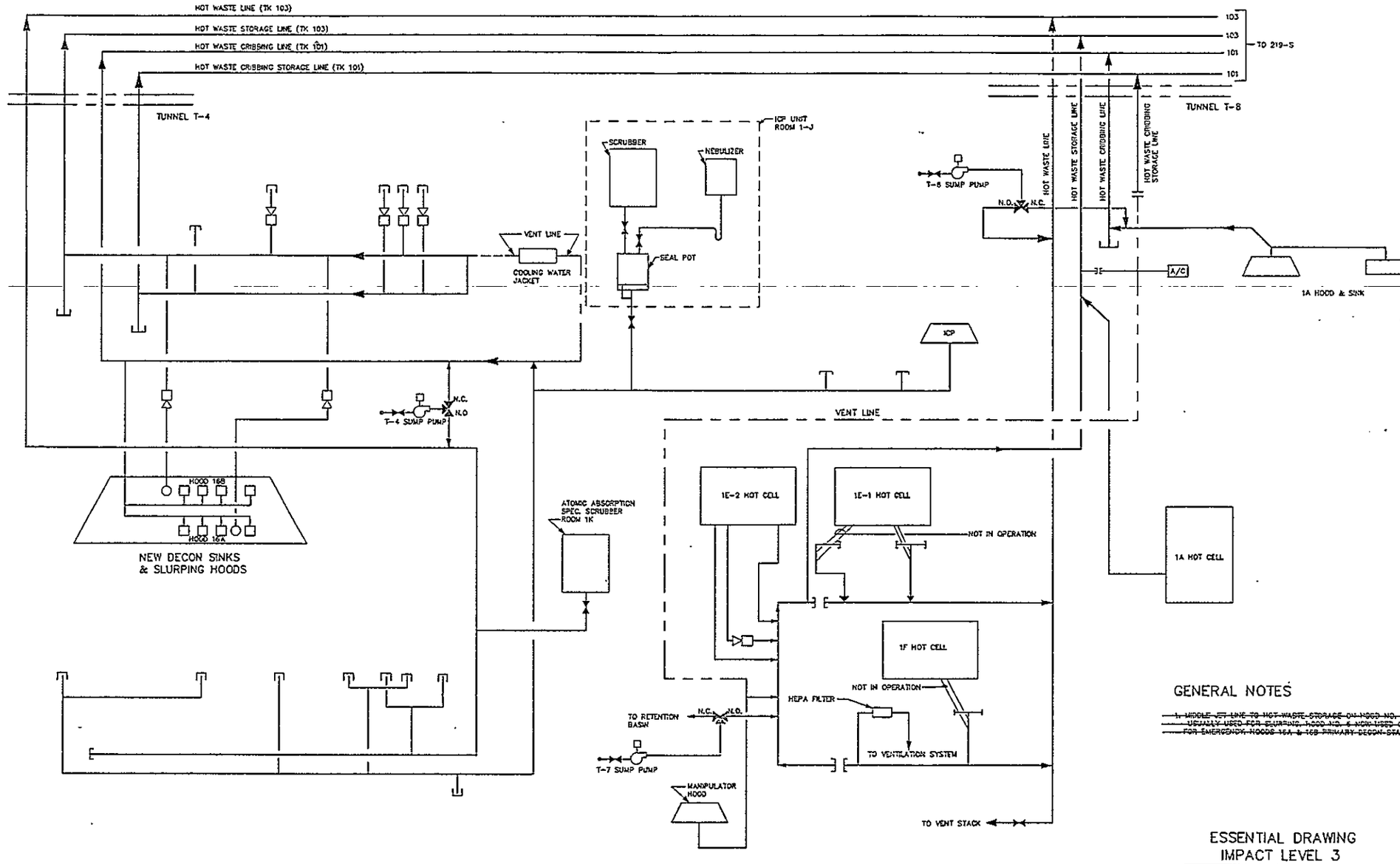
SIZE F | BLDG NO 222-S | INDEX NO 2502 | DWG NO H-2-80856 | REV 0

SCALE AS NOTED | SHEET 2 OF 2

REFERENCES: SEE SHEET 1 — NEXT USED ON H-2-80856 SH 1

DRAWING TRACEABILITY LIST: SEE SHEET 1

ECN/CADFILE: B0808563 ... 10:18M ACD2:10 0:55



GENERAL NOTES

~~1. MIDDLE VENT LINE TO HOT WASTE STORAGE ON HOOD NO. 6 USUALLY USED FOR SLURPING. HOOD NO. 6 NOW USED ONLY FOR EMERGENCY. HOODS 16A & 16B PRIMARY DECON STATION.~~

ESSENTIAL DRAWING
IMPACT LEVEL 3

DRAWING APPROVALS	DATE
J.T. SAMS	11/1/88
P.A. BYRNE	11/1/88
P.A. BYRNE	11/1/88
P.A. BYRNE	11/1/88
R.K. NORMAN	11/1/88

U. S. Department of Energy
Richland Operations Office
Rockwell Hanford Operations
Richland, Washington 99352

HOT WASTE DRAIN SYSTEM

REVISIONS			
RS		INCORPORATED ECN 145197	1

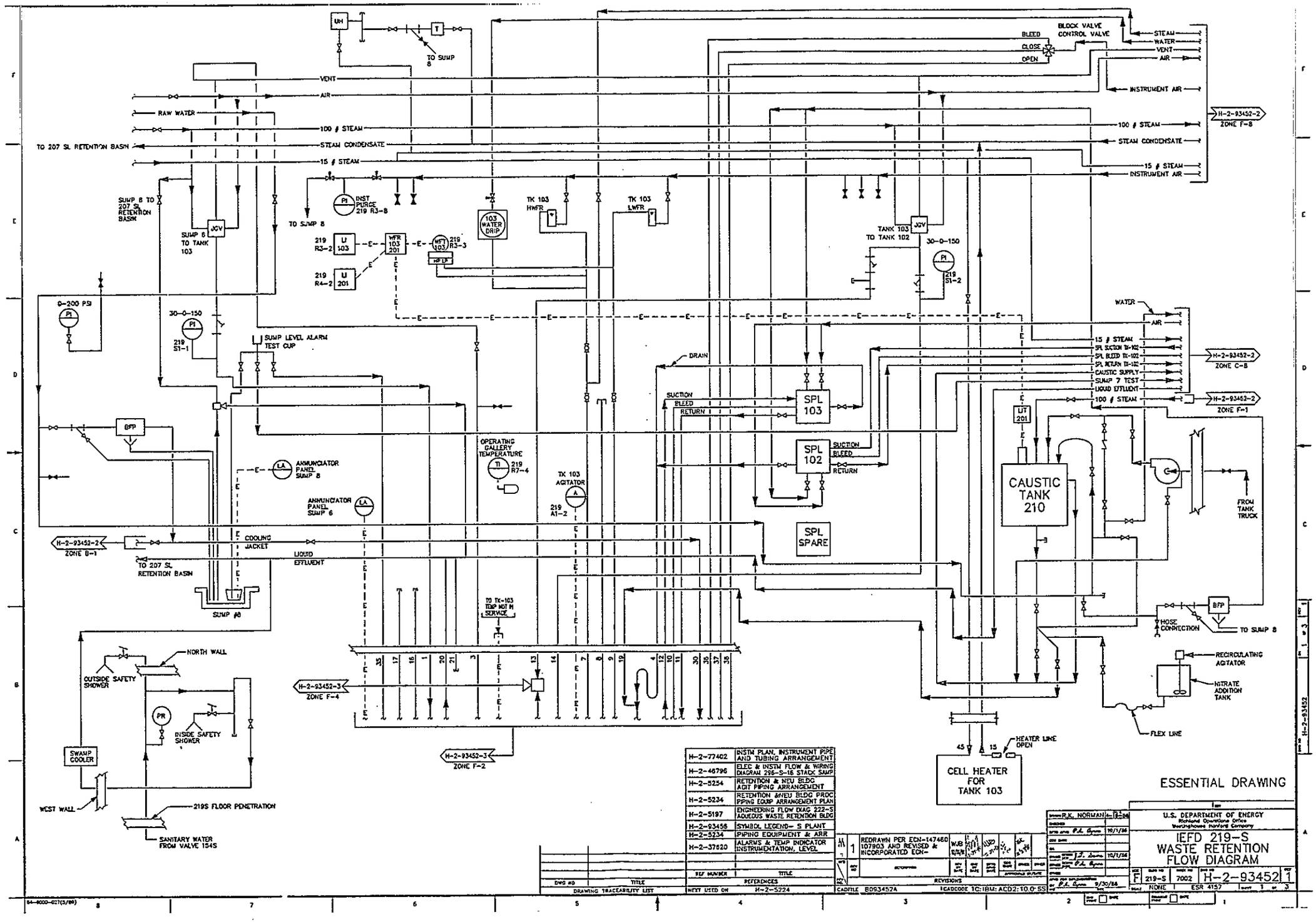
DWG. NO.	TITLE	DWG. NO.	TITLE
N/A		H-2-93455	SYMBOL LEGEND-'S' PLANT

DRAWING TRACEABILITY LIST — REFERENCE DRAWINGS

NEXT USED ON H-2-5357 — DRAWING STATUS ESR 4157

SCALE	CODE	SIZE	REV.
NONE	222-S	7002	

B-15M: ACD: 2.18 — H-2-93451 — 1 1 1



DWG NO	TITLE
H-2-77402	INSTM PLAN, INSTRUMENT PIPE AND TUBING ARRANGEMENT
H-2-46796	ELEC & INSTM FLOW & WIRING DIAGRAM 296-S-16 STACK SAMP
H-2-5254	RETENTION & NEU BLDG ADIT PIPING ARRANGEMENT
H-2-5234	RETENTION &NEU BLDG PROC PIPING EQUIP ARRANGEMENT PLAN
H-2-5197	ENGINEERING FLOW DIAG 222-S AQUEOUS WASTE RETENTION BLDG
H-2-93456	SYMBOL LEGEND- S PLANT
H-2-5234	PIPING EQUIPMENT & ARR
H-2-37620	ALARMS & TEMP INDICATOR INSTRUMENTATION, LEVEL

DRAWING TRACEABILITY LIST

REF NUMBER	TITLE
NEXT USED ON	H-2-5224

REFERENCES

REV NO	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
1		REDRAWN PER ECN-147460 107903 AND REVISED & INCORPORATED ECN-	WJB		

REVISIONS

CADFILE B093457A

ICADCODE 1C:IBM: ACD2:10.0-SS

R.K. NORMAN 4-19-86
10/1/86
10/1/86
9/30/86

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Westinghouse Hanford Company

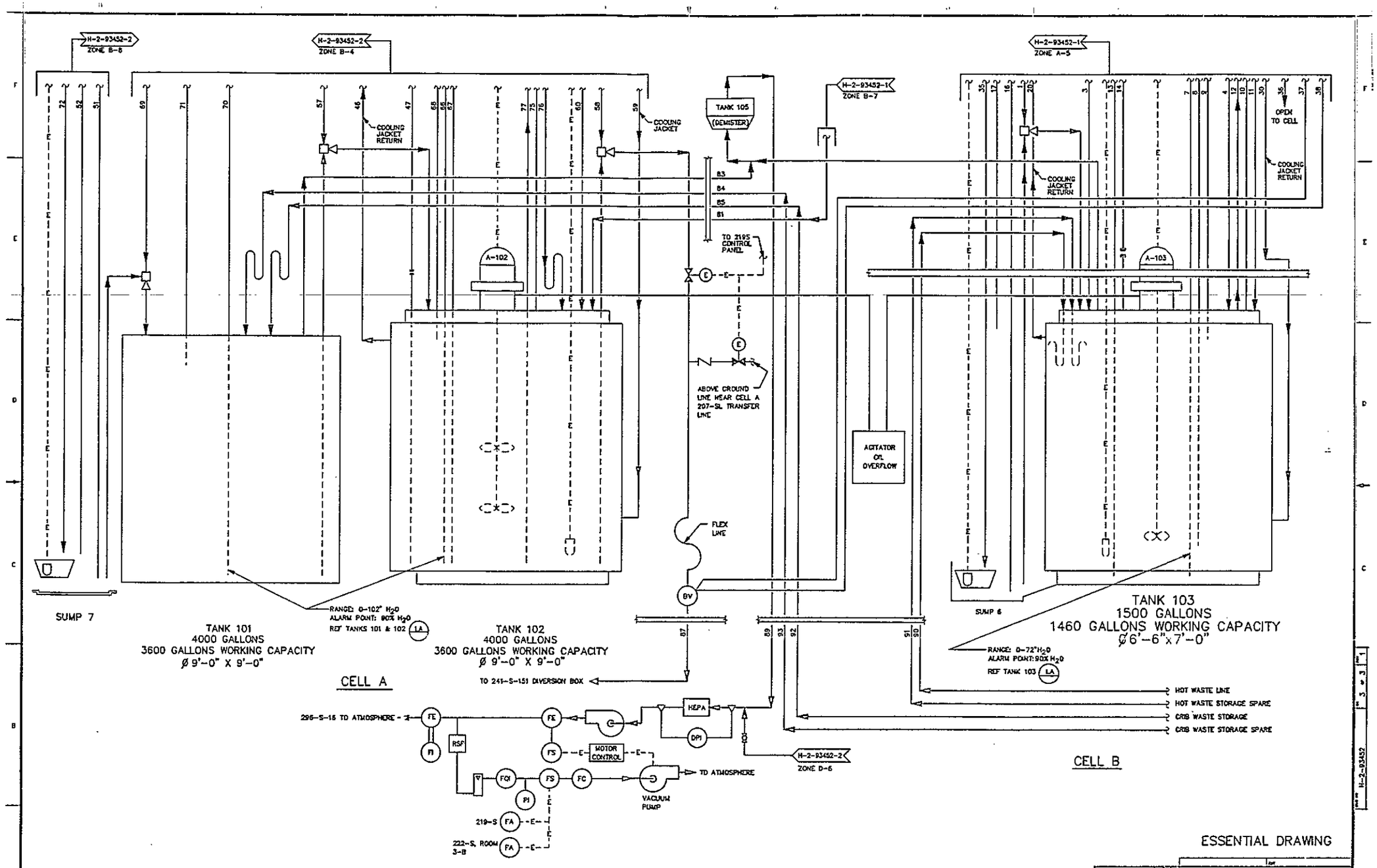
IEFD 219-S WASTE RETENTION FLOW DIAGRAM

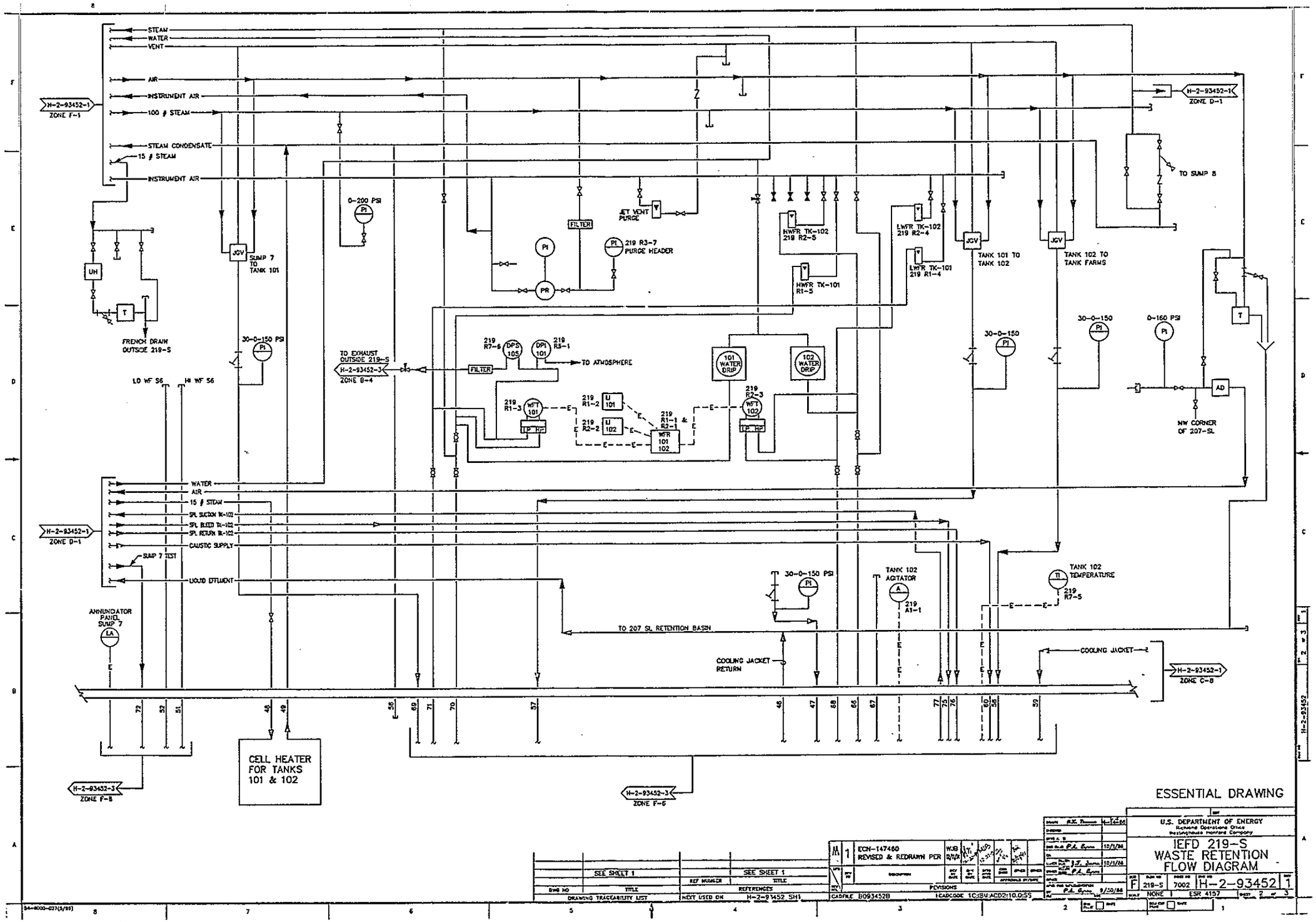
SIZE	SUB NO	SHEET NO	DWG NO	REV
F	219-S	7002	H-2-93452	1

SCALE NONE | ESR 4157 | SHEET 1 OF 3

H-2-93452

84-6000-027(3/86)


H-2-93452-2
ZONE B-8
H-2-93452-2
ZONE B-4
H-2-93452-1
ZONE A-5
H-2-93452-1
ZONE B-7
TANK 105
(DEMISTER)
COOLING JACKET RETURN
COOLING JACKET
OPEN TO CELL
TO 2195 CONTROL PANEL
A-102
A-103
ABOVE GROUND LINE NEAR CELL A 207-SL TRANSFER LINE
AGITATOR OIL OVERFLOW
FLEX LINE
BV
SUMP 7
SUMP 6
TANK 101
4000 GALLONS
3600 GALLONS WORKING CAPACITY
Ø 9'-0" X 9'-0"
RANGE: 0-102" H2O
ALARM POINT: 90% H2O
REF TANKS 101 & 102
LA
TANK 102
4000 GALLONS
3600 GALLONS WORKING CAPACITY
Ø 9'-0" X 9'-0"
TANK 103
1500 GALLONS
1460 GALLONS WORKING CAPACITY
Ø 6'-6" x 7'-0"
RANGE: 0-72" H2O
ALARM POINT: 90% H2O
REF TANK 103
LA
TO 241-S-151 DIVERSION BOX
HOT WASTE LINE
HOT WASTE STORAGE SPARE
CRIB WASTE STORAGE
CRIB WASTE STORAGE SPARE
CELL A
CELL B
296-S-15 TO ATMOSPHERE
FE
FI
RSF
FE
FS
MOTOR CONTROL
HEPA
DPI
H-2-93452-2
ZONE D-6
FQI
FS
FC
PI
TO ATMOSPHERE
VACUUM PUMP
219-S
FA
222-S, ROOM 3-B
FA
ESSENTIAL DRAWING
U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Westinghouse Hanford Company
IEFD 219-S
WASTE RETENTION
FLOW DIAGRAM
F
219-S
7002
H-2-93452
1
NONE
ESR 4157
3 of 3
ECN-147460
REVISED & REDRAWN PER
SEE SHEET 1
REFERENCES
REVISIONS
DRAWING TRACEABILITY LIST
CADFILE B093452C
CADCODE 1C:IBM: ACD2.10.0:SS
H-2-93452


STEAM
WATER
VENT
AIR
INSTRUMENT AIR
100 # STEAM
STEAM CONDENSATE
15 # STEAM
INSTRUMENT AIR
H-2-93452-1
ZONE F-1
H-2-93452-1
ZONE D-1
TO SUMP 8
0-200 PSI
JET VENT PURGE
FILTER
219 R3-7 PURGE HEADER
HWFR TK-102 219 R2-5
HWFR TK-101 R1-5
LWFR TK-102 219 R2-4
LWFR TK-101 219 R1-4
TANK 101 TO TANK 102
TANK 102 TO TANK FARMS
SUMP 7 TO TANK 101
UH
T
FRENCH DRAIN OUTSIDE 219-S
30-0-150 PSI
TO EXHAUST OUTSIDE 219-S
H-2-93452-3
ZONE B-4
219 R7-6
DPS 105
DPI 101
219 R5-1
TO ATMOSPHERE
101 WATER DRIP
102 WATER DRIP
219 R2-3
219 R1-3
WFT 101
219 R1-2
LI 101
219 R2-2
LI 102
219 R1-1 & R2-1
WFR 101 102
WFT 102
30-0-150
30-0-150
0-160 PSI
AD
NW CORNER OF 207-SL
LO WF S6
HI WF S6
WATER
AIR
15 # STEAM
SPL SUCTION TK-102
SPL BLEED TK-102
SPL RETURN TK-102
CAUSTIC SUPPLY
SUMP 7 TEST
LIQUID EFFLUENT
H-2-93452-1
ZONE D-1
ANNUNCIATOR PANEL SUMP 7
LA
30-0-150 PSI
TANK 102 AGITATOR
219 A1-1
TANK 102 TEMPERATURE
219 R7-5
TO 207 SL RETENTION BASIN
COOLING JACKET RETURN
COOLING JACKET
H-2-93452-1
ZONE C-8
72
52
51
46
49
56
69
71
70
57
48
47
68
66
67
77
75
76
60
58
59
CELL HEATER FOR TANKS 101 & 102
H-2-93452-3
ZONE F-8
H-2-93452-3
ZONE F-6
ESSENTIAL DRAWING
U.S. DEPARTMENT OF ENERGY
Richland Operations Office
Westinghouse Hanford Company
IEFD 219-S
WASTE RETENTION
FLOW DIAGRAM
F
219-S
7002
H-2-93452
1
NONE
ESR 4157
SHEET 2 OF 3
1
ECN-147460
REVISED & REDRAWN PER
W.B.
9/4/86
REVISIONS
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SEE SHEET 1
SEE SHEET 1
DRAWING TRACEABILITY LIST
REFERENCES
NEXT USED ON H-2-91452 SH1
10/1/86
10/1/86
9/30/86

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APPENDIX 4B

CONTAINMENT CALCULATIONS FOR THE 219-S WASTE HANDLING FACILITY AND THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA

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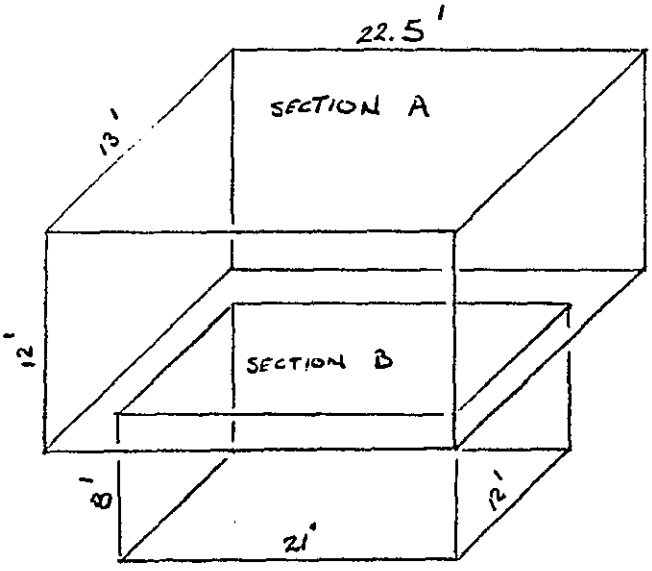
219-S VAULT AREA / GALLON CALCULATIONS

BECAUSE THE CELLS ARE SUBSTANTIALLY LARGER THAN THE TANKS, THE AREA OF THE CELLS WAS CALCULATED USING THE SMALLEST AREA (STEPS IN THE WALLS AND SLOPES OF THE FLOORS WERE OMITTED). THE AREA THE TANKS DISPLACE WAS CALCULATED USING THE FORMULA $V = \pi R^2 l$ AND SUBTRACTED FROM THE TOTAL AREA. DIMENSIONS FOR THE CELLS WERE TAKEN FROM DRAWING H-2-5332 SH 1 DIMENSIONS FOR THE TANKS WERE TAKEN FROM DRAWING H-2-5234 SH 5 THE SKETCHES ARE NOT DRAWN TO SCALE.

CELL A

TANKS 101 AND 102 ARE 9'-0" DIAM. AND 9'-0" HIGH

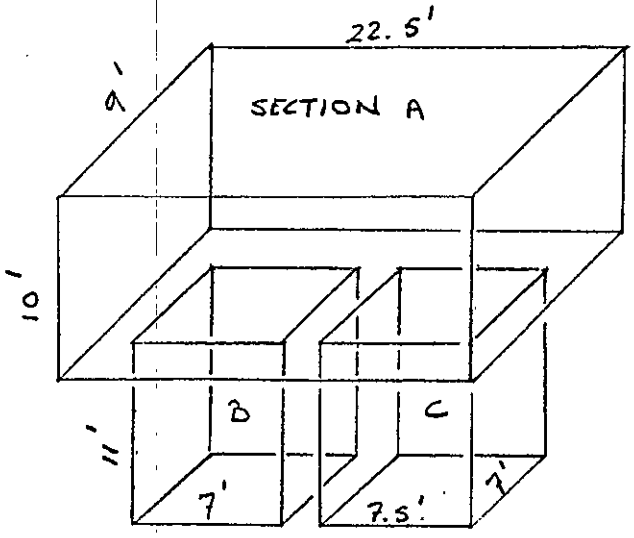


SECTION A	13' · 12' · 22.5'	=	3510 ft³
SECTION B	12' · 8' · 21'	=	2016
TK-101	3.14 (4.5²) 9	=	(572)
TK-102	3.14 (4.5²) 9	=	(572)

4382 ft³ × 7.48 gal/ft³ = 32777 gal

CELL B

TANK 103 IS 6'-6" DIAM. AND 7' HIGH



SECTION A	$9' \cdot 10' \cdot 22.5'$	=	2025 ft^3
SECTION B	$7' \cdot 11' \cdot 7'$	=	539
SECTION C	$7' \cdot 11' \cdot 7.5'$	=	577
TK-103	$3.14\ (3.25^2)\ 7$	=	(232)

$2909\ ft^3 \times 7.48\ gal/ft^3 = 21759\ g$

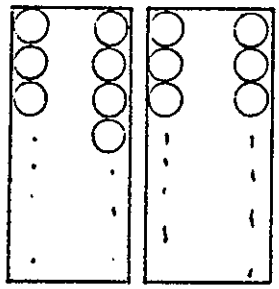
BY [illegible] Goodwin 11/7/91

6-3-91

CALCULATION: MAXIMUM DRUM STORAGE VOLUME & CONTAINMENT SYSTEM VOLUME

PROJECT: 222-S PART B PERMIT APPLICATION 1-817-03-894-00

P. JENKINS

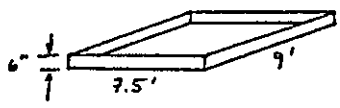


TOTAL CONTAINER VOLUME =

36 DRUMS x 55 GAL/DRUM = 1,980 GAL

TEN PERCENT OF TOTAL VOLUME =

0.10(1,980 GAL) = 198 GAL



CONTAINMENT BASIN

CONTAINMENT BASIN VOLUME =

(7.5' x 9' x 0.5') 7.48 GAL/CF = 253 GAL

TWO BASINS PER CONEX BOX, TWO CONEX BOXES IN DMWSA,

∴ TOTAL CONTAINMENT VOLUME =

2(2)(252.5 GAL) = 1,010 GAL

1,010 GAL > 198 GAL ∴ CONTAINMENT IS SUFFICIENT

TOTAL ANTICIPATED WASTE VOLUME

- ASSUME 15 GAL WASTE/DRUM

VOLUME = 36 DRUMS (15 GAL/DRUM) = 540 GAL

∴ CONTAINMENT SYSTEM CAN HOLD APPROX. TWICE THE TOTAL VOLUME OF WASTE STORED IN DMWSA.

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APPENDIX 4C

PROFESSIONAL ENGINEER CERTIFICATION OF 219-S WASTE HANDLING FACILITY TANK SYSTEM INTEGRITY ASSESSMENT REPORT

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**Independent, Qualified,
Registered Professional Engineer
Certification of**

**219-S AQUEOUS WASTE DISPOSAL FACILITY
TANK SYSTEM INTEGRITY ASSESSMENT
REPORT**

The results of the leak tests, inspections, and analyses performed for this assessment utilizing the tank system operating parameters provided by the facility engineering staff indicate:

1) The tank system is not leaking.

2) Tanks TK-101 and TK-102 and the TK-103 cover/support slab are not adequately restrained to resist lateral loading such as a design basis earthquake (0.12g) according to current design criteria for seismic loads.

3) The chemically resistant coating of the Cell A and B structural concrete is no longer intact and no longer provides corrosion protection to the structural concrete.

4) The PTFE (Teflon) gaskets used to seal flanged connections in Cell B of the vault have been exposed to radiation doses above the recommended damage threshold.

5) The Cover blocks are not adequately sealed, resulting in migration of rain water and soils into the secondary containment.

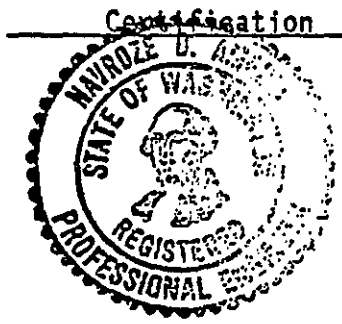
6) The Crib Waste Storage Line has a flaw that appears to be a manufacturing defect. Confirmatory examination of this flaw remains an open item to be closed through the WHC Non-Conformance control system (WHC NCR#B03213)

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and that, based on my assessment of the plans and procedures utilized for obtaining the information, I believe that the 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."

Navroze D. Amaria 6/8/90

Navroze D. Amaria Date

Certification



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APPENDIX 4D

THEORETICAL AIRBORNE EMISSION CALCULATIONS FOR THE 219-S WASTE HANDLING FACILITY TANKS

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ES ENGINEERING-SCIENCE

Client WHC
Subject Air Emissions from 219-S tanks

Job No. RL026
By GCD
Checked [illegible]

Sheet 1 of 9
Date 9/3/91
Rev. 0

PURPOSE: FIND THEORETICAL EMISSIONS FROM THE AQUEOUS WASTE TANK SYSTEM IN THE 219-S WASTE HANDLING FACILITY.

BACKGROUND: THERE IS NO MONITORING DATA AVAILABLE FOR THE TANK VENTILATION EMISSIONS THROUGH THE 296-S-16 STACK. THE FOLLOWING COMPOUNDS ARE KNOWN TO BE PRESENT IN THE TANKS, AND COULD VOLATILIZE TO THE AIRSTREAM.

COMPOUND	TYPICAL CONCENTRATION (ppm)	MOLECULAR WEIGHT lb/lbmole	SATURATED VAPOR PRESSURE[1] (mm Hg)
HEXONE	1.220	100.16	8.57
O-XYLENE	0.085	106.17	9.16
ACETONE	0.108	58.08	263
ETHYLBENZENE	0.007	106.17	9.77
PROPANOL	0.094	60.11	24.3
ETHANOL	0.860	46.07	62.6

SOLUTION: IN ORDER TO FIND THE FRACTION OF THE COMPOUND THAT IS VOLATILE, ASSUME AN IDEAL SOLUTION AND ASSUME HENRY'S LAW APPLIES.

HENRY'S LAW: $V_{SOLN} = X_i V_{SAT}$

WHERE V_{SOLN} = VAPOR PRESSURE OF COMPOUND IN SOLUTION
X_i = MOLAR FRACTION OF COMPOUND
V_{SAT} = VAPOR PRESSURE OF PURE COMPOUND

1. SOURCE: CRC Handbook, 1980 assumed 25°C

ES-COR-8 (5/88)

THE FIRST STEP IN CALCULATING THE VAPOR PRESSURE FROM THE COMPOUND IS TO FIND THE MOLAR FRACTION OF THE COMPOUND IN SOLUTION. ASSUMING A DILUTE SOLUTION, THE SOLUTION MOLECULAR WEIGHT IS ASSUMED AT 18 lb/lb-mole. THE MOLE FRACTION, X_i, CAN BE FOUND AS FOLLOWS.

$$X_i = \frac{(C_i)(18\ lb/lbmole\ soln)}{10^6 (MW_i)}$$

WHERE

X_i = MOLE FRACTION OF COMPOUND i
C_i = CONCENTRATION OF i IN SOLUTION
MW_i = MOLECULAR WEIGHT OF i

FOR HEXONE

$$X_{HEXONE} = \frac{\left(\frac{1.220\ lb\ Hexone}{10^6\ lb\ soln}\right)\left(\frac{18\ lb\ soln}{lb\ mole\ soln}\right)}{\left(\frac{100.16\ lb\ Hexone}{lb\ mole\ Hexone}\right)} = 2.2 \times 10^{-7}\ \frac{lb\ mol\ Hexone}{lb\ mol\ Solution}$$

FOR THE REMAINING COMPOUNDS, THE MOLE FRACTIONS ARE

$X_{XYLENE} = 1.4 \times 10^{-8}$
$X_{ACETONE} = 3.3 \times 10^{-8}$
$X_{ETHYLBENZENE} = 1.2 \times 10^{-9}$
$X_{PROPANOL} = 2.8 \times 10^{-8}$
$X_{ETHANOL} = 3.4 \times 10^{-7}$

FROM HENRY'S LAW, THE VAPOR PRESSURE FROM THE COMPOUNDS IS CALCULATED. FOR EXAMPLE, THE HEXONE CONTRIBUTION TO THE TANK PRESSURE IS

$$V_{HEXONE} = (2.2 \times 10^{-7})(8.57 \text{ mmHg}) = 1.9 \times 10^{-6} \text{ mmHg}$$

FOR THE REMAINING COMPOUNDS

$V_{XYLENE} = 1.3 \times 10^{-7}$ mmHg
$V_{ACETONE} = 8.7 \times 10^{-6}$ mmHg
$V_{ETHYLBENZENE} = 1.2 \times 10^{-8}$ mmHg
$V_{PROPANOL} = 6.8 \times 10^{-7}$ mmHg
$V_{ETHANOL} = 2.1 \times 10^{-5}$ mmHg

IN ORDER TO DETERMINE THE CONCENTRATION OF COMPOUND i IN THE TANK OFF-GAS, FIRST FIND THE MOLE FRACTION IN THE VAPOR, AND USE THE IDEAL GAS LAW AND THE VOLUMETRIC FLOWRATE TO ESTABLISH EMISSION RATES. FOR HEXONE, THE MOLE FRACTION IN THE VAPOR CAN BE FOUND

$$X_{HEXONE\,VAPOR} = \frac{V_{HEXONE\,VAPOR}}{V_{TANK\,SPACE}}$$

WHERE $V_{TANK\,SPACE}$ = PRESSURE WITHIN THE TANK (ASSUMED TO BE 740 mmHg)

THEREFORE

$$X_{HEXONE} = \frac{1.9 \times 10^{-6} \text{ mmHg}}{740 \text{ mmHg}} = 2.6 \times 10^{-9}$$

FOR THE REMAINING COMPOUNDS, THE MOLE FRACTIONS ARE

$X_{XYLENE\ VAPOR} = 1.8 \times 10^{-10}$
$X_{ACETONE\ VAPOR} = 1.2 \times 10^{-8}$
$X_{ETHYLBENZENE\ VAPOR} = 1.6 \times 10^{-11}$
$X_{PROPANOL\ VAPOR} = 9.2 \times 10^{-10}$
$X_{ETHANOL\ VAPOR} = 2.8 \times 10^{-8}$

THESE CALCULATIONS ARE CONSERVATIVE IN THAT THEY ASSUME CONSTANT EQUILIBRIUM WITHIN THE TANK HEADSPACE. THE VENTILATION AIR THROUGH THE TANKS IS 140 ft^3/min. THE FRACTION OF COMPOUND i EXHAUSTED TO THE 296-S-16 STACK IS

$$F_i = (X_{i\,VAPOR})(F_{VENT}) \quad \text{WHERE}$$

F_i = FLOWRATE OF COMPOUND i (ft^3/min)
$X_{i\,VAPOR}$ = MOLE FRACTION OF i IN VAPOR
F_{VENT} = VENTILATION AIR FLOW RATE (ft^3/min)

FOR HEXONE

$$F_{HEXONE} = (2.6 \times 10^{-9})(140\ ft^3/m) = 3.64 \times 10^{-7}\ ft^3/min$$

LIKEWISE, FOR THE REMAINING COMPOUNDS

$F_{XYLENE} = 2.5 \times 10^{-8}\ ft^3/min$
$F_{ACETONE} = 1.7 \times 10^{-6}\ ft^3/min$
$F_{ETHYLBENZENE} = 2.2 \times 10^{-9}\ ft^3/min$
$F_{PROPANOL} = 1.3 \times 10^{-7}\ ft^3/min$
$F_{ETHANOL} = 3.9 \times 10^{-6}\ ft^3/min$

THE IDEAL GAS LAW IS USED TO FIND THE EMISSIONS RATE:

$$E_i = \frac{(P)(F_i)(MW_i)}{(R)(T)}$$ WHERE

P = DISCHARGE PRESSURE (ASSUMED 740 mm Hg = 14.3 lb/in²)
F_i = VOLUMETRIC FLOWRATE OF COMPOUND i (ft³/min)
R = GAS CONSTANT (1545.3 ft·lb/lb mol °R)
T = ABSOLUTE TEMPERATURE (ASSUMED 536°R [25°C])
MW_i = MOLECULAR WEIGHT OF i

FOR HEXONE

$$E_{HEXONE} = \frac{(14.3\ lb/in^2)(144\ in^2/ft^2)(3.64\times10^{-7}\ ft^3/min)(100.16\ \frac{lb}{lb\ mol})}{(1545.3\ \frac{ft\cdot lb}{lb\ mol\ °R})(536°R)}$$

$$= 9.06\times10^{-8}\ lb/min = 5.4\times10^{-6}\ lb/hr = 4.7\times10^{-2}\ lb/yr$$

FOR THE REMAINING COMPOUNDS

$E_{XYLENE} = 6.6\times10^{-9}\ lb/min = 4.0\times10^{-7}\ lb/hr = 3.5\times10^{-3}\ lb/yr$

$E_{ACETONE} = 2.5\times10^{-7}\ lb/min = 1.5\times10^{-5}\ lb/hr = 1.3\times10^{-1}\ lb/yr$

$E_{ETHYLBENZENE} = 5.8\times10^{-10}\ lb/min = 3.5\times10^{-8}\ lb/hr = 3.1\times10^{-4}\ lb/yr$

$E_{PROPANOL} = 1.9\times10^{-8}\ lb/min = 1.1\times10^{-6}\ lb/hr = 1.0\times10^{-2}\ lb/yr$

$E_{ETHANOL} = 4.5\times10^{-7}\ lb/min = 2.7\times10^{-5}\ lb/hr = 2.4\times10^{-1}\ lb/yr$

AS CALCULATED ABOVE, THE TYPICAL EMISSIONS FROM THE TANKS ARE EXTREMELY LOW, AND CAN BE CONSIDERED NEGLIGABLE. THE CONCENTRATIONS OF THE COMPOUNDS IN THE AIR STREAM CAN BE CALCULATED AS FOLLOWS.

THE VENTILATION AIR MOLAR FLOWRATE IS CALCULATED USING THE IDEAL GAS LAW, WHERE F_{AIR} IS 140 cfm.

$$n_{VAIR} = \frac{(P)(F_{air})}{(R)(T)} = \frac{(14.3\ lb/in^2)(144\ in^2/ft^2)(140\ ft^3/min)}{\left(1545.3\ \frac{ft\ lb}{lbmol\ °R}\right)(536\ °R)}$$

$$= 0.348 \text{ mole VENTILATION AIR/MIN}$$

THE NUMBER OF MOLES OF COMPOUND i EMITTED FROM A TANK CONTAINING PURE i IS CALCULATED AS

$$n_{PURE\,i} = (n_{VAIR})\left(\frac{V_{SAT\,i}}{P}\right) \quad \text{WHERE}$$

$n_{PURE\,i}$ = NUMBER OF MOLES OF i IN AIRSTREAM

$V_{SAT\,i}$ = SATURATED VAPOR PRESSURE OF i FROM PAGE 1

P = OPERATING PRESSURE OF THE TANK (740 mm Hg)

FOR COMPARISON, CALCULATE EMISSIONS FROM "PURE i" IN THE TANKS TO ILLUSTRATE THE INHERENT CONSERVATISM IN THESE CALCULATIONS.

FOR HEXONE, THE NUMBER OF MOLES EMITTED FROM TANKS CONTAINING PURE HEXONE WOULD BE

$$n_{HEXONE} = \frac{(0.348)(8.57\,mmHg)}{790\,mmHg} = 4.0\times10^{-3}\,mol/min$$

CONVERT TO lb/hr AND lb/yr

$$E_{HEXONE} = \frac{4.0\times10^{-3}\,mole}{min} \cdot \frac{100.16\,lb}{mole} \cdot \frac{60\,min}{hr} = 24\,lb/hr = 2.1\times10^{5}\,lb/yr$$

LIKE WISE FOR THE REMAINING COMPOUNDS

$E_{XYLENE} = 27\,lb/hr = 2.4\times10^{5}\,lb/yr$

$E_{ACETONE} = 430\,lb/hr = 3.8\times10^{6}\,lb/yr$

$E_{ETHYLBENZENE} = 29\,lb/hr = 2.6\times10^{5}\,lb/yr$

$E_{PROPANOL} = 41\,lb/hr = 3.6\times10^{5}\,lb/yr$

$E_{ETHANOL} = 81\,lb/hr = 7.1\times10^{5}\,lb/yr$

THESE CALCULATIONS ILLUSTRATE THE EXTREME CONSERVATISM USED IN THESE EMISSION CALCULATIONS. NO NONAQUEOUS WASTE IS STORED IN THE 219-S TANK SYSTEM, AND THE "PURE ORGANIC" CALCULATIONS ARE FOR ILLUSTRATIVE PURPOSES.

TO OBTAIN A COMPARISON TO ESTABLISHED HEALTH-BASED CRITERIA, COMPARE THE TYPICAL EMISSIONS TO OCCUPATIONAL EXPOSURE LIMITS (OELS) ESTABLISHED BY NIOSH.

ES ENGINEERING-SCIENCE

Client WHC | Job No. RL026 | Sheet 8 of 9
Subject AIR EMISSIONS FROM 219-S TANKS | By GCD | Date 9/3/91
Checked PRJ | Rev. 0

FIRST, CONVERT THE TYPICAL EMISSIONS TO mg/m^3. FOR HEXONE, FOR EXAMPLE

$$\left(\frac{5.4\times10^{-6}\,lb}{hr}\right)\left(\frac{hr}{60\,min}\right)\left(\frac{1\,mol}{140\,ft^3}\right)\left(\frac{35.315\,ft^3}{m^3}\right)\left(\frac{1\,kg}{2.2\,lb}\right)\left(\frac{10^6\,mg}{kg}\right)=0.01\,mg/m^3$$

THE FOLLOWING TABLE SHOWS THE COMPARISON OF THE CONCENTRATION AT THE 219-S STACK OUTLET TO THE OELS.

COMPOUND	STACK OUTLET CONCENTRATION (mg/m^3)	OEL[3] (mg/m^3)	% OEL
HEXONE	0.01	205	4.9×10^{-3}
XYLENE	7.7×10^{-4}	450	1.8×10^{-4}
ACETONE	2.9×10^{-2}	590	4.9×10^{-3}
ETHYLBENZENE	6.7×10^{-5}	435	1.5×10^{-5}
PROPANOL	2.1×10^{-3}	500	4.2×10^{-4}
ETHANOL	5.2×10^{-2}	N/A	N/A

BASED ON THIS COMPARISON, THE EMISSIONS DO NOT POSE A HEALTH RISK TO ONSITE OR OFFSITE PERSONNEL, AS THE EMISSION CONCENTRATIONS ARE ORDERS-OF-MAGNITUDE BELOW ACCEPTED SAFETY LEVELS.

3. SOURCE NIOSH POCKET GUIDE TO CHEMICAL HAZARDS, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, JUNE 1990

SUMMARY OF ASSUMPTIONS AND CONCLUSIONS

ASSUMPTION 1. EQUILIBRIUM BETWEEN THE AIRSTREAM AND THE LIQUID IS CONSTANT DURING OPERATION OF THE TANKS.

2. HENRY'S LAW APPLIES TO DILUTE SOLUTIONS

3. THE DEMISTER REMOVES NO CONTAMINANTS

4. ONLY VOLATILE ORGANICS ARE EMITTED FROM THE TANKS. INORGANICS DO NOT CONTRIBUTE TO THE AIRSTREAM.

5. TYPICAL CONCENTRATIONS OF ORGANICS WERE TAKEN FROM TABLE 3-5.

CONCLUSIONS 1. THE NONRADIOACTIVE EMISSIONS DO NOT POSE A THREAT TO HEALTH OF WORKERS OR THE PUBLIC

2. THE EMISSIONS CAN BE CONSIDERED INSIGNIFICANT

3. HOURLY AND YEARLY EMISSIONS ARE SIGNIFICANTLY BELOW 1 POUND PER YEAR FOR EACH CONTAMINANT.

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APPENDIX 4E

RADIOACTIVE LIQUID WASTE LINES UPGRADES CONCEPTUAL PROJECT SCHEDULE

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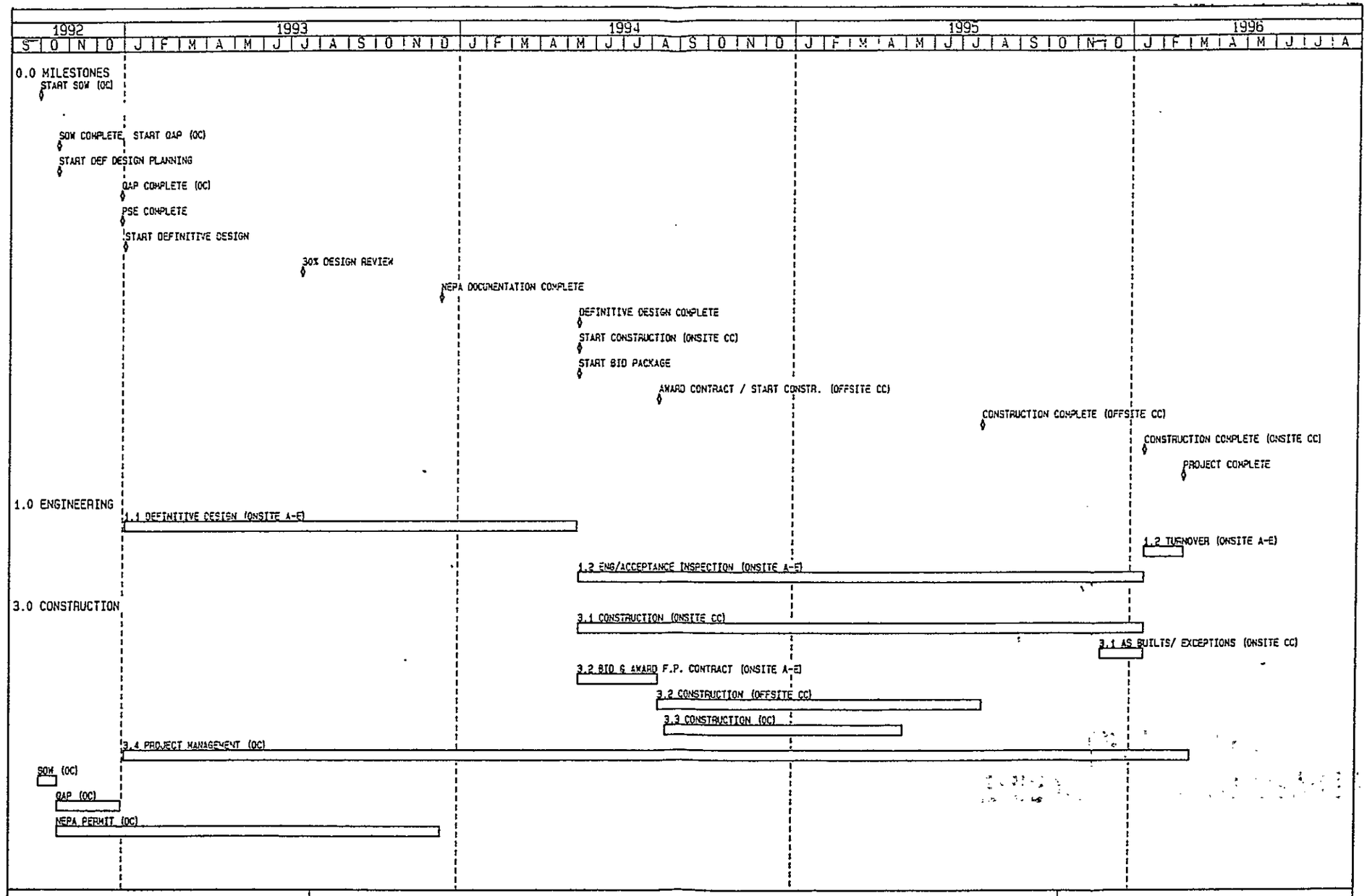

Summary Bar/ Early Dates
Critical Designator
Progress Bar

Primavision PC ENGR

Sheet 1 of 1

RADIOACTIVE LIQUID WASTE LINES UPGR.
W-087, CONCEPTUAL PROJ SCHED / REV 0

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KAISER ENGINEERS HANFORD

Rev.	Approval	Company	Date

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APPENDIX 7A

BUILDING EMERGENCY PLAN FOR 222-S LABORATORY COMPLEX

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This building emergency plan is required to be completed and maintained on an annual basis for all facilities covered by a safety analysis report; designated as a nuclear reactor, nuclear facility, treatment storage or disposal facility; requiring a permit to operate under *Resource Conservation and Recovery Act* regulations; or presents a significant hazard to surrounding facilities or personnel.

This plan covers the following buildings and structures: 222-S Complex.

Approved:

Building Emergency Director	Date 12/12/91
Manager, Emergency Preparedness, or Delegate	Date 12/12/91
Nuclear Facility Safety Representative	Date 12-13-91
Environmental Compliance Representative	Date 12-12-91

This document will be reviewed and updated at least annually by the Building Emergency Director and approved by the Manager, Emergency Preparedness, or his delegate.

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1.0 INTRODUCTION

This Emergency Plan has been designed to provide a system of planned responses that will minimize risks to personnel, equipment, buildings, and the environment in the event of an emergency situation. This plan is applicable to the total complex, employees, and visitors identified in Section 1.1. If visitors are present during implementation of this plan, the escorting employee is responsible for their safety and for ensuring their compliance with emergency responses. Unescorted visitors should be directed to respond by any building employee.

Emergency situations for this complex requiring emergency response plans are identified in Section 3.0 POTENTIAL EMERGENCY CONDITIONS. The six categories of emergencies considered are identified as follows:

- Operational Emergencies, to include Security Events
- Natural Hazards
- Nonradioactive Hazardous Material Hazards
- Radioactive Material
- Criticality
- Explosive Materials/Munitions.

Planned responses are those activities that are intended to provide direction to contain a fire, to minimize the immediate effects of an explosion, to contain a spill or release, and to minimize the effects of a criticality incident. These responses include, for example, notification of personnel, emergency organizations, and the Building Emergency Director. The plan also provides guidance for notifying personnel to take cover, evacuate, or take other actions, which are determined by the particular circumstances. The planned responses also provide for formal notification and reporting, investigation of the incident, cleanup, and restoration.

The 222-S Laboratory Complex is located on the 560 square mile (1,450 square kilometer), U.S. Department of Energy (DOE) Hanford Site in southeastern Washington State. The 222-S Laboratory Complex, as presented in Figure 1-1, is located in the southeastern portion of the 200 West Area.

A discussion of the operations within the 222-S Laboratory Complex is contained in Section 1.4.

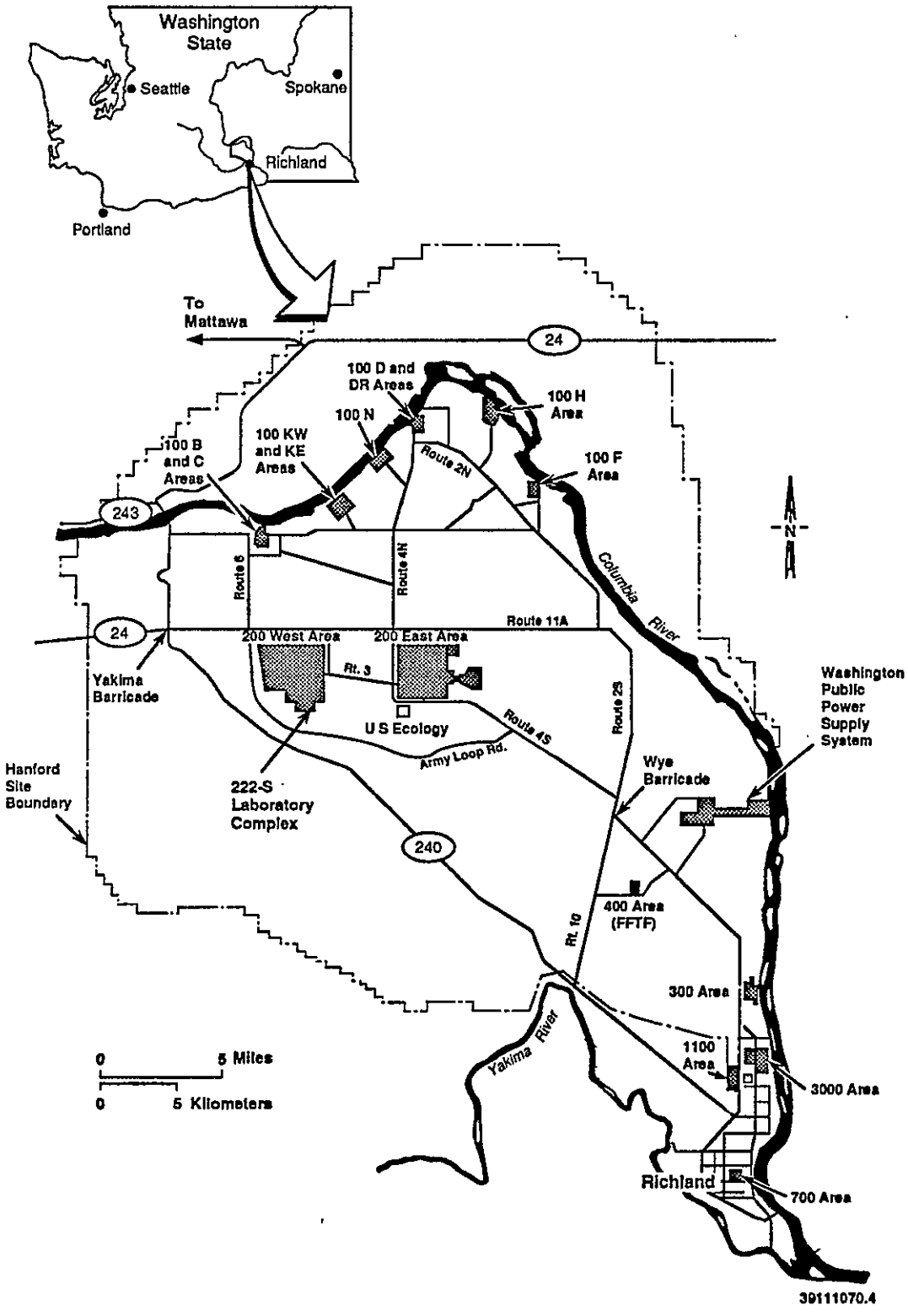
1.1 FACILITY NAME: 222-S Laboratory Complex
U.S. Department of Energy, Hanford Site,
Richland, Washington.

1.2 FACILITY LOCATION: Benton County, Washington, within the 200 West Area

The buildings identified as the 222-S Laboratory Complex are as follows:

Building	Description
222-S	Analytical Laboratory, including the Laboratory Annex

Figure 1-1. Location of 222-S Laboratory Complex.



222-SA	Standard and Process Development Laboratory
2704-S	Engineering and Operations Offices
MO-028	Engineering and Operation Offices
MO-037	Engineering and Operation Offices
MO-039	Engineering and Operation Offices
MO-346	Engineering and Operation Offices
MO-924	Engineering and Operation Offices
MO-936	Engineering and Operation Offices
MO-947	Engineering and Operation Offices
207-SL	Retention Basin for Liquid Wastewater
218-W-7	Inactive Dry Waste Burial Ground
219-S	Waste Handling Facility
Dangerous and Mixed Waste Storage Area	
222-SB	High Efficiency Particulate Air (HEPA) Filter Building
222-SC	HEPA Filter Building
222-SD	Solid Radioactive Waste Interim Storage
222-SF	Noncontaminated Equipment Storage
2716-S	Storage and Work Order Equipment Staging
Satellite Accumulation and Temporary (Less-than-90-Day) Storage Areas	

1.3 OWNER

U.S. Department of Energy Field Office, Richland
Federal Building
825 Jadwin Avenue
Richland, Washington 99352

CO-OPERATOR

Westinghouse Hanford Company
P. O. Box 1970
Richland, Washington 99352

1.4 DESCRIPTION OF THE FACILITY AND OPERATIONS

The 222-S Laboratory Complex was constructed between 1950 to 1951 to provide analytical and plant support for the S-Plant Reduction-Oxidation (REDOX) Complex. Through the years, the missions of the 222-S Laboratory

Complex have changed, and modifications have been made in response to new requirements and to increasingly restrictive operating and design criteria.

A simplified layout of the 222-S Laboratory Complex and associated buildings is shown in Figure 1-2. The following is a short description of the major buildings and areas of the 222-S Laboratory Complex.

- 222-S

The 222-S Analytical Laboratory is a two story building, 322 feet (98 meters) long and 107 feet (33 meters) wide, located in the southeast corner of the 200 West Area.

The design of the 222-S Analytical Laboratory provides for all laboratory work to be done within the building. The building is provided with several support function shops for maintenance, instrument repair and service, electricians, millwrights, pipefitters, and glass work. Areas for laboratory material storage, liquid and solid waste accumulation and storage, and filtration and exhaust are provided in areas adjacent to the 222-S Analytical Laboratory Building.

The first floor of 222-S (Figure 1-3) is divided into three general areas. The west end contains the lunchroom, offices, and locker rooms that are maintained free of radioactivity and toxic chemicals. The central section contains laboratories and service areas for work with low- to intermediate-level radioactive and/or toxic materials, although an occasional high-level sample might be located in this area. The east end, commonly referred to as the MultiCurie Section, contains laboratories, hot cells, and service areas for working with intermediate- to high-level radioactive samples. The central and east sections contain laboratory benches and hoods that are supplied with services such a electrical outlets, sanitary and distilled water, propane, compressed air, and process vacuum. The partial basement (Figure 1-4) contains service piping, vacuum pumps, a counting room, an instrument maintenance shop, and a scanning electron microscope laboratory. The second floor (Figure 1-5) contains the ventilation supply fans, supply and exhaust ductwork, the ventilation system operation and control room, a glass shop, and storage areas. The second floor is maintained free of radioactive contamination.

- 2704-S

The 2704-S Building is located directly west of the 222-S. This is an office building for laboratory management, engineering, statistics, and other support personnel.

- 2716-S

The 2716-S Storage Building, located south of the 222-S, is a 1,700 square foot (157.9 square meter) metal building with 200 square foot (18.6 square meter) partitioned off for the storage of acids and bases. The building provides both long- and short-term storage capacity for laboratory

Figure 1-2. 222-S Laboratory Complex.

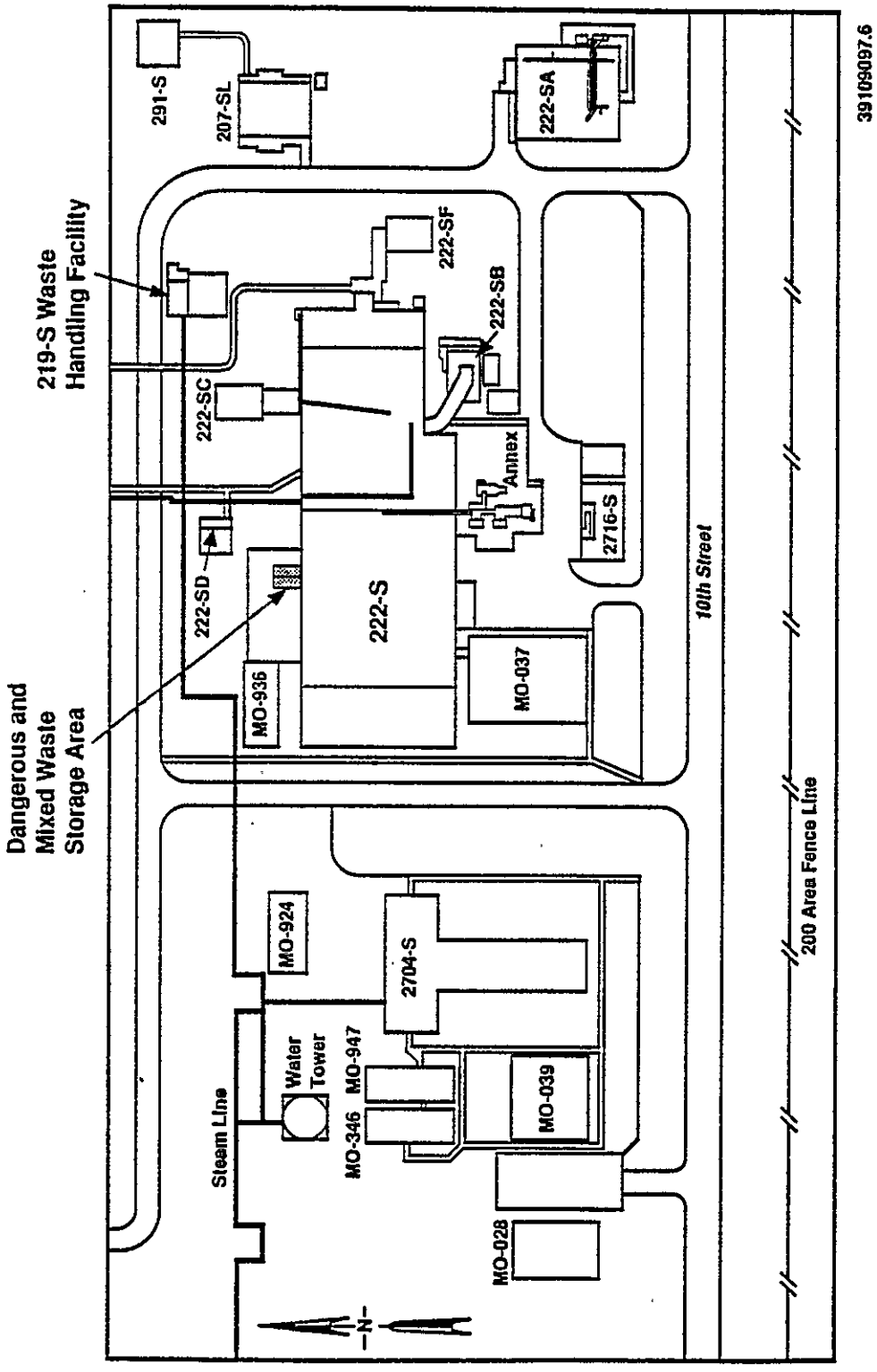


Figure 1-3. 222-S Laboratory First Floor Plan.

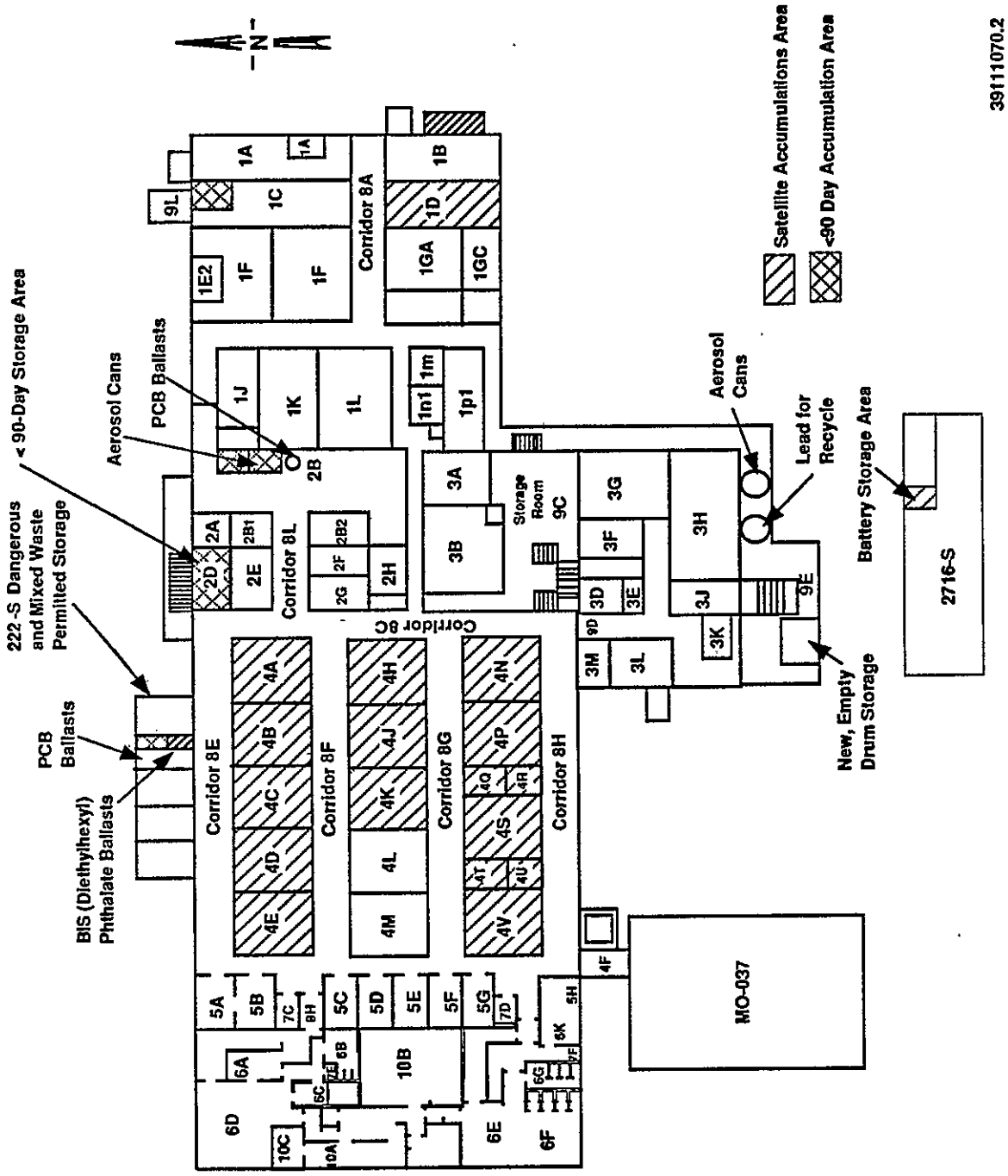


Figure 1-4. Tunnel or Basement 222-S Laboratory.

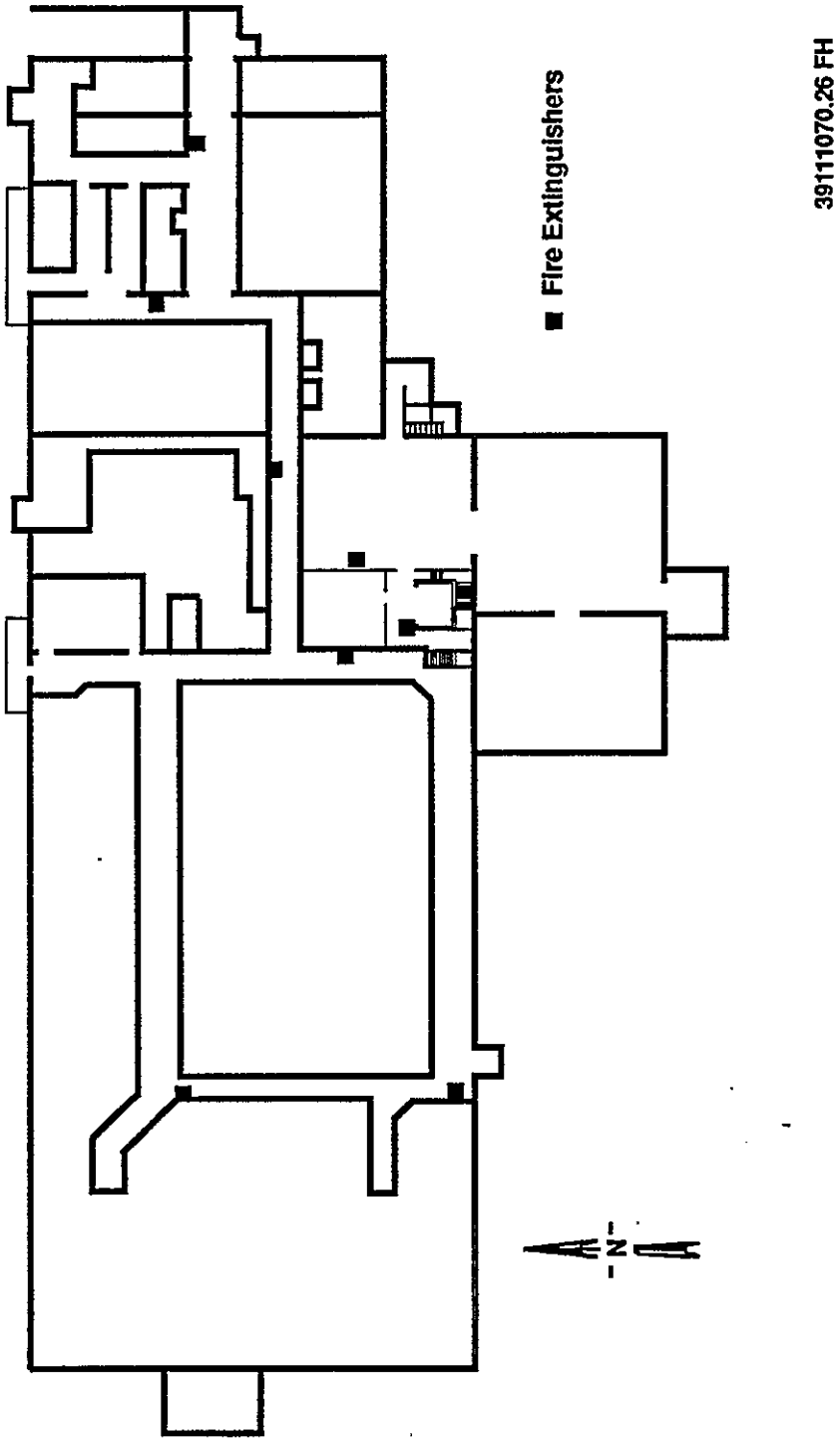
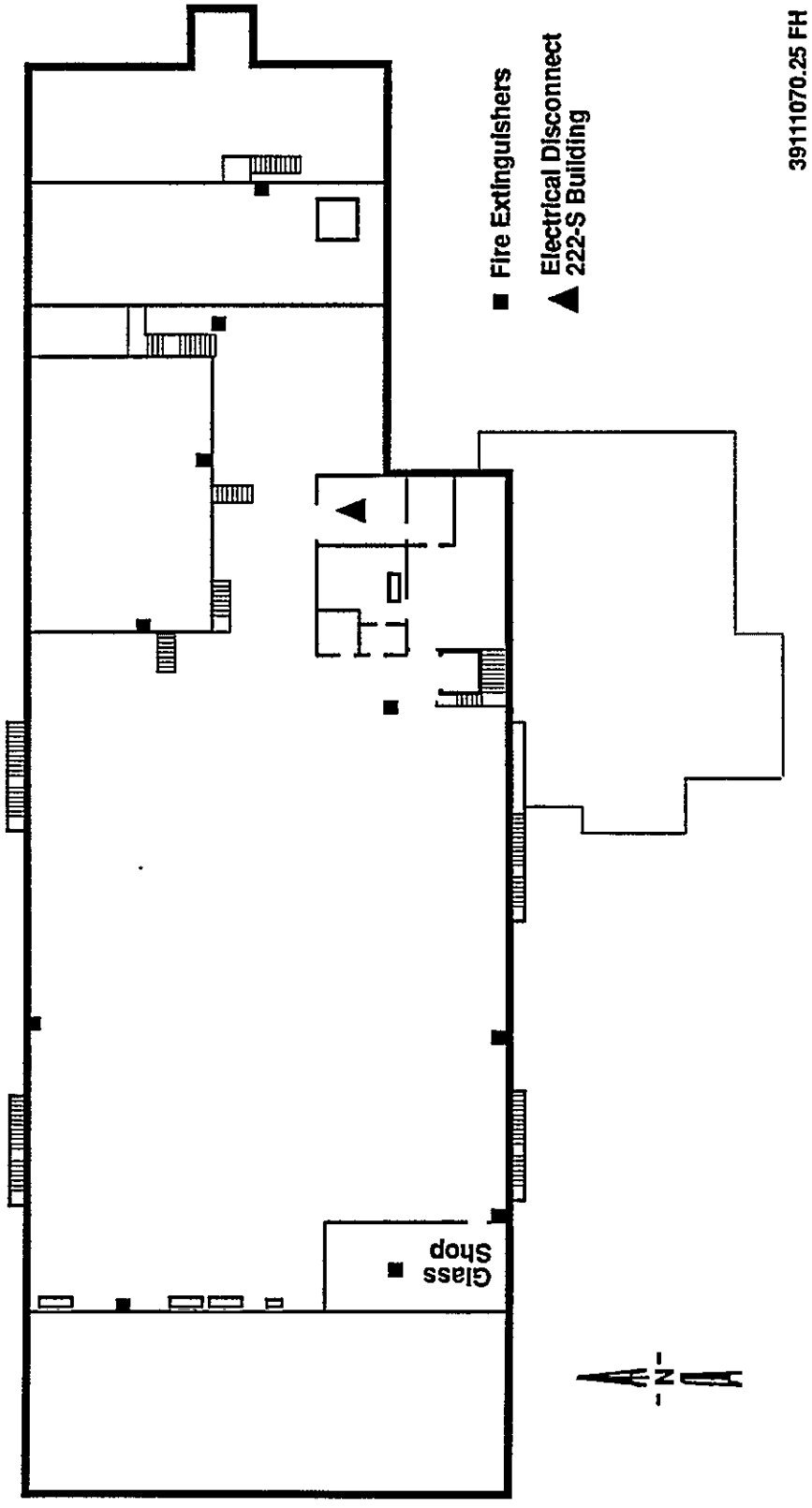


Figure 1-5. Second Floor 222-S Laboratory.



materials and contains no radioactive materials. It is protected with a dry pipe automatic sprinkler system, heat detectors, a manual pullbox, and portable fire extinguisher. The hazardous storage area is equipped with explosion proof lighting, a separate ventilation system, and a fire wall to meet Occupational Safety and Health Act (OSHA) safety requirements for volatile liquid combustibles, although no volatile liquid combustibles are stored in the building.

- Annex

The 222-S Laboratory Annex (Figure 1-2) houses the maintenance shop, instrument shop, and the counting room filter building.

- 222-SA

The 222-SA Laboratory is a five-wide trailer located southeast of the 222-S. Part of this laboratory prepares nonradioactive standards for the PUREX Analytical Laboratory, 234-5 Analytical Laboratory, and the 222-S Analytical Laboratory. The other section of the laboratory is used to support non-radioactive process development work.

- MO-037

The MO-037 is a six-wide trailer adjacent to the south side of the 222-S. This trailer is an office area and contains the laboratory's data acquisition system.

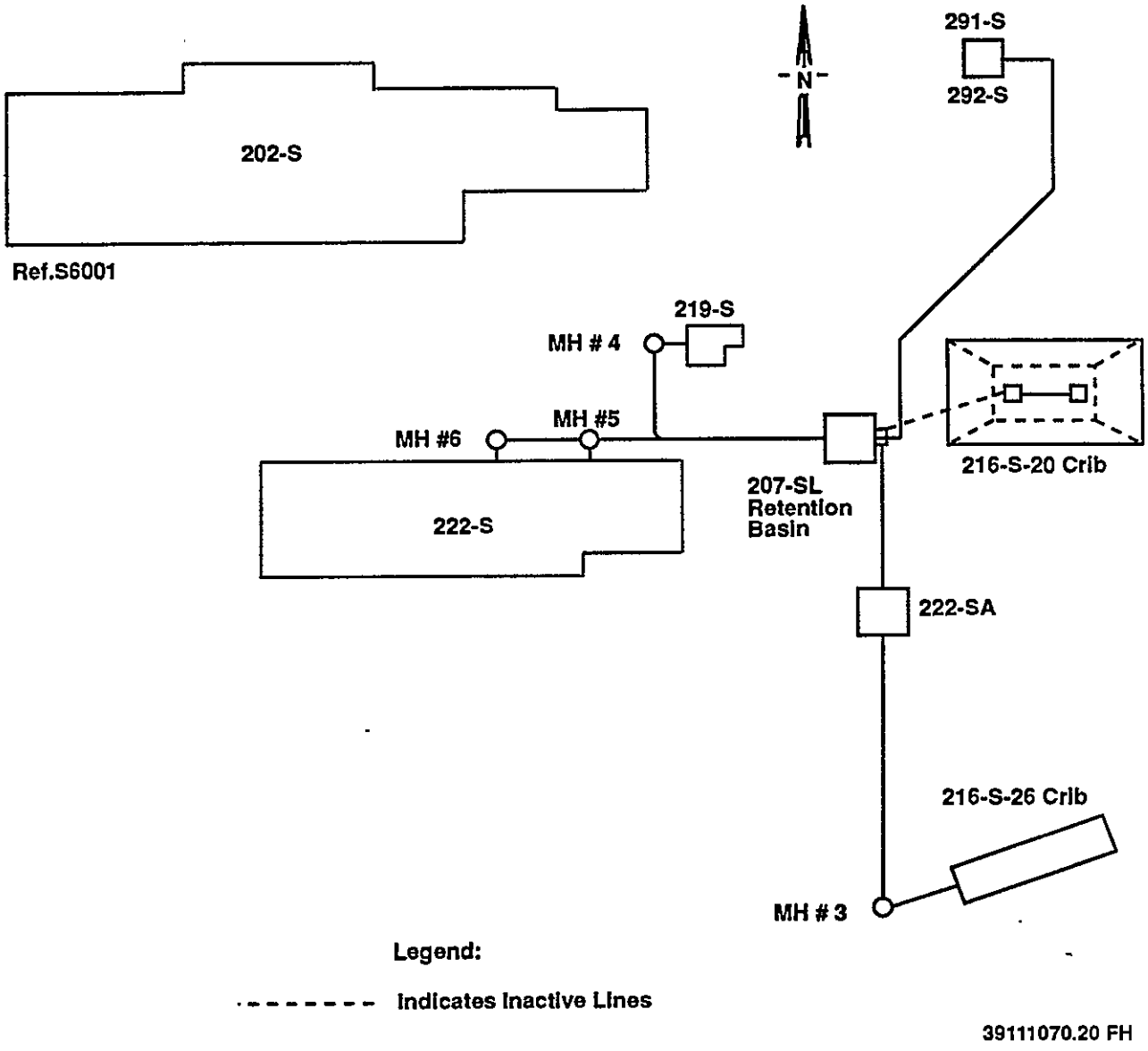
- 207-SL

The 207-SL Retention Basin (Figure 1-6) acts as a temporary holding basin for potentially radioactive or dangerous liquid effluents before discharge to the 216-S-26 Crib. Waste water from the laboratory, normally free of radioactive and dangerous chemical contamination, is routed to the 207-SL Retention Basin. This basin is a belowgrade concrete structure, directly east of the 222-S Building. Two 25,000-gallon (94,635-liter) compartments allow batch collection, sampling, and discharge of the waste. If the waste water meets alpha, beta, gamma, and pH specifications for surface discharge (WHC-CM-7-5), the waste water is routed to the 216-S-26 Crib, located southeast of 222-S, outside the 200 West exclusion area. Water not meeting radioactive specifications is routed to the 219-S Waste Handling Facility for treatment and storage in underground storage tanks before transfer to the Double-Shell Tank System. Water not meeting pH and/or dangerous waste requirements is handled as the situation necessitates.

- 219-S

The 219-S Waste Handling Facility is located northeast of the 222-S Analytical Laboratory. The 219-S Waste Handling Facility contains three stainless steel tanks; tank 101 [4,000 gallon (15,142 liter)], tank 102 [4,000 gallon (15,142 liter)], and tank 103 [1,500 gallon (5,678 liter)] located in an underground concrete vault. Tanks tank 101 and tank 103 are

Figure 1-6. Location of 207-SL Retention Basin.



used for the primary band backup storage of mixed waste from the 222-S Analytical Laboratory. The mixed waste is transferred from tank 101 and tank 103 to tank 102 for treatment and storage before transfer to the Double-Shell Tank System. The mixed waste is treated in tank 102 with sodium hydroxide (NaOH) to a pH greater than or equal to 12.0 and sodium nitrite ($NaNO_2$) to a concentration of 600 parts per million. This treatment process makes the mixed waste more amenable for storage in the DST System. (Figure 1-7).

- **Dangerous and Mixed Waste**

The Dangerous and Mixed Waste Storage Area is located on the north side of the 222-S Analytical Laboratory. The Dangerous and Mixed Waste Storage Area consists of two metal storage structures resting on a concrete pad. The Dangerous and Mixed Waste Storage Area stores drums of mixed waste and nonradioactive dangerous waste until transferred to the Hanford Central Waste Complex (mixed waste) or the 616 Nonradioactive Dangerous Waste Storage Facility (nonradioactive dangerous waste) for storage and/or disposal.

- **MO-936**

The MO-936, located on the north side of 222-S, is a double-wide trailer used for offices.

- **222-SD**

The 222-SD Solid Waste Handling/Storage System is a concrete shielded drum storage area. This area is used for temporary storage of radioactive waste drums, before transfer to a burial ground. The area is equipped with an electrically-driven jib crane for remotely positioning the drums in the storage area and for remotely loading the drums on the bed of the waste truck.

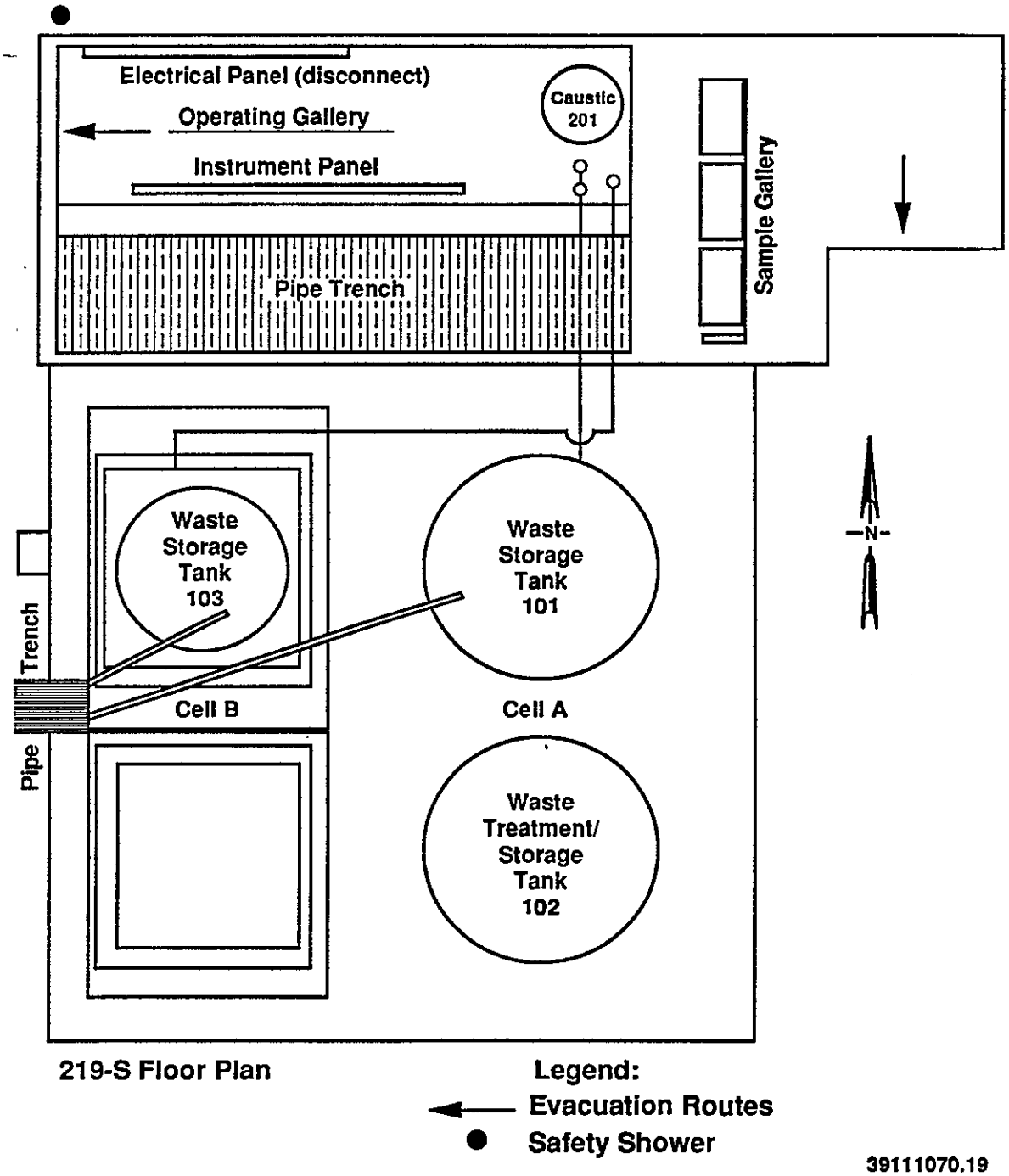
- **222-SC**

The 222-SC Filter Building contains the 2nd and 3rd stage HEPA filtration for Hot Cells 1-A, 1-E-1, 1-E-2, and 1-F. The hot cells in Rooms 1-A, 1-E, and 1-F are serviced by the main building supply and exhaust ventilation, but to increase safety and containment, additional features are presented. The 222-SC Filter Building houses five parallel pairs of HEPA filters, which provide filtration to hot cells exhaust air before the air enters the main exhaust plenum and final filtering in the 222-SB Filter Building. In total, four stages of HEPA filtration are provided for hot cell exhaust.

- **222-SB**

The 222-SB Filter Building houses 96 HEPA filters to provide final filtration for the 222-S. Under normal operation of the ventilation system, two 46,000 cubic feet (1,303 cubic meters) per minute fans exhaust air from the laboratory. Exhaust air leaves the 222-S Building through the 296-S-21 stack. A third exhaust fan, driven by a diesel engine, will provide half of the normal operation of the exhaust system if the electrically powered

Figure 1-7. 219-S Waste Treatment Facility.



fans are lost. All HEPA filters in laboratory outlets and stack discharges are tested annually with dioctylphthalate (DOP) or certified equivalent to assess filter efficiency. Filters that fail to meet performance standards are replaced.

- **222-SF**

The 222-SF is a steel building that is used as a material staging area for new laboratory equipment before installation.

- **218-W-7**

The 218-W-7 Dry Waste Burial Ground is located south of 222-SF (Drawing No. H-2-5170). This underground tank was removed from service sometime before 1975. It was used primarily for disposal of contaminated dry hood waste generated by the 222-S.

There are two *Resource Conservation and Recovery Act* (RCRA)-regulated units in the 222-S Laboratory Complex. These are the 222-S Dangerous and Mixed Waste Storage Area and the 219-S Waste Handling Facility.

- **Satellite Accumulation and Temporary (Less-than-90-Day) Storage Areas**

There are satellite accumulation and temporary (<90-day) storage areas in and around the 222-S Complex. These are identified in Figure 1-3. The number of satellite accumulation areas can vary at times because of the work performed in the laboratories. A complete listing always is available from the Hazardous Materials Coordinator in Room 5C, PAX 206, or on 3-5449. The majority of satellite accumulation areas are laboratory hoods and benchtops, in which waste collection bottles are located. The bottles receive small quantities of liquid mixed waste, are collected at intervals, and moved to Room 2D, the temporary (<90-day) storage area. Expired or no longer needed reagents, and standards area collected as needed and moved to Room 2D or directly to the Dangerous and Mixed Waste Storage Area.

Satellite accumulation areas also are located in the 222-SA (Figure 1-8). The Process Development Laboratory uses a cabinet to accumulate expired chemicals and research waste. The Standards Laboratory uses cabinets and hoods to accumulate hazardous waste liquids and solids.

Solid waste generated from maintenance activities is placed in satellite accumulation areas identified in Figure I-3. Waste collected includes Bis (di Ethylhexyl) phthalate ballasts, aerosol cans, and batteries.

The Bis (di Ethylhexyl) phthalate ballasts satellite accumulation area is a 55-gallon (208-liter) drum used to collect ballasts from fluorescent fixture maintenance. The ballasts are smeared for detectable radioactive contamination, and are released before being placed in the drum.

Aerosol cans are collected in two satellite areas: one in Room 2B and the other outside on the east side of 222-S. Waste aerosol cans from any of

the laboratory areas initially are logged and deposited in 55-gallon (208-liter) drums in Room 2B.

The aerosol cans in the drum in Room 2B are checked at intervals for radioactivity, sorted by their hazardous classification, and disposed of accordingly. Nonhazardous aerosol cans are bagged and sent to an onsite solid waste landfill. Aerosol cans regulated as hazardous are packaged and sent to the 616 Nonradioactive Dangerous Waste Storage Facility. Any aerosols regulated as mixed waste are packaged and sent to the Hanford Central Waste Complex.

The 222-SC Building contains a satellite accumulation area for unused non-radioactive and very low level radioactive samples that are returned to the Hanford Site from offsite laboratories. These samples consist mostly of wellwater and soils being characterized.

1.5 BUILDING EVACUATION ROUTING (BUILDING LAYOUT)

The following figures provide identification of emergency evacuation routes from the 222-S Laboratory Complex to the staging area(s) and, if necessary, evacuation routes within the 222-S Laboratory Complex.

1.5.1 Building Evacuation Routes (Building Layout and Exits)

Figures 1-8, 1-9, and 1-10 show the layouts and exits for Buildings 222-SA, 222-S, and 219-S, respectively.

1.5.2 Building Evacuation Routes (Building to Primary Staging Area)

Figure 1-11 shows evacuation routes from the 222-S, 219-S, 2704-S, 202-S (not occupied), 222-SA, the Dangerous and Mixed Waste Storage Area, and surrounding trailers to the 222-S Laboratory Complex Primary Staging Area, which is located immediately east of 2704-S Building.

1.5.3 Building Evacuation Routes (Secondary Staging Area)

Figure 1-12 shows evacuation routes from the 222-S, 219-S, 2704-S, 202-S (not occupied), 222-SA, 222-S Dangerous and Mixed Waste Storage Area, and surrounding trailers to the Alternate or Secondary Staging Area. The Secondary Building Staging Area is located immediately east of 222-SA Building.

2.0 PURPOSE

2.1 PURPOSE OF PLAN

The purpose of the 222-S Complex Emergency Plan is to provide employees and visitors information necessary to react to emergency situations.

- Maximize employee safety, minimize the risk to life and health, and provide prompt and efficient treatment for injured persons.

Figure 1-8. 222-SA Floor Plan.

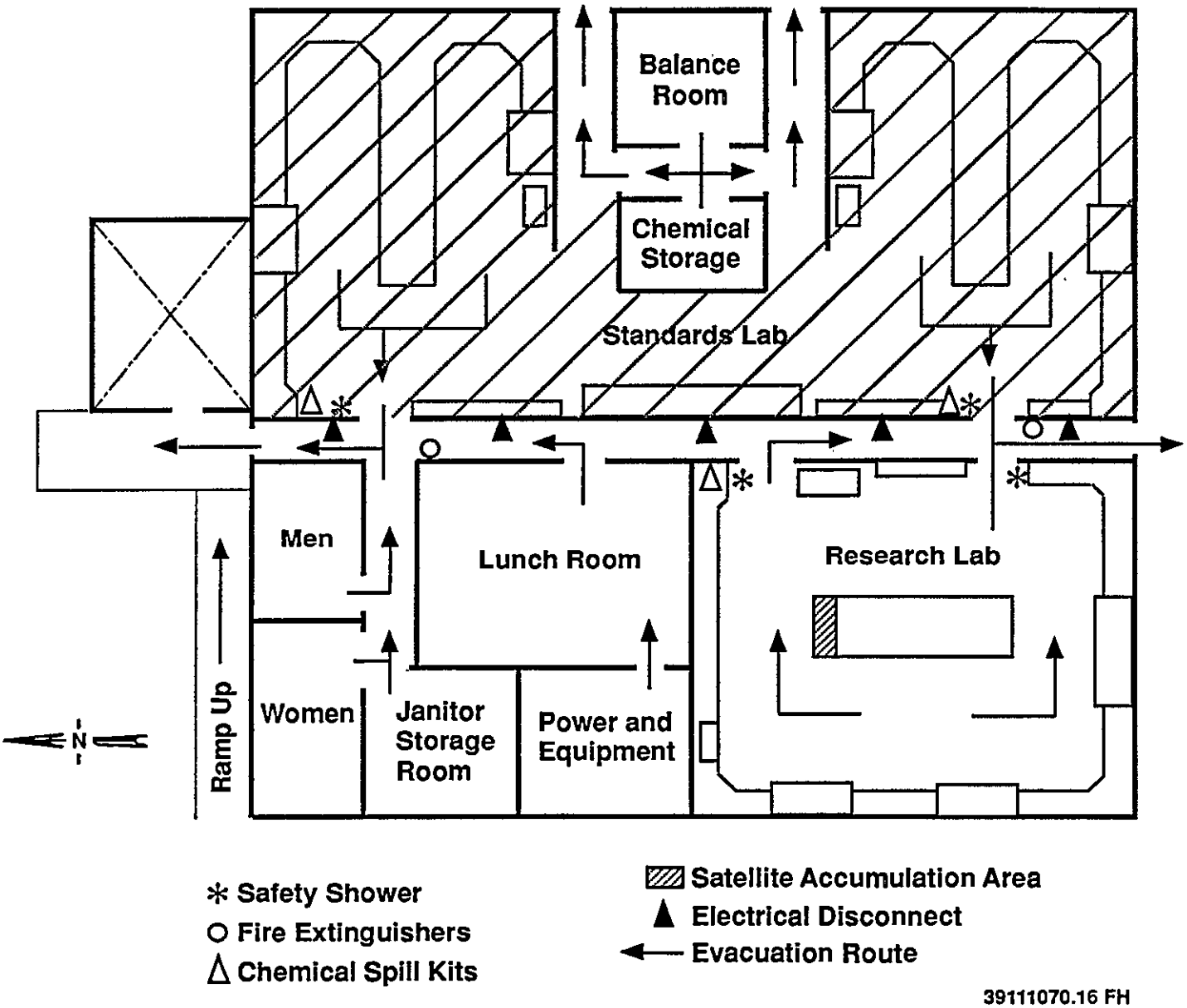


Figure 1-9. 222-S Evacuation Routes.

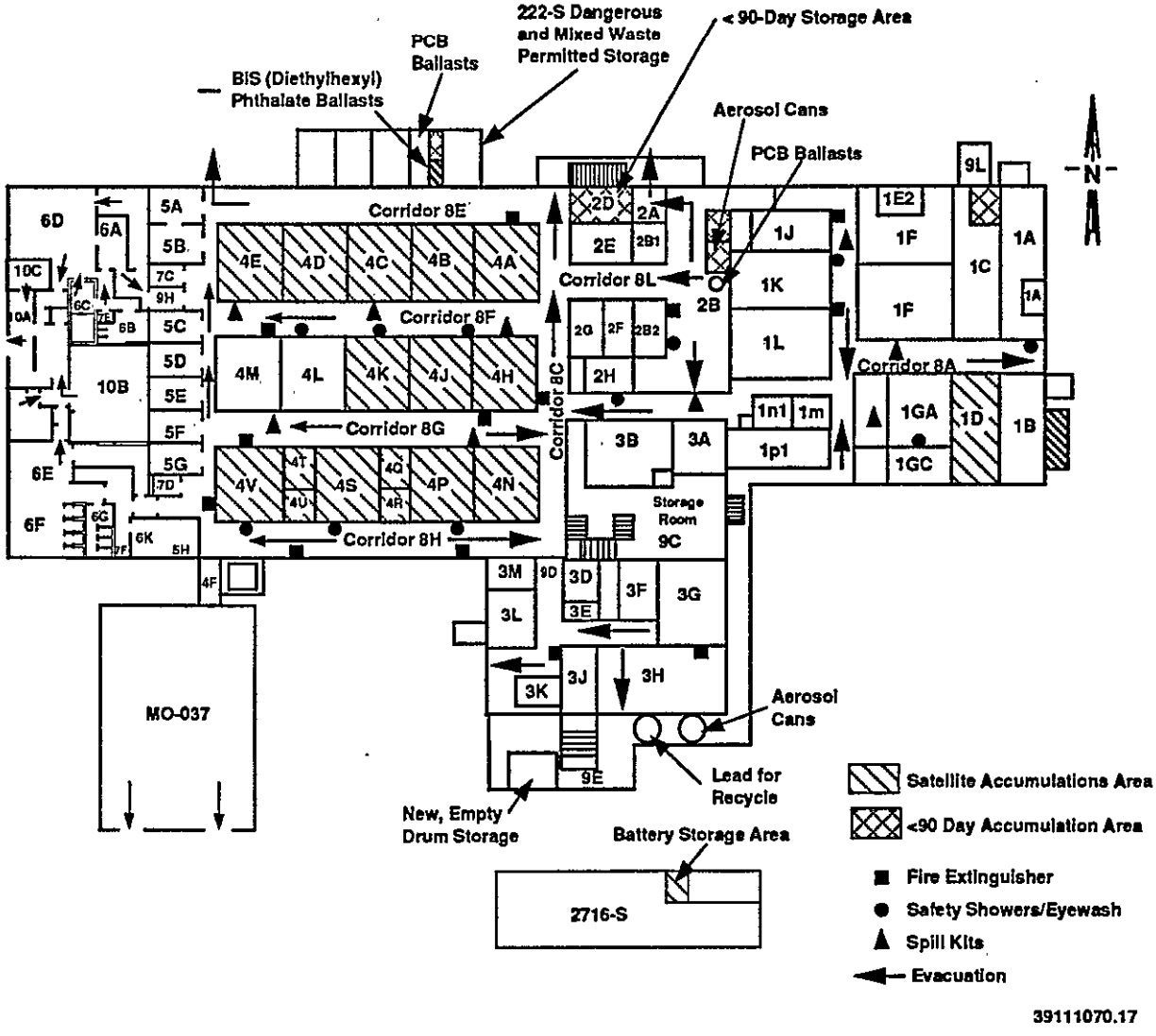


Figure 1-10. 219-S Evacuation Routes.

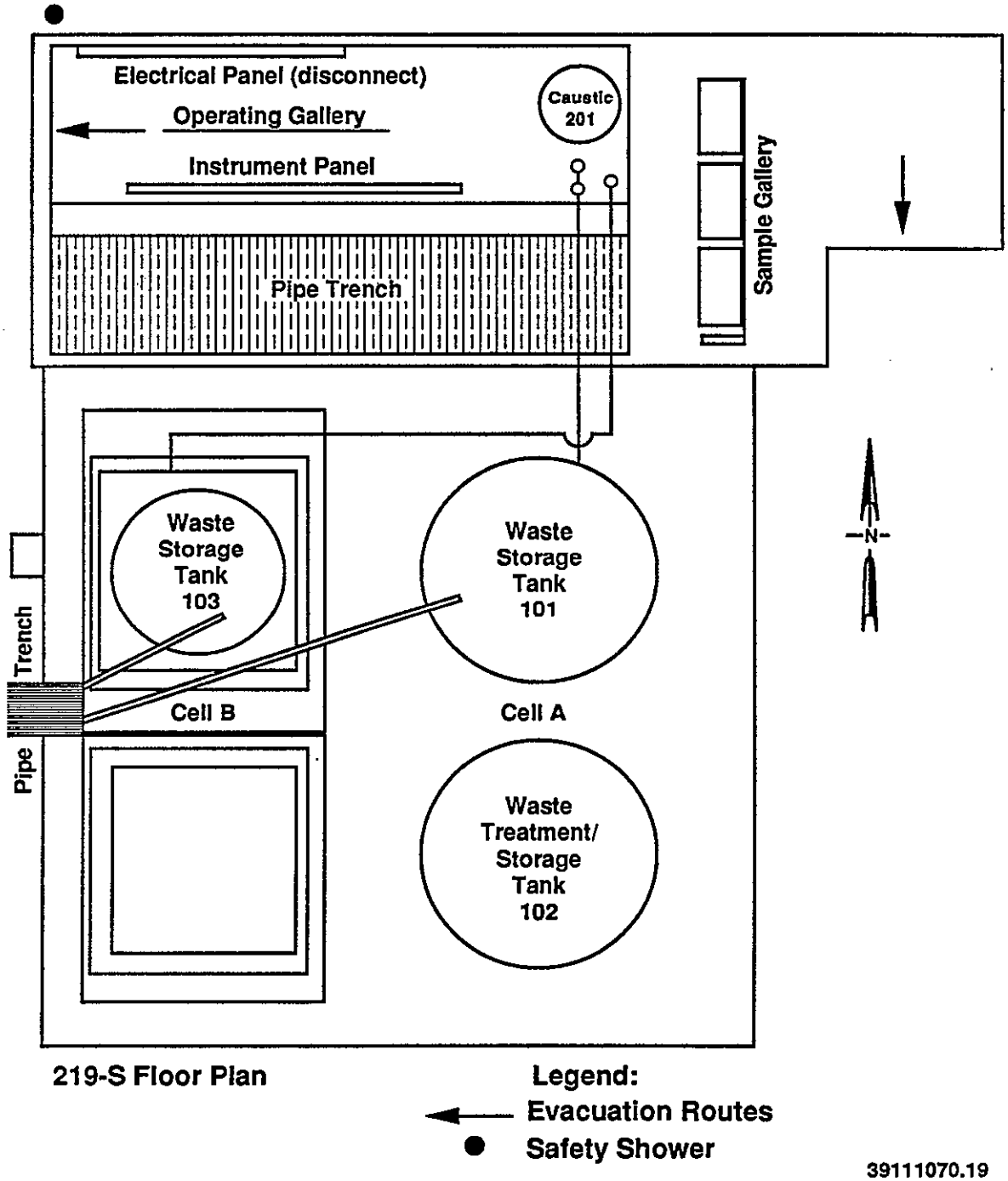


Figure 1-11. Location of Primary Staging Area.

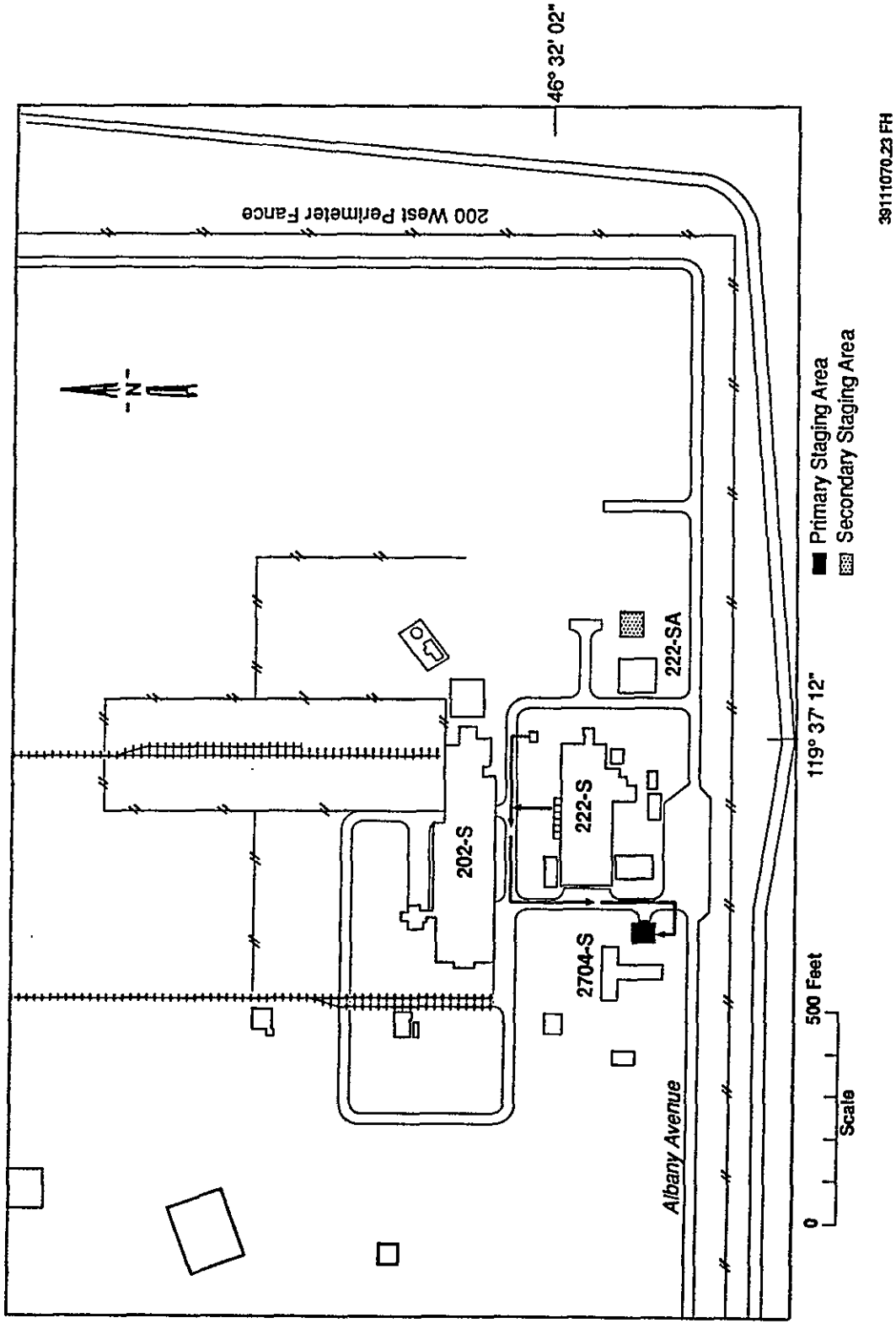
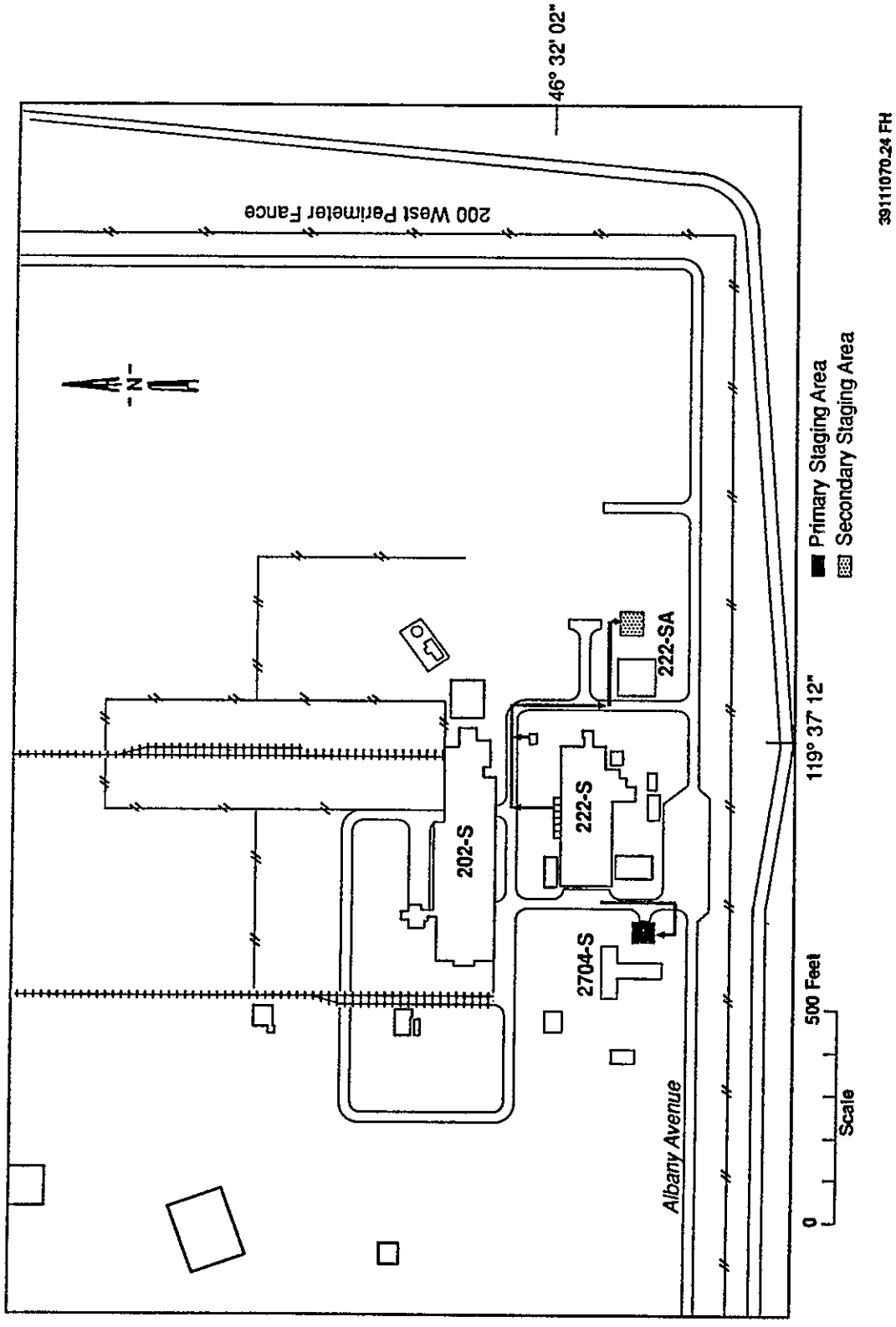


Figure 1-12. Location of Secondary Staging Area.



- Ensure continuity of leadership at all times and in all emergency situations.
- Minimize the effects of an accident on the health and safety of the general public and the environment.
- Minimize property damage.
- Ensure prompt internal and external communications with responsible authority.
- Meet the requirements of DOE Orders 5500 series.
- Comply with the requirements of WHC-CM-4-1, Emergency Plan, which along with the DOE-RL Emergency Plan, and the DOE-RL Emergency Procedures Manual comprises the Emergency Plan for this complex.

2.2 EMPLOYEE REQUIREMENTS

Each employee assigned to the 222-S Laboratory Complex is required to annually review this plan and document that review using the "Employee Facility Emergency and Hazard Information Checklist" (Form 6000-784) as defined in WHC-CM-4-1, *Emergency Plan*. New WHC employees or permanent visitors are required to review this plan upon arrival at the 222-S Laboratory Complex. It is the responsibility of the employee's manager to ensure time is provided for this review and to ensure proper documentation for each employee or visitor. Training is detailed in the 222-S Emergency Procedure/Abnormal Plant Conditions Course (EP/APC No. 172318).

3.0 POTENTIAL EMERGENCY CONDITIONS

The following provides a generalized idea of the types and amounts of dangerous materials stored and used in the 222-S Laboratory Complex. Job Safety Analysis (JSA) and/or Radiation Work Procedures (RWP) and Material Safety Data Sheets (MSDS) provide the basis for safe use of the materials in the workplace. A specific list of dangerous materials and MSDSs are kept by the Building Emergency Director, located in 2704-S and the Hazardous Materials Coordinator, located in Room 5C. Each employee shall know the appropriate actions to take in case of a spill or unwanted release (where specified). The dangerous materials are stored in the 222-S Laboratory Complex as follows:

- The Dangerous and Mixed Waste Storage Area is used to accumulate polyethylene-lined 55-gallon (208-liter) drums of liquid and solid mixed and dangerous nonradioactive waste from 222-S Laboratory Complex operations. The maximum capacity of each storage structure is 18 drums.
- The 219-S Waste Handling Facility contains two 4,000-gallon (15,142-liter) capacity tanks and one 1,500-gallon (5,678-liter) capacity tank for liquid mixed waste.

- A 700-gallon (2,650-liter) capacity tank (located in the 219-S Operating Gallery) of sodium hydroxide (caustic) is used to neutralize waste stored in the tanks.

- A 100-gallon (379-liter) nitric acid (NHO_3) holding tank is located in the 222-S.

- A 700-gallon (2,650-liter) nitric acid storage tank is located on the north side of 222-S.

- Satellite accumulation areas are located in the 222-S Laboratory Complex to temporarily collect liquid and solid waste and mixed waste until sufficient quantities are collected for convenient and efficient removal to the Dangerous and Mixed Waste Storage Area.

- Various sizes of different types of chemicals used in the analyses of samples are stored at the 222-S.

A specific list of hazardous materials and MSDSs is kept by the Alternate Building Emergency Director, the Shift Manager (Room 5B), and the Hazardous Materials Coordinator (Room 5C).

3.0.1 Assessment

After identifying the source and nature of the incident, the Building Emergency Director, with assistance from the Hazardous Materials Coordinator, will assess any potential hazards to human health or the environment using the following criteria.

- Origin of the leak, fire, or explosion, if known.

- Conditions of the source; e.g., controllable leak or fire, uncontrollable leak or fire, easily moved, immovable.

- Materials involved.

- Physical state of the material; e.g., solid, liquid, or gas.

- Evidence of reaction(s); e.g., fuming, flaming, gas evolution.

- Odor.

- Color of material.

This information, in conjunction with the detailed information acquired in determining the material involved, will provide the Building Emergency Director, or individual assessing the event, with enough data to assess the potential hazards and to determine the appropriate response actions necessary.

The assessment will consider the potential for:

- Spread of fire
- Explosion or further chemical reaction
- Increase in spill volume
- Generation of new compounds and their hazards
- Generation or spread of toxic, irritating, or asphyxiating gases
- Identification of exposure and/or release pathways
- Effect of exposure and appropriate safety precautions
- Contaminated runoff from spilled chemicals, response chemicals and/or fire, explosion, or reaction residues
- Impacts beyond the immediate area involved.

3.0.2 Sampling

In cases involving soil contamination, a follow-up sampling must be performed to determine the lateral and vertical extent of contamination. The Building Emergency Director is responsible for coordinating onsite characterization activities that will be performed by qualified Hanford Site organizations that are qualified to conduct the work.

3.1 EVACUATION AND TAKE COVER

Evacuation Alarms at this complex may be activated for the following reasons.

- Release of hazardous material (radioactive or nonradioactive) at this or another building impacting this complex.
- Loss of utilities.
- Protective response to emergencies affecting ability to inhabit the complex.

Take-Cover Alarms at this complex may be activated for the following reasons:

- Release of hazardous material outside of a complex.
- Attack by hostile factions.
- Protective response to emergencies affecting the complex or personnel.

3.2 OPERATIONAL EMERGENCIES

The following emergency situations are those considered credible for this complex, unless determined to be not applicable (N/A). Described in this section are the types and extent of credible emergency events. The response plan for each type is listed in Section 6.0 of this plan.

The following sections contain a description of the "Worst Case" anticipated accident in each category and the event classifications associated with the identified credible event. The information is typically derived from the facility safety analysis report, hazardous evaluation, or risk assessment for the complex.

3.2.1 Bomb Threat

Bomb threats indicate the possibility that an explosive device may have been placed in or around the complex. Therefore, bomb threats may pose a fire and/or explosion hazard. Fire and/or explosion from a bomb could result in the release of dangerous chemicals or radioactive materials and exposure of employees, visitors, and the general public.

3.2.2 Industrial Accidents

Hazards associated with industrial accidents include the potential for injuries or death resulting from moving equipment, falls, or radiological and/or chemical exposure from spilled waste or chemicals.

3.2.3 Loss of Electricity

A loss of electricity could include loss of air balance contamination control, safety instrumentation, and waste transfer operations. The associated hazard in all these cases is exposure to radiation and/or toxic materials. Loss of electricity also will affect the 222-S stack sampling capabilities.

3.2.4 Loss of Water

Loss of water can interfere with the ability to flush pipes or cool tanks and could result in an increased radiological hazard from accelerated deterioration of containment and control systems.

Also, the vacuum pumps in the tunnel area must be shut down to prevent damage to the pumps (Section 3.2.12).

3.2.5 Loss of Ventilation

A loss of ventilation could result in the loss of airborne contamination control, producing a radiological and/or toxic exposure hazard from low hood flows and inadequate air changes.

3.2.6 Loss of Steam

Loss of steam, used for building heat, could result in freeze damage to piping, creating a potential hazard due to waste leakage. This could also result in the inability to transfer wastes from tank to tank. The physical failure of steam lines [325 °F (162.7 °C) at 225 psig maximum] could result in burns to employees.

3.2.7 Loss of Compressed Air

Compressors located on the second floor of the 222-S supply air to the instrument air system and to the hoods within the lab rooms. A loss of instrument air could affect the control systems on the ventilation systems. Interruption of process operations could cause potentially hazardous situations.

3.2.8 Fire

Fire hazards include smoke inhalation, burns, and damage to equipment or storage containers and could result in the release of dangerous or mixed waste. Small quantities of flammable materials are in the 222-S and the Dangerous and the Mixed Waste Storage Area. Some of the materials stored in the 222-S and waste material in the Dangerous and Mixed Waste Storage Area also pose an explosive hazard.

3.2.9 Major Process Upset

A major process upset could involve leakage of mixed waste from a storage tank. Process upsets typically result from the failure of mechanical controlling or monitoring equipment, such as failure of a pump, liquid level control, or chemical metering equipment.

3.2.10 Pressure Hazards

Pressure hazards, which could cause objects to be propelled through the air, could result from damage to the building air system (maximum 125 psig). Steam [325 °F (162.7 °C) at 225 psig maximum] presents an additional hazard for burns.

High pressure (2000+ psig) air/gas bottles could become uncontrolled missiles if the valves are broken.

3.2.11 Security Event

A security event is defined as a deliberate attempt by person(s) to disrupt complex or process operations. Security events might result in the occurrence of numerous hazards, including injury, fire, explosion, or environmental damage.

3.2.12 Loss of Vacuum

The loss of vacuum could result in the building constant air monitoring system being taken out of service and/or the ability to transfer waste liquids within the hoods. Loss of vacuum will affect staff monitoring capabilities.

3.3 NATURAL HAZARDS EMERGENCIES

The following emergencies are those applicable to all facilities on the Hanford Site. Response plans for each are contained in Section 6.0.

3.3.1 Seismic Event

A seismic event can result in hazards caused by falling objects, failure of systems using steam, stored dangerous, radioactive, and mixed waste or materials, or electricity. Failure of systems or physical damage to storage containers could result in the release of hazardous or radioactive materials.

3.3.2 Volcanic Eruption/Ashfall

Hazards associated with a volcanic eruption/ashfall include potential interference with building and process ventilation systems, leading to failure of airborne contaminant control systems. Also, depending on the quantity of fallout, the increased weight load on the buildings could cause structural loading concerns.

3.3.3 High Winds/Tornado

Hazards associated with high winds/tornado include loss of power, loss of steam, and damage caused by flying objects. Failure of systems or physical damage to storage containers could result in the release of dangerous or radioactive materials.

3.3.4 Flood

Hazards associated with a flood include loss of utilities, high water, and loss of containment of waste or dangerous material. The complex is above the 100-year floodplain, so there is a very low probability of floods in this area.

3.3.5 Range Fire

Hazards associated with range fires are the same as those described in Section 3.2.8.

3.4 HAZARDOUS MATERIALS AND MIXED WASTE SPILLS/RELEASES

This section addresses the spill and/or release of nonradioactive dangerous materials and mixed waste (waste containing both radioactive and hazardous/dangerous components).

Dangerous materials are stored and used throughout the 222-S Laboratory Complex. Aqueous mixed waste is accumulated primarily in bottles in

laboratory hoods where radiochemical separation processes occur. When full, these bottles are transferred to the decontamination hood (Hood 16) in Room 2B of 222-S for transfer to 219-S. Discarded samples are disposed of in Hood 16 located in Room 2B or through drains in the hot cells. Liquid decontamination waste from Hood 16 in Room 2B also is drained into 219-S tanks.

Dangerous waste generated in the 222-S is treated and stored in the 219-S and in the 222-S Dangerous and Mixed Waste Storage Area. Sodium hydroxide is stored and used to neutralize the stored liquid mixed waste in the 219-S.

The following incidents could result from most of the operational emergencies listed in Section 3.2.

3.4.1 Spill of Hazardous Material

Hazards associated with a spill include potential exposure to radioactive, corrosive, and/or toxic material as well as potential environmental damage by its release to air or ground (soil).

3.4.2 Fires or Explosions Involving Hazardous Material

A fire or explosion in the 222-S Laboratory Complex could result in the release of hazardous materials to the air or ground. Some materials and waste used and accumulated in the 222-S Laboratory and Dangerous and Mixed Waste Storage Area have explosive characteristics.

3.4.3 Toxic Fume Hazards

Mixed waste stored at the 222-S, 219-S, and the Dangerous and Mixed Waste Storage Area could produce airborne radioactive contamination. Volatile materials such as concentrated caustics and solvents can generate toxic fumes.

3.4.4 Reactive Chemical/Corrosive Material Hazards

The sodium hydroxide solution stored at the 219-S and the nitric acid stored at the 222-S Analytical Laboratory are corrosive. Any physical contact with these solutions can cause chemical burns. Reactive materials are handled at the 219-S and the 222-S.

3.4.5 Thermal Reactions/Hazards

Steam pipelines supplying the 222-S Laboratory Complex could present thermal hazards.

3.4.6 Flammable Material/Liquids Hazards

Fire associated with 55-gal drums of flammable materials stored in the Dangerous and Mixed Waste Storage Area would likely result in a significant hazard. Liquids with exotherm below 450 °F (232.2 °C) or flash point below 150 °F (65.5 °C) are not allowed in the 219-S tanks.

3.4.7 Asbestos Release

Asbestos materials can be found in some of the older buildings within the 222-S Laboratory Complex. Physical damage could cause an unplanned release of friable asbestos to the environment or within the complex and would result in a health hazard. Asbestos-containing materials normally are well encapsulated so that the asbestos fibers do not become airborne. An asbestos hazard emergency condition would arise when a large portion of the encapsulation is damaged and the asbestos-containing material is physically dispersed in the area. Examples include bursting steam piping or vehicles colliding with overhead steam lines.

3.5 RADIOACTIVE MATERIALS

Mixed waste is stored, treated, and sampled in the 219-S and stored in the Dangerous and Mixed Waste Storage Area. The following types of emergencies are those identified as credible for this complex. The 222-S Laboratory Complex generates aqueous and solid radioactive waste. The aqueous waste stream is sampled for total alpha, total beta, and plutonium. The response plan for each type of emergency is listed in Section 6.0.

3.5.1 Gaseous Effluent Discharges (Stack Releases)

Hazards associated with stack releases include personnel and environmental exposure to radioactive contamination.

3.5.2 Liquid Effluent Discharges

Hazards associated with liquid releases from misroutings, process upsets, or spills can expose personnel and the environment to hazardous and liquid mixed waste.

3.5.3 Significant Contamination Spread/Releases

Significant contamination spread/releases from failure of secondary containment systems can result in the transport to and contamination of soil, water, or air. The hazards involve personnel and environmental exposure to radioactive and toxic materials.

3.6 CRITICALITY

The 222-S Laboratory is classified as a "limited" nuclear material area meaning that the total amount of special nuclear material is controlled to be less than 177 grams. There are no criticality alarm systems installed within the 222-S Complex. However, three material balance areas (MBA) exist to track fissile material quantities.

3.7 EXPLOSIVE MATERIALS/MUNITIONS HAZARDS

No explosive materials/munitions hazards exist at the 222-S Laboratory Complex.

4.0 DESCRIPTION OF WHEN AND HOW BUILDING EMERGENCY PLAN WILL BE IMPLEMENTED

4.1 IMPLEMENTATION

The provisions of this emergency plan will be implemented when the Building Emergency Director makes a determination that the severity of an incident is such that there is a potential to endanger human health or the environment. The plan will be implemented whenever there is an imminent threat or an actual incident, as listed in Section 3.0.

The Building Emergency Director is responsible for assessing facility emergency incidents to determine the level of action necessary to protect personnel, buildings, and the environment. If the incident requires assistance from patrol, fire, and/or ambulance units, notification to the Patrol Operations Center (POC) requesting the assistance is made by calling the Hanford Emergency Response Number 811. When additional resources or assistance from outside the complex, other than from patrol, fire, and/or ambulance units, is required, notification is given to the Emergency Duty Officer at the POC business number 3-3800. For a relatively minor incident, the situation is handled by personnel under the direction of the Building Emergency Director or alternate Building Emergency Director.

4.2 IDENTIFICATION OF HAZARDOUS MATERIALS

The Building Emergency Director should be aware of the location, types, and general amounts of all hazardous/dangerous materials or waste in the complex. The mixed waste from the 222-S contain significant quantities of nitric acid, but the exact chemical constituents in the waste fluctuate with the type of analysis that could be ongoing at the time. Therefore, the Building Emergency Director will not know the specific hazards associated with the waste contents of the 219-S. If there is an emergency incident and the materials or waste involved are unknown, the materials and/or waste will be identified by:

- Questioning witnesses or individuals familiar with the operations or area where the incident occurred or is occurring
- Checking the label or placard on the container or tank, if it is visible from a safe distance
- Noting the location of a container, if in a waste storage or accumulation area, and checking that location against the waste inventory log, chemical waste disposal analysis letter file, waste transfer manifest file, or the accumulation area record file
- Calling the Hazardous Material Response Team on 811 if the waste cannot be identified. The Hazardous Material Response Team will sample the waste in accordance with sampling and testing methods specified in Washington Administrative Code (WAC) 173-303-110 and/or SW-846, and following proper chain-of-custody procedures. The samples will be packaged and transported to an approved analytical laboratory for analysis and identification.

4.3 EMERGENCY DOSE LIMITS

These limits only apply in an emergency. Every effort will be made to maintain doses as low as is reasonably achievable (ALARA).

Circumstances of exposure	Maximum single Dose (whole body)
Recovery of Hanford Site criticality radiation dosimeters (WHC-CM-4-1, *Emergency Plan*, provides guidelines)	3 rem
Recovery of deceased victim, prevent property loss/reduce hazard	10 rem
In special circumstances, to reduce hazard or prevent substantial property loss	25 rem

5.0 EMERGENCY RESOURCES

5.1 BUILDING EMERGENCY ORGANIZATION

Attachment A contains the list of the Building Emergency Response Organizations for the 222-S Laboratory Complex. The personnel listed in Attachment A are the minimum recommended emergency staff of the Building Emergency Response Organization. In an emergency that requires implementation of the provisions of this plan, the Building Emergency Director has the authority to commit the resources required to respond, including, money, manpower, and/or equipment.

Definitions of roles and responsibilities are contained in the WHC-CM-4-1, *Emergency Plan*.

5.2 EMERGENCY EQUIPMENT

The 222-S Laboratory Complex has a variety of fixed and portable emergency equipment. The emergency equipment is summarized in Section 5.2.1.

5.2.1 Fixed Emergency Equipment

Type	Location	Capabilities
Fire control systems		
(Wet Pipe) sprinkler	Throughout entire 222-S (except Room 2E and Counting Room)	Assist in the control of a Class A fire.

Type	Location	Capabilities
Deluge sprinkler	Northeast corner of building surrounding transformers	Assist in cooling down a transformer and controlling a transformer fire.
Halon system	Counting Room 222-S	Assist in the control of a Class A fire, with lesser impact to employees and equipment.
Inert gas	Room 2E	Prevents fire by displacing oxygen.
Process sewer diverter system	Building 222-SF (portable pump)	Divert radiological waste, inadvertently placed in the wrong waste line to 219-S.
Eyewash/shower stations*	Eyewash and showers are located in the hallways and Room 2B (Figures 1-8 and 1-9) and on the north side of 219-S Building.	Assist in flushing unwanted chemical/ material from an employee's clothing and body.
Alarms	Section 5.4.2	
Public address system (PAX)	Throughout entire complex	Paging and notifying building employees of actions to take. Communication with employees within complex.
Emergency lighting	Selected points in hallways, stairs, and rooms	Provide low-level lighting for buildings during loss of electricity.
Other	Portable water vacuum in S-3-B	For use in water spill situations, as necessary.
Stack monitor	Stack monitor emergency monitoring generator	Emergency power for exhaust stack monitoring system.

* NOTE: There are no floor drains to take away the water from the eyewash or shower stations. The water will flow to the floor where it is picked up and disposed of or via the building sump pumps to the tunnels where the water can be transferred to 219-S or 207-SL. Use the water necessary, but not to excess.

5.2.2 Portable Emergency Equipment

Type	Location	Capabilities
Fire extinguishers	Building map, Figures 1-8, 1-9, 5-1 and 5-2	Use on any Class A, B, and C fires. (Note some are only applicable to Class B and C fires.
Fire classification examples Class A: wood, cloth paper Class B: flammable liquids, gases, greases Class C: energized electrical equipment Class D: combustible metals, sodium, lithium.		

5.2.3 Protective Equipment

Type	Location	Capabilities
SWP clothing	Rooms 6A and 6F (change rooms)	N/A
Respirators	Corridors 8A, 8C, 8F, 8J; Rooms 9H, 9K	N/A
Filtered masks	N/A	N/A
Escape pak	N/A	N/A
Self-contained breathing apparatus	Corridors 8J, 8L, 8B; east side of 222-S Dangerous and Mixed Waste Storage Area	N/A
Acid suit	219-S (1)	N/A

5.2.4 Spill Control Equipment

Type	Location	Capabilities
Spill control kit	Corridors 8F, 8G, 8C, 8B, 8A; Rooms 4S, 4P, Dangerous and Mixed Waste Storage Area, 222-S; and 222-SA	Use on all chemical spills.

Figure 5-1. Location of Emergency Equipment First Floor 222-S.

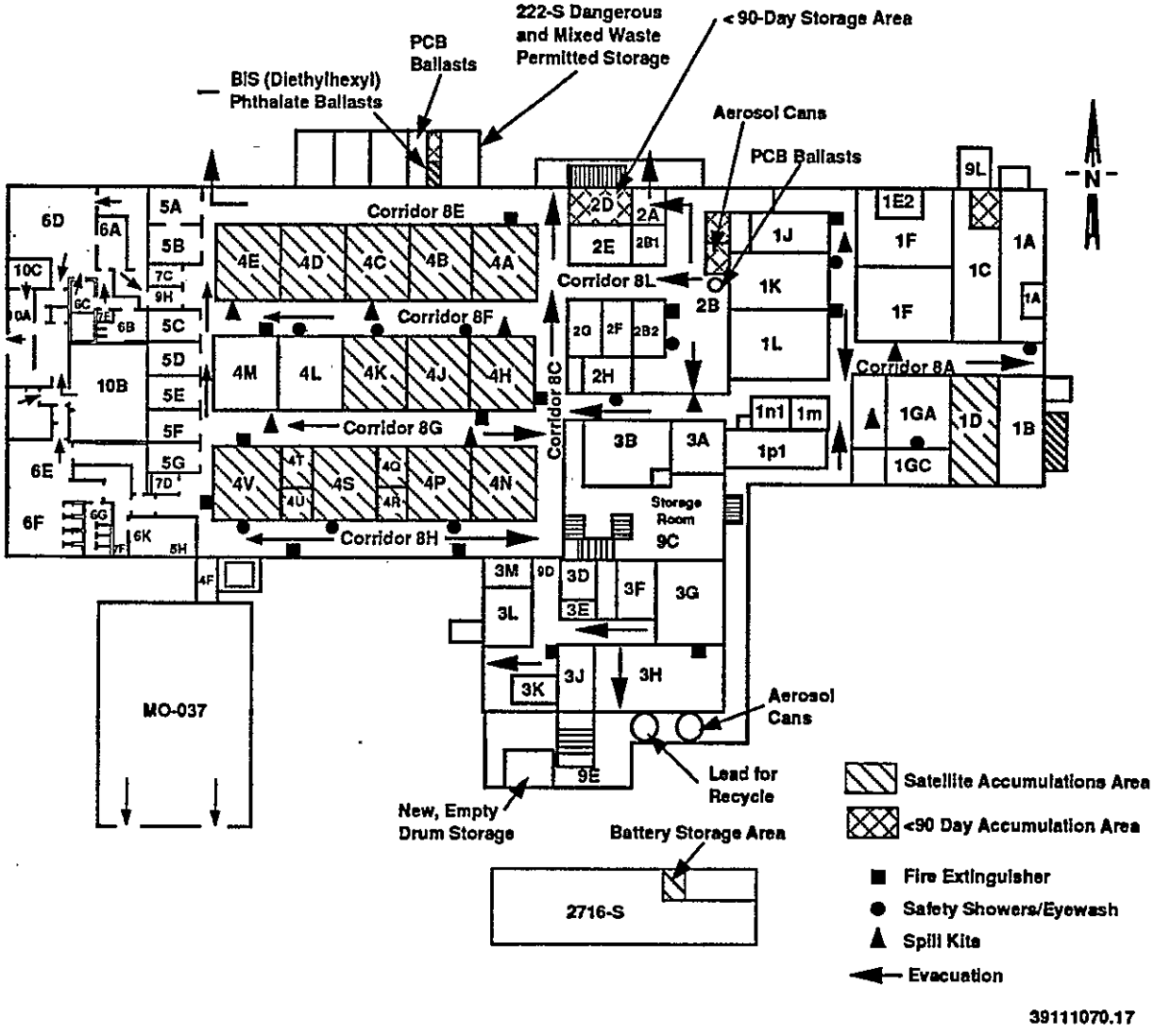
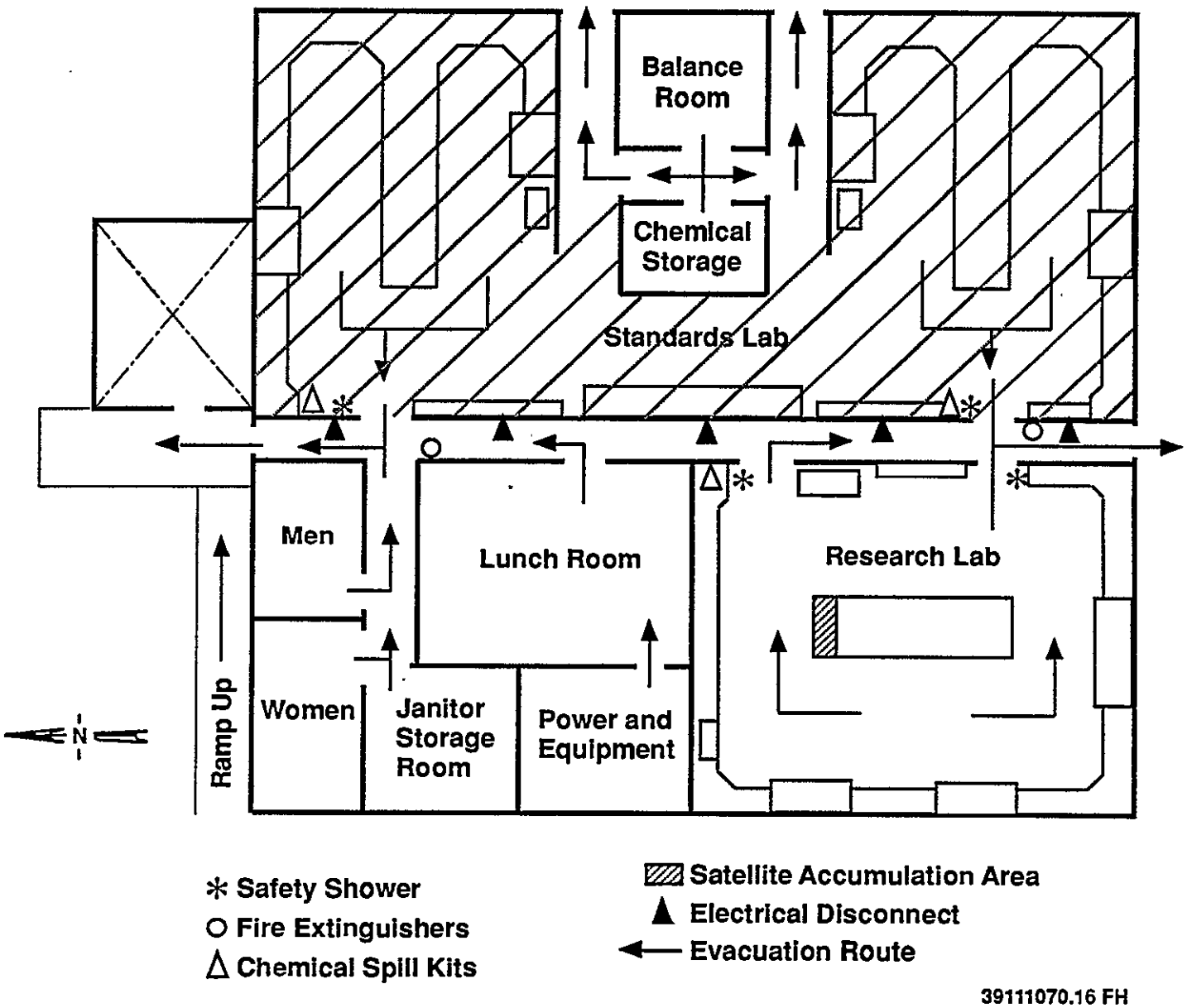


Figure 5-2. Location of Emergency Equipment 222-SA.



5.2.5 Emergency Monitoring Kit

Type	Location	Capabilities
Emergency monitoring kit	Rooms 5A, 222-S; Room 31B, 2704-S; Office, 222-SA	Use during emergencies to provide radiation detection capabilities, SWP clothing, and respiratory equipment.
Two-way radios	Rooms 5A and 10A, 222-S; Room 31B, 2704-S	Communication with fire, patrol, and Health Physics personnel.

5.3 EMERGENCY NOTIFICATIONS

5.3.1 Notification to Personnel Within the Complex

Notification of personnel will be given immediately upon discovering any conditions that affect occupants or operations.

Any person discovering such an incident should leave the immediate area if there is any danger of harm. If the incident is a fire, the nearest fire alarm should be activated. After activating the fire alarm, and for any other emergency incident, go to the nearest phone in a safe area, dial 811 or 3-3800, and provide the following information slowly and clearly:

- Your name
- Nature of the emergency
- Exact location of the emergency.

Ask the person answering the call to repeat the message to you. The Shift Manager will assess the situation and determine if the Building Emergency Director must be notified.

Notification of emergency incidents will be given to building, area, or site personnel, depending on the severity of the incident, through one or more of the following emergency warning systems.

- Building PAX System. For use during localized incidents that affect only a limited area in immediate proximity to the incident.

- Hanford Site Standard Emergency Signals. As summarized in Section 5.4.1 and more fully described in WHC-CM-4-1, *Emergency Plan*.

- Crash Alarm Telephone System. A telephone system activated by dialing one number and accessing a predefined number of telephones used for the purpose of disseminating emergency messages.

ADDITIONAL INFORMATION - Crash Telephones are identified with a yellow label on the handle. The following rooms have a telephone on the Crash Alarm System.

- 3B, 5B, and Lunchroom in 222-S (3-2435)
- 31B in 2704-S (3-2944).

All remote locations in 222-S Laboratory Complex will be notified through an announcement on the PAX system. This is to ensure that the message gets to all personnel. Other means of notification include the following.

- Priority Message System (management bulletin). A network of telefax machines used to communicate written information rapidly across the Hanford Site.
- The DOE-RL Radio System. A system that links management, patrol, fire, safety, and engineering representatives through a network of base stations and mobile and portable radio units.

5.3.2 Notifications to Personnel and Organizations Outside of the Complex

The DOE-RL is responsible for all notifications to organizations or agencies outside of the DOE and contractor organizations. The DOE-RL reports any release of hazardous or dangerous waste or materials in quantities greater than the reportable quantities identified in federal and state regulations to the Washington State Department of Ecology and the National Response Center.

In the event of a fire or explosion, the Building Emergency Director must immediately notify the POC by telephone at 811. In the event of any unplanned release of hazardous or dangerous waste or materials, the Building Emergency Director immediately will notify Environmental Protection at 373-1716, who will notify DOE-RL. The DOE-RL must be notified by phone as soon as possible on the day of the event. The Building Emergency Director or line management must document the emergency in accordance with WHC-CM-1-3, *Management Requirements And Procedures*, MRP 5.14, "Occurrence Reporting and Processing of Operations Information," and DOE Order 5000.3A, "Occurrence Reporting and Processing of Operational Information."

The report to DOE-RL must contain the following information:

- Name and telephone number of person reporting
- Name and address of the facility
- Time of incident
- 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 facility.

5.4 EMERGENCY ALARMS AND WHEN/HOW THEY WILL BE ACTIVATED

5.4.1 Standard Emergency Alarms

Signal	Meaning	Actions
Steady tone or siren (3 to 5 minutes) or building PAX system or at manager's request	Area evacuation radioactive material release, hazardous material release, bomb threat	Get car keys, if time permits, and go to evacuation staging area.
Wavering tone or siren (3 to 5 minutes)	Take cover - hazardous materials release or security event where evacuation cannot be completed in a timely manner	Take cover in nearest building, shut doors and windows, and shut off ventilation in the building. The 222-S Complex ventilation may be shut down or reduced under the direction of the building emergency director.
Howler (AH-OO-GAH)	Criticality - nuclear excursion	Run away from alarm sound and go directly to a designated staging area as identified in the building emergency plan.
NOTE: 222-S Complex does not have any criticality alarms installed.		
Gong	Fire	Evacuate and go to staging area unless directed not to do so by the building emergency director.
Continuous ringing bell and flashing light [continuous air monitor (CAM) alarm]	Potential airborne radiological contamination	Stop breathing and place one barrier between you and alarm.

Signal	Meaning	Actions
Crash alarm (200, 300, 400 Areas) steadily ringing telephone	Emergency communications	Pick up phone and LISTEN. Relay message to building emergency director.

The all clear signal for any of these alarms or signals will be approved and passed by voice by the building emergency director. The public address or crash alarm phones may be used for this purpose.

5.4.2 Facility Specific Emergency Alarms

Alarms specific to the 222-S Laboratory Complex are:

- Fire alarms (gong) in the 222-S Laboratory Complex
- Continuous air monitor equipped with a beacon and audible alarm (bell) in the 222-S
- Liquid-level overflow alarms (buzzer) for Tanks 101, 102, and 103 and 219-S Sumps in Room 3B of the 222-S and in the 219-S Operating Gallery
- Tunnel cold sump alarms display and alarm in Room 3B
- Low pressure ventilation plenum pressure alarm display and alarm in Room 3B and the Power Operator's control panel (second floor)
- 219-S and 222-S exhaust stack continuous air monitor alarms display and alarm in Room 3B
- Direction by PAX system.

6.0 EMERGENCY RESPONSE PLANS

This section contains emergency response guides that pertain to the 222-S Laboratory Complex.

6.1 RESPONSE TO BUILDING EVACUATION AND TAKE-COVER ALARMS

This section identifies the proper response to evacuation and take- cover alarms.

6.1.1 Evacuation - Steady Siren Response

When an evacuation siren sounds (STEADY SIREN), employees shall proceed to the primary or alternate staging area as identified below and shown in Figure 1-11. The Building Emergency Director will announce through the PAX

system to which staging area to evacuate. Figure 1-12 shows routes to the secondary staging area should further evacuation be initiated by the Building Emergency Director.

Area	Location
Primary staging area	222-S Laboratory Complex immediately east of 2704-S Building
Alternate staging area	200 Area immediately east of 222-SA

Actions at the complex are at the direction of the Building Emergency Director. The following steps are designed to be followed by these individuals when an area evacuation has been ordered; however, all employees should be familiar with the evacuation process.

Area evacuations will be one of two types, RAPID or CONTROLLED. Differences between RAPID and CONTROLLED evacuations will be pointed out as the evacuations occur in the following steps. The order to evacuate normally will be passed via the Crash Alarm System. Because there are not enough Crash Phones to cover all occupied buildings, those buildings on the Crash Alarm System must ensure that all occupied buildings in their local area also are evacuating. When possible, the following steps should be conducted concurrently.

1. Halt any operations or work (initiate emergency shutdown procedures for RAPID evacuation) and place the complex in a safe condition.

2. Use whatever means are available (PAX system, bullhorns, runners, etc.) to pass the evacuation information to employees.

3. Sound the evacuation siren, if available, or issue the order to evacuate by whatever means are available. The 200 Area Powerhouses (284-E and 284-W) shall sound the steam whistles, as well a their sirens.

4. Evacuate personnel to the staging area.

5. Conduct personnel accountability (not done for RAPID evacuations). Report results to the Emergency Control Center (ECC) (3-3876, 3-1786, 9-948-0833, Radio Safety Net KOB.743 freq. 165.410 or Ops. & Maint. Net KGB.513 freq. 167.975).

6. Segregate personnel into four groups: SWP clad personnel, persons with keys to immediately available private vehicles, persons with keys to government vehicles, and all others.

7. Relay pertinent evacuation information (routes, destination, etc.) to personnel with vehicle keys and evacuation bus drivers. Unless

directed otherwise as part of the area evacuation order, the 222-S Laboratory Complex evacuation buses shall follow the following routes:

Bus #1 - Proceed west on 10th to Cooper; north on Cooper to 16th; east on 16th to Camden; north on Camden to 19th; east on 19th to Beloit; north on Beloit to 20th; east on 20th to the main gate.

Bus #2 - Proceed east on 10th to Beloit; north on Beloit to 16th; west on 16th to U-Plant; double back east on 16th to Albany; north on Albany to the main gate.

8. Direct evacuation bus drivers to warm up the buses.

9. Load personnel in civilian clothes into private and government vehicles, load SWP clad people into buses, and try to provide reserve transportation for people with late shutdown duties.

10. Dispatch private and government vehicles as soon as they are loaded to the new staging area as specified by the Building Emergency Director.

11. Load remaining people into evacuation buses, maintaining segregation if possible.

12. Dispatch buses, and instruct drivers to pick up pedestrians along their route. If possible, provide bus drivers with portable radios so that they can communicate with the ECC on frequencies mentioned in Step 5.

13. Report status to the ECC, request additional transportation if required, and report any persons remaining who are performing late shutdown duties.

14. Direct any remaining people to the pickup point at 242-S parking lot.

    200 West Pick-Up Points

    Parking lot south of 222-S: all 222-S area buildings.

6.1.2 Take Cover - Wailing Siren Response

When the take-cover alarm is activated, personnel should take cover in the nearest building or trailer. The following actions should be taken or considered: close all exterior doors and windows; report your location to your manager or Building Emergency Director; if possible, secure (turn off) ventilation and unnecessary electronic or electrical equipment.

6.1.3 Attack by Hostile Factions - Take Cover

Normally, the 222-S Laboratory Complex will be alerted of an impending attack via the area Crash Alarm System phones located in Room 3B of the 222-S.

6.2 BOMB THREAT RESPONSE GUIDES

Bomb Search Kits containing some or all of the following items are provided by the Building Emergency Director and are located in Room 31B of Building 2704-S and Room 10A of the 222-S:

- Flashlights
- Bump hats and gloves
- Set of maps
- Marking pens (for marking search plans on maps)
- Mirrors and extension handles
- Crescent wrenches (for mirror adjustments)
- Thread or string (for marking paths to objects for investigation)
- Green tape (for repairs, holding string, etc.)
- Masking tape (for taping off areas searched).

6.2.1 Receivers of Telephone Threats

An employee receiving a direct telephone threat should respond as follows:

1. Using a copy of the Bomb Threat Checklist (form BD-9100-201) in WHC-CM-4-1, *Emergency Plan*, obtain as much information as possible about the threat, caller, background noise, etc.

2. Notify the Building Emergency Director

3. Notify POC (811) at termination of call

4. Carry out instructions given by Building Emergency Director.

6.2.2 Receivers of Written Threats

Receivers of written threats should respond as follows.

1. Handle the envelope and letter as little as possible to preserve fingerprints and avoid smudging.

2. Immediately notify the Building Emergency Director and the POC on 811.

3. Record all details of the receipt; i.e., where found, how delivered, when found, etc.

4. Tell no one else.

5. Release the letter only to Security personnel or to a person authorized by Security.

6.2.3 Discoverer of a Bomb or Suspicious Object

Discoverers of a bomb or suspicious object should respond as follows.

1. Clear the immediate area of personnel. Do not transmit on a radio near the suspected object.

2. Immediately notify the Building Emergency Director and the POC on 811.

3. Stand guard in a sheltered location and at maximum possible distance to ensure that no one enters the area.

6.3 OPERATIONAL EMERGENCY RESPONSE PLAN

The following sections contain response plans for each type of emergency condition or hazard identified in Section 3.0.

6.3.1 Utility Disconnect Plan

The purpose of this plan is to provide the steps necessary to place the utilities in a safe and secure condition when an emergency has been declared or at the direction of the Building Emergency Director.

6.3.1.1 Heating, Ventilation, and Air Conditioning. Contact Building Emergency Director for shutdown instructions.

6.3.1.2 Electrical (Total Building). Each building covered under this plan has one or more breaker panels that control power to specific areas. Figures 1-5, 1-10, and 5-2 show electrical disconnect locations for 222-S, 219-S, and 222-SA respectively. Contact Building Emergency Director for shutdown instructions and appropriate breaker to throw.

If power disconnects are required outside of the buildings, request the Building Emergency Director to call the electrical dispatch at the A-8 substation on 3-2321 for power disconnect.

6.3.1.3 Fire Sprinkler System (Raw Water). The first floor of the 222-S has a raw water sprinkler system.

219-S has raw water, but does not have a sprinkler system.

222-S

- Proceed to outside door 16 and north 20 yards.
- Locate valve number 60R (Figure 6-1).
- Use operating wrench to shut valve.
- Turn valve until the valve window words change from Open to Shut.
- Properly tag valve.

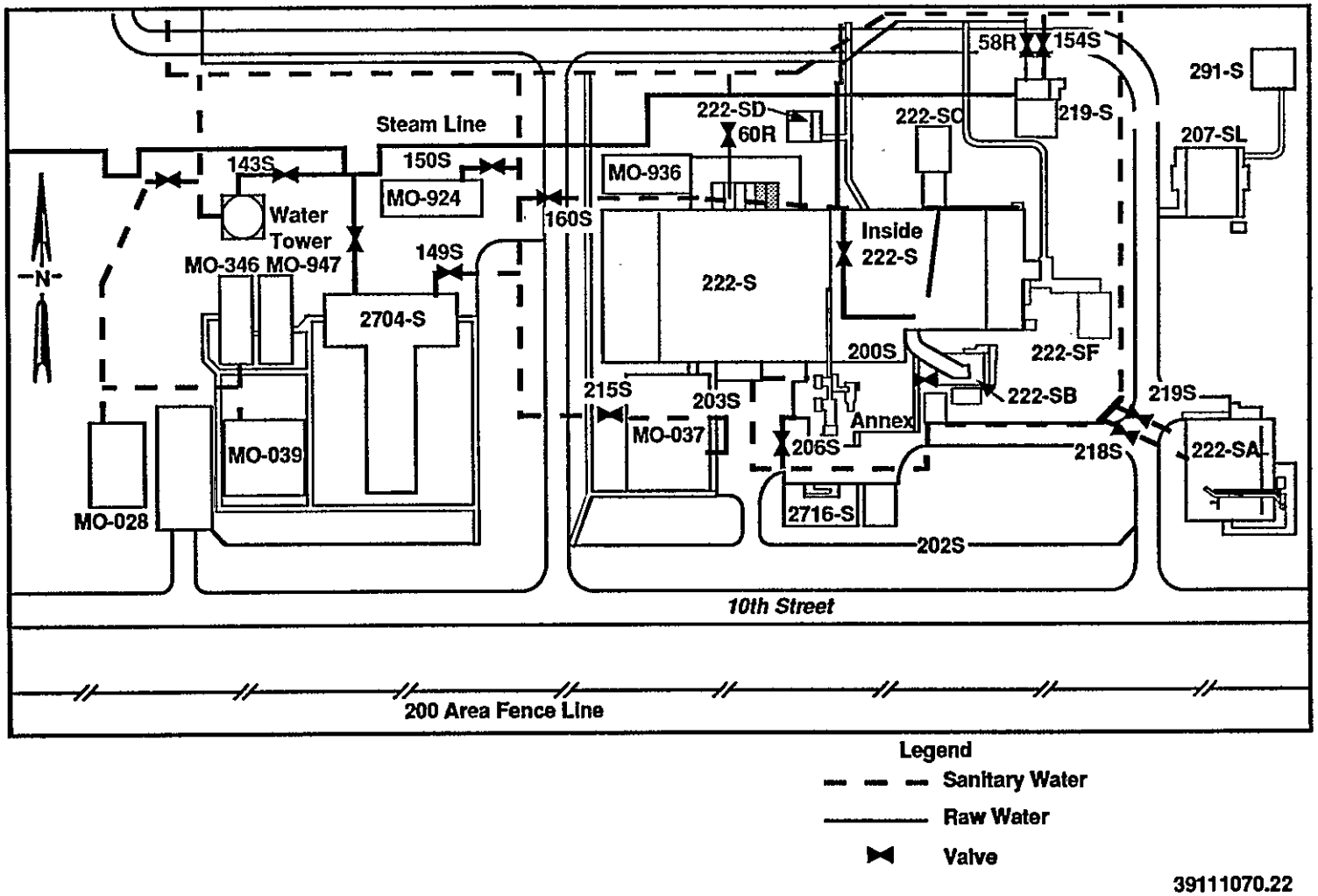


Figure 6-1. Location of Sanitary and Raw Water Valving.

Fire Sprinkler System (Sanitary Water).

2716-S

- Proceed to northeast side of 2716-S.
- Locate valve number 202S (Figure 6-1).
- Use operating wrench to shut valve.
- Properly tag valve.

222-S

- Proceed to south side of 222-S (by door 3).

222-SA

- Proceed to northwest side of 222-SA (south of 222-SF).
- Locate valve number 218S (Figure 6-1).
- Use operating wrench to shut valve.
- Properly tag valve.

2704-S

- Proceed to northeast side of 2704-S.
- Locate valve number 149S (Figure 6-1).
- Use operating wrench to shut valve.
- Properly tag valve.

MO-028, MO-346, MO-947, and MO-039

- Proceed to north side of MO-346, a few yards west of the Waste Tower.
- Locate the unnumbered valve immediately west of valve number 143S (Figure 6-1).
- Use operating wrench to shut valve.
- Properly tag valve.

MO-037. Three valves need to be located to disconnect water.

- Proceed to west side of MO-037 and locate valve number 215S (Figure 6-1).
- Valve 216-S controls the fire sprinkler system
- Use operating wrench to shut valve and properly tag valve.
- Proceed to east side of MO-037 and locate valve number 203S (Figure 6-1).
- Use operating wrench to shut valve and properly tag valve.

MO-924

- Proceed to east side of MO-924.
- Locate valve number 150S (Figure 6-1).
- Use operating wrench to shut valve.
- Properly tag valve.

MO-936

- Proceed to north side of MO-936.
- Locate hinged door on skirt of trailer.
- Open door and shut valve immediately inside door.
- Properly tag valve.

6.3.1.4 Domestic Water. Refer to previous section, "Fire Sprinkler System (Sanitary Water)" for all facilities except 222-S, 222-SA, and 219-S.

222-S

- Proceed to east end of MO-924.
- Locate main valve number 160S (Figure 6-1).
- Use operating wrench to shut valve.
- Properly tag valve.

or

- Proceed to north end or corridor B-8D (tunnel).
- Locate main valve number SW-1.
- Turn valve until closed.
- Properly tag valve.

222-SA

- Proceed to northwest side of 222-SA.
- Locate valve numbered 219S (Figure 6-1).
- Use operating wrench to shut valve.
- Properly tag valve.

219-S

- Proceed to north side of 219-S.
- Locate valve number 154S (Figure 6-1).
- Use operating wrench to shut valve.
- Properly tag valve.

6.3.1.5 Process Water. This section is applicable to 222-S and 219-S only.

222-S

- Proceed to duct level (west of supply fan platform).
- Locate valves on the 3 in. back flow preventor.
- Close either or both valves.
- Properly tag valves.

219-S

- Proceed to northwest side of 219-S.
- Locate valve number 58R (Figure 6-1).
- Use operating wrench to shut valve.
- Properly tag valve.

6.3.1.6 Steam. Only 222-S, 219-S, and 2716-S have steam service.

222-S

- Proceed to Area A-2A near door 16 of 222-S.
- Locate main valve and next valve upstream (Figure 6-2).
- Close main valve, then close next valve upstream.
- Properly tag valves.

219-S

- Proceed to west side of 219-S (main steam line.)
- Locate first two valves upstream from 219-S (Figure 6-2).
- Close the nearest valve to the building, then close the next nearest valve.
- Properly tag valves.

2716-S

- Proceed to second floor of 222-S.
- Locate steam pressure reducing station just west of door 23 (Figure 6-2).
- Close pressure reducing valve.*
- Properly tag valves.

*Note: Pressure is reduced to 25 psig and only requires one valve for shutdown.

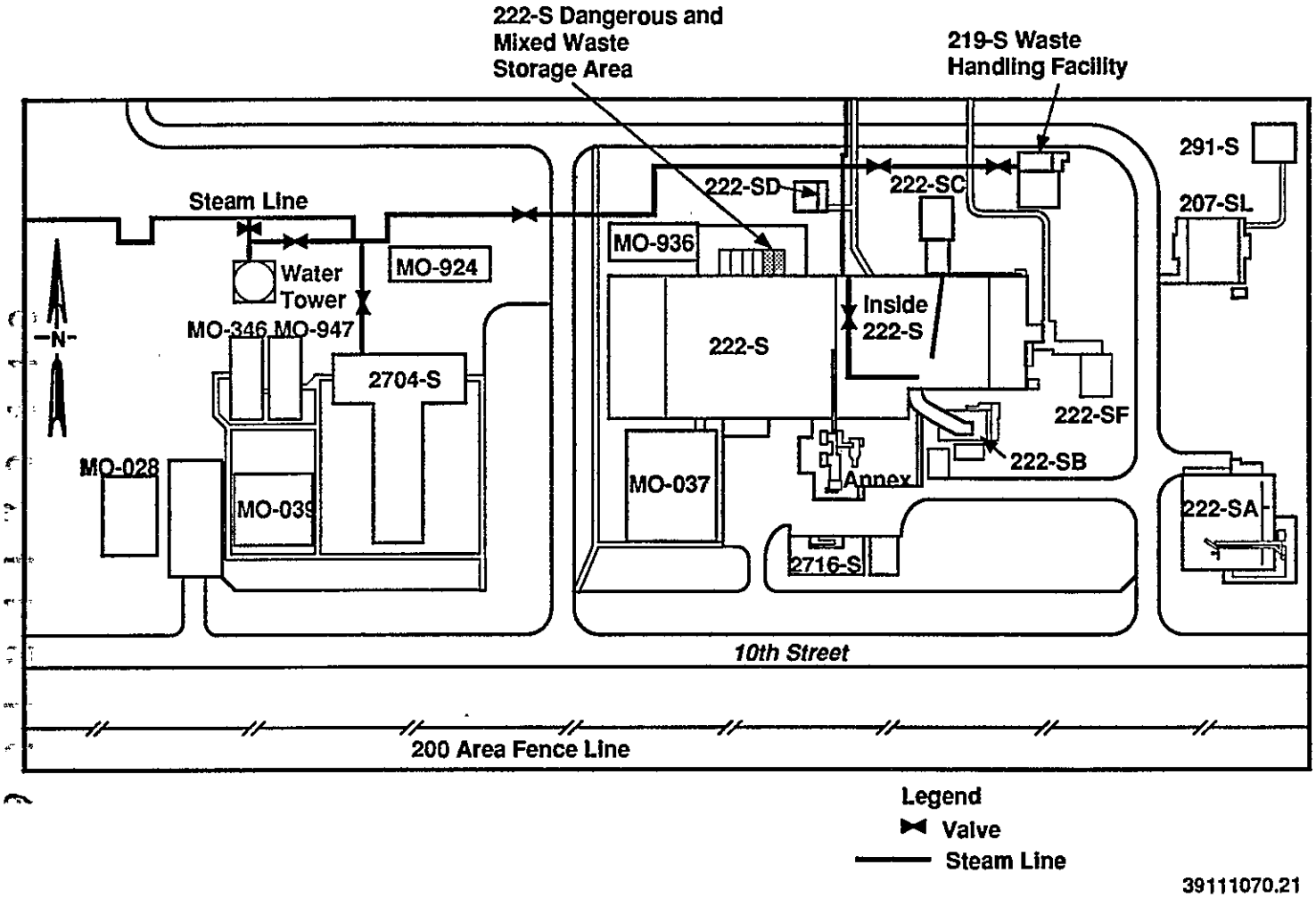
6.3.1.7 Telephone Service (Regular or PAX).

- Only the contracted telephone utility can disconnect this service.
- Call 6-6322 or 6-1611 and state your request.

6.3.1.8 Complete Shutoff Plans for Other Services. Compressed gas supply system to the building.

- Contact cognizant engineer for building ventilation for shutdown instructions (compressed gas line, etc.)
- Proceed to gas dock located between doors 6 and 7 in 222-S

Figure 6-2. Location of Steam Lines and Valving.



- Valves are located atop each gas cylinder*
- Turn each valve until closed
- Properly tag valves.

*Note: Contact Counting Room Manager before shutting off P-10 gas.

6.3.2 Industrial Emergency

- Contact the POC at 811 or 3-3800 and provide as much information as possible. Request additional assistance as required.
- Inform the Building Emergency Director.
- Take other action as directed.

6.3.3 Loss of Electricity

- In the event of a loss of normal electrical power to locations requiring power to maintain air balance contamination control, occupants of the building should execute evacuation instructions and assemble at the staging area.
- Notify the Building Emergency Director.
- Start the temporary generator to ensure continuous sampling of the 222-S Exhaust Stack. (Refer to SD-CP-HIE-001, 222-S Hazards Identification and Evaluation, the Operational Safety Limit or WHC-CM-7-5, Environmental Compliance Manual for response.)
- Notify appropriate maintenance personnel for repair.

6.3.4 Loss of Water

- Halt operations.
- Notify the Building Emergency Director.
- Notify appropriate maintenance personnel for repair.

6.3.5 Loss of Ventilation

- Halt operations.
- Evacuate building.
- Notify the Building Emergency Director.
- Notify appropriate maintenance personnel for repair.
- Notify Environmental Protection if stack sampler is affected.

6.3.6 Loss of Steam

- Notify the Building Emergency Director.
- Notify appropriate maintenance personnel for repair.

6.3.7 Loss of Compressed Air

- Halt affected operations.
- Evacuate building.
- Notify the Building Emergency Director.
- Notify appropriate maintenance personnel for repair.

6.3.8 Fire

Firefighting in the 222-S Laboratory Complex is complicated by the presence of significant amounts of dangerous or radioactive material that could cause contamination. The avoidance of breaching containment of the buildings is extremely important.

The following actions are the responsibility of the Building Emergency Director, or alternate, and should be taken in the event a fire is detected or an explosion occurs at the 222-S Laboratory Complex:

1. Personnel discovering the fire shall pull the nearest alarm box and notify the Building Emergency Director.

2. Call 811 and request Fire Department support.

3. Confer with Health Physics and Nuclear Safety for contamination controls and area postings.

4. Assign a person to meet the Fire Department and direct the Fire Department to the location of the alarm or fire.

5. Proceed to the scene of the incident and make an assessment of the situation; request assistance if necessary.

6. Occupants respond to the fire alarm and stand by for further instructions.

7. The Fire Department/Hazardous Material Response Team will proceed to the scene of the incident and, coordinating with the Building Emergency Director, initiate actions to control the incident.

8. Establish an incident command post in a safe location and request additional assistance as necessary.

9. Remove injured personnel to a safe area; provide immediate first aid and prepare for transport to a full-service medical facility for medical treatment.

10. As necessary, establish roadblocks to prevent unauthorized personnel from entering.

11. After the fire has been controlled and extinguished and there is no longer an imminent threat to human health, the Building Emergency Director will announce an "All Clear" signal.

12. Isolate any dangerous materials and stabilize the materials until the materials can be removed in a nonemergency mode and properly treated or disposed.

13. Clean and repair emergency equipment and return to a condition fit for reuse.

14. Replace all expendable supplies.

6.3.9 Major Process Disruption

A major process disruption in this complex would involve a spill of waste stored in the vault, aboveground tank, or storage tanks (tank 101, tank 102, and tank 103). A spill response plan is given in Section 6.5.1.

6.3.10 Pressure Hazards Emergency Response

- Notify personnel to leave the area of the hazard.
- Inform the Building Emergency Director.
- If appropriate, shutoff the affected system - such as steam.
- Inform appropriate maintenance personnel for repair.

6.3.11 Loss of Vacuum

- Halt operations
- Evacuate building
- Notify the Building Emergency Director
- Notify appropriate maintenance personnel for repair
- Notify environmental protection if stack sampler is affected.

6.4 NATURAL HAZARD RESPONSE PLAN

6.4.1 Volcanic Eruption/Ashfall

Volcanic eruptions and ash fallout from several Cascade mountains are a possibility. Notification to the facility in the event that ash fallout is imminent would be through the Crash Alarm System. The following actions should be taken upon notification that an ash plume is headed for the Hanford Site.

1. The Building Emergency Director should contact the ECC to obtain meteorology data and to determine estimated time of arrival for the ash plume.

2. Decide whether to evacuate or initiate take-cover emergency response. If the decision is made to evacuate, follow the "evacuation" response in Section 6.1.1.

3. If the take-cover response is required, follow the "Take Cover" response in Section 6.1.2.

4. Protect supply air inlets and reduce ventilation flows as appropriate.

5. Determine the need for shutting down some or all of the processes. Notify appropriate personnel to begin shutdown activities.

6. Maintain communication with the Emergency Duty Officer or the ECC to discuss building condition and changing fallout conditions.

6.4.2 Seismic Event Response

The emergency organizations' primary role in a seismic event is to coordinate the initial response to injuries, fires, or fire hazards, and to take measures to contain or control radioactive and/or toxic material releases that may have an adverse impact.

6.4.2.1 Seismic Event - Response During the Event. Each building emergency organization must be ready to respond following a seismic event affecting the Hanford Site, facilities, personnel, and property. The following guidelines identify the responses necessary to respond to a seismic event at the complex:

1. Promptly assess postearthquake emergency needs

2. Conduct personnel accountability and report missing individual

3. Take necessary actions to protect building personnel and onsite and offsite personnel

4. Report needs to 811 number or ECC

5. Search for injured or trapped employees

6. Render first aid

7. Search for fires and other hazards

8. Fight fires

9. Turn off water, gas, and electricity

10. Perform building inspection

11. Consider shutdown of operating systems

12. Arrange for rescue of personnel

13. Form a recovery plan

14. Perform cleanup.

6.4.2.2 Seismic Event - Employee Response During the Event. During the earthquake, building personnel should perform the following actions:

1. Remain calm

2. If indoors, stay away from windows, steam lines, and hoods

3. Respond to all emergency signals

4. Seek shelter away from windows

5. If outside, avoid objects which could fall or release hazardous material.

6.4.2.3 Seismic Event - Employee Response Following the Event. After the earthquake, perform the following actions:

1. Follow instructions of the Building Emergency Director

2. Check fellow workers for injuries and administer first aid

3. Call 811 for emergency assistance and notify your plant management

4. Do not use matches or lighters

5. Do not touch downed power lines or objects touched by downed wires

6. Do not use the telephone or PAX except for emergency communications

7. Establish damage assessment teams for the local area and areas beyond the complex background

8. Determine if release of inventories of dangerous material (both radioactive and nonradioactive) is occurring or likely to occur

9. Determine current local meteorology

10. Warn adjacent buildings of event using Crash Alarm, radios, telephone, runners, and/or Hanford Patrol rover vehicles

11. Initiate road closures (Highway 240 and/or onsite roadways) to reduce potential exposures

12. Provide resources and personnel assistance to other affected personnel and facilities.

6.4.3 High Winds/Tornado

- Take cover until the event subsides, as directed

- Assess and identify damage to the 222-S Laboratory Complex and report damage to Building Emergency Director

- Contact the POC at 811 or the Emergency Duty Officer at 3-3800, as appropriate

- Further response should be similar to that for seismic event, using the same checklist (Section 6.4.2).

6.4.4 Flood

- Take cover or assemble in the staging area, as directed
- Assess and identify damage to 222-S Laboratory Complex
- Contact the POC at 811 or the Emergency Duty Office at 3-3800, as appropriate
- Further response should be similar to that for seismic event, using the same checklist (Section 6.4.2).

6.4.5 Range Fire

Not applicable for this complex. Section 6.3.8 contains the response to fires.

6.5 DANGEROUS MATERIALS/MIXED WASTE RESPONSE PLAN

Discovery of a nonradioactive dangerous material or mixed waste spill could be made by anyone. Emergency equipment can be used by individuals discovering a spill provided the individual has been properly trained in the use of the spill equipment and uses proper respiratory and personnel protection equipment.

6.5.1 Spill Response Plan

The Building Emergency Director has overall responsibility to ensure proper response to emergency situations involving dangerous materials. The following responses should be taken in response to a spill of dangerous material.

1. Assess the severity of the situation.
2. If the release can be controlled safely and promptly, do so; if not, notify the Building Emergency Director.
3. The Building Emergency Director will assess the situation and determine the type and quantity of material(s) released and the hazards involved.
4. Activate the appropriate emergency alarms, if necessary, and notify personnel in the immediate area of the incident via the PAX PA system.
5. Respond to the emergency alarm and stand by for further instructions over the PAX system.
6. If response is within the capabilities of the emergency response organization, actions appropriate for the waste or material involved will be initiated to contain and control the release.

7. If beyond the capabilities of the building emergency response organization, the Building Emergency Director will notify the POC at 811 to request additional assistance.

8. Direct personnel to take those actions that can be safely performed to control or contain the release before arrival of requested assistance.

9. Immediately notify Environmental Protection on 373-1716 of any spill or release inside or outside of the complex.

10. Direct an individual to meet the emergency responders from outside the affected area and direct them to the event scene.

11. Hanford Fire Department will proceed immediately to the scene of the incident and, coordinating with the Building Emergency Director, will initiate actions to control the incident.

12. Establish an incident command post in a safe location and request additional assistance as necessary.

13. Rescue personnel, provide immediate first aid, and prepare for transport to a full-service medical facility.

14. Establish roadblocks or other traffic control measures to prevent unauthorized personnel from entering the area.

15. After the release has been contained and controlled and there is no longer an imminent threat to human health, the Building Emergency Director will announce an "All Clear" signal.

16. Residual dangerous materials will be isolated and stabilized by covering or other appropriate means until the materials can be removed in a nonemergency mode and properly treated or disposed.

17. Emergency equipment used in the response to the incident will be cleaned and returned to a condition ready for reuse after the cleanup is completed, and all expendable supplies used will be replaced.

6.5.2 Fire and Explosion Associated with Hazardous Materials

Explosions might be the cause or result of a fire or might be totally disassociated. For this plan, fire and explosion are treated simultaneously. Special chemical hazards are addressed in the Fire Department's "Pre-Fire Plans" located at the entrance to the 222-S Laboratory Complex and/or the entrances of the associated buildings covered by this plan.

6.5.2.1 Discoverer of Fire.

1. Avoid inhaling smoke, fumes, or vapors even if no dangerous waste is involved.

2. Pull the nearest fire alarm pullbox and call 811.

3. Notify the Building Emergency Director and Operations Shift Office. Provide as much information as possible without personal risk.

4. Move and keep people away from the fire scene.

6.5.2.2 Building Emergency Director Actions

1. The Building Emergency Director will identify the character, exact source, amount, and extent of any released materials. Support will be requested from Process Engineering, as required, for this effort.

2. If the emergency involves a dangerous waste accumulation area, contact the 222-S Laboratory Complex Hazardous Waste Coordinator to identify the materials involved and suggest actions that should be considered.

3. Contact the POC at 811 or 3-3800 and provide as much information as possible. Request additional assistance as required.

4. Evacuate all of the complex. Ensure that the staging area remains safe.

5. Consider requesting POC to evacuate personnel along adjacent streets and roadways.

6. Ensure that the Fire Department/Hazardous Material Response Team has been notified.

7. Relay pertinent information, including telephone number and proposed location of the command post.

8. Establish a command post in a safe location.

6.5.3 Toxic Fume Release

Discovery of a nonradioactive dangerous material toxic fume release could be made by anyone. Rapid communication is a vital part of warning personnel and notifying appropriate response personnel.

6.5.3.1 Discoverer. The person discovering the toxic fumes shall take the following immediate actions:

1. ASSUME A FUME RELEASE IS TOXIC UNLESS IT IS ABSOLUTELY KNOWN TO BE HARMLESS.

2. Avoid inhaling smoke, fumes, or vapors even if no hazardous waste is involved.

3. Do not assume that gases or vapors are harmless because of lack of smell.

4. Contact the Building Emergency Director and Operations Shift Office immediately. Provide as much information as possible without personal risk.

5. Keep people away from the area of the release.

6.5.3.2 **Building Emergency Director.** The Building Emergency Director must immediately take the following actions:

1. Identify the character, exact source, amount, and extent of any released materials.

2. Refer to the MSDSs for information concerning what type of respiratory and personnel protective equipment should be used to isolate the spill area and/or stop the leak.

3. If the emergency involves a dangerous waste accumulation area, contact the 222-S Laboratory Complex Hazardous Waste Coordinator at 3-5449 to identify the materials involved.

4. If assistance is required, notify the POC at 811, or 3-3800, and request that the Fire Department/Hazardous Material Response Team be dispatched. Provide as much information as possible.

5. Assign a representative to meet and direct the Hazardous Material Response Team to the area of the spill.

6. Assess possible hazards to human health and the environment (considering direct, indirect, immediate, and long-term effects) that could result from the spill.

7. Contact Pacific Northwest Laboratory Meteorology Weather Station on 3-2716 to determine the wind speed, direction, and plume stability.

8. Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the complex.

9. Where applicable, stop processes and operations, collect and contain released waste, and remove or isolate containers.

10. Notify Environmental Protection on 373-1716 in the event of any release.

11. Evaluate the need to evacuate part or all of the complex. Take into account the location of the spill and ensure the safety of the evacuation staging area.

12. Consider building evacuation if gases or vapors would be pulled in through air intakes.

6.5.4 Reactive Corrosive Chemical Hazard

In the event of a reactive or corrosive chemical release or spill in the 222-S Laboratory Complex, the area should be evacuated immediately and the Building Emergency Director shall decide whether to evacuate the entire complex. Environmental Protection and the 222-S Laboratory Complex Hazardous Material Coordinator shall be contacted and advised of the spill. The hazardous Material Response Team will be contacted (811) for advice and response, if required, as to spill containment and cleanup by the Building Emergency Director.

6.5.5 Thermal Reaction/Hazard

In the event of an escaping steam hazard:

- Leave the area of the hazard
- Inform the Building Emergency Director
- Isolate the steam supply to stop the steam leak if possible
- Inform the appropriate maintenance personnel for repair.

6.5.6 Flammable Liquids/Materials

Response to spills of flammable liquids/hazardous materials is handled according to the Section 6.5.1 Spill Response Plan.

6.5.7 Asbestos Release

Asbestos containing materials normally are well encapsulated so that the asbestos fibers do not become airborne. An asbestos hazard emergency condition arises when a large portion of the encapsulation is damaged and the asbestos containing material is physically dispensed in the area. Examples include bursting steam piping or vehicles colliding with overhead steam lines. An emergency response to asbestos is <u>not</u> anticipated; however, the following actions should be taken in the event of a release:

1. Evacuate all personnel from the affected area

2. Isolate and post the area

3. Contact Industrial Safety and Fire Protection to determine remedial action

4. Contact the Building Warden and provide information

5. At the direction of Industrial Safety and Fire Protection, and "competent" personnel for asbestos release (listed in Appendix A), identify a recovery/cleanup plan.

6.6 RADIOACTIVE MATERIALS RESPONSE PLAN

6.6.1 Radioactive Gaseous Effluent Discharge - Stack Alarm

All potentially contaminated gaseous effluent discharges are monitored continuously and/or sampled periodically to determine radioactivity. Alarms are activated for continuously monitored streams in the 222-S. The three vault tanks in the 219-S are vented by an electrical exhaust fan through a deentrainer or demister and a HEPA filter to the atmosphere via the 296-S-16 Stack. The laboratory hoods, hot cells, and room exhausts are vented by an electrical exhaust fan via 296-S-21 Stack. The 296-S-2 stack is monitored continuously and these streams are sampled weekly for total alpha and total beta activity. (WHC-CM-7-5 contains additional information.)

6.6.2 Radioactive Liquid Effluent Discharge

The 222-S drains high- and intermediate-level radioactive liquid mixed waste to the 219-S. The 219-S is designed and operated to prevent liquid effluent discharge to the environment. If a spill or release occurs, employees should:

1. Evacuate the area
2. Contact Manager and Operational Health Physics (PAX 221)
3. Contact the Building Emergency Director
4. Designated personnel may be required to remain in/at the 219-S to ensure equipment operation
5. Immediately notify Environmental Protection on 373-1716.

6.6.3 Significant Contamination Spread

Typically, the contamination spread will be indicated by a continuous air monitor. Personnel will respond to a continuous air monitor alarm by carrying out the following activities:

1. Stop breathing
2. Move one barrier away from the alarm to safety
3. Contact Health Physics and stand by for survey and contamination status
4. If the room is found to be contaminated, Health Physics will place the room on airborne contamination status
5. Notify immediate Manager and Building Emergency Director
6. Notify Environmental Protection on 373-1716.

6.7 CRITICALITY RESPONSE PLAN

The probability of a criticality is unlikely since the 222-S Laboratory Complex.

The limits, controls, and action plans for special nuclear materials within the 222-S Laboratory Complex are defined in the Nuclear Criticality Safety Manual (WHC-CM-4-29), the 222-S Laboratory Facilities Hazards Identification and Evaluation (SD-CP-HIE-001), the Operating Specification Documents (OSD-S-186-0003 and OSD-S-186-0004), and in various laboratory operating procedures.

6.8 EXPLOSIVE MATERIALS/MUNITIONS HAZARDS RESPONSE PLAN

Because no explosive materials/munitions are stored in the 222-S Laboratory Complex, a hazards response plan is not applicable for the Complex.

6.9 PREVENTION OF RECURRENCE OR SPREAD OF FIRES, EXPLOSIONS, OR RELEASES

To try to ensure that fires, explosions, or releases do not occur, recur, or spread, operations have been reviewed to identify potential hazards, and the laboratory operating procedures have been developed to minimize the occurrence of unplanned incidents. Safety systems such as automatic fire sprinklers, automatic process shutdown controls, spill containment structures, and contaminated waste stream diversion systems have been installed to ensure that, if an emergency event occurs, the affected areas will be kept to a minimum.

Should an emergency incident occur, upon completion of the emergency response to that incident, the Building Emergency Director is responsible for analyzing the events that lead to the incident and for conducting a critique, including cause(s), impacts, and lessons learned from the incident. The requirements of DOE Order 5484.1 must be followed to ensure that all appropriate parties are aware of and participate in decisions on the best course(s) of action to take to prevent or minimize the possibility of future occurrences.

Specific steps that might be taken for a particular incident could include the following.

1. Isolating the site of the initial incident by shutting off power, closing off ventilation systems, etc., to minimize the spread of a release and/or the potential for a fire or explosion.

2. Inspecting the site for noted component or system failure.

3. Removing released material and waste remaining inside of containment structures as soon as possible.

4. Containing and isolating residual waste material using dikes and absorbents.

5. Covering or otherwise stabilizing areas where residual released materials remain to prevent migration or spread from wind or precipitation run-off.

6. Install new buildings, systems, or equipment to enable better management of dangerous waste or materials.

7.0 TERMINATION OF EMERGENCY

Normally, it is a function of the Building Emergency Director to declare the termination of an emergency. However, once the Emergency Organization is activated, only the Area Emergency Director or the Emergency Director shall declare that an emergency has ended. If the DOE-RL Emergency Action Coordination Team is activated, only the DOE-RL Director shall officially terminate the emergency. In all cases, however, the Building Emergency Director must be consulted before reentry is initiated.

8.0 ACCIDENT RECOVERY

The recovery phase of the accident is not handled under emergency criteria but according to a recovery plan developed for the specific event. Thus, the Complex Manager will create an emergency organization encompassing all required aspects of engineering, operations, quality assurance, maintenance, and functional support, with direction provided by the Site Hazardous Waste Engineering Unit, Occupational Health and Safety, and Environmental Protection. This will include making proper notifications to official agencies (i.e., U.S. Department of Energy, U.S. Environmental Protection Agency, and or Washington State Department of Ecology, etc., via Environmental Protection). Recapture (where possible), storage, and disposal of any material that is released, and storage and disposal of any contaminated soil or surface water, or any other material that results from a spill, toxic fume generation, fire, or explosion is coordinated by the Building Emergency Director.

No waste that may be incompatible with the released material will be treated, stored, or disposed of in the affected area until cleanup is completed.

All emergency equipment will be cleaned and returned to its intended use immediately following an emergency.

9.0 POSTEVENT ANALYSIS AND REPORTING REQUIREMENTS

Damage assessments should be made at the conclusion of the emergency phase and the results of these assessments must be communicated to the ECC. The Building Emergency Director should designate a Recovery Manager who, with the assistance from engineering, quality assurance, and operations, will determine necessary steps to return the complex to an operational status. The following items should be considered:

1. Building Structures (walls, ceilings, systems, etc.)

2. Utilities

   - Electricity
   - Water
   - Gas
   - Steam
   - Telephone.

3. Hazardous Materials/Processes

   - Radioactive systems or equipment
   - Chemical system
   - Toxic
   - Reactive
   - Corrosive
   - Explosive
   - Pressure systems
   - Compressed gas lines
   - Pressure vessels
   - Vacuum system.

4. Waste Systems

   - Process sewer line
   - Process water line
   - Sanitary water line
   - Fire sprinklers
   - Liquid metal
   - Cryogenic.

5. Heating, Ventilation, and Air Conditioning.

6. Safety Eyewash/Safety Shower

   - Fire alarm
   - Crash alarms
   - Sirens and alarms.

ATTACHMENT A

BUILDING EMERGENCY RESPONSE ORGANIZATION LISTING

A 1.0 BUILDING EMERGENCY DIRECTOR

	Name	Location	Phone
Primary:	Operations	2704-S/31B	
Alternate:	Shift manager	222-S/5B	
Alternate:		222-S/100	

A 2.0 BUILDING WARDENS/PERSONNEL ACCOUNTABILITY AIDES

Building		Name	Location	Phone
222-SA	Primary:	Shift manager	222-S/5B	
2704-S	Primary:		2704-S/24	
	Alternate:		2704-S/18	
MO-037	Primary:		MO-037	
	Alternate:	Shift manager	222-S/5B	
Trailers	Primary:		222-S/5C	
	Alternate:	Shift manager	222-S/5B	

A 3.0 STAGING AREA MANAGERS

	Name	Location	Phone
Primary:	Shift manager	222-S/5B	
Alternate:		222-S/10D	

A 4.0 VOLUNTEER BOMB SEARCH TEAM MEMBERS

	Name	Location	Phone
Primary:		222-S	
Primary:		222-S	
Primary:		222-S	
Primary:		222-S	
Primary:		222-S	

A 5.0 EVACUATION BUS DRIVERS

Name	Location	Phone
	222-S	
	222-S	
	222-S	
	222-S	
	222-S	

A 6.0 HAZARDOUS MATERIALS COORDINATOR

	Name	Location	Phone
Primary:		222-S/5D	
Alternate:		222-S/5C	

Note: Home addresses and phone numbers are available from the Patrol Operations Center (3-3800) in the event of an emergency.

ATTACHMENT B1

219-S WASTE HANDLING FACILITY CONTINGENCY PLAN

B1 1.0 INTRODUCTION

This attachment is supplemental to the 222-S Complex Emergency Plan and provides specific information and response plans for the 219-S Waste Handling Facility. Because of the nature of this unit, special plans identified here are required for response to emergencies at this location.

B1 1.1 CONTINGENCY PLAN COVERED BY THIS PLAN

This Plan covers the 219-S Waste Handling Facility as described in Section 1.4.

B1 1.2 LOCATION OF THE FACILITY

The 219-S Waste Handling Facility is in the northeast corner of the 222-S Complex, located in the 200 West Area.

B1 1.3 DESCRIPTION OF FACILITY AND OPERATIONS

A description of the 219-S Waste Handling Facility and its function is given in Sections 1.4 of the 222-S Complex Emergency Plan.

B1 2.0 PURPOSE OF THE PLAN

The purpose of this Plan is to minimize the potential impact on human health and the environment in the event of an emergency situation, including a fire, an explosion, or an unplanned release of dangerous or mixed waste. This Plan is a prepared set of responses to each emergency of concern.

B1 3.0 DESCRIPTION OF POTENTIAL EMERGENCIES

Section 3.0 of the 222-S Complex Emergency Plan identifies and describes the potential emergencies that could involve the 219-S Waste Handling Facility. Of these various potential emergencies, only those events that could initiate an aqueous or gaseous leak, spill, or release of the contents of the 219-S Waste Handling Facility tanks are considered credible, especially when transferring tank 102 waste contents to a tanker truck.

B1 4.0 DESCRIPTION OF WHEN THE PLAN WILL BE IMPLEMENTED

This Plan will be implemented when the Building Emergency Director determines that the severity of the incident at the 219-S Waste Handling Facility poses a significant threat to human health or the environment (Section 4.1 of the Building Emergency Plan).

B1 5.0 EMERGENCY RESPONSE PLAN

B1 5.1 BUILDING EMERGENCY RESPONSE ORGANIZATION (SPECIFIC)

Attachment A of the 222-S Complex Emergency Plan identifies the members of the building emergency response organization. The 219-S Waste Handling Facility has the same response organization. In an emergency, the duties and responsibilities of an Emergency Coordinator (WAC 173-303) are assigned to the Building Emergency Director. In an emergency, only the Building Emergency Director or alternate has the authority to implement this Plan.

B1 5.2 IDENTIFICATION AND DESCRIPTION OF SPECIALIZED EMERGENCY EQUIPMENT

A PAX telephone, outside-line telephone, and hand-held fire extinguisher are located on the inside of the north wall of the 219-S Building, and a safety shower is located on the outside of the same wall. Section 5.2 of the Building Emergency Plan lists the equipment necessary for 222-S Complex personnel to respond to credible emergency situations.

B1 5.3 EMERGENCY PLAN

Generic complex-wide emergency response plans are addressed in Section 6.0 of the 222-S Complex Emergency Plan. The 219-S Waste Handling Facility responses will be identical to the 222-S Complex responses for the following events:

- Loss of ventilation (Section 6.3.5)
- Loss of vacuum (Section 6.3.11)
- Natural hazards (Section 6.4)
- Toxic fume releases (Section 6.5.3)
- Thermal reactions (Section 6.5.5)
- Radioactive gaseous effluent discharge (Section 6.6.1)
- Loss of air (Section 6.3.7).

Emergency responses unique to the 219-S Waste Handling Facility, which could initiate or contaminate an aqueous or gaseous leak, spill, or release of the tank contents, are outlined in this section of Attachment B1. As discussed in the 222-S Complex Emergency Plan, the emergency responses include the following:

- Loss of electricity (Section 6.3.3)
- Loss of water (Section 6.3.4)
- Loss of steam (Section 6.3.6)
- Fire (Section 6.3.8)
- Process upsets and spills or releases (Section 6.3.9).

Response plans for each of these emergency situations are described in the following sections. The evacuation plan for the 219-S Waste Handling Facility is the same as the 222-S Complex (Sections 1.5 and 6.1.1 of the 222-S Complex Emergency Plan).

B1 5.3.1 Responses to Loss of Electricity

Loss of electricity will result in the loss of sump pumps, exhaust pumps, agitators, cooling water circulation, and all indicators and alarms. Wastes received from the 222-S Analytical Laboratory flows by gravity to the 219-S Waste Handling Facility tanks.

Discoverer--In the event of loss of electricity, personnel will:

- Notify the Shift Manager in the 222-S Analytical Laboratory to shut down discharge to 219-S Waste Handling Facility until power is restored
- Call the 222-S Complex Manager
- Cease all neutralization and transfer operations
- Monitor tank level gages in the 219-S Waste Handling Facility operating gallery to confirm waste inflow has stopped
- Notify the Building Emergency Director.

Building Emergency Director--Section B1 5.3.8 of this Plan contains the responsibilities of the Building Emergency Director in this emergency situation.

B1 5.3.2 Responses to Loss of Water

Loss of water to the 219-S Waste Handling Facility could prevent flushing of the lines and could result in the deterioration of transfer lines or could prevent cooling of tanks during caustic addition. If the ability to flush transfer lines is lost, personnel will notify the Shift Manager and follow the actions outlined in Section 6.3.4.

Discoverer--If the ability to cool the neutralization process is lost, personnel will:

- Stop the addition of caustic by closing both the raw water and caustic valves to tanks 103 and 102
- Verify that the caustic supply valve is closed (Figure B1-1)
- Notify the Building Emergency Director of the situation
- Monitor the pressure gage dials on the instrument panel in the operating gallery of the 219-S Waste Handling Facility for pressure hazards.

Building Emergency Director--Section B1 5.3.8 of this Plan contains the responsibilities of the Building Emergency Director in this emergency situation.

B1 5.3.3 Responses to Loss of Steam

Loss of steam would result in the loss of transfer capabilities between tanks.

Discoverer--In the event of the loss of steam, personnel will:

- Notify the Shift Manager of the situation
- Monitor the level indicators for the tanks located in the operating gallery
- If the overflow limit is approached, notify the 222-S Complex Shift Manager to stop the flow of waste until the steam is restored. The liquid-level overflow alarm is located in the operating gallery and in Room 3B of the 222-S Analytical Laboratory.

Building Emergency Director--Section B1 5.3.8 of this Plan contains the responsibilities of the Building Emergency Director in this emergency situation.

B1 5.3.4 Responses to Fire

Fire might result in the spread of contamination and/or the loss of control and operational capabilities.

Discoverer--In the case of fire, personnel will:

- Pull fire alarm if readily available and/or call the POC at 811 to report the fire. (Do not hang up until instructed to do so)
- Immediately notify the Shift Manager and the Building Emergency Director
- After notification, attempt to extinguish the fire (if deemed feasible and if wearing proper respiratory protection). Evacuate the building and assemble at the staging area.

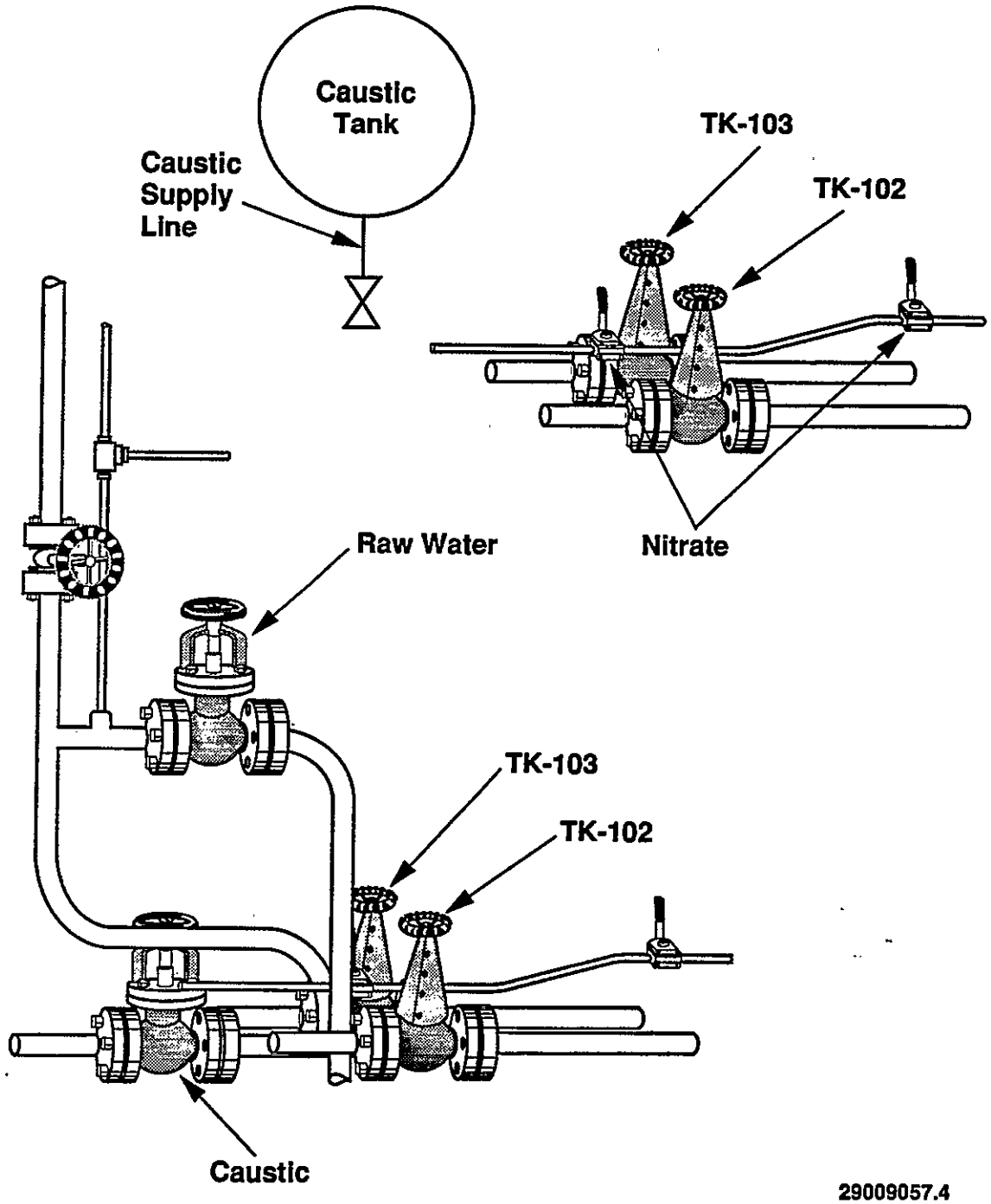
Building Emergency Director--The Building Emergency Director will initiate the responses for fire outlined in Section 6.3.8 of the Building Emergency Plan.

Section B1 5.3.8 of this Plan contains the responsibilities of the Building Emergency Director in this emergency situation.

B1 5.3.5 Responses to Transfer Upsets, Spills, and/or Releases

Transfer upsets, spills and/or releases of the contents of 219-S Waste Handling Facility tanks could result in significant contamination spread. Any leakage from the tanks or the inflow transfer lines normally is collected in Sump 6 or 7 and jetted back to the tank by steam. The liquid level in the

Figure B1-1. Piping and Valve Configuration for Neutralization Process.



sumps is set at 6 inches (15.2 centimeters) to keep the amount of waste in the sump to a minimum because concrete in the vault is the only barrier between the waste and the environment.

Note: Rainwater or snowmelt might be encountered in the 219-S Waste Handling Facility sumps.

Discoverer--If a leak is detected in the tanks or during transfer operation to a tanker truck, personnel will:

- Follow Section 6.5.1, Spill Response Plan
- Stop the inflow into the tanks or tanker truck
- Confirm that the flow into the tanks or tanker truck has been stopped by observing changes in the level indicator.

Building Emergency Director--Section B1 5.3.8 of this Plan contains the responsibilities of the Building Emergency Director in this emergency situation.

- If the release is beyond the capabilities of the building emergency response organization, the Building Emergency Director will activate the appropriate emergency alarms and notify personnel in the immediate area of the incident via the PAX system.
- The Building Emergency Director will notify the POC at 811 and request that the Fire Department/Hazardous Material Response Team be dispatched if necessary.
- The Building Emergency Director will direct an individual to meet and direct the Hazardous Material Response Team to the event scene.
- The Building Emergency Director will assess possible hazards to human health and the environment (considering direct, indirect, immediate, and long-term effects) that might result from the spill.
- The Building Emergency Director will take all appropriate and reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other parts of the complex.

B1 5.3.6 Availability of Contingency Plan

Copies of this Building Emergency Plan are maintained throughout the 222-S Laboratory Complex and by onsite emergency organizations. The DOE-RL is responsible for distribution to all local police departments, fire departments, hospitals, and state and local emergency response teams that might be called upon to provide emergency services. A description of the arrangements with hospitals, state and local agencies and governments, etc., is located in Appendix A of the Emergency Plan of the DOE-RL.

B1 5.3.7 Updating the Contingency Plan

Amendments to this Plan will be made annually or, if needed, whenever applicable regulations or the dangerous waste permit are revised; the Plan fails in an emergency; the complex changes (in its design, construction, operation, maintenance, or other circumstances) in a way that materially increases the potential for fires, explosions, or releases of dangerous waste or dangerous waste constituents, or in a way that changes the response necessary in an emergency; or the list of emergency equipment changes.

B1 5.3.8 Responsibilities of Building Emergency Director

The responsibilities and authority of the Building Emergency Director are established in Section 5.1 of the *Emergency Plan*, WHC-CM-4-1. The Building Emergency Director or designated alternate is the only individual authorized to implement this Plan.

A Building Emergency Director will at all times either be on the complex premises or on call with the responsibility for coordinating all emergency response measures. The Building Emergency Director will be familiar with all aspects of this Plan and the 222-S Complex Emergency Plan, and will have knowledge of the contractor's emergency plan. The Building Emergency Director also will be familiar with all operations and activities at the complex, the location and properties of all waste handled, the location of all records within the complex, and the complex layout. In addition, this person has the authority to commit the resources needed to carry out this Plan.

Whenever there is an imminent or actual emergency situation involving the 219-S Waste Handling Facility, the Building Emergency Director will immediately:

- Activate internal alarms or communication systems, where applicable, to affected personnel
- Notify Environmental Protection to initiate the notification to the DOE-RL who subsequently informs the appropriate state or local agencies with designated response roles if their help is needed. Whenever there is a release, a fire, or an explosion involving the 219-S Waste Handling Facility, the Building Emergency Director will immediately identify the character, type of source material, estimated amount, and extent of any released materials.

Concurrently, the Building Emergency Director will assess possible hazards to human health and the environment (considering direct, indirect, immediate, and long-term effects) that might result from the release, fire, or explosion.

If the Building Emergency Director determines that the complex has had a release, a fire, or an explosion that could threaten human health or the environment outside the complex and an assessment indicates that evacuation of

local areas might be advisable, the Building Emergency Director will immediately perform the following:

- Notify Environmental Protection to notify DOE-RL who subsequently informs state and local authorities

- Be available to help appropriate officials decide whether local areas should be evacuated.

During the emergency, the Building Emergency Director will take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the complex. These measures will include, where applicable, stopping processes and operations, collecting and containing released waste, and removing or isolating containers.

If the complex operations cease in response to a fire, an explosion, or a release, the Building Emergency Director will monitor for leaks or ruptures in tanks, valves, pipes, or other equipment, wherever this is appropriate.

Immediately after an emergency, the Building Emergency Director will provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, a fire, or an explosion at the complex. The Building Emergency Director will ensure that, in the affected areas of the complex, the following protocols are followed:

- No waste that might be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed

- All emergency equipment listed in Section 5.2 of this Plan is cleaned and ready for use or replaced before operations are resumed.

The Building Emergency Director will initiate notifications to Environmental Protection. Environmental Protection is responsible for notification of the DOE-RL who subsequently informs local authorities. Notification includes reassurance that the complex is in compliance with the incompatible waste and emergency equipment requirements described previously before operations are resumed in the affected area(s) of the complex. Notifications to the Washington State Department of Ecology and local authorities will be verified completed by the DOE-RL before restart.

The Building Emergency Director will ensure that the time, date, and details are recorded in the operating log for any incident that requires implementing this Plan.

B1 5.3.9 Assessment Report

The Building Emergency Director will cooperate in preparing a written assessment report on the incident for the DOE-RL to submit (within 15 days

after the incident) to the Washington State Department of Ecology. This report will include the following:

- Name, address, and telephone number of the owner or operator
- Name, address, and telephone number of the unit
- Date, time, and type of incident (e.g., fire, explosion)
- Name and quantity of material(s) involved
- The extent of injuries if any
- An 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 the corrective action taken to prevent recurrence of the incident.

ATTACHMENT B2

DANGEROUS AND MIXED WASTE STORAGE AREA CONTINGENCY PLAN

B2 1.0 INTRODUCTION

This attachment is supplemental to the 222-S Complex Emergency Plan and provides specific information and response plans for the Dangerous and Mixed Waste Storage Area. Because of the nature of these structures, specific plans identified here are required for responses to emergencies involving the Dangerous and Mixed Waste Storage Area.

B2 1.1 FACILITIES COVERED BY THIS PLAN

This Contingency Plan (Plan) covers the Dangerous and Mixed Waste Storage Area as described in Section 1.4 of the 222-S Complex Emergency Plan.

B2 1.2 LOCATION OF THE FACILITY

The Dangerous and Mixed Waste Storage Area is on the north side of the 222-S Analytical Laboratory located in the 200 West Area.

B2 1.3 DESCRIPTION OF FACILITY AND OPERATIONS

A description of the 222-S Complex Dangerous and Mixed Waste Storage Area and its function is given in Section 1.4 of the 222-S Complex Emergency Plan.

B2 2.0 PURPOSE OF THE PLAN

The purpose of this Plan is to minimize the potential impact on human health and the environment in the event of an emergency situation, including a fire, an explosion, or an unplanned release of dangerous or mixed waste. This Plan is a prepared set of responses to each emergency of concern.

B2 3.0 DESCRIPTION OF POTENTIAL EMERGENCIES

Section 3.0 of the 222-S Complex Emergency Plan identifies and describes the potential emergencies that could occur within the 222-S Complex. Because of the proximity of the Dangerous and Mixed Waste Storage Area to the 222-S Analytical Laboratory, an emergency at either location could impact the other.

Industrial accidents (Section 3.2.2) and fire (Section 3.2.8) are the only two operational emergencies that were determined to be credible for the Dangerous and Mixed Waste Storage Area. Several natural events identified in Section 3.3 could affect the Dangerous and Mixed Waste Storage Area. These natural events might initiate a spill or leakage of materials, a fire/explosion, or a toxic fume release. Of these events, spills and/or

releases of hazardous materials and mixed waste are considered to be of greatest concern. Spills and/or releases, as identified in Section 3.4, might present the following hazards at the Dangerous and Mixed Waste Storage Area:

- Spill of hazardous material (Section 3.4.1)
- Fire or explosions involving hazardous materials (Section 3.4.2)
- Toxic fumes hazard (Section 3.4.3)
- Flammable material/liquids hazards (Section 3.4.6).

B2 4.0 DESCRIPTION OF WHEN THE PLAN WILL BE IMPLEMENTED

This Plan will be implemented when the Building Emergency Director determines that severity of the incident at the Dangerous and Mixed Waste Storage Area poses a significant threat to human health or the environment (Section 4.1 of the 222-S Complex Emergency Plan).

B2 5.0 EMERGENCY RESPONSE PLAN

B2 5.1 BUILDING EMERGENCY RESPONSE ORGANIZATION (SPECIFIC)

The 222-S Complex emergency response organization is outlined in Attachment A of this Building Emergency Plan. The Dangerous and Mixed Waste Storage Area have the same emergency response organization. In an emergency, the Building Emergency Director or his designated alternate has the duties (described in WAC 173-303) of the Building Emergency Coordinator. In an emergency, only the Building Emergency Director or alternate has the authority to implement this Plan.

B2 5.2 IDENTIFICATION AND DESCRIPTION OF SPECIALIZED EMERGENCY EQUIPMENT

The 222-S Complex has a variety of fixed and portable equipment to respond to the potential emergencies (Section 3.0). A complete list is provided in Section 5.2. The specific equipment associated with the Dangerous and Mixed Waste Storage Area is summarized as follows:

B2 5.2.1 Fixed Equipment

Type	Location	Capabilities
PAX telephone	Outside storage structures at door 13 or door 15	
Evacuation siren	Laboratory leader's office	

B2 5.2.2 Portable Emergency Equipment

Type	Location	Capabilities
Fire extinguisher	Outside east wall of storage structures	Assist in the control of a fire
Overpack drums (2)	Outside east wall at storage structures	85-gallon (322-liter) capacity

B2 5.2.3 Protective Equipment

Type	Location	Capabilities
Self-contained breathing apparatus (2)	Outside east wall of storage structures	Rated at 30 minutes

B2 5.2.4 Spill Control Equipment

Type	Location	Capabilities
Acid cleanup kit	Outside east wall of storage structures	
Caustic cleanup kit	Outside east wall of storage structures	
Organic cleanup kit	Outside east wall of storage structures	

B2 5.3 EMERGENCY PLAN

Generic complex-wide response plans are addressed in Section 6.0 of the 222-S Complex Emergency Plan. Emergency response plans for the Dangerous and Mixed Waste Storage Area are located in Section 6.5 of this Building Emergency Plan. The evacuation plan for the 222-S Laboratory Complex is presented in Sections 1.5 and 6.1.1 of this Building Emergency Plan.

B2 5.3.1 Availability of Contingency Plan

Copies of this Building Emergency Plan are maintained throughout the 222-S Complex and by onsite emergency organizations. The DOE-RL is responsible for distribution to all local police departments, fire departments, hospitals, and state and local emergency response teams that could be called upon to provide emergency services. A description of the arrangements with hospitals, state and local agencies and governments, etc., is located in Appendix A of the Emergency Plan of DOE-RL.

B2 5.3.2 Updating the Contingency Plan

Amendments to this Plan will be made annually or, if needed, whenever applicable regulations or the complex dangerous waste permit are revised; the Plan fails in an emergency; the complex changes (in its design, construction, operation, maintenance, or other circumstances) in a way that materially increases the potential for fires, explosions, or releases of dangerous waste or dangerous waste constituents, or in a way that changes the response necessary in an emergency; or the list of emergency equipment changes.

B2 5.3.3 Responsibilities of Building Emergency Director

The responsibilities and authority of the Building Emergency Director are established in Section 5.1 of the contractor's Emergency Plan, WHC-CM-4-1. The Building Emergency Director or designated alternate is the only individual authorized to implement this Plan.

A Building Emergency Director will at all times either be on the complex premises or on call with the responsibility for coordinating all emergency response measures. The Building Emergency Director will be familiar with all aspects of this Plan and the 222-S Complex Emergency Plan, and will have knowledge of the contractor's Emergency Plan. The Building Emergency Director also will be familiar with all operations and activities at the complex, the location and properties of all waste handled, the location of all records within the complex, and the complex layout. In addition, this person has the authority to commit the resources needed to carry out this Building Emergency Plan.

Whenever there is an imminent or actual emergency situation involving the Dangerous and Mixed Waste Storage Area, the Building Emergency Director (or designee) will immediately:

- Activate internal complex alarms or communication systems, where applicable, to affected personnel
- Notify Environmental Protection to initiate the notification to the DOE-RL who subsequently informs the appropriate state and local agencies with designated response roles if their help is needed.

Whenever there is a release, a fire, or an explosion involving the Dangerous and Mixed Waste Storage Area, the Building Emergency Director immediately will identify the character, type of source material, estimated amount, and extent of any released materials.

Concurrently, the Building Emergency Director will assess possible hazards to human health and the environment (considering direct, indirect, immediate, and long-term effects) that might result from the release, fire, or explosion.

If the Building Emergency Director determines that the complex has had a release, a fire, or an explosion that could threaten human health or the environment outside the complex, and his assessment indicates that evacuation

of local areas might be advisable, the Building Emergency Director immediately will perform the following:

- Notify Environmental Protection to notify the DOE-RL who subsequently informs state and local authorities
- Be available to help appropriate officials decide whether local areas should be evacuated.

During the emergency, the Building Emergency Director will take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the complex. These measures will include, where applicable, stopping processes and operations, collecting and containing released waste, and removing or isolating containers.

If the operations cease in response to a fire, an explosion, or a release, the Building Emergency Director will monitor for leaks or ruptures in tanks, valves, pipes, or other equipment, as appropriate.

Immediately after an emergency, the Building Emergency Director will provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, a fire, or an explosion at the complex.

The Building Emergency Director will ensure that, in the affected areas of the complex, the following protocols are followed.

- No waste that might be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed
- All emergency equipment listed in Section 5.2 of this Plan is cleaned and ready for use or replaced before operations are resumed.

The Building Emergency Director will initiate notifications to Environmental Protection. Environmental Protection is responsible for notification of the DOE-RL, who subsequently informs local authorities. Notification includes reassurance that the complex is in compliance with the incompatible waste and emergency equipment requirements described previously before operations are resumed in the affected area(s) of the complex. Notifications to the Washington Stat Department of Ecology and local authorities will be verified completed by DOE-RL before restart.

The Building Emergency Director will ensure that the time, date, and details are recorded in the operating log for any incident that requires implementing this Plan.

B2 5.3.4 Assessment Report

The Building Emergency Director will cooperate in preparing a written assessment report on the incident for the DOE-RL to submit (within 15 days

after the incident) to the Washington State Department of Ecology. This report will include the following:

- Name, address, and telephone number of the owner or operator
- Name, address, and telephone number of the unit
- Date, time, and type of incident (e.g., fire, explosion)
- Name and quantity of material(s) involved
- The extent of injuries
- An 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 the corrective action taken to prevent recurrence of the incident.

ATTACHMENT B3

SATELLITE ACCUMULATION AND TEMPORARY (LESS THAN 90-DAY) STORAGE AREAS CONTINGENCY PLAN

B3 1.0 INTRODUCTION

This attachment is supplemental to the 222-S Complex Emergency Plan and provides specific information and response plans for the satellite accumulation and temporary (less-than-90-day) storage areas that are part of this complex. Because of the nature of these areas, specific plans identified here are required for responses to emergencies involving the satellite and less-than-90-day storage areas.

B3 1.1 FACILITIES COVERED BY THIS PLAN

The areas covered by this plan include satellite accumulation and temporary (less-than-90 day) storage areas in and around the 222-S Complex. These areas are used to temporarily accumulate hazardous waste from 222-S Complex operations while awaiting shipment of the waste to the onsite burial grounds.

B3 1.2 LOCATION OF THE FACILITIES

The locations of satellite accumulation and less-than-90-day areas are given in Section 1.4.3. A complete listing always is available from the Hazardous Materials Coordinator in Room 5C, PAX 206, or on 3-5449.

B3 1.3 DESCRIPTION OF FACILITIES AND OPERATIONS

A description of the satellite accumulation and less-than-90-day storage areas in the 222-S Complex and their functions are given in Section 1.4.3 of the 222-S Building Complex Emergency Plan.

B3 2.0 PURPOSE OF THE PLAN

The purpose of this Plan is to minimize the potential impact on human health and the environment in the event of an emergency situation, including a fire, an explosion, or an unplanned release of dangerous or mixed waste. The Plan is a prepared set of responses to each emergency of concern.

B3 3.0 DESCRIPTION OF POTENTIAL EMERGENCIES

Section 3.0 of the 222-S Complex Emergency Plan identifies and describes the potential emergencies that could occur within the 222-S Complex. Section 6.5 contains the hazardous materials/mixed waste response plan. This Plan describes the responses taken for spills, fire, or explosion, and toxic fume release.

Several natural events identified in Section 3.3 could affect the satellite or less-than-90-day satellite accumulation areas. These natural events might initiate a spill or leakage of hazardous materials, a fire/explosion, or a toxic fume release. Of these events, spills and/or releases of hazardous materials and mixed waste are considered to be of greatest concern.

B3 4.0 DESCRIPTION OF WHEN THE PLAN WILL BE IMPLEMENTED

This Plan will be implemented when the Building Emergency Director determines that the severity of the incident at a satellite accumulation area or less-than-90-day satellite accumulation areas poses a significant threat to human health or the environment (Section 4.1 of the Building Emergency Plan).

B3 5.0 EMERGENCY RESPONSE PLAN

B3 5.1 BUILDING EMERGENCY RESPONSE

The 222-S Complex Emergency Response Organization is outlined in Attachment A of the Building Emergency Plan. The satellite accumulation area or less-than-90-day satellite accumulation areas have the same emergency response organization. In an emergency, the Building Emergency Director or his designated alternate has the duties (described in WAC 173-303) as the Building Emergency Coordinator. The Building Emergency Director is located at 2704-S, Room 31B, and the alternate Building Emergency Director is located in 222-S Analytical Laboratory. In an emergency, only the Building Emergency Director or alternate has the authority to implement this Plan.

B3 5.2 IDENTIFICATION AND DESCRIPTION OF SPECIALIZED EMERGENCY EQUIPMENT

Because the satellite accumulation area or less-than-90-day satellite accumulation areas are spread throughout the 222-S Complex and because of the close proximity of some of the satellite areas to each other, specific equipment to each satellite and less-than-90-day area would be difficult to discern. The 222-S Complex has a variety of fixed and portable equipment to respond to the potential emergencies (Section 3.0). A complete list is provided in Section 5.2.1. Specific equipment available within the 222-S Complex is summarized as follows:

B3 5.2.1 Fixed Equipment

Type	Location	Capabilities
PAX telephone	Within 25 feet (7.6 meters) of each designated accumulation area	
Evacuation siren	Laboratory leader's office	
Safety showers and eyewash	Figures 1-8 and 1-9 222-S Complex Emergency Plan	

B3 5.2.2 Portable Emergency Equipment

Type	Location	Capabilities
Fire extinguisher	Figures 1-8 and 1-9, 222-S Complex Emergency Plan	Assist in the control of a fire
Bomb search kit	222-S Analytical Laboratory Lobby	

B3 5.2.3 Protective Equipment

Type	Location	Capabilities
Self-contained breathing apparatus (2)	Side of storage structure Number 1	Rated at 30 minutes

B3 5.2.4 Spill Control Equipment

Type	Location	Capabilities
Acid cleanup kit	Figure 1-8 and 1-9, 222-S Complex Emergency Plan	
Caustic cleanup kit	Figure 1-8 and 1-9, 222-S Complex Emergency Plan	
Organic cleanup kit	Figure 1-8 and 1-9, 222-S Complex Emergency Plan	

B3 5.3 EMERGENCY PLAN

The potential emergencies identified in Section 3.0 specifically for the satellite and less-than-90-day accumulation areas require emergency response plans for fire or explosion, spill or leakage, toxic fume release, and

flammable materials/liquid hazards. The generic complex-wide response plans are applicable and are addressed in Section 6.0 of the 222-S Complex Emergency Plan. The evacuation plan for the 222-S Analytical and 222-SA Standards Laboratories is presented in Sections 1.5 and 6.1.1 of the 222-S Complex Emergency Plan.

B3 5.3.1 Availability of Contingency Plan

Copies of this Building Emergency Plan are maintained at 222-S Complex and by onsite emergency organizations. The DOE-RL is responsible for distribution to all local police departments, fire departments, hospitals, and state and local emergency response teams that could be called upon to provide emergency services. A description of the arrangements with hospitals, state and local agencies and governments, etc., is located in Appendix A of the Emergency Plan of the DOE-RL.

B3 5.3.2 Updating the Contingency Plan

Amendments to this Plan will be made annually or, if needed, whenever applicable regulations or the dangerous waste permit are revised; the plan fails in an emergency; the complex changes (in its design, construction, operation, maintenance, or other circumstances) in a way that materially increases the potential for fires, explosions, or releases of dangerous waste or dangerous waste constituents, or in a way that changes the response necessary in an emergency; or the list of emergency equipment changes.

B3 5.3.3 Responsibilities of Building Emergency Director

The responsibilities and authority of the Building Emergency Director are established in the *Emergency Plan*, WHC-CM-4-1, Section 5.1. The Building Emergency Director or designated alternate is the only individual authorized to implement this Plan.

A Building Emergency Director will at all times either be on the complex premises or on call with the responsibility for coordinating all emergency response measures. The Building Emergency Director will be familiar with all aspects of this Plan and the 222-S Complex Emergency Plan, and will have knowledge of the contractor's Emergency Plan. The Building Emergency Director also will be familiar with all operations and activities at the complex, the location and properties of all waste handled, the location of all records within the complex, and the complex layout.

In addition, this person has the authority to commit the resources needed to carry out this Building Emergency Plan.

Whenever there is an imminent or actual emergency situation involving a satellite accumulation area or less-than-90-day satellite accumulation area, the Building Emergency Director (or designee) immediately will:

- Activate internal complex alarms or communication systems, where applicable, to affected personnel

- Notify Environmental Protection to initiate notification to the DOE-RL, who subsequently informs the appropriate state or local agencies with designated response roles if their help is needed. (Notification sequence shown in Figure 6.0-2 of the contractor's Emergency Plan, WHC-CM-4-1.)

Whenever there is a release, a fire, or an explosion involving the waste accumulation areas, the Building Emergency Director immediately will identify the character, type of source material, estimated amount, and extent of any released materials.

Concurrently, the Building Emergency Director will assess possible hazards to human health and the environment (considering direct, indirect, immediate, and long-term effects) that might result from the release, fire, or explosion.

If the Building Emergency Director determines that the complex has had a release, a fire, or an explosion that could threaten human health or the environment outside the complex, and his assessment indicates that evacuation of local areas might be advisable, the Building Emergency Director will perform the following:

- Notify Environmental Protection to notify the DOE-RL, who subsequently informs state and local authorities

- Be available to help appropriate officials decide whether local areas should be evacuated.

During the emergency, the Building Emergency Director will take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the complex. These measures will include, where applicable, stopping processes and operations, collecting and containing released waste, and removing or isolating containers.

If the operations cease in response to a fire, an explosion, or a release, the Building Emergency Director will monitor for leaks or ruptures in tanks, valves, pipes, or other equipment, as appropriate.

Immediately after an emergency, the Building Emergency Director will provide for the treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, a fire, or an explosion at the complex.

The Building Emergency Director will ensure that, in the affected areas of the complex, the following protocols are followed.

- No waste that might be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed

- All emergency equipment listed in Section 5.2 of this Plan is cleaned and ready for use or replaced before operations are resumed.

The Building Emergency Director will initiate notifications to Environmental Protection. Environmental Protection is responsible for notification of the DOE-RL, who subsequently informs local authorities. Notification includes reassurance that the complex is in compliance with the incompatible waste and emergency equipment requirements described previously before operations are resumed in the affected area(s) of the complex. Notifications to the Washington State Department of Ecology and local authorities will be verified completed by DOE-RL before restart.

The Building Emergency Director will ensure that the time, date, and details are recorded in the operating log for any incident that requires implementing this Plan.

B3 5.3.4 Assessment Report

The Building Emergency Director will cooperate in preparing a written assessment report on the incident for the U.S. Department of Energy to submit (within 15 days after the incident) to the Washington State Department of Ecology. This report will include the following:

- Name, address, and telephone number of the owner or operator
- Name, address, and telephone number of the unit
- Date, time, and type of incident (e.g., fire, explosion)
- Name and quantity of material(s) involved
- The extent of injuries
- An 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 the corrective action taken to prevent recurrence of the incident.

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APPENDIX 8A

TRAINING COURSE DESCRIPTIONS

APPENDIX 8A

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8A.3 JOB-SPECIFIC COURSES . . . . . APP 8A-7

8A.4 ENVIRONMENTAL AND HAZARDOUS MATERIAL SAFETY TRAINING . . APP 8A-18

8A.1 GENERAL COURSES	
Title	Radiation Safety Training
Description	Course instructs radiation workers in the fundamentals of radiation protection and the proper procedures for monitoring exposures.
Target audience	Radiation workers
Delivery	Classroom
Evaluation	Written test and practical dress/undress exercise
Length	7 hours
Frequency	24 months by completion of radiation safety requalification

Title	Radiation Safety Requalification
Description	Course instructs radiation workers in the fundamentals of radiation protection and the proper procedures for monitoring exposures.
Target audience	Radiation workers
Delivery	Classroom or computer-based training
Evaluation	Written test and practical dress/undress exercise
Length	7 hours
Frequency	24 months

Title	New Employee Safety Training
Description	Course covers U.S. Department of Energy Orders and applicable policies pertaining to employer and employee rights and responsibilities, general radiation training, hazardous waste, fire prevention, personal protective equipment, safety requirements, accident reporting, and avenues for addressing safety concerns.
Target audience	All new employees
Delivery	Classroom
Evaluation	Not applicable
Length	3 hours
Frequency	Not applicable

Title	Hanford General Employee Training
Description	Course covers U.S. Department of Energy Orders and applicable policies pertaining to employer and employee rights and responsibilities, general radiation training, hazardous communications and hazardous waste, fire prevention, personal protective equipment, safety requirements, accident reporting, and avenues for addressing safety concerns.
Target audience	All employees
Delivery	Computer-based training/interactive video
Evaluation	Computer generated questions
Length	4-6 hours
Frequency	12 months
Title	On-the-Job Training Instructor Training
Description	Course provides instructional approach to the planning, implementation, and evaluation of on-the-job training. Includes role-model demonstration exercise and practice with critique.
Target audience	Identified bargaining unit, exempt personnel
Delivery	Classroom
Evaluation	Practical exercise
Length	12 hours
Frequency	Not applicable
Title	Fork Truck Operator Training
Description	Course is designed to make personnel more knowledgeable of fork truck and components.
Target audience	Nuclear operators or anyone who operates a fork truck as part of work assignment
Delivery	Classroom, self-study, demonstration training
Evaluation	Written test and driving test
Length	6 hours
Frequency	36 months

Title	Fork Truck Operator Requalification
Description	Course consists of safety training requalifying operators of fork trucks and similar material-moving vehicles.
Target audience	Nuclear operators or anyone occasionally or regularly operating a fork truck
Delivery	Demonstration training
Evaluation	Written test and driving test
Length	3 hours
Frequency	36 months

Title	Light-Duty Hoist Training
Description	Course covers the proper use of electric and manual hoists as well as the pre-use inspection of rigging hardware.
Target audience	Operations and maintenance personnel
Delivery	Classroom, videocassette, and mockup rigging accessories
Evaluation	Written test
Length	8 hours
Frequency	36 months

Title	Building Emergency Director Training
Description	Course provides an overview of building emergency director responsibilities, identifies the building emergency organizations, reviews building emergency plan, and discusses drill and exercise requirements.
Target audience	Primary and alternate building emergency directors and members of a building emergency organization
Delivery	Classroom
Evaluation	Written test
Length	2 hours
Frequency	12 months

Title	Basic Crane and Rigging Training
Description	Course is designed to familiarize those who operate any type of lifting device who are not professional crane operators. The content includes principles of rigging and lifting as well as safety checks and practices.
Target audience	Anyone who operates a lifting device
Delivery	Classroom
Evaluation	Written test
Length	Average = 8 hours
Frequency	24 months

Title	Orientation to U.S. Department of Energy Order 5000.3A Occurrence Reporting
Description	Course is designed to familiarize personnel with the new U.S. Department of Energy Order 5000.3A *Occurrence Reporting and Processing of Operations Information*. Course provides information on Order requirements and the changes made to occurrence reporting and processing of operational information.
Target audience	Personnel involved in occurrence reporting
Delivery	Classroom
Evaluation	Not applicable
Length	1.5 hours
Frequency	Not applicable

Title	Managers Conduct of Operations
Description	Course provides indepth discussion of DOE Order 5480.19, conduct of operations requirements for DOE facilities, and application of Order to the Hanford Facility.
Target audience	Management
Delivery	Classroom
Evaluation	Not applicable
Length	16 hours
Frequency	Not applicable

Title	First Line Managers Conduct of Operations
Description	Course provides indepth discussion of DOE Order 5480.19, conduct of operations requirements for DOE facilities, and application of Order at the Hanford Facility plus practical walkthrough of TSD units.
Target audience	Management
Delivery	Classroom and walkthrough of TSD unit
Evaluation	Not applicable
Length	24 hours
Frequency	Not applicable

8A.2 UNIT-SPECIFIC COURSES

Title	222-S Laboratory Complex Orientation
Description	Course consists of a classroom presentation using structured notes. Topics presented in compliance with federal and state requirements include: entry and exit requirements; location of organizational charts, administrative and operating procedures; the person in charge of communications; potential hazards; restricted areas; potential emergencies, alarms, communications, responses and staging areas; location and use of personal protective and emergency equipment; identification of TSD units; overview of the laboratories.
Target audience	All personnel assigned to or performing work in 222-S Laboratory Complex
Delivery	Classroom
Evaluation	Not applicable
Length	1 hour
Frequency	24 months

Title	Building Emergency Plan Checklist (Appendix 7A)
Description	Course provides the information managers are required to discuss with employees. The checklist is contained in the building emergency plan. The building emergency plan covers designated 222-S Laboratory Complex areas.
Target audience	All 222-S Laboratory Complex employees, including personnel contracted to work at the 222-S Laboratory Complex
Delivery	Classroom
Evaluation	Not applicable
Length	2 hours
Frequency	12 months

8A.3 JOB-SPECIFIC COURSES

Title	Laboratory Technologist Training Plan
Description	Course provides formal classroom training in safety programs and emergency procedures. Course provides general laboratory familiarization and on-the-job training on analytical procedures. Laboratory specific training on the chemical hygiene plan and hazardous waste material is provided.
Target audience	Newly hired chemical technologists and senior chemical technologist, also other chemical technologists and senior chemical technologists assigned to the Analytical Laboratories.
Delivery	Classroom, self-study, and on-the-job training.
Evaluation	Written test and on-the-job training checklist.
Length	Average = 400 hours.
Frequency	Not applicable.

Title	222-S Laboratory Complex Unit-Specific Training
Description	Course is designed to establish a general understanding and comprehension of 222-S Laboratory Complex procedures.
Target audience	Chemical technologist assigned to 222-S Laboratory Complex.
Delivery	Self-study.
Evaluation	Written test.
Length	Average = 80 hours.
Frequency	24 months.

Title	Chemical Technologist Qualification
Description	Course includes tasks based on job and procedures.
Target audience	Chemical technologists.
Delivery	Classroom and on-the-job training.
Evaluation	Written test and on-the-job training checklist
Length	Average (classroom) = 80 hours. Average (on-the-job training) = 20 hours.
Frequency	12 months

Title	Hazardous Material and Waste Handling--Job Specific
Description	Course covers the hazardous material and waste handling procedures and requirements, including material safety data sheets for all personnel who work in the 222-S Laboratory Complex.
Target audience	All personnel who work in the laboratories in the 222-S Laboratory Complex.
Delivery	Classroom.
Evaluation	Written test and on-the-job training checklist.
Length	Average = 2 hours.
Frequency	12 months.

1	Title	222-S Laboratory Complex Chemical Technologists Emergency Procedures and Offnormal Plant Conditions Training
2	Description	Course consists of a review of offnormal and emergency conditions that could occur in 222-S Laboratory Complex, associated alarms and communications, and proper responses.
3	Target audience	Chemical technologists.
4	Delivery	Classroom, self-study, and on-the-job training
5	Evaluation	Written test.
6	Length	Average = 2 hours.
7	Frequency	12 months.
8		
9	Title	222-S Laboratory Managers Qualification Program
10	Description	Course consists of the following topics: • Administrative information • Laboratory technical information • Environmental/hazardous materials requirements • Operations safety requirements • Acceptance, storage, and transfer of dangerous waste • Jobs conducted in the area of assigned responsibility • Processing and analytical services • Equipment.
11	Target audience	222-S Laboratory Building operations manager and shift managers.
12	Delivery	Classroom, self-study, and on-the-job training.
13	Evaluation	Written test and on-the-job training checklist.
14	Length	Average = (classroom) 4 hours Average = (on-the-job) 20 hours.
15	Frequency	24 months.
16		

1	Title	222-S Laboratory Managers Emergency Procedures and Offnormal Plant Conditions Training
2	Description	Course is designed to be a review of abnormal and emergency conditions that could occur in 222-S Laboratory, associated alarms and communications, and proper responses.
3	Target audience	Operations manager and supervisors.
4	Delivery	Classroom, self-study, and on-the-job training.
5	Evaluation	Written test.
6	Length	Average = 4 hours.
7	Frequency	12 months.
8		
9	Title	Laboratory Scientist Qualification Program
10	Description	Course ensures that job knowledge and skills are sufficient to provide safe and efficient performance in the scientist's area of responsibility, and ensures that the scientist possesses the knowledge necessary to provide safe and competent direction for the operation of the laboratories within their respective groups. Includes 222-S Laboratories.
11	Target audience	Scientists.
12	Delivery	Classroom, self-study, and on-the job training.
13	Evaluation	Written test and on-the-job checklist.
14	Length	Average = (classroom) 4 hours Average = (on-the-job) 20 hours.
15	Frequency	24 months.
16		
17	Title	Hazardous Material-Carrier/Driver Course
18	Description	Course familiarizes truck drivers and train crews in procedures for accepting and transporting hazardous and/or dangerous material in compliance with 49 CFR 173 and company requirements
19	Delivery	Classroom
20	Evaluation	Written test
21	Length	8 hours
22	Frequency	24 months

1	Title	Scientific Technician Qualification Program
2	Description	Training consists of 6 months on-the-job training and self-study designed to establish a general understanding and comprehension of sampling and mobile laboratories processes, services, and operations. Field trained to meet RCRA requirements.
3	Target audience	Scientific technicians.
4	Delivery	Classroom, self-study, and on-the-job training.
5	Evaluation	On-the-job training checklist.
6	Length	6 months
7	Frequency	Not applicable.
8		
9	Title	Health Physics Technician Trainee Certification
10	Description	Course consists of the following topics: • Academics • Radiation protection practices • Emergency response • Radiation safety • Criticality safety • Industrial safety • Practical exercises - Dress/undress - Establishing radiation areas and control points - Surveying radiation generating machines - Release surveying - Estimating exposure - Detailed radiological survey.
11	Target audience	Health physics technician trainee
12	Delivery	Classroom
13	Evaluation	Written test
14	Length	Average = 170 hours
15	Frequency	Not applicable. The health physics technician trainee must complete the Health Physics Technician Certification within 15 to 18 months of this course completion, including on-the-job training courses.
16		

1	Title	Health Physics Technician Trainee General On-the-Job Training
2	Description	Course includes the following topics: • Records and reports • Exposure control - Dosimetry - Survey techniques • Instrumentation • Qualitative respirator fit • Routine radiological control • Job planning - Radiological postings - Hazards analysis • Abnormal conditions and emergencies - Criticality - Radiation area injuries - Personnel decontamination - Radioactive spills - Area evacuation - Continuous alarm monitor alarm response.
3	Target audience	Health physics technician trainee
4	Delivery	On-the-job training
5	Evaluation	On-the-job training checklist
6	Length	Average = 200 hours
7	Frequency	24 months
8		

1	Title	Health Physics Technician Trainee 222-S Laboratory Complex On-the-Job Training
2	Description	Course includes the following tasks: • Decontamination and decommissioning • General monitoring and applicable routines • Isolation and stabilization monitoring • High-efficiency particulate air filter change • Construction coverage • Routine coverage.
3	Target audience	Health physics technician trainee
4	Delivery	On-the-job training
5	Evaluation	On-the-job training checklist
6	Length	Average = 200 hours
7	Frequency	24 months
8		
9	Title	Health Physics Technician Certification
10	Description	Course includes the following topics: • Academics • Radiation protection practices • Radiological work planning and briefing • Radiation safety • Criticality safety • Emergency response • Practical exercise - radiation detection instrumentation.
11	Target audience	Health physics technician
12	Delivery	Classroom
13	Evaluation	Written test
14	Length	Average = 168 hours
15	Frequency	Not applicable. The health physics technician must complete the Senior Health Physics Technical Certification within 15 to 18 months of this course completion, including on-the-job training.
16		

1	Title	Health Physics Technician General On-the-Job Training
2	Description	Course includes the following topics: • Records and reports • Exposure control - Dosimetry - Survey techniques • Instrumentation • Qualitative respirator fit • Routine radiological control • Job planning - Radiological postings - Hazards analysis • Abnormal conditions and emergencies - Criticality - Radiation area injuries - Personnel decontamination - Radioactive spills - Area evacuation - Continuous alarm monitor alarm response.
3	Target audience	Health physics technician
4	Delivery	On-the-job training
5	Evaluation	On-the-job training checklist
6	Length	Average = 200 hours
7	Frequency	24 months
8		

1	Title	Health Physics Technician 222-S Laboratory Complex On-the-Job Training
2	Description	Course includes the following topics: • Decontamination and decommissioning • General monitoring and applicable routines • Isolation and stabilization monitoring • High-efficiency particulate air filter change • Construction coverage • Routine coverage.
3	Target audience	Health physics technicians
4	Delivery	On-the-job training
5	Evaluation	On-the-job training checklist
6	Length	Average = 200 hours
7	Frequency	24 months
8		
9	Title	Senior Health Physics Technician Certification
10	Description	Course consists of the following topics: • Academics • Radiation protection practices • Emergency response • Radiation safety • Criticality safety • Radiological problem solving • Practical exercises.
11	Target audience	Senior health physics technician
12	Delivery	Classroom
13	Evaluation	Written test
14	Length	Average = 168 hours
15	Frequency	24 months
16		

1	Title	Senior Health Physics Technician General On-the-Job Training
2	Description	Course includes the following topics: • Records and reports • Exposure control - Dosimetry - Survey techniques • Instrumentation • Qualitative respirator fit • Routine radiological control • Job planning - Radiological postings - Hazards analysis • Abnormal conditions and emergencies - Criticality - Radiation area injuries - Personnel decontamination - Radioactive spills - Area evacuation - Continuous alarm monitor alarm response.
3	Target audience	Senior health physics technician
4	Delivery	On-the-job training
5	Evaluation	On-the-job training checklist
6	Length	Average = 200 hours
7	Frequency	24 months
8		

Title	Senior Health Physics Technician 222-S Laboratory Complex On-the-Job Training
Description	Course includes the following topics: • Decontamination and decommissioning • General monitoring and applicable routines • Isolation and stabilization monitoring • High-efficiency particulate air filter change • Construction coverage • Routine coverage.
Target audience	Senior health physics technicians
Delivery	On-the-job training
Evaluation	On-the-job training checklist
Length	Average = 200 hours
Frequency	24 months

Title	222-S Laboratory Complex Health Physics Technicians (All) Emergency Procedures and Abnormal Plant Conditions
Description	Course consists of the following topics and alternates from year to year between classroom training and testing, on-the-job training, and on-the-job training checklist: • Continuous air monitor alarm • Contamination spread • Personnel decontamination • Criticality alarm • Chemical spill or problem • General emergencies (e.g., fire).
Target audience	Health physics technician trainee, health physics technician, senior health physics technician
Delivery	Classroom or on-the-job training
Evaluation	Written test or on-the-job training checklist
Length	Average = 16 hours
Frequency	12 months

8A.4 ENVIRONMENTAL AND HAZARDOUS MATERIAL SAFETY TRAINING[1]		
	Course name	Description
1.	Hazard Communication and Waste Orientation	Course provides an overview of the federal and applicable hazard communication programs and hazardous and/or dangerous waste disposal programs.
2.	Generator Hazards Safety Training	Course provides the hazardous and/or dangerous material/waste worker with the fundamentals for use and disposal of hazardous and/or dangerous materials.
3.	Hazardous Materials/Waste Job-Specific Training	Course provides specific information on hazardous and/or dangerous chemicals and waste management at the employees' TSD unit.
4.	Initial Radiation Worker Training	Course provides radiation workers with the fundamentals of radiation protection and the proper procedures for maintaining exposures ALARA.
5.	Waste Site Basics	Course provides required information for the safe operation of hazardous and/or dangerous waste TSD units regulated under 40 CFR 264 and 265 pursuant to RCRA and WAC 173-303.
6.	Scott 'SKA-PAK'[2] Training-SKA	Course instructs employees in the proper use of the Scott 'SKA-PAK' for entry, exit, or work in conditions 'immediately dangerous to life and health' and instructs employees to recognize and handle emergencies.
7.	Cardiopulmonary Resuscitation	Course of the American Heart Association that provides certification in cardiopulmonary resuscitation for the single rescuer (Heartsaver Course).

[1]Chapter 8.0, Tables 8-4 and 8-5 present a compilation of training requirements.

[2]Scott SKA-PAK is a trademark of Figgie International, Incorporated.

	Course name	Description
8.	Fire Extinguisher Safety	Course provides videocassette presentation that covers types of portable fire extinguishers and the proper usage for each.
9.	Waste Site-Advanced	Course provides environmental safety information for RCRA and/or CERCLA operations and sites. Topics include regulations and acronyms, occupational health and safety, chemical hazard information, toxicology, personal protective equipment and respirators, site safety, decontamination, and chemical monitoring instrumentation.
10.	Waste Site Field Experience	Course is a 3-day field experience under the direct supervision of a trained, experienced supervisor.
11.	Hazardous Waste Shipment Certification	Course provides an indepth look at federal, state, and Hanford Site requirements for nonradioactive hazardous and/or dangerous waste management and transportation.
12.	Certification of Hazardous Material Shipments	Course provides training in dangerous material regulation of the U.S. Department of Transportation, as required by law, to those who certify the compliance of Hanford Site hazardous and/or dangerous material shipments. The main focus is on the proper preparation and release of radioactive material shipments.
13.	Hazardous Waste Site Supervisor/Manager	Course provides specialized training to operations and site management in the following programs: safety and health, employee training, personal protective equipment, spill containment, and health hazard monitoring procedures and techniques.

APPENDIX 10A

222-S LABORATORY COMPLEX WASTE MINIMIZATION PLAN

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WHC-SD-WM-EV-024
Rev. 1

222-S LABORATORY COMPLEX WASTE MINIMIZATION PLAN

DECEMBER 1991

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FIGURE

1. Hanford Facility 2

222-S LABORATORY COMPLEX WASTE MINIMIZATION PLAN

1.0 INTRODUCTION

In October 1976, Congress enacted the *Resource Conservation and Recovery Act* (RCRA) to provide cradle to grave management of hazardous waste by imposing management requirements on generators, transporters, and owners/operators of treatment, storage, and/or disposal facilities. In November 1984, Congress enacted the *Hazardous and Solid Waste Amendment* (HSWA) to the RCRA to establish a national policy for the reduction of hazardous waste through waste minimization.

Specific objectives directly related to RCRA and the HSWA waste minimization provisions have been established by the U.S. Department of Energy (DOE) in DOE Orders 5820.2 *Radioactive Waste Management* and 5400.5 *Hazardous and Radioactive Mixed Waste Management*. These DOE Orders have waste minimization provisions that apply to mixed and hazardous waste.

The Washington State Department of Ecology (Ecology) has been authorized by the U.S. Environmental Protection Agency (EPA) to administer the hazardous waste program within Washington State. The hazardous waste program is implemented by Ecology through Chapter 173-303 of the Washington Administrative Code (WAC). The regulations in WAC 173-303 encourage recycling, reuse, reclamation, and recovery of waste to the maximum extent possible.

1.1 PURPOSE AND SCOPE

The overall purpose of the waste minimization plan is to minimize the volume, weight, or toxicity of all regulated waste to the extent practical. The waste minimization plan is required to identify the operations, material usage, and the major categories of waste generated. This information will be used to establish ways, techniques, or methods of minimizing the generation of waste at the 222-S Laboratory Complex (222-S Complex).

1.2 FACILITY BACKGROUND

The 222-S Complex, located in the 200 West Area of the Hanford Facility (Figure 1), is the primary laboratory for analytical chemistry activities. The 222-S Complex is made up of the main laboratory building, identified as the 222-S Analytical Laboratory, the standards laboratory, identified as the 222-SA Standards Laboratory, and two treatment and storage units: the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area.

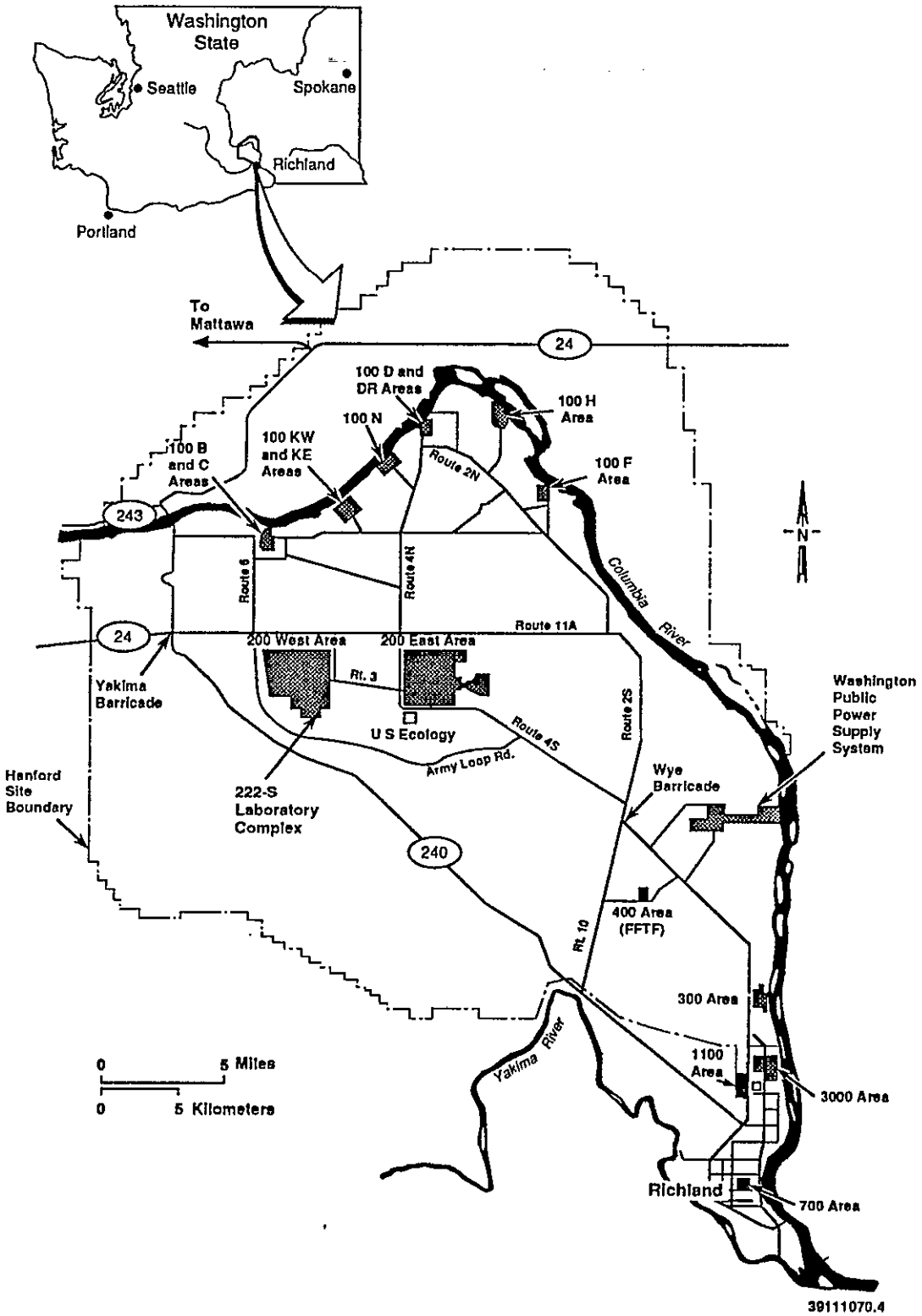

Figure 1. Hanford Facility.

The 222-S Complex buildings were constructed in 1950 and 1951 to provide analytical support for the Reduction-Oxidation Plant (REDOX). Through the years, the mission of the 222-S Complex has changed, and modifications have been made in response to new requirements and to increasingly restrictive operating and design criteria.

The current mission of the 222-S Complex is to provide quality analytical chemistry services in support of Hanford Facility reprocessing units with emphasis on waste management, chemical processing, and environmental monitoring programs for B Plant, U Plant, Tank Farms, 242-A and 242-S Evaporators, Waste Encapsulation Storage Facility, Plutonium-Uranium Extraction (PUREX) Plant, Plutonium Finishing Plant, and the Grout Treatment Facility, for general process development/upset activities, and for essential materials.

The 222-S Analytical Laboratory provides for all laboratory work to be done within the building. The 222-S Analytical Laboratory is a two-story building, located in the southeast corner of the 200 West Area. The first floor is divided into three general areas. The west end contains the lunchroom, offices and locker rooms, which are maintained free of radioactive and toxic chemicals. The central section contains laboratories and service areas for work with radioactive and/or toxic materials. The east end, commonly referred to as the multicurie section, contains laboratories, hot cells, and service areas for work with radioactive samples. The central and east sections contain laboratory benches and hoods that are supplied with services such as electrical outlets, sanitary and distilled water, propane, compressed air, and a process vacuum. The second floor contains the ventilation supply fans, supply and exhaust ductwork, the ventilation system operation and control room, a glass shop, and storage areas. This area is a radiologically controlled area, with the exception of the glass shop, which is radiologically clean.

The 222-S Analytical Laboratory is designed with its own waste management system, decontamination unit, fire protection and alarm systems, ventilation systems, radiation monitoring systems, and gas monitoring systems.

The 222-SA Standards Laboratory is a five-wide trailer located southeast of the 222-S Analytical Laboratory. The 222-SA Standards Laboratory prepares nonradioactive standards for other analytical laboratories on the Hanford Facility and is used for nonradioactive development work. Waste generated from operations of the 222-SA Standards Laboratory is nonradioactive dangerous waste. Waste is accumulated at satellite accumulation areas before the waste is packaged in drums for storage in the 222-S Dangerous and Mixed Waste Storage Area for shipment to the 616 Nonradioactive Dangerous Waste Storage Facility.

The 219-S Waste Handling Facility is located northeast of the 222-S Analytical Laboratory. The 219-S Waste Handling Facility contains three stainless steel tanks; tank 101 [4,000 gallons (15,142 liters)], tank 102 [4,000 gallons (15,142 liters)], and tank 103 [1,500 gallons (5,678 liters)] located in underground concrete vaults. Tanks 101 and 103 are used for the primary and backup storage of mixed waste from the 222-S Analytical Laboratory. The mixed waste is transferred from tank 101 and tank 103 to

tank 102 for treatment and storage before transfer to the Double-Shell Tank System.

The 222-S Dangerous and Mixed Waste Storage Area is located on the north side of the 222-S Analytical Laboratory. The 222-S Dangerous and Mixed Waste Storage Area consists of two metal storage structures resting on a concrete pad. The 222-S Dangerous and Mixed Waste Storage Area stores drums of mixed waste and nonradioactive dangerous waste until the waste is transferred to the Hanford Central Waste Complex (mixed waste) or the 616 Nonradioactive Dangerous Waste Storage Facility (nonradioactive dangerous waste) for storage and/or disposal.

1.2.1 Material Use

The major process chemicals used at the 222-S Analytical Laboratory are concentrated (57 percent) nitric acid, 50 percent sodium hydroxide, and solid sodium nitrite. The nitric acid is used in decontamination activities in Room 2B and in the hot cells. The acidic waste is transferred via drain lines to 219-S Waste Handling Facility where the waste is stored until neutralized with the 50 percent sodium hydroxide and treated with sodium nitrite. Approximately 3,500 gallons (13,250 liters) each of nitric acid and sodium hydroxide, along with 500 pounds (227 kilograms) of sodium nitrite, are used annually at the 219-S Waste Handling Facility.

1.2.2 Waste Categories

The 222-S Complex manages waste that falls into the following categories.

1.2.2.1 Solid Low-Level Waste. This waste consists of laboratory office trash and dry waste from laboratory areas. This waste is generated only in the 222-S Analytical Laboratory. Laboratory dry waste consists of compactible and noncompactible waste. Compactible waste consists of used surgical gloves, empty polyethylene bottles, and paper towels. This waste is accumulated in plastic bags inside 55-gallon (208-liter) drums in individual laboratory areas. Full plastic bags are staged in reusable wooden burial boxes for shipment to the 200 West Area burial grounds. Noncompactible waste, consisting of broken glassware, metal planchets, and glass vials, are accumulated in 55-gallon (208-liter) drums in Room 2B. When full, these drums, as well as drums of broken glassware, are staged at a shielded storage pad north of the 222-S Analytical Laboratory before shipment to the 200 West Area burial grounds. Large articles of solid waste from radiological control zones that are certified free of surface contamination but that cannot be certified for unconditional release are accumulated in steel load luggers outside of the 222-S Analytical Laboratory before shipment to the 200 West Area burial grounds. The 222-S Analytical Laboratory disposes of an average of 12,000 cubic feet (340 cubic meters) per year of solid low-level waste.

1.2.2.2 Solid Mixed Waste - Lead Waste. The primary solid mixed waste generated at the 222-S Analytical Laboratory is radioactively contaminated lead. This radioactively contaminated lead consists of sample pigs, doorstops, and carriers that cannot be decontaminated before recycling. Lead shielded waste from hot cell operations that is too radioactive for placement

in fiberboard boxes is placed in drums. These waste drums are segregated from other radioactive solid waste and staged at the 222-S Dangerous and Mixed Waste Storage Area before shipment to the 200 West Area burial grounds. No mixed waste is generated in the 222-SA Standards Laboratory. The 222-S Analytical Laboratory disposes of approximately 2,000 pounds (907 kilograms) of radioactively contaminated lead waste per year.

1.2.2.3 Solid Mixed Waste - Laboratory Chemicals. Solid mixed waste generated at the 222-S Analytical Laboratory also includes outdated laboratory chemicals. Laboratory chemical waste is accumulated with liquid mixed waste in satellite accumulation areas before being packaged for disposal. The outdated chemicals are either (1) recertified and put back into use; (2) checked for radioactivity and, if radioactive (i.e., greater than 50 picocuries per gram), are labpacked and sent to the 200 West Area burial grounds; or, (3) if nonradioactive, are packaged and sent to the 616 Nonradioactive Dangerous Waste Storage Facility for storage before disposal. No baseline data exist for this waste.

1.2.2.4 Nonradioactive Dangerous Waste. This waste, which includes outdated laboratory chemicals and laboratory chemical waste, is generated at both the 222-S Analytical and 222-SA Standards Laboratories. This waste is accumulated at satellite accumulation areas before being packaged in labpack drums for shipment to the 616 Nonradioactive Dangerous Waste Storage Facility. The 222-S Analytical Laboratory disposed of 159 pounds (72 kilograms) of solid nonradioactive dangerous waste and 734 pounds (333 kilograms) of liquid nonradioactive dangerous waste in calendar year 1988.

1.2.2.5 Liquid Mixed Waste - Organic. Liquid mixed waste is generated only at the 222-S Analytical Laboratory during the radiochemical separation processes conducted throughout the laboratory. Organic liquid mixed waste, consisting primarily of xylene, toluene, and 1,3,5-pseudocumene, is accumulated in bottles in satellite accumulation areas inside laboratory hoods where the separation processes occur. When a sufficient quantity of waste is accumulated, the waste is packaged in labpack drums. These drums are staged at the 222-S Dangerous and Mixed Waste Storage Area before shipment to the 200 West Area burial grounds. The 222-S Analytical Laboratory disposes of approximately 1,376 pounds (624 kilograms) of organic liquid mixed waste per year.

Carbon tetrachloride, generated in the 222-S Complex laboratories, is reclaimed by distillation. This reclaimed solvent can be reused several times before disposal is necessary.

1.2.2.6 Liquid Mixed Waste - Aqueous. Aqueous mixed waste includes aqueous phase waste from radiochemical separation processes, discarded samples, and liquid decontamination waste. Aqueous phase separation waste, consisting primarily of dilute nitric acid and ethanol, is accumulated in bottles in laboratory hoods where the separation process occurs. When full, these bottles are transferred to a hood in Room 2B for transfer to the tanks in the 219-S Waste Handling Facility. Discarded samples also are sent to these tanks. Samples can be slurped into the tanks in Hood 16 located in Room 2B, or can reach the 219-S Waste Handling Facility tanks through drains in laboratories or hot cells. Decontamination takes place in Hood 16 in Room 2B and decontamination waste is drained into the 219-S Waste Handling Facility

tanks. The average amount of waste generated is 48,500 gallons (183,592 liters) per year.

1.2.2.7 Waste Aerosol Cans. This waste consists of discarded aerosol cans from the 222-S Complex. Aerosol cans from within radiological control zones that cannot be unconditionally released are disposed of as solid low-level waste. Aerosol cans from other nonradiological areas are disposed of as nonregulated solid waste. No baseline data exists for this waste.

1.2.2.8 Transuranic Solid Waste. Transuranic (TRU) waste is not generated routinely at the 222-S Complex. However, future sampling efforts of single- and double-shell tank waste could produce TRU waste. This will not be known until further analysis of the single-shell and double-shell tanks is performed. No TRU waste has been collected during the past 5 years.

1.2.2.9 Asbestos Waste. This waste consists of asbestos removed from construction and asbestos removal activities in the 222-S Complex. Because some activities are performed in radioactively contaminated areas, the asbestos is considered to be low-level waste. This low-level waste (asbestos) is double-bagged in polyethylene and placed in fiberboard boxes. These boxes are disposed of in the 200 West Area burial grounds. This waste is collected and disposed of on an as-needed basis and therefore is not baselined. Nonradioactive asbestos waste is packaged and disposed of in a solid waste landfill.

1.2.2.10 207-SL Retention Basin. Waste water from the 222-S Analytical Laboratory is routed to the 207-SL retention basin, located directly east of the 222-S Analytical Laboratory. This waste water consists of nonradioactive, nonhazardous effluent discharges from the following sources: laboratory sinks, floor drains, service sinks, as well as equipment cooling water and steam condensate from nonradioactive and nontoxic areas. The effluent is discharged into one of the two 25,000-gallon (94,635-liter) basins. The effluent is collected and analyzed. If the effluent is below radioactive release limits and within the pH limits for discharge to the soil column, the effluent is discharged to the 216-S-26 Crib. If the effluent exceeds release limits, the effluent can be sent to the 219-S Waste Handling Facility for treatment and storage before being transferred to the Double-Shell Tank System. The effluent discharge from the 207-SL retention basin to the 216-S-26 Crib averaged approximately 3.0 million gallons (11.4 million liters) during calendar years 1990 and 1991.

In the past, this effluent was discharged to the 216-S-26 Crib. Discharge to the 216-S-26 Crib was halted when the liquid level in the crib exceeded limits. The head limits have been revised and discharge to the 216-S-26 Crib was restarted on September 9, 1989. The 216-S-10 ditch might be used in the future as a backup discharge point.

1.2.2.11 222-SA Standards Laboratory Effluent. This waste consists of the liquid effluent from the 222-SA Standards Laboratory. Included in this effluent waste water is purification system backflush water, sink and hood drains, and discharges from the glass washer. This effluent is discharged directly to the 216-S-26 Crib. Administrative controls are in place (e.g., signs at sink drains) to prevent discharge of dangerous waste. Estimated discharge is 1,000 gallons (3,785 liters) per day.

1.2.2.12 296-S-21 Stack. The 296-S-21 Stack is the main exhaust stack for the 222-S Analytical Laboratory. This waste consists of exhaust air from hoods, hot cells, room exhaust, and process vacuum pump exhaust. The waste contains small amounts of radioactivity and is filtered through high-efficiency particulate air (HEPA) filters. There is also the potential for the waste to contain small amounts of nitrogen oxides from nitric acid fumes and small amounts of volatiles from laboratory chemicals. The waste is monitored continuously and is sampled routinely for radioactivity. No sampling for chemicals is performed. The normal flow is 74,000 cubic feet (2,095 cubic meters) per minute with an annual volume of 3.89 E+10 cubic feet (1.1 E+9 cubic meters).

1.2.2.13 296-S-23 Stack. The 296-S-23 Stack is the stack from the 219-S Waste Handling Facility sample gallery. This waste consists of exhaust air from the sample gallery hood, which is operated on an as-needed basis (1 to 4 hours per month). The air from the sample gallery hood has a very low potential for contamination with radionuclides or dangerous chemicals. Because of the low potential for contamination, the stack is not monitored or sampled. This waste does go through a HEPA filter before being discharged to the atmosphere. Normal flow is 800 cubic feet (22.6 cubic meters) per minute with an annual flow of 230,000 cubic feet (6,513 cubic meters).

1.2.2.14 219-S-16 Stack. This waste consists of exhaust air from the 219-S Waste Handling Facility tank vaults. The waste contains air vented from the mixed waste tanks in the vaults. The waste is sampled weekly for total alpha and total beta. The exhaust air from the vaults goes through a deentrainer tank and HEPA filters before being discharged to the atmosphere. Normal flow is 140 cubic feet (4 cubic meters) per minute with an annual volume of 7,400,000 cubic feet (209,546 cubic meters).

1.2.2.15 222-SA Standards Laboratory Stack. The 222-SA Standards Laboratory Stack receives exhaust air from the laboratory hoods located in the 222-SA Standards Laboratory building. There is the potential for this waste to contain trace amounts of volatile organics from chemicals handled in the hoods. Because the 222-SA Standards Laboratory is not used to handle radioactive materials, there is no potential for this waste to contain radionuclides. The waste has not been sampled for either chemicals or radionuclides. No treatment of the waste occurs before being discharged to the atmosphere. Normal flow is 9,365 cubic feet (265 cubic meters) per minute with an annual volume of 4.92 E+9 cubic feet (1.39 E+8 cubic meters).

1.2.2.16 Vacuum Air Sample Pumps Stack. The vacuum air sample pumps stack receives exhaust air from the 222-S Analytical Laboratory vacuum air sampling pumps for continuous air monitors and fixed head samplers. The air that is drawn into the monitors and samplers consists of the waste discharged to the 296-S-21 Stack. The vacuum pump exhaust has not been sampled but calculations indicate that the exhaust is potentially radioactive. The potential for chemical contamination is very low. This waste is not treated before being discharged to the atmosphere (some treatment is accomplished when the air is filtered through fixed head air samplers). The normal flow is 190 cubic feet (5.4 cubic meters) per minute with an annual volume of 10,200,000 cubic feet (288,833 cubic meters).

1.2.2.17 Nitric Acid Tank Vent. This waste consists of the ventilation from the 222-S Analytical Laboratory nitric acid supply tank [800 gallons (3,028 liters)]. The waste potentially contains small amounts of nitrogen oxides, although the waste has not been sampled. The nitric acid tank does not contain radioactive materials, so there is no potential for the waste to contain radionuclides. No treatment of the waste occurs before being discharged to the atmosphere.

2.0 WASTE MINIMIZATION PROGRAM

2.1 WASTE MINIMIZATION ORGANIZATION

The waste minimization organization consists of representatives from various 222-S Complex groups. The waste minimization organization meets monthly to review status on progress towards waste minimization, to report any problems, to set new goals, and to provide recommendations on waste minimization to the 222-S Laboratory Complex manager.

2.2 RESPONSIBILITIES

Responsibilities for waste minimization activities within the 222-S Complex are discussed in the following sections.

2.2.1 222-S Laboratory Complex Manager

The 222-S Complex manager is responsible for waste minimization within the 222-S Complex. The manager is responsible for seeing that a waste minimization plan is written, implemented, and waste minimization progress is tracked and reported. The manager ensures that all employees receive appropriate training on waste minimization.

The 222-S Complex manager is responsible for maintaining a waste minimization organization by appointing an individual from within the 222-S Complex to act as the Waste Minimization Coordinator. Other members of this organization include representatives from Operational Health Physics, Building Operations, Process Chemistry Laboratories, and the 222-S Complex Hazardous Materials Coordinator. Other individuals from various groups within the 222-S Complex could be assigned to this organization pending approval of the 222-S Complex manager.

2.2.2 Waste Minimization Coordinator

The Waste Minimization Coordinator is responsible for writing the waste minimization plan and for preparing annual updates. The Waste Minimization Coordinator collects, tracks, and reports waste minimization information and activity generated within the 222-S Complex. The Waste Minimization Coordinator is responsible for seeing that an employee training plan is established as appropriate for all workers. The Waste Minimization

Coordinator also coordinates dissemination of information, and receives and processes all waste minimization suggestions.

2.2.3 Waste Minimization Organization Members

The waste minimization organization members act as support personnel for the Waste Minimization Coordinator. The waste minimization organization members also form a reserve for special assignments to facilitate process changes, procedures changes, process reviews, waste audits, reporting, and training. The waste minimization organization members have the responsibility to review any waste minimization suggestions made by employees.

2.2.4 222-S Complex Manager/Supervisors Responsibilities

The 222-S Complex manager/supervisors are responsible to ensure the appropriate work related waste minimization training is given to each employee. These individuals also ensure that waste minimization suggestions are reviewed promptly and passed along to the Waste Minimization Coordinator.

2.2.5 Employees

Employees are responsible for implementing the waste minimization techniques and procedures.

2.3 TRAINING

All designated 222-S Complex employees receive general hazardous waste training every 2 years.

More specific training and the direct application of waste minimization techniques are provided on a group basis by the group managers or supervisors. Managers establish responsibilities, assignments, goals, etc. for their employees. A record of waste minimization training and the personnel involved is maintained by each group. This training is carried out annually.

2.4 EMPLOYEE PARTICIPATION/INCENTIVE PROGRAM

Promotion and application of employee incentives is a good way to minimize waste generation and maximize the use of good waste minimization techniques. The incentive program for 222-S Complex consists of the following:

1. Employees are encouraged to write down waste minimization ideas and submit the ideas to appropriate incentive programs.

2. Employees can submit on-the-job waste minimization ideas for consideration by the 222-S Complex Waste Minimization Organization Committee members.

2.5 WASTE MINIMIZATION FOR NEW PROJECTS/DESIGNS

The DOE Order 5820.2A, Section III-3, requires the incorporation of waste minimization principles into the design of a new process or any significant process changes. To complete this requirement, the 222-S Complex manager reviews any proposed process changes to ensure that waste minimization has been considered.

3.0 REFERENCES

Resource Conservation and Recovery Act of 1976, 90 Stat. 2795, 42 USC 6901 et seq, Sections 3002(b) and 3005(h) et seq.

DOE Order 5400.1, *General Environmental Protection Program*, Chapter III 4. (b) and (c), U.S. Department of Energy, Washington, D.C.

DOE Order 5820.2A, *Radioactive Waste Management*, Chapter I, 3(b)7; Chapter II, 3(a)&(b); Chapter III, 3(c); Chapter VI, 3(d)2, U.S. Department of Energy, Washington, D.C.

Dangerous Waste Regulations, Washington Administrative Code, Chapter 173-303, Sections 173-303-010 (7), 173-303-070, Washington State Department of Ecology, Olympia, Washington.

Hazardous and Solid Waste Amendments of 1984, 42 USC 6912(a), 6921, 6922, 6924, 6925, 6926, 6930, 6935, 6937, 6939, 6991, and 6993.

APPENDIX B

GOALS/PROGRESS REPORTS

Each fiscal year, goals related to waste minimization activities will be documented in letter reports to the waste minimization organization and will be appended to the 222-S Complex waste minimization plan.

Each quarter, letter reports on the progress toward the established goals will be submitted by the 222-S Complex to the Waste Minimization Program's level III manager. These letter reports will be appended to the 222-S Complex waste minimization plan.

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APPENDIX A

WASTE STREAM IDENTIFICATION/MINIMIZATION POTENTIAL

Appendix A, Waste Stream Identification/Minimization Potential, which contains detailed information on waste streams, will be presented in letter reports to the waste minimization organization members and will be appended to the 222-S Complex waste minimization plan.

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