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DATE: January 3, 1996

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SUBJECT: Page changes for the 4843 AMSF Closure Plan, Revision 1

Attached are page changes to the 4843 Alkali Metal Storage Facility Closure Plan, Revision 1. These page changes respond to comments received informally from Ecology and to other minor text errors noted in the document since that date.

Please incorporate the enclosed page changes into your copies of the 4843 ASMF Revision 1, transmitted on October 27, 1995.

THE 4843 ALKALI METAL STORAGE FACILITY CLOSURE PLAN

1.0 INTRODUCTION

The Hanford Site, located adjacent to the city of Richland, Washington, is operated by U.S. Department of Energy, Richland Operations Office (DOE-RL). The 4843 Alkali Metal Storage Facility (4843 AMSF) is a storage unit located on the Hanford Site. The 4843 AMSF began operation as a waste management unit in 1986. The 4843 AMSF received dangerous and mixed alkali metal waste from the Fast Flux Test Facility (FFTF) and from other various operations on the Hanford Site that used alkali metals, including 437-FFTF, 405-FFTF, 324-300A, 4713D, and 4843. The 4843 AMSF is located in the northwest corner of the 400 Area. The 4843 AMSF provided a centralized building to store shipments of dangerous and/or mixed alkali metal waste generated on the Hanford Site.

1.1 EXECUTIVE SUMMARY

The proposed method of closure for the 4843 AMSF is clean closure. All dangerous waste must be removed from the 4843 AMSF before decontamination and verification activities of closure may begin. The last shipment of waste was removed from the 4843 AMSF on May 10, 1995. The mixed waste was transferred to the Hanford Central Waste Complex. The nonradioactive waste was shipped to an approved treatment, storage, and/or disposal (TSD) facility. A radiation survey was conducted on May 15, 1995, with the results allowing the building to be removed from a Radiologically Controlled Area (RCA). To complete closure, the following steps must be completed: (1) decontaminate any equipment or structures that may be contaminated with the waste associated with the 4843 AMSF, (2) verify that all equipment and structures associated with the AMSF have been sufficiently decontaminated, and (3) certify closure activities.

Closure will be conducted pursuant to the requirements of the Washington State Department of Ecology (Ecology) *Dangerous Waste Regulations*, Washington Administrative Code (WAC) 173-303-610. This closure plan presents a description of the 4843 AMSF, the history of waste managed, and the procedures that will be followed to close the 4843 AMSF.

1.2 THE 4843 ALKALI METAL STORAGE FACILITY CLOSURE PLAN CONTENTS

The 4843 AMSF closure plan consists of the following nine chapters:

- Introduction (Chapter 1.0)
- Facility Description (Chapter 2.0)

- Process Information (Chapter 3.0)
- Waste Characteristics (Chapter 4.0)
- Groundwater Monitoring (Chapter 5.0)
- Closure Strategy and Performance Standards (Chapter 6.0)
- **Closure Activities (Chapter 7.0)**
- Postclosure (Chapter 8.0)
- References (Chapter 9.0).

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

1.2.1 Unit Description (Chapter 2.0)

This chapter provides a general description of the 4843 AMSF, including location and past use. Also included is a general Hanford Site description and permitting history.

1.2.2 Process Information (Chapter 3.0)

This chapter provides information on waste storage at the 4843 AMSF. Also included is a general description of the processes responsible for generating the waste, and information on waste management and storage practices at the 4843 AMSF.

1.2.3 Waste Characteristics (Chapter 4.0)

This chapter provides information on the physical and chemical characteristics of the waste stored at the 4843 AMSF.

1.2.4 Groundwater Monitoring (Chapter 5.0)

Groundwater protection regulations established by WAC 173-303-645 only pertain to surface impoundments, waste piles, land treatment units, or landfills. Because the 4843 AMSF has been operated as a container-storage unit, groundwater monitoring is not included as part of the 4843 AMSF closure plan.

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2.0 UNIT DESCRIPTION

2.1 GENERAL HANFORD SITE DESCRIPTION

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 plutonium. The Hanford Site (Figure 2-1) covers approximately 1,450 square kilometers (560 square miles) of semiarid land, located adjacent to the city of Richland, Washington. The Hanford Site is owned by the U.S. Government and operated by DOE-RL, which operates the site with the management support of various prime contractors. Since 1987, the sitewide management and operations (M&O) contractor has been the Westinghouse Hanford Company (WHC).

The 4843 AMSF is located in the 400 Area of the Hanford Site. Drawing H-6-958 in Appendix A provides a general overview of the Hanford Site and general location of the 400 Area. Design drawings of the 4843 AMSF are in Appendix B.

2.1.1 Permitting History

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 (EPA) and Ecology is EPA/State Identification Number WA7890008967. This identification number encompasses a number of waste management units within the Hanford Site. All waste management activities carried out under the assigned identification number are considered to be onsite as defined in WAC 173-303.

2.2 UNIT DESCRIPTION AND OPERATIONS

The 4843 AMSF, which began operation as a waste management unit in 1986, is located in the northwest corner of the 400 Area (Figure 2-1). There are no other buildings in the immediate vicinity (within 122 meters [400 feet]) of the 4843 AMSF. The gravel area surrounding the building is clear of combustibles for several hundred meters (several hundred feet). The building is 12 meters (40 feet) long, 12 meters (40 feet) wide, and 6 meters (20 feet) high. The building has an all-steel structural frame, walls, and gable roof, all of which have fiberglass insulation. There are no offices or restrooms inside the 4843 AMSF. The west wall serves as part of the fencing around the laydown area (Figure 2-2). Access to the 4843 AMSF is through two large roll-up doors in the east and west ends and through personnel doors in the southeast and northwest corners (Figure 2-3). All loading and unloading operations are carried out on concrete pads located outside the two roll-up doors. No legal boundary exists for the 4843 AMSF. However, the stated boundary is considered to be 3 meters (10 feet) from the building exterior walls.

The 4843 AMSF was used to store dangerous and mixed alkali metal waste, including sodium and lithium, which was generated at FFTF and at various other Hanford Site operations that used alkali metals, including 437-FFTF, 405-FFTF, 324-300A, 4713D, and 4843. Mixed alkali metal waste was stored in the northern half of the 4843 AMSF Building in 5-, 30-, and 55-gallon drums, various sealed piping, and sealed components. Adjacent to the northern wall of the 4843 AMSF, a concrete block wall approximately 1 meter (3 feet) high shielded the outside environment from the mixed alkali metal waste. Dangerous alkali metal waste was stored in the southern half of the building. The dangerous and mixed alkali metal waste storage areas were separated by a rope divider (Figure 2-3). The design drawings for the 4843 AMSF are included in Appendix B.

The floor of the 4843 AMSF consists of poured concrete that is essentially an inert material with respect to caustic, oxidizing, combustible, and flammable materials. The floor has visible seams consisting of 3.18-millimeter (.125-inch) wide and 6.35-millimeter (.25-inch) deep saw-cut control joints to allow the concrete to expand and contract to help prevent cracking of the slab. There are small insignificant cracks in the concrete floor, which are not large enough to be a potential pathway for dangerous waste to enter the environment because of the thickness of the concrete (up to 30 centimeters [12 inches] thick) relative to the size of the cracks and the nature of the dangerous waste stored.

Electric service provides power for the overhead fluorescent lights, exhaust fan, and two hanging heaters within the 4843 AMSF. Because heating the building is not required for alkali metal waste, the heaters are not wired for service.

2.3 SECURITY

The following sections describe the 24-hour surveillance system and entry control measures used to provide security and to restrict access to the 4843 AMSF.

2.3.1 24-Hour Surveillance System

The entire Hanford Site is a controlled-access area and is expected to remain so during the 4843 AMSF closure. The Hanford Site maintains around-the-clock surveillance for the protection of government property, classified information, and special nuclear materials. The Hanford Patrol maintains a continuous presence of armed guards to provide security.

2.3.2 Barrier and Means to Control Entry

Barricades are maintained around the clock at checkpoints on vehicular access roads leading to the Hanford Site, including the 400 Area, Protected Area. Vehicle operators desiring to enter portions of the Hanford Site beyond these checkpoints must display a DOE-issued security identification badge

before being admitted. Only DOE vehicles or private vehicles under special permit are allowed in the 400 Area. All personnel entering or leaving the 400 Area must submit, when requested, to a search of personal items carried into and out of the area.

The 4843 AMSF has warning signs stating "DANGER--UNAUTHORIZED PERSONNEL KEEP OUT" posted at each entrance of the building. These signs are legible from a distance of 8 meters (25 feet) and are visible from all angles of approach. The doors to the 4843 AMSF are locked when the building is unoccupied.

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There have been two basic storage configurations at the 4843 AMSF. Before November 9, 1987, drum racks for storage of product (non-waste) were located on the north and east walls. The radioactive mixed waste containers were stored in the center of the building. Concrete block walls (dry stacked without mortar and about 1.22 meters [4 feet] high) were located on the east, north, and west sides of the radioactive mixed waste storage area for radiation protection purposes. The dangerous waste was stored along the south wall. Proper management was assured by weekly inspection and by segregation of waste.

The large quantity of product material (lithium, sodium, and sodium-potassium), shown in Figure E-5, was removed before November 9, 1987. By this time, the product racks were removed and the storage configuration was modified for the last time to store waste only. Dangerous waste continued to be stored along the south wall. The east wall, south of the roll-up door, was used for very limited amounts of product storage. Radioactive mixed waste was stored between the line running approximately from the north edge of the roll-up doors to the north wall. Each storage area in the 4843 AMSF contained alkali metal waste. As for the final configuration, one area was for dangerous alkali metal waste and the other area was for mixed alkali metal waste. The building consisted only of these two storage areas, which were separated by a rope divider (Chapter 2.0, Figure 2-3).

3.4 WASTE TEMPORARILY STORED OUTSIDE

Three containers of radioactive mixed waste were palletized and temporarily stored on the west side of the building next to the roll-up door from about February 9, 1989, to June 9, 1989, (approximately four months). These drums were stored outside because the door was inoperable. This is the only report of waste being stored outside of the building. The three containers, a 7A container, a Hot Trap, and a Fermi Heat Exchanger, are drum numbers 80, 81, and 82 on the waste inventory provided in Appendix C. If a spill would have occurred, once the material came into contact with the environment a metal fire would have been the result. This type of event never occurred with materials that were stored outside the 4843 AMSF. Any spill from the containers would have been noted when the material was routinely inspected or when it was moved inside the building; no such events have been recorded. While being stored outside the building, the containers were monitored weekly; there were no spills or leaks detected. Therefore, since recordkeeping at the 4843 AMSF has been adequate and meets the regulatory requirements per WAC Chapter 173-303-610(3)(a)(iii), there is no reason to suspect any contamination outside the building.

3.5 DOCUMENTATION OF SPILLS

Appendix D contains the reports of two spills occurring within the 4843 AMSF. The associated Event Fact Sheets (EFS) are attached. Both spills were the result of leaks from waste containers and both spills were addressed and corrected promptly. An eyewitness account gives the following steps as being followed during clean up of the two spills. Upon discovery of the

spills a team consisting of two workers was used to clean up the spills of alkali metal. The workers were instructed to completely remove any material and if possible to clean the area until no traces of the spill remained. The first step in the clean up of the two spills was to remove all spilled sodium carbonate by sweeping it up and disposing of it appropriately; by the time the spills were discovered all sodium metal had reacted with air leaving only sodium carbonate residue. Secondly, any residue that remained on the concrete was treated with Dowenal EB[1] and scrubbed with a wire bristle brush. Finally, the spill areas were scrubbed with extremely small amounts of water and a wire bristle brush. The eyewitness account stated that after completion of spill clean up, there were no marks left on the concrete and it could not be distinguished exactly where the spill had occurred.

[1]Dowenal EB is a trademark of Dow Chemical Company.

4.0 WASTE CHARACTERISTICS

This chapter provides information on the physical and chemical characteristics of the waste that was stored at the 4843 AMSF.

4.1 ESTIMATE OF MAXIMUM INVENTORY OF WASTE

The inventory (Appendix C) lists all waste that was stored in the 4843 AMSF. The maximum total waste volume is estimated at 15,000 liters (4,000 gallons), including packing material, based on the inventory including forty-nine 55-gallon drums, three 30-gallon drums, four 5-gallon cans, one DOT 7-A container, and sealed piping and equipment components.

Using design conditions, the maximum possible waste quantity allowed was calculated as approximately 83,000 liters (22,000 gallons) (Part A Permit).

4.2 WASTE STORED AT THE 4843 ALKALI METAL STORAGE FACILITY

The 4843 AMSF received dangerous and mixed alkali metal waste from Hanford Site generators. Alkali metal waste refers to either sodium or lithium metal waste. Mixed waste is defined as containing both radioactive and hazardous components (DOE 1984). Most of the dangerous and mixed alkali metal waste received at the 4843 AMSF consisted of retired equipment from liquid sodium processes. The waste was segregated within the 4843 AMSF depending on whether the alkali metal was dangerous or mixed waste. Segregation was based on the labeling of the waste container with a radioactive material upon generation. The presence of these labels was verified by the weekly inspections. Also, the monthly radiation surveys checked all containers. Standard practice at the Hanford Site would require HPT coverage for radiological surveys during any movement of material into or out of the building. The HPT coverage was required because the 4843 AMSF was a radiological controlled area containing a radiation zone. The requirements for HPT coverage (i.e., radiological survey) would apply to both radiological and nonradiological material entering or leaving the building. Detecting radiation from a nonradioactive waste container would have generated an event sheet; no such events occurred at the 4843 AMSF. The alkali metal waste stored at the 4843 AMSF was listed in WAC 173-303-090 as having the characteristics of ignitability (dangerous waste number D001), corrosivity (D002), and reactivity (D003). The alkali metal waste was identified with Ecology waste code designations by using information from product manufacturers, material safety data sheets, laboratory analysis, and such references as the *Dangerous Properties of Industrial Materials* (Sax 1984), 40 CFR 302.4 (EPA 1985), *Registry of Toxic Effects of Chemical Substances* (NIOSH 1986), and *The Condensed Chemical Dictionary* (Sax and Lewis 1987). Waste also was characterized according to the requirements of 40 CFR 261 (EPA 1988).

It is the responsibility of the Hanford Site generators to completely and correctly identify the constituents of their waste. Based on waste identification information provided by the waste coordinator of the generating unit, Solid Waste Engineering designates the waste in accordance with WAC 173-303-070. The 340 Facility and Tanker maintains auditable copies of the following records for waste stored at the 4843 AMSF, as applicable:

- All records providing a description of the waste
- Documentation identifying the dangerous characteristics of the waste
- The basis for waste designation
- Laboratory reports with chemical, biological, and physical analysis of samples
- Manifests
- Land disposal restriction documentation.

Generally, each package was similar in that the only waste that had been accepted at the 4843 AMSF was alkali metal waste sealed in a container having an inert atmosphere. The 4843 AMSF had accepted for storage waste with waste codes identified as D001 (Ignitability), D002 (Corrosivity), D003 (Reactivity), WT01 (Extremely Hazardous Waste), and WT02 (Dangerous Waste, if less than 4 pounds).

All alkali metal waste was stored in 5-, 30-, or 55-gallon drums or in sealed piping and sealed components. None of these containers contained free liquids. Instead, the alkali metal waste was placed under an inert atmosphere and sealed. Because of the reactive nature of the material, moisture segregation was a requirement for the waste generating unit that originally packaged the waste.

Sodium and lithium are designated as dangerous waste because of their ignitable, reactive, and corrosive characteristics. If the stored material would happen to come into contact with the air, it would produce sodium and lithium oxides and hydroxides, which are strong alkalis that readily absorb carbon dioxide from the atmosphere to form carbonates. Both sodium carbonate and lithium carbonate are characteristic Category D (least toxic) dangerous waste. The LD_{50} (lethal dose) for oral exposure to rats of sodium carbonate is 4,090 parts per million (NIOSH 1986); for lithium carbonate the same LD_{50} is 525 parts per million. Compounds with LD_{50}s at concentrations from 500 to 5,000 parts per million are Category D dangerous waste as established by WAC 173-303-100.

6.0 CLOSURE STRATEGY AND PERFORMANCE STANDARDS

This chapter describes the closure strategy and performance standards that will be met and closure activities that will be conducted to achieve clean closure. Generally, these standards will be achieved by removing dangerous waste from the 4843 AMSF and decontaminating to levels protective of human health and the environment, or removing all equipment, structures, or other materials containing or contaminated with dangerous waste or waste residue from the waste management unit.

6.1 GENERAL CLOSURE STRATEGY

The 4843 AMSF is a clean, well-maintained waste management unit. The 340 Facility and Tanker maintains detailed records of materials stored at the 4843 AMSF (Appendix C). Spills and other unusual occurrences were handled promptly and are well documented (Appendix D). Closure of the 4843 AMSF will be accomplished by verifying that dangerous waste constituents stored in the 4843 AMSF are not present above action levels. This will be assessed using information obtained from implementation of decontamination and sampling activities outlined in Chapter 7.0. The 4843 AMSF is expected to be clean closed; therefore, no postclosure activities are necessary.

The only waste stored in the 4843 AMSF was alkali metal (sodium and lithium [Section 4.2]). Most of the dangerous and mixed alkali metal waste received consisted of retired equipment from liquid sodium processes. Alkali metals have the property of being very reactive in an air environment. As a result, any spills or releases of alkali metals are not anticipated to be found in an unreacted state. The compounds anticipated after reaction with the air are oxides, hydroxides, and carbonates of lithium and sodium.

These carbonates are only dangerous in very large quantities and concentrations (Section 4.2). The concentration expected to be found within the 4843 AMSF is extremely small relative to the size of the building. Closure will be achieved by removing surface deposits of sodium and lithium carbonates from the building and floor. Effort will focus on the interior of the building where the waste was stored. The two reported spills (Appendix D) occurred inside the building.

6.2 GENERAL CLOSURE PROCEDURE

The 4843 AMSF will be closed in a manner consistent with Ecology guidelines and regulations (WAC 173-303-610). The general closure procedure is detailed as follows.

After removal of waste inventory, closure activities will indicate decontamination and visual verification, or removal and disposal of the structure and equipment. These activities will consist of the following steps (as necessary):

1. Perform visual and radiological survey of building interior.

2. Decontaminate associated building equipment to below action levels.

3. Decontaminate building floor and walls, as described in Section 7.3.

4. Perform visual verification of the building and associated equipment to determine the effectiveness of decontamination procedures.

5. Repeat remediation and visual verification until removal of all contaminants above action levels is verified or the component is properly disposed of.

6. Decontaminate equipment used in performing closure activities.

7. Designate and dispose of all contaminated materials and rinsates generated during the closure activities.

8. Certify that closure activities were completed in accordance with the approved plan.

Action levels refer to chemical concentrations that prompt an action. For sodium and lithium carbonates the action level is 10 weight percent; therefore, a visual inspection would be sufficient to ensure dangerous waste concentrations are below the acceptable action levels. The naturally occurring background levels on the Hanford Site for sodium and lithium are as follows: sodium is 1390 parts per million and lithium is 37 parts per million (DOE-RL 1994).

6.3 MINIMIZE THE NEED FOR FURTHER MAINTENANCE

Closure of the 4843 AMSF by removing or decontaminating equipment and structure to the levels specified will eliminate the need for further maintenance specific to the 4843 AMSF.

6.4 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

As discussed previously, the 4843 AMSF will be closed by removing or decontaminating, to identified action levels, all dangerous waste and waste residues to protect human health and the environment.

6.5 RETURN LAND TO THE APPEARANCE AND USE OF SURROUNDINGS

Following closure, if possible, the 4843 AMSF location will be restored to allow for the continued use of the building as a storage unit.

7.0 CLOSURE ACTIVITIES

7.1 INTRODUCTION

The strategy for closure of the 4843 AMSF is clean closure. Before closure activities begin, all containers will be removed from the 4843 AMSF. Contaminated equipment, floors, and walls will be decontaminated or contaminated sections will be removed. All decontamination rinsate will be contained, designated, and disposed of accordingly.

7.2 REMOVAL OF DANGEROUS WASTE INVENTORY

All stored dangerous waste has been removed from the 4843 AMSF as of May 10, 1995. The mixed waste was transferred to the Hanford Central Waste Complex. The nonradioactive waste was shipped offsite to an approved TSD facility.

7.3 UNIT DECONTAMINATION AND SAMPLING

Closure activities will entail decontaminating contaminated sections of the structure and equipment and properly disposing of any material generated during decontamination activities. These activities will consist of the following steps, as necessary, to determine what dangerous chemical waste, if any, has contaminated the building or the associated equipment:

1. Perform visual inspection and radiation survey of the interior of the building.

2. Decontaminate the floor as described in Section 7.3.3.

3. Verify by visual inspection that no carbonates remain on concrete surfaces.

4. If necessary, repeat remediation and visual inspection until contaminant concentrations are at or below action levels, if practical.

5. Decontaminate or dispose of equipment used in performing closure activities.

6. Designate and dispose of all contaminated materials and rinsates generated during closure activities.

7. Restore the area after closure activities are complete.

8. Certify that closure activities were completed in accordance with the approved plan.

Now that all stored waste has been removed from the AMSF, closure will be achieved by removing all visual surface deposits of sodium and lithium carbonates. The only waste stored in the 4843 AMSF was alkali metal (sodium

and lithium [Chapter 4.0]). Alkali metals have the property of being very reactive in an air environment. As a result, any spills or releases of alkali metals are not anticipated to be found in an unreacted state. The compounds anticipated after reaction with the air are carbonates of lithium and sodium (Chapter 4.0). These carbonates are only dangerous in very large quantities that are above 10 weight percent. The concentration, if any, at the 4843 AMSF is expected to be extremely small relative to the size of the building.

Effort will focus on the interior of the building where the waste has been stored. The two reported spills both occurred inside the building (Appendix D).

After the removal of all dangerous waste containers from the 4843 AMSF, a radiation survey was conducted on May 15, 1995 (see Appendix C). The radiation survey was performed according to established WHC procedures (Environmental Investigations Instructions [EII] 2.3, "Administration of Radiation Surveys to Support Environmental Characterization Work on the Hanford Site," [WHC 1988]) for worker protection and unit characterization. The survey was to be used as a tool to select biased sampling locations. If there were areas where the survey showed measurable radioactivity, samples of those locations would be collected and analyzed. The results of the May 15, 1995, survey allowed the building to be released from a RCA; there were no areas with measurable radiation that could be used as biased sample locations. All that remains to finalize closure activities is to conduct a visual inspection for carbonates and, if found, properly remove carbonates as described in this section.

Any dangerous waste generated during the decontamination of the structure will be containerized, sampled, designated, and shipped to a permitted TSD facility. All materials packaged for shipment will be shipped in DOT-approved containers that are compatible with the waste contents. All containers will be marked, labeled, and shipped with an accompanying manifest in accordance with applicable regulations.

7.3.1 Decontamination of Building Equipment

All equipment that was associated with the storage of alkali metals at the 4843 AMSF (i.e., shielding concrete blocks and metal drum racks) was found to be free of measurable amounts of radiation. Equipment will be inspected first for carbonate deposits; if the associated equipment is found to be contaminated with carbonate deposits, it will be decontaminated. If the equipment can be deemed free of all contamination associated with the AMSF, it will be excessed. Otherwise, all equipment will be disposed of appropriately. Any decontamination rinsate generated will be containerized, sampled, designated (in accordance with WAC 173-303-070), and, if regulated, shipped to a permitted TSD facility. All materials packaged for shipment to a TSD facility will be in DOT-approved containers that are compatible with waste contents. All containers will be labeled and shipped with an accompanying manifest. All dangerous waste rinsate generated from decontamination of the equipment will be handled in the previously stated manner.

7.3.2 Decontamination of the Walls

The walls of the 4843 AMSF were not used for the storage of waste. Also, because of the nature of the waste stored at the 4843 AMSF, spills that could result in airborne contamination are not expected. Thus, the type of waste and the way the waste was handled suggest that there is no basis to suspect that the walls or ceiling will be contaminated.

Verification of the absence of contamination on the walls will be accomplished using a radiation survey and visual inspection. The walls were part of the survey conducted on May 15, 1995; no measurable amounts of radiation were detected, therefore, the walls will be visual inspected for carbonate deposits. It is very unlikely that the walls will be contaminated with carbonate. If, however, the walls are found to be contaminated with carbonates, they will be decontaminated.

7.3.3 Decontamination of the Concrete Floor

The floor of the 4843 AMSF consists of poured concrete with an area of approximately 150 square meters (1,613 square feet) as shown in Figure 2-3 in Chapter 2.0. There are visible seams where 3.18-millimeter (.125-inch)-wide and 6.35-millimeter (.25-inch)-deep saw-cut control joints were cut to allow the concrete to expand and contract to help prevent cracking of the slab. The floor does have some small fractures in it, but these are not seen as a likely pathway for the dangerous waste to enter the environment because of the nature of the waste stored at the 4843 AMSF, the number of spills documented, and the thickness of the concrete floor (up to 12 inches thick).
The 4843 AMSF was divided by a rope into two storage areas: the dangerous alkali metal storage area and the mixed alkali metal storage area. To date, two containers that were located within the mixed alkali metal storage area are known to have leaked (Appendix D). These spills released a small amount of sodium carbonate and sodium hydroxide on the concrete floor, which was visible by the eye. (Sodium hydroxide reacts with carbon dioxide in the air to form sodium carbonate.) The spills were cleaned according to existing procedures, and the floor was released for use. The two reported spills have left no etching or scaring of the concrete surface and cannot be distinguished by visual inspection of the floor and are considered to be below the action level of 10 weight percent for lithium and sodium carbonates.

The floor was surveyed on May 15, 1995, and no measurable amounts of radiation were found. Afterwards, the floor was swept and visually inspected for carbonate deposits. No carbonates were seen. All material that was generated during sweeping of the floor was collected and analyzed with EPA Method 300.7, Ion Chromatography, to determine levels of sodium and lithium; the generated material then will be disposed accordingly. Results from the sample of the sweepings reported at less than 10 parts per million (detection limit) for lithium and a reading of 95 parts per million for sodium. Both the readings for lithium and sodium are well below the Hanford Site Background levels (DOE-RL 1994); therefore it can be concluded that the sweepings are a nonregulated material and can be disposed of accordingly. No further action will be required to decontaminate the concrete floor and the floor will be deemed free of contamination.

7.3.4 Field Logbook

All field activities will be recorded in a field logbook according to the protocols outlined in EII 1.5, "Field Logbooks" (WHC 1988). All entries will be made in ink, signed, and dated. Photographs should be taken of decontamination locations and of any unusual circumstances encountered during the investigation.

7.3.5 Reporting

After completion of the decontamination effort, verification documents will be produced by the Field Team Leader and the Hanford Technical Lead to provide for actual decontamination locations and specific methods used for decontamination.

7.3.6 Site Safety

Site safety during all closure activities will involve planning, training, and approved standard procedures.

7.3.6.1 Health and Safety Plan. A health and safety plan (HASP) is required for all dangerous waste sampling sites. The HASP is intended to specify information pertinent to field assignments and to be a guide in unusual situations or emergencies. A site-specific version of the general *Resource Conservation and Recovery Act of 1976* (RCRA)/*Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) investigation health and safety manual will be developed and used for sampling at the 4843 AMSF. This plan will be developed and completed before initiation of sampling activities in accordance with EII 2.1 "Preparation of Hazardous Waste Operations Permits" (WHC 1988).

7.3.6.2 Personnel Training. All personnel involved with the closure activities at the 4843 AMSF will receive a minimum level of dangerous waste training. Personnel generally are placed into the following job categories:

- Managers and supervisors, who are responsible for supervising, coordinating, and directing the closure activities and personnel
- Nuclear Process Operators and Decommissioning and Decontamination workers, who are responsible for sampling, packaging, and handling of both dangerous and mixed waste
- HPTs, who are responsible for surveying for radiological and dangerous waste contaminants
- Crafts personnel, who are responsible for specialized work. The various crafts include carpenters, electricians, ironworkers/riggers, heavy equipment operators, crane operators, millwrights, pipefitters, and painters.

In addition to the personnel mentioned, any person entering a TSD unit during closure must have completed the 40-hour hazardous waste worker safety training.

Table 7-1 contains a matrix that relates job categories to the individual training course (WHC-CM-7-5, *Environmental Compliance Manual*, Chapter 11). Appendix F contains brief descriptions of the training courses, including descriptions of the target audience, instructional technique, evaluation method, length of course, and frequency of retraining.

7.3.6.3 Standard Safety Procedures. The following safety procedures will apply each time personnel make a site entry for sampling purposes:

- No personnel will be at the site without a designated 'buddy'
- Of the personnel entering the site, one will be designated to be in charge
- Personal protective equipment will be worn as specified. Approved deviations will be entered in the field logbook and signed by the field team leader (cognizant engineer) and the site safety officer
- Field work will be planned before the site is entered
- Equipment needed for work will be inventoried and inspected before the site visit to ensure that all equipment is present and in operable condition.

7.4 SCHEDULE FOR CLOSURE

A schedule of the closure activities is presented in Figure 7-1. The activities representing the greatest portion of time noted on the schedule are decontamination activities. However, a visual inspection conducted on September 25, 1995, indicated that there are no carbonate residues present. Therefore, the clean up requirements of Sections 7.3.1, 7.3.2, and 7.3.3 have been met and no further decontamination activities will be conducted.

7.5 AMENDMENT OF PLAN

The closure plan for the 4843 AMSF will be amended whenever changes in operating plans or unit design affect the closure plan, whenever there is a change in the expected time of closure, or if, when conducting closure activities, unexpected events require a modification of the closure plan. The closure plan will be modified in accordance with WAC 173-303-610(3). This plan can be amended any time before certification of final closure of the 4843 AMSF.

If an amendment to the approved closure plan is required, DOE-RL will submit a written request to Ecology to authorize a change to the approved plan. The written request will include a copy of the closure plan amendment for approval.

7.6 CERTIFICATION OF CLOSURE

Within 60 days of final closure of the 4843 AMSF, DOE-RL will submit to Ecology a certification of closure. The certification will be signed by both DOE-RL and an independent professional engineer registered in the state of Washington, stating that the unit has been closed in accordance with the approved closure plan. The certification will be submitted by registered mail. Documentation supporting the independent professional engineer's certification will be retained and furnished to Ecology upon request.

The DOE-RL and the independent professional engineer registered in the state of Washington will certify with a document similar to Figure 7-2.

APPENDIX D

SPILL REPORTS

This appendix contains the reports of two spills occurring within the 4843 Alkali Metal Storage Facility (4843 AMSF) and an eyewitness account of the spill clean ups. The associated Event Fact Sheets (EFS) are attached. Both spills were the result of leaks from waste containers and both spills were addressed and corrected promptly. An eyewitness account gives the following steps as being followed during clean up of the two spills. Upon discovery of the spills a team consisting of two workers was used to clean up the spills of alkali metal. The workers were instructed to completely remove any material and if possible to clean the area until no traces of the spill remained. The first step in the clean up of the two spills was to remove all spilled sodium carbonate by sweeping it up and disposing of it appropriately. Secondly, any residue that remained on the concrete was treated with Dowenal EB[1] and scrubbed with a wire bristle brush. Finally, the spill areas were scrubbed with extremely small amounts of water and a wire bristle brush. The eyewitness account stated that after completion of spill clean up, there were no marks left on the concrete and it could not be distinguished exactly where the spill had occurred.

The spill of February 5, 1990, involving Container No. 80 (the DOT-7A metal box) took place about 1.5 to 3 meters (5 to 10 feet) from the west roll-up door and about 1.5 to 3 meters (5 to 10 feet) north of the east-west building centerline. No stain was left on the floor once the spill had been cleaned. Information on the spill of April 11, 1988, is sketchy. The operations personnel state that the spill occurred in front of the cold traps. This was roughly the same general area as the February 5, 1990, spill, but either north 1.5 to 3 meters (5 to 10 feet) or west 1.5 to 3 meters (5 to 10 feet). Again, no stain was left on the floor after clean up of the spill.

Generally, both spills appear to have occurred in the northwest quadrant of the building, with the spills most likely being closer to the centerline of the building than to the wall.

The presence of oil spills on the floor of the 4843 AMSF is strongly disputed. During the Washington State Department of Ecology (Ecology) visit to the 4843 AMSF of July 9, 1993, no oil stains were observed. Oil stains would occur where the forklift was stored or parked for long periods. The forklifts used at Fast Flux Test Facility (FFTF) are not stored or parked at 4843 AMSF. The only observed marks on the floor were the faint black tire marks (similar to skid marks, but fainter) that are commonly left by rubber-tired forklifts operating on smooth concrete floors. The tire tracks are unrelated to closure of this or any other dangerous waste treatment, storage, or disposal facility.

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[1]Dowenal EB is a trademark of Dow Chemical Company.

STAR : WHC EVENT FACT SHEET

1. Title: Breached Radioactive Waste Sodium Container
2. Reporting Org: 300 Area Waste Services
3. Div/Dept/Proj: Solid Waste Management Defense Waste Management
4. No: SWM-90-004
5. Rev:
6. Event Date: 02/05/90 Event Time: 1430

7. Event Identification:

A) Location of Event: 4843 Building/400 Area

B) Plant/Facility Status: Normal Surveillance Routine.

1. Alarm: Facility Type (False, Fire, CAM, CAS, etc)
2. Regulatory Requirement (CERCLA, RCRA, WDOE, DOE-RL, DOE-HQ, etc)
3. Operating Requirements (OSR, CPS, Tech Spec, Procedure, Administrative, etc)
4. Release/Spread - Radioactive Contamination/Hazardous Material
5. Radiological - Personnel Contamination, Internal Deposition, Over Exposure, etc.
6. Industrial Safety, Personnel Injury, First Aid, etc.
7. Process Misrouting
8. Utility System - Electrical, Steam, Air, Water
9. Hoisting/Lifting
10. Other

C) Event Type: 4 - Contaminated Sodium Carbonate seed through weld seam of a DOT 7A container.

8. Apparent Cause(s) of Event:

[P] Design	[ ] Administrative Control
[ ] Personnel Error	[ ] Procedure
[S] Material	[ ] Other:

9. Description of Event: On February 5, 1990 at 1430 a small quantity of sodium carbonate was discovered along a welded seam and underneath a DOT 7A metal box containing radioactive waste sodium. A Plant Engineer, Nuclear Process Operator, and Health Physics Technician from the 340 Facility, cleaned up the material and covered the potential leak area. The material from the container reads 600 counts per minute.

10. Consequences of Event: The DOT 7A Metal container will need to be reevaluated with respect to the containers ability to provide containment. The release of radioactive contaminated material outside a surface contamination area.

11. Actions Taken (A) or Planned (B):

Actions Taken:

A-1. The area was cleaned up and the potentially breached areas were taped. Completed 2/5/90

APPENDIX E

PHOTOGRAPHS

Attached are six photographs of the 4843 Alkali Metal Storage Facility (4843 AMSF).

Figures E-1 and E-2 show the outside of the building and some surrounding gravel and roadway.

Figures E-3 and E-4 show a past configuration of the interior of the building. These photographs were taken in December 1990.

Figures E-5 and E-6 show a past configuration of interior of the building. These photographs were taken in May 1987.

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Figure E-3. Interior of the 4843 AMSF. Past configuration showing containers of dangerous waste. Photograph taken December 1990.

Figure E-4. Interior of the 4843 AMSF. Past configuration showing containers of mixed alkali metal waste. Photograph taken December 1990.