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HWMA RCRA Storage and Treatment Permit Application Book 1 & 2

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HWMA RCRA Storage and Treatment Permit Application

for the

Materials and Fuels Complex

Book 1 of 2

Experimental Fuels Facility (EFF)

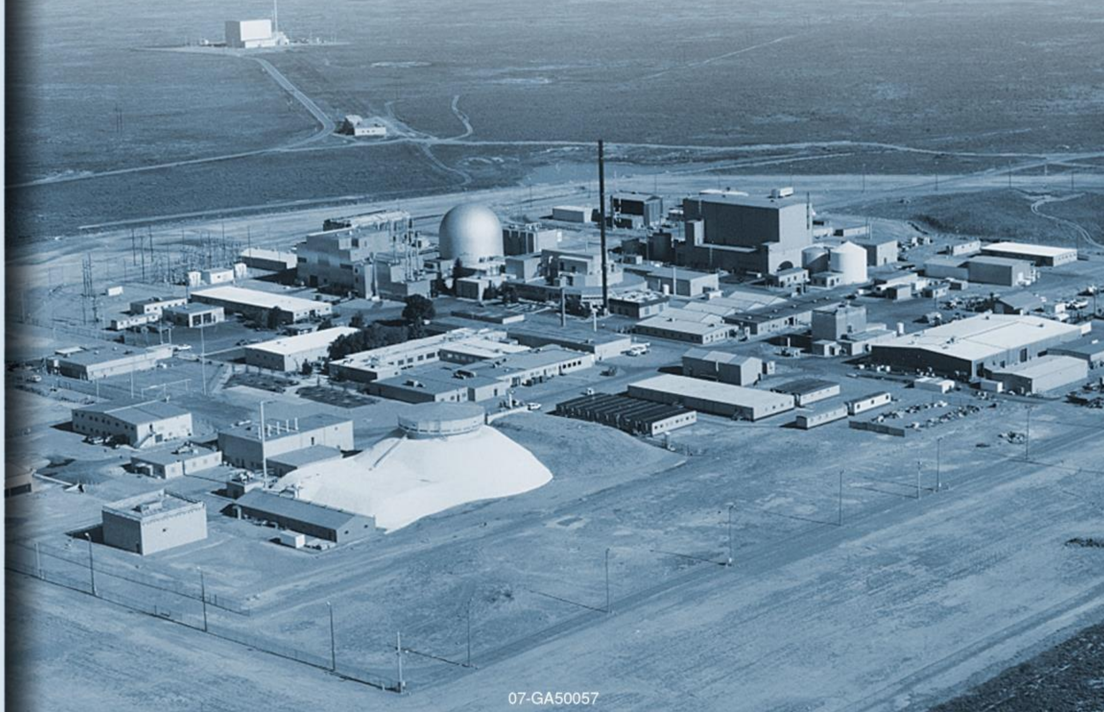
Hot Fuel Examination Facility (HFEF)

Radioactive Scrap and Waste Facility (RSWF)

Sodium Components Maintenance Shop (SCMS)

Sodium Storage Building (SSB)

APRIL 2014



Idaho National Laboratory

Responses to Notice of Deficiency for the Hazardous Waste Management Act/Resource Conservation and Recovery Act Storage and Treatment Permit Renewal Application for the Materials and Fuels Complex (EPA ID No. ID4890008952		
Dated January 9, 2015		
No.	NOD Deficiency Comment	NOD Comment Response
1.1.	Part A, Permit Information Form (PIF), Item 4: The facility existence date (January 1994) appears to be incorrect. Construction of facilities at MFC began in 1950. The Experimental Breeder Reactor (EBR)-II has an existence date of August 13, 1964. The Radioactive Scrap and Waste Facility (RSWF) began operation in 1965, the Hot Fuel Examination Facility (HFEF) started operation in 1975, the Experimental Fuels Facility (EFF) was built in 1975, the Sodium Components Maintenance Shop (SCMS) was built to support EBR-II (so probably in the 1960s) and treated Army Reentry Vehicle Facility Site NaK in 1995, and the Sodium Storage Building (SSB) was built in 1984. Correction Provide the existence date as the earliest date that any of the hazardous waste management units (HWMUs) were put into use, which would appear to be sometime in 1965.	Part A, Permit Information Form (PIF), Item 4, changed to February 1965. A new EPA Part A form was issued January 2015 and expires on January 31, 2017. Information has been incorporated on the new Part A form.
1.2	Part A, PIF, Item 10 (Supplement) (editorial): Item 10 is used twice. Correction Renumber Item 10 (Supplement) as Item 9 (Supplement) or Item 9A.	Part A, PIF, Item 10 (Supplement), renumbered to Item 9A.
2.1	Section B, Attachments: The closed hazardous waste management units (HWMUs) are not identified on the facility drawing. A plot plan of the RSWF is missing (which should include cathodic protection system, drainage system, elevations, etc.). The bottom of the schematic of the RSWF liners (Attachment B-11) is cropped off. Correction Identify the Radioactive Sodium Storage Facility, Transient Reactor Test Facility, EBRII, Sodium Processing Facility (SPF), Sodium Boiler Building, SCMS Buildings MFC-793E and MFC-793F, and any other closed HWMU on the facility drawing. Provide a plot plan for the RSWF, including the staging areas. Describe the HFEF and RSWF staging areas in the application. Revise the schematic of the RSWF liners.	Added closed HWMA units RSSF, TREAT, EBR-II, SPF, and the West half of SBB (i.e., the Secondary Sodium Drain Tank) to Attachment B-2 plot plan. The East half of the SBB (i.e., the Secondary Sodium System) is permitted under CWI and is currently undergoing closure. MFC-793E and -793F are not shown on the map because they have been demolished. Added a schematic plot plan of RSWF to Attachment B-11 that includes the staging areas. Drawings showing the cathodic protection system, drainage systems, and elevations can be found in Section D attachments (see response to NOD 9.1). The HFEF staging area is described in Section B-3(b)(8), no change. A description of the RSWF staging areas was added to Section B-3(c). Revised the RSWF liner schematic in Attachment B-11 with an image that is not cropped off.
2.2	Section B, Attachments B-4, B-6, B-7, B-9, B-10, B-12, B-13, B-14, B-15, and B-17 (Photographs): The explanation in the Part A, PIF, Item 12, indicates that these are drawings, not photographs. The plot plans are the	The Part A PIF, Item 12 was revised to indicate photographs. Also, a photograph of EFF was added.

	drawings. There is not a photograph of the EFF East Room. The photographs are not dated, and some of the photographs are of poor quality. Correction Provide clear, updated photographs of all the HWMUs at the facility following the instructions in the EPA Part A Instructions website (http://www.epa.gov/epawaste/inforesources/data/form8700/8700-23.pdf). "All existing facilities must include photographs that clearly delineate all existing structures; all existing areas for storing, treating, or disposing of hazardous waste,· and all known sites of future storage, treatment, or disposal operations. Photographs may be color or black and white, ground-level or aerial. Indicate the date the photograph was taken on the back of each photograph. Use the process codes listed in Items 7 and 8 to indicate the location of all storage, treatment, and disposal areas." Provide a photograph of the EFF East Room. In Item 12 - Photographs, indicate that the photographs can be found in Section B. Indicate on each photograph the date the photograph was taken.	In addition, each photograph includes the date when the photograph was taken. The date was added to the front of each picture to allow printing on single sided. See Section B, Attachment B-4, B-6, B-7, B-9, B-10, B-12, B-13, B-14, B-15, and B-17. More recent photographs of Attachment B-7, Attachment B-10, Attachment B-15, and Attachment B-17 were added. Some photos may appear poor quality, but these photographs are taken through hot cell windows, and are of best quality.
3.1	B-2(a), p. B-5: The section indicates that off-site waste is being managed at MFC. Offsite is defined in the Site Treatment Plan (STP) as any facility or installation other than the Idaho National Laboratory. The current wastes allowed to be accepted at the INL are only from Argonne National Laboratory East, Hanford, Los Alamos National Laboratory (LANL), and Lawrence Livermore National Laboratory (LLNL), and the INL has already received these wastes. There are no other approved off-site waste streams. The treatment plan for the LANL waste, which is currently at the INL, does not include treatment at MFC. Correction Explain what off-site (non-INL) 'and non-MFC INL waste is being managed at MFC, where it come from, how often is it received, and whether the waste is mixed waste or hazardous only waste. If the off-site waste is legacy waste (precedes the STP), indicate so. For waste received after the STP was put into place, provide information regarding STP approval for each off-site waste stream. Also describe manifesting, recordkeeping and reporting as related to off-site waste, as per IDAPA 58.01.05.008 [40 CFR § 264Subpart E].	There are no plans to accept off-site waste at this time. Section B-2(a) was revised to remove the acceptance of off-site waste at MFC. Language associated with off-site waste was removed throughout the permit application. Also, the listing of on-site facilities in Section B-2(a) that may transfer HW/MW for treatment and storage at MFC was revised. In addition, in December 2014, BEA responded to DEQ's comments on the NOD. Question number six was in regards to management of off-site waste at MFC. BEA indicated that one container containing 22 sludge samples from Rocky Flats is stored at HFEF, container number MFC090132, and is listed on the Site Treatment Plan under profile CH-ANL-553. This is correct that one container containing 22 sludge samples from Rocky Flats is stored at HFEF, but these sludge samples were core samples generated from the evaluation of the off-site waste and would not be considered off-site waste, but waste generated at MFC. Therefore, no off-site waste is being managed at MFC. Also, there is no off-site legacy waste. MFC does not plan to accept off-site waste in the future, therefore the manifesting, recordkeeping and reporting as related to off-site waste will not be addressed in the permit.
3.2	B-2, p. B-2: Although the wastes are described in general and by treatment codes and hazardous waste numbers in Section B-2(a) and in Table B-1, there are no physical descriptions of what waste is being managed in each unit, by unit, even in Attachment 2, Waste Analysis Plan.	The waste streams managed at each MFC HWMU have been added to tables in Attachment 2, Waste Analysis Plan, Attachment C-6. These tables represent a snap shot in time of the wastes managed at each HWMU.

	Correction List and briefly describe the waste streams managed at each MFC HWMU. For each waste stream, indicate if it is off-site waste, non-MFC INL waste, or MFC-generated waste; the source; generation rate; containers; treatments to be performed on it; and its destination. In the response, indicate where the information can be found in the permit application. Provide the STP waste stream designation, the Waste Matrix Code, and/or the Integrated Waste Tracking System (IWTS) tracking number, as appropriate.	
3.3	B-3(b)(8), p. B-13: It isn't clear what facility this section is referring to. It may refer to the HFEF Staging Area, Interim Storage Area for Interim Storage Containers (ISCs), or the RSWF Staging Area. Correction Identify the staging areas on the facility plot plan and the RSWF plot plan, and describe them further in the permit application. Refer to them by the names generally used in facility documents, and indicate what names they may also be referred to. Explain why a loaded cask or loaded transporter can be staged at the HFEF staging area for up to 60 days, and the time limits are on the other staging areas. If there was some agreement with DEQ regarding the 60 days, cite it. Delete "or" in the first sentence.	Section B-3(b) is in reference to the Hot Fuels Examination Facility (HFEF). Section B-3(b)(8) is a subsection of B-3(b) and is in reference to the HFEF staging area. A reference will be added to Section B-3(b)(8) designating that the HFEF staging area is shown on Attachment B-8. There are three staging areas used at MFC which include the RSWF staging area, North Fenced Area and the HFEF Staging area and are discussed below. The RSWF staging area and the North Fenced Area have been identified on a RSWF plot plan, see Attachment B-11. The RSWF staging area is used for staging Interim Storage Containers (ISC's) and Facility Transfer Containers (FTCs) containing HW/MW and TRU waste and their transport vehicle for up to 10 days. The North Fenced Area which was referred to as the Interim Storage Area for Interim Storage Containers (ISC's) is now referred to as the North Fenced Area, which stores radioactive waste only. Information on the RSWF staging area and North Fenced Area was added to Section B-3(c), new subsections B-3(c)(1) and B-3(c)(2). A cask or loaded transporter was allowed to be staged for up to 60 days in the HFEF staging area to facilitate loading, unloading and shipment of CH-MTRU waste within TRUPACT II shipping casks associated with the Waste Isolation Pilot Plant (WIPP) waste characterization program that was conducted at HFEF. The 60 day time limit was added to the MFC HWMA/RCRA Permit Application around 1999 and has since been referenced in the permit. TRU waste continues to be generated at MFC as either CH-TRU/MTRU or RH-TRU/MTRU and is generated mainly from MFC hot cells. Due to the generation of TRU waste the potential exists to use TRUPACT II shipping casks in the future. INL Waste Management Programs is evaluating the TRU waste activities from the MFC hot cells and the management and shipment of the TRU waste. Deleted "or" in the first sentence in Section B-3(b)(8).
3.4	B-3(c), p. B-13: The power for the RSWF cathodic protection system comes from Building 799 (the former Sodium Processing Facility) to the	Section B-3(c) of the permit application was revised to include the source of electrical power which supports the cathodic protection system. The source of

	RSWF. Building 799 is a closed facility. Correction In the permit application, describe the electrical system that supports the cathodic protection system for the RSWF.	power is a 480 VAC, 3 phase, direct buried cable from Building MFC-711 to the RSWF. The power from MFC-799, Sodium Processing Facility was rerouted to MFC-711 when the building was transferred to CH2M-WG Idaho, LLC. CH2M-WG, Idaho, LLC has since closed the facility.
4.1	Table D-1, p. D-11 : The list of the containers in Table D-1 does not affirm the compatibility of waste to the container construction materials. Correction Update Table D-1 to show the compatibility of each waste stream with the corresponding container construction materials.	Revised Section D-2 preceding Table D-1 and Section D-2(a)(1). Added language to address the compatibility of waste to the container construction material associated with periods of long term storage.
5.1	D-2(a)(3)(a), p. D-2 1: Waste containers that are themselves hazardous waste when emptied are not discussed (fabricated overpacks with lead shot shielding). Correction Describe management of discarded containers, such as the fabricated overpacks that contain lead shot to provide shielding.	Response to Deficiency 5.1 is addressed in Section D-1(b)(7).
5.2	D-2(a)(2), p . D-14 - D-30: Container stacking is not addressed. Correction Describe and illustrate container stacking practices at each storage unit.	Section D-2(a)(2)(e) was revised to address container stacking.
5.3	D-2(a)(2)(i) Container Treatment, p. D-17: The neutralization, solidification and stabilization agents are not identified. Correction Identify the neutralization, solidification and stabilization agents that will be used in waste treatment and spill containment. Include manufacturer information.	The primary neutralizing agents used is nitric acid or sodium hydroxide. The objective is to adjust the pH of the liquid to a neutral pH. To ensure the neutralizing agent is compatible with the media bench scale testing is performed. The list of agents was added to Section D-2(a)(2)(i) and a reference was added to include the manufacturer information found in Attachment D-4. The solidification and stabilization agents used may include Aquaset-II-H and Aquaset II-G. These agents may also be used as a blend. The treatment objective of solidification and stabilization would be to stabilize the material to meet UTS standards. To ensure the solidification and stabilization agent is compatible with the media bench scale testing is performed. The list of agents was added to Section D-2(a)(2)(i) and a reference was added to include the manufacturer information found in Attachment D-4.
5.4	D-2(a)(2)(i) Container Treatment, p. D-18: The permit application refers to treatability studies. Correction Clarify what is meant by treatability studies. Make sure that any treatability studies are included on the annual report required by IDAPA 58.01.05.005 [40 CFR § 261.4(f)].	The tests for container treatment processes are performed as bench scale tests to ensure that the recipes used will be effective prior to performing treatment. The treatability studies terminology is misleading and should be referred to as bench scale testing. Removed the term “treatability study” throughout permit.
6.1	D-2(a)(2), p. D-14-D-30; and D-4(b)(9), p. D-57: Waste management and handling procedures are not provided, for example:	Added new Section D-2(a)(2)(k) summarizing the relevant procedures that describe container management practices.

	• HFEF-OI-6601, Waste Handling, • HFEF-OI-6801, HW/MW Requirements • LWP-8300, Transuranic Waste Handling • LWP-17000, Waste Management • MCP-1 7000, WGS Waste Management • MCP-17410, Management of Waste Storage Areas • PDD-17000, Waste Management Program • SCMS-01-1, Facility Information and Administrative Requirements • SD-38.1.1, TSDF Environmental Compliance • TSM-OI-003, Transfer of Hazardous Material in Non-DOT-Certified Packaging between MC Nuclear Facilities • Hazardous Waste Management Checklist Correction List and summarize the appropriate and relevant waste handling procedures to prevent hazards from unloading operations, container management, containment and detection of releases, prevention of spills and overflows, etc. Provide descriptions of container loading and unloading practices. Provide the hazardous waste acceptance checklist.	Added information associated with container loading and unloading operations to Section D-2(a)(2)(d). Also, added reference to Attachment 6, Section F Procedures to Prevent Hazards, Section F-4(a) loading and unloading operations. Added hazardous waste acceptance checklists FRM-323 (SSB and SCMS), FRM-1200 (HFEF), and FRM-1629 (EFF) as examples in Attachment D-3, which are used during container management practices.
6.2	D-2(a)(2)(i), p. D-19: The broad list of absorbents includes cellulose, which has shown to react with acids or nitrating agents. The absorbents must be shown to be compatible by waste stream. Correction List absorbents used, and provide manufacturer information. For each absorbent, provide information on compatibility with the waste and the containers for a lengthy storage period. Clarify if the absorbent is added during treatment at the MFC or if the absorbent was added to the waste before it came to MFC. Describe how cellulose may be present in the waste primarily from spill pigs/mats used to contain small drips or spills as a preventative measure in some legacy waste containers, if appropriate. For cellulose, provide information demonstrating that it will not react with the waste.	Absorbents used may include diatomaceous earth, super absorbent polymer (SAP), Aquaset, or Petroset. Section D-2(a)(2)(i) was updated to include these absorbents and a reference was added to include the manufacturer information found in Attachment D-4. These absorbents are added during treatment at MFC. To ensure the absorbent agent is compatible with the media bench scale testing is performed. Cellulose may be present in the form of spill cleanup material. Per MFC procedure prior to absorbing liquid an Industrial Hygienist and or waste disposition specialist or designee must be contacted to approve the liquid absorbing media.
7.1	D-2(a)(3), p. D-20; D-2(a)(3)(a), p. D-21-22; B-3(b)(l), p. B-9 through-B-13: Although the dimensions of the secondary containment systems for the HWMUs are described in Section B; and there are very simple floor plans in the attachments; there are no engineering drawings of the buildings and their secondary containment systems that demonstrate adequate design. Correction Provide the design drawings for the buildings or permitted areas within	An SCMS drawing detailing the High Bay secondary containment area (drawing 748438, W7930-0111-DD-43) has been added to Attachment D-28, and a reference to it has been added to section D-4(b)(8)(b) text. Drawing 749631 (W7930-0101-DD-04), sheet 4, currently in Attachment D-26 (formerly Attachment D-23), shows the Low Bay Pit secondary containment details, as referenced in section D-4(b)(8)(b).

	buildings and secondary containment systems.	Drawings detailing the HFEF secondary containment areas have been added as Attachment D-6. Section D-2(a)(3)(a) has been revised to reference the drawings.
8.1	D-2(a)(3)(c), p. D-24, second paragraph (editorial): The reference to the fabricated spill pan described in Table D-3, has an error in the volume. The available capacity should be 302.4 gal, not 3,024 gal. There is a similar error for the spill pan containment volume; it should be 336 gal, not 3,360 gal. Correction Correct volumes.	Corrected volumes, see Section D-2(a)(3)(c).
8.2	D-3(a)(3) Carbonation System, p. D-33; D-3(a)(4), p. D-34: The neutralization, solidification and stabilization agents are not identified. Correction Identify the neutralization, solidification and stabilization agents that will be used. Include manufacturer information.	The primary neutralizing agent used includes nitric acid. Nitric acid is used to neutralize sodium hydroxide. The objective is to adjust the pH of the liquid to a neutral pH. To ensure the neutralizing agent is compatible with the media bench scale testing is performed. The list of agents was added to Section D-3(a)(3) and a reference was added to include the manufacturer information found in Attachment D-4. In addition, gaseous Carbon Dioxide (CO_2) can be introduced into the carbonation vessel near the bottom and allowed to bubble through the scrubber water, forming sodium carbonates and potassium carbonates, which lower the pH. When carbonation activities are completed, the carbonation tank is gravity-drained to the scrubber water tank and is maintained empty and dry. The solidification and stabilization agents used may include Aquaset II-H and Aquaset II-G. These agents may also be used as a blend. The treatment objective of solidification and stabilization would be to stabilize the material to meet UTS standards. To ensure the solidification and stabilization agent is compatible with the media bench scale testing is performed. The list of agents was added to Section D-3(a)(4) and a reference was added to include the manufacturer information found in Attachment D-4.
8.3	D-4(b)(l), p. D-47; Attachment D-22 (editorial): The last paragraph in the section discusses water wash vessel (WWV) pressurization. It should refer to the carbonation vessel pressurization. Correction Revise paragraph.	Revised Section D-4(b)(1) last paragraph that described water wash vessel. Changed water wash vessel to carbonation vessel.
9.1	D-5(a), p. D-58; D-5(d)(c), p. D-63; B-3, p. B-13: The permit application is missing a detailed plan view of the RSWF with each liner site identified by a descriptive number, when it was placed, what waste is stored in it, and the type of liner; and the concrete pads, the location of drains, ditches and swales, surface drainage patters, elevations, and the cathodic protection system. There are no engineering drawings of the cathodic protection system.	The current detailed plan view drawing (drawing 747635, Liner Configuration) of the RSWF has been added as Attachment D-31. Reference to this attachment has been added to Section D-5(d). See NOD 12.1 resolution for the types of wastes stored in the liners. Fabrication drawings of each liner type have been added as Attachment D-32. Reference to this attachment has been added to Section D-5(d)(1). These drawings

	Correction Provide a detailed plan view of the RSWF. Provide detail on the design of each liner, the cathodic protection system, sacrificial anodes, the elevations, and drainage systems, similar to what was submitted in the first permit application in May 1992, but updated, since at the time there was a major upgrade project underway to install the cathodic protection system and upgrade the liners. Include the design standards used to manufacture the liners, and the standards for welding the lids (testing, standards, etc.) or otherwise sealing the lids. Also provide diagrams of shield plugs, lifting equipment, etc.	include the standards that were used for manufacture. The current RSWF drawing of the cathodic protection system, including the anodes, has been added as Attachment D-34. Reference to this attachment has been added to Section D-5(d)(4). A drawing showing elevation contours of the RSWF has been added as Attachment D-30. This drawing also shows the drainage systems in place at RSWF. Lid welding requirements are described in RSWF-OI-001. Added discussion of liner lid sealing to Section D-5(d)(1). Drawings of shield plugs have been added as Attachment D-33. Reference to this attachment has been added to Section D-5(d)(3). A diagram showing lifting equipment configuration has been added to Attachment B-11, and described and referenced from Section D-5(g)(2).
9.2	D-5(d): There is no detailed description of how the liners are placed, and there is no description about pulling a liner. Correction Provide a detailed description of how the liners are placed. Indicate what is the minimum amount the liners need to protrude and why. Also indicate what the maximum protrusion is before it becomes an obstacle to retrieval. Describe how a failing liner would be pulled or dug out. Indicate how the liners are designed to resist frost heaves. Describe how the liners are checked for movement, such as from frost heaves. Describe how liner covers are marked to identify them.	A description of liner installation, including a discussion of protrusion height, has been added to Section D-5(d). A description of liner removal procedures has been added as Section D-5(g)(4). A discussion of how liners are designed to resist movement has been added to Section D-5(d). Each full liner top plate has a unique identification number, corresponding to its location on the grid, welded onto its exposed surface. Added this description to Section D-5(c).
9.3	D-5(d)(l), Carbon-Steel Installed Liners: Detailed plans of all the liner types are missing. Correction Provide detailed plans of each liner type. Define SLSF (Sodium Loop Safety Facility). Indicate if the 24-in liners are blind flanged with gaskets or welded. Indicate how the cathodic protection system is attached to each liner.	Fabrication drawings of each liner type have been added as Attachment D-32. Reference to this attachment has been added to Section D-5(d)(1). SLSF (Sodium Loop Safety Facility) has been defined in a footnote, and referenced from the first use of the term in section D-1(a)(1). The 24-in. liners containing HW/MW are closed with welded shield plugs. There are 24-in liners that are closed with a bolted/gasketed blind flange, but these contain low-level waste only. Clarification has been added to Section D-5(d)(1). The liner configuration drawing in new Attachment D-31 notes the two types. Details of how the cathodic protection system is attached to the liner are shown on

		sheet 2 of drawing 747628, which has been added as Attachment D-34. Discussion of this attachment has been added to section D-5(d)(4).
9.4	D-5(d)(2), Inner Containers, p. D-61: The paint can description indicates that the upper section was welded to the lower section, which contradicts an earlier permit application that indicated that they were joined using a lug foam rubber gasketed cover. The earlier application also indicated that smaller pails were used and placed inside the paint cans. Also, there is no description of any drop testing done on the containers. Correction Clarify the current configuration of the pails. If tests were done to support possible accident scenarios, summarize the test results.	The paint can description in Section D-5(d)(2) as written in the permit application is correct. The lower section of the container was fabricated from 20-gauge steel tube with a welded side seam and bottom. The upper section was a bottomless standard 5-gal steel pail body (22 gauge) attached to the lower section with a circumferential weld. The container was closed with a standard 16 lug foam-rubber gasketed cover and placed into the original 16-in. liners. In some cases smaller pails may or may not have been added to the paint cans. These paint cans are no longer being used. Revised Section D-5(d)(2) to include the pails inside the paint cans and included a description of drop testing done on the paint cant from the earlier permit application, May 1992.
9.5	D-5(d)(2), Inner Containers, p. D-62: The permit application describes the HFEF-5 inner container. It does not describe the HFEF/S and HFEF/N containers described in other documents. Correction Explain what the HFEF/S and HFEF/N containers are and how they relate to the HFEF-5 container.	The HFEF/S and HFEF/N containers were earlier versions of waste cans used prior to the HFEF-5 containers. The container dimensions are roughly the same, but the use of these containers was discontinued in 1987. Some of the changes over the years included the type of closure and use of a filter. MFC is currently using the HFEF-5 containers, which consists of an inner and outer container. The inner container is bolted and the outer container is seal-welded shut. No filters are used with HFEF-5 containers. HFEF/S refers to FCF, which is south of HFEF, and HFEF/N refers to HFEF. Section D-5(d)(2) was revised to explain the HFEF/S and HFEF/N containers.
9.6	D-5(d)(2), Inner Containers, p. D-62: The SLSF bulk sodium container is not described, the SLSF Warm Vapor Trap container is not described, and the containers with waste from the decommissioned EBR-I reactor are not described. Correction Describe all of the waste containers used at the RSWF.	Revised Section D-5(d)(2) to include a description of the SLSF bulk sodium container, the SLSF Warm Vapor Trap container and the containers containing material from the decommissioned EBR-I reactor.
9.7	D-5(d)(3), p. D-63: This section describes that 70 inches of gravel was placed on top of the paint cans in the liners to provide shielding. However, all of the liners were redone in the 1990s. It is not clear if the liners are still shielded with the gravel; now shielded with lead, steel or concrete shield plugs; or both. Correction Clarify which liners have what type of shielding. Indicate if the shield plugs are lead, steel or concrete.	Section D-5(d)(3) was revised to include the type of shielding used on the liners as follows: 16-in new liners have a 30-in concrete shield plug with ½ inch welded steel plate (original 16-in liners relocated into the 24-in liners contained gravel with a ½ welded steel plate) 24-in liners have either ½-in. steel plate welded shut; 6-in carbon steel shield plug welded shut. This shielding is based on the radiation reading.

		26-in liners have a 6-in carbon steel shield plug welded shut. Some of the original 26-in liners contain lead shield plugs welded shut. 48-in liners have a carbon steel plate welded shut. 60-in liners have ½ in. carbon steel plate welded shut.
10.1	D-5(b), p. D-59, Environmental Performance Standards for Miscellaneous Units: The potential pathways for the release of hazardous waste constituents from the RSWF stored waste are not described. Correction Describe the potential pathways for the release of hazardous waste constituents (e.g., air, surface water, soil, ground water). Describe the potential causes for releases and how the design of the facility or the physical characteristics of the area minimize the possible harm to human health and the environment. Include a discussion on the corrosivity of the soil and include the results of the latest soil corrosion mapping. Indicate if there are any structures, such as snow fences, to prevent snow from drifting onto the RSWF.	The potential pathways and causes for a release of hazardous waste constituents were added to Section D-5(b). The design features of the facility or the physical characteristics of the area are addressed in Section D-5(m). A reference to Section D-5(m) was added in Section D-5(c). Also, a discussion on the corrosivity of the soil was added to Section D-5(b). No new soil corrosion mapping has been performed since the initial soil mapping performed in 1989. See Attachment D-29 for Field Testing Report. No snow fences are used around the RSWF. The elevation of RSWF related to the surrounding area reduces the chance for snow drifting.
11.1	D-5(d)(4), Cathodic Protection System, p. D-63: The results of the cathodic protection system demonstration done from 1993 to 2001 were not provided. The frequency of the liner-to-soil potential monitoring is not provided. Correction Provide the results of the cathodic protection demonstration to support the frequency of inspection. Indicate how often the liner-to-soil potential readings are done.	A summary of the results of the cathodic protection system demonstration done from 1993 to 2001 was added to Section D-5(d)(4). Documentation supporting the demonstration is also referenced (new Attachment D-35), which supports the frequency of inspection. The liner-to-soil potential is performed annually and this information was added to Section D-5(d)(4).
12.1	D-5(c), p. D-59; C: There is not a description of the RSWF waste in the Waste Analysis Plan (Attachment 2, Section C), nor an analysis of its potential to migrate. Correction Provide a summary description of each type of waste stored in the RSWF, including when and where it was generated, the volume, and physical and chemical characteristics. Include an analysis of the wastes' potential for migration through soil, liners, or other containment structures. Briefly discuss the hazards of storing liquid waste (NaK), reactive and ignitable waste (NaK and Na), and toxic waste (Pb, Cd, Cr, and Ba). Indicate how the waste is tracked at the RSWF in the IWTS. Indicate if absorbents are used in the waste, and if so, what they are. Indicate if any gases are generated inside the containers during storage, and	Section D-5(c) was revised to include a summary of each waste type stored at RSWF, including when and where it was generated, the volume, and the physical and chemical characteristics. In addition, the hazards of storing liquid waste (NaK), reactive and ignitable waste (NaK and Na), and toxic waste (Pb, Cd, Cr, and Ba) was also addressed. The potential for migration of waste is discussed in Section D-5(m). A reference to this section was provided in Section D-5(c). A description of how the waste is tracked at RSWF was included in Section D-5(c). Section D-5(c) was revised to indicate no absorbents are used in the waste. Also, described the potential for gases and how over-pressurization of containers or liners

	if so, what they are and what would be typical concentrations. Describe how over-pressurization of the containers is prevented.	is mitigated.
13.1	D-5(e), p. D-65; D-5(f), p . D-65; Volume 3: Volume 3 does not have any air condition descriptions, except for the wind roses. Correction Provide a description of the site air characteristics and conditions at the RSWF. Describe the effects of high wind gusts, dust devils, wildfire winds, etc., on the RSWF structures. In addition, whenever referencing information in Volume 3, indicate the location of the information by page or drawing number.	Section D-(e) was revised to describe the site air characteristics and conditions at the RSWF.
14.1	D-5(g), Operating Standards, p. D-65: The operating instructions, requirements and responsibilities are not provided. Correction Provide the operating instructions for general operations, waste placement, and retrieval. Describe the worst case drop scenario and how equipment failure due to a dropped container is mitigated.	Section D-5(g) was revised to include a summary and listing of the operating instructions for general operations, waste placement, and retrieval. In Section D-5(m) added a worst case drop scenario and how equipment failure due to a dropped container is mitigated.
15.1	D-5(h), p. D-67 (Site Hydrogeologic Conditions): This section refers to Volume 3 -General Information for INL Waste Management Units, but Volume 3 does not have an assessment of site hydrogeologic conditions. It has a description of the conditions. Correction Provide an assessment of the site hydrogeologic conditions at the RSWF. Include an assessment of the corrosivity of the soil, and a description of the geology directly below the facility, as determined from borings done when the facility was built or more recent information, if available. Provide a topological/grading map for the RSWF area with sufficient detail to show the drainage patterns.	Section D-5(h) was revised to include hydrogeologic conditions at the RSWF, which includes an assessment of the corrosivity of the soil, geology beneath the facility. Drawing showing details of the drainage pattern is found in Section D Attachment D-30, see also Deficiency 9.1.
15.2	D-5(m), Migration of Waste Constituents, p. D-70: The site appears to have about a 1.5% slope from the center, from the information provided on p. B-13 (388' x 448') and p. D-69 (elevation slopes off from 5120 ft in the center of the facility to 5117 ft at the fence line). Most guidance suggests a cover should be 3-5% slope for adequate drainage. Also, there is no detailed information regarding site grading and drainage. Correction Provide engineering documentation on adequacy of the drainage design of the RSWF. Provide detailed information on site grading and drainage, such as the degree of slope (minimum and maximum), the elevation points, the location of the survey benchmark point, etc. Describe the features of the site that ensure adequate drainage away from the liners and the corrosion protection system components.	A drawing showing elevation contours of the RSWF has been added as Attachment D-30. This drawing also shows the drainage systems in place at RSWF. A letter discussing the impact of saturated soil conditions on the cathodic protection system by the corrosion expert who is very familiar with the RSWF has been added Attachment D-30. The RSWF cathodic protection system was designed and has proven to adequately protect the liners from corrosion for the RSWF soil and surface water conditions. Saturating the soil environment in fact increases the effectiveness of the impressed current cathodic protection system. Additionally, pooling of water at the surface of the liners also provides for the transfer of cathodic protection current to the exposed steel. References have been added to Section D-5(m).
15.3	D-5(m), Migration of Waste Constituents, p. D-70: The credible release	A summary of release scenarios was added to Section D-5(m).

	scenarios are not described. Correction Summarize the credible release scenarios and explain how through design or location the release scenarios are mitigated.	In addition, the mitigation of a release through the design and location of RSWF is described in Section D-5(m), no further detail is provided.
16.1	D-5(g), p. D-65; D-5(g)(l); D-5(g)(2); Attachment D-25 (editorial): The photograph of transport cask and forklift is undated. Correction Provide dates and locations on all photographs.	Dates were included on photographs. Also, replaced Attachment D-26, Photograph of RSWF Concrete Pads with Attachment D-31, liner configuration drawing showing concrete pads.
16.2	B-3(b)(8), p. B-13 and D-5(a), p. D-58: Although a cast/transporter staging area is briefly described in Section B-3(b)(8), p. B-13, there are no descriptions of the Interim Storage Area for Interim Storage Containers (ISCs), or the RSWF Staging Area in either Section B or Section D. Correction Describe any additional temporary or permanent waste storage areas besides the liners, including staging areas at or near the RSWF.	Addressed under Deficiency # 3.3.
17.1	C-l(b), p. C-2, and C-2(b), p. C-5: There are four Idaho Waste Tracking System (IWTS) profiles for example purposes, but no complete list. Two of the example IWTS profiles provided are inactive (ANL 180CH and ANL 182CH). Correction Use current profiles as the example profiles. Provide a list of IWTS profiles for the MFC permitted HWMUs, by unit (DEQ acknowledges that this is a snapshot look and may change over time). Provide waste characterization information for the EFF, HFEF, RSWF, SCMS and the SSB, such as INL/EXT-10-17600, PK Summary Report for MFC CH-TRU Waste.	IWTS material profiles ANL 180CH and ANL 182CH are both for Site Treatment Plan (STP) waste. Both material profiles encompass containers that are still in RCRA permitted storage in SCMS and SSB. IWTS marked both material profiles as inactive because no newly generated waste is being or will be added to these profiles. Newly generated waste is tracked on other IWTS material profiles. A list of IWTS material profiles for the MFC permitted HWMUs is provided in Section C, Attachment C-6. Specific waste characterization information for the EFF, HFEF, RSWF, SCMS, and SSB is provided in Section C-2(a).
17.2	C-l(c), p. C-2: Since the SCMS uses water and other liquids to decontaminate the debris waste, it generates hazardous liquid wastes. These are not described. Correction Describe the liquid hazardous wastes generated in the SCMS, including their analysis and disposition. Also, demonstrate that the tank construction materials are compatible with the waste stored in the tanks.	A description of the liquid hazardous waste generated in SCMS, including their analysis and disposition along with a description demonstrating the tank construction is compatible with the waste stored is included in Section C-1(c).
17.3	C-2(a), p.C-2: There are no unit-specific waste acceptance criteria included in the permit application. Correction Provide specific waste acceptance criteria for the EFF, HFEF, RSWF, SCMS and the SSB, such as TSD-OI-004, "Waste and Material Acceptance for Storage/Treatment and Radioactive Material Inventory Control"; RSWF-OI-003, "Material Acceptance for Storage", INL/EXT-10-17600,	Section C-2(a) was revised to include unit specific waste acceptance criteria.

	PK Summary Report for MFC CH-TRU Waste; and TSD-OI-004, Waste and Material Acceptance for Storage/Treatment and Radioactive Material Inventory Control.	
18.1	C-2(c), p. C-6: Method 131 O/MFC is not listed on Table C-1 as a test method. Maybe it should refer to Method 9095/MFC? Correction Make test methods are consistent between the tables and the text.	Removed reference to test methods in Section C-2(c). Also, added footnote in Table C-1 for clarification describing sodium waste is ignitable/reactive.
18.2	C-2(f), p. C-11: The basis for the sampling scheme for when Universal Treatment Standard (UTS) limits are exceeded is not described. Correction Provide the basis for the sampling scheme when UTS limits are exceeded.	Section C-2(f) has been revised to include the basis for the sampling scheme. The basis for the sampling scheme is based on two samples per drum up to eight drums per day for a batch process. Batch processes are based on the number of drums going through the solidification system per day, which have historically been eight per day. In addition, if UTS limits are exceeded the waste can be rejected without further treatment and dispositioned to an off-site facility for treatment and disposal.
19.1	C-2(g), p. C-11: The permit application is missing some additional steps needed for accepting off-site waste. Correction The waste analysis plan must describe how mixed off-site waste must be approved through the STP process prior to receipt, including the approval of a waste treatment plan, and that the waste and the waste treatment residues may only be on site for a year or less. The off-site waste generators must submit a waste profile to be approved by MFC or DOE (IDAPA 58.01.05.008 [40 CFR § 264.13(b)(5)]). If the waste profile is approved and MFC decides to accept the waste, they must notify the generator that they have the appropriate permit(s) for, and will accept, the waste the generator is shipping, as required by IDAPA 58.01.05.008 [40 CFR § 264.12(b)].	Section C-2(g) was revised to reflect no off-site waste is received at MFC. Off-site waste is being removed from permit application.
20.1	Table C-1, third row, p. C-7 (editorial): "spectroscopy" is misspelled. Correction Fix spelling.	Corrected spelling of "spectroscopy". Based on redline revisions to the permit application Table C-1 is now Table C-3.
20.2	C-2(g), p. C-11: There appears to be an incorrect reference in the first line. Correction Change the reference from C-3(a) to C-2(a).	Revised Section C-2(g) to indicate that off-site waste is no longer accepted at MFC. Incorrect reference was deleted.
21.1	Section F-1, Security: Since the RSWF is outside the secured perimeter of the MFC, the security is not the same as at the MFC. The permit application does not describe the security for the RSWF in detail. Correction Describe the 24-hour surveillance system as it applies to the RSWF. Describe the barrier around the RSWF. Describe the means to control entry	Added information to Section F-1 Security for RSWF.

	into the RSWF. Identify the warning signs posted at the RSWF. Describe the surveillance camera system. Identify the minimum warning signs for each permitted HWMU, by unit. Limit the description to only information that is not Official Use Only.	
22.1	F-2(a), Attachment F-3 and Attachment F-4: The inspection plan does not describe the periodic RSWF liner pulls to inspect for corrosion (every 4 years), and the RSWF grading inspection and maintenance (annual, semi-annual, or as needed). Correction Describe the 4-year liner inspections and the annual/semi-annual grading and maintenance inspection in detail. Include in the description that the liner-to-soil readings are done on each liner at the facility. Provide a copy of the Preventative Maintenance (PM) Procedure Number 198267, which is an annual PM procedure used to conduct drainage and erosion control at RSWF, and provide the procedure or Engineering Design File (EDF) that describes the liner inspections.	Added description of the 4-year liner inspections and that the liner-to-soil readings are done on each liner to Section F-2(b)(3). Also, removed two sheets associated with adjacent liner impedance measurements (continuity of the adjacent liner lead wires and the liner/rectifier header cable) from the example annual cathodic protection PM data sheet set. These liner-to-liner impedance measurements were removed from the permit in October 2008, since redundant information is obtained from the liner-to-soil potential measurements. See response to NOD 22.2 for the annual/semi-annual grading and maintenance inspection. Model work order #125409 is the template procedure for the RSWF annual drainage and erosion control PM. This template is used in the work package whenever the PM is performed. Each performance of the PM is assigned a unique PM work order number; for example, work order number 198267 is the identification for the draining and erosion control PM done on 5/5/14. The template model work order #125409 has been added as Attachment F-6. Added (as Attachment F-5) the 2013 statement-of-work and resulting inspection report as examples of what is done by the independent corrosion expert for the 4-year liner inspections.
22.2	F-2(b)(3), p.F-7, Attachment F-3: The inspection program for the RSWF does not describe the surface maintenance standards and requirements. Correction In the permit application, describe the surface maintenance requirements, including periodic inspections. The inspections should include identifying problems such as eroded banks, animal burrows, subsidence, and cracks; and evaluation of the condition of concrete structures (manholes), drains, fencing, rectifier, outbuildings, staging areas, etc. The program must also include a determination if any of the liners have sunken or are protruding, as compared to some permanent landmark. The permit application should include a description of the items to be inspected. The results of the inspection shall be record on either an inspection form or in a log. Include in the permit application the information to be recorded. As part of the Preventive Maintenance program, the permit application	Section F-2(b)(3) was revised to describe the surface maintenance requirements performed at RSWF. In addition, Attachment F-3, Inspection Schedule was revised to include semi-annual and annual preventative maintenance activities for RSWF culverts and soil erosion. Also, Section D-5(d) describes why the liners will stay in place and that a program to ensure liners are not sinking or protruding, as compared to some permanent landmark is not needed.

	must describe how the integrity and effectiveness of the RSWF surface will be maintained. The application should include that MFC shall remedy any deterioration or malfunction discovered by an inspection immediately within a 72-hour period (or some other reasonable period), if feasible. If not feasible, a management action plan and implementation schedule shall be established within 72 hours.	
23.1	F-3(a)(2), p. F-1: The permit application does not address how personnel would call in an emergency on cell phones. Correction Provide instructions as to the use of cell phones in an emergency, including providing the emergency number to call using the cell phone; and if cell phone use is not allowed in certain circumstances.	Added info to F-3(a)(2) associated with the use of cell phones during an emergency.
24.1	F-3(a)(4), p. F-2: The application does not indicate that fire control is evaluated at each permitted HWMU as operating conditions change (e.g., programs change, units are closed). Correction Describe how fire control is evaluated for changes in operating conditions. Describe non-water fire control equipment also, such as that used with water-reactive waste.	Revised Section F-3(a)(4) to address fire control.
25.1	F-3(a)(5) (missing), p. F-2: The permit application does not include a description about how the communication, alarm, fire control equipment, spill control equipment, and decontamination equipment are tested and maintained. Correction Describe how the communication, alarm, fire control equipment, spill control equipment, and decontamination equipment are tested and maintained.	Added information to Section F-2(a) describing how the communication, alarm, fire control equipment, spill control equipment and decontamination equipment are tested and maintained. Section F-2(a) of the permit application currently references 40 CFR 264.33, which is associated with testing and maintenance of equipment; however, the information was missing.
26.1	F-3(a)(6) (missing), p. F-2: When waste is being handled, including being hauled, personnel must have access to internal alarm or communication device. This is not indicated in the permit application. Correction Describe how that when waste is being handled or hauled, personnel have access to emergency communications at all times.	Added Section F-3(a)(5) addressing access to communications or alarm systems when handling hazardous waste.
27.1	F-3(c)(4) (missing), p. F-2: There is no indication whether there was a refusal to sign a memorandum of agreement by a local authority or not. Need to include a statement as to which way.	Addressed in Attachment 7 Contingency Plan, Section G-6. See deficiency # 35.1.
28.1	F-4(f) (missing), p. F-4: The section does not describe how hazardous waste releases to the atmosphere are prevented. Correction Describe how hazardous waste releases to the atmosphere are prevented.	Added Section F-4(f) to address releases to the atmosphere.
29.1	Container venting equipment and procedures are not described.	There is no specific venting equipment installed on containers. If containers are

	Correction F-5(a), p. F-5: Describe if container venting equipment is used and the procedures, such as what they used at the Secondary Sodium System (MFC-766) with the cans of sodium waste generated from closure. This included installing special vents on containers that could be opened and closed to check for pressurization.	found to be pressurized standard operating procedures are followed for venting and opening of containers. Section F-5(a) was revised to include the following: When venting drums use only non-sparking tools and perform monitoring of gases.
30.1	G-2, p. G-3: The home addresses and home phone numbers are not provided. Correction Explain why the home addresses and home phone numbers of the plan are not provided and where they may be obtained. Describe who will be the primary Emergency Action Manager (EAM) (probably the one currently on shift).	The home addresses and home phone numbers of the EAMs are now located in Attachment G-1. This information was withheld as privacy information or personal identifiable information, however, acceptance to release or publish this information has been received from EAM's. In addition, language was added to Section G-2 describing the primary EAM.
31.1	G-4(a), p. G-10: There is no mention of the requirement for the Emergency Action Manager (EAM) to provide a verbal report to the State Communications Center of any release of hazardous waste or a fire or explosion at a facility. There is no mention of the 5-day written report. Correction The Idaho regulation at IDAPA 58.01.05.0D6.02 (see above) requires the emergency coordinator to immediately notify the State Communications Center by telephone, 1-800- 632-8000, to file an identical report to the notification required by IDAPA 58.01.08.008 [40 CFR § 264.56(d)(2)]. This means that the EAM must verbally notify the Idaho State Communications Center immediately upon identifying that there has been a fire, explosion, or release that could threaten human health or the environment. The regulations at IDAPA 58.01.05.012 [40 CFR § 270.30(6)] require a verbal report to DEQ within 24-hours of the event. Also, the regulations at IDAPA 58.01.05.012 [40 CFR § 270.30(6)(iii)] require a 5-day report to DEQ. The fifteen-day report to DEQ, in this section of the regulations, is for if and when the DEQ waives the 5-day report. IDAPA 58.01.05.008 [40 CFR § 264.56(i)] requires a 15-day report to DEQ. The section shall describe that whenever there is an event such as a (1) sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil or surface water, (2) fire, or (3) explosion, which could threaten human health, or the environment, outside the facility, the EAM must immediately (or as soon as it is safe to do so) make a call to the State Communications Center. Within 24 hours the owner or operator must contact DEQ. Then the owner or operator must make a 5-day written report to DEQ, unless the Director waives the five day report in favor of a 15-day	Section G-4(a) was revised to include the State Communications Center. In addition, included information on the 5-day written report in Section G-4(b).

	report. Regardless of the 5-day report waiver, a 15-day report is required.	
32.1	G-4(f), p. G-15: This section does not discuss monitoring leaks, pressure buildup, gas generation or ruptures in valves, pipes or other equipment while the facility operations have ceased. Correction Include information on monitoring leaks, pressure buildup, gas generation or ruptures in valves, pipes or other equipment while the facility operations have ceased.	Section G-4(g) was revised to address monitoring for leaks; pressure buildup; gas generation; or ruptures in valves, pipes, or other equipment while the facility operations have ceased.
33.1	G-4(j), p. G-16: This section does not include a part on provisions of secondary containment, repair or closure of the SCMS. Correction Describe how the SCMS primary or secondary containment will be repaired.	Revised Section G-4(k) to include how the SCMS secondary containment is repaired.
34.1	G-4(j)(3), p. G-20: There is no longer a requirement to submit to DEQ a certification of major repairs to a tank system by a professional engineer. See 71 Federal Register (FR) 16906, April 4, 2006. Correction Revise permit application to state that the certification must be placed in the operating record and maintained until closure of the facility.	Revise permit application to state that the certification must be placed in the operating record and maintained until closure of the facility. This is now found in Section G-4(k)(3).
35.1	G-6, p.G-21: There is no information about whether there were any refusals to enter into coordination agreements. Correction Provide documentation of any refusal to enter into a coordination agreement, or state that there were no refusals.	Attachment 7 Contingency Plan, Section G-6 addresses coordination agreements. No refusals to sign a memorandum of agreement by a local authority had been made. The following sentence was added to Section G-6: "If a state or local authority declines to enter into such agreements the refusal will be included in the operating record".
36.1	G-7, p. G-21: There are no references to individual unit evacuation routes. Correction Provide diagrams of the evacuation routes from each unit.	Added diagrams of evacuation routes from each unit to Attachment G-3.
37.1	Exhibit I-3, PR, p. I-5: The permit application does not explain how the final performance standards will be incorporated into the closure plan, such as by a by permit modification request or some other process in which DEQ has approval authority. Correction Explain how the final performance standards will be incorporated into the closure plan.	A footnote was added to Exhibit I-3 stating "The closure plan will be modified, in accordance with IDAPA 51.01.05.008 and 40 CFR 264.112(c), to include the HWMA unit specific final performance closure standards prior to implementation of the closure plan."
38.1	Exhibit I-3, VSI, p. I-5: There are no specific visual site inspection requirements pertaining to the individual units (that is, RSWF, EFF, HFEF, SCMS, and SSB). Correction Provide specific visual site inspection requirements pertaining to the individual units, or indicate that these will be provided to DEQ prior to initiating closure. Provide the procedure for performing the visual	A footnote was added to Exhibit I-3 stating "HWMA unit specific visual site inspection requirements and the visual inspection procedures will be included in the closure plan that will be modified in accordance with IDAPA 51.01.05.008 and 40 CFR 264.112(c)."

	inspection, including how the results of the inspection will be recorded, such as on the radiological survey forms typically used along with photographs of each area, or indicate that the procedures will be provided in a sampling and analysis plan prior to initiating closure.	
38.2	Exhibits I-4 and I-5, F&ID, p. I-6 and I-7: The problem with using a sample of a rinse solution as decontamination verification is dilution concerns, even if decontaminating non-porous surfaces. The application does not include a basis for using rinsate sampling for proving clean closure. Correction In order to use the rinsate sampling process to provide clean closure, it must include evaluation of the chemical decontamination methods chosen, followed by triple rinsing. Given sufficient evidence that the chemical decontamination was performed as required and the solubility of the waste constituents was sufficient to ensure that the waste constituents on the non-porous surface would be removed with the wash solution, an analysis of the final rinse solution to detect hazardous constituents might be appropriate. Include a discussion/evaluation of how cleaning methods and the surfactants chosen are suitable for the contaminants. If detergent washing and water rinsing are selected, the closure plan should show that the detergent solution will remove the contaminants of concern. The independent professional engineer would have to certify the decontamination methods used and that the hazardous waste residues have been removed to the maximum extent practicable. When using chemical methods, a triple wash/rinse procedure for the entire surface of the unit and associated structures should be followed to ensure adequate decontamination. While the wash solution may be site-specific, the wash and rinse steps mentioned below should be performed at least three times. (1) Physically remove all gross contamination. (2) Wash the surface(s) with a detergent solution. This may be accompanied by the use of a brush made of inert material, a steam cleaner, or high pressure washer to remove any particles or surface film. (3) Rinse thoroughly with water. Each step that involves washing the surface should be followed by rinsing the surface thoroughly with water. This triple wash/rinse method is typically used when decontaminating a container storage pad, walls, secondary containment for a tank, etc. All rinsate should be collected, handled, and disposed of as a hazardous waste, unless sampling results demonstrate that the rinsate is non-hazardous.	A footnote was added to Exhibit I-4 stating "Rinsate and associated sample/analysis details will be included in the closure plan that will be modified in accordance with IDAPA 51.01.05.008 and 40 CFR 264.112(c)." In addition, the information contained in the original Exhibit I-5 was added to Exhibit I-4 and the original Exhibit I-5 was deleted.

	Depending on the potential future use of the unit, analytical data may be required to demonstrate that adequate decontamination has been achieved. The EPA regional screening limits might be an appropriate decontamination standard for the final rinse water. The secondary containment may be decontaminated analogous to a clean debris surface. For purposes of meeting a clean debris surface, a document describing the decontamination approach (i.e., water washing, spraying, mopping, etc.) and a statistical basis for evaluation for a clean debris surface must be submitted to DEQ prior to the initiation of decontamination activities. This does not preclude normal decontamination efforts implemented for work area control and safety concerns from being implemented prior to submittal of the document. A record of decontamination and evaluation efforts for the purpose of meeting a clean debris surface must be maintained, and, along with photographs, must be submitted to the PE certifying closure. Alternatively, the secondary containment may be removed in accord or subjected to confirmatory surface wipe sampling.	
38.3	Exhibit 1-6, p. 1-9: The standards are less than or equal (:'S), not less than(<). Also, naked eye is not a sufficient visual examination for the bottom of the liners at RSWF. Perhaps video or camera would be more appropriate. Rather than the Estimated Quantitation Limit (EQL), there must be a standard that determines the action levels, such as the EPA regional screening levels. Correction Correct Exhibit 1-6 by replacing the (<) with (≤). If visual examination is going to be used to evaluate the bottoms of the liners and the liner pits after the liners have been removed, the examination must be done with a device that can see the surface from a distance of at least as close as 10-20 inches. For analytical action levels, the comparison must be to a published standard, such as the EPA regional screening levels.	Replaced the (<) with (≤) and the (>) with (≥). Added camera to analytical method column for visual inspections in Exhibit I-5. Deleted "EQL" and replaced with "Action Levels", throughout closure plan.
38.4	I-7(a), p. 1-11: Visual examination of the tank surface areas is not sufficient to determine if the closure performance standards have been met. Correction The closure plan must provide for wipe samples or something equivalent.	Section I-7(a) was revised to address visual examination of tank surface areas.
38.5	1-8, p. 1-11: The permit application does not provide the basis for using the presence or absence of radioactive contamination as a closure performance standard. Correction Provide the basis for using the presence or absence of radioactive	In Section I-8 deleted the paragraph that discussed radioactive contamination and added the following paragraph: "In the future, as the actual closure of the RSWF is considered, this closure plan will be modified to reflect any information or condition that has changed or occurred and may precipitate different closure options and to address HWMA unit specific clean closure performance standards.

	contamination, as indicated by counts above background, as a closure performance standard. If there are records showing previous DEQ approval of this, provide that documentation.	This closure plan will be modified in accordance with IDAPA 58.01.05.008 and 40 CFR 264.112(c)."
39.1	1-3, p. 1-10: Indicate that partial closures may (and have) be performed, including the closure of the HFEF Waste Characterization Chamber, the EFF East Room, and the EFF West Room. Identify all previous closures at the facility and provide the dates that the closure certifications were approved by DEQ. Identify all previous partial closures at the facility and the dates that the PE certified the closure.	Revised Section I-3 to include the partial closures performed at MFC.
40.1	Other deficiencies and corrections: (a) 1-1, p. 1-2, item 4 (editorial): The word "operating" is missing from item (4), first sentence, p. I-2. Change to "operating records." (b) Exhibit I-3, VSI, p. I-5 (editorial): The sentence in the fourth row, second column ends in "(deposits or". Complete sentence. (c) Exhibit I-5, F&ID, p. I-7, (editorial): This table is almost a duplicate of Exhibit I-4. Perhaps they can be combined. (d) I-9, p. I-11 (editorial): Change "groundwater" to "groundwater contamination." (e) I-11, p.I-14 (editorial): Use the following address: Director, c/o Hazardous Waste Program Manager Idaho Department of Environmental Quality 1410 North Hilton Boise, ID 83706	(a) Revised closure plan. Corrected editorial. (b) The phrase "(deposits or staining)" should now appear correctly. (c) Combined Exhibits I-4 and I-5, as suggested. (d) Added "contamination," as requested. (e) Revised address, as requested.

Application Certification

OPERATOR CERTIFICATION STATEMENT

IDAPA 58.01.05.012 and 40 CFR 270.11(d) and 270.30(k)

Subject: Contract No. DE-AC07-05ID14517 – Materials and Fuels Complex Hazardous Waste Management Act/Resource Conservation and Recovery Act Storage and Treatment Permit Reapplication, Environmental Protection Agency Number ID4890008952

The undersigned responsible official certifies, as required by *Idaho Administrative Procedures Act* (IDAPA) 58.01.05.012 and 40 *Code of Federal Regulations* (CFR) 270.11(d) and 270.30(k), as follows:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to 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.

Contractor Operator Signature

Carolyn S. Mascareñas 4-1-15

Carolyn S. Mascareñas, Director, ESH&Q Date

Battelle Energy Alliance, LLC

OWNER CERTIFICATION STATEMENT

IDAPA 58.01.05.012 and 40 CFR 270.11(d) and 270.30(k)

Subject: Contract No. DE-AC07-05ID14517 –Materials and Fuels Complex Hazardous Waste Management Act/Resource Conservation and Recovery Act Storage and Treatment Permit Reapplication, Environmental Protection Agency Number ID4890008952

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I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to 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.

Owner Signature

4/7/15

Richard B. Provencher, Manager
Department of Energy Idaho Operations Office

Date

Application
Completion Checklist

PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
A. PART A APPLICATION		Y	Y	Attachment 1, Part A Application (1) Site Identification Form and (2) Hazardous Waste Permit Information Form	(1) Pages 1-4 (2) Pages 1-22
B. MFC FACILITY DESCRIPTION		Y	Y	Attachment 1, MFC Facility Description	B-1
B-1	MFC Site Description	Y	Y	Attachment 1	B-1
B-2	MFC HWMA Unit Overview	Y	Y	Attachment 1	B-2
B-2(a)	HW/MW Received/Managed and Services Provided at MFC HWMA Units	Y	Y	Attachment 1	B-2
B-3	MFC HWMA Unit Facility Descriptions	Y	Y	Attachment 1	B-6
B-3(a)	Experimental Fuels Facility (EFF)—Building 794	Y	Y	Attachment 1	B-6
B-3(b)	Hot Fuel Examination Facility (HFEF)—Building 785	Y	Y	Attachment 1	B-7
B-3(b)(1)	HFEF General Description	Y	Y	Attachment 1	B-8
B-3(b)(2)	High Bay Area (HBA)	Y	Y	Attachment 1	B-9
B-3(b)(3)	Hot Repair Area (HRA)	Y	Y	Attachment 1	B-9
B-3(b)(4)	Decontamination Cell/Spray Chamber (DC)	Y	Y	Attachment 1	B-9
B-3(b)(5)	Waste Characterization Chamber (WCC)/Transfer Room (TR)	Y	Y	Attachment 1	B-10
B-3(b)(6)	Preparation Room (PR)	Y	Y	Attachment 1	B-11
B-3(b)(7)	Truck Lock (Non-HWMA)	Y	Y	Attachment 1	B-11
B-3(b)(8)	Casks/Transporter Staging Area (Non-HWMA)	Y	Y	Attachment 1	B-12
B-3(c)	Radioactive Scrap and Waste Facility (RSWF) - Building 771	Y	Y	Attachment 1	B-12
B-3(d)	Sodium Components Maintenance Shop (SCMS)—Buildings 793, 793C, 793G	Y	Y	Attachment 1	B-14
B-3(d)(1)	SCMS Building 793—High Bay	Y	Y	Attachment 1	B-15
B-3(d)(2)	SCMS Building 793—Low Bay	Y	Y	Attachment 1	B-16
B-3(d)(3)	SCMS Building 793C	Y	Y	Attachment 1	B-16

*Shaded areas are not applicable

PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
B-3(d)(4)	SCMS Building 793G	Y	Y	Attachment 1	B-17
B-3(e)	Sodium Storage Building (SSB)—Building 703	Y	Y	Attachment 1	B-17
B-4	Topographical Map	Y	Y	Attachment 1	B-18
B-4(a)	General Requirements	Y	Y	Attachment 1	B-18
	Additional Requirements for Land Disposal Facilities				
B-5	Location	Y	Y	Attachment 1	B-19
B-5(a)	Seismic Standard	Y	Y	Attachment 1	B-19
B-5(b)	Floodplain Standard	Y	Y	Attachment 1	B-19
	Demonstration of Compliance				
	Engineering Analysis for Units in 100-year Floodplain				
	Plan for Future Compliance With Floodplain Standard				
	Waiver for Land Storage and Disposal Facilities				
B-6	Traffic Information	Y	Y	Attachment 1	B-19
C. WASTE ANALYSIS PLAN		Y	Y	Attachment 2, Waste Analysis Plan	C-1
C-1	HW/MW Chemical and Physical Analysis Methods and Requirements	Y	Y	Attachment 2	C-1
C-1(a)	HW/MW Received/Managed and Services Provided	Y	Y	Attachment 2	C-1
C-1(b)	Containerized HW/MW and HW/MW Debris	Y	Y	Attachment 2	C-1
C-1(c)	HW/MW in Tank Systems	Y	Y	Attachment 2	C-2
	Waste in Piles				
	Landfilled Wastes				
	Wastes Incinerated and Wastes Used in Performance Tests				
	Wastes to be Land Treated				
	Wastes in Miscellaneous Treatment Units				

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PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST*
INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015
EPA ID. No. 4890008952

Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
	Wastes in Boilers and Industrial Furnaces				
	Wastes on Drip Pads				
C-2	Waste Analysis Plan	Y	Y	Attachment 2	C-3
C-2(a)	Waste Acceptance Criteria	Y	Y	Attachment 2	C-3
C-2(b)	HW/MW Analysis Parameters and Rationale	Y	Y	Attachment 2	C-9
C-2(c)	HW/MW Analysis Test Methods	Y	Y	Attachment 2	C-9
C-2(c)(1)	Test Methods for Debris	Y	Y	Attachment 2	C-12
C-2(d)	HW/MW Sampling Methods	Y	Y	Attachment 2	C-12
C-2(e)	Quality Assurance/Quality Control	Y	Y	Attachment 2	C-13
C-2(e)(1)	Field Control Samples	Y	Y	Attachment 2	C-13
C-2(e)(2)	Laboratory QA/QC	Y	Y	Attachment 2	C-13
C-2(e)(3)	Data Validation	Y	Y	Attachment 2	C-13
C-2(e)(4)	Corrective Action	Y	Y	Attachment 2	C-14
C-2(f)	Frequency of Analysis	Y	Y	Attachment 2	C-14
C-2(g)	Requirements for HW/MW Received from Off-Site Generators/Owners	Y	Y	Attachment 2	C-15
C-2(h)	Requirements for Ignitable, Reactive, or Incompatible HW/MW	Y	Y	Attachment 2	C-15
	Additional Requirements Pertaining to BIF Facilities				
C-3	Requirements Pertaining to LDR	Y	Y	Attachment 2	C-16
C-3(a)	HW/MW LDR-Related Parameters and Rationale	Y	Y	Attachment 2	C-16
C-3(b)	HW/MW LDR-Related Analysis Test Methods	Y	Y	Attachment 2	C-17
C-3(c)	HW/MW LDR-Related Sampling Methods	Y	Y	Attachment 2	C-17
C-3(d)	HW/MW LDR-Related Frequency of Analysis	Y	Y	Attachment 2	C-17
C-4	MFC HWMA Units Subparts AA, BB and CC Applicability	Y	Y	Attachment 2	C-17

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PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
C-4(a)	40 CFR 264 Subpart AA Applicability	Y	Y	Attachment 2	C-17
C-4(b)	40 CFR 264 Subpart BB Applicability	Y	Y	Attachment 2	C-18
C-4(c)	40 CFR 264 Subpart CC Applicability	Y	Y	Attachment 2	C-18
	Notification and Certification Requirements for Land Disposal Facilities				
	Notification and Certification Requirements for Recyclable Materials				
	Requirements Pertaining to the Storage of Restricted Wastes				
	Exemptions, Extensions, and Variances to Land Disposal Restrictions				
D. PROCESS DESCRIPTION		Y	Y	Attachment 1, MFC Process Description	D-1
D-1	HWMA Unit Process Description Overview	Y	Y	Attachment 1	D-1
D-1(a)	Basic HW/MW Service Descriptions	Y	Y	Attachment 1	D-3
D-1(a)(1)	Storage of HW/MW	Y	Y	Attachment 1	D-3
D-1(a)(2)	Verification Sampling of HW/MW	Y	Y	Attachment 1	D-5
D-1(a)(3)	Repackaging HW/MW	Y	Y	Attachment 1	D-5
D-1(a)(4)	Absorption of Free Liquids in HW/MW	Y	Y	Attachment 1	D-6
D-1(a)(5)	Neutralization of Corrosive HW/MW	Y	Y	Attachment 1	D-7
D-1(a)(6)	Solidification/Stabilization of HW/MW	Y	Y	Attachment 1	D-8
D-1(a)(7)	Deactivating Ignitable and Reactive HW/MW	Y	Y	Attachment 1	D-8
D-1(a)(8)	Heating and Melting for Repackaging	Y	Y	Attachment 1	D-9
D-1(b)	Flow Path of HW/MW Services	Y	Y	Attachment 1	D-9
D-1(b)(1)	HW/MW Generator Specifications	Y	Y	Attachment 1	D-9
D-1(b)(2)	HWMA Unit Approval to Accept HW/MW	Y	Y	Attachment 1	D-10
D-1(b)(3)	HW/MW Receipt at HWMA Units	Y	Y	Attachment 1	D-10
D-1(b)(4)	Transfer of HW/MW to Storage	Y	Y	Attachment 1	D-10
D-1(b)(5)	Verification, Repackaging, and/or Container/Tank or Debris Treatment	Y	Y	Attachment 1	D-10

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Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
D-1(b)(6)	Transfer of HW/MW to Storage Following Verification, Repackaging, and/or Container, Tank or Debris Treatment	Y	Y	Attachment 1	D-10
D-1(b)(7)	HW/MW Shipment to Generator or Disposal Facility	Y	Y	Attachment 1	D-11
D-2	Containers and Container Management Practices	Y	Y	Attachment 1	D-11
D-2(a)	Containers With and Without Free Liquids	Y	Y	Attachment 1	D-14
D-2(a)(1)	Description of Containers	Y	Y	Attachment 1	D-14
D-2(a)(2)	Container Management Practices	Y	Y	Attachment 1	D-15
D-2(a)(2)(a)	Acceptance Criteria	Y	Y	Attachment 1	D-15
D-2(a)(2)(b)	Labeling	Y	Y	Attachment 1	D-15
D-2(a)(2)(c)	Handling	Y	Y	Attachment 1	D-16
D-2(a)(2)(d)	Container Integrity	Y	Y	Attachment 1	D-16
D-2(a)(2)(e)	Waste Placement	Y	Y	Attachment 1	D-16
D-2(a)(2)(f)	Maintenance during Storage	Y	Y	Attachment 1	D-17
D-2(a)(2)(g)	HWMA Unit Decontamination/Cleaning Between Waste Containers	Y	Y	Attachment 1	D-18
D-2(a)(2)(h)	Inventory and Accountability	Y	Y	Attachment 1	D-18
D-2(a)(2)(i)	Container Treatment	Y	Y	Attachment 1	D-19
D-2(a)(2)(j)	Container Management during Verification, Repackaging, and/or Container Treatment	Y	Y	Attachment 1	D-21
D-2(a)(3)	Secondary Containment System Design and Operation	Y	Y	Attachment 1	D-23
D-2(a)(3)(a)	Requirement for the Base or Liner to Contain Liquids	Y	Y	Attachment 1	D-24
D-2(a)(3)(b)	Containment System Drainage	Y	Y	Attachment 1	D-26
D-2(a)(3)(c)	Containment System Capacity	Y	Y	Attachment 1	D-26
D-2(a)(3)(d)	Control of Run-On	Y	Y	Attachment 1	D-28
D-2(a)(3)(e)	Removal of Liquids From Containment Systems	Y	Y	Attachment 1	D-28

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PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST*
INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015
EPA ID. No. 4890008952

Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
D-2(a)(4)	Test for Free Liquids	Y	Y	Attachment 1	D-29
D-2(a)(5)	Container (w/o free liquid) Storage Drainage	Y	Y	Attachment 1	D-29
D-3	Basic Treatment System Description	Y	Y	Attachment 1	D-29
D-3(a)	SCMS Treatment System Descriptions	Y	Y	Attachment 1	D-30
D-3(a)(1)	Water Wash System	Y	Y	Attachment 1	D-31
D-3(a)(2)	Scrubber Water System	Y	Y	Attachment 1	D-34
D-3(a)(3)	Carbonation System	Y	Y	Attachment 1	D-36
D-3(a)(4)	Solidification System	Y	Y	Attachment 1	D-37
D-3(a)(5)	Support System	Y	Y	Attachment 1	D-38
D-3(a)(5)(a)	Ventilation System	Y	Y	Attachment 1	D-39
D-3(a)(6)	Service Water System	Y	Y	Attachment 1	D-40
D-3(a)(7)	CO2 System	Y	Y	Attachment 1	D-40
D-3(a)(8)	Steam and Condensate System	Y	Y	Attachment 1	D-41
D-3(a)(9)	Compressed Air System	Y	Y	Attachment 1	D-41
D-3(a)(10)	Nitrogen System	Y	Y	Attachment 1	D-41
D-3(a)(11)	Fire Suppression System	Y	Y	Attachment 1	D-42
D-4	Tank Systems	Y	Y	Attachment 1	D-43
D-4(a)	SCMS Existing Tank Systems	Y	Y	Attachment 1	D-43
D-4(a)(1)	Assessment of Existing Tank System Integrity	Y	Y	Attachment 1	D-44
D-4(a)(2)	External Corrosion Practices	Y	Y	Attachment 1	D-49
D-4(b)	New Tank Systems	Y	Y	Attachment 1	D-50
D-4(b)(1)	Assessment of New Tank System Integrity	Y	Y	Attachment 1	D-50
D-4(b)(2)	External Corrosion Protection	Y	Y	Attachment 1	D-51

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PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
D-4(b)(3)	Description of Tank System Installation and Testing Plans and Procedures	Y	Y	Attachment 1	D-52
D-4(b)(4)	Dimensions and Capacity of Each Tank	Y	Y	Attachment 1	D-53
D-4(b)(4)(a)	Water Wash System—Water Wash Vessel	Y	Y	Attachment 1	D-53
D-4(b)(4)(b)	Scrubber Water System—Scrubber Water Tank	Y	Y	Attachment 1	D-53
D-4(b)(4)(c)	Carbonation System—Carbonation Vessel	Y	Y	Attachment 1	D-53
D-4(b)(5)	Description of Feed Systems, Safety Cutoff, Bypass Systems, and Pressure Controls	Y	Y	Attachment 1	D-55
D-4(b)(5)(a)	Water Wash System	Y	Y	Attachment 1	D-53
D-4(b)(5)(b)	Scrubber Water System	Y	Y	Attachment 1	D-54
D-4(b)(5)(c)	Carbonation System	Y	Y	Attachment 1	D-55
D-4(b)(6)	Diagram of Piping, instrumentation, and Process Flow	Y	Y	Attachment 1	D-55
D-4(b)(7)	Containment and Detection of Releases	Y	Y	Attachment 1	D-56
D-4(b)(8)	Plans and Description of the Design, Construction, and Operation of the Secondary Containment System	Y	Y	Attachment 1	D-56
D-4(b)(8)(a)	Tank Age Determination	Y	Y	Attachment 1	D-57
D-4(b)(8)(b)	Requirements for Secondary Containment and Leak Detection	Y	Y	Attachment 1	D-57
D-4(b)(8)(c)	Requirements for External Liner, Vault, Double Walled Tank or Equivalent Device	Y	Y	Attachment 1	D-60
D-4(b)(8)(d)	Secondary Containment and Leak Detection Requirements for Ancillary Equipment	Y	Y	Attachment 1	D-60
D-4(b)(8)(e)	Requirements for Tank Systems Until Secondary Containment is Implemented				
D-4(b)(8)(f)	Variance From Secondary Containment Requirements				
D-4(b)(8)(g)	Variance Based on a Demonstration of Equivalent Protection of Groundwater and Surface Water				
D-4(b)(8)(h)	Variance Based on a Demonstration of No Substantial Present or Potential Hazard				

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PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
D-4(b)(8)(i)	Exemption Based on No Free Liquids and Location Inside a Building				
D-4(b)(9)	Controls and Practices to Prevent Spills and Overflows	Y	Y	Attachment 1	D-60
D-4(b)(9)(a)	Scrubber Water System	Y	Y	Attachment 1	D-61
D-4(b)(9)(b)	Carbonation System	Y	Y	Attachment 1	D-61
D-5	Miscellaneous Units	Y	Y	Attachment 1	D-62
D-5(a)	Description of Miscellaneous Units	Y	Y	Attachment 1	D-62
D-5(b)	Environmental Performance Standards	Y	Y	Attachment 1	D-62
D-5(c)	Miscellaneous Unit Waste	Y	Y	Attachment 1	D-63
D-5(d)	Containment System	Y	Y	Attachment 1	D-66
D-5(d)(1)	Carbon Steel Installed Liners	Y	Y	Attachment 1	D-67
D-5(d)(2)	Inner Containers	Y	Y	Attachment 1	D-69
D-5(d)(3)	Liner Radiation Shielding	Y	Y	Attachment 1	D-72
D-5(d)(4)	Cathodic Protection System	Y	Y	Attachment 1	D-72
D-5(e)	Site Air Conditions	Y	Y	Attachment 1	D-74
D-5(f)	Prevention of Air Emissions	Y	Y	Attachment 1	D-75
D-5(g)	Operating Standards	Y	Y	Attachment 1	D-75
D-5(g)(1)	Inner Container Handling	Y	Y	Attachment 1	D-77
D-5(g)(2)	Inner Container Transport	Y	Y	Attachment 1	D-77
D-5(g)(3)	Inner Container Loading and Damage Prevention	Y	Y	Attachment 1	D-78
D-5(g)(4)	Liner Removal	Y	Y	Attachment 1	D-79
D-5(h)	Site Hydrogeologic Conditions	Y	Y	Attachment 1	D-79
D-5(i)	Site Precipitation	Y	Y	Attachment 1	D-81
D-5(j)	Ground Water Usage	Y	Y	Attachment 1	D-81

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PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
D-5(k)	Surface Waters	Y	Y	Attachment 1	D-81
D-5(l)	Area Land Use	Y	Y	Attachment 1	D-81
D-5(m)	Migration of Waste Constituents	Y	Y	Attachment 1	D-82
D-5(n)	Evaluation of Risk to Human Health and the Environment	Y	Y	Attachment 1	D-86
E. GROUNDWATER MONITORING					
F. PROCEDURES TO PREVENT HAZARDS		Y	Y	Attachment 3, Security	F-1
F-1	Security	Y	Y	Attachment 3	F-1
F-1(a)	Security Procedures and Equipment	Y	Y	Attachment 3	F-1
F-1(a)(1)	Twenty-four Hour Surveillance System	Y	Y	Attachment 3	F-2
F-1(a)(2)	Barrier and Means to Control Entry	Y	Y	Attachment 3	F-2
F-1(a)(2)(a)	Barriers	Y	Y	Attachment 3	F-2
F-1(a)(2)(b)	Means to Control Entry	Y	Y	Attachment 3	F-2
F-1(a)(3)	Warning Signs	Y	Y	Attachment 3	F-3
	Waiver				
	Injury to Intruder				
	Violation Caused by Intruder				
F-2	Inspection Schedule	Y	Y	Attachment 4, Inspections	F-1
F-2(a)	General Inspection Requirements	Y	Y	Attachment 4	F-2
F-2(a)(1)	Types of Problems	Y	Y	Attachment 4	F-3
F-2(a)(2)	Frequency of Inspections	Y	Y	Attachment 4	F-4
F-2(a)(3)	Schedule of Remedial Action				
F-2(b)	Specific Process Inspection Requirements	Y	Y	Attachment 4	F-4
F-2(b)(1)	Container Inspection	Y	Y	Attachment 4	F-4

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PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
F-2(b)(1)(a)	High Radiation Container Inspection	Y	Y	Attachment 4	F-4
F-2(b)(1)(b)	Hot Fuel Examination Facility Decontamination Cell Inspections	Y	Y	Attachment 4	F-5
F-2(b)(2)	Tank System Inspections	Y	Y	Attachment 4	F-6
F-2(b)(2)(a)	Certification for Major Tank Repairs	Y	Y	Attachment 4	F-6
F-2(b)(2)(b)	Tank System External Corrosion and Releases	Y	Y	Attachment 4	F-6
F-2(b)(2)(c)	Tank System Construction Materials and Surrounding Area	Y	Y	Attachment 4	F-6
F-2(b)(2)(d)	Tank System Overfilling Control Equipment	Y	Y	Attachment 4	F-6
F-2(b)(2)(e)	Tank System Monitoring and Leak Detection Equipment	Y	Y	Attachment 4	F-8
	Waste Pile Inspection				
	Surface Impoundment Inspection				
	Incinerator Inspection				
	Landfill Inspection				
	Land Treatment Facility Inspection				
F-2(b)(3)	Miscellaneous Unit Inspections	Y	Y	Attachment 4	F-8
	Boilers and Industrial Furnaces (BIF) Inspection				
	Containment Building Inspection				
	Drip Pad Inspection				
F-3	Prevention and Preparedness	Y	Y	Attachment 6, Procedures to Prevent Hazards	F-1
F-3(a)	Equipment Requirements	Y	Y	Attachment 6	F-1
F-3(a)(1)	Internal Communications	Y	Y	Attachment 6	F-1
F-3(a)(2)	External Communications	Y	Y	Attachment 6	F-1
F-3(a)(3)	Emergency Equipment	Y	Y	Attachment 6	F-1
F-3(a)(4)	Water for Fire Control	Y	Y	Attachment 6	F-2

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PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
F-3(a)(5)	Access to Communication or Alarm System	Y	Y	Attachment 6	F-2
F-3(b)	Aisle Space Requirements	Y	Y	Attachment 6	F-2
F-4	Prevention Procedures, Structures, and Equipment	Y	Y	Attachment 6	F-3
F-4(a)	Loading and Unloading Operations	Y	Y	Attachment 6	F-3
F-4(b)	Run-On and Run-Off	Y	Y	Attachment 6	F-3
F-4(b)(1)	Indoor HWMA Units	Y	Y	Attachment 6	F-3
F-4(b)(2)	Outdoor HWMA Unit (RSWF)	Y	Y	Attachment 6	F-3
F-4(c)	Water Supplies	Y	Y	Attachment 6	F-4
F-4(d)	Equipment and Power Failure	Y	Y	Attachment 6	F-4
F-4(d)(1)	Equipment and Power Failure at RSWF	Y	Y	Attachment 6	F-5
F-4(e)	Personnel Protective Equipment	Y	Y	Attachment 6	F-5
F-4(f)	Releases to the Atmosphere	Y	Y	Attachment 6	F-5
F-5	Ignitable, Reactive, and Incompatible Wastes	Y	Y	Attachment 6	F-6
F-5(a)	Prevent Ignition or Reaction of Ignitable or Reactive Waste	Y	Y	Attachment 6	F-7
F-5(b)	General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste	Y	Y	Attachment 6	F-7
F-5(c)	Management of Ignitable or Reactive Waste in Containers	Y	Y	Attachment 6	F-8
F-5(d)	Management of Incompatible Waste in Containers	Y	Y	Attachment 6	F-8
F-5(e)	Management of Ignitable or Reactive Waste in Tank Systems	Y	Y	Attachment 6	F-9
F-5(f)	Management of Incompatible Waste in Tank Systems	Y	Y	Attachment 6	F-9
F-5(g)	Management of Ignitable or Reactive Wastes Placed in Waste Piles				
F-5(h)	Management of Incompatible Wastes Placed in Waste Piles				
F-5(i)	Management of Ignitable or Reactive Wastes Placed in Surface Impoundments				
F-5(j)	Management of Incompatible Wastes Placed in Surface Impoundments				

*Shaded areas are not applicable

PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
F-5(k)	Management of Ignitable or Reactive Wastes Placed in Landfills				
F-5(l)	Management of Incompatible Wastes Placed in Landfills				
F-5(m)	Management of Ignitable or Reactive Wastes Placed in Land Treatment Units				
F-5(n)	Management of Incompatible Wastes Placed in Land Treatment Units				
F-5(o)	Management of Incompatible Wastes Placed in Containment Buildings				
G.	***CONTINGENCY PLAN***	Y	Y	Attachment 7 – Contingency Plan	G-1
G-1	General Information	Y	Y	Attachment 7	G-1
G-1(a)	Purpose, Implementation, and Content	Y	Y	Attachment 7	G-1
G-1(b)	Copies and Amendments	Y	Y	Attachment 7	G-2
G-2	Emergency Action Manager List	Y	Y	Attachment 7	G-3
G-2(a)	Emergency Action Manager Duties	Y	Y	Attachment 7	G-3
G-3	Emergency-Response Procedures	Y	Y	Attachment 7	G-6
G-3(a)	Contingency Plan Implementation	Y	Y	Attachment 7	G-6
G-3(b)	Alert	Y	Y	Attachment 7	G-8
G-3(c)	Site Area Emergency	Y	Y	Attachment 7	G-8
G-3(d)	General Emergency	Y	Y	Attachment 7	G-8
G-3(e)	Emergency Signals	Y	Y	Attachment 7	G-8
G-4	Notifications and Reporting	Y	Y	Attachment 7	G-11
G-4(a)	Notification and Reporting—General	Y	Y	Attachment 7	G-11
G-4(b)	Notifications and Reports—Non-compliance	Y	Y	Attachment 7	G-13
G-4(c)	Notifications and Reports—Tank Systems	Y	Y	Attachment 7	G-14
G-4(d)	Identification of Hazardous Materials	Y	Y	Attachment 7	G-15
G-4(e)	Assessment	Y	Y	Attachment 7	G-15

*Shaded areas are not applicable

PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952				
Information Requirement	Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
G-4(f) Control Procedures	Y	Y	Attachment 7	G-16
G-4(f)(1) Fire Response	Y	Y	Attachment 7	G-16
G-4(f)(2) HW/MW Release Response	Y	Y	Attachment 7	G-16
G-4(f)(2)(a) HW/MW Release Cleanup and Decontamination Verification	Y	Y	Attachment 7	G-17
G-4(g) Prevention of Recurrence or Spread of Fires, Explosions, or Releases	Y	Y	Attachment 7	G-17
G-4(h) Storage and Treatment of Released Material	Y	Y	Attachment 7	G-18
G-4(i) Post-Emergency Equipment Maintenance	Y	Y	Attachment 7	G-18
G-4(j) Container Releases and Leakage	Y	Y	Attachment 7	G-19
G-4(k) Tank Releases and Leakage	Y	Y	Attachment 7	G-19
G-4(k)(1) Cessation of Use and Removal of Contents from SCMS Tanks	Y	Y	Attachment 7	G-20
G-4(k)(1)(a) Na/NaK or Hydroxide Release/Leak From 90 Gal Water Wash Vessel (WWV)	Y	Y	Attachment 7	G-20
G-4(k)(1)(b) Hydroxide Release/Leak From 30 Gal Carbonation Vessel	Y	Y	Attachment 7	G-21
G-4(k)(1)(c) Hydroxide Release/Leak From 300 Gal Scrubber Water Tank	Y	Y	Attachment 7	G-22
G-4(k)(2) Containment of Visible Releases to the Environment	Y	Y	Attachment 7	G-22
G-4(k)(3) Certification of Major Repairs	Y	Y	Attachment 7	G-23
G-4(l) Surface Impoundments Spills and Leakage				
G-4(m) Waste Pile Spills and Leakage				
G-4(n) Incineration				
G-4(o) Landfill Leakage				
G-4(p) Land Treatment Spills and Leakage				
G-5 Emergency Equipment	Y	Y	Attachment 7	G-23
G-6 Coordination Agreements	Y	Y	Attachment 7	G-23
G-7 Evacuation Plan	Y	Y	Attachment 7	G-24

*Shaded areas are not applicable

PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
H.	***PERSONNEL TRAINING***	Y	Y	Attachment 5 - Training	H-1
H-1	Training Director	Y	Y	Attachment 5	H-1
H-2	Training Program Design	Y	Y	Attachment 5	H-2
H-3	Training Program Content	Y	Y	Attachment 5	H-3
H-3(a)	Classroom/Computer-Based Instruction	Y	Y	Attachment 5	H-3
H-3(b)	On-the-Job Training	Y	Y	Attachment 5	H-3
H-4	Training Program Implementation	Y	Y	Attachment 5	H-3
H-4(a)	Job Titles/Job Descriptions	Y	Y	Attachment 5	H-3
H-4(b)	Required Training and Relevance to Job Positions	Y	Y	Attachment 5	H-4
H-4(c)	Completion of Required Training	Y	Y	Attachment 5	H-4
H-5	Training Records Management	Y	Y	Attachment 5	H-5
I.	***CLOSURE PLANS***	Y	Y	Attachment 8 – Closure Plan	I-1
I-1	Closure Plan Overview	Y	Y	Attachment 8	I-1
I-2	Closure Performance Standard	Y	Y	Attachment 8	I-7
I-3	Partial Closure Activities	Y	Y	Attachment 8	I-9
I-4	Maximum Waste Inventory	Y	Y	Attachment 8	I-10
I-5	Disposal or Decontamination of Equipment, Structures, and Soils	Y	Y	Attachment 8	I-10
	Closure of Disposal Units				
I-6	Closure of Container Storage/Process Areas	Y	Y	Attachment 8	I-10
I-7	Closure of Tanks	Y	Y	Attachment 8	I-10
I-7(a)	Closure of SCMS Tanks/Tank Systems and Ancillary Equipment	Y	Y	Attachment 8	I-10
	Closure of Waste Piles				
	Closure of Surface Impoundments				

*Shaded areas are not applicable

PERMIT APPLICATION COMPLETENESS/TECHNICAL EVALUATION CHECKLIST* INL HWMA/RCRA Permit Application, MFC HWMA Units, April 2015 EPA ID. No. 4890008952					
Information Requirement		Complete (Y or N)	Technically Adequate (Y or N)	Tab	Page
	Closure of Incinerators				
	Closure of Landfills				
	Closure of Land Treatment Facilities				
	Continuance of Treatment				
	Vegetative Cover				
I-8	Closure of Miscellaneous Unit	Y	Y	Attachment 8	I-11
	Closure of Boilers and Industrial Furnaces				
	Closure of Containment Buildings				
I-9	Ancillary Closure Activities	Y	Y	Attachment 8	I-11
I-10	Schedule for Closure and Notification of Closure	Y	Y	Attachment 8	I-11
I-10(a)	Extensions for Closure Time	Y	Y	Attachment 8	I-13
I-11	Certification of Closure	Y	Y	Attachment 8	I-13
I-12	Post-Closure Plan	Y	Y	Attachment 8	I-13
I-13	Post-Closure Notices	Y	Y	Attachment 8	I-13
I-14	Closure Cost Estimate	Y	Y	Attachment 8	I-13
I-15	Financial Assurance Mechanism for Closure	Y	Y	Attachment 8	I-13
I-16	Post-Closure Cost Estimate	Y	Y	Attachment 8	I-14
I-17	Financial Assurance Mechanism for Post-Closure Care	Y	Y	Attachment 8	I-14
I-18	Liability Requirements	Y	Y	Attachment 8	I-14
I-19	Use of State Required Mechanism and State Assumption of Responsibility	Y	Y	Attachment 8	I-14
J. CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS		Y	Y	Solid Waste Management Units	J-1
K. OTHER FEDERAL LAWS		Y	Y	Other Federal Laws	K-1
L. PART B CERTIFICATION		Y	Y	Certification	NA

*Shaded areas are not applicable

ACRONYMS & ABBREVIATIONS

AISI	American Iron and Steel Institute
AL	Analytical Laboratory
AMWTF	Advanced Mixed Waste Treatment Facility
ANL-E	Argonne National Laboratory - East
ANS	American Nuclear Society
ANSI	American National Standards Institute
ATR	Advanced Test Reactor
CAB	Counts above Background
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CH-TRU	Contact-handled Transuranic
CITRC	Critical Infrastructure Test Range Complex
CO_2	Carbon Dioxide
COC	Chain-of-custody
DC	Decontamination Cell / Spray Chamber, or Direct Current
DEQ	Department of Environmental Quality
DOE	Department of Energy
DOE-ID	Department of Energy - Idaho Operations Office
DOT	Department of Transportation
DQO	Data Quality Objective
EAM	Emergency Action Manager

EC	Emergency Coordinator
ECC	Emergency Control Center
EFF	Experimental Fuels Facility
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EQL	Estimated Quantitation Limit
ER	Equipment Repair
FCF	Fuel Conditioning Facility
FFA/CO	Federal Facility Agreement and Consent Order
FFCA	Federal Facilities Compliance Act
FI&D	Facility Investigation and Decontamination
FIRM	Flood Insurance Rate Map
FR	Federal Register
FRP	Fiber-reinforced Plywood
HAZMAT	Hazardous Material
HBA	High Bay Area
HEPA	High-efficiency Particulate Air
HFEF	Hot Fuel Examination Facility
HRA	Hot Repair Area
HWMA	Hazardous Waste Management Act
HW/MW	Hazardous Waste / Mixed Waste
HWN	Hazardous Waste Number
I&C	Instrumentation and Control

IC	Incident Commander
ICP/AAS	Induction Coupled Plasma Atomic Emission Spectrometry / Atomic Absorption Spectrometry
ICS	Incident Command System
IDAPA	Idaho Administrative Procedures Act
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IWTS	Integrated Waste Tracking System
KOH	Potassium Hydroxide
LANL	Los Alamos National Laboratory
LDR	Land Disposal Restrictions
LSC	Life Safety Code
LSS	Life Safety System
LWP	Lab Wide Procedure
MCCE	Maintenance Characterization and Containment Enclosure
MDL	Minimum Detection Limit
MESA	Miscellaneous Equipment and Storage Area
MFC	Materials and Fuels Complex
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSDS	Material Safety Data Sheet
Na	Sodium
NaK	Sodium Potassium Alloy

Na_2O	Sodium Monoxide
NaOH	Sodium Hydroxide
NDA	Nondestructive Assay
NFPA	National Fire Protection Association
No.	Number
NRC	Nuclear Regulatory Commission
NRF	Navel Reactors Facility
OH	Hydroxide
OJT	On-the-job Training
OSHA	Occupational Safety and Health Administration
P&ID	Piping and Instrumentation Diagram
PE	Professional Engineer
PPE	Personal Protective Equipment
PR	Preparation Room, or Preliminary Review
PR/VSI	Preliminary Review / Visual Site Inspection
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RF	Rocky Flats
RH	Remote Handled
RPI	Rensselaer Polytechnic Institute
RSWF	Radioactive Scrap and Waste Facility

RWMC	Radioactive Waste Management Complex
SAP	Sampling and Analysis Plan
SCMS	Sodium Components Maintenance Shop
SLSF	Sodium Loop Safety Facility
SP	Sample Preparation
SSB	Sodium Storage Building
STP	Site Treatment Plan
SW-846	Test Methods for Evaluating Solid Waste: Physical/Chemical Methods
SWB	Standard Waste Box
TAN	Test Area North
TR	Transfer Room
TRAIN	Training Records and Information Network
UBC	Uniform Building Code
UHC	Underlying Hazardous Constituents
USGS	United States Geological Survey
UTS	Universal Treatment Standards
VSI	Visual Site Inspection
WAC	Waste Acceptance Criteria
WAP	Waste Analysis Plan
WCC	Waste Characterization Chamber or Warning Communications Center
WWV	Water Wash Vessel

Attachment 1 Facility Description

OMB#: 2050-0024 Expires 01/31/2017

SEND COMPLETED FORM TO: The appropriate State or Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**	
1. Reason for Submittal MARK ALL BOX(ES) THAT APPLY	**Reason for Submittal:** ❑ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location). ❑ To provide Subsequent Notification (to update site identification information for this location). ❑ As a component of a First RCRA Hazardous Waste Part A Permit Application. ☒ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment #) ❑ As a component of the Hazardous Waste Report (If marked, see sub-bullet below) ❑ Site was a TSD facility and/or generator of >1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)	
2. Site EPA ID Number	**EPA ID Number:** ID4890008952	
3. Site Name	**Name:** Idaho National Laboratory — Materials and Fuels Complex Permit	
4. Site Location Information	**Street Address:**	
	City, Town, or Village: Scoville	**County:** Bingham
	State: Idaho	**Country:** USA **Zip Code:** 83415
5. Site Land Type	❑ Private ❑ County ❑ District ☒ Federal ❑ Tribal ❑ Municipal ❑ State ❑ Other	
6. NAICS Code(s) for the Site (at least 5-digit codes)	**A.** 924110	**B.** 541712
	C. 336992	**D.** Not Applicable
7. Site Mailing Address	**Street or P. O. Box:** 1955 Fremont Avenue	
	City, Town, or Village: Idaho Falls	
	State: Idaho	**Country:** USA **Zip Code:** 83415
8. Site Contact Person	**First Name:** Teresa	**MI:** L **Last Name:** Perkins
	Title: Director, Environment & Sustainability Division	
	Street or P. O. Box: 1955 Fremont Avenue	
	City, Town, or Village: Idaho Falls	
	State: Idaho	**Country:** USA **Zip Code:** 83415
	Email: perkintl@id.doe.gov	
	Phone: (208) 526-1483	**Ext.:** N/A **Fax:** 208-526-1926
9. Legal Owner and Operator of the Site	**A. Name of Site's Legal Owner:** Department of Energy — Idaho	**Date Became Owner:** 02/01/2005
	Owner Type: ❑ Private ❑ County ❑ District ☒ Federal ❑ Tribal ❑ Municipal ❑ State ❑ Other	
	Street or P. O. Box: 1955 Fremont Avenue	
	City, Town, or Village: Idaho Falls	**Phone:** (208) 526-1483
	State: Idaho	**Country:** USA **Zip Code:** 83415
	B. Name of Sites Operator: Battelle Energy Alliance, LLC	**Date Became Operator:** 02/01/2005
	Operator Type: ❑ Private ❑ County ❑ District ☒ Federal ❑ Tribal ❑ Municipal ❑ State ❑ Other	

EPA ID NO.: ID4890008952

10. Type of Regulated Waste Activity (at your site)

Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities; Complete all parts 1-10.

Y ☒ N ☐ 1. **Generator of Hazardous Waste**
If "Yes" mark only one of the following - a, b, or c

☒ a. LQG: Generates, in any calendar month, 1,000 kg/mo (2,200 lbs/mo) or more of hazardous waste; **or** Generates In any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lbs/mo) of acute hazardous waste **or** Generates, in any calendar month **or** accumulates at any time, more than 100 kg/mo (220 lbs/mo) of acute hazardous spill cleanup material.

☐ b. SQG: 100 to 1,000 kg/mo (220 - 2,200 lbs/mo) of non-acute hazardous waste.

☐ c. CESQG: Less than 100 kg/mo (220 lbs/mo) of non-acute hazardous waste

If "Yes" above, indicate other generator activities in 2-10.

Y ☐ N ☒ 2. **Short-Term Generator** (generate from a short term or one-time event and not from on-going processes). If "Yes," provide an explanation in the Comments section

Y☐ N ☒ 3. **United States Importer of Hazardous Waste**

Y ☒ N ☐ 4. **Mixed Waste (hazardous and radioactive) Generator**

Y☒ N ☐ 5. **Transporter of Hazardous Waste. If "Yes," mark all that apply.**

☒ a. Transporter

☐ b. Transfer Facility (at your site)

Y☒ N ☐ 6. **Treater, Storer, or Disposer of Hazardous Waste** Note: A hazardous waste Part B permit is required for these activities.

Y☒ N ☐ 7. **Recycler of Hazardous Waste**

Y☐ N ☒ 8. **Exempt Boiler and/or Industrial Furnace. If "Yes," mark all that apply.**

☐ a. Small Quantity On-site Burner Exemption

☐ b. Smelting, Melting, and Refining Furnace Exemption

Y☐ N ☒ 9. **Underground Injection Control**

Y☐ N ☒ 10. **Receives Hazardous Waste from Off-site**

B. Universal Waste Activities; Complete all parts 1-2

Y☒ N ☐ 1. **Large Quantity Handler of Universal Waste (you accumulate 5,000kg or more)[refer to your State regulations to determine what is regulated]. Indicate types of universal waste managed at your site. If "Yes", mark all that apply.**

a. Batteries	☒
b. Pesticides	☒
c. Mercury containing equipment	☒
d. Lamps	☒
e. Other (specify)__________	☐
f. Other (specify)__________	☐
g. Other (specify)__________	☐

Y ☐ N ☒ 2. **Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity

C. Used Oil Activities; Complete all parts 1-4.

Y☐ N ☒ 1. **Used Oil Transporter**
If "Yes," mark all that apply.

☐ a. Transporter

☐ b. Transfer Facility (at your site)

Y☐ N ☒ 2. **Used Oil Processor and/or Re-refiner**
If "Yes," mark all that apply.

☐ a. Processor

☐ b. Re-refiner

Y☐ N ☒ 3. **Off-Specification Used Oil Burner**

Y☐ N ☒ 4. **Used Oil Fuel Marketer**

If "Yes," mark all that apply.

☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner

☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Eligible Academic Entities with Laboratories - Notification for opting into or witdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K.

♦ You can **ONLY** Opt into Subpart K if:

- you are at least one of the following: a college or university; a teaching hospital that is owned by or has a formal affiliation agreement with a college or university; or a non-profit research institute that is owned by or has a formal affiliation agreement with a college or university; AND
- you have checked with your State to determine if 40 CFR Part 262 Subpart K is effective in your state

Y❑ **N**❑ 1. Opting into or currently operating under 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

See the item-by-item instructions for definitions of types of eligible academic entities. Mark all that apply:

❑a. **College or University**

❑b. **Teaching Hospital that is owned by or has a formal written affilation agreement with a college or university**

❑c. **Non-profit Institute that is owned by or has a formal written affiliation agreement with a college or university**

Y❑ N❑ 2. Withdrawing from 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

11. Description of Hazardous Wastes

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

See section #13						

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please List the waste codes of the State-Regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

12. Notification of Hazardous Secondary Material (HSM) Activity

Y☐ N ☒ Are you notifying under 40 CFR 260.42 that you will begin managing, are managing or will stop managing hazardous secondary material under 40 CFR 261.2(a)(2)(ii), 40 CFR 261.4(a)(23), (24), or (25)?

If "Yes", you must fill out the Addendum to the Site Identification Form: Notification for Managing Hazardous Secondary Material.

13. Comments

For 11(A), see attached Form OMB#: 2050-0024, Item 9 page(s) 5a of 6 thru 5n of 6

14. Certification. 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 fines and imprisonment for knowing violations. For the RCRA Hazardous Waste Part A Permit Application, all owner(s) and operator(s) must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
Owner	Richard B. Provencher, Manager, DOE Idaho Operations Office	
	[signature]	4/7/15
Operator	Carolyn S. Mascareñas, Director ESH&Q, Battelle Energy Alliance, LLC	
	Carolyn S. Mascareñas	4-1-15

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact	**First Name:** Teresa	**MI:** L	**Last Name:** Perkins
	Contact Title: Director, Environment & Sustainability Division		
	Phone: (208) 526-1483	**Ext.:** N/A	**Email:** perkintl@id.doe.gov
2. Facility Permit Contact Mailing Address	**Street or P.O. Box:** 1955 Fremont Avenue		
	City, Town, or Village: Idaho Falls		
	State: Idaho		
	Country: USA		**Zip Code:** 83415
3. Operator Mailing Address and Telephone Number	**Street or P.O. Box:** Battelle Energy Alliance, LLC, 2525 Fremont Avenue		
	City, Town, or Village: Idaho Falls		
	State: Idaho		**Phone:** (208) 526-9021
	Country: USA		**Zip Code:** 83415
4. Facility Existence Date	**Facility Existence Date (mm/dd/yyyy):** February 1965		

5. Other Environmental Permits

A. Facility Type *(Enter code)*	B. Permit Number												C. Description
R	I	D	4	8	9	0	0	0	8	9	5	2	Final HWMA Permit for the INL MFC Facilities
P	P	T	C	P	2	0	0	8	0	0	7	3	Building 765 Fuel Conditioning Facility (FCF)
P	P	T	C	-	0	1	1	0	0	0	2	2	Building 753 Plant Services Paint Spray Booth
P, E, U													See Item 5 Supplement, Page 1a for additional permits

6. Nature of Business

In operation since 1949, INL is a science-based, applied engineering national laboratory dedicated to supporting the United States Department of Energy's missions in nuclear and energy research, science, and national defense.

The Materials and Fuels Complex performs a variety of research, development, demonstration, and deployment activities to expand the knowledge-base and capabilities of nuclear fuels, reactors, and associated components. In addition, research associated with energy, environment, and homeland security functions is also conducted. These activities require capabilities to store and treat both hazardous and mixed wastes.

Part A Form Supplement

ITEM 5. OTHER ENVIRONMENTAL PERMITS

AIR PERMITS

Area	Type and Number	Description
Advanced Test Reactor Complex	P, PTC-023-00001	TRA-715 Evaporation pond
	P, PTC-000534	TRA-Diesel-powered generators
Idaho National Laboratory	P, TI-2009.0148	Title V Operating Permit
Materials and Fuels Complex	P, P-2011.0077	Fuel Manufacturing Facility
Materials and Fuels Complex	P, P-2011.0113	Irradiated Materials Characterization Laboratory
Test Area North Facility	P, P-2011.0092	Specific Manufacturing Capability

WATER PERMITS

Area	Type and Number	Description
Idaho National Laboratory	U, CITRC Disposal Well #1 34W003001, CITRC Disposal Well #2 34W003002, CITRC Disposal Well #3 34W003003, CFA Disposal Well 34W003004, TAN Disposal Well #1 34W003005, TAN Disposal Well #2 34W003006, TAN Disposal Well # 3 34W003007	State of Idaho Underground Injection Well Permits [Idaho Department of Water Resources (IDWR)]
Idaho National Laboratory	U, State of Idaho Monitoring Well Permits	INL monitoring well permit applications are sent annually to the IDWR for wells (greater than 18 ft deep) to be constructed in the current calendar year. Permits are authorized by agreement between the DOE-ID and the IDWR
Central Facilities Area/Site Wide Complex	E, LA-000141-03	Municipal Wastewater Reuse Permit INL Central Facilities Area (CFA) Sewage Treatment Plant.
Materials and Fuels Complex	E, WRU-I-0160-01	Industrial Wastewater Reuse Permit INL Materials and Fuels Complex (MFC) Industrial Waste Ditch (IWD) and Industrial Waste Pond (IWP).
Advanced Test Reactor Complex	E, LA-000161-01	Industrial Wastewater Reuse Permit INL Minor Modification “B” Advanced Test Reactor Complex (ATR Complex)
Idaho National Laboratory	E	INL operates under a Federal Reserved Water Right for groundwater use

7. Process Codes and Design Capacities - Enter information in the Sections on Form Page 3.

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in Item 8.

B. PROCESS DESIGN CAPACITY - For each code entered in Item 7.A; enter the capacity of the process.

1. AMOUNT - Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.

2. UNIT OF MEASURE - For each amount entered in Item 7.B(1), enter the code in Item 7.B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.

C. PROCESS TOTAL NUMBER OF UNITS - Enter the total number of units for each corresponding process code.

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
	Disposal	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectare-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
	Storage	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
	Treatment	
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Metric Tons Per Hour; or Million BTU Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Short Tons Per Day; BTUs Per Hour; Gallons Per Day; Liters Per Hour; or Million BTU Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; or Million BTU Per Hour

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
	Treatment (continued)	**(for T81 - T94)**
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; Liters Per Hour; Kilograms Per Hour; or Million BTU Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used In the Recovery Of Sulfur Values From Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed In 40 CFR §260.10	
T94	Containment Building Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTU Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million BTU Per Hour
	Miscellaneous (Subpart X)	
X01	Open Burning/Open Detonation	Any Unit of Measure in Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour, or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; or Million BTU Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code
Gallons	**G**	**Short Tons Per Hour**	**D**	**Cubic Yards**	**Y**
Gallons Per Hour	**E**	**Short Tons Per Day**	**N**	**Cubic Meters**	**C**
Gallons Per Day	**U**	**Metric Tons Per Hour**	**W**	**Acres**	**B**
Liters	**L**	**Metric Tons Per Day**	**S**	**Acre-feet**	**A**
Liters Per Hour	**H**	**Pounds Per Hour**	**J**	**Hectares**	**Q**
Liters Per Day	**V**	**Kilograms Per Hour**	**X**	**Hectare-meter**	**F**
		Million BTU Per Hour	**X**	**BTU Per Hour**	**I**

7. Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 7 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	B. PROCESS DESIGN CAPACITY (2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	**1**	**S**	**0**	**2**	**533.788**	**G**	**001**	
	1	S	0	1	95365.000	G	006	
	2	S	0	2	390.000	G	002	
	3	T	0	1	1187.000	U	002	
	4							
	5							
	6							
	7							
	8							
	9							
1	**0**							
1	**1**							
1	**2**							
1	**3**							

NOTE: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for "other" processes (i.e., D99, S99, T04 and X99) in Item 8.

8. Other Processes (Follow instructions from Item 7 for D99, S99, T04 and X99 process codes)

Line Number (Enter #s in sequence with item 7)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	B. PROCESS DESIGN CAPACITY (2) Unit of Measure	C. Process Total Number of Units	For Official Use Only
X	**2**	**T**	**0**	**4**	**100.00**	**U**	**001**	
	4	S	9	9	53000.000	G	001	
	5	T	0	4	1320	U	003	

Part A Form Supplement

ITEM–7-8A PROCESS CODES AND DESIGN CAPACITIES SUPPLEMENT

Line Number	Process Code	Process Description	Process Design Capacity	Process Unit Capacity
Item # 7 Line # 1	S01	Container Storage	95,365 (total all units)	**Experimental Fuels Facility (EFF)** Building 794 12,000 gallons[1] **HFEF Container Storage** Building 785 10,725 gallons[1] **SCMS Container Storage** Building 793 7,040 gallons[1] Building 793C 14,080 gallons[1] Building 793G 3,520 gallons[1] **SSB Container Storage** Building 703 48,000 gallons[1]
Item # 7 Line # 2	S02	Tank Storage	390 gallons (total all units)	**SCMS Tank Storage** Water Wash Vessel 90 gallons[2,] Scrubber Water Tank 300 gallons[2,]
Item # 7 Line # 3	T01	Tank Treatment	1187 (total all units)	**SCMS Tank Treatment** Water Wash Vessel 155 gallons/day[3] Scrubber Water Tank 1,032 gallons/day[4]
Item # 8 Line # 4	S99	Miscellaneous Unit Storage	53,000 gallons	**RSWF Miscellaneous Unit Storage** Building 771 53,000 gallons[1]
Item # 8 Line # 5	T04	Container Treatment	1320 (total all units)	**EFF Container Treatment** 440 gallons/day[5] **HFEF Container Treatment** 440 gallons/day[5] **SCMS Container Treatment** 440 gallons/day[5]

ITEM 7-8A PROCESS CODES AND DESIGN CAPACITIES SUPPLEMENT

1 Total volume in 55 gallon drums or process equipment.

2 Total volume in process tanks.

3 SCMS tank deactivation (water reaction) rate:

$$\left(\frac{50\ lbs}{hour}\right)\left(\frac{24\ hours}{day}\right)\left(\frac{gallon}{7.7\ lbs}\right)=\frac{155\ gallons}{day}$$

Note: calculation rate is rounded down

4 SCMS tank evaporation and deactivation (acid addition or carbonation) rate:

$$\left(\frac{43\ gallons}{hour}\right)\left(\frac{24\ hours}{day}\right)=\frac{1032\ gallons}{day}$$

5 EFF, HFEF, SCMS container treatment-melt and draining, absorption, deactivation, neutralization, solidification, stabilization, and repackaging rate:

$$\left(\frac{18.3\ gallons}{hour}\right)\left(\frac{24\ hours}{day}\right)=\frac{440\ gallons}{day}$$

9. Description of Hazardous Wastes - Enter information in the Sections on Form Page 5.

A. EPA HAZARDOUS WASTE NUMBER - Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in Item 9.A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Item 9.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 Item 9.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 hazardous waste: For each listed hazardous waste entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all listed hazardous wastes.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. Enter the first two as described above.
2. Enter "000" in the extreme right box of Item 9.D(1).
3. Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 9.E.

2. PROCESS DESCRIPTION: If code is not listed for a process that will be used, describe the process in Item 9.D(2) or in Item 9.E(2).

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

1. Select one of the EPA Hazardous Waste Numbers and enter it in Item 9.A. On the same line complete Items 9.B, 9.C, and 9.D by estimating the total annual quantity of the waste and describing all the processes to be used to store, treat, and/or dispose of the waste.

2. In Item 9.A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Item 9.D.2 on that line enter "included with above" and make no other entries on that line.

3. Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING Item 9 (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing 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 Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES									
								(1) PROCESS CODES (Enter code)									(2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

9. Description of Hazardous Wastes *(Continued. Use the additional sheet(s) as necessary; number pages as 5a, etc.)*

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D(1))
	1	D	0	0	1	116,424	P	S	0	1	T	0	4				EFF HWMA Unit
	2	D	0	0	3												Included with the above
	3	D	0	0	2	990,000	P	S	0	1	T	0	4				EFF HWMA Unit
	4	D	0	0	4												Included with the above
	5	D	0	0	5												Included with the above
	6	D	0	0	6												Included with the above
	7	D	0	0	7												Included with the above
	8	D	0	0	8												Included with the above
	9	D	0	0	9												Included with the above
1	0	D	0	1	0												Included with the above
1	1	D	0	1	1												Included with the above
1	2	F	0	0	1	990,000	P	S	0	1	T	0	4				Included with the above
1	3	F	0	0	2												Included with the above
1	4	F	0	0	5												Included with the above
1	5	U	1	3	4												Included with the above
1	6																
1	7																
1	8																
1	9																
2	0																
2	1																
2	2																
2	3																
2	4																
2	5																
2	6																
2	7																
2	8																
2	9																
3	0																
3	1																
3	2																
3	3																
3	4																
3	5																
3	6																

9. Description of Hazardous Wastes ***(Continued. Use the additional sheet(s) as necessary; number pages as 5a, etc.)***

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D(1))
	1	D	0	0	1	1,430,000	P	S	0	1	T	0	4				HFEF HWMA Units
	2	D	0	0	2												Included with the above
	3	D	0	0	4												Included with the above
	4	D	0	0	5												Included with the above
	5	D	0	0	6												Included with the above
	6	D	0	0	7												Included with the above
	7	D	0	0	8												Included with the above
	8	D	0	0	9												Included with the above
	9	D	0	1	0												Included with the above
1	0	D	0	1	1												Included with the above
1	1	D	0	1	2												Included with the above
1	2	D	0	1	3												Included with the above
1	3	D	0	1	4												Included with the above
1	4	D	0	1	5												Included with the above
1	5	D	0	1	6												Included with the above
1	6	D	0	1	7												Included with the above
1	7	D	0	1	8												Included with the above
1	8	D	0	1	9												Included with the above
1	9	D	0	2	0												Included with the above
2	0	D	0	2	1												Included with the above
2	1	D	0	2	2												Included with the above
2	2	D	0	2	3												Included with the above
2	3	D	0	2	4												Included with the above
2	4	D	0	2	5												Included with the above
2	5	D	0	2	6												Included with the above
2	6	D	0	2	7												Included with the above
2	7	D	0	2	8												Included with the above
2	8	D	0	2	9												Included with the above
2	9	D	0	3	0												Included with the above
3	0	D	0	3	1												Included with the above
3	1	D	0	3	2												Included with the above
3	2	D	0	3	3												Included with the above
3	3	D	0	3	4												Included with the above
3	4	D	0	3	5												Included with the above
3	5	D	0	3	6												Included with the above
3	6	D	0	3	7												Included with the above

9. Description of Hazardous Wastes ***(Continued. Use the additional sheet(s) as necessary; number pages as 5a, etc.)***

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES									
								(1) PROCESS CODES (Enter code)									(2) PROCESS DESCRIPTION (If a code is not entered in 9.D(1))
3	7	D	0	3	8												Included with the above
3	8	D	0	3	9												Included with the above
3	9	D	0	4	0												Included with the above
4	0	D	0	4	1												Included with the above
4	1	D	0	4	2												Included with the above
4	2	D	0	4	3												Included with the above
4	3	F	0	0	1	1,430,000		S	0	1	T	0	4				Included with the above
4	4	F	0	0	2												Included with the above
4	5	F	0	0	3												Included with the above
4	6	F	0	0	4												Included with the above
4	7	F	0	0	5												Included with the above
4	8	F	0	0	6												Included with the above
4	9	F	0	0	7												Included with the above
5	0	F	0	0	8												Included with the above
5	1	F	0	0	9												Included with the above
5	2	F	0	3	9												Included with the above
5	3	P	0	0	5												Included with the above
5	4	P	0	1	2												Included with the above
5	5	P	0	2	2												Included with the above
5	6	P	0	2	4												Included with the above
5	7	P	0	2	7												Included with the above
5	8	P	0	2	8												Included with the above
5	9	P	0	3	0												Included with the above
6	0	P	0	3	1												Included with the above
6	1	P	0	5	6												Included with the above
6	2	P	0	7	3												Included with the above
6	3	P	0	7	7												Included with the above
6	4	P	0	9	8												Included with the above
6	5	P	1	0	4												Included with the above
6	6	P	1	0	5												Included with the above
6	7	P	1	0	6												Included with the above
6	8	P	1	1	3												Included with the above
6	9	P	1	1	6												Included with the above
7	0	P	1	1	9												Included with the above
7	1	P	1	2	0												Included with the above
7	2	U	0	0	3												Included with the above

9. Description of Hazardous Wastes *(Continued. Use the additional sheet(s) as necessary; number pages as 5a, etc.)*

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D(1))
7	3	U	0	0	4				Included with the above
7	4	U	0	0	7				Included with the above
7	5	U	0	0	9				Included with the above
7	6	U	0	1	2				Included with the above
7	7	U	0	1	4				Included with the above
7	8	U	0	1	9				Included with the above
7	9	U	0	2	0				Included with the above
8	0	U	0	3	2				Included with the above
8	1	U	0	3	7				Included with the above
8	2	U	0	4	4				Included with the above
8	3	U	0	4	8				Included with the above
8	4	U	0	5	2				Included with the above
8	5	U	0	6	9				Included with the above
8	6	U	0	7	9				Included with the above
8	7	U	0	8	0				Included with the above
8	8	U	0	8	1				Included with the above
8	9	U	0	8	3				Included with the above
9	0	U	0	8	4				Included with the above
9	1	U	1	0	2				Included with the above
9	2	U	1	0	3				Included with the above
9	3	U	1	0	8				Included with the above
9	4	U	1	1	6				Included with the above
9	5	U	1	1	8				Included with the above
9	6	U	1	2	0				Included with the above
9	7	U	1	2	2				Included with the above
9	8	U	1	2	3				Included with the above
9	9	U	1	2	7				Included with the above
10	0	U	1	2	8				Included with the above
10	1	U	1	3	1				Included with the above
10	2	U	1	3	3				Included with the above
10	3	U	1	3	4				Included with the above
10	4	U	1	3	5				Included with the above
10	5	U	1	3	8				Included with the above
10	6	U	1	4	0				Included with the above
10	7	U	1	4	4				Included with the above
10	8	U	1	4	5				Included with the above

9. Description of Hazardous Wastes *(Continued. Use the additional sheet(s) as necessary; number pages as 5a, etc.)*

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D(1))
10	9	U	1	4	7				Included with the above
11	0	U	1	5	1				Included with the above
11	1	U	1	5	9				Included with the above
11	2	U	1	6	2				Included with the above
11	3	U	1	6	5				Included with the above
11	4	U	1	6	9				Included with the above
11	5	U	1	7	0				Included with the above
11	6	U	1	7	1				Included with the above
11	7	U	1	8	2				Included with the above
11	8	U	1	8	8				Included with the above
11	9	U	1	9	0				Included with the above
12	0	U	1	9	1				Included with the above
12	1	U	1	9	6				Included with the above
12	2	U	2	0	1				Included with the above
12	3	U	2	0	4				Included with the above
12	4	U	2	0	7				Included with the above
12	5	U	2	0	8				Included with the above
12	6	U	2	1	0				Included with the above
12	7	U	2	1	1				Included with the above
12	8	U	2	1	5				Included with the above
12	9	U	2	1	7				Included with the above
13	0	U	2	1	8				Included with the above
13	1	U	2	1	9				Included with the above
13	2	U	2	2	0				Included with the above
13	3	U	2	2	5				Included with the above
13	4	U	2	2	6				Included with the above
13	5	U	2	2	7				Included with the above
13	6	U	2	2	8				Included with the above
13	7	U	2	3	9				Included with the above
13	8	U	3	2	8				Included with the above

9. Description of Hazardous Wastes ***(Continued. Use the additional sheet(s) as necessary; number pages as 5a, etc.)***

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D(1))
1	D001	477,000	P	S99	RSWF HWMA Unit
2	D003				Included with the above
3	D004				Included with the above
4	D005				Included with the above
5	D006				Included with the above
6	D007				Included with the above
7	D008				Included with the above
8	D009				Included with the above
9	D010				Included with the above
10	D011				Included with the above
11					
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32					
33					
34					
35					
36					

9. Description of Hazardous Wastes ***(Continued. Use the additional sheet(s) as necessary; number pages as 5a, etc.)***

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in 9.D(1))
	1	D	0	0	1	298,375	P	S	0	1	S	0	2	T	0	1	SCMS HWMA Unit
	2	D	0	0	3			T	0	4							Included with the above
	3	D	0	0	2	990,000	P	S	0	1	S	0	2	T	0	1	SCMS HWMA Unit
	4	D	0	0	4			T	0	4							Included with the above
	5	D	0	0	5												Included with the above
	6	D	0	0	6												Included with the above
	7	D	0	0	7												Included with the above
	8	D	0	0	8												Included with the above
	9	D	0	0	9												Included with the above
1	0	D	0	1	0												Included with the above
1	1	D	0	1	1												Included with the above
1	2																
1	3																
1	4																
1	5																
1	6																
1	7																
1	8																
1	9																
2	0																
2	1																
2	2																
2	3																
2	4																
2	5																
2	6																
2	7																
2	8																
2	9																
3	0																
3	1																
3	2																
3	3																
3	4																
3	5																
3	6																

9. Description of Hazardous Wastes ***(Continued. Use the additional sheet(s) as necessary; number pages as 5a, etc.)***

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES	
				(1) PROCESS CODES (Enter code)	(2) PROCESS DESCRIPTION (If a code is not entered in 9.D(1))
1	D 0 0 1	432,000	P	S 0 1	SSB HWMA Unit
2	D 0 0 3				Included with the above
3	D 0 0 4				Included with the above
4	D 0 0 5				Included with the above
5	D 0 0 6				Included with the above
6	D 0 0 7				Included with the above
7	D 0 0 8				Included with the above
8	D 0 0 9				Included with the above
9	D 0 1 0				Included with the above
1 0	D 0 1 1				Included with the above
1 1					
1 2					
1 3					
1 4					
1 5					
1 6					
1 7					
1 8					
1 9					
2 0					
2 1					
2 2					
2 3					
2 4					
2 5					
2 6					
2 7					
2 8					
2 9					
3 0					
3 1					
3 2					
3 3					
3 4					
3 5					
3 6					

INL HWMA/RCRA FINAL PERMIT, EPA NO. ID4890008952
MFC Permit, Doc. No. PER-116
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ITEM – 9A DESCRIPTION OF HAZARDOUS WASTE SUPPLEMENT

PAGE/LINE NUMBERS	A. EPA HAZARDOUS WASTE NUMBER	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE
Page 5a of 6 Lines 1-2 (Highest estimated annual qty shown on Line 1)	D001 D003	This annual estimate is based on EFF Na and NaK container/debris treatment processing rates for ignitable and reactive waste. This estimated annual quantity of ignitable and reactive waste (throughput) is the product of a 240 gallons/day, a production rate of 63 days/year of operation, and the density of waste streams of 7.7 lbs per gallon. $\left(\frac{240\ gal}{day}\right)\left(\frac{63\ days}{year}\right)\left(\frac{7.7\ lbs}{gal}\right) = \frac{116{,}424\ lbs}{year}$	The density used for the waste is 7.7 lb/gal
	D001 D003	This annual estimate is based on EFF container storage rates. This estimated annual quantity of Na and NaK waste stored per year is the product of the maximum allowable quantity of waste and the density of the waste streams of 7.7 lbs per gallon. $\left(\frac{12000\ gal}{year}\right)\left(\frac{7.7\ lbs}{gal}\right) = \frac{92{,}400\ lbs}{year}$	The density used for the waste is 7.7 lb/gal
Page 5a of 6 Lines 3-11 (Highest estimated annual qty shown on Lines 3)	D002 D004-11	This annual estimate is based on EFF container treatment processing rates for corrosive and/or toxic metal waste. This estimated annual quantity of corrosive and/or toxic metal waste (throughput) is the product of a 440 gallons/day container treatment rate, a production rate of 250 days/year of operation, and the density of corrosive and/or toxic waste streams of 9 lbs per gallon $\left(\frac{440\ gallons}{day}\right)\left(\frac{9lbs}{gallon}\right)\left(\frac{250days}{year}\right) = \frac{990{,}000\ lbs}{year}$	The density used for the waste is estimated at 9.0 lbs/gal.
	D002 D004-11	This annual estimate is based on EFF container storage rates. This estimated annual quantity of waste stored per year is the product of the maximum allowable quantity of waste and the density of the waste streams of 9.0 lbs per gallon. $\left(\frac{12000\ gal}{year}\right)\left(\frac{9.0\ lbs}{gal}\right) = \frac{108{,}000\ lbs}{year}$	The density used for the waste is 9.0 lb/gal

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ITEM – 9A DESCRIPTION OF HAZARDOUS WASTE SUPPLEMENT

PAGE/LINE NUMBERS	A. EPA HAZARDOUS WASTE NUMBER	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE
Page 5a of 6 Lines 12-15 (Highest estimated annual qty shown on Lines 12)	F001 F002 F005 U134	This annual estimate is based on EFF container treatment processing rates for listed waste. This estimated annual quantity of listed waste (throughput) is the product of a 440 gallons/day container treatment rate, a production rate of 250 days/year of operation, and the density of listed waste streams of 9 lbs per gallon $\left(\frac{440\ gallons}{day}\right)\left(\frac{9\ lbs}{gallon}\right)\left(\frac{250\ days}{year}\right)=\frac{990{,}000\ lbs}{year}$	The density used for of the waste is estimated at 9.0 lbs/gal.
	F001 F002 F005 U134	This annual estimate is based on EFF container storage rates. This estimated annual quantity of waste stored per year is the product of the maximum allowable quantity of waste and the density of the waste streams of 9.0 lbs per gallon $\left(\frac{12000\ gallons}{year}\right)\left(\frac{9\ lbs}{gallon}\right)=\frac{108{,}000\ lbs}{year}$	The density used for of the waste is estimated at 9.0 lbs/gal.
Page 5b of 6 Lines 1-42 (Highest estimated annual qty shown on Line 1)	See characteristic codes	This annual estimate is based on HFEF container treatment processing rates for characteristic waste. This estimated annual quantity of characteristic waste (throughput) is the product of a 440 gallons/day container treatment rate, a production rate of 250 days/year of operation, and the density of characteristic waste streams of 13 lbs per gallon $\left(\frac{440\ gallons}{day}\right)\left(\frac{13\ lbs}{gallon}\right)\left(\frac{250\ days}{year}\right)=\frac{1{,}430{,}000\ lb}{year}$	The density used for of the waste is estimated at 13.0 lbs/gal.
	See characteristic codes	This annual estimate is based on HFEF container storage rates. This estimated annual quantity of waste stored per year is the product of the maximum allowable quantity of waste and the density of the waste streams of 13.0 lbs per gallon $\left(\frac{10725\ gallons}{year}\right)\left(\frac{13\ lbs}{gallon}\right)=\frac{139{,}425\ lbs}{year}$	The density used for of the waste is estimated at 13.0 lbs/gal.

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ITEM – 9A DESCRIPTION OF HAZARDOUS WASTE SUPPLEMENT

PAGE/LINE NUMBERS	A. EPA HAZARDOUS WASTE NUMBER	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE
Page 5c of 6 thru 5e of 6 Lines 43-138 (Highest estimated annual qty shown on Line 43)	See listed codes	This annual estimate is based on HFEF container treatment processing rates for listed waste. This estimated annual quantity of listed waste (throughput) is the product of a 440 gallons/day container treatment rate, a production rate of 250 days/year of operation, and the density of listed waste streams of 13 lbs per gallon $\left(\frac{440\ gallons}{day}\right)\left(\frac{13\ lbs}{gallon}\right)\left(\frac{250\ days}{year}\right)=\frac{1{,}430{,}000\ lb}{year}$	The density used for of the waste is estimated at 13.0 lbs/gal.
	See listed codes	This annual estimate is based on HFEF container storage rates. This estimated annual quantity of waste stored per year is the product of the maximum allowable quantity of waste and the density of the waste streams of 13.0 lbs per gallon $\left(\frac{10725\ gallons}{year}\right)\left(\frac{13\ lbs}{gallon}\right)=\frac{139{,}425\ lbs}{year}$	The density used for of the waste is estimated at 13.0 lbs/gal.
Page 5f of 6 Lines 1-10	D001 D003-D011	This annual estimate is based on RSWF container storage rates. This estimated annual quantity of waste stored per year is the product of the maximum allowable quantity of waste and the density of the waste streams of 9 lbs per gallon. $\left(\frac{53000\ gallons}{year}\right)\left(\frac{9lbs}{gallon}\right)=\frac{477{,}000\ lbs}{year}$	The density used for the waste is 9.0 lb/gal.

ITEM – 9A DESCRIPTION OF HAZARDOUS WASTE SUPPLEMENT

PAGE/LINE NUMBERS	A. EPA HAZARDOUS WASTE NUMBER	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE
Page 5g of 6 Lines 1-2 (Highest estimated annual qty shown on Line 1)	D001 D003	This annual estimate is based on SCMS tank treatment processing rates for ignitable and reactive waste. This estimated annual quantity of ignitable and reactive waste (throughput) is the product of a 155 gallons/day burn rate, a production rate of 250 days/year of operation, and the density of Na waste streams of 7.7 lbs per gallon. $\left(\frac{155\ gal}{day}\right)\left(\frac{250\ days}{year}\right)\left(\frac{7.7\ lbs}{gal}\right)=\frac{298{,}375\ lbs}{year}$	The density used for the waste is 7.7 lb/gal.
	D001 D003	This annual estimate is based on SCMS container storage rates. This estimated annual quantity of waste stored per year is the product of the maximum allowable quantity of waste and the density of the waste streams of 7.7 lbs per gallon. $\left(\frac{24640\ gal}{year}\right)\left(\frac{7.7\ lbs}{gal}\right)=\frac{189{,}728\ lbs}{year}$	The density used for the waste is 7.7 lb/gal.
Page 5g of 6 Lines 3-11 (Highest estimated annual qty shown on Line 3)	D002 D004-11	This annual estimate is based on SCMS container treatment processing rates for corrosive and/or toxic metal waste. This estimated annual quantity of corrosive and/or toxic metal waste (throughput) is the product of a 440 gallons/day container treatment rate, a production rate of 250 days/year of operation, and the density of corrosive and/or toxic waste streams of 9 lbs per gallon $\left(\frac{440\ gallons}{day}\right)\left(\frac{9lbs}{gallon}\right)\left(\frac{250\ days}{year}\right)=\frac{990{,}000\ lbs}{year}$	The density used for the waste is estimated at 9.0 lbs/gal.
	D002 D004-11	This annual estimate is based on SCMS container storage rates. This estimated annual quantity of waste stored per year is the product of the maximum allowable quantity of waste and the density of the waste streams of 9 lbs per gallon. $\left(\frac{24640\ gal}{year}\right)\left(\frac{9.0\ lbs}{gal}\right)=\frac{221{,}760\ lbs}{year}$	The density used for the waste is estimated at 9.0 lbs/gal.

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ITEM – 9A DESCRIPTION OF HAZARDOUS WASTE SUPPLEMENT

PAGE/LINE NUMBERS	A. EPA HAZARDOUS WASTE NUMBER	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE
Page 5h of 6 Lines 1-10	D001 and D003--11	This annual estimate is based on SSB container storage rates. This estimated annual quantity of waste stored per year is the product of the maximum allowable quantity of waste and the density of the waste streams of 9 lbs per gallon. $\left(\frac{48000\ gal}{year}\right)\left(\frac{9lbs}{gallon}\right)=\frac{432{,}000lbs}{year}$	The density used for of the waste is estimated at 9.0 lbs/gal.

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ITEM – 9A DESCRIPTION OF HAZARDOUS WASTE SUPPLEMENT

Debris Waste Categories[1]	EFF	HFEF	RSWF	SCMS	SSB
Metal Debris[2]	x	x	x	x	x
Inorganic Debris[3]	x	x	x	x	x
Organic Debris[4]	x	x	x	x	x
Paper/plastic/rubber/rags[5]	x	x	x	x	x
Ceramic/Brick Debris[6]	x	x	x	x	x
Heterogenous Debris[7]	x	x	x	x	x
Debris Contaminant Categories	**EFF**	**HFEF**	**RSWF**	**SCMS**	**SSB**
Characteristic contaminants	D001-D011	D001 D002 D004-43	D001 D003-11	D001- D011	D001, D003-11
Listed contaminants	Note[8]	Note[9]	NA	NA	NA

Notes:

1 Debris Waste Categories—debris waste streams have been grouped into six debris waste categories consistent with packaging and storage configurations and/or treatment plans.

2 Metal Debris Waste—process and ancillary equipment and operations components including pipes, pumps, valves, fitting, flanges, metal scrap, shipping and process vessels, cold traps, vapor traps, nonintact containers and tanks, cut-up equipment.

3 Inorganic Debris Waste—operational, decontamination, and closure-related wastes including filters, prefilters and filter media, glass, insulation, concrete, asbestos and noncombustible solids.

4 Organic Debris Waste—operational, decontamination, and closure-related wastes including combustible solids, paper, cloth, wood, plastic, industrial equipment, and natural geologic material.

5 Paper/Plastic/Rubber/Rags—operational, decontamination, and closure-related wastes including paper and rags, washables, rubber, plastic, gloves, aprons, PVC, nonintact containers.

6 Ceramic/Brick Debris—ceramic or brick from operational, decontamination, and closure-related activities.

7 Heterogenous Debris—operational, decontamination, and closure-related waste consisting of mixtures of debris categories.

8 See EFF HWNs.

9 See HFEF HWNs.

10. Map

Topographical maps of the MFC site extending to at least one mile beyond property boundaries are provided in this Permit Application, Section B, Facility Description.

11. Facility Drawing

Drawings of the facility listed in the Part A Application are provided in this Permit Application, Section B, Facility Description.

12. Photographs

Photographs showing the facilities, storage, and treatment areas is provided in this Permit Application, Section B, Facility Description.

13. Comments

No comments

MFC Facility Description

CONTENTS

TABLES

ATTACHMENTS

B. MFC FACILITY DESCRIPTION [IDAPA 58.01.05.012; 40 CFR 270.14(b)(1)]

The Idaho National Laboratory (INL) is owned by the United States Government and is operated by the Department of Energy (DOE). Management and operation of the INL is the responsibility of DOE-designated private contractors working under the direction of DOE Idaho Operations Office (DOE-ID) and the Idaho branch of the Pittsburgh Naval Reactors Office. A general description of the INL, as required by the Idaho Administrative Procedures Act (IDAPA), 58.01.05.012 [Title 40, Code of Federal Regulations (CFR) Part 270.14(b)] is provided in the Hazardous Waste Management Act/Resource Conservation and Recovery Act (HWMA/RCRA) Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131).

In accordance with the requirements of IDAPA 58.01.05.012 and 40 CFR 270.14(b), this section of the Materials and Fuels Complex (MFC) HWMA/RCRA Permit Application contains facility description, topography, and traffic-related information for the HWMA/RCRA units (herein referred to as HWMA units) on the MFC site.

Information on the location of the MFC site on the INL and of each HWMA unit on the MFC site is included in this section (including photographs of the exteriors/interiors of the units, floor plans, and foundation plans) is provided in Subsections B-1 through B-3 and Attachments B-1 through B-18. A brief overview of the types of hazardous waste/mixed waste (HW/MW) received and managed at the HWMA units and the HW/MW services provided is also provided in this section. Detailed information on the types of HW/MW received and managed, and the HW/MW services performed at the HWMA units, is provided in Attachment 2, Section C, Waste Analysis Plan, and Attachment 1, Section D, Process Description.

The information provided in this section is organized by subsection as follows:

- Subsection B-1, MFC Facility Description
- Subsection B-2, MFC HWMA Unit Overview
- Subsection B-3, MFC HWMA Unit Descriptions
- Subsection B-4, MFC Topographical Maps
- Subsection B-5, MFC Traffic Information.

B-1 MFC Site Description [IDAPA 58.01.05.012; 40 CFR 270.14(b)(1)]

The MFC site is located on the southeastern corner of the INL in Bingham County, Idaho. MFC is operated for the United States DOE by the INL through the DOE-ID.

The location of MFC on the INL site and the MFC administrative boundaries are shown in Attachment B-1. Additional detailed MFC facility information regarding the topography of the site, well locations, floodplain, and traffic information is provided in Subsections B-4 and B-5.

B-2 MFC HWMA Unit Overview

This HWMA/RCRA Permit Application includes MFC HWMA units as listed below:

- Experimental Fuels Facility (EFF)
- Hot Fuel Examination Facility (HFEF)
- Radioactive Scrap and Waste Facility (RSWF)
- Sodium Components Maintenance Shop (SCMS)
- Sodium Storage Building (SSB).

The locations of each of the HWMA units are shown on the MFC Plot Plan in Attachment B-2. The map in Attachment B-3 shows the EPA Process Codes associated with each HWMA unit and the transfer routes between the MFC HWMA units and off-Site.

Brief descriptions of the HW/MW to be received/managed at the HWMA units, and the services (processes) to be performed in each HWMA unit, are provided in Subsections B-2(a) and B-2(b). Detailed descriptions of each of the HWMA units are provided in Subsection B-3.

B-2(a) HW/MW Received/Managed and Services Provided at MFC HWMA Units

The MFC HWMA units will receive/manage solid, liquid, and debris HW/MW, and are used to perform a variety of services for on-Site[1] HW/MW generators and/or owners.

Ongoing receipt, management, and processing of on-Site HW/MW will ensure compliance with federal-and state-mandated HW/MW treatment and disposal plans, schedules, and stipulations set forth in the INL Site Treatment Plan (STP), the Federal Facilities Compliance Act (FFCA), and the State of Idaho and DOE Settlement Agreement.

[1] On-Site means HW/MW generated at a facility physically located on the INL site or HW/MW from a generator that is a contractor or subcontractor, physically located on the INL site, of the INL Management and Operations contractor.

MFC HWMA units will be used to store, repackage, and/or treat the following wastes [categorized by EPA processes and shown by waste type and associated hazardous waste numbers (HWNs)]:

- Receive/manage the following HW/MW types:
  - Ignitable waste (D001)
  - Corrosive waste (D002)
  - Reactive waste (D003)
  - Toxic-metal inorganic waste (D004-D011)
  - Toxic-metal organic waste (D012-D043)
  - F-listed waste (nonspecific sources as specified in Part A)
  - P-listed (commercial chemicals as specified in Part A)
  - U-listed (commercial chemicals as specified in Part A).
- Store, verify/sample, repackage and/or treat the following process codes:
  - Container/debris storage (S01)
  - Tank storage (S02)
  - Miscellaneous unit storage (S99)
  - Container/debris treatment (T04)
  - Tank treatment (T01).

The forms of HW/MW to be received/managed at the MFC HWMA units include solids, liquids, and/or debris waste that are currently in storage in the HWMA units or that will be received from on-Site facilities. The forms of HW/MW to be received include the following:

- Solids
  - Process waste and residuals
  - Laboratory waste
  - Treatment residuals
  - Sludges
- Liquids
  - Process waste and residuals
  - Laboratory waste
  - Treatment residuals
- Debris[2]
  - Metal debris
  - Inorganic/organic debris
  - Paper/plastic/rubber/rags
  - Ceramic/brick
  - Heterogeneous debris.

Facilities that may transfer HW/MW to MFC for storage and treatment include the facilities located at MFC as well as facilities located on the INL.

Estimated maximum storage capacities for each HWMA unit and the annual quantities of the HW/MW to be managed (stored, verified/sampled, repackaged and/or treated) at the HWMA units are provided in Attachment 1, Part A Application.

A matrix of the EPA HWNs that can be received/managed at each HWMA unit, the HW/MW services (processes) performed in each HWMA unit, and the types of HW/MW is provided in Table B-1.

[2] As defined in IDAPA 58.01.05.008 and 40 CFR 268.2(g).

Table B-1. HW/MW processes, waste types, services, and limits provided by MFC HWMA units.

Facility		EFF	HFEF	RSWF	SCMS	SSB
D001	Ignitable	X	X	X	X	X
D002	Corrosive	X	X	—	X	—
D003	Reactive	X	—	X	X	X
D004-11	Toxicity characteristic (inorganic)	X	X	X	X	X
D012-43	Toxicity characteristic (organic)	—	X	—	—	—
F Listed	Non-specific sources (Ref. Part A)	X	X	—	—	—
P Listed	Commercial chemicals (Ref. Part A)	—	X	—	—	—
U Listed	Commercial chemicals (Ref. Part A)	X	X	—	—	—
S01	Container/debris storage[1]	12000	10725	—	24640	48000
S02	Tank storage[1]	—	—	—	390	—
S99	Miscellaneous unit storage[1]	—	—	53000	—	—
T01	Tank treatment[2]	—	—	—	1187	—
T04	Container/debris treatment[2]	440	440	—	440	—
Solids		X	X	X	X	X
Liquids		X	X		X	X
Debris		X	X	X	X	X
Verification/sampling [solids/liquids/debris]		X	X	—	X	—
Repackaging	[solids/liquids/debris]	X	X	—	X	—
Absorption	[free liquids]	X	X	—	X	—
Deactivation	[ignitable/reactives/corrosives]	X	X	—	X	—
Melt/drain	[reactive metals]	—	—	—	X	—
Neutralization	[corrosives]	X	X	—	X	—
Solidification	[immobilize liquids/inorganics]	X	X	—	X	—
Water washing/spraying [debris surfaces]		—	—	—	X	—

1. Maximum storage amount at any time in gal.
2. Maximum treatment amount per day in gal.

B-3 MFC HWMA Unit Facility Descriptions

B-3(a) Experimental Fuels Facility (EFF)—Building 794

The EFF, Building 794, consists of one building with two designated areas used for HW/MW container storage, verification, repackaging and/or container treatment (S01, T04). The designated areas are the following:

- EFF—East Room
- EFF—West Room

A description of the EFF, Building 794, is provided below. A number of EFF photographs, schematics, and drawings are provided as follows:

- Attachment B-4, Photograph of the Exterior, EFF, Building 794
- Attachment B-5, Floor Plan Schematic Showing Facility Arrangement and Maximum Storage Capacity, EFF, Building 794
- Attachment B-6, Photograph of the Interior of EFF, Building 794.

The location of the EFF is shown on the MFC plot plan provided in Attachment B-2.

The EFF is classified as a non-reactor, radiological facility. The building dimensions are approximately 125 x 40 x 26 ft tall. The building was originally designed to meet the requirement of the Uniform Building Code (UBC) Zone 3 seismic design requirements. The east addition was designed to meet UBC Zone 2 requirements.

Building 794 is a pre-engineered metal building consisting of painted metal wall panels, metal roof panels, and structural steel support frames located on a concrete pad. The West Room of the building is the original structure, designed and constructed in 1975. It has a personnel access door, as well as a large roll-up door on the west end. An extension was added to the east, the East Room, in 1983, which also has a personnel access door and a large roll-up door. The East and West Rooms have independent ventilation systems. The east side contains a bank of HEPA filters, redundant exhaust fans and a supply air handling unit. The west side contains a bank of HEPA filters, one exhaust fan and a supply air handling unit. In 1998, the addition of the Maintenance Characterization and Containment Enclosure (MCCE) added a large containment tent to the East Room. To provide for operational flexibility, the MCCE may be removed altogether, or a MCCE may be installed in either the East Room or West Room of EFF. A dividing wall separates the East and West Rooms. The East Room of the EFF is equipped with a 2-ton bridge crane. The building is normally locked when not occupied. The EFF is constructed on a raised concrete pad, making run-on from the surrounding area unlikely to enter the facility.

The East and West Rooms of the EFF have floor trenches, sumps, and drains. The East Room has two circular concrete collection sumps that are 30 in. in diameter and 60 in. deep. The West Room has one concrete trench that runs the length of the room. The trench dimensions are 60 ft x 12 in. and 16 in. deep. The sumps and trench do not drain to the outside of the facility. Two drains are also installed in the East Room to accommodate equipment cooling water discharges to the industrial waste water system on the south side of the building. The drains have raised edges and will be plugged when not required.

Currently research and development equipment reduces the available floor space in both the East and West Rooms for HW/MW container storage. To best utilize available floor space containers without free liquids may be double-stacked. An example of the storage configuration is depicted in Attachment B-5, which consists of 2-ft. aisle spacing plus adequate spacing for visual inspection between containers.

The MCCE is a soft-walled enclosure that provides contamination control and containment for opening various radiologically contaminated or mixed waste containers for examination, maintenance, repackaging, or treatment. The walls of the MCCE consist of a NFPA-701 compliant fire-retardant or noncombustible material.

B-3(b) Hot Fuel Examination Facility (HFEF)—Building 785

The HFEF, Building 785, consists of one building with five designated HWMA unit areas, one transfer area, and one staging area used to support HWMA unit operations. These designated areas within HFEF are used for HW/MW container storage, verification, and repackaging treatment (S01, T04). The areas within HFEF, Building 785, include:

<u>HWMA Unit Areas</u>

- High Bay Area (HBA)
- Hot Repair Area (HRA)
- Decontamination Cell/Spray Chamber (DC)

- Miscellaneous Equipment and Storage Area (MESA)
  - Waste Characterization Chamber (WCC)/Transfer Room(TR), including Sample Preparation (SP) Glovebox and Equipment Repair (ER) Glovebox
  - Preparation Room (PR)

<u>HWMA Unit Support Areas</u>

- Truck Lock Transfer Area (Non-HWMA)
- Casks/Transporter Staging Area (Non-HWMA)

Descriptions of the HFEF HWMA areas in Building 785 are provided below. A number of HFEF photographs, schematics, and drawings are provided as follows:

- Attachment B-7, Photograph of the Exterior, HFEF, Building 785
- Attachment B-8, Floor Plan Schematic Showing Facility Arrangement and Maximum Storage Capacity, HFEF, Building 785
- Attachment B-9, Photograph of the Interior of HFEF, Building 785

The location of the HFEF is shown on the MFC plot plan provided in Attachment B-2.

B-3(b)(1) HFEF General Description

HFEF consists primarily of two adjacent shielded cells (i.e., main cell and decontamination cell), the HRA, and the HBA in a three-story building. Offices, laboratories, and other personnel-related areas are located on the operating floor, which is slightly above grade level. A truck lock at the west end of the cell complex is also at this level. The service floor below contains the subcell tunnels and most of the building support equipment. The second floor contains additional building support equipment and offices.

The HBA, covering the entire cell complex and serviced by a 40-ton bridge crane, provides access to the tops of the cells. This area contains the HRA, including repair rooms, change room, and access room, and provides space for clean equipment repair and mockup, and cask storage. The MESA, which includes the WCC/TR, SP glovebox, ER glovebox, and PR, is also located in the HBA.

B-3(b)(2) High Bay Area (HBA)

The HFEF HBA is used to store MW. That portion of the HBA where HW/MW is stored is posted with signs that state: **Danger — Unauthorized Personnel Keep Out.** The HBA is 68-ft wide by 154-ft long and extends over the main cell, decontamination cell, and truck lock. It provides access between the truck lock and ports in the cell roof for waste transfer operations. The HBA is serviced by a traveling bridge crane, which traverses the full HBA length and width and provides access to the truck lock through the ceiling hatch. The bridge spans approximately 60 ft and the hoist provides a lift capability of approximately 67 ft. The crane has 5- and 40-ton hoists.

B-3(b)(3) Hot Repair Area (HRA)

The HFEF HRA is a shielded area used to perform HW/MW verification, repackaging and/or container treatment. It is directly above the decontamination cell/spray chamber in the HFEF HBA and is divided into a number of separate rooms. The entire HFEF HRA is designed for effective control of radioactive contamination. The outside dimensions of the HFEF HRA are 45-ft long by 70-ft wide. Hatches and doors provide for the transfer of equipment or personnel between HRA rooms and between the HRA, HBA, and decontamination cell. A concrete-block wall and steel-containment wall separate the Hot Repair Room from the Clean Change Room. The containment wall has removable panels for the insertion of glove ports, tunnel suits, and transfer devices. Repair and Access Room walls have windows. The HRA is used to support the reactor programs by providing a containment enclosure where cell equipment (previously decontaminated and smear surveyed) can be further decontaminated, repaired or modified, and returned to the decontamination or main cell.

B-3(b)(4) Decontamination Cell/Spray Chamber (DC)

The HFEF DC is used to perform HW/MW verification, repackaging and/or container treatment. The HFEF DC is a heavily shielded cell located directly below the HFEF HRA. It is an extension of the main cell and is separated internally from the main cell by a 48-in. thick concrete shield wall. Internal cell dimensions are 20 x 30 x 25 ft high. The walls, floor, and ceiling are 48-in. thick concrete. The cell floor is lined with stainless steel and the walls are lined with carbon steel, which is coated with epoxy paint to a height of 13.5 ft above the cell floor. In-cell work is performed using electromechanical manipulators operated by personnel located outside of the cell walls. One of the work stations along the west wall is equipped with a spray chamber consisting of a 7.75 x 9.5 x 12-ft sealed stainless-steel enclosure fitted with water spraying fixtures normally used for equipment decontamination. When HW/MW verification, container treatment, and/or repackaging activities are being performed in the spray chamber, the water spray system is isolated and tagged out and the drain in the spray-chamber floor (used in routine spray-chamber operations) is blocked off. All HW/MW must be removed from the spray chamber when verification, container treatment, and/or repackaging activities are not being performed.

B-3(b)(5) Waste Characterization Chamber (WCC)/Transfer Room (TR)

The HFEF WCC/TR is used to perform HW/MW verification, repackaging, and/or container treatment. The HFEF WCC is a metal framed enclosure in the Operations Room and allows personnel access via glove ports around the chamber. The TR is directly below the HFEF WCC to access the bottom of the HFEF WCC for interfacing waste containers. A 42-in. high stainless-steel wainscot is installed on the walls of the TR. The floor is steel beam and covered with 0.375-in. thick sheets of carbon steel. A 2-in. high carbon-steel curb surrounds the room at the walls. The floor and curb are seal-welded at the seams and edges. The HFEF WCC is approximately 16-ft long, 8.5-ft wide, by 8-ft high, and is framed on the outside with 4-in. carbon-steel square tubing. It has an inner surface constructed of 304 stainless steel that is 0.135-in. thick on the top and sides, and 0.375-in. thick on the bottom. The WCC has four handling stations on the front surface, each with two glove ports and a window (0.5-in. thick) constructed of Lexan™. Additional windows and glove ports are located on all sides of the HFEF WCC. Portal openings on the bottom surface of the enclosure provide access for waste containers. WCC openings allow container attachment to the ports during handling operations. The HFEF WCC is mounted on a carbon-steel structure that provides approximately 7 ft of clearance under the HFEF WCC for handling and transfer operations. HFEF WCC equipment provided for handling material during the waste characterization process includes two hydraulically-driven manipulators and a jib crane. The HFEF WCC ventilation system maintains a minimum negative pressure differential of 0.3 in. H_2O inside the HFEF WCC, with respect to the operating area, when HW/MW containers are open. High-efficiency particulate air (HEPA) filters are provided at the HFEF WCC inlet and outlet. The system is designed to automatically ensure adequate inflow of air through a credible breach in the enclosure system.

The SP glovebox is located on the east mezzanine of the Operations Room and is connected to a port on the east end of the WCC. It is an L-shaped structure that is approximately 6.7-ft high. The north-south leg of the glovebox is approximately

6.25-ft long by 2.8-ft wide, and the east-west leg is approximately 12.2-ft long by 2.8- to 4-ft wide. The SP glovebox was designed for sampling, preparation, analysis, and/or transfer of sludge samples. The windows and walls of the glovebox provide the same shielding protection as the WCC. Filtered air from the TR is supplied to the box, and then exhausted to the WCC.

The ER glovebox, connected to a port on the top of the WCC, is located in the Equipment Room on the HRA/Operations Room roof. It is approximately 16-ft long by 3.8-ft wide by 9-ft high. The ER glovebox was designed for the repair of WCC equipment without requiring the equipment to be bagged into and out of the WCC. The ER glovebox includes an electrically-driven hoist and trolley system for transferring equipment to and within the glovebox. Glove ports provide remote manual access to the equipment being repaired. The ER glovebox also includes a hatch to insert/remove large items and internal hydraulic and electrical connections for test purposes. Filtered air from the TR is supplied to the box, then exhausted to the WCC exhaust.

B-3(b)(6) Preparation Room (PR)

The HFEF PR is used to store HW/MW pending/following performance of HW/MW verification, repackaging, container treatment and/or final disposition. The HFEF PR is approximately 56 x 14 x 17 ft high, is located in the northeastern portion of the HBA, interfaces with the TR, and extends to the east wall of the HBA. The HFEF PR is accessed from the HBA via a double door. The HFEF PR is equipped with a crane for moving containers between the HBA and HFEF PR. A 42-in. high stainless-steel wainscot is installed on the walls of the HFEF PR. The floor in the HFEF PR (and TR) accommodates anticipated loading from carts that are used to move containers between the HFEF PR and TR. The floor is steel beam and covered with 0.375-in. thick sheets of carbon steel. A 2-in. high carbon-steel curb surrounds the room at the walls and two exterior doorways. The floor and curb are seal-welded at the seams and edges to form a secondary containment.

B-3(b)(7) Truck Lock (Non-HWMA)

The HFEF truck lock (which includes the truck lock and front and rear access areas) is located on the west end of HFEF and serves as the facility receiving and dispatching area for trucks and transporters. The truck lock is 87 x 17 ft, with a ceiling height of 27.5 ft. Overhead roll-up doors (approximately 16 x 14 ft) at the north and south ends of the truck lock provide large equipment access. In addition, the truck lock has a ceiling hatch that is 51 x 10-ft wide in the north portion and 13-ft wide in the south portion that provides access to the HBA and high bay crane.

HW/MW will be received (i.e., accepted and unloaded) via the HFEF truck lock. HW/MW containers will then be transferred from the truck lock into the HBA using a traveling bridge crane or the freight elevator (in the southwest corner of the HBA). Loaded trucks/transporters may, if necessary, remain in the truck lock area prior to/ following either unloading or shipment to the sender.

B-3(b)(8) HFEF Casks/Transporter Staging Area (Non-HWMA)

The cask and transporter staging area is located outside of HFEF, north of the facility and south of the access road. Loaded casks and/or loaded transporters may, if necessary, be staged in this area for up to 60 days prior to either unloading or shipment to the sender. The HFEF staging area is shown on the Floor Plan Schematic in Attachment B-8.

B-3(c) Radioactive Scrap and Waste Facility (RSWF) - Building 771

The RSWF, Building 771, consists of a fenced area (miscellaneous unit, S99) used for remote handled (RH) (hazardous waste with surface dose readings of 200 mRem or greater) MW storage in subsurface carbon-steel pipes, called liners.

A description of the RSWF, Building 771, is provided below. A number of RSWF photographs, schematics, and drawings are provided as follows:

- Attachment B-10, Photograph of the Fenced Area, RSWF, Building 771
- Attachment B-11, Schematics of RSWF Showing the RSWF Plot Plan, Liner Configurations, and Cathodic Protection System, RSWF, Building 771.

The location of the RSWF is shown on the MFC plot plan provided in Attachment B-2.

The RSWF, established in 1965 for the storage of RH MW, is outdoors. There are no permanent buildings. The facility is approximately 388 x 448 ft (4 acres) and is entirely enclosed by a fence. Sealed carbon-steel liners are buried vertically in the ground in bored holes such that the tops of the liners protrude approximately 4 in. above ground.

Prior to placing the liners in the storage area, several feet of gravel and soil were placed over the storage area and graded to slope gently from the centerline to the parallel sides, which were banked with gravel. This grade promotes run-off, reducing percolation, and also serves to prevent run-on into the area.

The RSWF is designed with a grid of approximately 27 rows, spaced approximately 12 ft apart, with approximately 50 storage sites per row. The storage liners are arranged on approximate 6-ft centers in the rows. The volume capacity, based on the size of the waste containers that are placed in storage, is approximately 53,000 gal. This assumes that approximately 1,320 of the liner sites are usable for MW storage.

There are three primary sizes of storage liners containing HW/MW currently located in RSWF. They are 16 in., 24 in., and 26 in. in diameter (ref. schematics of the liner sizes in Attachment B-11). Non-standard liners include 48-in., and 60- in. diameter sizes.

- 16-in. diameter liners: The 16-in. diameter standard liners are constructed of either Schedule-10 carbon steel and 12.33 ft long, or Schedule-40 carbon steel and 10 ft long. They have a 19-in. diameter oversized base plate welded to the liner bottom. They are sealed with a concrete shield plug/lid assembly welded into the top of the liner.

- 24-in. diameter liners: The 24-in. liners are constructed of Schedule-10 carbon steel and are 13.67-ft long, with a 26-in. diameter base plate. The 24-in. liners containing MW have a carbon-steel shield plug assembly welded into the top.

- 26-in. diameter liners: The 26-in. liners are constructed of 0.25-in. thick carbon steel and are 13 ft long. They have a 28-in. diameter base plate and are welded closed with a 6-in. carbon-steel plug.

- Non-standard liners: Non-standard liners include one 60-in. diameter by 10.8-ft long liner that stores an EBR-II cold trap, and two 48-in. diameter by 3.81-ft long liners that store EBR-II nuclide traps.

Two other types of liners with diameters of 24 and 30 in. were designed with flanged lids that are gasketed/bolted in place. The flanged 24-in. liners contain non-HW/MW, low level waste only. The 30-in. liners are maintained empty. They were installed to be available as overpacks during previous 24-in. liner relocation activities.

Waste is not placed directly in the carbon steel liners, but rather is placed in containers that are transferred into the liners. Shielding is provided by placing a 30-in. long concrete or 6-in. long steel shield plug in the liner and either welding it to the top of the liner, or fitting the liner with a blind flange, as applicable. The soil surrounding the liners provides additional passive radiation shielding.

The storage liners are protected from corrosion by a cathodic protection system [reference Attachment B-11 and Subsection D-5(d)(4)]. The source of the electrical power for the cathodic protection system is a 480 VAC, 3-phase, direct buried cable from Building MFC-711 to the RSWF.

B-3(c)(1) RSWF Staging Area (Non-HWMA)

The RSWF staging area is used for staging of Interim Storage Containers (ISCs) and Facility Transfer Containers (FTCs) and their transport vehicle for up to 10 days. The RSWF staging area is located before the RSWF main storage area along the southeast side of the main access road. The RSWF staging area is an asphalt pad measuring approximately 100 x 200 ft. The area is enclosed entirely by a 9-ft chain link fence. A gate off the main access road allows vehicles to enter or exit from the southwest side, and with its double gates vehicles may also enter or exit onto the main access road at the northeast side.

B-3(c)(2) North Fenced Area (Non-HWMA)

The North Fenced Area (NFA) is used to stage radioactive waste only in ISCs; no HW/MW is allowed. The NFA area is located before the RSWF main storage across from the RSWF staging area along the southwest side of the main access road. The NFA is an asphalt pad measuring approximately 100 x 200 ft. The area is enclosed entirely by a 9-ft chain link fence. Two gates off the main access road allow vehicles to enter or exit from the southwest side.

B-3(d) Sodium Components Maintenance Shop (SCMS)—Buildings 793, 793C, 793G

The SCMS consists of three buildings used for HW/MW container and tank storage, repackaging, and treatment (S01, S02, T01, T04). The three buildings include the following:

- Building 793—High Bay and Low Bay
- Building 793C—Storage Building
- Building 793G—Storage Building.

Descriptions of each of the SCMS buildings are provided in the following subsections. A number of SCMS photographs, schematics, and drawings are provided as follows:

- Attachment B-12, Photographs of the Exterior, SCMS Buildings

- Attachment B-13, Floor Plan Schematic Showing Facility Arrangement and Maximum Storage Capacity, SCMS Buildings 793, 793C and 793G
- Attachment B-14, Photographs of the Interior of SCMS Buildings.

The locations of the SCMS buildings are shown on the MFC plot plan provided in Attachment B-2.

B-3(d)(1) SCMS Building 793—High Bay

The High Bay is used to store, repackage, and/or treat HW/MW. The High Bay is a prefabricated steel frame building with insulated metal siding. It has a reinforced concrete floor that is approximately 39 x 66 ft with a ceiling height of 38 ft. The floor is curbed and sealed with an epoxy coating and is sloped toward floor drains that are routed to the Low Bay Pit (in the Low Bay). The High Bay houses the water wash vessel and its associated ventilation system and Change Room (provides radioactive contamination control); the water wash scrubber; the carbonation vessel; the removable melt, drain, and transfer system; and a work tent (radioactive contamination control).

The High Bay is serviced by two 15-ton electrically powered hoists on a single, manually powered 30-ton bridge, and one 5-ton electrically powered bridge crane installed on the building crane rails. The cranes provide the capability to move large components for removal of HW/MW during storage, repackaging, and/or treatment. Vehicle and component access into the High Bay is through doors located on the east and west ends of the building. Four personnel doors are provided on three sides of the High Bay. One door is located on the south end of the high bay, which allows entry into the low bay. Another door is located on the east end, which allows entry into a vestibule and then out of the building. Two additional doors are on the north side of the building, which are used as emergency exits. Lighting intensity is a minimum of 50-ft candles at floor level and the bulbs are enclosed in explosion-proof casings. Electrical outlets and explosion-proof electrical outlets, 120 volts, are provided around the inside periphery of the building. The High Bay is designed to Seismic Zone 3 of the UBC.

B-3(d)(2) SCMS Building 793—Low Bay

The Low Bay is used to store, repackage, and/or treat HW/MW. It is a self-supporting building with a standard construction reinforced concrete floor 24 x 48 ft and a 14-ft high ceiling on the low side. The walls of the prefabricated steel frame building are insulated. It contains a bank of HEPA filters, an exhaust fan for the ventilation of the High Bay, and power and motor controls for the fixed solidification station.

The Low Bay is serviced by a 1000 lb rated, electrically powered hoist installed on a monorail in the ceiling of the Low Bay. This hoist provides the capability to move containers before and after solidification and to remove large components for maintenance, disassembly and disposal. The Low Bay also has a pit that contains the carbonate retention vessel and the scrubber water tank. The floor inside the Low Bay Pit slopes toward a sump in the northeast corner of the pit floor and is painted with a waste-compatible epoxy coating. The floor of the pit is sloped to drain liquids to the 1.5 × 1.5 × 0.5-ft deep sump. The sump pump discharges into containers or to the carbonate retention vessel, as appropriate. The exterior pit walls are coated with waterproofing. The pit is covered by metal grating that allows personnel and equipment movement. At floor level there is a sampling station for the carbonate retention vessel and the scrubber water tank. The Low Bay contains two personnel doors: one going outside on the west end and one into the High Bay. The door on the east end of the building is a double door system that has a large door to accommodate the removal of pallets loaded with drums prior to and following solidification. Lighting intensity and electrical outlets, 120 volts, are of standard construction types. The Low Bay is designed to Seismic Zone 3 of the UBC.

B-3(d)(3) SCMS Building 793C

Building 793C, located west of the SCMS main building, is used for the storage of HW/MW. The building size is 40 × 30 ft with a 16-ft eave height. The floor of the storage building is concrete with a design load of 500 psf, sloping toward the center, with two small concrete sumps designed to remove liquid resulting from precipitation. The floor is painted with an epoxy coating; however, the epoxy floor is not maintained as the secondary containment. HW/MW containing liquids are stored atop spill pallets and non-liquid HW/MW containers are stored on pallets or secondary containment devices. Two 12 × 12-ft roll-up freight doors and two personnel doors are provided. The prefabricated metal building has ridge ventilation and a wall louver to provide gravity ventilation. Two electric heaters with thermostatically controlled fan operation provide heat for the storage building. The building is provided with fluorescent lighting, power outlets (120 volts) for using hand tools, and a welding outlet (480 volts). All roof and wall panel joints are self-sealing to maintain a weather-tight seal. The building is designed to Seismic Zone 2 of the UBC.

An 8 × 10 × 20-ft deep storage pit is located inside the building. The pit is constructed of reinforced concrete and includes a sump in the northeast corner of the pit floor (see Attachment B-13). The floor of the pit is sloped to drain any liquids to the 1.5 × 1.5 × 0.5-ft deep sump. An 8-mm thick polyethylene vapor barrier is installed under the pit floor and the exterior pit walls are coated with waterproofing.

B-3(d)(4) SCMS Building 793G

A metal storage building (shed), identified as 793G, is located south of SCMS Building 793C, and is used for the storage of HW/MW. The metal storage shed was built in the late 1980s to house sodium containers. Shed 793G is 13 × 25.5 ft, insulated, and has a personnel door and a large overhead roll-up door. The metal storage shed sits on reinforced concrete and is anchored to ensure the integrity in the wind.

B-3(e) Sodium Storage Building (SSB)—Building 703

The SSB, Building 703, consists of one building used for HW/MW container storage (S01).

A description of the SSB is provided below. A number of SSB photographs, schematics, and drawings are provided as follows:

- Attachment B-15, Photograph of the Exterior, SSB, Building 703
- Attachment B-16, Floor Plan Schematic Showing Facility Arrangement and Maximum Storage Capacity, SSB, Building 703
- Attachment B-17, Photograph of the Interior of SSB, Building 703.

The location of the SSB is shown on the MFC plot plan provided in Attachment B-2. Access to the building is by an asphalt paved road to the east end of the building.

The SSB is a prefabricated steel frame building with uninsulated metal wall and roof panels, as shown in photographs provided in Attachments B-15 and B-17. The wall and roof panels are nestable ribbed-type panels of painted steel. Steel flashing, closures, and trim provide weather-tight construction and finishing to the building. End laps in the roofing and side walls, in addition to all flashing and vertical joints of the siding, are sealed with continuous beads of sealant and/or sealant tape. Ridge vents and wall louvers, providing building passive ventilation, are designed to prevent moisture influx into the building.

The SSB is 50 x 100 ft with a nominal eave height of 12 ft (10 ft clear at the inside haunch connection of the structural frame). The building was placed on a 6-in. reinforced-concrete slab, elevated slightly above grade, ensuring that any precipitation drains away from the building. Access into the building is limited to two personnel doors and one 14 × 12-ft overhead door for forklift access on the east end. The doors are maintained closed and locked except when access is necessary for inspection or other routine activities.

The electrical system in the SSB consists of a 480-volt, three-phase power service, transformed to 120/208-volt power for lighting, receptacles, the overhead door motor, and the fire alarm and detection system.

B-4 Topographical Map

B-4(a) General Requirements [IDAPA 58.01.05.012; 40 CFR 270.14(b)(19)]

Topographical maps with informational requirements of this section (i.e., topographical relief of the required interval, date, clearly enunciated map orientation, and locations of access control barriers, buildings, structures, sewers, loading and unloading areas, fire control facilities, flood control or drainage barriers, run-off control systems and HWMA units) are provided as follows:

- United States Geological Survey (USGS) 7.5 Minute Series Little Butte SW Quadrangle that shows general topography of the MFC site [see Appendix I, Map 8, of INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)]
- Attachment B-18, MFC site-specific topographical map (1:200 scale) that includes the 40 CFR 270.14(b)(19) required detail
- MFC wind rose [see Exhibit B-6 of INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)]
- Flood Insurance Rate Map (FIRM) for Bingham County, Idaho (which details 100-year floodplain areas) [see Appendix II, Maps 01 and 03, of INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)]

- Map of surrounding land uses [see Exhibit B-9 of INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)]
- USGS Miscellaneous Investigation Map I-2330, Geologic Map of the Idaho National Engineering Laboratory and Adjoining Areas, Eastern Idaho, 1994 [see Exhibit B-10 of INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)].

B-5 Location [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(11)(i) and (ii) and 264.18(a)]

B-5(a) Seismic Standard [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(11)(i) and (ii) and 264.18(a)]

The MFC site is located in Bingham County, Idaho. Because the county in which the MFC site is located is listed in IDAPA 58.01.05.008 and 40 CFR 264, Appendix VI, MFC must demonstrate compliance with the seismic standard (ref. IDAPA 58.01.05.008; 40 CFR 264.18). MFC will demonstrate compliance with this standard using USGS data, which indicates there are no faults or other known evidence of Holocene horizon motion within 3,000 ft of the HWMA units.

B-5(b) Floodplain Standard [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(11)(iii) and 264.18(b)]

As detailed in the previously referenced FIRM for Bingham County, Idaho [ref. Subsection B-4(a)], the MFC site is entirely located in a Zone-C floodplain area (floods less frequent than every 500 years). The MFC HWMA units are located in the area addressed in Panel 1600 18 0050B; the footnote to the map indicates that this panel is not published, but the area is designated Zone C. Also, for Bingham County, Map Panel No. 25 of 750, section 11, includes a small part of the west side of the MFC area designated as Zone C. The requirements in 40 CFR 270.14(b)(11)(iv) and (v) [Subsections B-3(b)(1) through B-3(b)(3) of the EPA RCRA permit application review checklist] are not applicable to this permit application, as MFC is not in a 100-year floodplain.

B-6 Traffic Information [IDAPA 58.01.05.012; 40 CFR 270.14(b)(10)]

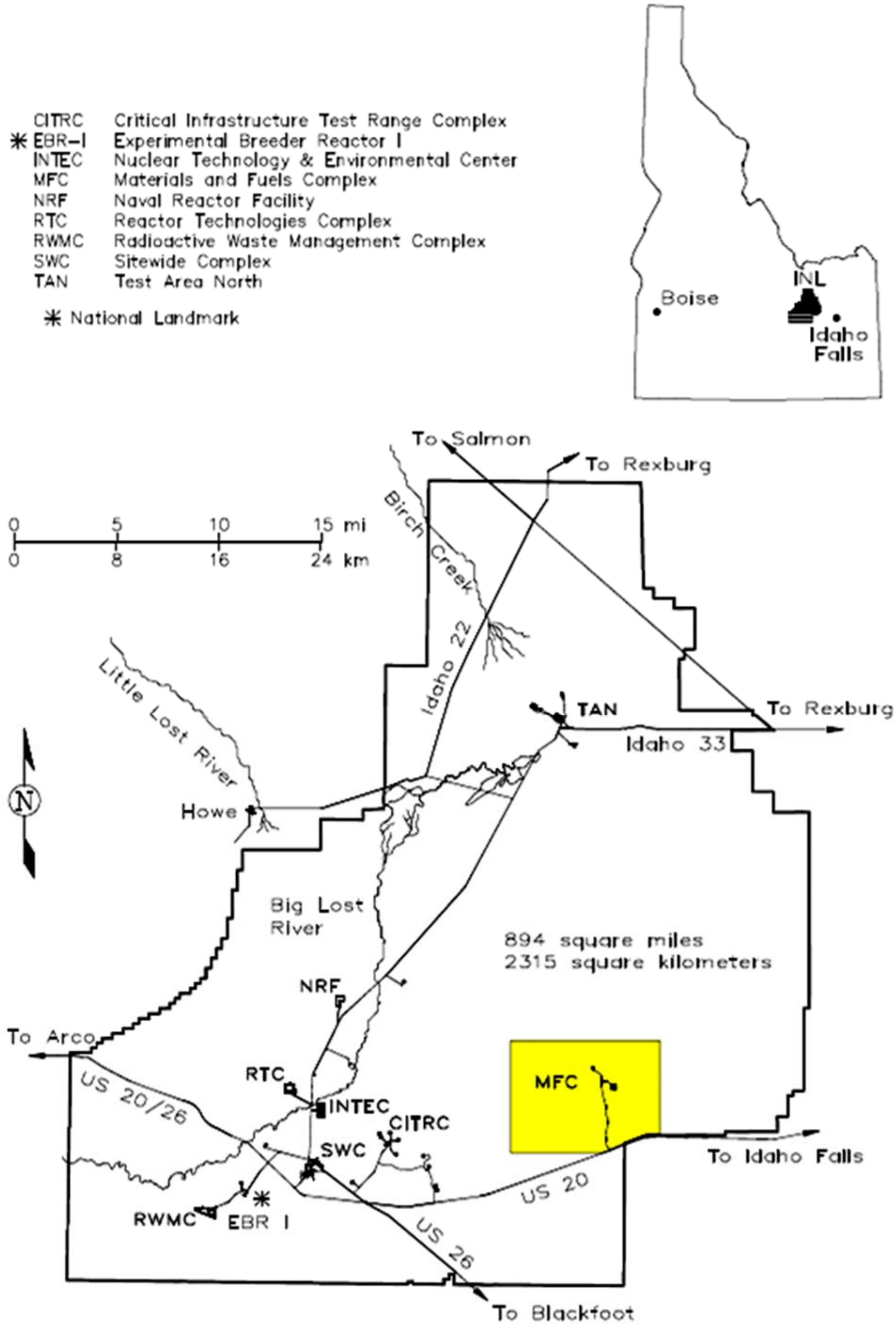
U.S. Route 20 is the general access route for MFC. Taylor Boulevard intersects U.S. 20 south of MFC and is the direct access road leading to the personnel security and control area. Taylor Boulevard is a 5.6-km paved roadway. A right turn off Taylor Boulevard leads to the MFC main entrance. The heaviest traffic on the MFC site roads occurs between 6:00 and 8:30 a.m. and, again, from 4:00 to 6:30 p.m., Monday through Thursday. Traffic consists primarily of site transit buses, employee-driven private vehicles, and government contractor vehicles from various communities near/surrounding the INL. The map provided in Attachment B-2 shows U.S. Route 20 and the roadways to and within the MFC site.

MFC access is attained through a security station located at the MFC main entrance. To enter the main MFC fenced area, vehicles must pass through a two-gate arrangement that allows security personnel to conduct thorough inspections. All personnel must pass through the security station to obtain proper dosimetry and verify they have proper identification and access credentials. Personnel or visitors without the proper credentials are escorted while on the MFC site. Exhibit B-14 of the INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131) provides access and traffic control information for the MFC.

Access to HWMA units and facilities within MFC is provided by a network of paved and gravel roadways. Any one of these roadways may be used to transport HW/MW among MFC facilities. Transport from MFC facilities to other facilities on the INL site is done via U.S. 20 or the Haul Road (east-west road intersecting Taylor Boulevard between MFC Security Gate 2 and U.S. 20). The roads accessing the MFC are constructed of asphalt, with load-bearing capacities of 68 metric tons (75 tons). The Haul Road has a capacity of 45,000 kg (100,000 lb). Roads within the MFC area, used to transport HW/MW, have been tested to 45,000 kg (100,000 lb) single-axle loading. Traffic is limited inside the MFC fenced area to security-approved vehicles, such as government and construction vehicles, and to a speed limit of 10 mph.

Attachment B-1

Schematic Showing MFC Administrative Boundaries

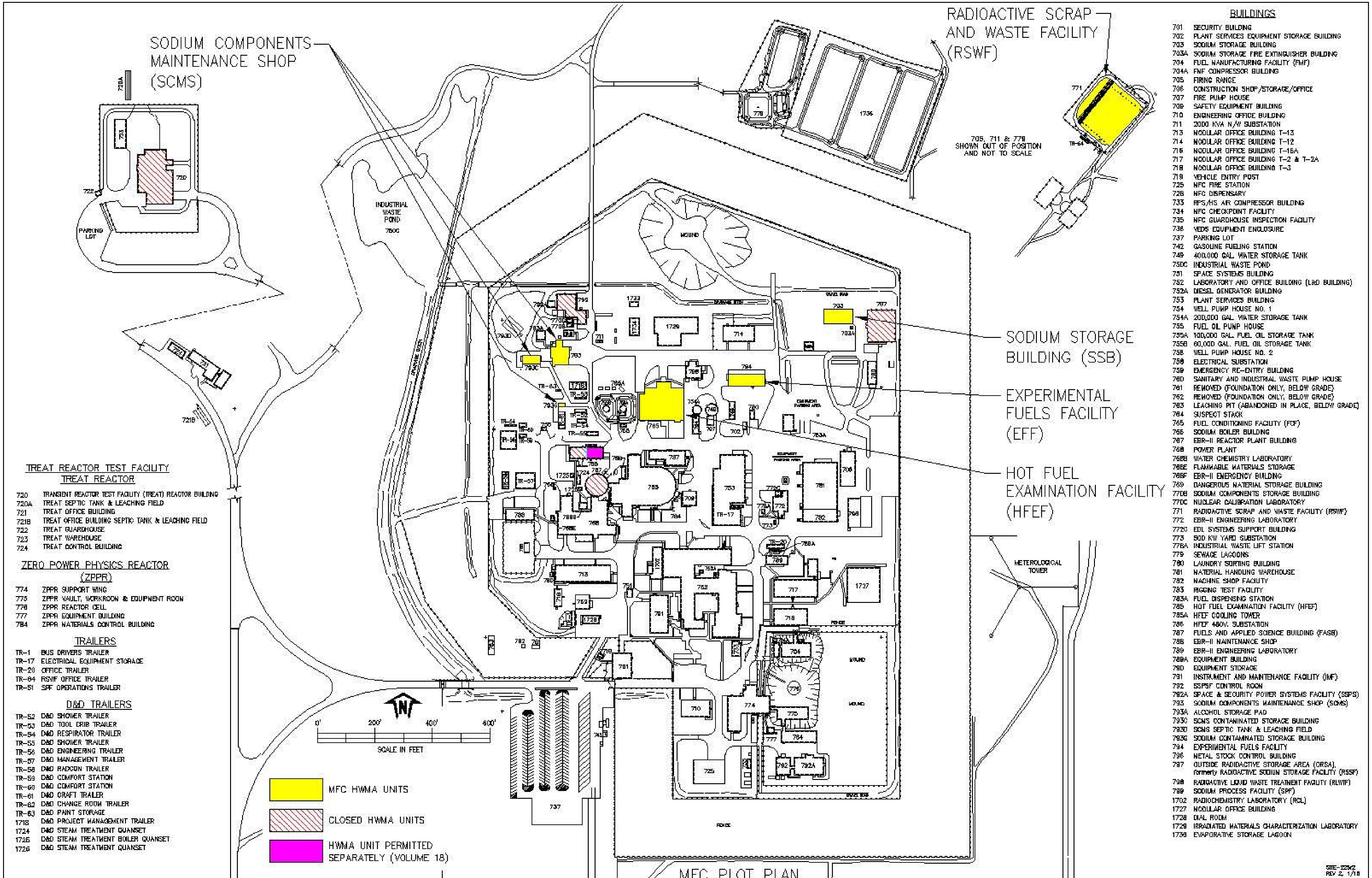


LOCATION OF MFC
ON THE INL SITE

SITE-192r2
8/13

Attachment B-2

MFC Plot Plan: Location of HWMA Units

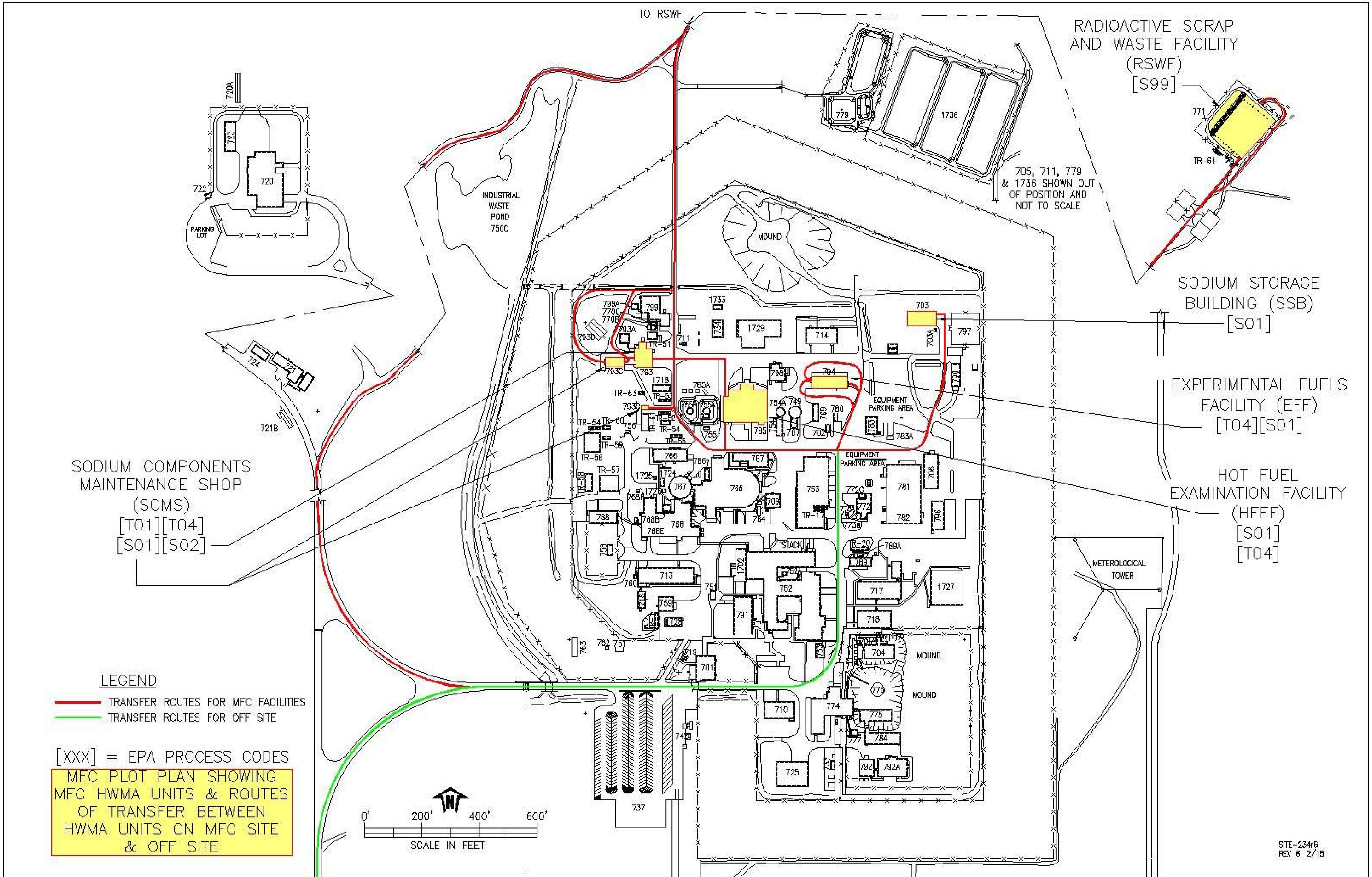


SODIUM COMPONENTS MAINTENANCE SHOP (SCMS)
RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF)
SODIUM STORAGE BUILDING (SSB)
EXPERIMENTAL FUELS FACILITY (EFF)
HOT FUEL EXAMINATION FACILITY (HFEF)
705, 711 & 779 SHOWN OUT OF POSITION AND NOT TO SCALE
INDUSTRIAL WASTE POND 750C
PARKING LOT
MOUND
METEROLOGICAL TOWER
FENCE
SCALE IN FEET
0' 200' 400' 600'
MFC HWMA UNITS
CLOSED HWMA UNITS
HWMA UNIT PERMITTED SEPARATELY (VOLUME 18)
MFC PLOT PLAN
TREAT REACTOR TEST FACILITY
TREAT REACTOR
720 TRANSIENT REACTOR TEST FACILITY (TREAT) REACTOR BUILDING
720A TREAT SEPTIC TANK & LEACHING FIELD
721 TREAT OFFICE BUILDING
721B TREAT OFFICE BUILDING SEPTIC TANK & LEACHING FIELD
722 TREAT GUARDHOUSE
723 TREAT WAREHOUSE
724 TREAT CONTROL BUILDING
ZERO POWER PHYSICS REACTOR (ZPPR)
774 ZPPR SUPPORT WING
775 ZPPR VAULT, WORKROOM & EQUIPMENT ROOM
776 ZPPR REACTOR CELL
777 ZPPR EQUIPMENT BUILDING
784 ZPPR MATERIALS CONTROL BUILDING
TRAILERS
TR-1 BUS DRIVERS TRAILER
TR-17 ELECTRICAL EQUIPMENT STORAGE
TR-20 OFFICE TRAILER
TR-64 RSWF OFFICE TRAILER
TR-51 SPF OPERATIONS TRAILER
D&D TRAILERS
TR-52 D&D SHOWER TRAILER
TR-53 D&D TOOL CRIB TRAILER
TR-54 D&D RESPIRATOR TRAILER
TR-55 D&D SHOWER TRAILER
TR-56 D&D ENGINEERING TRAILER
TR-57 D&D MANAGEMENT TRAILER
TR-58 D&D RADCON TRAILER
TR-59 D&D COMFORT STATION
TR-60 D&D COMFORT STATION
TR-61 D&D CRAFT TRAILER
TR-62 D&D CHANGE ROOM TRAILER
TR-63 D&D PAINT STORAGE
1718 D&D PROJECT MANAGEMENT TRAILER
1724 D&D STEAM TREATMENT QUANSET
1725 D&D STEAM TREATMENT BOILER QUANSET
1726 D&D STEAM TREATMENT QUANSET
BUILDINGS
701 SECURITY BUILDING
702 PLANT SERVICES EQUIPMENT STORAGE BUILDING
703 SODIUM STORAGE BUILDING
703A SODIUM STORAGE FIRE EXTINGUISHER BUILDING
704 FUEL MANUFACTURING FACILITY (FMF)
704A FMF COMPRESSOR BUILDING
705 FIRING RANGE
706 CONSTRUCTION SHOP/STORAGE/OFFICE
707 FIRE PUMP HOUSE
709 SAFETY EQUIPMENT BUILDING
710 ENGINEERING OFFICE BUILDING
711 2000 KVA N/W SUBSTATION
713 MODULAR OFFICE BUILDING T-13
714 MODULAR OFFICE BUILDING T-12
716 MODULAR OFFICE BUILDING T-16A
717 MODULAR OFFICE BUILDING T-2 & T-2A
718 MODULAR OFFICE BUILDING T-3
719 VEHICLE ENTRY POST
725 MFC FIRE STATION
726 MFC DISPENSARY
733 RPS/HS AIR COMPRESSOR BUILDING
734 MFC CHECKPOINT FACILITY
735 MFC GUARDHOUSE INSPECTION FACILITY
736 VEDS EQUIPMENT ENCLOSURE
737 PARKING LOT
742 GASOLINE FUELING STATION
749 400,000 GAL. WATER STORAGE TANK
750C INDUSTRIAL WASTE POND
751 SPACE SYSTEMS BUILDING
752 LABORATORY AND OFFICE BUILDING (L&O BUILDING)
752A DIESEL GENERATOR BUILDING
753 PLANT SERVICES BUILDING
754 WELL PUMP HOUSE NO. 1
754A 200,000 GAL. WATER STORAGE TANK
755 FUEL OIL PUMP HOUSE
755A 100,000 GAL. FUEL OIL STORAGE TANK
755B 60,000 GAL. FUEL OIL STORAGE TANK
756 WELL PUMP HOUSE NO. 2
758 ELECTRICAL SUBSTATION
759 EMERGENCY RE-ENTRY BUILDING
760 SANITARY AND INDUSTRIAL WASTE PUMP HOUSE
761 REMOVED (FOUNDATION ONLY, BELOW GRADE)
762 REMOVED (FOUNDATION ONLY, BELOW GRADE)
763 LEACHING PIT (ABANDONED IN PLACE, BELOW GRADE)
764 SUSPECT STACK
765 FUEL CONDITIONING FACILITY (FCF)
766 SODIUM BOILER BUILDING
767 EBR-II REACTOR PLANT BUILDING
768 POWER PLANT
768B WATER CHEMISTRY LABORATORY
768E FLAMMABLE MATERIALS STORAGE
768F EBR-II EMERGENCY BUILDING
769 DANGEROUS MATERIAL STORAGE BUILDING
770B SODIUM COMPONENTS STORAGE BUILDING
770C NUCLEAR CALIBRATION LABORATORY
771 RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF)
772 EBR-II ENGINEERING LABORATORY
772C EDL SYSTEMS SUPPORT BUILDING
773 500 KW YARD SUBSTATION
776A INDUSTRIAL WASTE LIFT STATION
779 SEWAGE LAGOONS
780 LAUNDRY SORTING BUILDING
781 MATERIAL HANDLING WAREHOUSE
782 MACHINE SHOP FACILITY
783 RIGGING TEST FACILITY
783A FUEL DISPENSING STATION
785 HOT FUEL EXAMINATION FACILITY (HFEF)
785A HFEF COOLING TOWER
786 HFEF 480V. SUBSTATION
787 FUELS AND APPLIED SCIENCE BUILDING (FASB)
788 EBR-II MAINTENANCE SHOP
789 EBR-II ENGINEERING LABORATORY
789A EQUIPMENT BUILDING
790 EQUIPMENT STORAGE
791 INSTRUMENT AND MAINTENANCE FACILITY (IMF)
792 SSPSF CONTROL ROOM
792A SPACE & SECURITY POWER SYSTEMS FACILITY (SSPS)
793 SODIUM COMPONENTS MAINTENANCE SHOP (SCMS)
793A ALCOHOL STORAGE PAD
793C SCMS CONTAMINATED STORAGE BUILDING
793D SCMS SEPTIC TANK & LEACHING FIELD
793G SODIUM CONTAMINATED STORAGE BUILDING
794 EXPERIMENTAL FUELS FACILITY
796 METAL STOCK CONTROL BUILDING
797 OUTSIDE RADIOACTIVE STORAGE AREA (ORSA), formerly RADIOACTIVE SODIUM STORAGE FACILITY (RSSF)
798 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY (RLWTF)
799 SODIUM PROCESS FACILITY (SPF)
1702 RADIOCHEMISTRY LABORATORY (RCL)
1727 MODULAR OFFICE BUILDING
1728 DIAL ROOM
1729 IRRADIATED MATERIALS CHARACTERIZATION LABORATORY
1736 EVAPORATIVE STORAGE LAGOON
SITE-2292
REV 2, 1/18

Attachment B-3

Location of HWMA Units, Process Codes, and Transfer

Routes Between MFC HWMA Units and Off-site


TO RSWF
RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF) [S99]
705, 711, 779 & 1736 SHOWN OUT OF POSITION AND NOT TO SCALE
INDUSTRIAL WASTE POND 750C
MOUND
SODIUM STORAGE BUILDING (SSB) [S01]
EXPERIMENTAL FUELS FACILITY (EFF) [T04][S01]
HOT FUEL EXAMINATION FACILITY (HFEF) [S01] [T04]
SODIUM COMPONENTS MAINTENANCE SHOP (SCMS) [T01][T04] [S01][S02]
PARKING LOT
EQUIPMENT PARKING AREA
STACK
METEROLOGICAL TOWER
LEGEND
TRANSFER ROUTES FOR MFC FACILITIES
TRANSFER ROUTES FOR OFF SITE
[XXX] = EPA PROCESS CODES
MFC PLOT PLAN SHOWING MFC HWMA UNITS & ROUTES OF TRANSFER BETWEEN HWMA UNITS ON MFC SITE & OFF SITE
0' 200' 400' 600'
SCALE IN FEET
SITE-234r6
REV 6, 2/15

Attachment B-4

Photograph of the Exterior

EFF Building 794

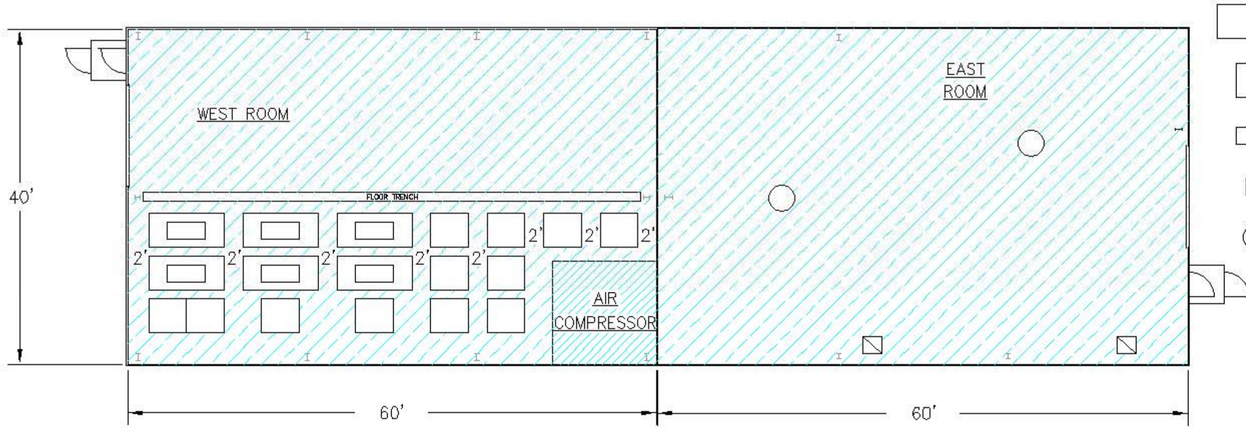
Experimental Fuels Facility (EFF) Building 794, West End
Photo taken October 2014

Attachment B-5

Floor Plan Schematic Showing Facility Arrangement and

Maximum Storage Capacity

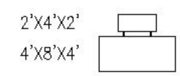
EFF Building 794



MAXIMUM
CAPACITY
12000 GAL.

LEGEND:

- CONTAINER/DEBRIS STORAGE, VERIFICATION, REPACKAGING, EXAMINATION AND/OR TREATMENT ACTIVITIES
- 4'X8'X4' STORAGE BOX
- 4'X4' PALLET-4 DRUMS DOUBLE-STACKED
- 2'X4'X2" STORAGE BOX
- DRAIN TO INDUSTRIAL WASTE
- SUMP



EXAMPLE OF STACKING
ELEVATION VIEW

NOTES:
1. CONTAINMENT ENCLOSURE TENT MAY OR MAY NOT BE LOCATED ON EITHER THE EAST ROOM OR WEST ROOM.
2. 2' AISLE SPACING AND ADEQUATE SPACING FOR VISUAL INSPECTION BETWEEN CONTAINERS.
3. STORAGE CONFIGURATION REPRESENTS 12,000 GAL.

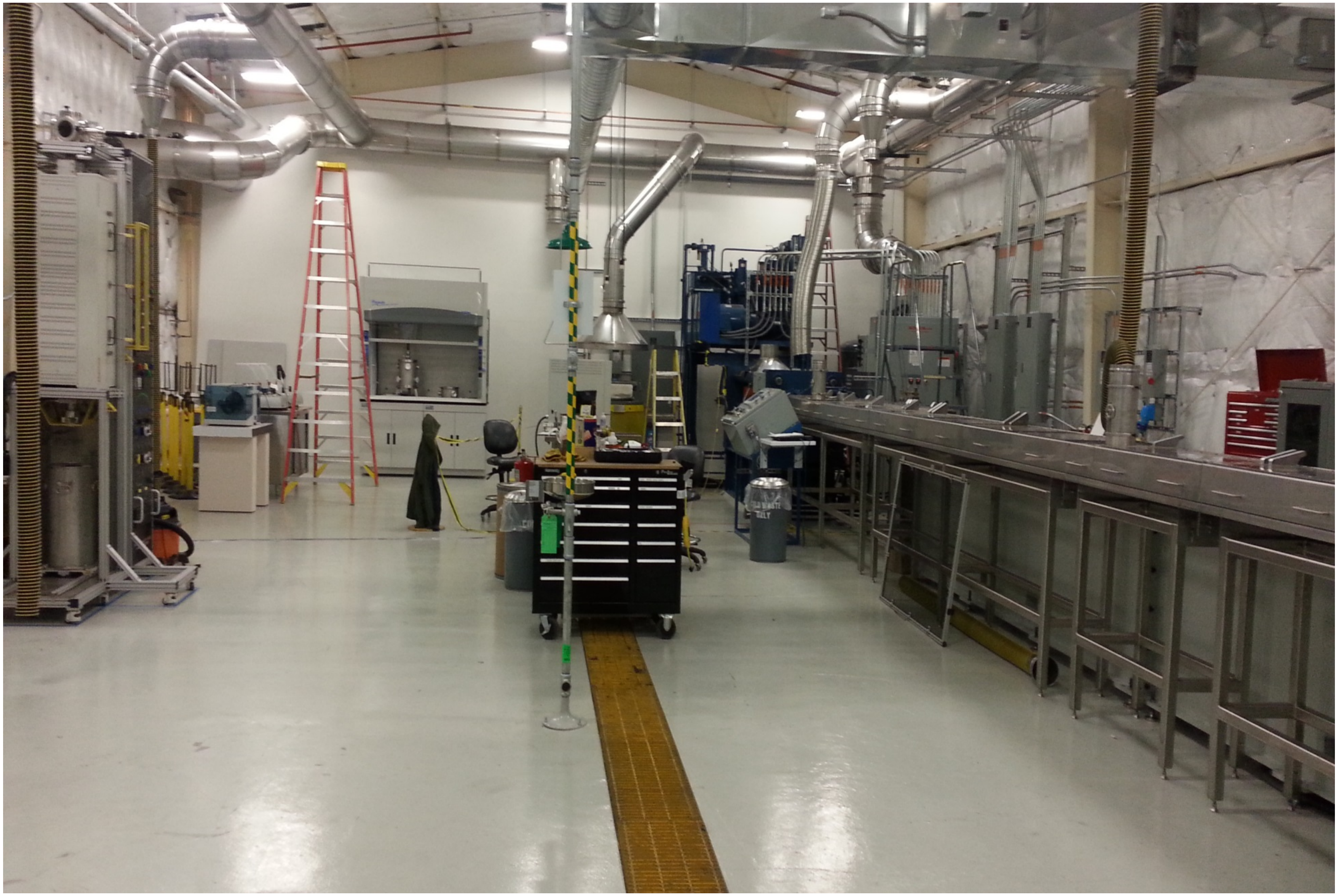
EFF – BUILDING 794
EXAMPLE FLOOR PLAN SHOWING FACILITY ARRANGEMENT
AND MAXIMUM STORAGE CAPACITY

794-013r6
REV 6, 2/15

Attachment B-6

Photograph of the Interior

EFF Building 794



Experimental Fuels Facility (EFF) Building 794, West Room
Photo taken July 2014

Attachment B-7

Photograph of the Exterior

HFEF Building 785

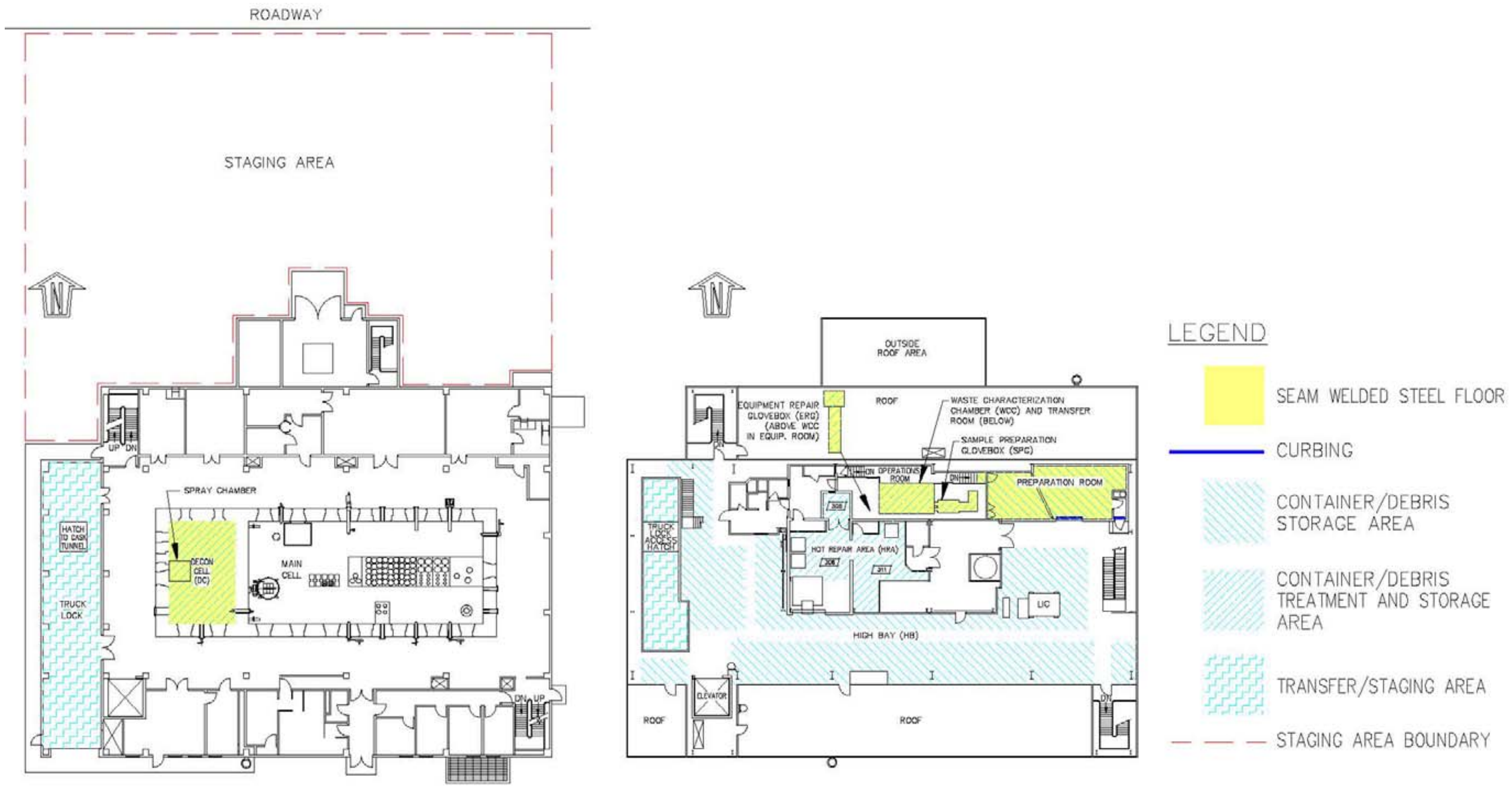
Hot Fuel Examination Facility (HFEF) Building 785, South End
Photo taken January 2015

Attachment B-8

Floor Plans Schematic Showing Facility Arrangement and

Maximum Storage Capacity

HFEF Building 785



NOTE: MAXIMUM STORAGE CAPACITY–10,725 GAL

1ST FLOOR

HIGH BAY FLOOR

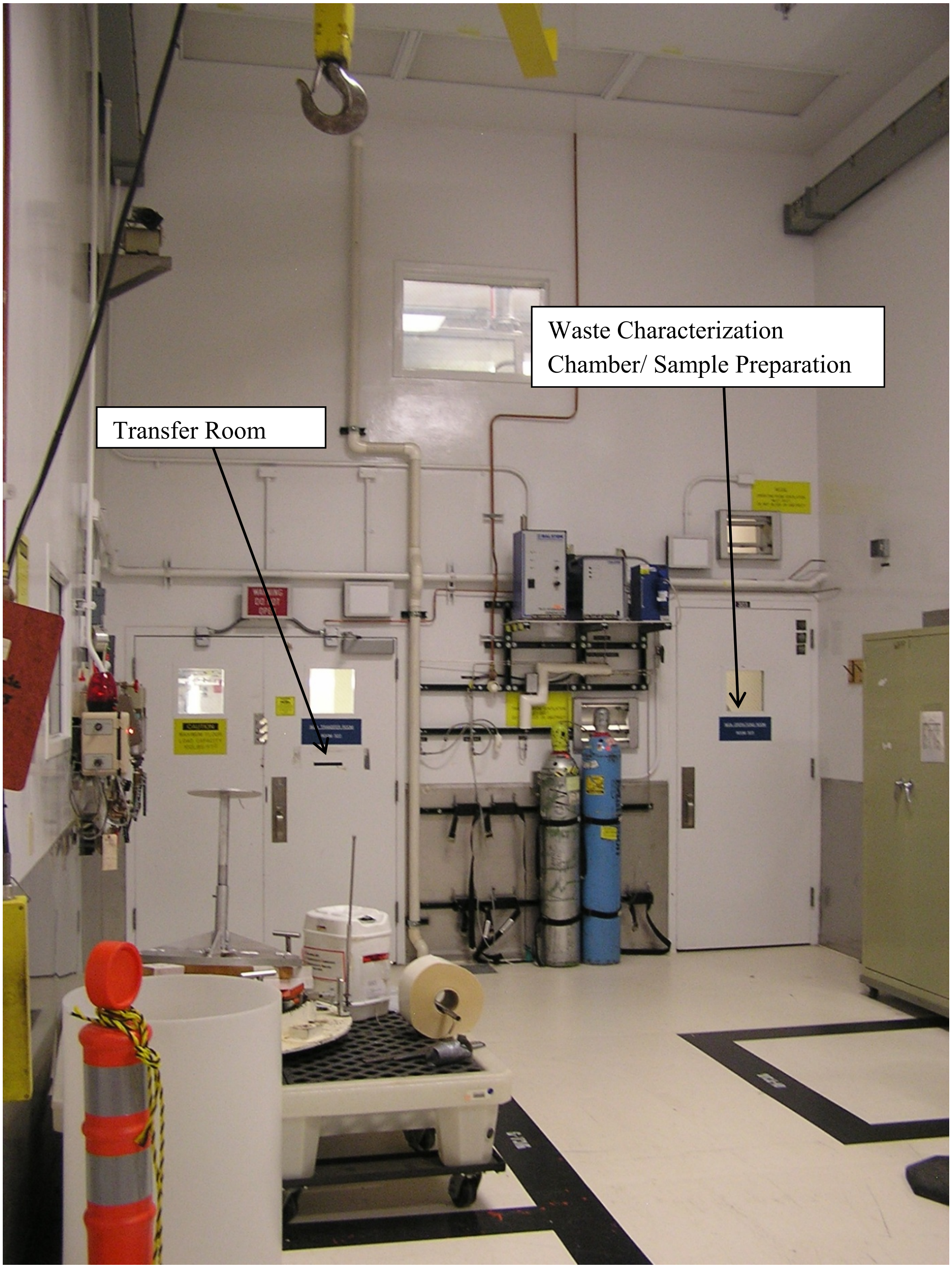
785–353r6
REV 6, 2/15

HFEF BUILDING 785 – 1ST FLOOR & HIGH BAY FLOOR PLAN SHOWING FACILITY ARRANGEMENT, MAXIMUM STORAGE CAPACITY AND FIXED SECONDARY CONTAINMENT

Attachment B-9

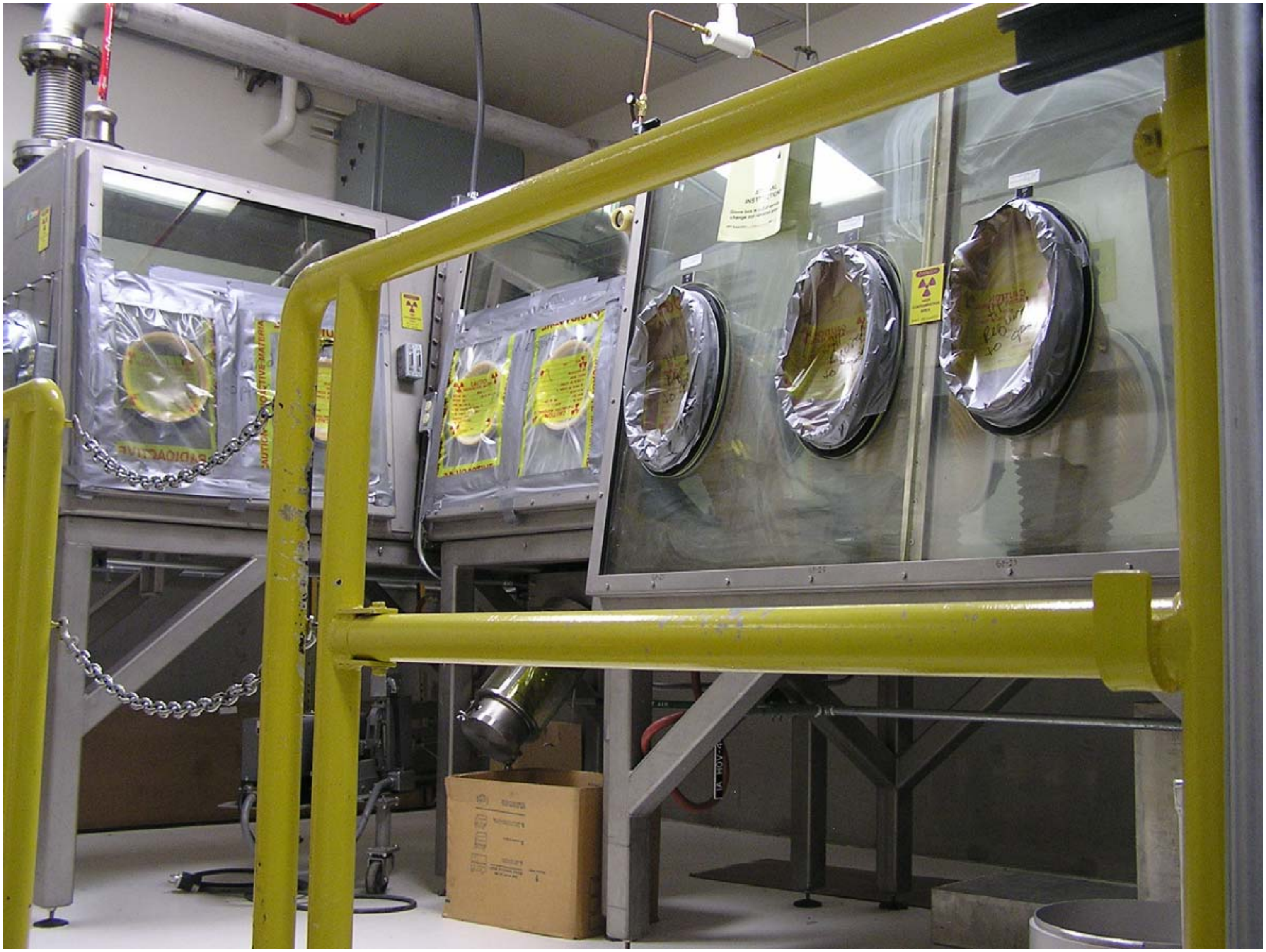
Photographs of the Interior

HFEF Building 785



HFEF Preparation Room
Photo taken August 2013

HFEF Transfer Room
Photo taken August 2013

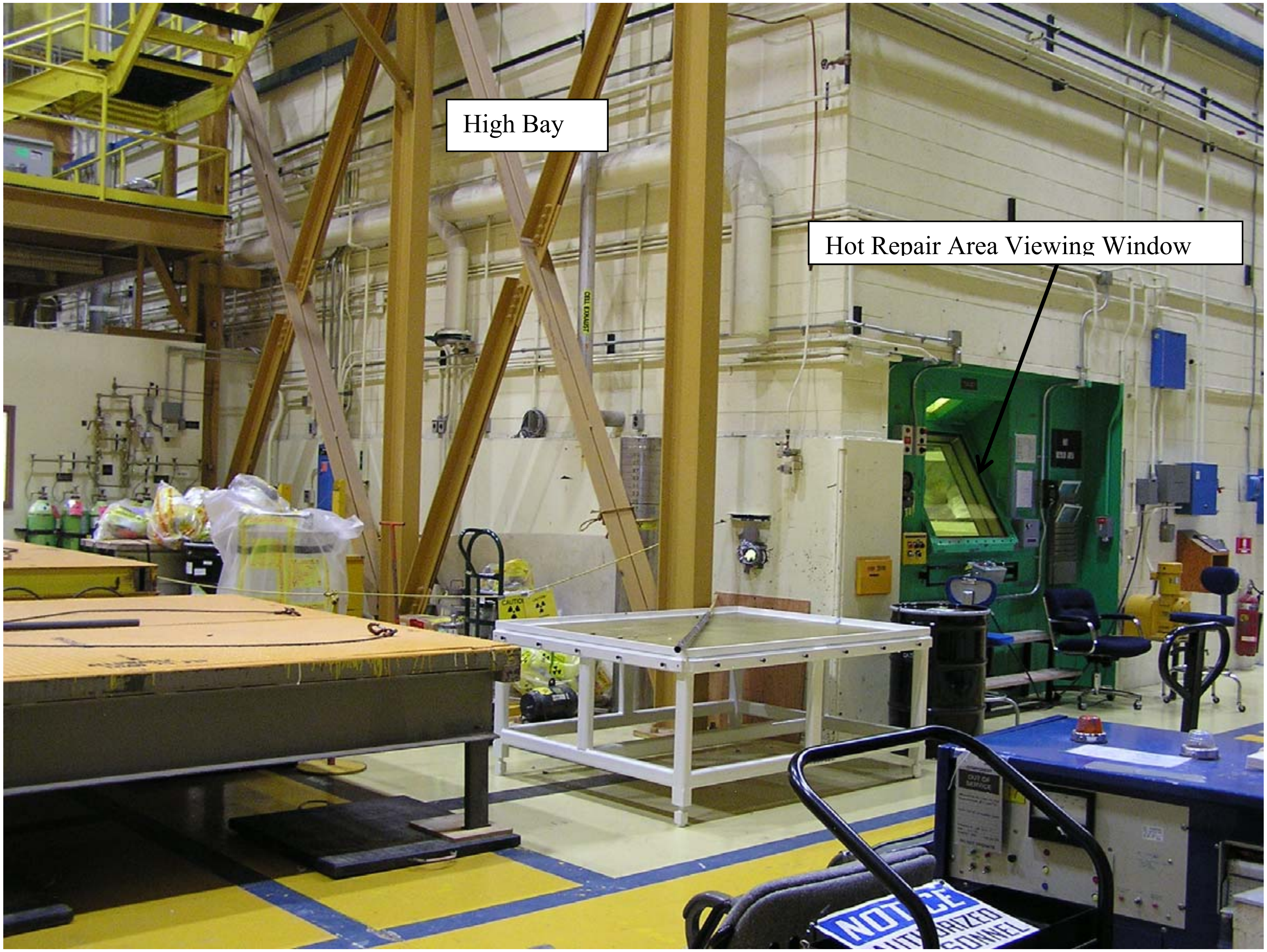


HFEF Sample Preparation Glovebox
Photo taken August 2013

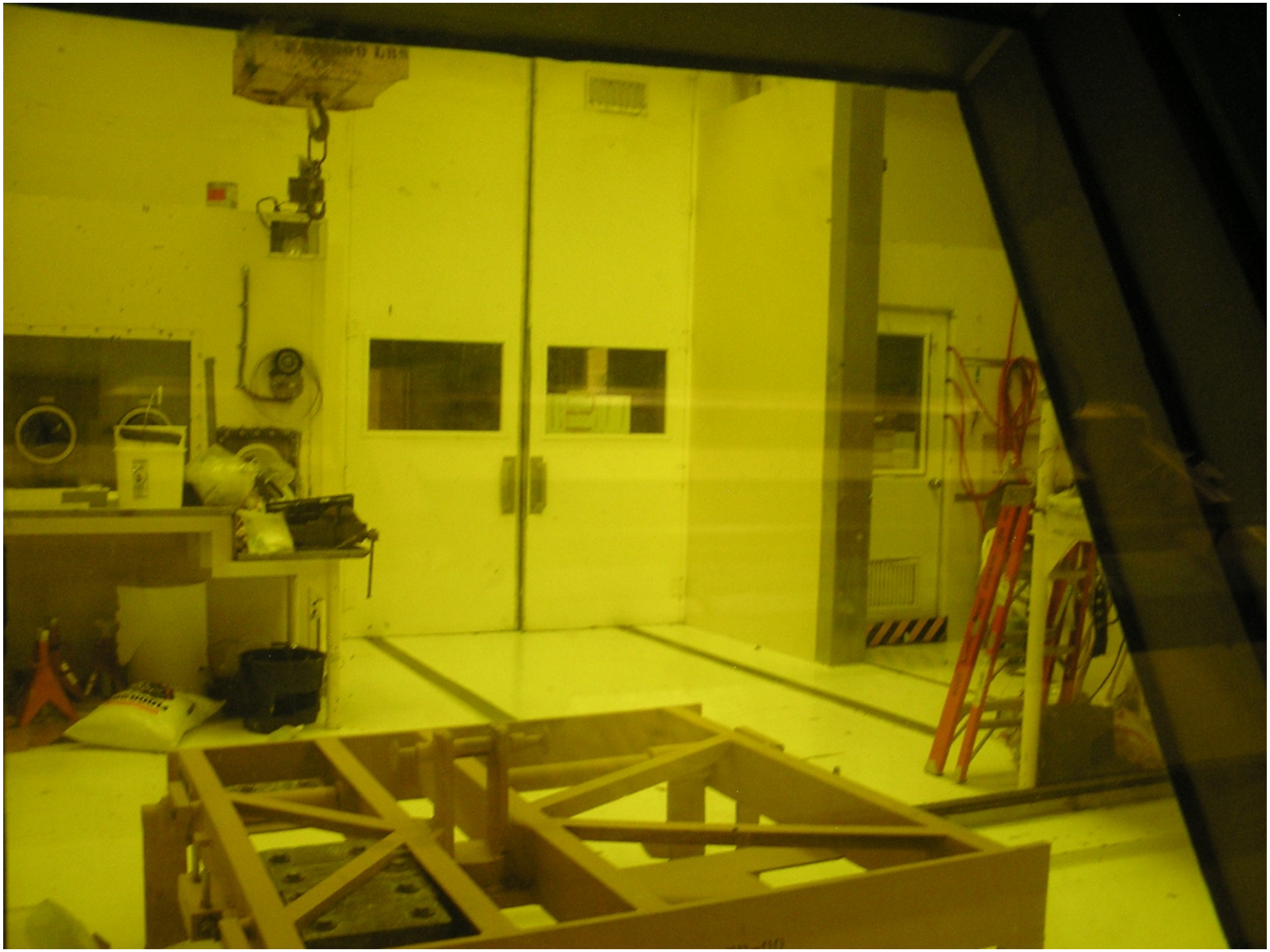
HFEF Waste Characterization Glovebox
Photo taken August 2013

HFEF Equipment Repair Glovebox
Photo taken August 2013

HFEF High Bay Area (looking from East to West)
Photo taken August 2013

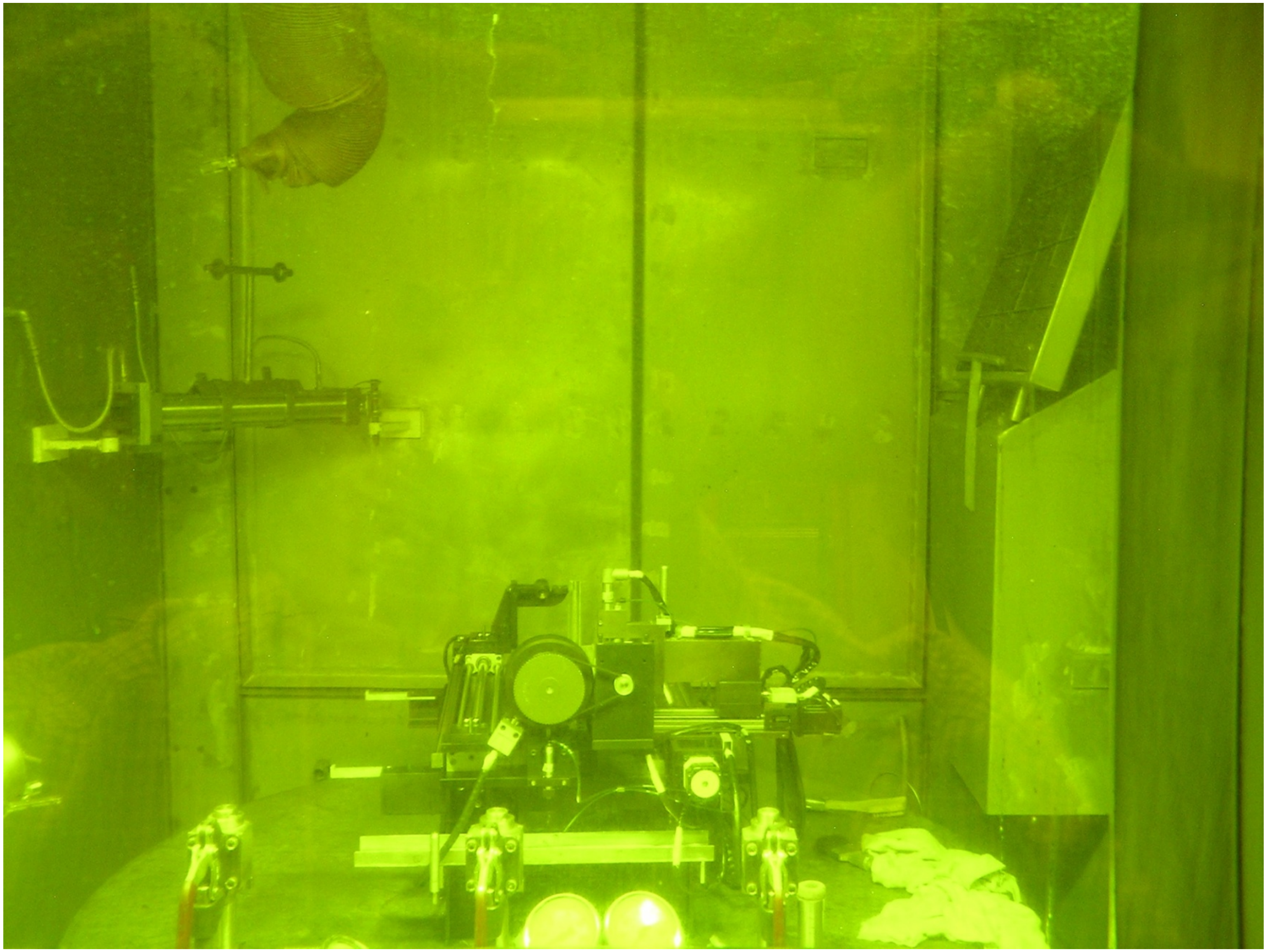


HFEF High Bay Area (West End)
Photo taken August 2013



HFEF Hot Repair Area
Photo taken August 2013

HFEF Decon Cell
Photo taken August 2013



HFEF Spray Chamber
Photo taken August 2013

Attachment B-10

Photograph of the Fenced Area

RSWF Building 771

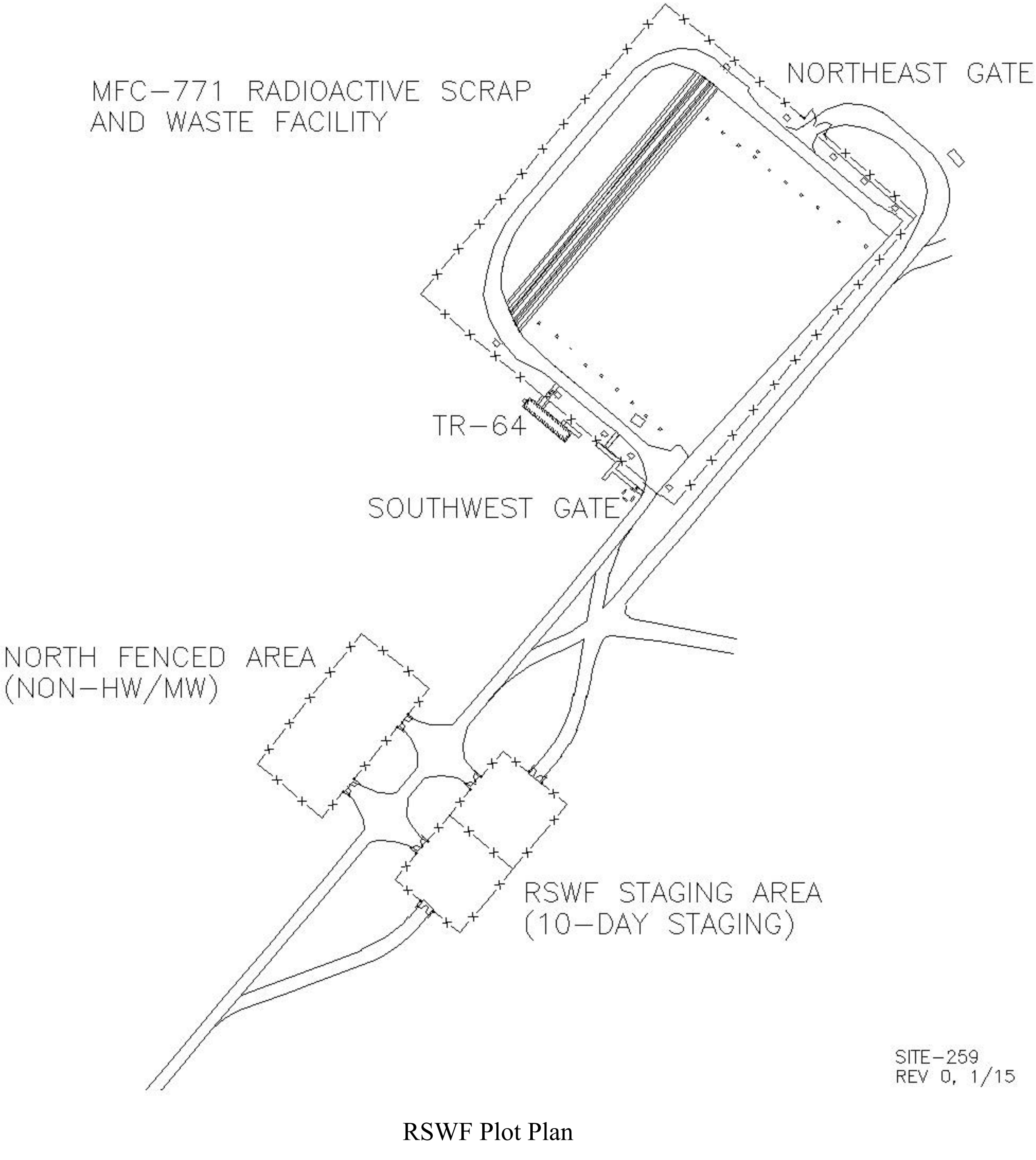
Radioactive Scrap and Waste Facility (RSWF) Building 771
Photo taken April 2014

Attachment B-11

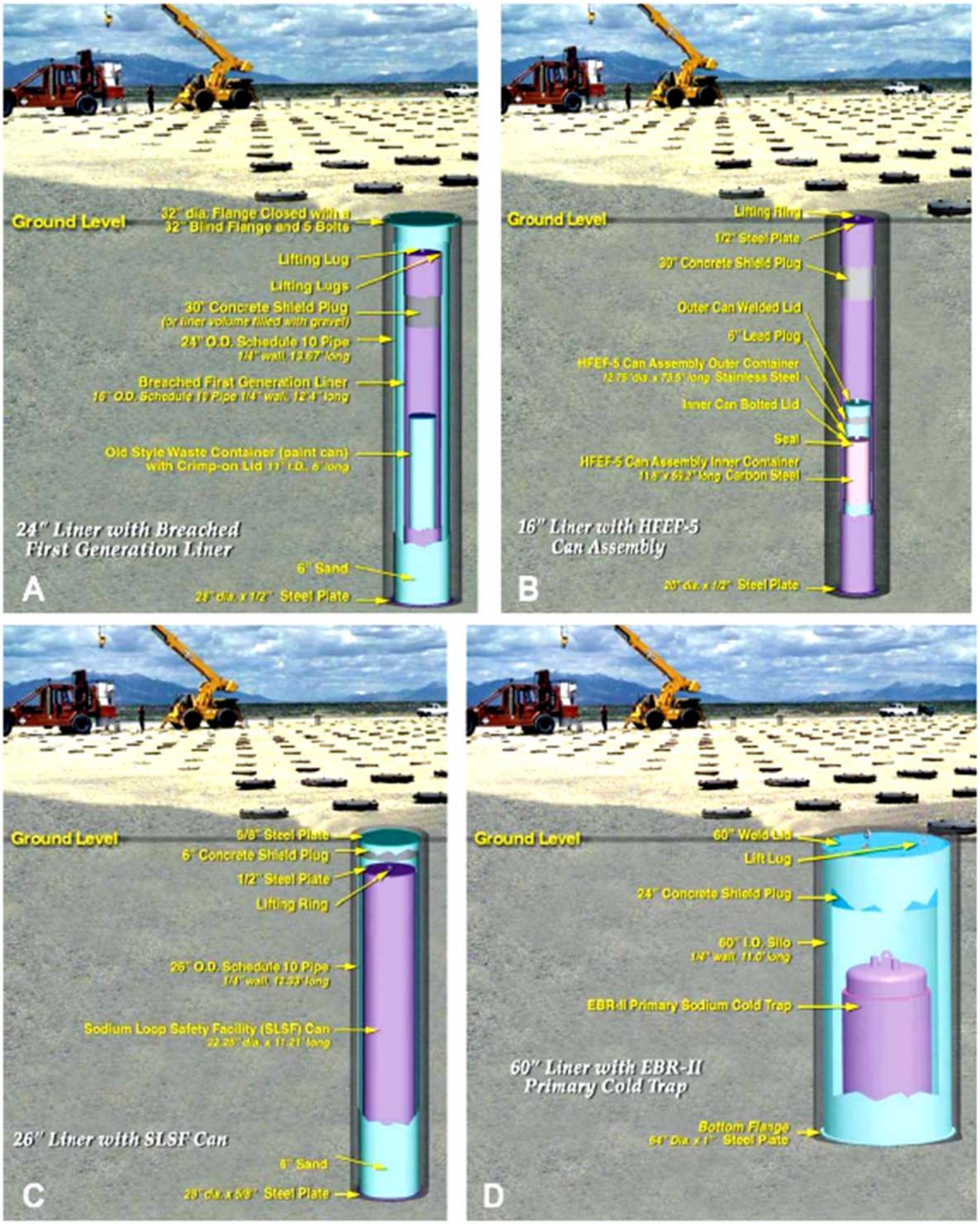
Schematics Showing the RSWF Plot Plan, Liner Configurations, and

Cathodic Protection System

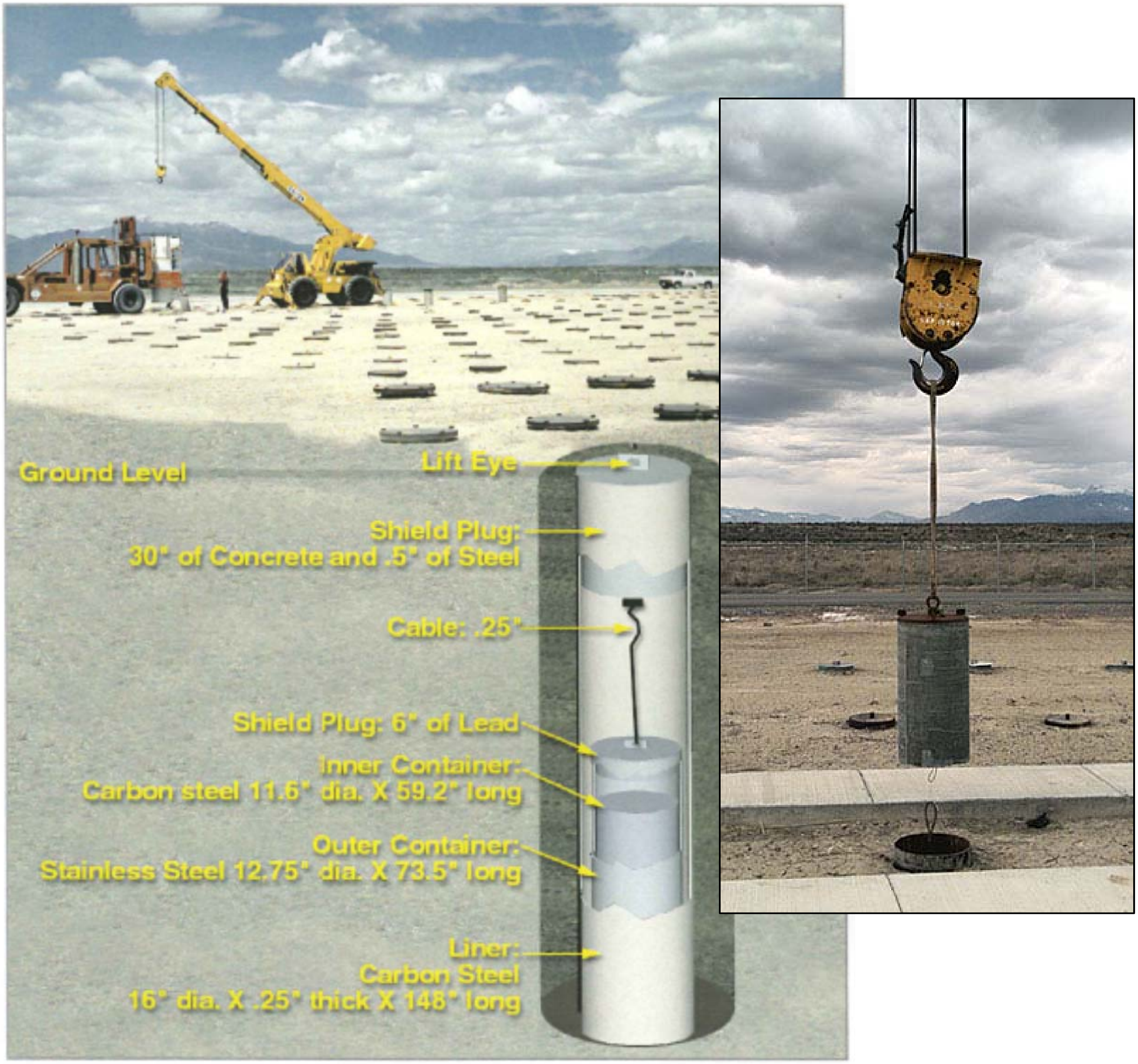
RSWF Building 771



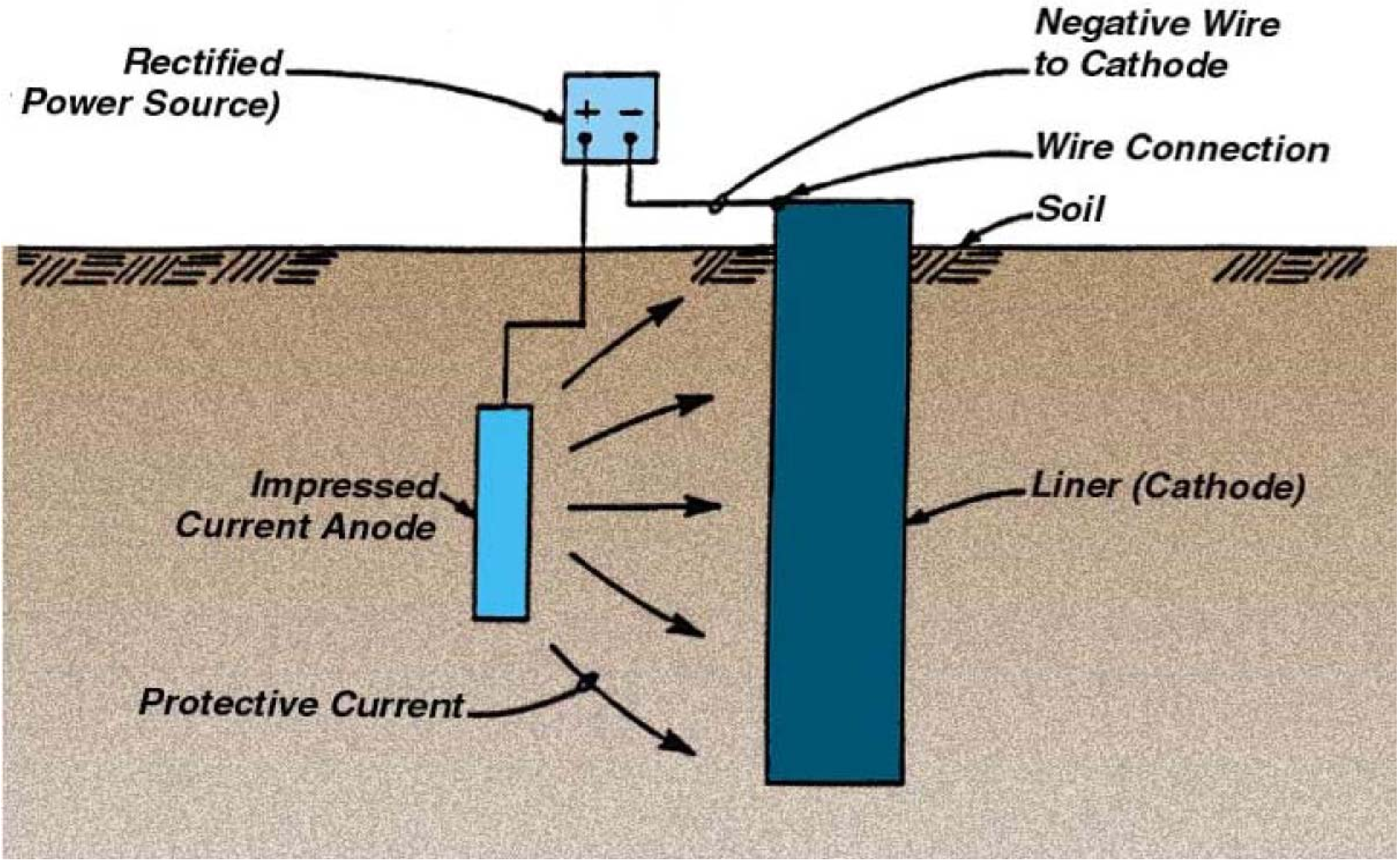
RSWF Plot Plan



RSWF Liner Configurations



RSWF Container Lifting



RSWF Cathodic Protection System

Attachment B-12

Photographs of the Exteriors

SCMS Buildings 793, 793C, and 793G

Sodium Components Maintenance Shop (SCMS) Building 793
Photo taken August 2013

Sodium Components Maintenance Shop (SCMS) Building 793C
Photo taken August 2013

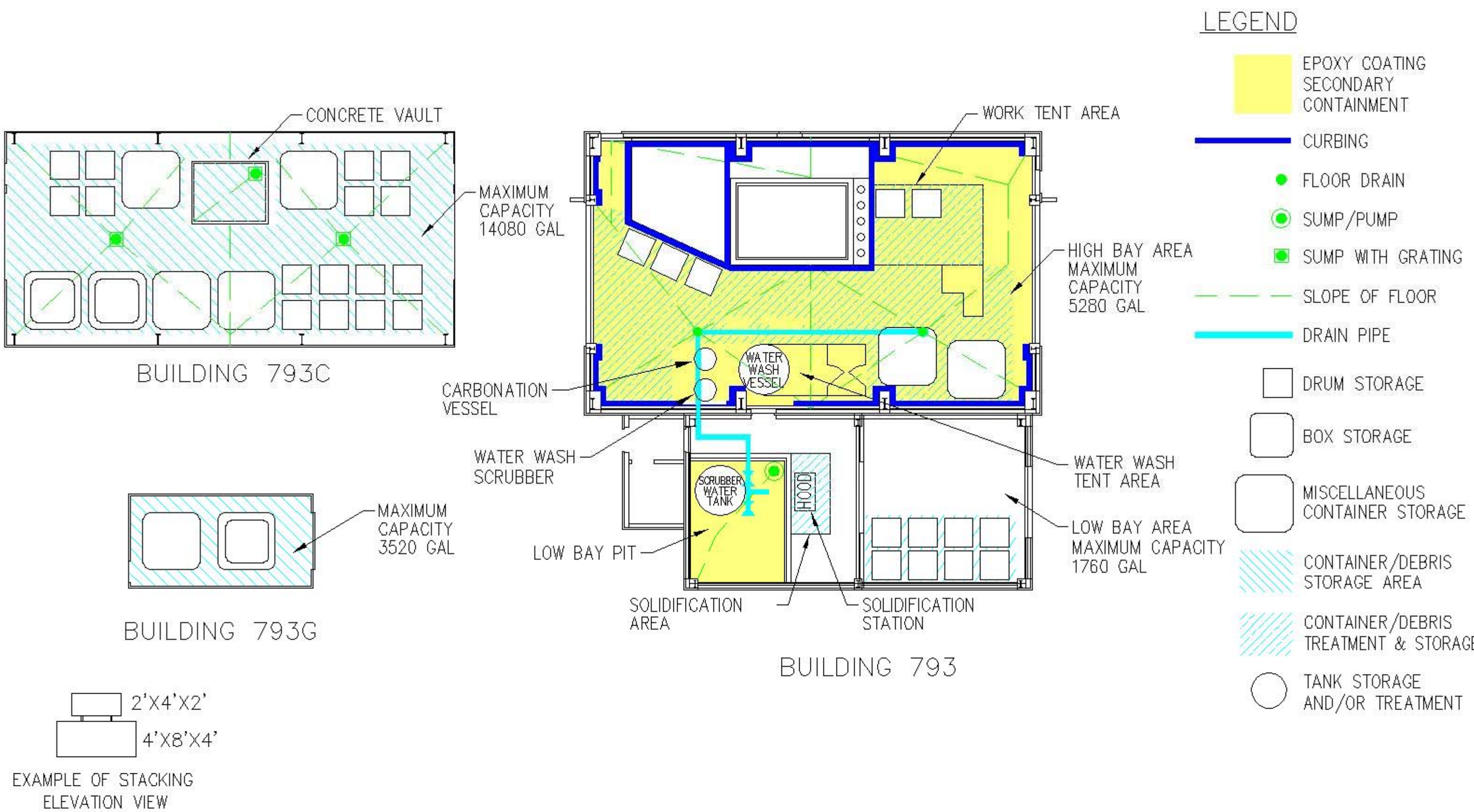
Sodium Components Maintenance Shop (SCMS) Building 793G
Photo taken August 2013

Attachment B-13

Floor Plans Schematic Showing Facility Arrangement and

Maximum Storage Capacity

SCMS Buildings 793, 793C, and 793G



793–047r4
REV 4, 2/15

SCMS BUILDINGS MFC–793, 793C, 793G
FLOOR PLANS SHOWING FACILITY ARRANGEMENTS, MAXIMUM STORAGE CAPACITY
AND FIXED SECONDARY CONTAINMENT

Attachment B-14

Photographs of the Interiors

SCMS Buildings 793, 793C, and 793G

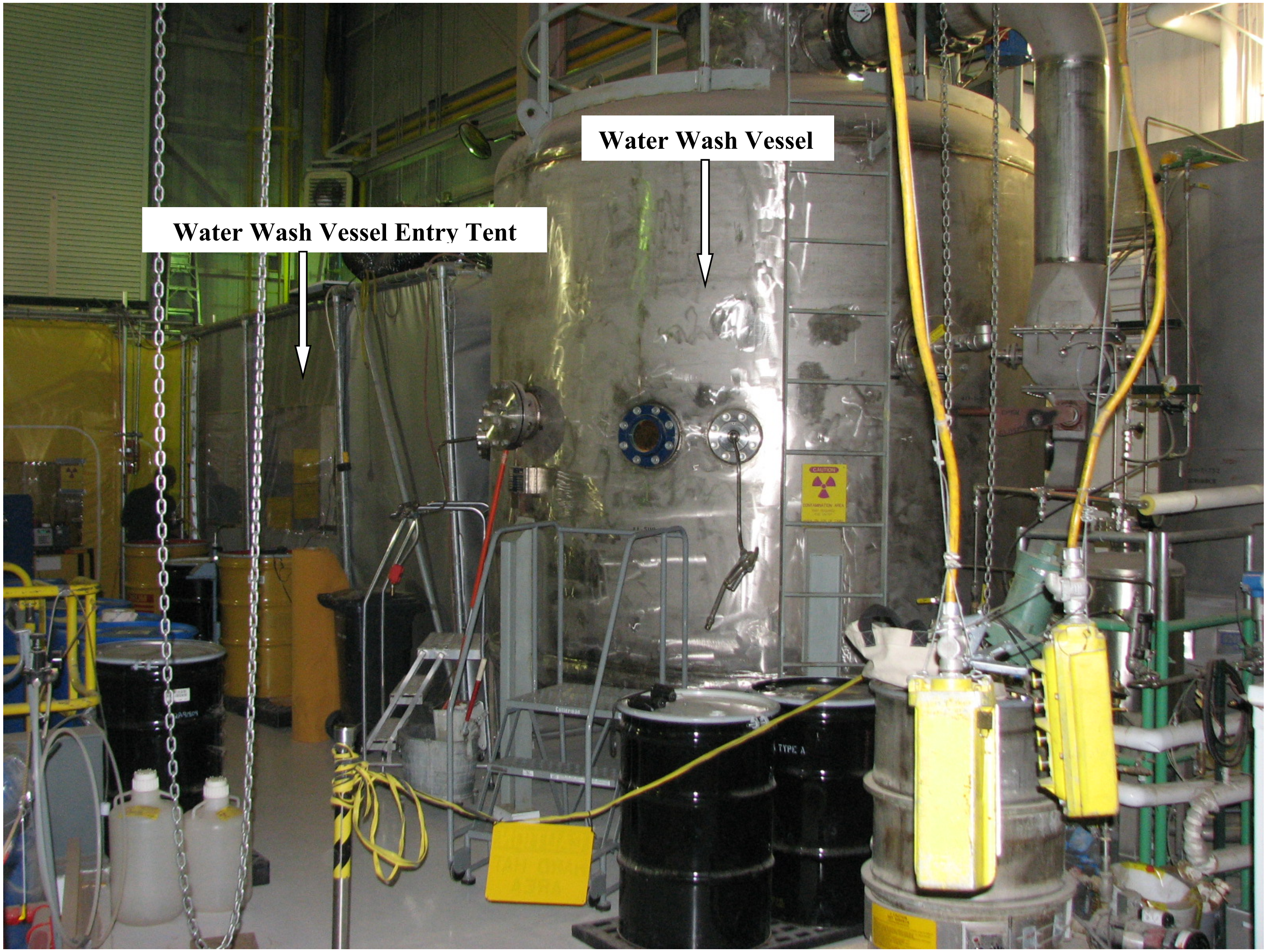
SCMS Building 793 Scrubber Water Tank
Photo taken August 2013

SCMS Building 793C from East Roll-up Door
Photo taken August 2013

SCMS Building 793G Storage Area
Photo taken August 2013

SCMS Low Bay Entrance Area
Photo taken August 2013

SCMS Solidification Station
Photo taken August 2013



SCMS Water Wash Vessel and Entrance Tent
Photo taken August 2013

SCMS Work Tent
Photo taken August 2013

Attachment B-15

Photograph of the Exterior

SSB Building 703

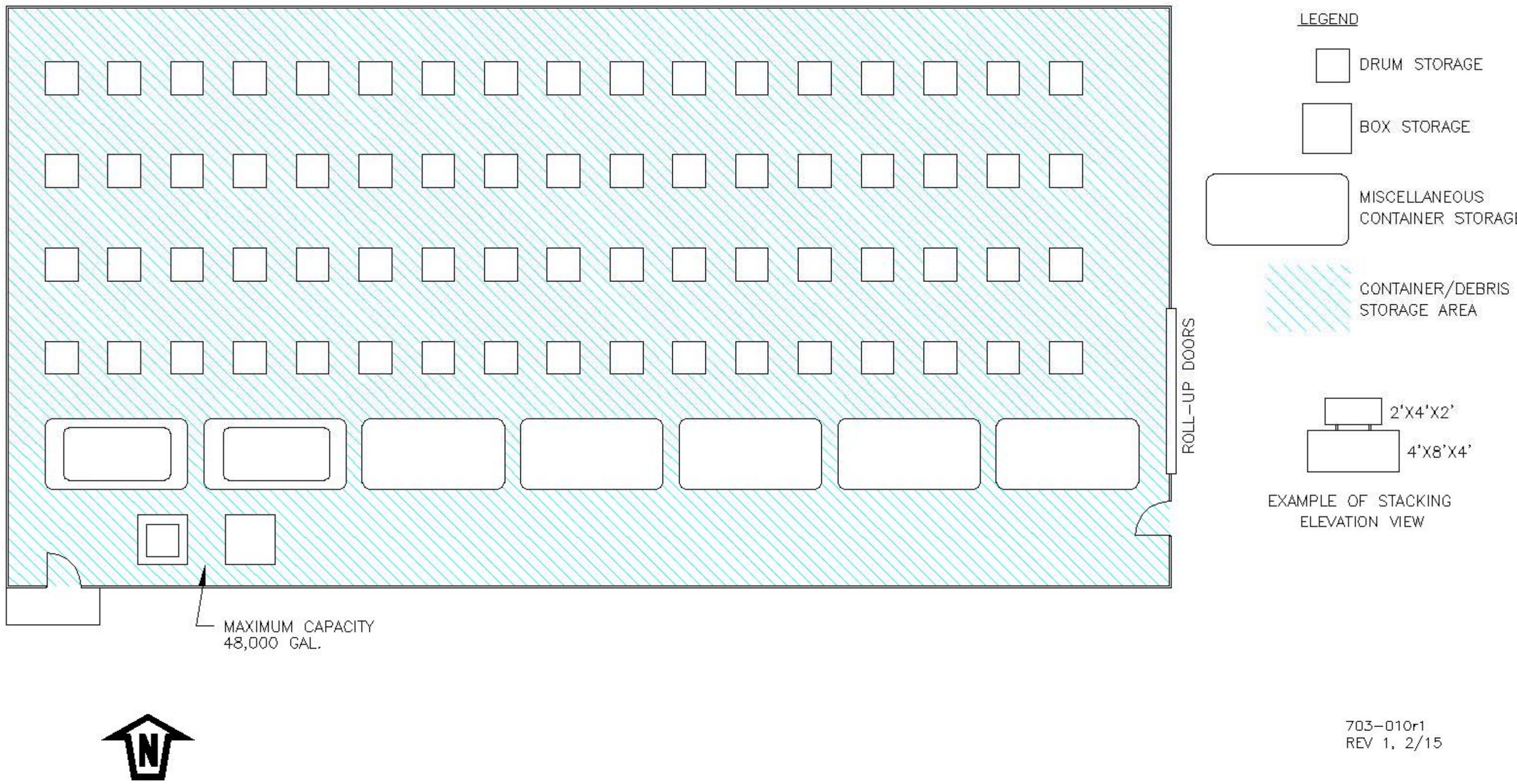
Sodium Storage Building (SSB)
Photo taken February 2015

Attachment B-16

Floor Plan Schematic Showing Facility Arrangement and

Maximum Storage Capacity

SSB Building 703



SODIUM STORAGE BUILDING – BUILDING 703
FLOOR PLAN SHOWING FACILITY ARRANGEMENT AND MAXIMUM STORAGE CAPACITY

Attachment B-17

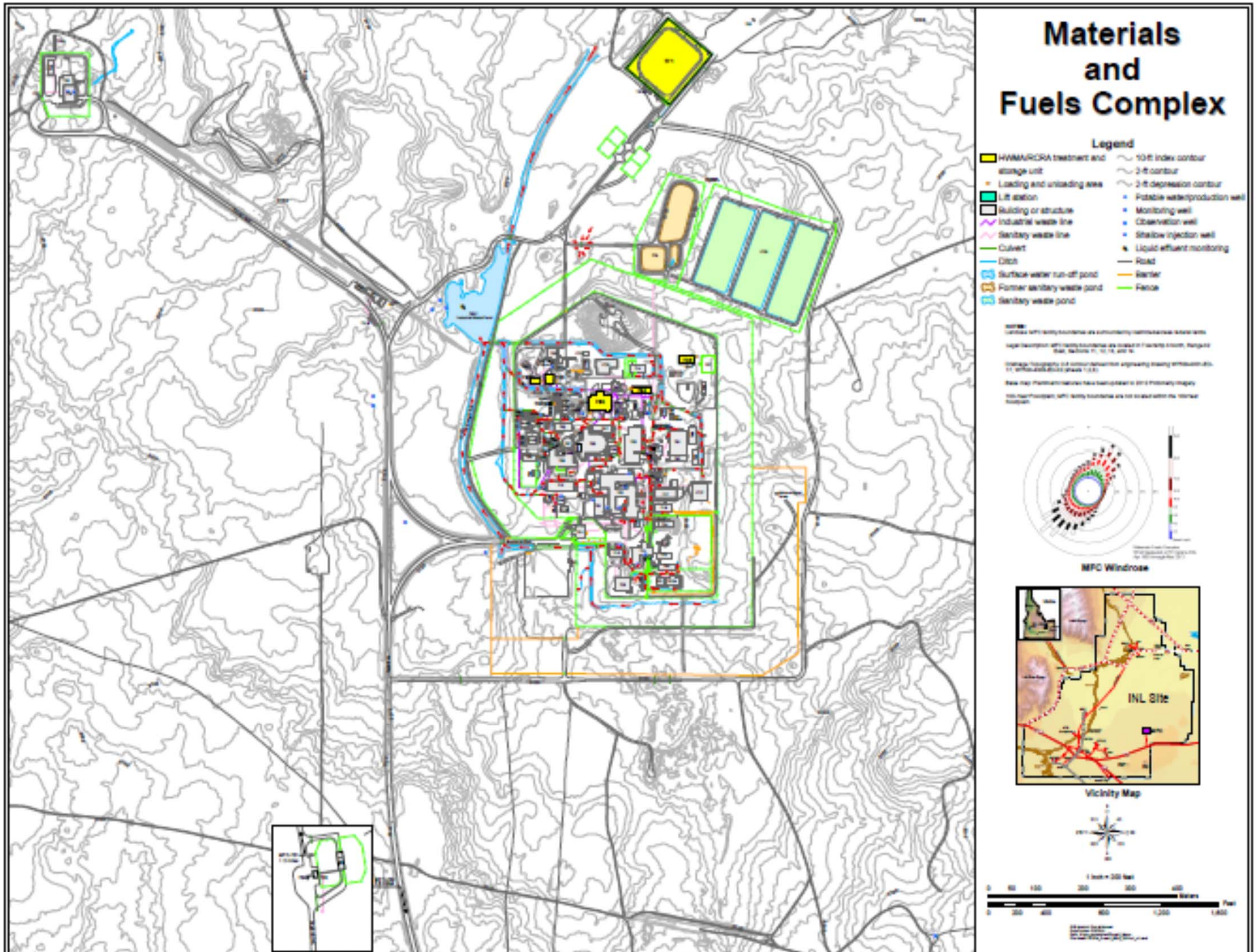
Photograph of the Interior

SSB Building 703

Sodium Storage Building (SSB) Building 703
Photo taken February 2015

Attachment B-18

MFC Topographical Map



<This sheet will be replaced with a full-size, folded map in a sleeve.>

MFC Process
Description

CONTENTS

TABLES

ATTACHMENTS

D. Process Description [IDAPA 58.01.05.008 and 012; 40 CFR 264 and 270]

In accordance with the requirements of Idaho Administrative Procedures Act (IDAPA) 58.01.05.008 and 012; 40 Code of Federal Regulations (CFR) 264 and 270, this section of the Hazardous Waste Management Act (HWMA)/Resource Conservation Recovery Act (RCRA) Permit Application provides process-related information for the HWMA units described below. For reference, the locations of the HWMA units discussed in this section are shown in Attachment 1, Section B, MFC Facility Description.

The information provided in this section is organized by subsection as follows:

- Subsection D-1, HWMA Unit Process Description Overview
- Subsection D-2, Containers and Container Management Practices
- Subsection D-3, Basis System Descriptions
- Subsection D-4, Tanks and Tank Management Practices
- Subsection D-5, Miscellaneous Unit Management Practices.

D-1 HWMA Unit Process Description Overview

The MFC HWMA units will be used to perform a variety of processes (services) for on-Site[1] hazardous waste/mixed waste (HW/MW) generators. The services conducted through operations at the MFC HWMA units allow safe and efficient handling of characteristic HW/MW (ignitable, reactive, corrosive, toxic metal) and/or listed HW/MW.

The HWMA unit waste acceptance criteria (WAC) will determine the types of HW/MW that can be received at a HWMA unit and the types of HW/MW services that can be performed.

1. On-Site means HW/MW generated at a facility physically located on the INL site or HW/MW from a generator that is a contractor or subcontractor, and physically located on the INL site, of the INL Management and Operations contractor.

The services performed at the HWMA units include:

- Storage of HW/MW in containers and/or tanks or as debris
  - Prior to, during and/or following verification/sampling, repackaging and/or treatment.
- Verification or sampling of HW/MW to facilitate
  - Use in bench scale studies
  - Storage and/or treatment at an MFC or off-Site HWMA unit
  - Acceptance at INL or off-Site disposal facilities.
- Repackaging of HW/MW to facilitate
  - Use in bench scale studies.
  - Storage and/or treatment at an MFC or off-Site HWMA unit
  - Acceptance at INL or off-Site disposal facilities.
- Container treatment of HW/MW including
  - Absorption (waste with free liquids)
  - Neutralization (corrosive wastes)
  - Solidification (liquid/sludge wastes)
  - Stabilization (liquid/sludge waste with metals)
  - Melting and draining (reactive metals)
  - Deactivation (corrosive/reactive waste).
- Tank treatment of HW/MW including
  - Neutralization (corrosives)
  - Deactivation (ignitable/reactive waste).
- Debris treatment including
  - Water spraying and water washing.

The maximum HW/MW storage capacities of each HWMA unit and the annual quantities of the HW/MW to be managed (stored, verified/sampled, repackaged and/or treated) at the HWMA units are provided in Attachment 1, Facility Description, Part A, Sections 7 and 9. A matrix of the EPA hazardous waste numbers (HWNs) (also known as waste codes) that can be received/managed at each HWMA unit, the HW/MW services (processes) performed in each HWMA unit, and the types HW/MW types (forms) accepted is provided in Attachment 1, Facility Description, Section B, MFC Facility Description, Table B-1.

Brief descriptions of the services performed at the HWMA units (HW/MW storage, verification/sampling, repackaging and/or treatment) are provided below.

D-1(a) Basic HW/MW Service Descriptions

D-1(a)(1) Storage of HW/MW

HW/MW, with and without free liquids, may be received and stored in containers, tanks and/or as debris while in the HWMA units prior to, during and/or following verification/sampling, repackaging and/or treatment. The HW/MW may be stored in original containers or repackaged containers or in process equipment (tanks/containers) during treatment. Services performed at the HWMA units during storage may include inert atmosphere container opening, sampling prior to treatment, nondestructive assay (NDA) and safety evaluations. Because several of the HWMA units are heated and air filtered, they are well suited for these activities.

The ability to store the HW/MW in the HWMA units may be necessary following generation and/or receipt of the HW/MW prior to the preparation of HW/MW for final disposal.

The types of containers, tanks and/or debris that may be received/stored at the HWMA units include, but are not limited to, the following:

- Cans, drums, boxes and bins
    - 1 pint to 8 gal cans
    - 5 to 71 gal drums
    - 85 to 100 gal overpack drums
    - Standard/nonstandard waste boxes
    - Steel waste bins

- Wooden waste boxes
- Steel container assemblies (HFEF-5 and Sodium Loop Safety Facility[2] [SLSF] cans).

- Operational components and process equipment
  - Piping/pumps
  - Heat exchangers
  - Cold/nuclide traps
  - Shipping vessels
  - Transfer tanks
  - Storage tanks
  - Process tanks.

- Debris
  - Pipes
  - Valves
  - Scrap metal
  - Industrial equipment.

The MFC HWMA units that can store HW/MW are identified in Attachment 1, Section B, MFC Facility Description, Table B-1. HWMA/RCRA designated container, tank and/or debris storage areas within each of the HWMA units are shown in the facility arrangement schematics provided in Attachment 1, Section B, MFC Facility Description, and its associated attachments. The maximum storage capacities for each HW/MW container and/or tank storage area are also listed on the referenced schematics.

[2] The Sodium Loop Safety Facility (SLSF) was located at the Experimental Test Reactor (ETR) and was used to perform experiments with sodium coolant from Fast Breeder Reactor fuel experiments intended to fail-test fuel pins under controlled conditions. SLSF containers were designed to contain HW/MW from this facility.

D-1(a)(2) Verification Sampling of HW/MW

HW/MW stored and/or received may require verification and/or sampling prior to repackaging, treatment and/or final disposal. The activities may include the following:

- Visual examination (fingerprint analyses) of the HW/MW to ensure that the container contents have been correctly identified through process knowledge and/or non-intrusive analysis
- Sampling and analysis of the HW/MW while in the original container to establish and/or validate HW/MW characteristics
- Removal of HW/MW samples for testing and analysis purposes, NDA and safety evaluations.

Several HWMA units are well suited for these activities because they are heated and air filtered. Following verification/sampling activities, the HW/MW may be repackaged and will then be stored, and/or treated, or transferred to a HWMA unit.

HW/MW certifications, data, and samples all result from the process of conducting HW/MW verification and/or sampling. Data is reduced and validated in accordance with generator requirements and provided to the generator. Samples are sent to qualified laboratories for testing/analysis. Following verification and/or sampling activities the HW/MW may be returned to the generator.

The MFC HWMA units that can perform HW/MW verification and/or sampling services are identified in Attachment 1, Section B, MFC Facility Description, Table B-1.

D-1(a)(3) Repackaging HW/MW

HW/MW stored and/or received may require repackaging. This involves removal and transfer of HW/MW from the original container to a new container, by the treatment facility, under, but not limited to, the following circumstances:

- HW/MW is stored in nonstandard containers (i.e., vessel, cold trap, tank) or in a form incompatible with on-Site or off-Site treatment unit equipment or processes (i.e., solid, liquid)

- HW/MW may require sorting and segregating (followed by repackaging) to meet an on-Site or off-Site treatment and/or disposal facility's WAC

- Original HW/MW container is unacceptable for storage and/or disposal due to deterioration or configuration.

Repackaging activities will include:

- Sorting and segregating the HW/MW by waste type (i.e., solid, liquid, debris) into a container compatible for storage or treatment and disposal

- Transferring the HW/MW from one container to another container while meeting the definition of treatment (i.e., sizing, compaction, etc).

- Heating/melting (if necessary) the HW/MW using portable heaters

- Transferring (pumping/draining) the HW/MW from the original container (using a transfer system such as a vacuum pump) into a container compatible for storage or treatment processes.

These repackaging activities will typically be performed within a containment/confinement consisting of a work tent, controlled area and/or glovebox for radiological control.

The MFC HWMA units that can perform HW/MW repacking services are identified in Attachment 1, Section B, MFC Facility Description, Table B-1.

D-1(a)(4) Absorption of Free Liquids in HW/MW

HW/MW stored and/or received for verification/sampling and/or repackaging may have limited amounts of free liquids that require absorption to meet storage, transport and/or waste disposal criteria. If liquid is found in HW/MW containers during verification/sampling and/or repackaging activities, the liquid will be absorbed so that the containers can safely be stored, transported and/or disposed. Specifically during verification and/or repackaging activities, any liquid will be absorbed by rearranging the absorbent originally packed in the drum. If rearranging the existing absorbent is inadequate, additional clean absorbent will be placed in the container or, if necessary due to volume increase, the additional absorbent and the

HW/MW will be transferred to a larger container. If liquid is found in a sludge drum prior to core sampling, its volume is determined. A sample of the liquid may be drawn and may be shipped to a laboratory for analysis. After coring, the unused portion of the core sample is returned to the drum. Absorbent will then be added in quantities sufficient to absorb the free liquid.

Following the treatment, free liquid absorption effectiveness will be determined by conducting a visual inspection to ensure no free liquids are present in accordance with specified requirements (i.e., disposal or transport).

The MFC HWMA units that can perform HW/MW absorption services are identified in Attachment 1, Section B, MFC Facility Description, Table B-1.

D-1(a)(5) Neutralization of Corrosive HW/MW

HW/MW stored and/or received may require neutralization or pH adjustment ($2 < pH < 12.5$) following an initial treatment process or prior to solidification/stabilization in preparation for disposal. These situations could include, but are not limited to, corrosive HW/MW produced in a HWMA unit (e.g, the Sodium Components Maintenance Shop (SCMS)) or containerized liquid corrosive HW/MW received at a HWMA unit. These corrosive solutions or liquids can be neutralized by processes such as (1) carbonating the hydroxide solution with carbon dioxide (CO_2) in the SCMS carbonation system, or by (2) adding acids or bases to neutralize the corrosive liquids. Neutralization will be performed to within an acceptable pH range ($2 < pH < 12.5$) to deactivate the corrosive characteristic and/or to obtain the optimum pH for subsequent solidification/stabilization of the neutralized solutions.

Following neutralization, pH will be determined by conducting pH analysis to ensure the corrosive solutions meet HWMA/RCRA Universal Treatment Standards (UTS).

The MFC HWMA units that can perform HW/MW neutralization are identified in Attachment 1, Section B, MFC Facility Description, Table B-1. HWMA/RCRA designated container and/or tank treatment areas within each of the HWMA units are shown in the facility arrangement schematics provided in Attachment 1, Section B, MFC Facility Description. The maximum daily process rates for each HW/MW container and/or tank treatment area are provided in Attachment 1, Facility Description, Part A.

D-1(a)(6) Solidification/Stabilization of HW/MW

Solidification or stabilization will be performed, as necessary, to meet UTS and/or disposal facility WAC. The solidification/stabilization procedure and the type and amount of solidification/stabilization agent used are based on the analysis of a representative sample of the waste and/or toxic metal contaminated HW/MW solution taken prior to solidification/stabilization. The solidification/stabilization procedure/agent used falls under one of the following practices:

- A previously approved Waste Analysis Plan (WAP) and treatment procedure
- An approved WAP and treatment procedure determined by bench-scale testing.
- Recommended usage and specifications provided by agent manufacturers. Solidification/stabilization agents may include natural materials such as vermiculite, silicates, clay, or synthetic materials such as absorbent polymers.

Solutions requiring solidification/stabilization are transferred directly to an empty container or to a fixed solidification system. Solidification/stabilization can also be performed in the original HW/MW container, if appropriate.

Following the solidification/stabilization procedure, a representative sample is taken and is then analyzed to ensure that the HW/MW meets UTS.

The MFC HWMA units that can perform HW/MW solidification/stabilization are identified in Attachment 1, Section B, MFC Facility Description, Table B-1. HWMA/RCRA designated container and/or tank treatment areas within each of the HWMA units are shown in the facility arrangement schematics provided in Attachment 1, Section B, MFC Facility Description. The maximum daily process rates for each HW/MW container and/or tank treatment area are provided in Attachment 1, Facility Description, Part A.

D-1(a)(7) Deactivating Ignitable and Reactive HW/MW

The ignitable and reactive characteristics of HW/MW can be deactivated (via water reaction) in a controlled manner in the SCMS water wash system. In this system, the ignitable and reactive HW/MW reacts with water and ultimately forms a hydroxide solution as illustrated in the following reaction (as shown for sodium [Na]):

$$Na + H_2O \rightarrow NaOH + 2H_2$$

The hydroxide solution produced from this direct reaction with water drains into the SCMS scrubber water tank.

Following the deactivation, a representative sample of the hydroxide solution may be taken and analyzed to ensure that UTS can be met.

The MFC HWMA units that can perform deactivation are identified in Attachment 1, Section B, MFC Facility Description, Table B-1. HWMA/RCRA designated tank treatment areas within each of the HWMA units are shown in the facility arrangement schematics provided in Attachment 1, Section B, MFC Facility Description. The maximum daily process rates are provided in Attachment 1, Facility Description, Part A.

D-1(a)(8) Heating and Melting for Repackaging

HW/MW received or stored in non-standard containers such as shipping vessels, process vessels, or tanks, may be incompatible with a HWMA unit's treatment system or equipment (i.e., SCMS) and may require transfer or repackaging into a compatible feed or transfer container prior to continued treatment.

Heating and melting of the HW/MW (e.g., Na) may be necessary using portable strap heaters or steam. Once the HW/MW is melted, it can be transferred by pressurizing the container, pumping and/or vacuum draining from the original container into a container compatible with the HWMA unit's treatment processes. This activity may be performed within a containment consisting of a work tent and/or glovebox for radiological control.

D-1(b) Flow Path of HW/MW Services

The purpose of this subsection is to briefly describe the services that the MFC HWMA units provide. Brief descriptions of these services are provided in following subsections.

D-1(b)(1) HW/MW Generator Specifications

To acquire HWMA unit services, the generator specifies the desired services and specific requirements that are needed. HWMA unit personnel then determine whether the desired services can be performed. If HWMA unit personnel determine the desired services can be performed, then the generator provides information needed to verify that HWMA unit WAC can be met. This detailed information is provided to the Integrated Waste Tracking System (IWTS) Profile as described in Attachment 2, Section C, Waste Analysis Plan.

D-1(b)(2) HWMA Unit Approval to Accept HW/MW

HWMA unit personnel review and approve transfer/shipments of HW/MW to the HWMA unit based on the generator's certifications.

D-1(b)(3) HW/MW Receipt at HWMA Units

Upon HW/MW receipt at a HWMA unit transfer area, HW/MW containers are inspected to ensure that received HW/MW is consistent with the generator's description of the HW/MW (such as labels, identification numbers, container condition, and radiation levels). Any noncompliant conditions or inconsistencies are documented as required by HWMA unit-specific procedures and the generator is contacted for assistance in the resolution. If discrepancies cannot be resolved, HW/MW is returned to the generator.

D-1(b)(4) Transfer of HW/MW to Storage

If as-received HW/MW is acceptable, it is transferred into the storage area until the requested services can be performed.

D-1(b)(5) Verification, Repackaging, and/or Container/Tank or Debris Treatment

Containers of HW/MW are transferred from the HWMA unit where it is stored to the HWMA unit where it will be opened and/or transferred to perform verification, repackaging, and/or container/tank or debris treatment. A variety of products result from the process of conducting verification, repackaging, and/or treatment. These include data, samples, repackaged generator HW/MW, and/or treated final HW/MW packaged for final disposal. Data is reduced and validated in accordance with generator requirements and provided to the generator. Samples are sent to qualified laboratories for testing/analysis. HW/MW is then packaged and transferred/shipped to the generator or another facility for disposal.

D-1(b)(6) Transfer of HW/MW to Storage Following Verification, Repackaging, and/or Container, Tank or Debris Treatment

Following completion of verification, repackaging, and/or treatment, the HW/MW is transferred to appropriate storage (HWMA/non-HWMA) until it is transferred/shipped back to the generator or to a disposal facility.

D-1(b)(7) HW/MW Shipment to Generator or Disposal Facility

Containers of verified, repackaged, and/or treated HW/MW are prepared for transfer/shipment to the generator or disposal facility and may be placed in a staging or transfer area, pending shipment. Appropriate documentation is prepared for the HW/MW to be returned to the generator or disposal facility.

In addition, fabricated overpacks or containers that are themselves hazardous (i.e., containers containing lead shot for shielding) will be disposed of in accordance with State of Idaho HW/MW management regulations, once the containers are no longer useable.

D-2 Containers and Container Management Practices [IDAPA 16.01.05.012; 40 CFR 270.15]

HW/MW (with and without free liquids) are currently stored or received from a variety of on-Site facilities as described in Attachment 1, Section B, MFC Facility Description. The HW/MW containers or debris may be stored prior to, during, and/or following verification, repackaging, and/or treatment.

Debris will be managed in the same manner as containers for the purposes of storage and inspection. Debris openings are typically covered or wrapped to preclude the spread of radioactive contamination or reaction of hazardous constituents.

Types of Containers. The types of containers that may be received/stored at HWMA units are listed in Subsection D-1(a)(1) and summarized in Table D-1.

Storage Area and Maximum Capacities. The maximum container storage capacity for each HMWA unit is provided in Attachment 1, Facility Description, Part A. Container storage areas and maximum container storage capacities are also shown on the HWMA unit facility arrangement schematics provided in Attachment 1, Section B, MFC Facility Description.

The different types of HW/MW containers currently stored in HWMA units or in other on-Site facilities that may be transferred to HWMA units for storage and treatment are described in the following paragraphs. All containers used for storing HW/MW are compatible with the waste stored in the containers. Container types are selected after ensuring compatibility of the container with the waste type and with transportation requirements of receiving facilities. Photographs of several different types of containers described in Table D-1 are provided in the Permit Application in Attachment D-1.

Table D-1. Examples of Containers Accepted at HWMA Units.

Container Type	Description
Department of Transportation (DOT) Carbon-Steel Drums	Carbon-steel, 71-gal DOT-approved 7A closed-head drums that are externally-coated 16 gauge carbon steel with a crimped cover closure and 2 in. steel plug in the head. The internal dimensions of the drums are 22.5-in., diameter, by 33.25-in. tall. Carbon-steel, 55-gal DOT-approved 17C and UN-approved 1A2-Y1.7/150 open-head drums that are externally-coated 16 gauge carbon steel with a 2-in. steel plug in the head. The internal dimensions of the drums are 22.5-in., diameter, by 33.25-in. tall. These drums may have installed 90-mil molded polyethylene liners with an open or closed head.
DOT High-Density Polyethylene Drums and Pails	The polyethylene drums are high-density polyethylene, 55-gal, UN-approved 1H1/Y1.9/100 closed-head drums with threaded closure. The internal dimensions of the drums are 23.25-in., diameter, by 33.25-in. tall. The pails are high-density polyethylene, 5-gal, UN-approved 1H1/X1.8/100 closed-head pails with threaded closure and an external handle. The internal dimensions of the pails are 14.75-in., diameter, by 11.6-in. tall. Other types of drums and pails may be used to store liquids in HWMA units. Container types are selected after ensuring compatibility of the container with the HW/MW described on the IWTS Profile and with transportation and WAC defined by HWMA units or another receiving facility.
DOT Steel Bins	A rectangular 12-gauge steel bin used for shipment of waste or DOT-approved containers of waste and meets the requirements of 49 CFR 178.350 (DOT 7A). When used as an "overpack," it holds eight 55-gal drums in two layers of four drums each, or ten 30-gal drums in two layers of five drums each. The bins are nominally 4 x 5 x 6 ft. This category covers a range of sizes and some structural variations. At the time of use, one bin type, entitled M-III, met DOT 7A requirements. The M-III bins now meet DOT requirements for a strong-tight container.
DOT Steel Box TX-4	A mild-steel-welded construction box, developed by Lawrence Livermore National Laboratory, with a gasketed bolted closure that is used in packaging contact-handled transuranic (CH TRU) waste. The container is a steel sheet supported by an external framework of four 4 x 2-in. square tubing (the container corners are reinforced with 2-in. angle stock, skip welded). Four 3-in. steel channels support the container, allowing standard forklift access. This box comes in a range of sizes ranging from 74 to 92-in. long, 46 to 52-in. wide, and 36 to 57-in. high. This box may be lined with two 40-mil. or one 80-mil. Polyvinyl chloride (PVC) liner. The top of the liner is then folded over the top and outside of the box and secured with duct tape.
Standard Waste Box	A steel container that is nominally 71 x 55 in. and 37-in. tall. This

Container Type	Description
(SWB)	box may be used to package waste or to overpack any container that does not meet the WAC as long as the dimensions are compatible. The lid is then bolted to the box.
DOT 7A Steel Overpack Box	A box constructed of carbon steel supported by an external framework of four 4 x 2-in. square tubing (container corners are reinforced with 2-in. angle stock). It may be used for overpacking plywood boxes and damaged fiber-reinforced plywood (FRP) boxes. Two 2 x 1-in. steel channels support the container for forklift access. The dimensions of this box are 92 x 56 in. and 55-in. tall. A variety of other sizes may be used (i.e., special sizes will be fabricated to handle a variety of overpack needs).
Wooden Box	A box constructed of plywood. At the time of use in the 1970s, this box met DOT 19A packaging requirements. It comes in a range of sizes but generally is 7 x 4 ft and either 2 or 4-ft tall. The lid is either nailed or glued shut.
FRP Box	A box constructed in the same manner as the wooden box previously described and has the same range of dimensions. However, the exterior of the box is coated with at least 1/8 in. of fiberglass-reinforced polyester.
HFEF-5 Canisters	Container system consists of an inner container and an outer container. The inner container is placed inside the outer container, which is seal-welded shut and placed in the RSWF liners for storage. The inner container, constructed of carbon steel, is the hot cell waste receptacle. It is a cylindrical, 14 gauge carbon-steel (AISI 1010-1020) container, 59.125-in. tall by 11.60-in. diameter. It is closed by a 3/8-in. thick lid fastened to a bolt ring in the top of the container by six cap-head bolts. The outer containers are the out-of-cell containers and are used to prevent the spread of contaminants from the inner container to the environment. It is a cylindrical, 14-gauge, Type-304 stainless-steel container, 73.5-in. long by 12.75-in. diameter.
SLSF Canisters	Container is constructed like the HFEF 5 Can assembly only it is larger in diameter. It is a cylindrical, 11-gauge Type-304 or-308 stainless-steel container, 20.76-in., diameter, by 122.00-in. long. It is closed by a 1.5-in. thick lid fastened to a bolt ring in the top of the container by six cap-head bolts. In addition to using the SLSF inner can, three 45-gal steel cans will also be used as the inner waste storage containers. The SLSF outer container is a cylindrical, 11 gauge carbon-steel (AISI 1010-1020) container, 22.25-in., diameter, by 134.5-in. tall. It is closed by a 1.5-in. thick lid that is seal-welded.

Container Type	Description
Process Components	Miscellaneous carbon or stainless-steel process components such as nuclide traps, cold traps, shipping vessels that are well suited for storage because they are compatible with the HW/MW and designed to withstand processing.

D-2(a) Containers With and Without Free Liquids

Containers or debris with and without free liquids are managed in the same manner with the exception of providing secondary containment for containers/debris with free liquids.

D-2(a)(1) Description of Containers [IDAPA 58.01.05.008; 40 CFR 264.171 and 264.172]

Examples of containers of HW/MW that are currently stored in HWMA units or are candidates for storage (they will be transferred from another on-Site facility) will be compatible with the waste stored and are summarized in Table D-1.

This listing is not inclusive but serves as a representative listing of the types of containers that may be received. Containers that are not in good condition (e.g., apparent structural failures or bulging), or whose contents are not compatible with the HW/MW they are storing, will not be accepted at HWMA units. HWMA units will only accept those containers that can be stored safely. In the event a container is not in good condition, it will be returned to the generator for repackaging or, if safe to do so, will be repackaged at an appropriate HWMA unit.

Containers are stored pending treatment at MFC or for transfer to an off-site facility for treatment or disposal. To confirm the structural integrity of containers while in storage visual inspections are performed as described in Attachment 6, Section F, Inspections. Container integrity is also verified prior to transfer between MFC HWMA units or prior to transfer to an off-site facility. In addition, the primary waste streams stored in the HWMA units for an extended duration (i.e., longer than 1 year) include Na/NaK, Na/NaK contaminated debris, and characteristic metal debris. The compatibility of these waste streams with respect to the construction material of the containers does not pose long term storage issues since the waste streams are Na/Nak including Na/NaK debris in nature. The Na/NaK and Na/NaK debris is from reactor components that were designed to handle Na/NaK at high temperatures. Long term storage of Na/NaK debris in metal containers and components is supported by various technical documents.[3]

Incompatible wastes, either solids or liquids, will be stored in accordance with the HW/MW separation precautions described in Attachment 6, Section F, Procedures to Prevent Hazards.

D-2(a)(2) Container Management Practices [IDAPA 58.01.05.008; 40 CFR 264.173]

Containers used to store HW/MW in HWMA units will be received, handled, managed and stored in a manner that reduces the likelihood of a HW/MW release as described in the following subsections.

D-2(a)(2)(a) Acceptance Criteria

Prior to the transfer of HW/MW to a HWMA unit, the HW/MW generator transferring the HW/MW must submit a completed IWTS Profile, or equivalent, and the HWMA Unit Waste Acceptance Checksheet, or equivalent, must be approved (ref. Attachment 2, Section C, Waste Analysis Plan). These forms are used to document details on the physical, chemical, and radiological characteristics of the HW/MW (which provides a detailed characterization of the HW/MW) to ensure it can be safely stored and processed with the existing HW/MW at an appropriate HWMA unit.

D-2(a)(2)(b) Labeling

Each container of HW/MW accepted at an HWMA unit is labeled with the labels (as applicable) shown in Table D-2. A photograph of the labels is shown in Attachment D-2.

Table D-2. HWMA Unit HW/MW Container Labels.

Label Type	Description
EPA Hazardous Waste Label	Identifies generator information and EPA identification and HWNs
MFC Barcode Label	Indicates the HW/MW container number that is included in the IWTS electronic database (or equivalent) and HW/MW inventory maintained by MFC

[3] ANL-4417, Argonne National Laboratory Resistance of Materials to Attack by Liquid Metals, By Leroy R. Kelman, Walter D. Wilkinson, and Frank L. Yaggee, Dated July, 1950. Technical Information by DUPont Specialty Chemicals, Sodium Properties, Uses, Storage, and Handling, Dated September, 1994.

D-2(a)(2)(c) Handling

HW/MW container handling practices will include the use of trained and qualified rigging and hoisting operators and trained material handling personnel for the placement or removal of HW/MW containers to/from HWMA units. All MFC hoisting and rigging activities (including periodic inspections, load testing, certification, and hoisting and rigging of critical items/loads) will be performed in accordance with the requirements identified in the DOE "Hoisting and Rigging Technical Standard," DOE-STD-1090, the INL Lab Wide Procedure (LWP-6500) Hoisting and Rigging at the INL, and in facility-specific procedures.

Heavy equipment (i.e., forklifts and cranes) used for handling HW/MW containers in HWMA units are selected based on their unique ability to handle a particular size and type of HW/MW container. Typically, all large forklift-handled HW/MW containers will be placed on pallets to facilitate lifting and handling with a forklift without using additional hoisting and rigging tackle. However, in some cases, hoisting and rigging tackle (such as slings, wire rope, shackles, or drum-lifters) may be used. Forklifts and hoisting and rigging tackle used for handling HW/MW containers will be periodically inspected and load tested by qualified personnel.

D-2(a)(2)(d) Container Integrity

Before a HW/MW container is unloaded from the transporting equipment at a HWMA unit, HWMA unit facility personnel will inspect the container for damage, leaks, general appearance, markings, and labeling. A used, new, or reconditioned container will be accepted if HWMA unit facility personnel finds it to be sealed and in good condition (structurally sound, free of leaks). Upon acceptance, the HW/MW container will be placed in the appropriate HWMA unit storage area (see Attachment D-3 for hazardous waste acceptance checklists). Inspections are documented on the HWMA Unit HW/MW Daily Container Transfer Inspection Form (ref. Attachment 4, Section F, Inspections).

HW/MW movement between buildings within MFC is generally by flatbed semitrailers, truck, or forklift. Container loading and unloading operations are conducted as described in Attachment 6, Section F, Procedures to Prevent Hazards, Section F-4(a).

D-2(a)(2)(e) Waste Placement

In accordance with National Fire Protection Association (NFPA) 101, The Life Safety Code (LSC) for Industrial Occupancies and Occupational Safety and Health

Standards (OSHA), a minimum of 3 ft of aisle space is maintained for any means of ingress or egress into a HWMA unit. Placement of containers within the facility in accordance with this minimum aisle spacing requirement ensures unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of the facility operation in an emergency.

Adequate aisle space is also maintained around containers to facilitate inspections of the containers and the storage, verification, repackaging and/or treatment areas.

As some HW/MW containers are irregular and nonuniform in size and shape, the number of HW/MW containers in an HWMA units storage area depends on the floor space occupied by the particular HW/MW containers and the secondary containment pallets or pans used (if storing liquids) to elevate containers of liquid HW/MW off the floor.

Container storage may involve stacking of containers of no more than two containers high. No stacking of containers with free liquids is allowed. Adequate aisle space will be maintained around containers to facilitate inspections of the containers. Container stacking may be performed at SCMS (MFC-793C and MFC-793G), SSB (MFC-703) and EFF (MFC-794).

SCMS storage configuration is provided in Attachment 1, Section B, MFC Facility Description, Attachment B-13.

SSB storage configuration is provided in Attachment 1, Section B, MFC Facility Description, Attachment B-16.

EFF storage configuration is provided in Attachment 1, Section B, MFC Facility Description, Attachment B-5. Container storage is conducted at EFF in order to best utilize the remaining floor space within EFF.

D-2(a)(2)(f) Maintenance during Storage

After HW/MW containers are placed in a HWMA storage-only unit, they are not opened or handled except when it is necessary to add or remove waste in accordance with IDAPA 58.01.05.008, 40 CFR 264.173(a). In addition, because HW/MW containers are not routinely handled or moved after placement in storage, the likelihood of an accident resulting in container rupture is minimized.

D-2(a)(2)(g) HWMA Unit Decontamination/Cleaning Between Waste Containers

Following verification, repackaging, and/or container treatment, all MW is removed from the HWMA unit where the activity is performed. Following removal of MW, decontamination and/or cleaning will be performed, if necessary. The decontamination and/or cleaning will be conducted consistent with the closure plan closure performance standards. Following this decontamination and/or cleaning future waste managed in the HWMA unit will only acquire the EPA HWNs assigned to the waste and the unit is considered to be free of all hazardous constituents in accordance with IDAPA 58.01.05.005; 40 CFR 261.

D-2(a)(2)(h) Inventory and Accountability

As described in Attachment 2, Section C, Waste Analysis Plan, the IWTS electronic database (or equivalent) is maintained by HWMA unit personnel and includes each HW/MW container received at a HWMA unit. A current inventory is maintained for each HWMA unit. For each HW/MW container, the database includes (but is not limited to) the following information:

- Container’s unique reference number
- Container’s location
- HW/MW description and hazardous constituents
- MW radionuclide composition
- Weight of the HW/MW
- Packaging
- Type of container
- Net and gross volume
- Gross weight
- Generating process
- Storage date.

D-2(a)(2)(i) Container Treatment

HWMA unit personnel conducting container treatment processes are trained and follow established procedures and/or guidelines for each treatment technique. This information will be provided in the WAP or in a HWMA unit-specific procedure. Treatments that may be conducted include absorption, neutralization and/or solidification/stabilization.

The primary neutralizing agents used include nitric acid or sodium hydroxide. The objective is to adjust the pH of the free liquid to a neutral pH. Solidification and stabilization agents used may include Aquaset-II-H and Aquaset II-G. These agents may also be used as a blend. The objective of solidification and stabilization would be to stabilize the material to meet UTS standards. The manufacturer information for these agents is found in Attachment D-4.

These container treatments will enable certain HW/MW to meet HWMA/RCRA UTS and WAC regarding pH, free liquids, and toxic metals. The HW/MW to be treated may contain both solids and liquids; therefore, different treatments will be selected accordingly. The general process is described below.

Container treatment procedures or WAPs will be developed, as required, and used based on bench scale testing results and/or information provided from commercial treatment agent vendors. The HWMA unit-specific treatment procedure will specify treatment process steps such as the amount of treatment agent(s) to be added, required pH, rate and order of HW/MW and treatment agent addition, rate and time of mixing, curing time (if appropriate), temperature control (if appropriate), and any other information important to proper treatment process control or desired outcome.

HWMA unit personnel will conduct the container treatments in accordance with the established treatment procedure or WAP. Container treatment procedures may be performed on the original container unless the original container integrity will not meet the WAC. In this case, the HW/MW will be transferred to a new container. Container size selected will depend on the volume of HW/MW and treatment agents to be added. The selected container will also be compatible with the HW/MW and treatment materials.

Upon treatment completion, treatment effectiveness will be determined in accordance with generator specifications and/or WAPs.

Following treatment, the HWMA unit where the container treatment was performed will be cleaned and inspected if required by facility-specific procedures.

The treatment will be documented in the HWMA unit operating record and may include the following information:

- Original container content code
- Container identification number
- Date of treatment
- Treatment conducted (absorption, neutralization, solidification)
- Treatment procedure or WAP used
- Type and amounts of treatment agents used
- Results of the treatment conducted (pH tests/visual verifications/free liquid test)
- Any additional comments by HWMA unit personnel.

This information will be used to update the applicable database regarding a specific HW/MW container. HW/MW characteristic information on a HW/MW container will be updated to ensure tracking of the initial HW/MW container and account for the final outcome of the container contents.

As an example, information on free liquid absorption process is presented as follows:

Absorption (free liquids). In order to meet a WAC for free liquid, absorbents will be added to absorb the free liquid. The container treatment procedural steps that will be used during the absorption/treatment process are as follows:

- The volume of free liquid to be absorbed will be determined and recorded.
- Adjustment of pH will be performed (if necessary).
- Required amounts of absorption agents will be added in accordance with the treatment procedure.

- The absorbent will be added to the free liquids and mixed in accordance with the method specified in the treatment procedure.

- Treated HW/MW will be visually inspected for signs of free liquids. If no free liquids are present, the treatment will be considered successful. If liquids are present, additional absorbent material will be added and the HW/MW will be remixed in accordance with procedural steps.

The type(s) of absorbent used will vary with the type of liquid and will be selected based on:

- Recommended usage and specifications provided by manufacturers

- Results of bench-scale testing

- Compatibility with the HW/MW.

Compatibility constraints of commercially available absorbents will be observed with the material being treated. No absorbents containing cellulose material will be used. Absorbents may include diatomaceous earth, Aquaset, Petroset, and Super Absorption Polymer (SAP). The manufacturer information for these absorbents is found in Attachment D-4.

D-2(a)(2)(j) Container Management during Verification, Repackaging, and/or Container Treatment

Standardized maintenance and housekeeping operations will be conducted for the HWMA units where container verification, repackaging, and/or container treatment is performed. Startup, operation, and maintenance of commercially available items will comply with the manufacturer's instructions and recommended practices.

Before conducting container verification, repackaging, and/or container treatment activities, there will be checks of the HWMA unit to ensure emergency equipment as identified on the applicable inspection form(s), is available.

D-2(a)(2)(k) Operating Procedures

This section provides a list and brief description of relevant operating procedures used to prevent any releases to the environment from waste handling and container management.

EFF-OI-001 (EFF TSD Operations) provides a description of the support systems (fire suppression, building-exhaust, and instrument air systems) contained in the Experimental Fuels Facility (EFF) and specifies requirements for mixed waste storage activities.

HFEF-OI-6601 (Waste, Equipment, and Scrap Handling at HFEF) provides instructions to establish and implement requirements for handling waste, equipment, and scrap at HFEF. Requirements encompass identification, segregation, characterization, packaging, and documentation of the various waste streams, equipment, and scrap to provide a means for proper disposal or storage.

HFEF-OI-6801 [Hazardous Waste/Mixed Waste (HW/MW) Requirements] specifies requirements for the evaluation and acceptance, receipt, and inspection of hazardous waste and mixed waste at the HFEF.

SCMS-OI-1(Facility Information and Administrative Requirements) provides a description of the SCMS (including secondary containment, ventilation systems, fire detection and suppression systems and equipment) and scope of shop operations and uses. It also addresses administrative and environmental-safety-and-health requirements applicable to the facility such as requirements for all waste activities in which alkali metals (typically Na and NaK) are being handled or transferred.

SCMS-OI-6 (Materials Characterization, Segregation, and/or Repackaging in the SCMS Enclosure) provides instructions and requirements for characterizing, sizing, segregating, and repackaging radioactively-contaminated equipment and waste in the SCMS enclosure in preparation for treatment, disposal, or continued storage. Waste types include radioactive waste, sodium-bearing waste, non-radioactively-contaminated items, and mixed waste.

SCMS-OI-7 (Water Wash Vessel) provides instructions for operating the water-wash vessel which is used to treat alkali metal bearing wastes using water. This procedure also covers the transfer of liquids to the scrubber tank from drums and containers, and the transfer of liquids from the scrubber tank into drums for additional treatment.

SD-38.1.1 [Treatment, Storage, and Disposal Facility (TSDF) Environmental Compliance] identifies each TSD facility, the applicable environmental requirements for each TSD facility, the method of implementation for each environmental requirement, and the personnel responsible for implementation of the requirements and maintaining the associated operating records. It also identifies all applicable inspection log sheets and describes how inspections, deficiencies, and corrective actions are tracked.

TSD-OI-003 (Drum, Box, or ISC Handling) specifies generic drum or box handling requirements at Treatment, Storage, and Disposal (TSD) facilities. The procedure provides instructions for performing different handling functions associated with 5 to 110 gallon drums and boxes of various sizes, and the load/handling of interim storage containers (ISCs).

TSD-OI-004 (Waste and Material Acceptance for Storage/Treatment and Radioactive Inventory Control) specifies requirements and provides instructions for accepting hazardous waste, mixed waste, and radioactive waste and material from MFC and non-MFC generators at the SCMS and SSB. Specifically, this procedure defines the acceptance criteria for the facilities to ensure that waste or material accepted can be managed in a manner which complies with the operating requirements of the facility and environmental regulations.

D-2(a)(3) Secondary Containment System Design and Operation [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.15(a)(1) and 264.175(a)]

Secondary containment for containers with free-liquids may consist of a portable secondary containment device such as spill pallets, fabricated spill pans, or an overpack depending on the type, size, and configuration of the "free-liquid" container. A SWB may also provide secondary containment. Attachment D-5 provides photographs and example drawings of devices that can be used to provide secondary containment.

Secondary containment may also be provided by seal-welded (lined) or epoxy-coated concrete floors. Two HWMA units (HFEF and SCMS) have lined floors or epoxy-coated floors that provide an impermeable surface and a method to collect spills of leaks. Seal-welded floors are maintained as secondary containment in HFEF (except in the HBA and HRA) and epoxy-coated floors are maintained as secondary containment at SCMS in the High Bay and Low Bay pit (see floor plan schematics in Attachment 1, Section B, MFC Facility Description).

Both portable and fixed secondary containment devices and floors are designed to have sufficient capacity to contain 10% of the total volume of containers stored within/on the secondary containment, or 100% of the volume of the largest container within its boundary, whichever is greater. Descriptions of secondary containment design, drainage, capacity, run-on, and free-liquid removable specifications for the pallets, pans, and overpacks are provided in the following subsections.

D-2(a)(3)(a) Requirements for the Base or Liner to Contain Liquids [IDAPA 58.01.05.008; 40 CFR 264.175(b)(1)]

Portable Secondary Containment Devices. Spill pallets, pans, and overpacks/boxes, will be used in container areas when the floors in the area do not serve as secondary containment. These devices are constructed of materials that are compatible with the ignitable, reactive, corrosive, toxic metal, and/or listed HW/MW that will be stored in/on the containment system to contain any spilled or leaking free liquids. The materials used in the construction of the secondary containment systems and dimensions, volumes, and capacities are as follows:

Portable Spill Pallets. Typically, portable spill pallets are constructed of translucent high-density polyethylene, which is compatible with a wide variety of HW/MW. The pallets have a support structure and a support grate used to elevate the containers off the base to prevent contact between the container and spilled or leaking HW/MW. The grate allows for visual detection of accumulated liquids during inspections.

Fabricated Spill Pans. Fabricated spill pans are typically constructed of steel. All of the seams will be welded in accordance with approved procedures. The welds will be visually inspected to ensure that the welds are free of cracks and holes. All containers stored in the spill pans will be elevated off the base of the pan to prevent contact between the container and spilled or leaking HW/MW. The spill pans may be designed to have a platform used to support the container and elevate the containers off the base. The platform will be grated to allow for visual detection of accumulated liquids during inspections.

Fabricated Overpacks. Typically, fabricated overpacks are constructed of steel, with continuous welds on the inside. All of the seams will be welded in accordance with approved INL procedures. The welds will be visually inspected to ensure that the welds are free of cracks and holes. The overpacks have cylindrical openings. The overpacks that are currently in use have an annulus filled with lead shot to provide shielding, if necessary. Containers within the overpacks may be elevated off the base.

Fixed Secondary Containment Floors. Lined rooms or storage areas with epoxy-coated floors are located in HFEF and SCMS. The floors in these HWMA units are described below.

HFEF. The HFEF preparation room (PR) and transfer room (TR) are surrounded by a 2-in. tall, 1/8 -in. thick steel curb. A 42-in. high stainless-steel wainscot is installed on the walls and over the curb of the PR/TR. The floor is covered with 3/8-in. thick sheets of steel. The floor and curb/wainscot are seal-welded at the seams and edges to form secondary containment. The 2-in. curb is maintained at the thresholds of the exterior doors. See Attachment D-6 for drawings that detail the PR/TR secondary containment.

The HFEF PR has a drain that is plugged and has a positive shutoff via a valve to maintain secondary containment. The valve is always closed and the drain is plugged whenever there is HW/MW in the room.

The spray chamber is a 7.75 x 9.5 ft and 12 ft high sealed stainless-steel chamber in the decontamination cell. The chamber was originally constructed for use in decontaminating equipment with low-pressure water spray and is provided with an impermeable lining around the base to a height of 22.5 in. The spray chamber was constructed to retain the water used in decontamination, which drains from the chamber through a floor drain to a holding tank. The drain (used in routine spray chamber operations) in the spray chamber floor is blocked off with a drain cover during MW verification, repackaging, and/or treatment operations to provide secondary containment. The drain cover forms a seal with the spray chamber floor and replaces the drain-pad screen basket.

Hinged doors on the east wall of the spray chamber provide a 6 x 12-ft opening into the spray chamber. Each door is opened with an air-operated cylinder and is fitted with a rubber gasket to seal water inside the spray chamber. A series of six air-operated toggle clamps compress the door gaskets and prevent leakage. The spray chamber doors are kept closed during drum unloading and HW/MW verification and are opened only during transfers of drums and bins between the spray chamber and decontamination cell.

As HW/MW is removed from the container, it is either placed onto a stainless-steel examination table (66 x 50 in. with a 2-in. lip) or into a 24 x 18 x 15-in lidded steel auxiliary collection bin.

HW/MW items are not allowed to be left out overnight and must be placed:

- In one of the two collection bins with the lid installed
- Back into the original container
- Into the SWB.

The spray chamber floor cover is a 5-in., diameter, by 2-in. thick steel plate with an attached bale handle and an affixed neoprene gasket. When in place, it forms a tight seal against the drain access lip. The spray chamber is a sealed enclosure that provides internal secondary containment for the HW/MW. See Attachment D-6 for drawings that detail the spray chamber secondary containment.

SCMS. The secondary containment features of the floors in SCMS are described in Subsection D-4, Tank Systems.

D-2(a)(3)(b) Containment System Drainage [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.15(a)(2) and 264.175(b)(2)]

HW/MW containers are stored inside the HWMA units (with the exception of RSWF) and, therefore, do not accumulate liquid from precipitation. Containers with free liquids are elevated within secondary containment. Note: containers may be staged directly on the floor to safely facilitate processing. HWMA unit personnel will be present during these operations.

D-2(a)(3)(c) Containment System Capacity [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.15(a)(3) and 264.175(b)(3)]

Portable Spill Pallets. Portable spill pallets used in HWMA units will be designed/selected to ensure that they contain 10% of the total volume of containers stored on them or 100% of the volume of the largest container, whichever is greater. Several types of spill pallets may be used in HWMA units. An example of a spill pallet that is currently used in HWMA units for 55-gal drums is a four-drum spill skid that has an 8000 lb load capacity. The exterior dimensions of the spill pallet are 51.5 x 51.5 in. and 10 in. tall. The interior dimensions at the bottom are 47 x 47 in. and 49.5 x 49.5 in. at the top. The bottom of each pallet is created to allow forklift access. The deck is 3/4 in. thick. The manufacturer specifications indicate that the pallet has 62 gal sump capacity.

These pallets are used to store 55-gal drums. No more than four 55-gal drums will be placed on the pallet at any one time. Therefore, the 62 gal sump capacity will contain either 10% of the total estimated volume of four 55-gal drums (22 gal) or 100% of the volume of the largest container (55 gal).

Fabricated Spill Pans. Fabricated spill pans used in HWMA units will be designed to ensure that they contain 10% of the total volume of containers stored in the pan or 100% of the volume of the largest container, whichever is greater. Containers will be elevated above the pan base with appropriate structures made of compatible materials.

An example of the interior dimensions of a spill pan are 90 x 216 in. and 4 in. tall. Ten percent (10%) of the volume is reserved for displacement by pallets. The capacity of the spill pan is calculated as shown in Table D-3.

Table D-3. Secondary Containment Capacity of Fabricated Spill Pan.

Secondary Containment	Dimensions
Interior dimensions of spill pan	90 × 216 × 4 in. (tall)
Containment volume of spill pan	(90 in)(216 in)(4 in)(1 gal/231 in^3) = 336 gal
Volume displaced (by pallet)	0.10 × 336 gal= 33.6 gal
Available capacity of spill pan	336 gal - 33.6 gal = 302.4 gal

This fabricated spill pan would have sufficient capacity to provide secondary containment of containers with a total volume of 302.4 gal (90% of 33.60 gal) or a single container holding a waste volume of up to 302 gal.

Fabricated Overpacks. Fabricated overpacks that may be used in HWMA units during the solidification process (for a 55-gal drum) are designed to ensure that they contain 100% of the volume of the container for which they provide secondary containment. Below is an example of dimensions and capacity of an overpack.

SWB. SWBs may also be used as secondary containment vessels. The capacity of an SWB when used as secondary containment vessel is 570 gal. Typically, the SWBs will be loaded within ten (10) days of transfer out of a HWMA unit. When used as a secondary containment vessel, the SWBs will be limited to containment of less than the volume of the SWB. Operation protocol at the HWMA units enables removing any free liquids resulting from leaks and spills.

For long-term storage, the SWB will be equipped with an interior support structure of sufficient height to allow for container elevation above the volume of a spill of 100% of the contents of the largest container plus the volume of liquid displaced by the interior grating or support structure. The capacity of an SWB when used as a secondary containment vessel is calculated as shown in Table D-4.

Table D-4. Secondary Containment Capacity of SWB.

Containment	Capacity
Total SWB volume	570 gal
SWB internal height	36.7 in.
SWB gal per inch of floor space	570 gal/36.7 in. = 15.5 gal/in.
Capacity of the largest stored container	55 gal
Estimated volume of liquid displaced by support structure	20%

Based on the information in Table D-4, the minimum height of the support structure is 4.3 in., as calculated below:

55 gal/15.5 gal/in. + 0.2 (55 gal/15.5 gal/in.) = 4.3 in.

To accommodate for a margin of error, a support structure will be used in the bottom of the SWB.

D-2(a)(3)(d) Control of Run-On [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.15(a)(4) and 264.175(b)(4)]

The likelihood of run-on into the secondary containment pallets, pans, and overpacks used for containment of HW/MW in HWMA units is controlled by elevation. The topography of the area where the HWMA units are located is high relative to its surroundings and drains away from the facility (Attachment 1, Section B, MFC Facility Description). Additional elevation above ground level is provided by the secondary containment platforms and/or supports. Elevation and secondary containment measures will effectively ensure all HW/MW containers are kept from contact with standing liquids.

D-2(a)(3)(e) Removal of Liquids from Containment Systems [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.15(a)(5) and 264.175(b)(5)]

Several measures will ensure that the secondary containment pallets, pans, and overpacks will not overflow because of spills, leaks, or accumulation of precipitation. The capacity of the pallets, pans, and overpacks will be sufficient to contain 10% of the volume of the containers within their boundary (if there are more than one) or 100% of the volume of the largest container, whichever is greater. The accumulation of run-on and precipitation in the secondary containment pans is prevented because of their physical location in the enclosed HWMA unit's storage areas.

In the unlikely event that liquids accumulate in the secondary containment pans, they can be identified during the daily and weekly inspections.

For example, in SCMS, because of the potential for corrosive liquids spills or leaks and because water reacts with the ignitable and reactive HW/MW that will typically be stored in HWMA units (Na and sodium-potassium alloy [NaK], which form sodium hydroxide [NaOH] and potassium hydroxide [KOH], respectively), pH measurements will be used to determine if the water is chemically contaminated. If the pH is determined to be < 2 or >12.5, it will be neutralized. Any spill materials will be packaged in drums and stored at HWMA units until further disposition.

D-2(a)(4) Test for Free Liquids [IDAPA 58.01.05.012; 40 CFR 270.15(b)(1)]

The presence or absence of free liquids in the HW/MW stored/to be stored in the HWMA units may be documented on an IWTS Profile or equivalent (ref. Attachment 2, Section C, Waste Analysis Plan). Certification will be made through analysis of the HW/MW or process knowledge and will be required by the HWMA unit's personnel prior to HW/MW acceptance.

D-2(a)(5) Container (without free liquid) Storage Drainage [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.15(b)(2) and 264.175(c)]

HW/MW containers are stored inside the HWMA units (with the exception of RSWF), and, therefore, do not accumulate liquid from precipitation. Containers without free liquids are elevated. Note: containers may be staged directly on the floor to safely facilitate processing. HWMA unit personnel will be present during these operations.

D-3 Basic Treatment System Description

This subsection provides basic system descriptions for HW/MW container and/or tank treatment systems (fixed in-place components) used to perform routine treatment processes. One of MFC's HWMA units has a fixed container and/or tank treatment system—SCMS. The treatment system for SCMS is discussed in Subsection D-3(a), SCMS Treatment System Descriptions.

D-3(a) SCMS Treatment System Descriptions

A floor diagram showing the location of each of the treatment systems within SCMS is provided in Attachment 1, Section B, MFC Facility Description, Attachment B-13. A process flow diagram, piping and instrumentation diagrams (P&IDs) for each system, and photographs and drawings of the systems components, are provided in the specified attachment(s) as shown in Table D-5.

Table D-5. Basic System Descriptions.

	Permit Application Attachment(s)	
System	**Process and Instrumentation Diagrams**	**Photos/Drawings**
SCMS Process Flow Diagram	D-7	–
Standard Process and Instrumentation Symbols	D-8	–
Piping and Instrumentation Diagram	D-9	–
Water Wash System	D-9	D-10 though D-16
Scrubber Water System	D-9	D-17 through D-20
Carbonation System	D-9	D-21 and D-22
Solidification System	D-9	D-23
Ventilation System	D-9	–
Service Water System	D-9	–
Carbon Dioxide System	D-9	–
Steam and Condensate System	D-9	–
Compressed Air System	D-9	–
Nitrogen System	D-9	–
Argon System	D-9	–

D-3(a)(1) Water Wash System

Ignitable and reactive characteristics of the HW/MW (typically Na and NaK) are deactivated in the water wash system. The water wash system is designed to perform the following deactivation processes:

- Deactivation of bulk ignitable and reactive HW/MW placed inside the water wash vessel (WWV) and or liquid HW/MW transferred to the WWV from the melt/drain and transfer feed container (Na and NaK)
- Deactivation of residual ignitable and reactive HW/MW remaining in closed containers that have been drained or emptied
- Deactivation of residual ignitable and reactive HW/MW contained in or remaining on debris, components, piping, open tanks, or other types of debris
- Deactivation of HW/MW accumulated from miscellaneous containers on-Site
- Aggregate HW/MW from multiple containers or tanks.

Process. In the WWV, the ignitable and reactive characteristics of HW/MW are deactivated in a controlled process (via water reaction/water washing) where the ignitable and reactive HW/MW reacts with air and water, ultimately forming a hydroxide solution (OH) by the following reaction (as shown for Na):

Direct Water Reaction

$$Na + H_2O \rightarrow NaOH + 1/2H_2$$

Direct Air Reaction

$$2Na + 1/2O_2 \rightarrow Na_2O$$

The hydroxide solution produced from the direct reaction with water drains into the scrubber water tank. Airborne reaction products from the water reaction are advanced through the water wash scrubber via a 3000 cfm air flow where the airborne particles combine with water droplets to form a hydroxide solution by the following reaction (as shown for Na):

$$Na_2O + H_2O \rightarrow 2NaOH$$

The water wash system basically consists of a WWV and a ventilation system. The WWV contains the ignitable and reactive HW/MW water, and ignitable and reactive waste-air reactions and resulting hydrogen-air reaction. The WWV protects personnel from these reactions and from heat; corrosive, ignitable, and reactive HW/MW burns; and radioactive contamination. The ventilation system consists of a venturi scrubber with a liquid separator, moisture separator, air heater, two banks of high efficiency particulate air (HEPA) filters, exhaust fan, and direct-to-atmosphere vent. The exhaust fan draws an air flow of 3000 cfm through the WWV, diluting the gaseous vapor reaction products.

The aqueous solutions generated from bulk, residual, and debris treatment operations are drained to the scrubber water tank by gravity flow through a 2-in. drain line from the center of the bottom head.

Airborne reaction products from deactivation of ignitable and reactive HW/MWs are drawn from the WWV through the venturi scrubber, moisture separator, and HEPA filters before being released to the SCMS exhaust stack. A direct-to-atmosphere vent line from the WWV is incorporated as an alternative for venting hydrogen in the event the exhaust fan fails during operation. The height of this atmospheric vent and numerous bends within the exhaust system minimize the possibility of HW/MW release. The water wash system is not allowed to operate when this backup system is in operation; treatment is secured immediately. In the event this vent is opened, operators will be notified by (1) an audible alarm that sounds on the SCMS control panel, (2) the very loud operation of the air-operated valves, and (3) an indication of normal exhaust differential pressure/flow changes.

Water is injected into the air stream through spray nozzles upstream of the venturi scrubber. The scrubbing action takes place as the water is sprayed into the air stream as it is accelerated through a venturi. The water containing the dissolved particulate/vapor is then removed by the downsteam liquid separator contained in the water wash scrubber.

Air and liquid flow through the flooded elbow into the bottom of the separator. The air and liquid mix passes into a cyclonic-entrainment separator that exerts centrifugal and gravitational forces to separate the liquid and air. The liquid flows out of the separator through the bottom drain, and the scrubbed air flows up through the water wash scrubber.

The moisture separator and air heater are installed downstream of the scrubber to reduce moisture condensation in the HEPA filters. They are both installed in the same housing. The heater is designed to raise the temperature of 3000 cfm of air a minimum of 10°F. Increasing the air temperature raises the dew point; thereby, reducing condensation in the HEPA filters.

There are two banks of HEPA filters downstream of the air heater to serve as final collection for smoke and airborne particulate contamination. The HEPA filters will remove particulates with a 99.97% efficiency for particle sizes 0.3 microns or larger.

The two banks of filters are arranged in parallel, with manually-operated isolation dampers upstream and downstream of each bank. Only one filter bank will be in operation at a time. The other bank will be in standby for use if the operating filter plugs up or fails. Switching to the standby filter bank will normally be done when the filter differential pressure exceeds the operating limit of 5 in. H_2O.

The water wash system exhaust fan is located outside of the SCMS, at ground level, on the south side of the SCMS Low Bay. The exhaust fan is rated to deliver 3000 cfm at this altitude.

The WWV has automatic dampers to isolate it from the normal ventilation system, and to open a vent to the atmosphere outside the building if the fan fails during operation. If ventilation flow is stopped because of fan failure or plugging of HEPA filters, a pitot-static tube in the fan discharge provides a signal to the pressure switch. The pressure switch will deenergize solenoid valves in the air lines to their respective dampers, the normal inlet and outlet dampers will close, and the emergency vent damper will open.

Venturi Scrubber and Liquid Separator. The venturi scrubber is used to remove reaction product smoke and other particulates from the ventilation air stream. It is designed to remove the smoke resulting from burning 50 lb/hr sodium in air, assuming that all the burned sodium results in smoke and is in the form of sodium monoxide (Na_2O). The scrubber is specified to have an efficiency of 97% for a particle size of 0.37 micron, regardless of composition. A drawing of the venturi scrubber is provided in Attachment D-14.

The venturi and separator are constructed of Type-304 stainless steel for resistance to corrosion by the hydroxide solution.

Instrumentation on the scrubber includes a locally-reading thermometer on the air outlet line and differential pressure sensor across the filter. The differential pressure indicator is mounted on the water wash ventilation gauge panel on the wall south of the instrumentation and control (I&C) panel. The I&C panel is located west of the scrubber.

Moisture Separator. The moisture separator is constructed of stainless steel and contains a knitted pad of stainless-steel mesh, about 2 ft^2 x 4-in. thick. It is capable of removing 99.9% of the entrained moisture when operating under conditions recommended by the manufacturer. The moisture that collects in the pad agglomerates into larger droplets and drains by gravity through the vent line back to the liquid separator. A drawing of the moisture separator is provided in Attachment D-15.

The air heater consists of a Type 316 stainless-steel, finned-tube assembly, heated by steam from the building steam system.

There are locally indicating thermometers at the inlet (D11-TI-111) and outlet (D11-T1-114) of the heater to monitor the air temperature rise.

HEPA Filters. Each filter bank contains four filters; each filter is 2 ft^2 x 1-ft. deep. The filter banks are contained in "bagout" housings that are designed so that the filters may be removed into plastic bags without exposure to the atmosphere. Drawings of the HEPA filter process ventilation system are provided Attachment D-16.

Instrumentation for the filters includes differential pressure indication and high differential pressure alarms across each bank of filters. The indicators are located on the water wash ventilation gauge panel and the alarms activate the "Water Wash System Abnormal" alarm on the SCMS High Bay I&C panel.

Exhaust Fan. The fan is a single-suction, squirrel-cage blower, constructed of carbon steel. It is driven by a 50 HP, 480 V, 3 phase, totally-enclosed motor. Discharge from the fan is routed to the SCMS building ventilation exhaust stack, where it joins the 10,000 cfm exhaust flow from the SCMS High Bay Area.

D-3(a)(2) Scrubber Water System

The scrubber water system receives aqueous liquid solutions from HW/MW treatment operations performed in the water wash system and/or aqueous carbonate solutions from the deactivation of corrosive HW/MW in the carbonation system.

The scrubber water system supplies or transfers solutions to the following:

- The venturi scrubber for the removal of airborne reaction products resulting from the deactivation of ignitable and reactive HW/MW in the water wash system

- The WWV for treatment of container residuals and debris treatment operations in the WWV

- The carbonation vessel for deactivation of the hydroxide solutions and conversion to their carbonate form

- The container fill station for temporary storage

- The solidification system for solidification/stabilization prior to disposal

- The work enclosure drum fill station.

Process. During HW/MW treatment operations performed in the water wash system, all the solutions that drain from the WWV and from the venturi scrubber go directly to the scrubber water tank. The scrubber pumps take suction from the tank and supply the solution back to the venturi scrubber or to the WWV for residual deactivation operations. Recirculating the scrubber water tank solution reduces the amount of liquid requiring further treatment by reducing the makeup water requirements and by evaporating water and concentrating the solution.

The scrubber tank solution can be recirculated until a maximum equivalent hydroxide concentration of 15 wt% is reached.

The equivalent hydroxide concentration in the scrubber water is measured continuously when the system is in operation. The readout for the meter is a digital volt meter, calibrated in % NaOH, located on the SCMS High Bay I&C panel.

The scrubber water tank sampler is installed above the SCMS Low Bay Pit grating in a stainless-steel enclosure. The scrubber water sampler provides a hard piped means of sampling the scrubber water directly, with a minimal potential for leakage or spills.

D-3(a)(3) Carbonation System

The corrosive characteristics of HW/MW that require deactivation (pH ≤2 or ≥12.5) following and/or prior to additional treatment processes include:

- Hydroxide solutions produced in the SCMS water wash system
- Containerized liquid corrosive HW/MW received at SCMS.

These corrosive solutions or liquids can be deactivated by carbonating the hydroxide solution with CO_2 in the SCMS carbonation system or by neutralizing the hydroxide solution or corrosive liquids with nitric acid. Carbonation or neutralization will be performed to within an acceptable pH range (2 < pH < 12.5) to deactivate the corrosive characteristic and/or to obtain the optimum pH for subsequent solidification/stabilization of the carbonated/neutralized solutions. The manufacturer information for the agents used is found in Attachment D-4.

Process. The carbonation system utilizes some components of the scrubber water system to supply solutions to the carbonation vessel.

Deactivation of ignitable and reactive HW/MW in the water wash system generates hydroxide solutions that drain to the scrubber water tank. This hydroxide solution is then recirculated and used in the water wash system until a maximum 15 wt% hydroxide concentration is attained. The carbonation of the hydroxide solution begins by transferring the solution from the scrubber water tank to the carbonation vessel using the scrubber pump(s).

The hydroxide solution in the scrubber water tank is recirculated through the bottom of the carbonation vessel at a rate of approximately 1 gpm , where it is contacted with finely divided gaseous CO_2, introduced through a sintered metal sparge element of 10 μm porosity. The CO_2 reacts with the hydroxide solution by the following reaction:

$$2NaOH + CO_2 \rightarrow Na_2CO_3 + H_2O$$

The recirculated solution gravity drains from the carbonation vessel back to the scrubber water tank. A combination of the mass of CO_2 delivered and the carbonation vessel pressure and temperature provides an indication of hydroxide to carbonate conversion completion. Sampling and analysis from the scrubber water tank confirms the conversion of hydroxide solution to a carbonate solution of pH > 2 and < 12.5.

In addition to the carbonation system, neutralization can be used for deactivating the corrosive liquids generated in the WWV. Corrosive liquids are neutralized by adding a precalculated amount of acid or base (i.e., nitric acid or sodium hydroxide) as a neutralizing agent. The amount of neutralizing agent will be based on the pH of the corrosive material and desired final pH.

D-3(a)(4) Solidification System

Solutions or liquids that may require solidification or stabilization prior to disposal can be solidified or stabilized in the SCMS solidification system (typically in, but not limited to, 55-gal drums). Solidification or stabilization of the solutions will be performed, as necessary, to meet UTS and/or disposal facility WAC criteria (free liquid tests).

Solutions or liquids that may require solidification or stabilization include:

- Non-HWMA/RCRA solutions resulting from the deactivation of ignitable, reactive, and/or corrosive HW/MW
- Toxic metal-contaminated HW/MW.

The solidification or stabilization procedure, and the type and amount of solidification or stabilization agent used, is based on the analysis of a representative sample of the non-HWMA/RCRA waste or toxic metal-contaminated HW/MW solution taken prior to the solidification or stabilization treatment process and one of the following:

- An approved WAP and a treatment procedure for a specific HW/MW stream
- Recommended usage and specifications provided by agent manufacturers based on bench-scale testing for a particular HW/MW stream.

Solidification and stabilization agents may include natural materials such as vermiculite, silicates, clays, or synthetic materials such as absorbent polymers. Examples of agents used include Aquaset II-G and Aquaset II-H. The manufacturer information is found in Attachment D-4.

Solidification Station. The solidification station is used to treat prefilled containers or accommodate transfer operations to place materials within new containers for treatment. The station consists of an enclosure (glovebox), a variable speed/position mixer, and a hydraulic lift platform. Containers requiring treatment are placed within a shielded overpack (ref. example provided in Attachment D-24) and raised into position under the mixer. The mixer is operated and the solidification/stabilization agent is added. The container is inspected for free liquid and, if required, a sample is taken. The treated container is then removed from the solidification station (ref. Attachment D-23).

Process. The solidification station can receive liquids from the following sources:

- Scrubber water tank
- Demineralized water line
- External transfer line
- CO_2 system.

Liquids received from the scrubber water tank can be transferred directly to the solidification station or to a container fill station for temporary storage until the solution can be processed in the solidification station. The container fill station and pump transfer connections allow for the transfer of liquid from the scrubber water tank via external transfer line into the container fill station and a means to transfer the liquid from the container fill station via external transfer line into the solidification station. This provides operational flexibility and allows the water wash system and the solidification station to operate independently of each other.

The solidification station also has additional lines that can be adapted for use in other HW/MW transfer operations. Containers requiring treatment are placed within a shielded overpack and raised into position under the mixer by the hydraulic lift platform. The containers are then connected to the solidification station using a bag-in sleeve system. The mixer is operated at varying speeds and elevations within the container using a disposable blade apparatus. Waste, liquids, treatment chemicals, and solidification/stabilization agents are added as required for treatment based on waste form development bench-scale testing. The container is inspected for free liquid and, if required, a sample is taken. The treated container is then removed from the solidification station.

D-3(a)(5) Support Systems

The support systems for the operation of SCMS are described in the following subsections.

D-3(a)(5)(a) Ventilation System

The major components of the SCMS ventilation system are a 10,000-cfm exhaust fan, a 350-cfm auxiliary exhaust fan, one 3000-cfm roof exhaust fan, two main HEPA filter banks, an exhaust stack, and associated ductwork and dampers (ref. Attachment D-16).

Building 793 Main Exhaust Fan. The main exhaust fan is located on the south side of the SCMS Low Bay.

The fan takes suction from the SCMS High Bay and the SCMS Low Bay through two main HEPA filter banks. The fan discharges to the outside atmosphere through the building exhaust stack.

The fan suction line branches in the SCMS Low Bay to draw air through two main HEPA filter banks. The first bank consists of eight 1000-cfm filters mounted in a box frame in the south wall of the SCMS High Bay. The other main filter bank consists of four 1500-cfm HEPA filters in a bagout housing mounted on the wall just west of the first bank.

There are two branches of ductwork to the inlet plenum of the bagout set of filters that provide exhaust from specific areas of the SCMS High Bay. The branches are identified as the upper-level exhaust duct and the lower-level exhaust duct.

The upper-level exhaust duct takes suction through three inlets in the extreme overhead of the SCMS High Bay. This flowpath is provided to remove any flammable vapors that may accumulate as a result of processing operations. The lower-level exhaust duct circles the SCMS High Bay on the south, west, and north sides.

There are eight inlets to the lower-level duct; four along the south wall and four along the north wall. These inlets are provided to connect flexible exhaust tubing for local area contamination control.

Auxiliary Exhaust Fan. There is a small, 350-cfm auxiliary exhaust fan in the SCMS Low Bay, which is configured in parallel with the main fan.

Exhaust Stack. The main SCMS exhaust stack is mounted on a concrete foundation just south of the SCMS Low Bay. It is a free-standing stack, 3 ft 6 in. in diameter and 48-ft. tall. The main and auxiliary exhaust fans and the water wash ventilation fan all discharge through the stack.

There is an isokinetic flow tube near the top of the stack to provide a sample of the exhaust air to a stack monitoring system. The stack monitor is located in the SCMS Low Bay and monitors for gross beta and alpha particulate activity.

Roof Exhauster Fan. A 3000-cfm roof exhauster fan is located on the peak of the SCMS High Bay roof. This fan is normally operated only during warm weather to cool the building.

Outside Air Supply. Outside air enters the SCMS High Bay through an air-inlet filter bank located high on the wall in the northeast corner. The filter bank comprises standard furnace filters and is used to limit dust entering the building.

There are thermostatically controlled electric heating coils in the SCMS High Bay air inlet to preheat the air in the winter.

Air is supplied to the equipment in the SCMS Low Bay by an externally mounted swamp cooler through an internal distribution duct along the south wall.

D-3(a)(6) Service Water System

Two separate water supplies make up the SCMS service water system. Demineralized water and potable water are supplied to the SCMS through underground piping. Both systems enter the building in the southeast corner of the SCMS Low Bay (ref. Attachment D-9).

Demineralized water comes from the EBR-II power plant purified water supply system at a pressure of about 80 psig. The line is routed to the SCMS High Bay where it supplies two hose outlets located on the south wall.

Demineralized water supplies SCMS tank treatment processes that require pure water.

Potable water is supplied by galvanized-steel piping from the main water line at a pressure of about 100–110 psig. At the point of entry into the SCMS Low Bay, this pressure is reduced to about 45 psig for distribution throughout the building.

D-3(a)(7) CO_2 System

Carbon dioxide (CO_2) gas can be used at SCMS to deactivate hydroxide solutions in the carbonation system (ref. Attachment D-9). Gaseous CO_2 can be supplied by the CO_2 manifold located in the SCMS High Bay by three portable liquid CO_2 dewars.

D-3(a)(8) Steam and Condensate System

Steam is supplied to the SCMS at 50 psig from a local boiler installed in the MFC 793 Annex. It is routed to the southwest corner of the SCMS High Bay where it supplies steam to the Water Wash Exhaust Air Heater. A relief valve provides overpressure protection.

The steam is drained through steam traps. All condensate is discharged to the building's industrial waste drain.

D-3(a)(9) Compressed Air System

Compressed air is supplied to the SCMS by two air compressors. One is the main plant/breathing/process-instrument compressor that supplies most of the loads. The other is a small auxiliary instrument air compressor (ref. Attachment D-9).

The main air compressor is housed in a small shed on the southwest side of the SCMS Low Bay. It supplies air (at 110 psig) throughout the SCMS for the following uses:

- Hose outlets for general plant air use in the SCMS High Bay
- Water wash system ventilation flow control and pneumatically operated ventilation valves on the water-wash tank.

The auxiliary instrument air compressor is located inside the SCMS Low Bay near the south wall. The compressor supplies air (at 20 psig) to the following:

- Carbonate retention vessel level indicator
- Main building exhaust fan outlet damper controls
- Thermostat control for the building supply air preheat coils.

D-3(a)(10) Nitrogen System

In the SCMS facility, nitrogen gas is typically used for purging and inerting when working with Na or NaK (ref. Attachment D-9).

D-3(a)(11) Fire Suppression System

In case of small Class A, B, C, or D fires, portable fire extinguishers of CO_2, dry chemical, and Met-L-X types are placed in the facility for personnel use. Silica sand and carbonate are also available in these areas for personnel use on Na or NaK fires.

D-4 Tank Systems [IDAPA 58.01.05.012; 40 CFR 270.16]

D-4(a) SCMS Existing Tank Systems

SCMS presently contains two connected tank systems—the water wash system and the scrubber water system—that are considered to be existing tank systems in accordance with the definition in IDAPA 58.01.05.004 and 40 CFR 260.10 and the preamble in 51 Federal Register (FR) 25446, Section IV.B.4, *Design and Installation of New Tank Systems*. These tanks systems were built in 1980, installed in 1981, and put into service as HW/MW (or materials) storage or treatment tank systems prior to the promulgation date of the regulations (July 14, 1986).

These two existing tank systems—the water wash system and the scrubber water system—meet secondary containment requirements in accordance with IDAPA 58.01.05.008 and 40 CFR 264.193 as described in Subsection D-4(b). The secondary containment has been:

- Designed, installed, and operated to prevent any migration of HW/MW or accumulated liquid out of the systems to the soil or groundwater
- Designed to detect (or allow detection of) releases of HW/MW and accumulated HW/MW until the collected material is removed
- Constructed and lined with materials that are compatible with the HW/MW placed in the tanks systems and have sufficient strength and thickness to prevent failure
- Constructed of a base that is sufficient to provide support to the secondary containment system
- Provided with leak detection capability (inspections) that will detect the failure of either the primary or secondary containment or the presence of any release of HW/MW or liquids in the secondary containment within 24 hours
- Sloped to drain and remove liquids resulting from leaks or spills.

D-4(a)(1) Assessment of Existing Tank System Integrity [40 CFR 270.16(a), 264.191]

Because these two tank systems meet the definition of an *existing tank system with secondary containment,* they do not require a written assessment of their integrity. However, information on the tank systems and ancillary equipment has been provided in this subsection.

The feed and ancillary systems for the water wash system and the scrubber water system are shown in Table D-6.

Table D-6. Existing Tank System Feed and Ancillary Systems.

Water Wash System	
Systems	Water Wash Vessel
Feed System(s)	Ventilation System Service Water System
Ancillary System(s)	Scrubber Water System Nitrogen System Argon System Compressed Air System Steam and Condensate System
Scrubber Water System	
Systems	Scrubber Water Tank
Feed System(s)	Water Wash System Carbonation System Service Water System
Ancillary System(s)	Compressed Air System Water Wash System Carbon Dioxide System Ventilation System Carbonate Retention Vessel Solidification System

The water wash system and the scrubber water system tanks and ancillary equipment have been designed, and have the structural integrity, to contain the hazardous characteristics of HW/MW processed in the systems. Inspection and testing (preventative maintenance checks) of the water wash system and the scrubber water system conducted on a routine basis are detailed in SCMS-specific procedures. These preventative maintenance checks are performed in accordance with SCMS operating procedures. Major deficiencies and repairs are noted in the SCMS operating record.

The design standards (basis) to which the water wash system and the scrubber water system tanks and ancillary equipment (components) were constructed are provided below:

WWV. MFC has been reacting ignitable and reactive HW/MW (consisting mainly of Na/NaK) in the WWV since installation of the unit in 1981. The limits of flammability and detonability of hydrogen in air were important in designing the system and determining the operating limits. The flammability limits define the hydrogen/air concentration that will burn. This concentration ranges from 4 to 75 percent by volume of hydrogen in air. Within these limits, the lower-order explosions, called deflagration, can occur. The detonation limits define the hydrogen/air concentration that can result in high-order explosions. The detonation limits are from 18.3 to 59 percent by volume of hydrogen in air.

Both classes of explosion cause a sudden increase in pressure in a confined space. A detonation, involving a greater energy release, results in a theoretical pressure rise of 1464 psig, while a deflagration would result in a calculated pressure rise of 86 psig. Designing a vessel to contain the maximum theoretical pressure rise would be impractical and prohibitively expensive. Therefore, the WWV design was based on the pressure rise of a deflagration.

The air intake to the WWV is essentially open to atmosphere, with only the differential pressure caused by the exhaust fan to keep pressure surges inside. A sudden overpressure could blow back through the air intake. The WWV burn pan is administratively controlled to contain a maximum amount of ignitable and reactive HW/MW at any one time, but never to exceed 156 gallons/day. A detailed engineering evaluation is written and maintained in the facilities operating record to document the maximum amount of ignitable and reactive HW/MW that can be treated in the WWV at any one time and determine needed safety and administrative limits. These limits are implemented through operating procedures to prevent over pressurization of the WWV. Deactivation procedures are written to limit the rate of the reaction and therefore the rate of hydrogen generation.

The WWV is a vertical cylindrical tank with dished top and bottom heads. It is about 10 ft in diameter and 12 ft high. It is constructed of Type-304 stainless steel for corrosion resistance.

The WWV design was based on the pressure rise of a hydrogen deflagration explosion, not a detonation explosion. It was hydro-tested to 86 psig instead of the 75 psig (1.5 x design pressure) specified by the code to withstand the maximum hypothetical pressure of a hydrogen deflagration. It normally operates at or near atmospheric pressure since it is always vented to the atmosphere through the normal or emergency vent system. All internal structural welds were ground flat and the inside of the tank was polished to make the water wash easier. All welds were made in accordance with applicable welding code requirements. Prior to daily operation, visual inspections of all parts of the water wash system are conducted to detect for signs of damage and leakage.

An equipment access nozzle on top of the WWV consists of a flanged section of 36-in. pipe projecting vertically from the center of the top head. The opening is sealed with a blank flange bolted in place during deactivation operations. The exhaust vent line is a 12-in. pipe exiting off the side of the equipment access nozzle. The inlet vent line is 12-in. pipe entering into the side of the WWV about 2 ft from the bottom and on the opposite side from the exhaust line.

There is a personnel and equipment access door on the side of the WWV, near the bottom. It is oblong in shape, 2.5 x 4 ft. It swings inward to open and may be operated from the inside as well as the outside. It is closed by six manually operated lever closures and sealed with a neoprene gasket. The door has a 4-in. circular viewing port in a gasketed-flanged mounting. The port is made of tempered glass and rated to withstand a pressure of 150 psig.

An angle-iron flange is welded to the WWV surrounding the door to seal an external change room to the WWV.

Removable floor grating is installed near the bottom of the WWV to provide a working platform for personnel and equipment/components/debris. It is made of Type-304 stainless steel and has a working load rating of 150 lb/ft^2.

There are four penetrations in the WWV for spray lances, spaced 90° apart, and about 3.5 ft above the floor grating. Each lance consists of a spray gun, piping, and a spray nozzle. The spray gun valve is outside the WWV, from which the spray is controlled and directed. The pipe penetrates the wall through a flanged ball and socket joint, which is bolted to a mating flange and welded to the WWV wall. This arrangement allows the nozzle to swivel through an included angle of 80° in any direction. The inlet to the spray gun is a stub-pipe with a quick disconnect coupling, to which a water hose is connected. The section of spray pipe inside the WWV is about 30 in. long. It terminates in a spray nozzle and contains a check valve to prevent blowback in case of an explosion in the WWV.

There are two viewing ports adjacent to two spray lances for observing the interior of the WWV during deactivation operations. The glass is contained in a flanged housing with cushioning gaskets, that is bolted to a mating flange welded to the WWV wall. They are 6 in. in diameter and made of tempered glass designed to withstand a pressure of 150 psig.

There is a 12-in. flanged penetration into the WWV on the south side near the top. Its purpose is to route air lines and electrical power to the WWV for maintenance work. The cover flange for this penetration contains bulkhead fittings for tubing and the valve operator for the drip-pan drain valve.

The interior of the WWV is lighted by two explosion-proof light fixtures mounted inside the top head. They are powered from the 110 VAC lighting panel.

The only instrumentation directly associated with the WWV is a locally-reading thermometer and a pressure gauge on the outlet vent line on top of the WWV.

Venturi Scrubber. The venturi scrubber was designed to remove the smoke that results from burning 50 lb of ignitable and reactive HW/MW per hour, assuming that all of the burned HW/MW results in smoke, and remove particulates with a mean particle size of 0.37 micron at an efficiency of 97% or greater.

The venturi and separator are constructed of Type-304 stainless steel for resistance to corrosion by the hydroxide solution. The venturi is a convergent/divergent nozzle of rectangular cross section, about 14 in. wide. It has a manually-operated damper that varies the throat opening from 1 in. to a maximum of 2 in. The velocity/pressure-drop across the venturi is determined by the position of the damper. The design maximum pressure drop is 38 in. H_2O at 3000 cfm.

Instrumentation on the scrubber includes a locally-reading thermometer on the air outlet line and differential pressure sensor across the venturi. The differential pressure indicator is mounted on the water wash ventilation gauge panel on the wall south of the I&C panel. The I&C panel is located west of the scrubber.

Moisture Separator. The moisture separator was designed to remove 99.5% of the entrained moisture in the off-gas stream and is made of stainless-steel materials that are resistant to the 25% concentrations of hydroxide solutions.

Air Heater. The air heater was designed to raise the off-gas air temperature a minimum of 10°F. This rise in air temperature precludes the condensation of moisture in the HEPA filters.

The air heater consists of a Type-316 stainless-steel, finned-tube assembly. It is heated by approximately 15 psig steam from the building steam system. Steam flow to the heater is controlled by a manual globe valve. Condensate drains from the heater through a steam trap to the building drain main.

There are locally indicating thermometers at the inlet (D11-TI-111) and outlet (D11-T1-114) of the heater to monitor the air temperature rise.

HEPA Filters. The HEPA filters were designed to remove particulates with a 99.97% efficiency. Dual banks of filters were installed to assure continuous operation in the event of filter failure or excessive fume loading.

Scrubber Water Tank. This tank was designed to provide scrubber solution recirculation capabilities. This provides minimization of corrosive radioactive liquid HW/MW.

Scrubber Water Tank and Pumps. The scrubber water tank and pumps are located in the SCMS Low Bay Pit in the SCMS Low Bay. The pumps are piped in parallel configuration with common suction and discharge lines. Normally, one pump is operating with the other in standby. All valves in the system are manually operated with the exception of the automatic makeup water supply to the scrubber water holding tank. The system piping is Type-304 stainless steel with welded connections.

The transfer piping to the fixed and removable solidification units are also Type-304 stainless steel with welded connections. Isolation valves are manually operated stainless-steel gate valves.

The scrubber pumps are manufactured by March Co., Model TE-7R-MD. The pump is a magnetically coupled 15-gpm centrifugal pump, hermetically sealed unit with no physical connection between the motor and pump shaft. The motor is a 3/4 Hp, single-phase, 120 VAC, 60 Hz, explosion proof, induction motor. Since no shaft penetrates the pump case, the possibility of leakage through the shaft is eliminated. All wetted parts of the pump are stainless steel except a ceramic spindle and washer.

The scrubber water tank is a 350 gal, vertical, cylindrical tank with conical top and bottom heads. The maximum administrative capacity of the scrubber water tank is 300 gal. It is constructed of Type-304 stainless steel for corrosion resistance. It is vented to the atmosphere through the vent line to the carbonate retention vessel line and, therefore, not subjected to pressure. The tank has three separate level probes, for level control, indication, and high-level alarm.

Scrubber Water Sampler. The scrubber water sampler consists of stainless-steel lines and valves and a 300-cc stainless-steel sample chamber. The sample chamber is fitted with quick-disconnects to minimize any leakage during sampling. The scrubber pumps provide the flow upward through the sampler and then returns it to the scrubber water tank.

There is a pressure gauge (D21-PI-109) on the common discharge line from the pumps and a thermometer (D21-TI-112) and flowmeter (D21-FI-115) in the line at the venturi scrubber. Flow to the scrubber is regulated with a manual ball valve upstream of the flowmeter.

D-4(a)(2) External Corrosion Protection [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(e) and 264.192(f)]

The WWV and scrubber water tank are constructed of stainless steel for resistance to corrosion and are designed to hold aqueous solutions. The WWV is located above ground inside the SCMS High Bay. The scrubber water tank is elevated off the floor of the SCMS Low Bay Pit. External corrosion is not a factor of concern as the external surfaces of the WWV and scrubber water tank are not in contact with soil or water.

D-4(b) New Tank Systems [IDAPA 58.01.05.012; 40 CFR 270.16]

SCMS presently contains one tank system—the carbonation system—that is considered to be a new tank system in accordance with the definition in IDAPA 58.01.05.004 and 40 CFR 260.10, and the preamble in 51 FR 254.46, Section IV.B.4, *Design and Installation of New Tank Systems*. This tank system was built in 1994, installed in 1995, and put into service as a HW/MW (or materials) storage or treatment tank system after the promulgation date of the regulations (July 14, 1986). As a result, a written assessment of the tank system was conducted. A copy of the assessment is provided in Attachment D-25. Information on the assessment is provided below.

D-4(b)(1) Assessment of New Tank System Integrity [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(a) and 264.192(a)]

Feed and ancillary systems associated with the carbonation system are identified in Table D-7.

Table D-7. New Tank System Feed and Ancillary Systems.

Carbonation System	
Systems	Carbonation Vessel
Feed System(s)	Scrubber Water System Carbon Dioxide system
Ancillary System(s)	Water Wash System Service Water System Solidification System Compressed Air System

The written assessment on the carbonation system (ref. Attachment D-25) identifies the following:

- Design standards according to which the tank and auxiliary equipment were constructed
- Hazardous characteristics of the HW/MW being handled

- Design considerations to ensure:
  - Tank foundations will maintain the load of a full tank
  - Tank systems will withstand the effects of frost heave.

The tank assessment provides information on the structural integrity and suitability of the tank system for handling HW/MW and has been reviewed and certified by an independent, qualified, registered professional engineer.

The carbonation vessel is a 30-gal, stainless-steel tank with a conical bottom. It is classified as a new tank system and has been assessed, certified, and tested in accordance with IDAPA 58.01.05.018 and 40 CFR 264.192. This tank has been inspected for weld breaks, punctures, corrosion, and cracks. None were found. The tank is not coated. The original supports are being used. This tank is not subject to flotation, dislodgement, or frost heaving. The tank is bolted to the concrete floor. The anchors are sufficiently strong to prevent horizontal motion during design-basis seismic events or inadvertent disturbances. In addition to the anchors, tipping is precluded by the platform base-to-tank height aspect. The tank has been successfully hydrostatically leak tested to 25 psig. Operating pressure is not expected to exceed 10 psig.

Carbonation vessel pressure is relieved directly to the water wash scrubber, which operates at a negative pressure. Pressure is also monitored during carbonation operations. Hydroxide level is limited by the normal recirculating path—the carbonation vessel overflows to the scrubber drain. Flow and level are monitored through sight tubes in the vent and overflow drain. After carbonation, the tank is verified empty through the overflow drain sight tube.

A thermocouple and pressure gauge are installed to monitor tank temperature and pressure during the carbonation process.

Carbon dioxide (CO_2) gas is supplied from the CO_2 system.

D-4(b)(2) External Corrosion Protection [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(e) and 264.192(f)]

The carbonation vessel is constructed of stainless steel for resistance to corrosion and is designed to hold aqueous solutions. The vessel is located above ground inside the SCMS High Bay. External corrosion is not a factor of concern because the external vessel surfaces are not in contact with soil or water.

D-4(b)(3) Description of Tank System Installation and Testing Plans and Procedures [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(f) and 264.192(b), (d), and (e)]

The carbonation system is considered a new tank system. Installation and testing plans and procedures for the carbonation system are described below. An independent, qualified, registered professional engineer, trained and experienced in the proper installation of tank systems, inspected and certified that proper installation and testing of this system was completed prior to commencement of HW/MW treatment in the carbonation system (ref. Attachment D-25).

The inspections and testing for the carbonation vessel included the following:

- A visual inspection, inside and outside, of the carbonation vessel
- A visual inspection of components, piping and monitoring devices (such as pressure, flow,level, and temperature gauges)
- Integrity and leak tests
- Determination of the presence of weld defects, punctures, scrapes of protective coatings, cracks, corrosion, and other structural damage or inadequate construction/installation.

Flow tests using compressed air and water were performed, simulating conditions anticipated for carbonation. The vessel was successfully hydrostatically leak tested at 25 psig. Operational pressure is not expected to exceed 10 psig.

The tank has four legs that are bolted to four extension legs, which are anchored to the concrete floor. The anchors and bolts are sufficiently strong to prevent horizontal motion during design-basis seismic events or inadvertent disturbances. Tipping is precluded by the platform base-to-height aspect.

Ongoing inspection and testing (preventative maintenance checks) of the carbonation system, along with the existing tank system inspections and testing, are conducted on a routine basis and are recorded on SCMS operating logs. Major deficiencies and repairs are noted in the SCMS operating record.

D-4(b)(4) Dimensions and Capacity of Each Tank [IDAPA 58.01.05.012; 40 CFR 270.16(b)]

There are three HWMA/RCRA-regulated tanks associated with the existing and new tank systems. The following subsections describe the dimensions and capacities of each tank in the systems.

D-4(b)(4)(a) Water Wash System—Water Wash Vessel

The WWV is a vertical, cylindrical tank with dished top and bottom heads. It is approximately 10 ft in diameter by 12 ft in height with a calculated volume of 817 ft^3 (6112 gal). The administratively controlled capacity of the WWV is 90 gal.

D-4(b)(4)(b) Scrubber Water System—Scrubber Water Tank

The scrubber water tank is a vertical, cylindrical tank with conical top and bottom heads. It is approximately 3 ft 6 in. in diameter by 4 ft 10.25 in. in height with a calculated volume of 46.8 ft^3 (350 gal). The administratively controlled capacity of the scrubber water tank is 300 gal.

D-4(b)(4)(c) Carbonation System—Carbonation Vessel

The carbonation vessel is a vertical, cylindrical tank with a conical bottom. It is 1 ft 6 in. in diameter by 3 ft 3 in. in height with a calculated volume of 30 gal.

D-4(b)(5) Description of Feed Systems, Safety Cutoff, Bypass Systems, and Pressure Controls [IDAPA 58.01.05.012; 40 CFR 270.16(c)]

The following subsections describe the WWV, scrubber water tank, and carbonation vessel feed systems, safety cutoffs, bypass systems, and pressure controls (ref. Attachment D-9).

D-4(b)(5)(a) Water Wash System

Air flow is provided to the WWV by the ventilation system. Manual control is provided by throttling the outlet valve for the on-line HEPA filter to maintain air flow at 3000 cfm through the ventilation system as the system resistance changes because of HEPA filter loading. The WWV has automatic dampers to isolate it from the normal ventilation system, and vent to the atmosphere outside the building in the event that the fan fails during operation. The normal inlet damper and the outlet damper are air-to-open and spring-to-close. The emergency vent damper is spring-to-open and air-to-close type. If ventilation flow is stopped because of fan failure or plugging of HEPA filters, a pitot-static tube in the discharge line of the fan provides a signal to pressure switch D11-PS-114. The pressure switch will deenergize solenoid valves D11-VS-15, -16, and -17 in the air lines to their respective dampers. The normal inlet and outlet dampers will close, and the emergency vent damper will open.

In order for dampers VR-15 and VR-17 to open, and VR-16 to close on fan startup, it is necessary to bypass the velocity-pressure switch, PS-114, until ventilation flow is established. This is done through a 30-second time delay circuit that is activated when the fan is started.

Service water is supplied to the WWV for ignitable and reactive HW/MW deactivation operations. Water is supplied at a pressure of about 80 psig. Operating procedures restrict adding additional water to the vessel as long as any water is standing in the drip pan.

D-4(b)(5)(b) Scrubber Water System

All the hydroxide solution that gravity drains from the WWV and from the venturi scrubber goes directly to the scrubber water tank. The scrubber pumps take suction from the tank and pump the hydroxide solution back to the venturi scrubber or to the WWV for residual deactivation operations. Water or hydroxide solutions are recirculated in this manner until the hydroxide concentration reaches 15 wt%, then it is pumped to the carbonation system for deactivation operations. Reusing the scrubber water in a recirculating system reduces the amount of liquid requiring treatment. Water for the initial fill and makeup to the scrubber water tank comes from the service water system through an automatic makeup valve.

The scrubber water tank is vented to the atmosphere through the vent line into the carbonate retention vessel; therefore, it is not subjected to pressure. The tank has three separate level probes for level control, indication, and high-level alarm. The level control probe has two setpoints that feed a level control switch. At the low setpoint, the switch opens a solenoid valve in the service water line to the tank. When water reaches the high level setpoint, the switch closes the solenoid valve, shutting off makeup flow to the tank. The level indicator probe generates a linear signal to feed a meter, calibrated 0–100% on the SCMS High Bay I&C panel. The alarm probe closes a switch on high level in the tank to actuate an alarm on the SCMS High Bay I&C alarm panel.

There is a pressure gauge on the common discharge line from the pumps, and a thermometer and flowmeter in the line to the venturi scrubber. Flow to the scrubber water tank is regulated with a manual ball valve upstream of the flowmeter.

During the transfer of the hydroxide solution for reacting the container residuals and/or debris in the WWV, or during transfer of carbonate solution to the solidification system, an operator will be positioned at the isolation valve for isolation of the system in case of an emergency.

D-4(b)(5)(c) Carbonation System

The scrubber water system supplies the hydroxide solution to the carbonation vessel. Typically up to a 15 wt% hydroxide solution is fed to the carbonation vessel at approximately 10 gpm and 28 psig. Gaseous CO_2 is introduced into the carbonation vessel through a sintered metal sparge element of 10 µm porosity.

The vessel temperature is continuously monitored during carbonation operations by an installed thermocouple. The vessel temperature is administratively controlled so as not to exceed 190°F during carbonation operations.

The carbonation vessel overflows continuously to the scrubber water tank during carbonation operations. If the vessel were to overfill, the solution would flow through the vent line, which would again drain to the scrubber water tank.

The carbonation vessel pressure is not expected to exceed 10 psig and is relieved through the vent line to the water wash scrubber. Vessel pressure is monitored during carbonation operations by an installed 0–15 psig pressure gauge.

Carbonation vessel flow and level are monitored through installed sight tubes located in the vent and overflow lines. The CO_2 gas supply is pressure controlled by an installed pressure regulator and flow controlled by an installed adjustable flow meter.

D-4(b)(6) Diagram of Piping, Instrumentation, and Process Flow [IDAPA 58.01.05.012; 40 CFR 270.16(d)]

The P&IDs are provided in Attachment D-9. A Standard Piping and Instrument Symbols and Lettering Legend is provided in Attachment D-8.

D-4(b)(7) Containment and Detection of Releases [IDAPA 58.01.05.008; 40 CFR 264.193]

Secondary containment systems are provided for all HWMA/RCRA tank systems in SCMS. Drawings of and specifications for the secondary containment are provided in:

- Attachment 1, Section B, MFC Facility Description Attachment: B-13, Floor Plans Schematic Showing Facility Arrangement and Maximum Storage Capacity
- Attachment D-26, Drawing of SCMS Low Bay Pit.

Leak detection will be performed by daily visual inspections of the tank systems and their designated secondary containments. Personnel who perform the inspections will be trained in accordance with the SCMS HWMA unit specific procedures. The extensive nature of this training program ensures that inspectors will recognize the makeup and source of hazardous material leakage that could occur from SCMS tank systems.

Response to spills that may occur at SCMS is addressed in Attachment 7, Section G, Contingency Plan.

D-4(b)(8) Plans and Description of the Design, Construction, and Operation of the Secondary Containment System [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(g) and 264.193(b) through (f)]

Specifications, drawings, and vendor data related to the secondary containment for existing and new tank systems located at SCMS are provided as described in Subsection D-3(a).

Structurally, the walls and floor of secondary containments are designed to resist the following forces:

- Dead loads (such as tank, tank contents, concrete, and steel liner)
- Soil pressure on external wall surfaces
- Hydraulic pressure that would occur on the walls and floor should the tank contents leak in the secondary containment
- UBC Zone-2 seismic forces.

The ground-water level in the MFC area is 640 ft or more below the surface and was not considered a factor in the design of the secondary containment pits because of its depth. SCMS is constructed such that the surface drainage is routed away from the structure. Consequently, water is kept from reaching the soil/gravel below the foundations and secondary containment pits. This alleviates the problem of frost heaves or decreased soil strength due to saturation.

All SCMS tank systems and secondary containment systems are inside the SCMS buildings and are constructed in such a manner that surface drainage is routed away from the structures and run-on and infiltration of precipitation is prevented.

All secondary containment was inspected when installed to ensure that it was free of cracks or gaps. The water wash system, scrubber water system, and carbonation systems are situated within the secondary containment so the secondary containment prevents HW/MW from coming into contact with surrounding soil.

None of the SCMS tank system secondary containments are equipped with a leak detection system. Therefore, leak detection will consist of daily visual inspections of the secondary containment by SCMS facility personnel during operation of the tank systems. Records of the daily inspections will be maintained as part of SCMS operating records. Response actions to spills or leaks of HW/MWs are detailed in Attachment 7, Section G, Contingency Plan.

D-4(b)(8)(a) Tank Age Determination [IDAPA 58.01.05.008; 40 CFR 264.193(a)]

The two tanks associated with the existing tank system, the WWV and scrubber water tank, were built and installed in 1980 and 1981, respectively. Receiving reports and as-built drawings document the age of the two tanks used in the systems (see Attachments D-11, D-18, and D-27).

D-4(b)(8)(b) Requirements for Secondary Containment and Leak Detection [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(g) and 264.193(b) and (c)]

The HWMA/RCRA tank systems in SCMS have secondary containment as described below:

Water Wash System and Carbonation System. The WWV and the carbonation vessel sit above a reinforced concrete floor in the SCMS High Bay area. The floor has been sealed with a corrosion-resistant epoxy paint to provide an impermeable surface and prevent migration of HW/MW. The floor in the SCMS High Bay has a 2-in. curb and was designed and installed to have a minimum floor loading of 1500 psf (ref. Attachment D-28). The reinforced concrete below the vessels is sloped (east and west) to allow drainage of spilled HW/MW to floor drains located on the east and west side of the vessels. The floor drains are routed to the SCMS Low Bay Pit located in the SCMS Low Bay (ref. Attachment D-26). A valve is installed in the floor drain line that will direct any spilled HW/MW to the SCMS Low Bay Pit or to a collection container (drum) located in the SCMS Low Bay Pit. The Low Bay Pit acts as an external vault for both the WWV and the carbonation vessel. The maximum amount of HW/MW within the WWV and the carbonation vessel at one time is 90 and 30 gal, respectively.

The SCMS Low Bay Pit has a floor with a 1.5-in. slope design (southwest to northeast) and has been sealed with corrosion-resistant epoxy paint. The vault and joints are sealed to a point 0.5 ft above the floor of the SCMS Low Bay Pit. The 300-gal scrubber water tank and the 4,272-gal empty carbonate retention vessel (non-HWMA) are located in the Low Bay Pit. The scrubber water tank, as the permitted and only tank in the pit for HW/MW, must be within secondary containment that holds more than 100% of its volume.

The Low Bay Pit can readily contain approximately 438 gal of HW/MW, which is greater than 100% of the volume of the scrubber water tank at 300 gal. The secondary containment volume of the SCMS Low Bay Pit is determined by accounting for 0.5 ft of epoxy up the wall and subtracting the displacement caused by the carbonation vessel. The calculation for the available secondary capacity of Low Bay Pit is shown in Table D-8.

Table D-8. SCMS Low Bay Pit Secondary Containment Capacity.

Capacity Derivation	
Dimensions of Low Bay Pit	17 x 13 x 6 ft (tall)
Volume of Low Bay Pit	(l) x (w) x (h) = V 17 x 13 x 0.5 ft = 110.5 ft^3; 826 gal
Volume displaced by carbonate retention vessel	(π) x (r^2) x (h) = V 3.14 x $(11.5/2)^2$ft x 0.5ft = 51.9ft^3; 388 gal
Available secondary capacity of Low Bay Pit	V pit up 0.5 ft - V vessels= secondary capacity 110.5 ft^3 – 51.9 ft^3 = 58.6 ft^3 or 438 gal

No volume displacement was considered for the scrubber water tank, which sits in the SCMS Low Bay Pit, because it is elevated approximately 0.5-ft off the floor by footings. A sump and electric sump pump are located in the northeast corner of the SCMS Low Bay Pit. This sump pump can be routed to discharge to a collection container (drum) or to the carbonate retention vessel (used only for non-HW/MW leaks or spills). The floor drain piping (primary piping), as well as the drains from the WWV, are within secondary piping, which is also routed to the SCMS Low Bay Pit. If a spill occurred, this routing of the floor drains to the SCMS Low Bay Pit, the floor being sloped away from the vessels, and the sump pump would meet the requirements in IDAPA 58.01.05.008 and 40 CFR 264.193(c)(4) for secondary containment drainage and removal within 24 hours. The WWV is accessible for daily inspections while in operation. This daily inspection meets the requirements of IDAPA 58.01.05.008 and 40 CFR 264.193(c)(3) for leak detection.

Scrubber Water System. The scrubber water tank sits above a reinforced concrete floor in the north end of the SCMS Low Bay Pit located in the SCMS Low Bay. The SCMS Low Bay Pit has a floor with a 1.5-in. slope design (southwest to northeast, ref. Attachment D-23) that has been sealed with a corrosion-resistant epoxy paint that acts as secondary containment and as an external vault for the scrubber water tank. The sloped floor in the SCMS Low Bay Pit allows for spills of HW/MW from the scrubber water tank to drain to the northeast corner. This design feature provides for leak detection for the scrubber water tank through daily visual inspection while in operation. The vault and joints are coated to a point 0.5 ft above the floor of the SCMS Low Bay Pit so that the vault can readily contain a maximum volume of approximately 438 gal of HW/MW which is >100% of the volume of the scrubber water tank (300 gal).

Capacity calculations are provided in Table D-8. A sump and electric sump pump are located in the northeast corner of the SCMS Low Bay Pit. This sump pump can be routed to discharge to a collection container (drum). If a spill occurred, the collection of HW/MW in the SCMS Low Bay Pit and the sump pump would fulfill the requirement in IDAPA 58.01.05.008 and 40 CFR 264.193(c)(4) for secondary containment drainage and removal within 24 hours. The daily inspections performed for the SCMS Low Bay Pit meets the requirements of IDAPA 58.01.05.008 and 40 CFR 264.193(c)(3) for leak detection.

D-4(b)(8)(c) Requirements for External Liner, Vault, Double-Walled Tank or Equivalent Device [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(g) and 264.193(d) and (e)]

Volume calculations show that the SCMS Low Bay Pit, which acts as secondary containment for SCMS tanks used for HW/MW treatment and storage (WWV, carbonation vessel, and the scrubber water tank), will provide sufficient volume to contain 100% of the volume of the scrubber water tank and all piping that could drain into the SCMS Low Bay Pit. All the secondary containment (curbing, sealed floors, and pits/vaults) in SCMS are constructed in such a manner that surface drainage is routed away from the structures and run-on, and infiltration of precipitation is prevented.

D-4(b)(8)(d) Secondary Containment and Leak Detection Requirements for Ancillary Equipment [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(g) and 264.193(f)]

SCMS High Bay floor drain piping, as well as drains from the WWV, carbonation vessel, and water wash scrubber are within secondary piping, which is routed to the SCMS Low Bay Pit. This provides leak detection capability and secondary containment for below ground piping associated with the tank systems. All other ancillary equipment associated with the water wash system, scrubber water system, or carbonation system is accessible for daily visual inspections while in operation. Daily inspections will be performed and the inspection logs will be maintained as part of the SCMS operating record. Response actions to spills or leaks of HW/MWs are detailed in Attachment 7, Section G, Contingency Plan.

D-4(b)(9) Controls and Practices to Prevent Spills and Overflows [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(I) and 264.194(b)]

Controls and practices to prevent spills and overflows include the following:

- Process equipment design controls
- Operational administrative limits for tank filling
- Instrumentation that monitors for overfilling.

Monitoring is performed by facility personnel on duty during operations and during daily inspection of the tank systems. A brief description of relevant operating procedures used to prevent spills and overflows from tank systems is listed below:

SCMS-OI-1(Facility Information and Administrative Requirements) provides a description of the SCMS (including secondary containment, ventilation systems, fire detection and suppression systems and equipment) and scope of shop operations and uses. It also addresses administrative and environmental-safety-and-health requirements applicable to the facility such as requirements for all waste activities in which alkali metals (typically Na and NaK) are being handled or transferred.

SCMS-OI-7 (Water Wash Vessel) provides instructions for operating the water-wash vessel which is used to treat alkali metal bearing wastes using water. This procedure also covers the transfer of liquids to the scrubber tank from drums and containers, and the transfer of liquids from the scrubber tank into drums for additional treatment.

Overfilling controls for the tank systems are described in following subsections.

D-4(b)(9)(a) Scrubber Water System

When the scrubber water system is in operation, the "makeup" to the scrubber water tank (service water or hydroxide solution from the WWV) is monitored and controlled by three separate level probes for level control, indication, and high-level alarm. The level control probe has two setpoints that feed a level control switch. At the low setpoint, the switch opens a solenoid valve in the service water supply line to the tank. When water reaches the high-level setpoint, the switch closes the solenoid valve, shutting off makeup flow to the tank. The level indicator probe generates a linear signal to feed a meter, calibrated 0–100%, on the SCMS High Bay I&C panel. The alarm probe closes a switch on high level in the tank to actuate an alarm on the SCMS High Bay I&C alarm panel. Readings on the local level indication for the scrubber water tank are required every half-hour during HW/MW processing. There is a pressure gauge on the common discharge line from the pumps, and a thermometer and flowmeter in the line to the venturi scrubber. Flow to the scrubber is regulated with a manual ball valve upstream of the flowmeter.

D-4(b)(9)(b) Carbonation System

When the carbonation system is in operation, hydroxide solution from the scrubber water tank flows into the conical bottom of the carbonation vessel and fills the carbonation vessel until it overflows at the outlet line on the side of the vessel. The vessel level is maintained at the outlet line location on the side of the vessel as the solution flows back to the scrubber water tank. Level indication is provided by the sight tube connected to the vessel outlet on the side of the vessel. A freeboard area is maintained in the vessel above the outlet line. This freeboard area is vented to the water wash venturi scrubber, so any vessel overfill would flow through the vent line and return to the scrubber water tank.

D-5 Miscellaneous Units [IDAPA 58.01.05.08 and 012; 40 CFR 264.601 and 270.23]

RSWF is presently the only HMWA unit at the MFC considered to be a miscellaneous unit. This section, therefore, only includes information on RSWF.

D-5(a) Description of Miscellaneous Units [IDAPA 58.01.05.012; and 270.23 (a)(1)]

A general description of the RSWF facility, and photographs and schematics of RSWF are provided in Attachment 1, Section B, MFC Facility Description. More details of the RSWF are provided in the following subsections.

D-5(b) Environmental Performance Standards for Miscellaneous Units [IDAPA 58.01.05.08; 40 CFR 264.601]

RSWF is located, designed, constructed, operated, and maintained in a manner that will ensure protection of human health and the environment. The prevention of any releases that may have adverse effects on human health or the environment due to the migration of MW stored in RSWF to the ground water, air and/or soil is described in the following subsections.

The potential pathways for the release of hazardous waste constituents from RSWF stored waste are the air and soil. The hypothetical causes of a release to the soil would require a breach of the liner from corrosion due to long-term undetected cathodic protection failure in combination with a waste container failure. The hypothetical causes of a release to the air are sodium-water reactions leading to sodium combustion and a hydrogen explosion. The release to the air would also have to be initiated by corrosion or some general failure of the waste containment system. All of these mechanisms require multiple mechanical failures and repeated long-term failure of the inspection and monitoring program to indicate a loss of cathodic protection.

Another potential cause of a release is equipment failure leading to dropping a waste container during waste transfer operations.

There are many features engineered into the RSWF design to prevent releases that may affect human health or the environment due to the migration of MW in the soil, air or ground water. The design features of the facility or physical characteristics of the area are described in Section D-5(m), Migration of Waste Constituents.

In addition, a soil corrosivity mapping of the site was performed in 1989 and revealed that the soil was mildly to moderately corrosive and that impressed current cathodic protection was needed to adequately protect the waste.

In June 1989, an independent corrosion engineering firm (CH2M Hill, Boise, ID) performed soil corrosion mapping of the RSWF. The electrical resistivity of the soil was measured by the Wenner four pin method. The tests consisted of 90 soil resistivity measurements at average depths of 2.5, 5.0, 7.5, 10.0, and 15.0 ft. Both average and layer resistivity calculations were made from these measurements. See Attachment D-29 for Field Testing Report.

The soil corrosivity mapping and soil corrosivity analysis made on soil as part of the 1988 liner removal indicated that the worst case soil is in the corrosive range. This corresponds to a corrosion rate of as much as 0.06 inches per year. Therefore, if the cathodic protection system were to completely fail in its protection of liners, no more than 0.06 inches/year of corrosion would be expected. This represents just less than a maximum of 25% penetration through the 0.25 in. wall thickness of a liner in a years time. In general, the RSWF soil ranges from mildly to moderately corrosive based on the ranking. This corresponds to a corrosion rate of 0.02 to 0.06 in./year. Based on these results, the corrosion engineers recommended that an impressed cathodic protection system be installed on all RSWF liners.

D-5(c) Miscellaneous Unit Waste [IDAPA 58.01.05.08; 40 CFR 264.601(a)(1), 264.601(b)(1), 264.601(c)(1)]

MFC was involved in numerous experiments in support of the Liquid Metal Fast Breeder Reactor (LMFBR) Development Program, which is no longer being conducted. Experiments in the LMFBR program resulted in solid waste consisting of reactor and coolant loop components that are contaminated with elemental sodium and NaK. These wastes are primarily metal parts that were in contact with, and are therefore, contaminated with reactive metals. The sodium and NaK contamination causes the HW/MW designation because these reactive metals are characteristic hazardous wastes due to reactivity and ignitability.

The processes that currently generate these wastes include hot cell operations and tests, and laboratory testing. The majority of the waste currently in the RSWF is from hot cell operations and tests. These wastes consist of subassembly hardware contaminated with sodium, Fuel Cycle Facility wastes (1964-1969), and routine wastes such as sodium-contaminated facility hardware that is no longer useful or required.

The hazardous constituents currently stored in RSWF include elemental sodium, sodium-potassium alloy (NaK), lead, barium, cadmium, and chromium. With the Fuel Conditioning Facility and the Hot Fuels Examination Facility generating waste from remote-handled reactor fuels research and other hot cell activities the waste may contain arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. The physical and chemical properties of these constituents are shown in Table D-9.

Table D-9. Physical and chemical properties of constituents that may be present at RSWF.

Hazardous Constituents	Atomic Weight	Boiling Point (°F)	Water Solubility	Specific Gravity	Melting Point (°F)
Sodium	23	1621	reacts	0.968	208
NaK	36	1443	reacts	0.847	12
Arsenic	75	1135	0	5.73	1508
Barium	137	2984	reacts	3.51	1337
Cadmium	112	1409	0	8.64	609
Chromium	52	4842	0	7.20	3375
Lead	207	3163	0	11.35	621
Mercury	201	673	0	13.55	-37.97
Selenium	79	1263	0	4.81	423
Silver	108	4014	0	10.5	1.763

A summary of each type of waste stored in RSWF including when, where it was generated, and volume is shown in Table D-10.

Table D-10. Summary of waste types stored at RSWF.

Waste Stream ID	Waste Stream Name	Dates	Facility/ Origin	Volume (M3)
CH-ANL-180RH	SODIUM -MLLW Remote Handled	1965 - 2009	MFC	25.95
CH-ANL-182RH	SODIUM POTASSIUM NaK Remote Handled	1981 - 1997	MFC	0.5
CH-ANL-716 RH	MLLW Remote Handled	1969 - 2006	MFC	2.06
CH-ANL-241Ta	MTRU Remote Handled	2008 - 2009	MFC	0.78

Sodium is ignitable and reactive and carries the RCRA hazardous waste codes D001 and D003. NaK is reactive and carries the D003 RCRA code. Lead, except when used for shielding in the containers, carries the RCRA code D008 for toxicity. The RCRA codes for cadmium and chromium are D006 and D007 for toxicity.

The majority (by number of liners) of the HW/MW presently stored in the RSWF is hazardous because of the presence of elemental sodium.

The NaK alloys used in the LMFBR program were liquid at ambient temperatures. NaK, a liquid metal, is the only liquid stored in the RSWF. Procedural restrictions on the placing of liquids (other than NaK) in the RSWF containers have been enforced since the facility first began accepting waste. At ambient temperatures, elemental sodium (208°F melting point) and lead are solid. In addition, cadmium and chromium are solid including any of the other potential hazardous constituents listed above.

In addition to the HW/MW, the RSWF also stores accountable nuclear material and radioactive waste. These materials are also stored in separate liners from the HW/MW. The waste does not contain hazardous constituents or have hazardous characteristics as defined in 40 CFR 261.

The hazardous constituents are safely contained by the waste containment system of the RSWF, as long as the integrity of the containers is maintained. The hazardous constituents and the solid waste hardware associated with the constituents are fully compatible with the stainless steel and carbon steel waste containers.

The inner waste containers with Na/NaK were packaged in an inert atmosphere isolating the HW/MW from moisture and oxygen, which reduces the concern for over-pressurization of the containers and generation of gases. In addition, no absorbents are used with Na/NaK. There is a potential for ambient water vapor to be converted to hydrogen when the lid is welded on. To mitigate hydrogen gas production procedures and practices are in place to provide assurance the liners are free of visible moisture prior to use. If moisture is identified a pump or vacuum is used to remove any moisture from the liner or the liner is air dried. If unable to remove visible moisture, the liner is simply not used. Prior to opening a liner an evaluation is performed to determine if a liner contains a hazardous atmosphere. The liner may be purged prior to opening in a controlled manner in accordance with operational procedure RSWF-OI-002.

The potential for migration of waste is addressed in Section D-5(m).

The waste stored at RSWF is tracked by grid location (i.e., X Y coordinates). Each liner has a welded alpha numeric designation located on the cover of the liner that corresponds to the grid location. The alpha numeric designation is used in IWTS as the container barcode.

D-5(d) Containment System [IDAPA 58.01.05.08 and 012; 40 CFR 264.601(b)(2) and 270.23 (a)(2)]

The containment system in RSWF consists of rows of sealed carbon-steel pipes, referred to as liners, buried vertically in the ground in bored holes such that the top of the liners protrude approximately 4 in. above ground. Photographs and schematics of the liners are provided in Attachment 1, Section B, MFC Facility Description.

Prior to placing the liners in the storage area, several feet of gravel and soil was placed in the liner area and graded to slope gently from the centerline to the parallel sides, which were banked with gravel. This grade promotes run-off, reducing percolation, maximized operating days, and also serves to prevent run-on into the area from normal or anticipated abnormal events. A drawing showing elevation contours of the RSWF has been added as Attachment D-30. This drawing also shows the drainage systems in place at RSWF.

The RSWF is designed with a grid of approximately 27 rows spaced approximately 12 ft apart with approximately 50 liners per row. The liners are arranged on approximate 6-ft centers in the rows. The volume capacity, based on the size of the waste containers that are placed in storage, is approximately 53,000 gal. This assumes that approximately 1,320 of the liner sites are usable for MW storage at the RSWF. See Attachment D-31 for the current liner configuration drawing, which is a detailed plan view of the RSWF showing the identification grid, liner types, the year the liners were installed, and the status of each liner or location (e.g., full, empty, unusable, removed, etc.).

The installation method for the liners has provided for stability of the liners and past operating experience has demonstrated that the liners will stay in place as discussed in the following paragraphs.

The liner locations are prepared by drilling approximately 24, 32, 34, or 38 in. diameter holes into the ground and centering a 16, 24, 26, or 30 in. diameter steel pipe, respectively, in the hole. Approximately 2 in. of sand slurry was placed in the bottom of each hole and around the sides of the liners. The sand slurry was backfilled in place in layers no greater than 48 in. thick. Each layer was vibrated to ensure that the fill completely surrounded the liner and that there were no voids. The soil beneath the liners was undisturbed. The sand slurry in essence holds the liner in place, since it provides a solid monolith surrounding the liner in the ground. The sand slurry has also shown to prevent subsidence around the sides and tops of the liners.

The first 30 standard liners installed in 1964 had welded hemispherical bottoms. Frost heaves caused the empty liners to lift out of the ground, so the design was changed to incorporate a base plate welded to the bottom with an outside diameter 2 to 3 in. larger in diameter than the liner. Operational experience has shown that the oversized base plates serve as a very effective anchor and makes it impossible that a liner would move vertically without the occurrence of an unusual and unanticipated event. The early hemispherical-bottom liners were all removed from the RSWF.

Past experience has shown that excavation down to the base plate is required to remove a liner from the ground. An early attempt to remove a liner from the ground without first excavating around it showed that a pulling force of approximately 48,000 pounds did not move the liner.

The height of the top of the liners above ground surface was specified at approximately 4 in. for the following reasons; 1) Empty liners too close to the ground surface are susceptible to surface water, 2) The protrusion of the liner above the ground facilitates access for welding the liner lid in place and 3) Liners too far above the ground surface could be hit by the forklift used to place or remove material into or from a liner.

MW is first containerized into one of two inner container systems referred to as HFEF-5 cans and SLSF cans. After placing the container system in the liner, shielding is provided by placing a 30 in. concrete or 6 in. steel shield plug in the liner and welding it to the top of the liner, as applicable. This configuration is illustrated in the photographs provided in Attachment 1, Section B, MFC Facility Description.

D-5(d)(1) Carbon-Steel Installed Liners

There are primarily three standard size liners used in RSWF. They are 16, 24, and 26 in. in diameter. Descriptions of the liners follow.[4] Fabrication drawings of each liner type are found in Attachment D-32.

[4] Liners and inner container systems dimensions are approximate sizes.

16-in. Diameter Liners. These are the standard liners used for MW storage in the RSWF and are sized to accept an inner container system referred to as the HFEF-5 can. These 16-in. liners are constructed of either schedule-10 carbon steel and 16 in. in diameter by 12.33 ft, or schedule-40 carbon steel and 10 ft long with a 19-in. diameter oversized base plate welded to the liner bottom. They are sealed with a concrete shield plug/lid assembly welded into the top of the liner.

24-in. Diameter Liners. These liners were sized, fabricated, and installed to accept the first generation 16-in. liner and inner container referred to as a "paint can," in which MW was stored prior to 1978. These 24-in. liners are constructed of Schedule-10 carbon steel and are 24 in. in diameter by 13.67 ft long, with a 26-in. diameter base plate. The 24-in. liners containing MW have a carbon-steel shield plug assembly welded into the top.

26-in. Diameter Liners. These liners are also used for MW storage in the RSWF and are sized to accept an inner container system referred to as the SLSF can. These 26-in. liners are constructed of 0.25-in. thick carbon steel and are 26 in. in diameter by 13 ft long, have a 28-in. diameter base plate, and are closed with a welded 6-in. carbon-steel plug.

Nonstandard liners include one 60-in. diameter by 10.8 ft long liner that was constructed to store an EBR-II cold trap and two 48-in. diameter by 3.81-ft long liners that were constructed to store EBR-II nuclide traps.

All the liners are protected from corrosion by a cathodic protection system described in Subsection D-5(d)(4). A schematic of the cathodic protection system is provided in Attachment 1, Section B, MFC Facility Description. The soil in the liner area provides passive radiation shielding that, in conjunction with radiation shield plugs placed in the top of the liners, provides shielding to protect human health and the environment.

Liner lids are sealed by welding a shield plug/plate in place. Lids are welded in place (as directed by operating procedure RSWF-OI-001) in accordance with the INL Welding Manual, and a visual inspection is performed of the final weld for cracks, through fusion, and undersized weld.

Two other types of liners with diameters of 24 and 30 in. were designed with flanged lids that are gasketed/bolted in place. The flanged 24-in. liners contain non-HW/MW, low level waste only. The 30-in. liners are maintained empty. They were installed to be available as overpacks during previous 24-in. liner relocation activities.

Each liner is subjected to leak testing after construction and prior to installation to ensure that it is free of cracks and gaps. These tests are performed prior to the liner being placed in the ground. Hydrostatic tests are conducted after the bottom plate is welded on. If leaks are detected, the liner is repaired and retested until it passes.

In order to ensure the structural integrity of the liners, they are fabricated in accordance with ASME standard codes and procedures. This includes specified welding procedures, tolerances, and grades of material. All of the liners are fabricated of carbon steel. Carbon steel and stainless steel are compatible with the MW stored in the RSWF. See Attachment D-32 for the liner drawings that specify welding and material fabrication details.

D-5(d)(2) Inner Containers

MW was first containerized in one of three types of inner container systems referred to as paint cans, HFFF-5 cans, or SLSF cans (nuclide traps and cold traps are not placed into HFEF-5 or SLSF cans). The type of inner container system used depends on when it was loaded and the type and radiation levels of the MW generated. Each of these inner container systems is described below. Photographs with illustrations of each inner container are provided in Attachment 1, Section B, MFC Facility Description.

Paint Cans. This inner container, used between May 12, 1964, and June 26, 1978, consists of a mild steel pail, 72 in. high and 11.25 in. in diameter. The lower section of the container was fabricated from 20-gauge steel tube with a welded side seam and bottom. The upper section was a bottomless standard 5-gal steel pail body (22 gauge) attached to the lower section with a circumferential weld. The container was closed with a standard 16 lug foam-rubber gasketed cover and placed into the original 16-in. liners. All of the 16-in. liners that contain these “paint cans” were extracted from the ground and placed within new, cathodically protected, 24-in. liners.

Smaller commercial pails may or may not have placed inside the paint cans. These pails are 10.25 in. ID and are 10, 12, and 24 in. high to accommodate various sizes and quantities of waste.

Both the 72 in. waste container and the small pails were subjected to a series of drop tests to establish their resistance to rupture. In these tests, the large waste container was loaded with heavy scrap metal or with small pails loaded with scrap and was dropped from various heights onto soil or a steel plate. These tests demonstrated that the small pails might collapse partially, but would not rupture or open, and the large container would deform slightly, but not rupture or open.

HFEF-5 Cans. This inner container system consists of an inner and outer container. The inner container is placed inside the outer container, which is seal-welded shut and placed in the RSWF liners for storage. The inner container, constructed of carbon steel, is the hot cell waste receptacle. It is a cylindrical, 14-gauge carbon-steel (AISI 1010-1020) container, 59.125-in. long by 11.60-in. in diameter. It is closed by a 0.375-in. thick lid fastened to a bolt ring in the top of the container by six cap-head bolts. The outer containers are the out-of-cell containers and are used to prevent the spread of contaminants from the inner container to the environment. It is a cylindrical, 14-gauge, Type-304 stainless-steel container, 73.5-in. long by 12.75-in. in diameter.

HFEF/S and HFEF/N containers were earlier versions of HFEF-5 cantainers. These containers had similar dimensions as HFEF-5 containers and were discontinued in 1987. Waste packaged into the HFEF/S and HFEF/N are still being managed at RSWF.

SLSF Cans. This inner container system is constructed like the HFEF-5 can, except that it is larger in diameter. It is a cylindrical, 11-gauge Type-304 or -308 stainless-steel container, 20.76 in. in diameter by 122.00-in. long. It is closed by a 1.5-in. thick lid fastened to a bolt ring in the top of the container by six cap-head bolts. In addition to using the SLSF inner can, three 45-gal stainless-steel cans are also used as the inner waste storage containers. They are 14 gauge, 21 in. in diameter by 32-in. long, and are closed with a 0.375-in. thick lid fastened to a bolt ring in the top of the container by 10 cap-head bolts. The SLSF outer container is a cylindrical, 11-gauge carbon-steel (AISI 1010-1020) container, 22.25 in. in diameter by 134.5-in. long. It is closed by a 1.5 in. thick lid that is seal-welded in place.

In addition, the bulk sodium storage container was placed inside the SLSF outer container for storage. The bulk sodium storage container is a cylindrical, type 304 stainless steel (0.25 in. wall) container, 17.5 in. ID by 32.875 in. long. The container cover is welded in place.

Nonstandard Containers. An EBR-II primary cold trap was placed directly in a specially designed 60-in. liner. The cold trap serves as the container for the waste sodium in it. Double containment is provided for the MW by the cooling jacket around the vessel. This jacket was drained of bulk MW and all pipes and fittings sealed prior to its placement in storage. Only residual MW that could not be drained or blown from the jacket remains.

EBR-II nuclide traps were placed directly into two specially designed 48-in. liners. The nuclide trap serves as the container for the waste sodium it contains. Double containment is provided for the MW by the jacket around the vessel and by additional metal welded around each of the nuclide traps.

The SLSF warm vapor trap is stored in its own special container. The container has a top section that is cylindrical, 12.25 in. ID by 7.25 in. high, and constructed of 0.25 in. type 304 stainless steel. The top section rests on an oval-shaped vessel that has a major axis of 12.25 in. ID and a minor axis of 7.00 in. ID. This vessel is also constructed of 0.25 in. type 304 stainless steel and is 24.13 in. high (interior dimension). The transition piece between the top and bottom sections was fabricated from 0.5 in. type 304 stainless steel.

The bottom section of the container holds the warm vapor trap and the top section holds the cover shield. The bottom section has an approximate volume of 3.76 ft3, which represents the waste containment volume of the vessel. The cover shield, which contains approximately 225 lbs of lead, provides radiation protection for personnel working in the RSWF. A second cover shield, which contains an addition 190 lbs of lead, is seal-welded on the top of the container, providing closure of the vessel.

In addition, containers containing thermocouple rods and other rods from the decommissioning of the EBR-I reactor are located in two original 16-in liners in the RSWF. No details are known about the containers within the original 16-in liner other than its steel construction and the use of lead, presumably as a shield plug. The two original 16 in liners have been relocated and placed into a catholically protected 24-in liner.

Originally five 30-in. liners were installed at RSWF as a contingency when the relocation of the original 16-in. liners into 24-in. liners occurred. If inspection of the 16-in. liners revealed evidence of corrosion that penetrated the entire wall thickness, then the 16-in. liners would be placed into a 24-in. liner and then into a 30-in. liner in order to have two levels of containment. These five liners were never used for contingency and are presently used for storage. Additional 30-in. liners allow for storage, relocating, and ease of accessing the 24-in. liners pending shipment. Concrete pads are utilized parallel to the 30-in. liners to enable access in mud and/or snow.

D-5(d)(3) Liner Radiation Shielding

The type of container shielding provided has varied over the history of RSWF. Shielding for most of the paint cans placed in the original 16-in. liners (now located in 24-in. liners) was provided by gravel. After the paint cans were placed into a liner, the liner was backfilled with gravel. This provided approximately 70 in. of gravel between the top of the paint can and the top of the liner. A 0.5-in. steel plate was then welded on the top of the liner to seal the containment.

Fabrication drawings of the various shield plug types are included in Attachment D-33. A summary of the shielding provided for the liners is listed below:

- Presently shielding for the 16-in liner is provided by a shield plug constructed of 30 in. of concrete and a 1/2-in. welded steel plate.
- The 24-in liners have either ½-in. steel plate welded shut; 6-in carbon steel shield plug welded shut. This shielding is based on the radiation reading.
- The 26-in liners have a 6-in carbon steel shield plug welded shut. Some of the original 26-in liners contain steel encased lead shield plugs welded shut.
- The 48-in liners have a carbon steel plate welded shut.
- The 60-in liners have ½ in. carbon steel plate welded shut.

D-5(d)(4) Cathodic Protection System

The liners are the final barrier between the MW container and the environment in the RSWF. The integrity of the liners provides assurance against the release and migration of MW into the soil, ground or surface water, or air. In order to ensure containment of the waste, each liner is protected against external corrosion by an impressed current cathodic protection system.

There are two basic mechanisms by which steel in contact with soil corrodes. One mechanism is called electrolytic corrosion. This corrosion results from stray direct current from an outside source picked up by metals in the soil. At the point where the current leaves the metal, corrosion occurs. This type of corrosion is not a consideration at the RSWF because of its remote location.

The second mechanism is called galvanic corrosion. This type of corrosion is self-generating. It arises from differences in electrical potential when metal is placed in the soil. The potential differences can develop from various nonuniformities including variation in soil properties. These nonuniformities can be variations in soil moisture, oxygen concentration, or soil resistivity. When an electrical potential develops, it provides the driving force for the flow of current. A flow of current from one structure to another will corrode the structure that acts as the anode.

The most effective method of protection against galvanic corrosion is called active or impressed current cathodic protection. It operates by passing direct current from impressed current anodes installed in the soil to the adjacent liners, which become cathodes. The liners in a given row are wired to one another and to the rectifiers on the ends of the row, making the liners the cathodes. Attachment D-34 contains the engineering drawing of the RSWF cathodic protection system. This drawing includes details of the cathodic protection system, including how the wires are welded to the liners. An illustration of the cathodic protection system is provided in in Attachment 1, Section B, MFC Facility Description. An external source of power is used to make the liner cathodic. The induced current ensures a current path from the replaceable sacrificial anodes to the liners (cathode) protecting the liner from galvanic corrosions. This type of protection is provided for all of the liners in the RSWF. Additionally, further safeguarding of the liners from the corrosive effects of the surrounding soil is provided by a 4-in. layer of noncorrosive sand slurry backfilled into the annulus between the liner and the soil at the time of liner emplacement. This will effectively prevent the liners from directly contacting the soil, thereby minimizing liner corrosion.

The cathodic protection system for the RSWF was designed by independent qualified corrosion engineers, under subcontract to MFC. The design was completed under the supervision of a registered professional engineer.

The basis for the design was the result of field testing at the RSWF that was also performed by the independent corrosion engineer. This testing was performed to determine the resistivity of the soil in which the liners are buried. Ninety soil resistivity measurements were made at 5 average soil depths (2.5, 5.0, 7.5, 10.0, and 15.0 ft). These data were used to generate soil resistivity contour plots for each of the average soil depths.

The field testing also included cathodic protection design tests done on the existing 16-in. liners to determine the current required for protection. In order to provide a margin of safety, the design criterion used for protection was the current required to obtain a structure to soil potential of –1.00 volts. Engineering design margins add conservatism to the design to account for such things as variable soil conditions, specifying size (e.g., rectifier and wire sizing), and procuring system components.

The adequacy of the cathodic protection system was demonstrated from 1993 to 2001 through the use of 12 4½-in. corrosion surveillance tubes (now known as radiation monitoring tubes) that were inspected by nondestructive methods (i.e., ultrasonic examination, which is no longer required). The results of the wall thickness measurements from the corrosion surveillance tubes indicated that general corrosion is not occurring. This is supported in the 2001 Corrosion Assessment Report for the Cathodic Protection System of the RSWF, dated October 10, 2001, see Attachment D-35. In addition, a 16-in liner is pulled every 4 years for corrosion surveillance (beginning in September 1997). The liner pull examination includes a visual surface inspection and ultrasonic thickness measurements of the entire length of the liner every 1-in. at 45 degree intervals. The results of the liner pulls show that general corrosion is also not occurring. The overall conclusion is that the impressed current cathodic protection system and surrounding sand slurry are effectively protecting the liners from external corrosion. The cathodic protection system is operated and maintained to recommended industry standards.

The collected liner-to-soil potentials are reviewed by engineering to ascertain that each liner meets the cathodic protection action level of -0.85 volt and is therefore protected from corrosion. The liners to soil-potential reading are performed annually to identify wiring failures and to account for voltage potential changes as anodes are used up or as soil-moisture condition change. If a liner exhibits less than -0.85 volt potential (i.e., less negative than -0.85 volt) with respect to the soil, the rectifier output will be increased or necessary repairs made. A liner-to-soil potential greater [i.e., less negative] than -0.85 volts direct-current does not mean that the cathodic protection system is not operating, but does indicate that operational adjustments or preventative maintenance is required.

D-5(e) Site Air Conditions [IDAPA 58.01.05.08 and 012; 40 CFR 264.601(c)(4) and (5), 270.23 (b)]

The characteristics of the near-surface wind regime at the MFC can best be described using a graphical display called a wind rose. A wind rose is an effective method of showing joint wind speed and direction frequency distributions at a glance. The wind rose for MFC is presented in Volume 3 of the HWMA/RCRA Part B Permit for the Idaho National Laboratory, Exhibit B-6, page B-16. The diagram indicates that winds are generally out of the southwest. The climate at MFC is semi-arid high dessert. Average annual precipitation is 8.00 inches (MFC data period spans 1994 through 2014). The maximum monthly precipitation occurred in June

2009 (4.51 inches). There were five months during the 20 year period between 1994 and 2014 with no precipitation. The average maximum monthly temperature is for July (88.3 degrees) and the average minimum monthly temperature is for January (6.7 degrees). Two to four 2-week or longer droughts occur during the July to November period. Two to three thunderstorm days occur during the summer months.

The RSWF consists of a fenced area used for subsurface storage of remote handled mixed waste. Sealed carbon-steel liners are buried vertically in the ground in bored holes such that the top of the liners protrude approximately 4 inches above ground. A 30 inch concrete or 6 inch steel shield plug is placed in the liner and the plug is welded to the top of the liner. There are no permanent buildings. Therefore high wind gusts, dust devils, wildfire winds, etc. have very little effect on the RSWF structures. The exposed portion of the liners ($\simeq$4 inches) is inspected quarterly for cracks, severe corrosion, and deterioration.

D-5(f) Prevention of Air Emissions [IDAPA 58.01.05.08 and 012; 40 CFR 264.601(c)(2), 270.23(a)(2)]

A complete description of the INL site air conditions is provided in INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)].

D-5(g) Operating Standards [IDAPA 58.01.05.08; 40 CFR 264.601(c)(3), 270.23(a)(2)]

This section describes how the RSWF will be operated to prevent any releases that may affect human health or the environment due to the migration of MW in the ground or surface water, soil, or air.

The operating instructions, requirements, and responsibilities for current operations at RSWF are included in operating procedures. The list of the procedures for general operations, waste placement and retrieval at RSWF, including a summary of these procedures is listed below:

RSWF-OI-001 (Storage Operations) provides operating instructions for waste placement or transfer of containers from HFEF or FCF to RSWF storage liners using the HFEF-5 and HFEF-14 casks.

RSWF-OI-002 (Retrieval of Material from 16-in, 24-in., and 26-in. liners) provides operating instructions for opening of liners in preparation for retrieval and transfer.

RSWF-OI-003 (Material Acceptance for Storage) specifies requirements and provides instructions for accepting mixed waste (MW), radioactive waste, and radioactive material (e.g., spent nuclear material, accountable material) for storage at RSWF.

RSWF-OI-004 (Administrative Requirements/Process for Material Transfers) describes the overall administrative requirements/process used by RSWF Management for approving material-transfer activities at the RSWF to ensure that proposed transfers are covered by safety documentation and receive the appropriate level of approval.

RSWF-OI-006 (Maintenance and Surveillance Requirements) is to document the various surveillance requirements associated with maintaining the overall integrity of RSWF. These requirements apply to the storage liners, the ground they are buried in, and the cathodic protection system. This procedure also addresses the activities, procedures, and documentation used to satisfy these requirements.

RSWF-OI-007 (Remote-Handled Waste Transfer) is used to transfer waste containers from RSWF liners via open-air transfer, to an Interim Storage Container (ISC) for removal from RSWF.

RSWF-OI-010 (Retrieval of Loaded Liners) provides instructions for retrieval of a previously-excavated loaded liner from RSWF free-air into a Facility Transfer Container (FTC) and preparing the loaded FTC for transport from RSWF.

RSWF-OI-011 (Retrieval of an SLSF Canister From A 26-IN. RSWF Liner) provides instructions for opening a RSWF liner, retrieving a Sodium Loop Safety Facility (SLSF) waste can from the RSWF liner, performing a free-air transfer of the SLSF to a Facility Transfer Container (FTC), and preparing the loaded FTC for transport from RSWF.

RSWF-OI-012 (Excavation of Loaded Liners) provides instructions for excavating a loaded liner at the RSWF and welding a lifting lug to the liner so that it can be retrieved per RSWF-OI-010, “Retrieval of Loaded Liners.”

D-5(g)(1) Inner Container Handling

Once a MW inner container system is placed in an RSWF liner, the liner is not handled or opened for the addition or removal of MW. The liners and inner containment system is seal-welded closed. This effectively ensures that the inner container system is kept closed during storage. Because of the radioactivity associated with the MW, the inner container system will never be opened at RSWF, but would be transported to a hot cell for opening.

D-5(g)(2) Inner Container Transport

MW inner container systems are transported from other MFC facilities in a top-load, bottom discharge transport cask using a 25-ton forklift. To unload the cask, it is set on a shield ring that extends approximately 4 in. into the liner. A photograph showing this transport cask loaded on the forklift and positioned over a liner is provided in Attachment D-36.

The HFEF-5 and SLSF can inner container systems each has a cable attached to its cover to allow the inner container system to be lowered into the liner. The upper end of this cable is attached to the bottom of the 30-in. concrete shield plug and left in place in the liner. The stored inner container system can be retrieved by removing the shield plug, securing the cable, and hoisting the container into a suitable cask. See Attachment 1, Section B, MFC Facility Description, Attachment B-11 for a diagram showing the lifting equipment, including the cable and shield plug lifting eye.

If a forklift fails during MW transfer, the cask could be transferred to a trailer and returned to the generating MFC facility. MFC also has backup cranes in the event of an equipment failure affecting a crane.

If a forklift or equipment failure occurs during MW transfer and results in a cask and/or inner container system drop, the inner container system, by design, is protected from damage and potential release of MW. The inner container system is designed to withstand the worst case drop scenario.

If an inner container system were actually dropped, it would be removed and returned to the generating MFC facility for repackaging. If it was unretrievable, it would be approximately centered in the liner and steel shot would be poured into the liner to provide shielding. The liner shield plug would be welded in place and the 16-in. liner would be pulled and placed in a 24-in. liner in accordance with an approved liner relocation procedure.

D-5(g)(3) Inner Container Loading and Damage Prevention

The MW is placed in the liners at RSWF using heavy equipment. The potential exists for damage to liners and the cathodic protection as a result of transfer operations. The potential for damage is minimized, however, by exercising preventive measures during normal facility operations. The facility is walked down after all transfer operations to ensure integrity of the systems.

The liners are protected from the heavy equipment by having the equipment straddle the liners into which the MW inner container system is being placed. Therefore, the equipment tires are several feet from the liner. In addition, all of the heavy equipment in the facility has sufficient clearance above the top of the liner. By procedure, if there is a concern about damaging a liner, prior to a MW transfer, the equipment operators load the transfer cask onto the transfer vehicle and drive the route to where the inner container system will be placed. Along the way, a second operator inspects to ensure that the ground is stable and there are no obstructions. If problems are found, they would be remedied before the actual transfer takes place.

If a liner were an obstruction, for example, enough additional back-fill would be added and compacted around the liner to ensure adequate clearance.

Beginning in 1995, concrete pads were poured parallel to new liners installed in the E, F, and H rows (ref. Attachment D-31). These liners will be used when access to liners in other rows is hampered by mud and/or snow. The concrete will prevent damage to the liners and cathodic protection system.

The cathodic protection system cables are also protected by straddling the liner row. The only part of the cathodic protection system that is above ground, and, therefore vulnerable, is the CADweld™ or connection attaching the negative lead cable to the liner. To further protect the weld and to obtain a better weld, a metal tab is attached to the front of the liner. The only other components of the system that are above ground are located at the fenceline and away from heavy equipment paths.

The design of the cathodic protection system protects the underground wiring from the heavy equipment. The trenches in which the wiring is laid were initially backfilled with sand and then native soil, which is compacted with a tamper. In addition, the placement of the wire in the trench minimizes the potential for damage. The negative lead wire is run horizontally to liners at a depth of 2-3 ft. The wire is then run vertically directly up the front of the liner to the connection point. This design minimizes stress on the wire from heavy equipment driven over the site.

The liners are exposed to loadings from soil and adjacent traffic. The capacity of the liners to withstand these loadings and the effect of corrosion on this capacity was evaluated by an independent professional engineer. The stresses in the liner due to the applied loads, assuming the liner was structurally sound, were found to be very low. The stresses were estimated at 500 psi in bending and 40 psi in shear, which are much less than the accepted values for A53 steel of 24,000 psi for bending and 14,000 psi for shear (Association of Iron and Steel Engineers Manual, Section 1.5, Allowable Stresses). Even with a 90% metal loss due to corrosion, the liners would have sufficient strength to resist collapse resulting from soil loads.

D-5(g)(4) Liner Removal

Liners are removed from the ground per operating procedures by first locating and cutting the cathodic protection lead wire. The soil surrounding the entire length of the liner is then excavated using an auger and/or vacuum excavator. Lifting eyes or another type of lifting device is then welded onto the liner to attach the rigging equipment.

D-5(h) Site Hydrogeologic Conditions [IDAPA 58.01.05.08 and 012; 40 CFR 264.601(a)(2),(3),(4), 264.601(b)(3),(5), 270.23(b)]

The RSWF is located in the Snake River Plain, which is a long, broad depression 300 miles long by up to 70 miles wide bordered on either side by mountains. RSWF is located on the eastern portion, which is a succession of basaltic lava flows of thicknesses from 10 to 100 feet interbedded with unconsolidated cinders, breccia and sediments. The total depth of the layered structure is at least 1500 ft. The ground surface of the area consists generally of composite layers of interbedded volcanic rock and sedimentary material, which includes alluvium, alluvial fan deposits, lakebed and playa deposits, and wind-blown deposits. This material varies in depths and is only a few feet deep covering bedrock in most areas. The sandy soils are characterized as having high ion-exchange characteristics. The principal ground water feature is the Snake River Plain aquifer, which is a continuous body of ground water underlying most of the eastern Snake River Plain. The aquifer consists of saturated basalt flows and sedimentary inter-beds. Most permeable zones appear to occur along the upper and lower edges of the basalt flows, which have large irregular fractures, fissures and voids. The depth to the aquifer is approximately 675 feet at the RSWF. Ground water in the unsaturated zone between the land surface and the aquifer seeps through the voids and cracks in and between layers of basalt and sedimentary material.

Twenty-nine test borings were made to depths ranging from 6 to 90 feet when the RSWF site was prepared as a storage facility. The results of the borings showed that an irregular lava surface lies between 8 and 23.5 feet below grade, with the shallow zone lying on the northwest edge of the fenced area. The average depth to lava is 15 feet. Ground water was not encountered in any of the exploratory borings.

The RSWF site is at an elevation of 5120 feet and 12 miles from the bed of the Big Lost River, which is at an elevation of 5042 feet. The Big Lost River is the closest surface water source to the RSWF. The flow of water in the Big Lost River is intermittent and associated with spring run-off. Because of the distance, elevation differences, and size of the Big Lost River, the RSWF is not considered to have any potential impact on the water quality of the big Lost River.

The RSWF area is elevated several feet above the surrounding land surface. The elevation slopes off from 5120 feet in the center of the facility to 5117 feet at the fence line. The surrounding land within 300 feet of the facility is at a lower elevation than the fence line. Furthermore, prior to placing the liners in the RSWF storage area, several feet of gravel and soil were placed over the storage area and graded to slope gently from the centerline to the parallel sides, which were banked with gravel. This grade promotes run-off, reduces percolation in the area of the RSWF, and also serves to prevent run-on into the area.

In June 1989, an independent corrosion engineering firm (CH2M Hill, Boise, ID) performed soil corrosion mapping of the RSWF. The electrical resistivity of the soil was measured by the Wenner four pin method. The tests consisted of 90 soil resistivity measurements at average depths of 2.5, 5.0, 7.5, 10.0, and 15.0 feet. Both average and layer resistivity calculations were made from these measurements. In general, the RSWF soil ranges from mildly to moderately corrosive based on the ranking defined by the US Bureau of Standards, see Table D-11. This corresponds to a corrosion rate of 0.021 to 0.061 inches/year.

Table D-11. Corrosion rates of steel in soil and soil corrosion classes.

Corrosion Class	Soil Resistivity (Ω/cm)	Corrosion Rate (inches/year)
Noncorrosive	>10,000	0.005
Mildly Corrosive	2,000 to10,000	0.021
Moderately Corrosive	1,000 to 2,000	0.061
Corrosive	500 to 1,000	0.10
Very Corrosive	<500	0.137
From M. Romanoff, Underground Corrosion, Circ. 579. National Bureau of Standards (U.S.) 1957.		

D-5(i) Site Precipitation [IDAPA 58.01.05.08; 40 CFR 264.601(b)(4)]

A complete description of the INL site precipitation is provided in the INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)].

D-5(j) Ground-Water Usage [IDAPA 58.01.05.08; 40 CFR 264.601(a)(5)]

A complete description of the INL ground-water usage is provided in the INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)].

D-5(k) Surface Waters [IDAPA 58.01.05.08; 40 CFR 264.601(b)(6),(7)]

A complete description of the INL surface waters is provided in the INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)].

D-5(l) Area Land Use [IDAPA 58.01.05.08 and 012; 40 CFR 264.601(a)(6), 264.601(b)(9), 270.23(b)]

A complete description of the INL site area land use is provided in the INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)].

D-5(m) Migration of Waste Constituents [IDAPA 58.01.05.08; 40 CFR 264.601(a)(7)]

The sequence of events that could lead to a release of hazardous constituents to the soil start with a failure of the liner. The failure of a liner could proceed by spot corrosion leading to a pinhole penetration in the short-term or general corrosion resulting in liner collapse in the long-term scenario. Liner failure could also result from a loss of the integrity of the weld between the bottom plate and the liner pipe. The liner breach then requires that water leak into the liner through the penetration corroding the waste container resulting in a water Na/NaK reaction or a slow release of TC constituents out of the liner.

During the spring months or after a period of heavy rain, the soil around a liner could become saturated with water. If water were to leak into the liner, corrosion of the waste container could then occur. In the case of previously single contained waste, this would be corrosion of the former 16 in. liner. In the case of doubly contained waste, this would be corrosion of the outer waste container. However, the stainless steel waste containers used since 1978, are corrosion resistant because of their chromium content. Therefore, penetration of the former 16 in. liners and inner waste containers of pre-1978 waste packages is much more credible.

After many years, additional corrosion to the 16 in. liner could penetrate this layer of containment. This would allow the penetration of water to the exterior of the final waste containment barrier. After corrosion and penetration of the final level of containment, water could reach sodium or NaK.

The products of the sodium-water reaction are sodium hydroxide (NaOH) and hydrogen (H2). Similarly, the products of the NaK-water reaction are NaOH, potassium hydroxide (KOH), and H2. Depending on the amount and geometry of sodium in the waste container, H2 generation could be significant and perhaps a flammable mixture of H2 and O2 could result. The production of a flammable mixture would depend on the formation of a water seal and the liner penetration being at the bottom of the liner. A water seal could form if the soil were saturated with water. This would allow the H2 to collect in top of the liner. If a water seal did not form, the hydrogen would diffuse back through the penetration in a matter of days. If the geometry of the sodium and availability of water were such that the reaction proceeded rapidly, sufficient heat could be generated to ignite the sodium (250°F ignition temperature). If the sodium were to react and combust, the H2 could also ignite (1100°F ignition temperature). The ignition of the H2 could result in a small explosion that is limited by the availability of O2. The quantity of O2 available is limited because the waste containers were loaded and sealed in the inert (argon) atmosphere of the MFC hot cells.

In the worst case, an explosion resulting from ignition of hydrogen gas in the liner could rupture the liner and forcibly disperse hazardous and radioactive material into the surrounding soil or into the air. If the rupture and dispersion were limited to the soil, it would be dispersed only a short distance from the liner. However, migration of the constituents could then proceed. The dispersion through the air could be much more widespread and could potentially reach the MFC site. However, because of the remote location of the RSWF it is highly unlikely that the contamination would reach populated areas.

Without the forced rupture of a container due to an explosion of hydrogen gas, the release and migration of radioactive or hazardous waste constituents would be limited to the soil, which would proceed very slowly. All of the waste constituents of concern exist as solids. Even the NaK in the RSWF would be converted to a solid upon reacting with soil-water. Sodium or NaK migrating from a liner would spontaneously react with soil moisture, oxygen, and carbon dioxide to deactivate the reactivity characteristic and form nonhazardous substances (NaOH, KOH, NaO_2, $NaCO_3$, etc.).

The formation and ignition of a flammable H2-O2 mixture is a highly improbable event whose occurrence depends on a sequence of improbable events. First, the ground water level must rise above the elevation of a leak in the liner and be maintained while the sodium-water reaction occurs. If the water level should drop below the elevation of the hole, the H2 would escape harmlessly into the environment. The ground water level at the RSWF has never been observed in the range of depths that a liner occupies (0-13 feet). The second improbable event is the ignition of a flammable mixture. In order for an 1100°F source to occur as the result of sodium combustion, the heat would have to be maintained. Since the sodium at the RSWF is associated with and in contact with metal parts, the heat would more likely be conducted away by the metal and dissipated. Other potential ignition sources such as electrical discharges and volcanic activity are so improbable that they may be disregarded.

Another potential cause of a release is equipment failure leading to dropping a waste container during waste transfer operations. An equipment failure during waste transfer resulting in a container being dropped, is mitigated by the container design. The container is designed to withstand the worst case drop scenario. The worst case drop is defined as the longest possible drop of a waste container. This event could occur with a waste container in its fully lifted position in the cask in place over a liner. A failure of the hoisting equipment or tackle at that stage would result in a maximum vertical drop of 13 ft (12 ft liner depth, plus 1 ft cask clearance). A drop test on a fully loaded waste containment package was performed to demonstrate the ability to survive the 13 ft drop. In the test a waste package containing 600 lbs of simulated waste material was dropped into an existing empty liner at the RSWF. The acceptance criteria for the test was maintenance of the integrity of at least one level of containment as verified by a pressure leak test.

The outer waste container survived the drop test maintaining at least one level of containment. The inner container received minor damage, but a portion of the weld on the bottom plate failed and slight deformation occurred. The diameter of the outer container was maintained; therefore, the package could be retrieved from the liner. The 16 in. liner also survived the test without structural damage.

If a drop were to actually occur into a liner, the container would be removed and returned to HFEF for repackaging. A Contingency Plan is also available in the unlikely event that a waste containment package was so damaged that it could not be retrieved. The package would be approximately centered in the liner and steel shot would be dumped in the liner to provide shielding. The liner shield plug would be welded in place and the 16 in. liner would be pulled and placed in a 24 in. liner per the liner relocation procedure.

There are many features engineered into the RSWF design to prevent releases that may affect human health or the environment due to the migration of MW in the ground water, soil or air. These features include the following:

- Impressed current cathodic protection for liners
- Protective 4-in. layer of noncorrosive sand slurry between the liners and the surrounding soil
- Multiple containment layers for MW[5]
- Quality assurance of liners (pressure testing, inspection, installation inspection, etc.)

5. From 1965 to 1978, the MW was placed into a paint can which was placed into an original 16-in. liner. The 16-in. liners were relocated and placed into new cathodically protected 24-in. liners. The viability/integrity of this containment varies depending on the contents of each of these levels of containment. Post 1978, the MW was placed into an inner HFEF-5 can or SLSF can, which was placed into an outer HFEF-5 can or SLSF can, and then the double container was placed into a new cathodically protected 16-in. or 26-in. liner.

- Arid climate
- Facility elevation with respect to surrounding surface and ground-water sources.
- Site geology
- Remote location.

An important feature is the cathodic protection system. A properly designed and operated impressed current cathodic protection system virtually eliminates liner corrosion by soils surrounding the liners. The proper operation of the system is ensured by regular inspection and a preventative maintenance corrosion monitoring program. With liner corrosion eliminated, almost all credible release scenarios are eliminated. As long as the liner integrity is maintained, it is a formidable barrier against the release of material to the soil or air.

Additional assurances against releases are provided by the protective layer of noncorrosive sand backfill surrounding the liners and the integrity of the inner container and liners used to store the MW.

While the cathodic protection system is designed to protect the liners, it is possible that residual moisture or soil encrustation on the inner containers could create corrosion on the internal wall of the liner. The environment within the liner provides a finite source of corrosive media, is less diverse, and, therefore, corrosive processes are more predictable than those occurring on the outside of the liner. Corrosion/pitting predictions based upon S. F. Mughabghab and T. M. Sullivan, "Evaluation of the Pitting Corrosion of Carbon Steels and Other Ferrous Metals in Soil Systems," Waste Management, 9, pp. 239-251, 1989, indicate no penetration for at least 50 years. This event can result in detectable level of hydrogen in the liner. As such liner atmosphere is tested and purge as necessary before opening the liner for waste removal.

The climate and elevation of the facility are mitigating features against a release migrating off-Site. The RSWF climate is semi-arid high desert with a low average annual rainfall (about 8 in.). The RSWF site is at an elevation of 5120 ft and 12 miles from the bed of the Big Lost River, which is at an elevation of 5042 ft. The Big Lost River is the closest surface-water source to the RSWF. The area is also on relatively high ground. The elevation slopes off from 5120 ft in the center of the facility to 5117 ft at the fenceline. The surrounding land within 300 ft of the facility is at a lower elevation than the fenceline (ref. drawing in Attachment D-30). In addition, a facility drainage system, consisting of drainage culverts located on the north, east, and west sides of the facility, and at specific locations within the facility, provides for general runoff and diversion of surface water from the facility to the surrounding desert. These features serve to isolate the facility from major sources of surface water.

The primary available sources of water are precipitation and ponding from rapid snow-melt, which are both intermittent and limited due to the climate. The RSWF cathodic protection system was designed and has proven to adequately protect the liners from corrosion for the RSWF soil and surface water conditions. Saturating the soil environment in fact increases the effectiveness of the impressed current cathodic protection system. Additionally, pooling of water at the surface of the liners also provides for the transfer of cathodic protection current to the exposed steel (Ref. Attachment D-30 for a discussion of the impact of saturated soil conditions on the cathodic protection system by the corrosion expert who is very familiar with the RSWF). The primary driving force for MW migration is percolation of soil-water through the unsaturated zone. Percolation is minimized by the slope of the RSWF, which promotes run off. Therefore, even if an undetected release were to occur, the migration of hazardous constituents to off-Site locations or into water supplies during the life of the facility is unlikely.

The soil of the INL is typically high in clay and silt content. As a result, the soil has a very low vertical hydraulic conductivity, approximately 0.01 ft/day, which should retard the downward migration of potential vapor or liquid contaminants. In addition, the clay may retard the migration of radionuclides and metals through adsorption. Because the RSWF is approximately 675 ft above the water table and is higher in elevation than potential surface-water sources, it is well isolated from major sources of water. Therefore, the migration of hazardous constituents to off-Site locations for incorporation into the root zone of crops and other vegetation or into water supplies during the life of the facility is highly improbable.

D-5(n) Evaluation of Risk to Human Health and the Environment [IDAPA 58.01.05.08; 40 CFR 264.601(a)(8), (9), 264.601(b)(10), (11), 264.601(c)(6), (7)]

There are many features engineered into the RSWF design to prevent releases of MW that may affect human health or the environment due to the migration of MW in the ground water, soil, or air. The geology, topography, and climate of the site and the engineering design of the facility combine to minimize the risk to human health and the environment from the hazardous constituents stored there. In addition, a comprehensive inspection and monitoring program is used to ensure that the waste is being adequately protected (ref. Attachment 4, Section F, Inspections).

An important mitigation against a loss of integrity of the RSWF MW liner is cathodic protection. Cathodic protection is the most effective available means of protecting steel in contact with soil from the effects of galvanic corrosion. A properly designed and operated impressed current cathodic protection system virtually eliminates external liner corrosion[6]. Galvanic corrosion is further minimized at the RSWF by completely surrounding the liners with noncorrosive sand at the time of emplacement. With corrosion on the liner exterior eliminated, credible release is virtually eliminated. As long as the liner integrity is maintained, it is an effective barrier against the release of material to the ground water, soil, or air.

The RSWF cathodic protection system was designed by corrosion engineers under the supervision of a State of Idaho-registered professional engineer. The corrosion engineers also provided the proper operating parameters for the system to provide maximum protection.

Cathodic protection is a well developed technology for which an extensive amount of operating experience and operating standards exists. The proper design, operation, and maintenance of cathodic protection systems has been documented by the National Association of Corrosion Engineers in a Recommended Practice (National Association of Corrosion Engineers Standard RP-02-85, Item No. 53056). The RSWF cathodic protection system conforms with all of the recommendations of this standard and the recommendations of the independent designers.

The proper operation of the cathodic protection system is assured through a monitoring or preventative maintenance and inspection program. The inspections will ensure that the cathodic protection system is operating and the monitoring or preventative maintenance will evaluate the effectiveness of the system. The inspection and preventative maintenance schedule and methods were developed based on the recommendations of the NACE Standard, IDAPA 58.01.05.08; 40 CFR 264 tank regulations, and the recommendations of the system designers. The monitoring program was devised to detect any potential inadequacies in the facility design that could lead to a loss of waste containment.

The integrity of liners is built in and verified prior to being placed in service through inspections and a pressure test. The liners are manufactured in accordance with site

6. Uhlig, H.H., Corrosion and Corrosion Control: An introduction to Corrosion Science, 3rd Edition, 1985, John Wiley & Sons, inc., p. 217.

fabrication drawings. The liner is hydrostatically tested and failed liners are repaired and retested. After an inner container system is placed in the liner, the cover is welded closed. Quarterly the exposed portions of the liners are visually inspected for cracks, corrosion and deterioration. However, snow conditions may render some or all liners unavailable for inspection.

In order to provide additional assurances against a release since 1978, the MW is contained within multiple layers of confinement within the liner. By providing multiple layers of confinement between the MW and ground water, soil, or air, the probability of a release is very low.

The climate and elevation of the facility are also mitigating features. The RSWF climate is semi-arid high desert. Average annual rainfall is about 8 in. at the Central Facilities Area of the INL with about 50% falling as snow. The RSWF site is at an elevation of 5120 ft and 12 miles from the bed of the Big Lost River, which is at an elevation of 5042 ft. The Big Lost River is the closest surface water source to the RSWF. The area is also on relatively high ground. The elevation slopes off from 5120 ft in the center of the facility to 5117 ft at the fenceline. The surrounding land within 300 ft of the facility is at a lower elevation than the fenceline.

Because the RSWF is higher in elevation than potential surface-water sources and is higher than the surrounding terrain, it is isolated from major sources of water. The primary available sources of soil-water are precipitation and ponding from rapid snowmelt, which are both intermittent and limited due to the climate. The primary driving force for contaminant migration is percolation of soil-water through the unsaturated zone. Therefore, even if an undetected release were to occur, the migration of hazardous constituents to off-Site locations or into water supplies where human health would be at risk is unlikely.

The principal ground-water feature of the INL is the Snake River Plain Aquifer, which is a continuous body of ground water underlying most of the eastern Snake River Plain. The aquifer is an important source of water to the State of Idaho and contamination of the aquifer by RSWF waste constituents would pose a risk to human health. However, the depth to the aquifer is approximately 675 ft at the RSWF. The risk to human health and the environment from contaminating the aquifer is very small because of the following factors:

- Depth to the aquifer
- Limited supply of water for transporting waste constituents

- Quantity of MW in an individual liner
- Large volume of the aquifer
- Engineering barriers to a release.

The risk to human health and the potential for damage to domestic animals, wildlife, and crops is also minimized by the remote location of the facility. The RSWF is located on the INL, which is described in detail in the INL HWMA/RCRA Permit Application, Volume 3 (General Information for INL Waste Management Units – DOE/ID-10131)]. The INL boundaries extend for approximately 39 miles (north to south) and 36 miles (east to west). Approximately 95% of the area has been withdrawn from the public domain with the remaining 5% controlled by the DOE. The population density within 20 miles of the RSWF in any direction is less than 10 persons/square mile.

Attachment D-1

HWMA Unit Miscellaneous Containers

HFEF 5-Can (inner and outer waste can)
and Sodium Disposal Container
Photo taken August 2013

Various Containers (e.g., drums, cold traps, boxes)
Photo taken February 2015

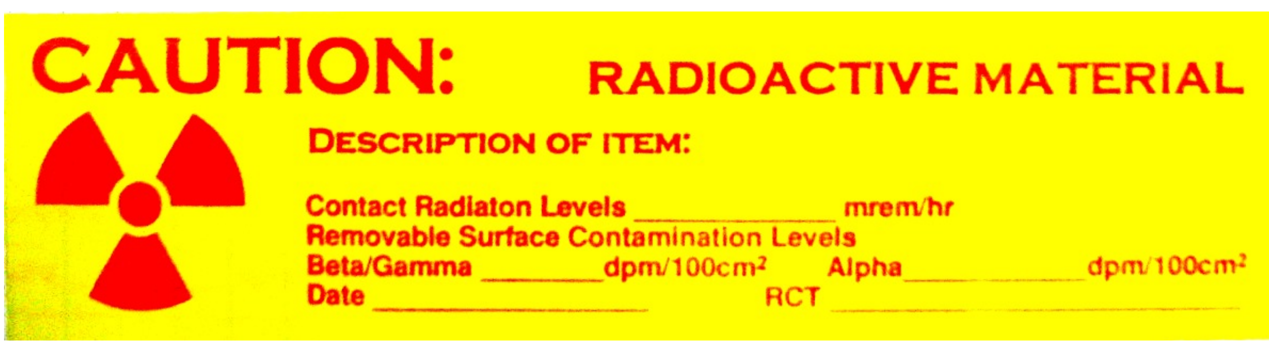
Attachment D-2

HWMA Unit Container Labeling


HAZARDOUS WASTE
FEDERAL LAWS PROHIBIT IMPROPER DISPOSAL.
IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY, OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY.
GENERATOR INFORMATION:
NAME
ADDRESS
CITY
STATE
ZIP
EPA ID NO.
EPA WASTE NO.
ACCUMULATION START DATE
MANIFEST TRACKING NO.
D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX
HANDLE WITH CARE!


Integrated Waste Tracking System
MFC110084
Duplicate Label
Integrated Waste Tracking System


CAUTION
RADIOACTIVE
MATERIAL
LOADED-EMPTY
REMARKS
mR/hr CONTACT
mR/hr @ 1 METER
d/min/100 Cm² β γ
d/min/100 Cm² α
PRINCIPAL ISOTOPES
DATE
SIGNATURE


CAUTION:
RADIOACTIVE MATERIAL
DESCRIPTION OF ITEM:
Contact Radiaton Levels
mrem/hr
Removable Surface Contamination Levels
Beta/Gamma
dpm/100cm²
Alpha
dpm/100cm²
Date
RCT

Attachment D-3

Example of Hazardous Waste Acceptance Checklists

TSD FACILITIES MATERIAL ACCEPTANCE CHECKSHEET

SECTION 1 — GENERATOR-SUPPLIED INFORMATION

General			
TSD Staff Specialist:		**Date:**	
Transferring facility:			
Receiving facility:	Radiological Facility		
	❑ NFA ❑ ORSA ❑ SCMS ❑ SSB		
Process knowledge contact:			

Waste/Material			
Source:			
Type:	❑ MW ❑ HW ❑ LLW ❑ TRU ❑ MTRU ❑ Radioactive Material		
List EPA Hazardous Waste codes:			
Container net volume (units):		Container gross volume (units):	
Transfer maximum gross volume (units):			
Description of characterization method:			

Container			
Physical description:			
Content description:			
Radiation levels:	at 1 in.	at 1 meter	
Barcode No(s).:			
Container net weight (lb):		Container gross weight (lb):	
Container properly labeled:	❑ Yes ❑ No	Transfer maximum gross weight (lb):	
Fissionable-material quantity (g):		DOE-Standard-1027 sum of the fractions per MCP-1989:	______ or ❑ NC-DM Attach Form-381
Proposed transfer is greater than HC-3 thresholds:	❑ Yes ❑ No If yes, initiate FRM-790, “Transfer of HC-3 or Greater Quantity of Hazardous Material in Non-DOT-Certified Packaging” (reference TSM-OI-003)		
Signature:		**Date:**	

SECTION 2 — RECEIVING FACILITY REVIEW AND APPROVAL

General			
The generator’s SAP and QAPjP have been reviewed for adequacy; they are acceptable:	❑ Yes ❑ No ❑ N/A		
TSD Facilities Manager:		**Date:**	
Storage facility:	❑ ORSA ❑ SSB ❑ SCMS (specify area: ❑ 793 ❑ 793-C ❑ 793-G)		
Verify mixed hazardous waste storage volume(s) is not exceeded.	❑ Yes ❑ No	SSB: 48,000 gal SCMS – (specific areas): High Bay Area: 5,280 gal 793C: 14,080 gal Low Bay Area: 1,760 gal 793G: 3,520 gal	
Verify EPA Hazardous waste codes written down above by generator are the same EPA Hazardous waste codes identified in the IWTS profile(s) provided by the generator or on the containers and that the EPA Hazardous waste codes meet the acceptable EPA Hazardous waste codes documented below for the receiving facility.			
TSD Staff Specialist:		**Date:**	

TSD FACILITIES MATERIAL ACCEPTANCE CHECKSHEET

Acceptable EPA Hazardous Waste Codes for HWMA/RCRA Regulated Facilities	Facility	EPA Hazardous Waste Codes
	SCMS	Ignitable waste – D001 Corrosive waste – D002 Reactive waste – D003 Toxic-metal waste – D004 – D011
	SSB	Ignitable waste – D001 Reactive waste – D003 Toxic-metal waste – D004 – D011

Facility permitted to store/treat waste/material:	❑ Yes ❑ No	Storage duration:	
Waste/material receipt:	❑ Container ❑ Shipment	If shipment, number of containers:	
Material profile No.:		IWTS Shipment Task Number:	
Storage requirements:		Surveillance requirements:	

Characterization

Waste-characterization data has been reviewed; adequate characterization has been performed and the data is complete, accurate, and sufficient to justify approval of the waste for acceptance at the receiving facility.

TSD Staff Specialist:		**Date:**	

Calculations and Verifications

Hazard-Category Radionuclide Threshold Quantities and Sum of the Fractions

Current Sum	Projected Total	Total Exceeds 0.8
		❑ Yes ❑ No

Fissionable-Material Threshold Quantities

Current Inventory (g)	Projected Total (g)	Single Container or Transfer Exceeds 350 g[2]	Inventory Exceeds Equivalent[3]
		❑ Yes ❑ No	❑ Yes ❑ No

Receipt of the proposed transfer will not cause the receiving facility to meet or exceed applicable fissionable-material threshold quantities or hazard-category radionuclide threshold quantities and sum of the fractions.

TSD Staff Specialist:		**Date:**	

The material/waste to be stored in ORSA complies with the requirements of the criticality safety controls for ORSA and is approved for transfer from a criticality standpoint.

ORSA CSO:		**Date:**		❑ N/A

For a proposed transfer that exceeds de minimis levels, waste-characterization data has been reviewed; it is in compliance with applicable nuclear and environmental regulations and is acceptable for storage or treatment at the receiving facility.

Peer Reviewer:		**Date:**	

Transfer Approval

The proposed transfer is approved for receipt at the designated facility.

TSD Facilities Manager:		**Date:**	

SECTION 3 — WASTE/MATERIAL RECEIPT

FRM-378, "All Container Storage Facilities Daily Container" Inspection Form has been completed.	❑ Yes ❑ No ❑ N/A

Storage No.:			
Shift Supervisor:		**Date:**	

1. The waste/material cannot be accepted if the proposed transfer will cause the applicable facility hazard-category radionuclide threshold quantities or sum of the fractions to be met or exceeded.
2. A single container is limited to no more than 350 g Moderated Fissionable Equivalent (MFE) per container. Transfers into or out of ORSA >350 g MFE must be specifically approved by Criticality Safety Engineering.

3. Fissionable material in ORSA is limited to 700 g MFE. Fissionable material in SCMS, or the SSB is limited to 250 g.

EFF MATERIAL ACCEPTANCE CHECKSHEET

SECTION 1 — GENERATOR-SUPPLIED INFORMATION

General			
Staff Specialist:		**Date:**	
Transferring facility:			
Process knowledge contact:			
Waste/Material			
Source:			
Type:	❑ MW ❑ HW ❑ LLW ❑ TRU ❑ MTRU ❑ Radioactive Material		
List EPA Hazardous Waste codes:			
Container net volume (units):		Container gross volume (units):	
Transfer maximum gross volume (units):			
Description of characterization method:			
Container			
Physical description:			
Content description:			
Radiation levels:	at 1 in.	at 1 meter	
Barcode No(s):			
Container net weight (lb):		Container gross weight (lb):	
Container properly labeled:	❑ Yes ❑ No	Transfer maximum gross weight (lb):	
Fissionable-material quantity (g):		DOE-Standard-1027 sum of the fractions per MCP-1989:	____________or ❑ NC-DM Attach Form-381
Signature:		**Date:**	

SECTION 2 — RECEIVING FACILITY REVIEW AND APPROVAL

General			
The generator's SAP and QAPjP have been reviewed for adequacy; they are acceptable:	❑ Yes ❑ No ❑ N/A		
EFF Facility Manager:		**Date:**	
Verify mixed hazardous waste storage volume(s) is not exceeded.	❑ Yes ❑ No	EFF: 12,000 gal	
Verify EPA Hazardous waste codes written down above by generator are the same EPA Hazardous waste codes identified in the IWTS profile(s) provided by the generator or on the containers and that the EPA Hazardous waste codes meet the acceptable EPA Hazardous waste codes documented below for the receiving facility.			
Staff Specialist:		**Date:**	
Acceptable EPA Hazardous Waste Codes for HWMA/RCRA Regulated Facilities	Facility	EPA Hazardous Waste Codes	
	EFF	Ignitable waste – D001 Corrosive waste – D002 Reactive waste – D003 Toxic-metal waste – D004 – D011 F-Listed waste – F001, F002, F005 U-Listed waste – U134	
Facility permitted to store/treat waste/material:	❑ Yes ❑ No	Storage duration:	
Waste/material receipt:	❑ Container ❑ Shipment	If shipment, number of containers:	

EFF MATERIAL ACCEPTANCE CHECKSHEET

Material profile No.:		IWTS Shipment Task Number:	
Storage requirements:		Surveillance requirements:	

Characterization			
Waste-characterization data has been reviewed; adequate characterization has been performed and the data is complete, accurate, and sufficient to justify approval of the waste for acceptance at the receiving facility.			
Staff Specialist:		**Date:**	
Calculations and Verifications			

Hazard-Category Radionuclide Threshold Quantities and Sum of the Fractions		
Current Sum	Projected Total	Total Exceeds 0.9
		❑ Yes ❑ No

Fissionable-Material Threshold Quantities			
Current Inventory (g)	Projected Total (g)	Single Container or Transfer Exceeds 350 g	Inventory Exceeds Equivalent
		❑ Yes ❑ No	❑ Yes ❑ No

Receipt of the proposed transfer will not cause the receiving facility to meet or exceed applicable fissionable-material threshold quantities or hazard-category radionuclide threshold quantities and sum of the fractions.			
Staff Specialist:		**Date:**	
For a proposed transfer that exceeds de minimis levels, waste-characterization data has been reviewed; it is in compliance with applicable nuclear and environmental regulations and is acceptable for storage or treatment at the receiving facility.			
Peer Reviewer:		**Date:**	
Transfer Approval			
The proposed transfer is approved for receipt at EFF.			
EFF Facility Manager:		**Date:**	

SECTION 3 — WASTE/MATERIAL RECEIPT

FRM-378, "All Container Storage Facilities Daily Container" Inspection Form has been completed.	❑ Yes ❑ No ❑ N/A		
Storage No.:			
Shift Supervisor:		**Date:**	

FRM-1200
09/07/10
Rev. 0

HFEF WASTE ACCEPTANCE CRITERIA

SECTION I – GENERATOR WASTE MATERIAL DESCRIPTION AND INFORMATION

Generator or Originating Facility:		Technical Contact Name:		Date:	
Description of characterization method:					
Material and Waste Characterization Information — Generators Material and Container Profile Information (IWTS Profile(s) or equivalent):				❑ Yes ❑ No	
Material profile number or equivalent:					
EPA hazardous waste codes:					
Barcode No(s):					
Content description:					
Container net weight (lb):		Container gross weight (lb):			
Signature:				**Date:**	

SECTION II – HFEF REVIEW AND APPROVAL

Verify EPA hazardous waste codes written down above by generator are the same EPA hazardous waste codes identified in the IWTS profile(s) or equivalent provided by the generator and that the EPA hazardous waste codes meet acceptable EPA hazardous waste codes for HFEF documented below.

HFEF Staff Specialist or Designee:		**Date:**	

HFEF Acceptable EPA Hazardous Waste Numbers

Characteristic Waste						F-Listed Waste	P-Listed Waste		U-Listed Waste					
Ignitable	Corrosive	Toxic												
D001	D002	D004 D005 D006 D007 D008 D009 D010 D011 D012 D013	D014 D015 D016 D017 D018 D019 D020 D021 D022 D023	D024 D025 D026 D027 D028 D029 D030 D031 D032 D033	D034 D035 D036 D037 D038 D039 D040 D041 D042 D043	F001 F002 F003 F004 F005 F006 F007 F008 F009 F039	P005 P012 P022 P024 P027 P028 P030 P031 P056 P073	P077 P098 P104 P105 P106 P113 P116 P119 P120	U003 U004 U007 U009 U012 U014 U019 U020 U032 U037 U044 U048	U052 U069 U079 U080 U081 U083 U084 U102 U103 U108 U116 U118	U120 U122 U123 U127 U128 U131 U133 U134 U135 U138 U140 U144	U145 U147 U151 U159 U162 U165 U170 U171 U182 U188 U190 U191	U196 U201 U204 U207 U208 U210 U211 U215 U217 U218 U219 U220	U225 U226 U227 U228 U239 U328

HWMA unit receipt area:	❑ HBA ❑ HRA ❑ Decon Cell ❑ Prep Room ❑ Transfer Room	
Verify hazardous waste storage volume(s) is not exceeded:	❑ Yes ❑ No	HBA – 5,500 gal; HRA – 880 gal; Decon Cell – 385 gal; Prep Room – 3,520 gal, Transfer Room 440 gal

Waste characterization data has been reviewed and data is complete, accurate and sufficient to accept waste at HFEF.

HFEF Staff Specialist or Designee:		**Date:**	
Facility Manager or Designee:		**Date:**	

Attachment D-4

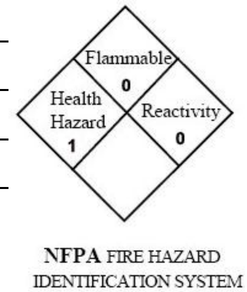
Manufacturer Information

FluidTech LLC

MATERIAL SAFETY DATA SHEET

Date Prepared: 07/03/13

I. PRODUCT IDENTIFICATION



Trade Name(s): **Aquaset**

Generic Name(s): Bentonite Clay (CAS No. 1302-78-9)

Chemical Name(s): Sodium Montmorillonite (CAS No. 1318-93-0)

Manufacturer: Fluid Tech LLC Address: 130 N. 12th St Montpelier, ID 83254	Telephone Numbers: Information: (800) 995 - 5691 Emergency: (865) 809 - 9995

II. HAZARDOUS INGREDIENTS

Ingredient	CAS NO.	%	Hazard
Crystalline Silica (SiO_2) as Quartz	14808-60-7	See Note	Low concentrations of crystalline silica (SiO_2) in the form of quartz may be present in airborne bentonite dust. See Section VI for discussion of health hazard.

Note: Although the typical quartz content of bentonite is in the range of 2 to 6% most of the quartz particles are larger than the 10 µ respirable threshold size. The actual respirable quartz concentration in airborne bentonite dust will depend upon bentonite source, fineness of product, moisture content of product, local humidity and wind condition at point of use and other use specific factors.

III. PHYSICAL DATA

Boiling Point (°F): NA	Specific Gravity (H_2O=1): 2.45-2.55
Vapor Pressure (mm. Hg): NA	Melting Point: Approx. 1450°C
Vapor Density (Air = 1): NA	Evaporation Rate (Butyl Acetate = 1): NA
Solubility in Water: Insoluble, forms colloidal suspension.	pH: 8-10 (5% aqueous suspension)
Density (at 20° C): 55-68 lbs./cu.ft. as product.	
Appearance and Odor: Light tan to gray dry granules. No odor.	

IV. FIRE AND EXPLOSION DATA

Flash Point: NA	Flammable Limits: LEL: NA UEL: NA
Special Fire Fighting Procedures: NA	
Unusual Fire and Explosion Hazards: None. Product will not support combustion.	
Extinguishing Media: None for product. Any media can be used for the packaging. Product becomes slippery when wet.	

V. REACTIVITY

Stability: Stable	
Hazardous Polymerization: None	
Incompatibility: None	
Hazardous Decomposition Products: None	
NA = Not Applicable ND = Not Determined	

VI. HEALTH HAZARD INFORMATION

Routes of Exposure and Effects:
Skin: Possible drying resulting in dermatitis.
Eyes: Mechanical irritant.
Inhalation: *Acute* (short term) exposure to dust levels exceeding the PEL may cause irritation of respiratory tract resulting in a dry cough. *Chronic* (long term) exposure to airborne bentonite dust containing respirable size ($\leq 10\ \mu m$) quartz particles, where respirable quartz particle levels are higher than TLV's, may lead to development of silicosis or other respiratory problems. Persistent dry cough and labored breathing upon exertion may be symptomatic.
Ingestion: No adverse effects.

Permissible Exposure Limits: (for air contaminants)	OSHA PEL (8hr. TWA)	ACGIH TLV
Bentonite as "Particulates not otherwise regulated" (formerly nuisance dust)		
Total dust	15 mg/m^3	ND
Respirable dust	5 mg/m^3	ND
Crystalline Silica: Quartz (respirable)	$\frac{10\ mg/m^3}{\%\ \text{Silica} + 2}$	0.025 mg/m^3

Carcinogenicity: Bentonite is not listed by ACGIH, IARC, NTP or OSHA. IARC, 1997, concludes that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica from occupational sources (IARC Class 1), that carcinogenicity was not detected in all industrial circumstances studied and that carcinogenicity may depend on characteristics of the crystalline silica or on external factors affecting its biological activity. NTP classifies respirable crystalline silica as "known to be a human carcinogen" (NTP 9th Report on Carcinogens – 2000). ACGIH classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

Acute Oral LD_{50}: ND	Acute Dermal LD_{50}: ND	Aquatic Toxicology LC_{50}: ND

Emergency and First Aid Procedures:
Skin: Wash with soap and water until clean.
Eyes: Flush with water until irritation ceases.
Inhalation: Move to area free from dust. If symptoms of irritation persist contact physician. Inhalation may aggravate existing respiratory illness.

VII. HANDLING AND USE PRECAUTIONS

Steps to be Taken if Material is Released or Spilled: Avoid breathing dust; wear respirator approved for silica bearing dust. Vacuum up to avoid generating airborne dust. Avoid using water. Product slippery when wetted.

Waste Disposal Methods: Product should be disposed of in accordance with applicable local, state and federal regulations.

Handling and Storage Precautions: Use NIOSH/MSHA respirators approved for silica bearing dust when free silica containing airborne bentonite dust levels exceed PEL/TLV's. Clean up spills promptly to avoid making dust. Storage area floors may become slippery if wetted.

VIII. INDUSTRIAL HYGIENE CONTROL MEASURES

Ventilation Requirements: Mechanical, general room ventilation. Use local ventilation to maintain PEL's/TLV's.

Respirator: Use respirators approved by NIOSH/MSHA for silica bearing dust.

Eye Protection: Generally not necessary. Personal preference.

Gloves: Generally not necessary. Personal preference.

Other Protective Clothing or Equipment: None

IX. SPECIAL PRECAUTIONS

Avoid prolonged inhalation of airborne dust.

DEPARTMENT OF TRANSPORTATION HAZARDOUS MATERIAL INFORMATION

Shipping Name: NA (Not Regulated)	Hazard Class: NA
Hazardous Substance: NA	Caution Labeling: NA

MATERIAL SAFETY DATA SHEET

Identity: AQUASET II-G

SECTION I

Manufacturer's Name	**Telephone Number**
Fluid Tech, LLC	Information: (800) 995 - 5691 Emergency: (865) 809 - 9995
Address 130 N. 12th St Montpelier, ID 83254	**Date Revised** 07/03/13

SECTION II - Hazardous Ingredients/Identity Information

Hazardous Components**:** Respirable dust may contain Silica, Crystalline Quartz (CAS #14808-60-7).

Specific Chemical Identity:

Sepiolite ($H_6 Mg_8 Si_{12} O_{30}[OH]_{10}) \cdot 6 H_2O$) CAS #63800-37-3

Common Names: Sepiolite, Meerschaum, Palygorskite, Clay-a natural mineral extracted from the earth

OSHA PEL: Classified as a nuisance dust when less than 1% crystalline silica is present, PEL=5.00mg/M^3 (respirable)

If greater than 1% crystalline silica, then exposures shall not exceed an 8-hour time-weighted average limit as stated in 29 CFR § 1910.1000 Table Z-1-A for air contaminants, specifically;

Silica, Crystalline Quartz (respirable) 0.1 mg/M^3

ACGHIH TLV: Classified as a nuisance dust when less than 1% crystalline silica, TLV-TWA=10 mg/M^3 (Total dust), 5 mg/M^3 (Respirable)

If greater than 1% crystalline silica, the TLV-TWA = 0.1 mg/M^3 (respirable crystalline quartz). See Threshold Limit Value and Biological Exposure Indices for 1991-1992, American Conference of Governmental Industrial Hygienists.

Other Limits Recommended: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration = 0.05 mg/M^3 (respirable crystalline quartz) as determined by a full shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica).

SECTION III - Physical/Chemical Characteristics

Boiling Point: More than 1000^0F

Bulk Density: $50 lbs/ft^3$

Vapor Pressure (mm Hg): None

Melting Point: None

Vapor Density (AIR = 1): N/A

Evaporation Rate: None

Solubility in Water: Insoluble in water.

Appearance and Odor: Light gray to tan granules.

SECTION IV - Fire and Explosion Hazard Data

Flash Point (Method Used): Non-flammable

Flammable Limits: None **LEL:** None **UEL:** None

Extinguishing Media: None required **Special**

Fire Fighting Procedures: None **Unusual**

Fire and Explosion Hazards: None

SECTION V - Reactivity Data

Stability: **Stable**

Conditions to Avoid: None

Incompatibility (Materials to Avoid): None

Hazardous Decomposition or Byproducts: None

Hazardous Polymerization: **Will Not Occur**

Conditions to Avoid: None

SECTION VI - Health Hazard Data

Route(s) of Entry: **Inhalation?** Yes **Skin?** No **Ingestion?** No

Health Hazards (Acute and Chronic): May be harmful if inhaled in sufficient quantities. Prolonged exposure to Sepiolite Clay dust may cause a relatively benign lung disease, though there is a risk of the development of massive fibrosis. Repeated and prolonged exposure to respirable crystalline quartz which may be contained in Sepiolite Clay dust may cause delayed (chronic) lung injury (silicosis). Silicosis is a form of disabling pulmonary fibrosis which can be progressive and may lead to death.

Carcinogenicity: **NTP?** Yes **IARC Monographs?** Yes **OSHA Regulated?** Yes
IARC has reported that there is inadequate evidence for the carcinogenicity of Sepiolite in experimental animals and that there is no data available to evaluate the carcinogenicity of Sepiolite in humans (IARC Class 3).

Sepiolite Clay, like other naturally occurring minerals, may contain crystalline silica. IARC has concluded that there is limited evidence for the carcinogenicity of crystalline silica to humans and sufficient evidence for the carcinogenicity of crystalline silica to experimental animals (IARC Class 2A). The NTP has concluded that "silica, crystalline (respirable)" may reasonably be anticipated to be a carcinogen, based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.

Signs and Symptoms of Exposure: Undue breathlessness, wheezing, cough and sputum production.

Medical Conditions Generally Aggravated by Exposure: Pulmonary function may be reduced by inhalation of respirable crystalline silica that may be in Sepiolite dust. Lung scarring produced by such inhalation may lead to a progressive massive fibrosis of the lung which may aggravate other pulmonary conditions and diseases and which increases susceptibility to pulmonary tuberculosis. Progressive massive fibrosis may be accompanied by right heart enlargement, heart failure and pulmonary failure. Smoking aggravates the effects of exposure.

Emergency and First Aid Procedures: For dust in eyes, wash immediately with water. If irritation persists, seek medical attention. For gross inhalation, remove person immediately to fresh air, give artificial respiration as needed, seek medical attention as needed.

SECTION VII - Precautions for Safe Handling and Use

Waste Disposal Method: Dispose in accordance with Federal, State and Local regulations.

Precautions to be Taken in Handling and Storing: Avoid breakage of bagged material or spills of bulk material. See control measures in Section VIII.

Other Precautions: Use dustless systems for handling, storage, and clean up so that airborne dust does not exceed the PEL. Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery or equipment. Maintain, clean and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty. See also control measures in Section VIII.

See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59 and 1928.21 and state and local worker or community "right to know laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. WARN YOUR EMPLOYEES (AND YOUR CUSTOMERS – USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARDS AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.

See also American Society for Testing and Materials (ASTM) standard practice E 1132-86, "Standard Practice for Health Requirements Relating to Occupational Exposure to Quartz Dust.

SECTION VIII - Control Measures

Respiratory Protection (Specify Type):

The following chart specifies the type of respirators, which may provide respiratory protection for respirable crystalline silica that may be contained in Sepiolite Clay dust.

RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA

Condition Particulate Concentration	MINIMUM RESPIRATORY PROTECTION*
Up to 5 X PEL	Any dust respirator
Up to 10 X PEL	Any dust respirator, except single-use or quarter-mask respirator. Any fume respirator of high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
Up to 50 X PEL	A high efficiency particulate filter respirator with a full face-piece. Any supplied-air respirator with a full face-piece, helmet or hood. Any self-contained breathing apparatus with a full face-piece.
UP to 500 X PEL	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 500 X PEL or entry and escape from unknown concentrations.	Self-contained breathing apparatus with a full face-piece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a face-piece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

Ventilation:

Local Exhaust Use sufficient local exhaust to reduce the level of dust to the PEL. See ACGIH "Industrial Ventilation, A Manual of Recommended Practice, "the latest edition.

Mechanical: See "Other Precautions" under Section VII.

Special: See "Other Precautions" under Section VII.

Other: See "Other Precautions" under Section VII.

Protective Gloves: Optional.

Eye Protection: Wear protective shield (safety glasses) when exposed to dust particles.

Other Protective Clothing and Equipment: Optional

Work/Hygienic Practices: Avoid creating and breathing dust. See "Other Precautions" under Section VII.

MATERIAL SAFETY DATA SHEET

Identity: AQUASET II-H

SECTION I

Manufacturer's Name Fluid Tech LLC	**Telephone Number** Information: (800) 995 - 5691 Emergency: (865) 809 - 6475
Address 130 N. Fluid Tech LLC Montpelier, ID 83254	**Date Revised** 07/03/13

SECTION II - Hazardous Ingredients/Identity Information

Hazardous Components**:** Respirable dust may contain Silica, Crystalline Quartz (CAS #14808-60-7).

Specific Chemical Identity:

Sepiolite ($H_6\ Mg_8\ Si_{12}\ O_{30}[OH]_{10}) \cdot 6\ H_2O$) CAS #63800-37-3

Common Names: Sepiolite, Meerschaum, Palygorskite, Clay-a natural mineral extracted from the earth

OSHA PEL: Classified as a nuisance dust when less than 1% crystalline silica is present, PEL=5.00mg/M^3 (respirable)

If greater than 1% crystalline silica, then exposures shall not exceed an 8-hour time-weighted average limit as stated in 29 CFR § 1910.1000 Table Z-1-A for air contaminants, specifically;

Silica, Crystalline Quartz (respirable) 0.1 mg/M^3

ACGHIH TLV: Classified as a nuisance dust when less than 1% crystalline silica, TLV-TWA=10 mg/M^3 (Total dust), 5 mg/M^3 (Respirable)

If greater than 1% crystalline silica, the TLV-TWA = 0.1 mg/M^3 (respirable crystalline quartz). See Threshold Limit Value and Biological Exposure Indices for 1991-1992, American Conference of Governmental Industrial Hygienists.

Other Limits Recommended: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration = 0.05 mg/M^3 (respirable crystalline quartz) as determined by a full shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica).

SECTION III - Physical/Chemical Characteristics

Boiling Point: More than 1000^0F

Bulk Density : 60lbs/ft^3

Vapor Pressure (mm Hg): None

Melting Point: None

Vapor Density (AIR = 1): N/A

Evaporation Rate: None

Solubility in Water: Insoluble in water.

Appearance and Odor: Light gray to tan powder.

SECTION IV - Fire and Explosion Hazard Data

Flash Point (Method Used): Non-flammable

Flammable Limits: None **LEL:** None **UEL:** None

Extinguishing Media: None required

Special Fire Fighting Procedures: None

Unusual Fire and Explosion Hazards: None

SECTION V - Reactivity Data

Stability: **Stable**

Conditions to Avoid: None

Incompatibility (Materials to Avoid): None

Hazardous Decomposition or Byproducts: None

Hazardous Polymerization: **Will Not Occur**

Conditions to Avoid: None

SECTION VI - Health Hazard Data

Route(s) of Entry: **Inhalation?** Yes **Skin?** No **Ingestion?** No

Health Hazards (Acute and Chronic): May be harmful if inhaled in sufficient quantities. Prolonged exposure to Sepiolite Clay dust may cause a relatively benign lung disease, though there is a risk of the development of massive fibrosis. Repeated and prolonged exposure to respirable crystalline quartz which may be contained in Sepiolite Clay dust may cause delayed (chronic) lung injury (silicosis). Silicosis is a form of disabling pulmonary fibrosis which can be progressive and may lead to death.

Carcinogenicity: **NTP?** Yes **IARC Monographs?** Yes **OSHA Regulated?** Yes
IARC has reported that there is inadequate evidence for the carcinogenicity of Sepiolite in experimental animals and that there is no data available to evaluate the carcinogenicity of Sepiolite in humans (IARC Class 3).
Sepiolite Clay, like other naturally occurring minerals, may contain crystalline silica. IARC has concluded that there is limited evidence for the carcinogenicity of crystalline silica to humans and sufficient evidence for the carcinogenicity of crystalline silica to experimental animals (IARC Class 2A). The NTP has concluded that “silica, crystalline (respirable)” may reasonably be anticipated to be a carcinogen, based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.

Signs and Symptoms of Exposure: Undue breathlessness, wheezing, cough and sputum production.

Medical Conditions Generally Aggravated by Exposure: Pulmonary function may be reduced by inhalation of respirable crystalline silica that may be in Sepiolite dust. Lung scarring produced by such inhalation may lead to a progressive massive fibrosis of the lung which may aggravate other pulmonary conditions and diseases and which increases susceptibility to pulmonary tuberculosis. Progressive massive fibrosis may be accompanied by right heart enlargement, heart failure and pulmonary failure. Smoking aggravates the effects of exposure.

Emergency and First Aid Procedures: For dust in eyes, wash immediately with water. If irritation persists, seek medical attention. For gross inhalation, remove person immediately to fresh air, give artificial respiration as needed, seek medical attention as needed.

SECTION VII - Precautions for Safe Handling and Use

Waste Disposal Method: Dispose in accordance with Federal, State and Local regulations.

Precautions to be Taken in Handling and Storing: Avoid breakage of bagged material or spills of bulk material. See control measures in Section VIII.

Other Precautions: Use dustless systems for handling, storage, and clean up so that airborne dust does not exceed the PEL. Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery or equipment. Maintain, clean and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty. See also control measures in Section VIII.

See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59 and 1928.21 and state and local worker or community "right to know laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. WARN YOUR EMPLOYEES (AND YOUR CUSTOMERS – USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARDS AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.

See also American Society for Testing and Materials (ASTM) standard practice E 1132-86, "Standard Practice for Health Requirements Relating to Occupational Exposure to Quartz Dust.

SECTION VIII - Control Measures

Respiratory Protection (Specify Type):

The following chart specifies the type of respirators, which may provide respiratory protection for respirable crystalline silica that may be contained in Sepiolite Clay dust.

RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA

Condition Particulate Concentration	MINIMUM RESPIRATORY PROTECTION*
Up to 5 X PEL	Any dust respirator

Up to 10 X PEL	Any dust respirator, except single-use or quarter-mask respirator. Any fume respirator of high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
Up to 50 X PEL	A high efficiency particulate filter respirator with a full face-piece. Any supplied-air respirator with a full face-piece, helmet or hood. Any self-contained breathing apparatus with a full face-piece.
UP to 500 X PEL	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 500 X PEL or entry and escape from unknown concentrations.	Self-contained breathing apparatus with a full face-piece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a face-piece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

Ventilation:

Local Exhaust Use sufficient local exhaust to reduce the level of dust to the PEL. See ACGIH “Industrial Ventilation, A Manual of Recommended Practice, “the latest edition.

Mechanical: See “Other Precautions” under Section VII.

Special: See “Other Precautions” under Section VII.

Other: See “Other Precautions” under Section VII.

Protective Gloves: Optional.

Eye Protection: Wear protective shield (safety glasses) when exposed to dust particles.

Other Protective Clothing and Equipment: Optional

Work/Hygienic Practices: Avoid creating and breathing dust. See “Other Precautions” under Section VII.

MATERIAL SAFETY DATA SHEET

Date revised: 11/4/2010

all natural ingredients
PERMA-GUARD™
Pure Diatomaceous Earth Products

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name(s): **Fossil Shell Flour**
Generic Name: Natural Diatomaceous earth
Chemical Name: Amorphous Silica
Manufacturer: Perma-Guard, Inc.
Address: 625 East, 2150 South
City: Bountiful State: UT Zip: 84010

CAS: 61790-53-2
EINECS: 310-127-6
Formula: SIO_2

Emergency: CHEMTREC-USA (800) 424-9300
International: (703) 527-3887 (Collect)

2. COMPOSITION INFORMATION

INGREDIENT Name:	CAS Number:	%	PEL and TLV (except as noted)
NATURAL DIATOMACEOUS EARTH (DE) AMORPHOUS SILICA	61790-53-2	100	Diatomaceous Earth (uncalcined) 6 mg/M³ TOTAL DUST, MSHA 10 mg/M³ TOTAL DUST, ACGIH

3. HAZARD IDENTIFICATION

Summary: PROLONGED AND REPEATED EXPOSURE TO EXESSIVE CONCENTRATIONS OF THIS PRODUCT DUST, OR ANY NUISANCE DUST, CAN CAUSE CHRONIC PULMONARY DISEASE. DUST CONTACT WITH EYES MAY CAUSE TEMPORARY SCRATCHINESS OR REDNESS. THIS PRODUCT HAS NOT BEEN CLASSIFIED AS A CARCINOGEN BY NTP OR IARC.

Medical Conditions which may be aggravated: PRE- EXISTING UPPER RESPIRATORY AND LUNG DISEASE SUCH AS. BUT NOT LIMITED TO BRONCHITIS, EMPHYSEMA AND ASTHMA.
Target Organ(s): LUNGS, EYES

Acute health Effects: TRANSITORY UPPER RESPIRATORY OR EYE IRRITATION.
Chronic Health Effects: PROLONGED AND REPEATED EXPOSURES TO EXCESSIVE CONCENTRATIONS OF PRODUCT DUST, IN EXCESS OF THE PEL/TLV, CAN CAUSE CHRONIC PULMONARY DISEASE.

Primary Entry Route(s): INHALATION, DUST CONTACT WITH EYES.
Inhalation: IRRITATION AND SORENESS IN THROAT & NOSE. IN EXTREME EXPOSURES SOME CONGESTION MAY OCCUR.
Eyes: TEMPORARY IRRITATION OR INFAMMATION.
Skin Contact: NA Skin Absorption: NA Ingestion: NOT HAZARDOUS WHEN INGESTED

4. FIRST AID MEASURES

Inhalation: REMOVE TO FRESH AIR. DRINK WATER TO CLEAR THROAT AND BLOW NOSE TO EVACUATE DUST.
Eyes: FLUSH EYES WITH LARGE QUANTITIES OF WATER. IF IRRITATION PERSISTS CONSULT A PHYSICIAN.
Skin Contact: NA Skin Absorption: NA Ingestion: NOT HAZARDOUS WHEN INGESTED

5. FIRE FIGHTING MEASURES

Flash Point: (Method): NON FLAMMABLE NFPA Flammable/Combustible Liquid Classification: NA
Flammable Limits: LEL: NA UEL: NA Auto-Ignition Temperature: NA
Extinguishing Media: NA Unusual Fire or Explosive Hazards: NONE Special Fire-Fighting Procedures: NONE

6. ACCIDENTAL RELEASE MEASURES

Procedures for Spill/Leak: VACUUM/CLEAN DUST WITH EQUIPMENT FITTED WITH A HEPA FILTER. USE A DUST SUPPRESSANT SUCH AS WATER IF SWEEPING IS NECESSARY.

7. HANDLING AND STORAGE

Minimize Dust generation and accumulation. Avoid Breathing Dust. Avoid contact with eyes. Seal broken bags immediately. Continue to follow all MSDS label warnings when handling empty containers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Goggles: GOGGLES OR SAFETY GLASSES WITH SIDE-SHIELDS ARE RECOMMENDED.
Gloves: NOT NORMALLY REQUIRED.
Respirator: <10X PEL, USE AN N95 QUARTER OR HALF MASK RESPIRATOR. <50X PEL, USE A FUILL FACE RESPIRATOR EQUIPPED WITH N95 FILTERS. <200X PEL, USE A POWERED AIR PURIFYING RESPIRATOR (POSITIVE PRESSURE) WITH N95 FILTERS. >200X PEL, USE A FULL FACE TYPE C SUPPLIED AIR RESPIRATOR (CONTINUOUS FLOW MODE).

Ventilation: USE SUFFICIENT NATURAL OR MECHANICAL VENTILATION TO KEEP DUST LEVEL BELOW PEL.
Other: Special considerations for repair/maintenance of contaminated equipment: INSURE PROPER RESPIRATORY PROTECTION.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and odor: FINE WHITE POWDER, NO ODOR

Boiling Point:	NA	Evaporation Rate: (=1):	NA	Specific Gravity (water =1) :	2.2
Vapor Pressure:	NA	Melting Point:	ND	% Volatile by Volume:	NIL
Water Solubility:	Negligible	Vapor Density:	NA	pH:	7.5-9.0

10. STABILITY and REACTIVITY

MATERIAL IS STABLE. HAZARDOUS POLYMERIZATION CANNOT OCCUR.
Chemical Incompatibilities: HYDROFLUORIC ACID. Conditions to Avoid: NONE IN DESIGNED USE.

11. TOXICOLOGICAL INFORMATION

Summary: PROLONGED AND REPEATED EXPOSURE TO EXESSIVE CONCENTRATIONS OF THIS PRODUCT'S DUST, OR ANY NUISANCE DUST, CAN CAUSE CHRONIC PULMONARY DISEASE. DUST CONTACT WITH EYES MAY CAUSE TEMPORARY SCRATCHINESS OR REDNESS. THIS PRODUCT HAS NOT BEEN CLASSIFIED AS A CARCINOGEN BY THE NTP OR IARC.

12. ECOLOGICAL INFORMATION

GENERALLY CONSIDERED CHEMICALLY INERT IN THE ENVIRONMENT. USED MATERIAL WHICH HAS BECOME CONTAMINATED MAY HAVE SIGNIFICANTLY DIFFERENT CHARACTERISTICS BASED ON THE CONTAMINANTS AND SHOULD BE EVALUATED ACCORDINGLY.

13. DISPOSAL CONSIDERATIONS

WASTE IS NOT HAZARDOUS AS DEFINED BY RCRA (40 CFR261). OTHER STATE AND LOCAL REGULATIONS MAY VARY. CONSULT LOCAL AGENCIES AS NEEDED. USED MATERIAL WHICH HAS BECOME CONTAMINATED MAY HAVE SIGNIFICANTLY DIFFERENT CHARACTERISTICS BASED ON THE CONTAMINANTS AND SHOULD BE EVALUATED ACCORDINGLY

14. TRANSPORTATION INFORMATION

D.O.T. proper shipping name: EARTH, DIATOMACEOUS, CRUDE OR GROUND . Hazard Classification: NOT CLASSIFIED
Reportable Quantities: NOT APPLICABLE UN (United Nations), NA (North America) Number: NA

15. REGULATORY INFORMATION

OSHA: Hazard Communications Standard 29CFR 1910.1200: MATERIAL IS CONSIDERED HAZARDOUS. SEE SECTION 3
RCRA: THE MATERIAL IS NOT DEFINED AS HAZARDOUS WASTE 40 CFR 261.
TSCA: THIS MATERIAL IS LISTED IN THE TSCA INVENTORY, AND IS NOT OTHERWISE REGULATED BY TSCA SEC 4,5,6,7, OR 12.
CRCLA: MATERIAL IS NOT REPORTABLE UNDER CERCLA. LOCAL REQUIREMENTS MAY VARY.
SARA: 311/312 HAZARD CATEGORIES– IMMEDIATE AND DELAYED HEALTH , 313 REPORTABLE INGREDIENTS- NONE.
Canada: THIS PRODUCT IS LISTED ON THE DSL. California Proposition 65: NOT APPLICABLE.

16. OTHER INFORMATION

Storage Segregation Hazard Classes: NA Special Handling/Storage : REPAIR ALL BROKEN BAGS IMMEDIATELY
Special Workplace Engineering Controls: ADEQUATE VENTILATION TO KEEP DUST LEVEL BELOW PEL.

PREPARED/REVISED BY: Marvin Haney, Perma-Guard, Inc. (801) 726-7107 As of the date of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with appropriate federal and state law(s). However, no warranty or representation with respect to such information is intended or given.

Safety Data Sheet:
Material Name: NITRIC ACID
SDS ID: ohs16550
Issue Date: 2014-06-19
Revision: 2.02

Other Sections
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16

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* * * Section 1 - PRODUCT AND COMPANY IDENTIFICATION * * *

Material Name:
NITRIC ACID

ChemADVISOR, Inc.
Stone Quarry Crossing 811 Camp Horne Road, Suite 220 Pittsburgh, PA 15237
E-mail: info@chemadvisor.com
MSDS is for reference use only; please contact manufacturer for emergency response information, routine product inquiries and orders.

Chemical Family
acids, inorganic

Synonyms
AQUA FORTIS; WFNA; RFNA; HYDROGEN NITRATE; AZOTIC ACID; NITRYL HYDROXIDE; NITAL; UN 2031; HNO3

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* * * Section 2 - HAZARDS IDENTIFICATION * * *

Emergency Overview

Color: colorless to yellow

Change in color: Not available

Physical Form: liquid

Odor: irritating odor

Health Hazards: potentially fatal if inhaled, respiratory tract burns, skin burns, eye burns, mucous membrane burns

Physical Hazards: May ignite combustibles. May react on contact with water.

Potential Health Effects

Inhalation
Short Term: potentially fatal if inhaled, burns

Long Term: burns

Skin Contact
Short Term: burns

Long Term: burns

Eye Contact
Short Term: burns

Long Term: burns

Ingestion
Short Term: burns

Long Term: burns

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* * * Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS * * *

CAS EC No Registration No	Component Name Synonyms	67/548/EEC (DSD)	1272/2008 (CLP)	Percent
7697-37-2 231-714-2 --	NITRIC ACID	O C; R:8-35 Note(s): B	Ox. Liq. 3 - H272 Skin Corr. 1A - H314 Note(s): B	70
7732-18-5 231-791-2 --	WATER	--	--	30

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* * * Section 4 - FIRST AID MEASURES * * *

Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin
Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse. Destroy contaminated shoes.

Eyes
Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion
Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. Give large amounts of water or milk. Allow vomiting to occur. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

Note to Physicians
For inhalation, consider oxygen. Avoid gastric lavage or emesis.

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* * * Section 5 - FIRE FIGHTING MEASURES * * *

See Section 9 for Flammability Properties

NFPA Ratings:
Health: 4 Fire: 0 Reactivity: 0 Other: OX
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Flammable Properties
Negligible fire hazard. Oxidizer. May ignite or explode on contact with combustible materials.

Extinguishing Media
regular dry chemical, soda ash, water Large fires: Flood with water. Apply water from a protected location or from a safe distance.

Fire Fighting Measures
Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Flood with water. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Stay upwind and keep out of low areas. Evacuate if fire gets out of control or containers are directly exposed to fire. Evacuation radius: 800 meters (1/2 mile).

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* * * Section 6 - ACCIDENTAL RELEASE MEASURES * * *

Occupational spill/release
Avoid contact with combustible materials. Do not touch spilled material. Stop leak if possible without personal risk. Reduce vapors with water spray. Do not get water inside container. Small spills: Flood with water. Large spills: Dike for later disposal. Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

* * * Section 7 - HANDLING AND STORAGE * * *

Handling Procedures
Handle as a corrosive liquid. When mixing, slowly add to water to minimize heat generation and spattering. Subject to handling regulations: U.S. OSHA 29 CFR 1910.119. Keep emergency spill kit near storage and use areas.

Storage Procedures
Store and handle in accordance with all current regulations and standards. NFPA 430 Code for the Storage of Liquid and Solid Oxidizing Materials. Protect from physical damage. Avoid contact with light. Store in a tightly closed container. Store in a cool, dry place. Store in a well-ventilated area. Keep dry. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355 Part B). Store with acids. See original container for storage recommendations. Keep separated from incompatible substances.

* * * Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION * * *

Component Exposure Limits

NITRIC ACID	7697-37-2
ACGIH:	2 ppm TWA
	4 ppm STEL
NIOSH:	2 ppmTWA; 5 mg/m3TWA
	4 ppmSTEL; 10 mg/m3STEL
	25 ppmIDLH
Europe:	1 ppm STEL; 2.6 mg/m3 STEL

OSHA (US):	2 ppmTWA; 5 mg/m3TWA
Mexico:	2 ppmTWA LMPE-PPT; 5 mg/m3TWA LMPE-PPT
	4 ppmSTEL [LMPE-CT]; 10 mg/m3STEL [LMPE-CT]

Component Analysis
Biological limit value
There are no biological limit values for any of this product's components.

Ventilation
Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eyes/Face Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Protective Clothing
Wear appropriate chemical resistant clothing.

Glove Recommendations
Wear appropriate chemical resistant gloves.

Respiratory Protection
The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA. 25 ppm Any supplied-air respirator operated in a continuous-flow mode. Any air-purifying respirator with a full facepiece and a canister providing protection against this substance. Only non-oxidizable sorbents are allowed (not charcoal). Any air-purifying full-facepiece respirator (gas mask) with a chin -style, front-mounted or back-mounted canister providing protection against the compound of concern. Only non-oxidizable sorbents are allowed (not charcoal). Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. Emergency or planned entry into unknown concentrations or IDLH conditions - Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator with a full facepiece that is operated in a 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. Escape - Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern. Only non-oxidizable sorbents are allowed (not charcoal). Any appropriate escape-type, self-contained breathing apparatus.

* * * Section 9 - PHYSICAL AND CHEMICAL PROPERTIES * * *

Appearance	Not available	**Physical State**	Liquid
Odor	irritating odor	**Color**	colorless to yellow

Odor Threshold	Not available	**pH**	1
Melting Point	-42 °C	**Boiling Point**	83 °C
Freezing point	Not available	**Evaporation Rate**	Not available
Boiling Point Range	Not available	**Flammability (solid, gas)**	Not available
Autoignition	Not available	**Flash Point**	not flammable
Lower Explosive Limit	Not available	**Decomposition**	Not available
Upper Explosive Limit	Not available	**Vapor Pressure**	47.9 mmHg at 20 °C
Vapor Density (air=1)	3.2	**Specific Gravity (water=1)**	1.5027 at 25 °C
Water Solubility	(miscible)	**Partition coefficient: n-octanol/water**	Not available
Viscosity	Not available	**Solubility (Other)**	Not available
Density	Not available	**pH Solution**	1 M
Physical Form	liquid	**Molecular Formula**	H-N-O3
Molecular Weight	63.01		

Solvent Miscibility

Miscible
ether

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* * * Section 10 - STABILITY AND REACTIVITY * * *

Chemical Stability
Stable at normal temperatures and pressure. May react with evolution of heat on contact with water.

Conditions to Avoid
Avoid contact with combustible materials. Keep dry. Dangerous gases may accumulate in confined spaces. Keep out of water supplies and sewers.

Incompatible Materials

acids, combustible materials, halo carbons, amines, bases, oxidizing materials, metals, halogens, metal salts, metal oxides, reducing agents, peroxides, metal carbide, cyanides,

NITRIC ACID: ACETIC ACID: May react explosively. ACETIC ANHYDRIDE: Explosive reaction by friction or impact. ACETONE: May react explosively. ACETONITRILE: Explosive mixture. 4-ACETOXY-3-METHOXYBENZALDEHYDE: Exothermic reaction. ACROLEIN: Temperature and pressure increase in closed container. ACRYLONITRILE: Explosive reaction at 90 C. ACRYLONITRILE-METHACRYLATE COPOLYMER: Incompatible. ALCOHOLS: Possible violent reaction or explosion; formation of explosive compound in the presence of heavy metals. ALKANETHIOLS: Exothermic reaction with possible ignition. 2-ALKOXY-1,3-DITHIA-2-PHOSPHOLANE: Ignition reaction. ALLYL ALCOHOL: Temperature and pressure increase in closed container. ALLYL CHLORIDE: Temperature and pressure increase in closed container. AMINES (ALIPHATIC OR AROMATIC): Possible ignition reaction. 2-AMINOETHANOL: Temperature and pressure increase in closed container. 2-AMINOTHIAZOLE: Explosive reaction. AMMONIA (GAS): Burns in an atmosphere of nitric acid vapor. AMMONIUM HYDROXIDE: Temperature and pressure increase in closed container. AMMONIUM NITRATE: Forms explosive mixture. ANILINE: Ignites on contact. ANILINIUM NITRATE: Forms explosive solution. ANION EXCHANGE RESINS: Possible violent exothermic reaction. ANTIMONY: Violent reaction. ARSINE: Explosive reaction. ARSINE-BORON TRIBROMIDE: Violent oxidation. BASES: Reacts. BENZENE: Explosive reaction. BENZIDINE: Spontaneous ignition. BENZONITRILE: Possible explosion. BENZOTHIOPHENE DERIVATIVES: Formation of possibly explosive compounds. N-BENZYL-N-ETHYLANILINE: Vigorous decomposition. 1,4-BIS(METHOXYMETHYL)2,3,5,6-TETRAMETHYLBENZENE: Gas evolution. BISMUTH: Intense exothermic reaction or explosion. 1,3-BIS(TRIFLUOROMETHYL)BENZENE: Possible explosion. BORON: Violent reaction with incandescence. BORON DECAHYDRIDE: Explosive reaction. BORON PHOSPHIDE: Ignition reaction. BROMINE PENTAFLUORIDE: Ignition reaction. N-BUTYL MERCAPTAN: Ignition reaction. N-BUTYRALDEHYDE: Temperature and pressure increase in closed container. CADMIUM PHOSPHIDE: Explosive reaction. CALCIUM HYPOPHOSPHITE: Ignition reaction. CARBON (PULVERIZED): Violent reaction. CELLULOSE: Forms easily combustible ester. CHLORATES: Reacts. CHLORINE: Incompatible. CHLORINE TRIFLUORIDE: Violent reaction. CHLOROBENZENE: Possible explosion. 4-CHLORO-2-NITROANILINE: Forms explosive compound. CHLOROSULFONIC ACID: Temperature and pressure increase in closed container. COAL: Explosive mixture. COATINGS: Attacks. CRESOL: Temperature and pressure increase in closed container. CROTONALDEHYDE: Violent decomposition with ignition. CUMENE: Temperature and pressure increase in closed container. CUPRIC NITRIDE: Explosive reaction. CUPROUS NITRIDE: Violent reaction. CYANATES: Possible explosive reaction. CYCLOHEXANONE: Violent reaction. CYCLOHEXYLAMINE: Forms explosive compound. CYCLOPENTADIENE: Explosive reaction. 1,2-DIAMINOETHANEBIS (TRIMETHYLGOLD): Explosive reaction. DIBORANE: Spontaneous ignition. DI-2-BUTOXYETHYL ETHER: Violent decomposition reaction. 2,6-DI-T-BUTYL PHENOL: Formation of explosive compound. DICHLOROETHANE: Forms shock and heat sensitive mixture. DICHLOROETHYLENE: Forms explosive compound. DICHLOROMETHANE: Forms explosive solution. DICYCLOPENTADIENE: Spontaneous ignition. DIENES: Ignition reaction. DIETHYLAMINO ETHANOL: Possible explosion. DIETHYL ETHER: Possible explosion. 3,6-DIHYDRO-1,2,2H-OXAZINE: Explosive interaction. DIISOPROPYL ETHER: Temperature and pressure increase in closed container. DIMETHYLAMINOMETHYLFERROCENE: Violent decomposition if heated. DIMETHYL ETHER: Forms explosive compound. DIMETHYL HYDRAZINE: Ignites on contact. DIMETHYL SULFOXIDE + 1,4-DIOXANE: Explosion. DIMETHYL SULFOXIDE + <14% WATER: Explosive reaction. DINITROBENZENE: Explosion hazard. DINITROTOLUENE: Explosive reaction. DIOXANE + PERCHLORIC ACID: Possible explosion. DIPHENYL DISTIBENE: Explosive oxidation. DIPHENYL MERCURY + CARBON DISULFIDE: Violent reaction. DIPHENYL TIN: Ignition reaction. DISODIUM PHENYL ORTHOPHOSPHATE: Violent explosion. DIVINYL ETHER: Possible ignition reaction. EPICHLOROHYDRIN: Temperature and pressure increase in closed container. ETHANESULFONAMIDE: Explosive reaction. ETHOXY-ETHYLENE DITHIOPHOSPHATE: Ignition on contact. M-ETHYL ANILINE: Ignition reaction. ETHYLENE DIAMINE: Temperature and pressure increase in closed container. ETHYLENE GLYCOL: Forms shock and heat sensitive mixture. ETHYLENEIMINE: Temperature and pressure increase in closed container. 5-ETHYL-2-METHYL PYRIDINE: Explosive reaction. ETHYL PHOSPHINE: Ignition reaction. 5-ETHYL-2-PICOLINE: Forms explosive compounds. FERROUS OXIDE (POWDERED): Intense exothermic reaction. FLUORINE: Possible explosive reaction. FORMIC ACID: Exothermic reaction with release of toxic gases. 2-FORMYLAMINO-1-PHENYL-1,3-PROPANEDIOL: Possible explosion. FUEL OIL (BURNING): Explosion. FULMINATES: Reacts. FURFURYLIDENE KETONES: Ignites on contact. GERMANIUM: Violent reaction. GLYCEROL: Possible explosion. GLYOXAL: Temperature and pressure increase in closed container. HEXALITHIUM DISILICIDE: Explosive reaction. HEXAMETHYLBENZENE: Possible explosion. 2,2,4,4,6,6-HEXAMETHYLTRITHIANE: Explosive oxidation. HEXENAL: Explodes on heating. HYDRAZINE: Violent reaction. HYDRAZOIC ACID: Energetic reaction. HYDROGEN IODIDE: Ignition reaction. HYDROGEN PEROXIDE: Forms unstable mixture. HYDROGEN PEROXIDE AND KETONES: Forms explosive products. HYDROGEN PEROXIDE AND MERCURIC OXIDE: Forms explosive compounds. HYDROGEN PEROXIDE AND THIOUREA: Forms explosive compounds. HYDROGEN SELENIDE: Ignition reaction. HYDROGEN SULFIDE: Incandescent reaction. HYDROGEN TELLURIDE: Ignition and possible explosive reaction. INDANE AND SULFURIC ACID: Explosive reaction. ISOPRENE: Temperature and pressure increase in closed container. KETONES (CYCLIC): Violent reaction. LACTIC ACID + HYDROFLUORIC ACID: Explosive reaction. LITHIUM: Ignition reaction. LITHIUM SILICIDE: Incandescent reaction. MAGNESIUM: Explosive reaction. MAGNESIUM + 2-NITROANILINE: May ignite on contact. MAGNESIUM PHOSPHIDE: Incandescent reaction. MAGNESIUM SILICIDE: Violent reaction. MAGNESIUM-TITANIUM ALLOY: Forms shock and heat sensitive mixture. MANGANESE (POWDERED): Incandescence and possible explosion. MESITYL OXIDE: Temperature and pressure increase in closed container. MESITYLENE: Possible explosive reaction. METALS: Violent reaction with explosion or ignition. METAL ACETYLIDES: Violent or explosive reaction. METAL CARBIDES: Violent or explosive reaction. METAL CYANIDES: Explosive reactions. METAL FERRICYANIDE OR FERROCYANIDE: Violent reaction. METAL SALICYLATES: Forms explosive compounds. METAL THIOCYANATES: Possible explosion. 2-METHYLBENZIMIDAZOLE + SULFURIC ACID: Possible explosive reaction. 4-METHYLCYCLOHEXANONE: Explosive reaction. 2-METHYL-5-ETHYLPYRIDINE: Temperature and pressure increase in closed container. METHYL THIOPHENE: Ignition reaction. NEODYMIUM PHOSPHIDE: Violent reaction. NICKEL TETRAPHOSPHIDE: Ignition reaction. NITRO AROMATIC HYDROCARBONS: Forms highly explosive products. NITROBENZENE: Explosive reaction, especially in the presence of water. NITROMETHANE: Explosive reaction. NITRONAPHTHALENE: Explosion hazard. NON-

METAL OXIDES: Explosive reaction. OLEUM: Temperature and pressure increase in closed container. ORGANIC MATERIALS: Fire and explosion hazard. ORGANIC SUBSTANCES: Possible explosion. PERCHLORATES: Possible explosion. PHENYL ACETYLENE + 1,1-DIMETHYLHYDRAZINE: Violent reaction. PHENYL ORTHOPHOSPHORIC ACID DISODIUM SALT: Forms explosive products. PHOSPHINE + OXYGEN: Spontaneous ignition. PHOSPHONIUM IODIDE: Ignition reaction. PHOSPHORUS (VAPOR): Ignites when heated. PHOSPHOROUS HALIDES: Ignition reaction. PHOSPHORUS TETRAIODIDE: Vigorous reaction. PHOSPHORUS TRICHLORIDE: Explosive reaction. PHTHALIC ACID: Possible explosive reaction. PHTHALIC ANHYDRIDE: Exothermic reaction and forms explosive products. PICRATES: Reacts. PLASTICS: Attacks. POLYALKENES: Intense reaction. POLYDIBROMOSILANES: Explosive reaction. POLY(ETHYLENE OXIDE) DERIVATIVES: Possible explosion. POLYPROPYLENE: Temperature and pressure increase in a closed container. POLY(SILYLENE): Ignition. POLYURETHANE (FOAM): Vigorous reaction. POTASSIUM HYPOPHOSPHITE: Explosive reaction. POTASSIUM PHOSPHINATE: Explodes on evaporation. B-PROPIOLACTONE: Temperature and pressure increase in closed container. PROPIOPHENONE + SULFURIC ACID: Exothermic reaction above -5 C. PROPYLENE GLYCOL + HYDROFLUORIC ACID + SILVER NITRATE: Explosive mixture. PROPYLENE OXIDE: Temperature and pressure increase in closed container. PYRIDINE: Temperature and pressure increase in closed container. PYROCATECHOL: Ignites on contact. REDUCING AGENTS: Possible explosive or ignition reaction. RESORCINOL: Possible explosion. RUBBER: Vigorous reaction, possible explosion. SELENIUM: Vigorous reaction. SELENIUM HYDRIDE: Ignition or incandescent reaction. SELENIUM IODOPHOSPHIDE: Explosive reaction. SILICON: Violent reaction. SILICONE OIL: Possible explosion. SILVER BUTEN-3-YNIDE: Explosion. SODIUM: Spontaneous ignition. SODIUM AZIDE: Exothermic reaction. SODIUM HYDROXIDE: Temperature and pressure increase in a closed container. STIBINE: Explosive reaction. SUCROSE (SOLID): Vigorous reaction. SULFAMIC ACID: Violent reaction with evolution of toxic nitrous oxide. SULFIDES: Reacts. SULFUR DIOXIDE: Explosive reaction. SULFUR HALIDES: Violent reaction. SULFURIC ACID: Possible explosion. SULFURIC ACID + GLYCERIDES: Explosive reaction. SULFURIC ACID + TEREPHTHALIC ACID: Violent reaction. SURFACTANTS + PHOSPHORIC ACID: Explosion hazard. TERPENES: Spontaneous ignition. TETRABORANE: Explosive reaction. TETRABORANE DECAHYDRIDE: Explosive reaction. TETRAPHOSPHOROUS DIIODOTRISELENIDE: Explosive reaction. TETRAPHOSPHOROUS IODIDE: Ignites on contact. TETRAPHOSPHOROUS TETRAOXIDE TRISULFIDE: Violent reaction. THIOALDEHYDES: Violent reaction. THIOKETONES: Violent reaction. THIOPHENES: Explosive reaction. TITANIUM: Forms shock-sensitive compound. TITANIUM ALLOYS: Possible explosive reaction. TITANIUM-MAGNESIUM ALLOY: Possible explosion on impact. TOLUENE: Violent reaction. TOLUIDENE: Ignition reaction. 1,3,5-TRIACETYLHEXAHYDRO-1,3,5-TRIAZINE + TRIFLUOROACETIC ANHYDRIDE: Explosive reaction. TRIAZINE: Violently explosive reaction. TRICADMIUM DIPHOSPHIDE: Explosive reaction. TRIETHYLGALLIUM MONOETHYL ETHER COMPLEX: Ignition reaction. TRIMETHYLTRIOXANE: Intense reaction. TRIS(IODOMERCURI)PHOSPHINE: Violent decomposition. TRITHIOACETONE: Explosive reaction. TURPENTINE: Explosive mixture. UNSYMMETRICAL DIMETHYL HYDRAZINE: Spontaneous ignition. URANIUM: Explosive reaction. URANIUM ALLOY: Violent reaction. URANIUM DISULFIDE: Violent reaction. URANIUM-NEODYMIUM ALLOYS: Explosive reaction. VINYL ACETATE: Temperature and pressure increase in closed container. VINYLIDENE CHLORIDE: Temperature and pressure increase in closed container. WOOD: Possible ignition. P-

XYLENE: Intense reaction in presence of sulfuric acid. ZINC: Incandescent reaction. ZINC ETHOXIDE: Possible explosion. ZIRCONIUM-URANIUM ALLOYS: Explosive reaction.

Hazardous Decomposition Products
oxides of nitrogen

Thermal decomposition products: oxides of nitrogen.

Possibility of Hazardous Reactions
Will not polymerize.

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* * * Section 11 - TOXICOLOGICAL INFORMATION * * *

Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:
NITRIC ACID (7697-37-2)
Inhalation LC50Rat 67 ppm 4 h

RTECS Acute Toxicity (selected)

The components of this material have been reviewed, and RTECS publishes the following endpoints:

NITRIC ACID	7697-37-2
Inhalation:	67 ppm/4 hour Inhalation Rat LC50; 130 mg/m3/4 hour Inhalation Rat LC50; 260 mg/m3/30 minute(s) Inhalation Rat LC50
WATER	7732-18-5
Oral:	>90 mL/kg Oral Rat LD50

Acute Toxicity Level

NITRIC ACID (7697-37-2)
Highly Toxic:
inhalation

Component Carcinogenicity
None of this product's components are listed by ACGIH, IARC, NTP, DFG or OSHA

RTECS Irritation

The components of this material have been reviewed and RTECS publishes no data as of the date on this document

Local Effects

NITRIC ACID (7697-37-2)
Corrosive:
inhalation, skin, eye, ingestion

Medical Conditions Aggravated by Exposure
eye disorders, respiratory disorders, skin disorders and allergies,

RTECS Reproductive Effects

The components of this material have been reviewed, and RTECS publishes the following endpoints:
NITRIC ACID (7697-37-2)
21150 mg/kg Oral Rat TDLo (pregnant 1-21 day(s)); 2345 mg/kg Oral Rat TDLo (pregnant 18 day (s))

Inhalation - Acute Exposure
NITRIC ACID: Inhalation of acidic substances may cause severe respiratory irritation with coughing, choking, and possibly yellowish burns of the mucous membranes Other initial symptoms may include dizziness, headache, nausea, and weakness Pulmonary edema may be immediate in the most severe exposures, but more likely will occur after a latent period of 5-72 hours The symptoms may include tightness in the chest, dyspnea, dizziness, frothy sputum, and cyanosis Physical findings may include hypotension, weak, rapid pulse, moist rales, and hemoconcentration In non-fatal cases, complete recovery may occur within a few days or weeks or, convalescence may be prolonged with frequent relapses and continued dyspnea and other signs and symptoms of pulmonary insufficiency In severe exposures, death due to anoxia may occur within a few hours after onset of the symptoms of pulmonary edema or following a relapse.

Inhalation - Chronic Exposure
NITRIC ACID: Depending on the concentration and duration of exposure, repeated or prolonged exposure to an acidic substance may cause erosion of the teeth, inflammatory and ulcerative changes in the mouth, and possibly jaw necrosis Bronchial irritation with cough and frequent attacks of bronchial pneumonia may occur Gastrointestinal disturbances are also possible.

Skin Contact - Acute Exposure
NITRIC ACID: Direct contact with liquid or vapor may cause severe pain, burns and possibly yellowish stains Burns may be deep with sharp edges and heal slowly with scar tissue formation Dilute solutions of nitric acid may produce mild irritation and harden the epidermis without destroying it Concentrated acid solutions applied to over 25% of the skin area in rats produced elevated methemoglobin and blood nitrate levels.

Skin Contact - Chronic Exposure
NITRIC ACID: Effects depend on the concentration and duration of exposure Repeated or prolonged contact with acidic substances may result in dermatitis or effects similar to acute exposure.

Eye Contact - Acute Exposure
NITRIC ACID: Direct contact with acidic substances may cause pain and lacrimation, photophobia, and burns, possibly severe The degree of injury depends on the concentration and duration of contact In mild burns, the epithelium regenerates rapidly and the eye recovers completely In severe cases, the extent of injury may not be fully apparent for several weeks Ultimately, the whole cornea may become deeply vascularized and opaque resulting in blindness In the worst cases, the eye may be totally destroyed Concentrated nitric acid may impart a yellow color to the eye upon contact.

Eye Contact - Chronic Exposure
NITRIC ACID: Effects depend on the concentration and duration of exposure Repeated or prolonged exposure to acidic substances may cause conjunctivitis or effects as in acute exposure.

Ingestion - Acute Exposure
NITRIC ACID: Acidic substances may cause circumoral burns with yellow discoloration and corrosion of the mucous membranes of the mouth, throat and esophagus There may be immediate pain and difficulty or inability to swallow or speak Epiglottal edema may result in respiratory distress and possibly asphyxia Marked thirst, epigastric pain, nausea, vomiting and diarrhea may occur Depending on the degree of espohageal and gastric corrosion, the vomitus may contain fresh or dark precipitated blood and large shreds of mucosa Shock with marked hypotension, weak, rapid pulse, shallow respiration, and clammy skin may occur Circulatory collapse may ensue and if uncorrected, lead to renal failure In severe cases, gastric, and to a lesser degree, esophageal perforation and subsequent peritonitis may occur and be accompanied by fever and abdominal rigidity Esophageal, gastric anc pyloric stricture may occur within a few weeks, but may be delayed for months or even years Death may result within a short time from asphyxia, circulatory collapse or aspiration of even minute amounts Later death may be due to peritonitis, severe nephritis or pneumonia Coma and convulsions sometimes occur terminally.

Ingestion - Chronic Exposure
NITRIC ACID: Depending on the concentration, repeated ingestion of acidic substances may result in inflammatory and ulcerative changes in the mucous membranes of the mouth and other effects as in acute ingestion Reproductive effects have been reported in animals.

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* * * Section 12 - ECOLOGICAL INFORMATION * * *

Component Analysis - Aquatic Toxicity

No LOLI ecotoxicity data are available for this product's components

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* * * Section 13 - DISPOSAL CONSIDERATIONS * * *

Disposal Methods
Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. D002.

Component Waste Numbers

The U.S. EPA has not published waste numbers for this product's components

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* * * Section 14 - TRANSPORT INFORMATION * * *

US DOT Information:
Shipping Name: NITRIC ACID
Hazard Class: 8
UN/NA #: UN2031
Packing Group: II
Required Label(s): 8

TDG Information:
Shipping Name: NITRIC ACID
Hazard Class: 8
UN#: UN2031
Packing Group: II
Required Label(s): 8

ADR Information:
Shipping Name: NITRIC ACID
Hazard Class: 8
UN#: UN2031
Packing Group: II
Required Label(s): 8

ADR Tunnel Code Restrictions

This list contains tunnel restriction codes for those substances and/or chemically related entries which are found in chapter 3.2 of the ADR regulations
NITRIC ACID (7697-37-2)
Restriction(s): E [UN2031] (I); E [UN2031] (II); C/D [UN2032] (I, red fuming)

RID Information:
Shipping Name: NITRIC ACID
Hazard Class: 8
UN#: UN2031
Packing Group: II
Required Label(s): 8

IATA Information:
Shipping Name: NITRIC ACID
Hazard Class: 8
UN#: UN2031
Packing Group: II
Required Label(s): 8

ICAO Information:
Shipping Name: NITRIC ACID
Hazard Class: 8
UN#: UN2031
Packing Group: II
Required Label(s): 8

IMDG Information:
Shipping Name: NITRIC ACID
Hazard Class: 8
UN#: UN2031
Packing Group: II

Component Marine Pollutants (IMDG)

Not regulated as dangerous goods.

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* * * Section 15 - REGULATORY INFORMATION * * *

US Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 311/312 (40 CFR 370.21), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan

NITRIC ACID	7697-37-2
SARA 302:	1000 lb TPQ
SARA 313:	1 % de minimis concentration
CERCLA:	1000 lbfinal RQ; 454 kgfinal RQ
OSHA (safety):	500 lb TQ >=94.5% by weight)
SARA 304:	1000 lb EPCRA RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C)

Acute Health: Yes **Chronic Health:** No **Fire:** Yes **Pressure:** No **Reactivity:** No

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
NITRIC ACID	7697-37-2	Yes	Yes	Yes	Yes	Yes

Not listed under California Proposition 65

Canadian WHMIS Ingredient Disclosure List (IDL)

Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which meet WHMIS criteria specified in the Controlled Products Regulations and are present above the threshold limits listed on the IDL

NITRIC ACID	7697-37-2
	1 %

Germany Water Classification

NITRIC ACID (7697-37-2)
ID Number 414 , hazard class 1 - low hazard to waters (except fuming)

Symbol(s)
C Corrosive
Risk Phrases
R35 Causes severe burns.
Safety Phrases
S1/2 Keep locked up and out of the reach of children.
S23 Do not breathe gas/fumes/vapour/spray.
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S36 Wear suitable protective clothing.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Component Analysis - Inventory

Component	CAS#	US	CA	EU	AU	PH	JP	KR	CN	NZ
NITRIC ACID	7697-37-2	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes
WATER	7732-18-5	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes

Globally Harmonized System of Classification and Labeling (GHS)

The listed component(s) of this material have been checked for country-specific published classifications according to the Globally Harmonized System of Classification and Labeling (GHS). The results of the queries are displayed below. Please see the individual country listings, as additional interpretations or reference information may be available. For a reference list of H- or P-statements, please visit ChemADVISOR's website at http://www.chemadvisor.com/product-resources/26-pure-substance-and-mixture-databases/247-ghs-hazard-and-physical-statements

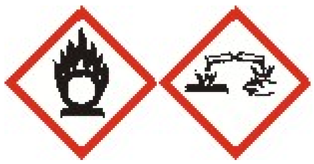
Australia GHS Classifications No published information availableThis material may be hazardous according to published criteria for classification

European Union GHS Classifications

Classifications below according to Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures (CLP)
NITRIC ACID (7697-37-2)
Oxidizing liquidsCategory 3 H272 May intensify fire, oxidizer
Skin corrosion/irritationCategory 1A H314 Causes severe skin burns and eye damage

European Union GHS Labeling Information

Labeling information below is according to Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures (CLP)
NITRIC ACID (7697-37-2)
Symbol(s)



Signal WordDanger
Hazard(s)
H272 May intensify fire, oxidizer
H314 Causes severe skin burns and eye damage
Prevention
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 Keep/Store away from clothing/combustible materials
P280 Wear protective gloves/protective clothing/eye protection/face protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 Wash contaminated clothing before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P321 Specific treatment (see label)
P370+P378 In case of fire: Use appropriate media for extinction
Storage
P405 Store locked up
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

Indonesia GHS Classifications No published information availableThis material may be hazardous according to published criteria for classification

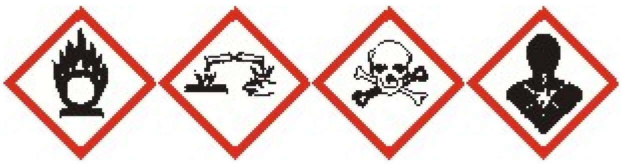
Japan GHS Classifications

Classifications below published under Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
NITRIC ACID (7697-37-2)
Oxidizing liquidsCategory 3 H272 May intensify fire, oxidizerApproval: 00597
Acute toxicityInhalation - Dust and MistCategory 2 H330 Fatal if inhaledApproval: 597
Skin corrosion/irritationCategory 1A H314 Causes severe skin burns and eye damageApproval: 00597

Serious Eye Damage/Eye IrritationCategory 1 H318 Causes serious eye damageApproval: 00597
Specific target organ toxicity - Single exposureCategory 1 H370 Causes damage to organs (respiratory system) Approval: 00597
Specific target organ toxicity - Repeated exposureCategory 1 H372 Causes damage to organs through prolonged or repeated exposure (respiratory system,teeth) Approval: 00597
Aspiration hazardCategory 1 H304 May be fatal if swallowed and enters airwaysApproval: 00597

Japan GHS Labeling Information

Labeling information below according to classifications published by Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
NITRIC ACID (7697-37-2)
Symbol(s)



Signal WordDanger
Hazard(s)
H272 May intensify fire, oxidizer
H330 Fatal if inhaled
H314 Causes severe skin burns and eye damage
H318 Causes serious eye damage
H370 Causes damage to organs
H372 Causes damage to organs through prolonged or repeated exposure
H304 May be fatal if swallowed and enters airways
Prevention
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 Keep/Store away from clothing/combustible materials
P271 Use only outdoors or in a well-ventilated area
P280 Wear protective gloves/protective clothing/eye protection/face protection
P284 Wear respiratory protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
P270 Do not eat, drink or smoke when using this product
Response
P308+P313 IF exposed or concerned: Get medical advice/attention
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P310 Immediately call a POISON CENTER or doctor/physician
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 Wash contaminated clothing before reuse
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P320 Specific treatment is urgent (see label)
P331 Do NOT induce vomiting
P370+P378 In case of fire: Use appropriate media for extinction
Storage
P403+P233 Store in a well-ventilated place. Keep container tightly closed
P405 Store locked up
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

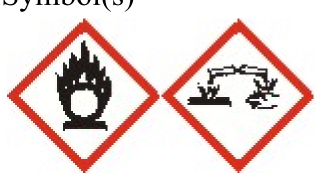
Korea GHS Classifications (SV)

Classifications below published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only)
NITRIC ACID (7697-37-2)

MOE:	Oxidizing liquidsCategory 1 H271 May cause fire or explosion, strong oxidizer Skin corrosion/irritationCategory 1 H314 Causes severe skin burns and eye damage
MOEL:	Oxidizing liquidsCategory 3 H272 May intensify fire, oxidizer Acute toxicityInhalation - Dust and MistCategory 2 H330 Fatal if inhaled Skin corrosion/irritationCategory 1 H314 Causes severe skin burns and eye damage Serious Eye Damage/Eye IrritationCategory 1 H318 Causes serious eye damage Specific target organ toxicity - Single exposureCategory 1 H370 Causes damage to organsrespiratory system Specific target organ toxicity - Repeated exposureCategory 1 H372 Causes damage to organs through prolonged or repeated exposurerespiratory system,teeth Aspiration hazardCategory 1 H304 May be fatal if swallowed and enters airways
NEMA:	Oxidizing liquidsCategory 1 H271 May cause fire or explosion, strong oxidizer

Korea GHS Labeling Information

Labeling information below according to classifications published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only)
NITRIC ACID (7697-37-2)
Symbol(s)



Signal WordDanger
Hazard(s)
H271 May cause fire or explosion, strong oxidizer
H314 Causes severe skin burns and eye damage
Prevention

P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 Keep/Store away from clothing/combustible materials
P280 Wear protective gloves/protective clothing/eye protection/face protection
P283 Wear fire/flame resistant/retardant clothing
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P306+P360 IF ON CLOTHING: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes
P363 Wash contaminated clothing before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P321 Specific treatment (see label)
P370+P378 In case of fire: Use appropriate media for extinction
P371+P380+P375 In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion
Storage
P405 Store locked up
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations
Symbol(s)

Signal WordDanger
Hazard(s)
H272 May intensify fire, oxidizer
H330 Fatal if inhaled
H314 Causes severe skin burns and eye damage
H318 Causes serious eye damage
H370 Causes damage to organs
H372 Causes damage to organs through prolonged or repeated exposure
H304 May be fatal if swallowed and enters airways
Prevention
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 Keep/Store away from clothing/combustible materials
P271 Use only outdoors or in a well-ventilated area
P280 Wear protective gloves/protective clothing/eye protection/face protection
P284 Wear respiratory protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray

P264 Wash thoroughly after handling
P270 Do not eat, drink or smoke when using this product
Response
P308+P313 IF exposed or concerned: Get medical advice/attention
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P310 Immediately call a POISON CENTER or doctor/physician
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 Wash contaminated clothing before reuse
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P320 Specific treatment is urgent (see label)
P331 Do NOT induce vomiting
P370+P378 In case of fire: Use appropriate media for extinction
Storage
P403+P233 Store in a well-ventilated place. Keep container tightly closed
P405 Store locked up
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations
Symbol(s)

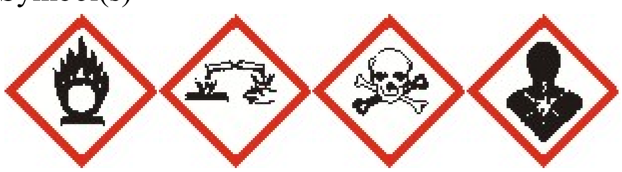
Signal WordDanger
Hazard(s)
H271 May cause fire or explosion, strong oxidizer
Prevention
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 Keep/Store away from clothing/combustible materials
P280 Wear protective gloves/protective clothing/eye protection/face protection
P283 Wear fire/flame resistant/retardant clothing
Response
P306+P360 IF ON CLOTHING: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes
P370+P378 In case of fire: Use appropriate media for extinction
P371+P380+P375 In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

New Zealand GHS Classifications

Classifications below according to the Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended. For a reference list defining the alphanumeric categories, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_NZ.html
NITRIC ACID (7697-37-2) Approval: HSR000982
Oxidizing liquidsCategory 3 H272 May intensify fire, oxidizer (red fuming)
Corrosive to MetalsCategory 1 H290 May be corrosive to metals (red fuming)
Acute toxicityInhalation:Category 1 H330 Fatal if inhaled (red fuming)
Skin corrosion/irritationCategory 1A H314 Causes severe skin burns and eye damage (red fuming)
Serious Eye Damage/Eye IrritationCategory 1 H318 Causes serious eye damage (red fuming)
Specific target organ toxicity - Repeated exposureInhalation:Category 2 H373 May cause damage to organs through prolonged or repeated exposure if inhaled (respiratory system,teeth) (red fuming)
Hazardous to aquatic environment - chronic hazardCategory 3 H412 Harmful to aquatic life with long lasting effects (fish) (red fuming)

New Zealand GHS Labeling Information

Labeling information below according to classifications published by New Zealand's Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended. For a reference list defining the alphanumeric categories, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_NZ.html
NITRIC ACID (7697-37-2)
Symbol(s)



Signal WordDanger
Hazard(s)
H272 May intensify fire, oxidizer
H290 May be corrosive to metals
H330 Fatal if inhaled
H314 Causes severe skin burns and eye damage
H318 Causes serious eye damage
H373 May cause damage to organs through prolonged or repeated exposure
H412 Harmful to aquatic life with long lasting effects
Prevention
P234 Keep only in original container
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 Keep/Store away from clothing/combustible materials
P271 Use only outdoors or in a well-ventilated area
P280 Wear protective gloves/protective clothing/eye protection/face protection
P284 Wear respiratory protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
P273 Avoid release to the environment
Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for

breathing
P310 Immediately call a POISON CENTER or doctor/physician
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 Wash contaminated clothing before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P310 Immediately call a POISON CENTER or doctor/physician
P320 Specific treatment is urgent (see label)
P370+P378 In case of fire: Use appropriate media for extinction
P390 Absorb spillage to prevent material-damage
Storage
P403+P233 Store in a well-ventilated place. Keep container tightly closed
P405 Store locked up
P406 Store in corrosive resistant container with a resistant inner liner
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

South Africa GHS Classifications

Information below presented according to the South African Bureau of Standards (SANS 10234:2008 - Globally Harmonized System (GHS) of Classification and Labeling of Chemicals). The information below identifies substances with recommended GHS classifications by CAS or RR numbers and chemical names; the data field contains the word "Present" along with any clarifying information in parenthesis. NOTE: Due to copyright laws on the standard, we are not able to publish the classification. Details about South Africa's implementation of GHS are available by ordering the Standard and its supplement through the South African Bureau of Standards website
NITRIC ACID (7697-37-2)
Listing: Present (>70% by mass)
Listing: Present (<=70% by mass)

Taiwan GHS Classifications

Information below presented according to Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labelling) which provide guidance on classification and labeling of chemicals according to GHS
NITRIC ACID (7697-37-2)

Taiwan:	Oxidizing liquidsCategory 1 H271 May cause fire or explosion, strong oxidizer
	Corrosive to MetalsCategory 1 H290 May be corrosive to metals
	Skin corrosion/irritationCategory 1 H314 Causes severe skin burns and eye damage
	Serious Eye Damage/Eye IrritationCategory 1 H318 Causes serious eye damage
	Specific target organ toxicity - Repeated exposureCategory 2 H373 May cause damage to organs through prolonged or repeated exposure (lungs)

Taiwan GHS Labeling Information

Labeling information below according to classifications published by Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labelling) which provide guidance on classification and labeling of chemicals according to GHS
NITRIC ACID (7697-37-2)
Symbol(s)

Signal WordDanger
Hazard(s)
H271 May cause fire or explosion, strong oxidizer
H290 May be corrosive to metals
H314 Causes severe skin burns and eye damage
H318 Causes serious eye damage
H373 May cause damage to organs through prolonged or repeated exposure
Prevention
P234 Keep only in original container
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P220 Keep/Store away from clothing/combustible materials
P280 Wear protective gloves/protective clothing/eye protection/face protection
P283 Wear fire/flame resistant/retardant clothing
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P306+P360 IF ON CLOTHING: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes
P363 Wash contaminated clothing before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P310 Immediately call a POISON CENTER or doctor/physician
P321 Specific treatment (see label)
P370+P378 In case of fire: Use appropriate media for extinction
P371+P380+P375 In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion
P390 Absorb spillage to prevent material-damage
Storage
P405 Store locked up

P406 Store in corrosive resistant container with a resistant inner liner
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

Classification
No classification assigned.

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* * * Section 16 - OTHER INFORMATION * * *

Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

Full text of R phrases in Section 3

R35 Causes severe burns.
R8Contact with combustible material may cause fire.

Other Information
Reasonable care has been taken in the preparation of this information; however, the manufacturer makes no warranty whatsoever including the warranty of merchantability, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental, consequential, or other such damages resulting from its use or misuse.

Disclaimer:
Supplier gives no warranty whatsoever, including the warranties of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser shall determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental, consequential or any other damages arising out of the use or misuse of this product. No information

provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights. THIS SDS IS TO BE UTILIZED SOLELY AS A REFERENCE DOCUMENT AND IT IS NOT TO BE USED TO SATISFY THE DISTRIBUTION REQUIREMENTS OF OSHA'S HAZARD COMMUNICATION STANDARD (HCS) NOR CANADA'S CONTROLLED PRODUCT REGULATION (CPR). Read the Safety Data Sheet before handling product. Use of any information contained herein is provided at the reader's own risk and thus independent judgment by trained professionals must be utilized at all times.

FluidTech LLC

MATERIAL SAFETY DATA SHEET

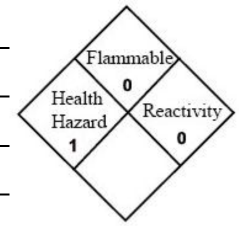
Date Prepared: 07/03/13

I. PRODUCT IDENTIFICATION

Trade Name(s): **Petroset**

Generic Name(s): Bentonite Clay (CAS No. 1302-78-9)

Chemical Name(s): Sodium Montmorillonite (CAS No. 1318-93-0)



NFPA FIRE HAZARD IDENTIFICATION SYSTEM

Manufacturer: Fluid Tech LLC Address: 130 N. 12th St. Montpelier, ID 83254	Telephone Numbers: Information: (800) 995 - 5691 Emergency: (865) 809 - 9995

II. HAZARDOUS INGREDIENTS

Ingredient	CAS NO.	%	Hazard
Crystalline Silica (SiO_2) as Quartz	14808-60-7	See Note	Low concentrations of crystalline silica (SiO_2) in the form of quartz may be present in airborne bentonite dust. See Section VI for discussion of health hazard.

Note: Although the typical quartz content of bentonite is in the range of 2 to 6% most of the quartz particles are larger than the 10 µ respirable threshold size. The actual respirable quartz concentration in airborne bentonite dust will depend upon bentonite source, fineness of product, moisture content of product, local humidity and wind condition at point of use and other use specific factors.

III. PHYSICAL DATA

Boiling Point (°F): NA	Specific Gravity (H_2O=1): 2.45-2.55
Vapor Pressure (mm. Hg): NA	Melting Point: Approx. 1450°C
Vapor Density (Air = 1): NA	Evaporation Rate (Butyl Acetate = 1): NA
Solubility in Water: Insoluble, forms colloidal suspension.	pH: 8-10 (5% aqueous suspension)
Density (at 20° C): 55-68 lbs./cu.ft. as product.	

Appearance and Odor: Light tan to gray dry powder. No odor.

IV. FIRE AND EXPLOSION DATA

Flash Point: NA	Flammable Limits: LEL: NA UEL: NA

Special Fire Fighting Procedures: NA

Unusual Fire and Explosion Hazards: None. Product will not support combustion.

Extinguishing Media: None for product. Any media can be used for the packaging. Product becomes slippery when wet.

V. REACTIVITY

Stability: Stable

Hazardous Polymerization: None

Incompatibility: None

Hazardous Decomposition Products: None

NA = Not Applicable ND = Not Determined

VI. HEALTH HAZARD INFORMATION

Routes of Exposure and Effects:
Skin: Possible drying resulting in dermatitis.
Eyes: Mechanical irritant.
Inhalation: *Acute* (short term) exposure to dust levels exceeding the PEL may cause irritation of respiratory tract resulting in a dry cough. *Chronic* (long term) exposure to airborne bentonite dust containing respirable size ($\leq$ 10 µm) quartz particles, where respirable quartz particle levels are higher than TLV's, may lead to development of silicosis or other respiratory problems. Persistent dry cough and labored breathing upon exertion may be symptomatic.
Ingestion: No adverse effects.

Permissible Exposure Limits: (for air contaminants)	OSHA PEL (8hr. TWA)	ACGIH TLV
Bentonite as "Particulates not otherwise regulated" (formerly nuisance dust)		
Total dust	15 mg/m^3	ND
Respirable dust	5 mg/m^3	ND
Crystalline Silica: Quartz (respirable)	$\frac{10\ mg/m^3}{\%\ Silica + 2}$	0.025 mg/m^3

Carcinogenicity: Bentonite is not listed by ACGIH, IARC, NTP or OSHA. IARC, 1997, concludes that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica from occupational sources (IARC Class 1), that carcinogenicity was not detected in all industrial circumstances studied and that carcinogenicity may depend on characteristics of the crystalline silica or on external factors affecting its biological activity. NTP classifies respirable crystalline silica as “known to be a human carcinogen” (NTP 9th Report on Carcinogens – 2000). ACGIH classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

Acute Oral LD_{50}: ND	Acute Dermal LD_{50}: ND	Aquatic Toxicology LC_{50}: ND

Emergency and First Aid Procedures:
Skin: Wash with soap and water until clean.
Eyes: Flush with water until irritation ceases.
Inhalation: Move to area free from dust. If symptoms of irritation persist contact physician. Inhalation may aggravate existing respiratory illness.

VII. HANDLING AND USE PRECAUTIONS

Steps to be Taken if Material is Released or Spilled: Avoid breathing dust; wear respirator approved for silica bearing dust. Vacuum up to avoid generating airborne dust. Avoid using water. Product slippery when wetted.

Waste Disposal Methods: Product should be disposed of in accordance with applicable local, state and federal regulations.

Handling and Storage Precautions: Use NIOSH/MSHA respirators approved for silica bearing dust when free silica containing airborne bentonite dust levels exceed PEL/TLV's. Clean up spills promptly to avoid making dust. Storage area floors may become slippery if wetted.

VIII. INDUSTRIAL HYGIENE CONTROL MEASURES

Ventilation Requirements: Mechanical, general room ventilation. Use local ventilation to maintain PEL's/TLV's.

Respirator: Use respirators approved by NIOSH/MSHA for silica bearing dust.

Eye Protection: Generally not necessary. Personal preference.

Gloves: Generally not necessary. Personal preference.

Other Protective Clothing or Equipment: None

IX. SPECIAL PRECAUTIONS

Avoid prolonged inhalation of airborne dust.

DEPARTMENT OF TRANSPORTATION HAZARDOUS MATERIAL INFORMATION

Shipping Name: NA (Not Regulated)	Hazard Class: NA
Hazardous Substance: NA	Caution Labeling: NA

Safety Data Sheet:
Material Name: SODIUM HYDROXIDE
SDS ID: ohs21300
Issue Date: 2014-12-15
Revision: 2.03

Other Sections
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16

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* * * Section 1 - PRODUCT AND COMPANY IDENTIFICATION * * *

Material Name:
SODIUM HYDROXIDE

ChemADVISOR, Inc.
Stone Quarry Crossing 811 Camp Horne Road, Suite 220 Pittsburgh, PA 15237
E-mail: info@chemadvisor.com
MSDS is for reference use only; please contact manufacturer for emergency response information, routine product inquiries and orders.

Chemical Family
inorganic bases

Synonyms
CAUSTIC SODA; SODA LYE; LYE; WHITE CAUSTIC; CAUSTIC SODA, BEAD; CAUSTIC SODA, DRY; CAUSTIC SODA, FLAKE; CAUSTIC SODA, GRANULAR; CAUSTIC SODA, SOLID; SODIUM HYDRATE; SODIUM HYDROXIDE (Na(OH)); SODIUM HYDROXIDE, FLAKE; SODIUM HYDROXIDE, DRY; SODIUM HYDROXIDE, SOLID; SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR; UN 1823; NaOH

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* * * Section 2 - HAZARDS IDENTIFICATION * * *

Emergency Overview

Color: white or off-white

Change in color: hygroscopic

Physical Form: beads, pellets, flakes

Odor: odorless

Health Hazards: harmful if swallowed, respiratory tract burns, skin burns, eye burns, mucous membrane burns

Physical Hazards: May react on contact with water.

Potential Health Effects

Inhalation
Short Term: burns

Long Term: burns

Skin Contact
Short Term: burns

Long Term: burns

Eye Contact
Short Term: burns

Long Term: burns

Ingestion
Short Term: burns

Long Term: burns

---

* * * Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS * * *

CAS EC No Registration No	Component Name Synonyms	67/548/EEC (DSD)	1272/2008 (CLP)	Percent
1310-73-2 215-185-5 --	SODIUM HYDROXIDE	C; R:35	Skin Corr. 1A - H314	100

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* * * Section 4 - FIRST AID MEASURES * * *

Inhalation
If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin
Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse. Destroy contaminated shoes.

Eyes
Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion
If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention.

Note to Physicians
For inhalation, consider oxygen. Avoid gastric lavage or emesis.

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* * * Section 5 - FIRE FIGHTING MEASURES * * *

See Section 9 for Flammability Properties

NFPA Ratings:
Health: 3 Fire: 0 Reactivity: 1
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Flammable Properties
Negligible fire hazard.

Extinguishing Media
regular dry chemical, carbon dioxide, water, regular foam Large fires: Use regular foam or flood with fine water spray.

Fire Fighting Measures
Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. Use extinguishing agents appropriate for surrounding fire. Flood with fine water spray. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

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* * * Section 6 - ACCIDENTAL RELEASE MEASURES * * *

Occupational spill/release
Do not touch spilled material. Stop leak if possible without personal risk. Reduce vapors with water

spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

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* * * Section 7 - HANDLING AND STORAGE * * *

Handling Procedures
Use methods to minimize dust.

Storage Procedures
Store and handle in accordance with all current regulations and standards. Store in a cool, dry place. Store in a well-ventilated area. Keep separated from incompatible substances. Keep dry. Store in a tightly closed container. Store with bases.

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* * * Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION * * *

Component Exposure Limits

SODIUM HYDROXIDE	1310-73-2
ACGIH:	2 mg/m3 Ceiling
NIOSH:	2 mg/m3 Ceiling
	10 mg/m3 IDLH
OSHA (US):	2 mg/m3 TWA
Mexico:	2 mg/m3 Ceiling

Component Analysis
Biological limit value
There are no biological limit values for any of this product's components.

Ventilation
Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eyes/Face Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Protective Clothing
Wear appropriate chemical resistant clothing.

Glove Recommendations
Wear appropriate chemical resistant gloves.

Respiratory Protection
The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA. 10 mg/m3 Any supplied-air respirator operated in a continuous-flow mode. Any air-purifying, full-facepiece respirator equipped with an N100, R100, or P100 filter. Any powered, air-purifying respirator with a high-efficiency particulate filter. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. Emergency or planned entry into unknown concentrations or IDLH conditions - Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator with a full facepiece that is operated in a 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. Escape - Any air-purifying, full-facepiece respirator equipped with an N100, R100, or P100 filter. Any appropriate escape-type, self-contained breathing apparatus.

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* * * Section 9 - PHYSICAL AND CHEMICAL PROPERTIES * * *

Appearance	Not available	**Physical State**	Solid
Odor	odorless	**Color**	white or off-white
Odor Threshold	Not available	**pH**	14
Melting Point	318 °C	**Boiling Point**	1390 °C
Freezing point	Not available	**Evaporation Rate**	Not available
Boiling Point Range	Not available	**Flammability (solid, gas)**	Not available
Autoignition	Not available	**Flash Point**	Not available
Lower Explosive Limit	Not available	**Decomposition**	Not available
Upper Explosive Limit	Not available	**Vapor Pressure**	100 mmHg at 1111 °C
Vapor Density (air=1)	Not available	**Specific Gravity (water=1)**	Not available
Water Solubility	1.11 g/mL	**Partition coefficient: n-octanol/water**	Not available
Viscosity	Not available	**Solubility (Other)**	Not available
Change in color	hygroscopic	**Density**	2.13 g/cc
pH Solution	5 %	**Physical Form**	beads, pellets, flakes
Texture	slippery to touch	**Molecular Formula**	Na-O-H
Molecular Weight	39.997		

Solvent Solubility

Soluble
alcohol, glycerol

Insoluble
acetone, ether

* * * Section 10 - STABILITY AND REACTIVITY * * *

Chemical Stability
May react with evolution of heat on contact with water.

Conditions to Avoid
Avoid heat, flames, sparks and other sources of ignition. Dangerous gases may accumulate in confined spaces. May ignite or explode on contact with combustible materials.

Incompatible Materials
combustible materials, acids, halo carbons, metals, halogens, oxidizing materials, peroxides, metal salts,

SODIUM HYDROXIDE: ACETALDEHYDE: May result in violent polymerization. ACETIC ACID: Mixing in closed container increases temperature and pressure. ACETIC ANHYDRIDE: Mixing in a closed container increases temperature and pressure. ACIDS: May react violently. ACROLEIN: May result in an extremely violent polymerization. ACRYLONITRILE: May cause violent polymerization. ALLYL ALCOHOL + BENZENE SULFONYL CHLORIDE: Possible explosion hazard. ALLYL CHLORIDE: Hydrolyzes. ALUMINUM: Vigorous reaction. ALUMINUM, ARSENIC TRIOXIDE, SODIUM ARSENATE: May generate flammable hydrogen gas. AMMONIA + SILVER NITRATE: Precipitation of explosive silver nitride may occur. AMMONIUM SALTS: May react violently evolving ammonia gas. BENZENE-1,4-DIOL: Exothermic reaction. N,N'-BIS(TRINITROETHYL)UREA: Formation of explosive compound. BROMINE: Possible explosion if not stirred continously. CHLORINE TRIFLUORIDE: May cause violent reaction. CHLOROFORM + METHYL ALCOHOL: Exothermic reaction. CHLOROHYDRIN: Mixing in a closed container causes an increase in temperature and pressure. 4-CHLORO-2-METHYLPHENOL: Possible ignition. CHLORONITROTOLUENES: Possible explosion. CHLOROPICRIN: May cause violent reaction. CHLOROSULFONIC ACID: Mixing in a closed container causes an increase in temperature and pressure. CINNAMALDEHYDE: Exothermic reaction. COATINGS: May be attacked. COPPER: Solutions may slowly corrode. CYANOGEN AZIDE: May form sodium 5-azidotetrazolide, which is explosive if isolated. 2,2-DICHLORO-3,3-DIMETHYLBUTANE: Hazardous reaction. 1,2-DICHLOROETHYLENE: May form spontaneously flammable monochloroacetylene. DIBORANE AND OCTANAL OXIME: Exothermic reaction. ETHYLENE CYANOHYDRIN: Mixing in a closed container causes an increase in temperature and pressure. FLAMMABLE LIQUIDS: Fire and explosion hazard. GLYCOLS: May cause exothermic decomposition with evolution of hydrogen gas. GLYOXAL: Mixing in a closed container increases temperature and pressure. HALOGENATED HYDROCARBONS: Violent reaction. HYDROCHLORIC ACID: Mixing in a closed container causes an increase in temperature and pressure. HYDROFLUORIC ACID: Mixing in a closed container causes an increase in temperature and pressure. HYDROQUINONE: Rapid decomposition of hydroquinone with evolution of heat. IRON: Solutions may slowly corrode. LEAD: May be attacked; flammable hydrogen gas may be liberated. LEATHER: May be attacked. MALEIC ANHYDRIDE: Explosive decomposition. METALS: Corrodes metals, reacting to form flammable hydrogen gas. 4-METHYL-2-NITROPHENOL: Exothermic reaction. NITRIC ACID: Mixing in closed container increases temperature and pressure. NITROBENZENE: Possibly explosive reaction upon heating in presence of water. NITROETHANE: Forms an explosive salt. NITROMETHANE: Forms an explosive salt. NITROPARAFFINS: The nitroparaffins, in the presence of water, form dry salts with organic bases. The dry salts are explosive. NITROPROPANE: Forms an explosive salt. O-NITROTOLUENE: Possible explosion. OLEUM: Mixing in a closed container causes an increase in temperature and pressure. ORGANIC PEROXIDES: Incompatible. PENTOL (3-METHYL-2-PENTENE-4-YN-1-OL): Possible explosion. PHOSPHORUS: May form mixed phosphines which may ignite spontaneously in air. PHOSPHORUS PENTOXIDE: May react violently when heated. PLASTICS: May be attacked. B-PROPIOLACTONE: Mixing in a closed container causes an increase in temperature and pressure. PROPYLENE OXIDE: Ignition or explosion may occur. RUBBER: May be attacked. SODIUM TETRAHYDROBORATE: Dry mixtures with sodium hydroxide containing 15-40% of tetrahydroborate liberate hydrogen explosively at 230-270 C. SULFURIC ACID: Mixing in a closed container causes an increase in temperaure and pressure. 1,2,4,5-TETRACHLOROBENZENE: Violent reaction. TETRACHLOROBENZENE + METHYL ALCOHOL: Possible explosion. TETRACHLOROETHYLENE: Possible explosion. TETRAHYDROFURAN: Serious explosions can occur. TIN: Evolution of hydrogen gas which may form an explosive mixture. 1,1,1-TRICHLOROETHANOL: Explosion may occur. TRICHLOROETHYLENE: Formation of explosive mixtures of dichloroacetylene. TRICHLORONITROMETHANE + METHANOL: May cause violent reaction. WOOL: May be attacked. ZINC (DUST): Fire and explosion hazard. ZIRCONIUM: May cause explosive reaction upon heating.

Hazardous Decomposition Products
oxides of sodium

Thermal decomposition products: sodium monoxide.

Possibility of Hazardous Reactions
Will not polymerize.

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* * * Section 11 - TOXICOLOGICAL INFORMATION * * *

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:
SODIUM HYDROXIDE (1310-73-2)
Dermal LD50 Rabbit 1350 mg/kg

RTECS Acute Toxicity (selected)
The components of this material have been reviewed and RTECS publishes no data as of the date on this document

Acute Toxicity Level
SODIUM HYDROXIDE (1310-73-2)

Toxic:
ingestion
Moderately Toxic:
dermal absorption

Component Carcinogenicity
None of this product's components are listed by ACGIH, IARC, NTP, DFG or OSHA

RTECS Irritation
The components of this material have been reviewed, and RTECS publishes the following endpoints:
SODIUM HYDROXIDE (1310-73-2)
2 percent Skin Human mild; 1 percent Eyes Monkey severe; 400 ug Eyes Rabbit mild; 50 ug/24 hour Eyes Rabbit severe; 1 mg/24 hour Eyes Rabbit severe; 1 mg/30 second(s) Eyes Rabbit severe; 1 percent Eyes Rabbit severe; 500 mg/24 hour Skin Rabbit severe

Local Effects
SODIUM HYDROXIDE (1310-73-2)
Corrosive:
inhalation, skin, eye, ingestion

Medical Conditions Aggravated by Exposure
eye disorders, skin disorders and allergies,

RTECS Mutagenic
The components of this material have been reviewed, and RTECS publishes the following endpoints:
SODIUM HYDROXIDE (1310-73-2)
20 mg grasshopper; 10 mmol/L hamster; 16 mmol/L hamster

Inhalation - Acute Exposure
SODIUM HYDROXIDE: Effects due to inhalation of dusts or mist may vary from mild irritation of the nose at 2 mg/m3 to severe pneumonitis depending on the exposure Low concentrations may cause mucous membrane irritation with sore throat, coughing, and dyspnea Intense exposures may result in destruction of mucous membranes and delayed pulmonary edema or pneumonitis Shock may occur.

Inhalation - Chronic Exposure
SODIUM HYDROXIDE: Prolonged exposures to high concentrations of dusts or mists may cause discomfort and ulceration of the nasal passages Repeated exposures of 5000 mg/L were harmless to rats, but 10,000 mg/L led to nervousness, sore eyes, diarrhea, and retarded growth Rats exposed 30 minutes/day to unmeasured concentrations of sodium hydroxide aerosols suffered pulmonary damage after 2-3 months Death occurred in 2 of 10 rats exposed to an aerosol of 40% aqueous sodium hydroxide for 30 minutes, twice a week, for 3 weeks Histopathological examination showed mostly normal lung tissue with foci of enlarged alveolar septae, emphysema, bronchial ulceration, and enlarged lymph adenoidal tissues An epidemiologic study of 291 workers chronically exposed to caustic dusts for 30 years or more found no significant increase in mortality in relation to duration or intensity of such exposures.

Skin Contact - Acute Exposure
SODIUM HYDROXIDE: Upon contact with the skin, damage including redness, cutaneous burns, skin fissures, and white eschars may occur without immediate pain Exposure to solutions as weak as 0.03 N (0.12%) for 1 hour has caused injury to healthy skin With solutions of 0.4-4%, irritation does not occur until after several hours Solutions of 25-50% caused no sensation of irritation within 3 minutes in human subjects Skin biopsies from human subjects having 1 N sodium hydroxide applied to their arms for 15 to 180 minutes showed

progressive changes beginning with dissolution of the cells in the horny layer and progressing through edema to total destruction of the epidermis in 60 minutes A 5% aqueous solution caused severe necrosis to the skin of rabbits when applied for 4 hours Alkalies penetrate the skin slowly The extent of injury depends on the duration of contact If sodium hydroxide is not removed from the skin, severe burns with deep ulceration may occur Exposure to the dust or mist may cause multiple small burns and temporary loss of hair Pathologic findings due to alkalies may include gelatinous, necrotic areas at the site of contact.

Skin Contact - Chronic Exposure
SODIUM HYDROXIDE: Effects are dependent upon concentration and duration of exposure Dermatitis or effects similar to those for acute exposure may occur.

Eye Contact - Acute Exposure
SODIUM HYDROXIDE: Contact may cause disintegration and sloughing of conjunctival and corneal epithelium, corneal opacification, marked edema and ulceration After 7 to 13 days either gradual recovery begins or there is progression of ulceration and corneal opacification Complications of severe eye burns are symblepharon with overgrowth of the cornea by a vascularized membrane, progressive or recurrent corneal ulceration and permanent corneal opacification Blindness may occur.

Eye Contact - Chronic Exposure
SODIUM HYDROXIDE: Effects are dependent upon concentration and duration of exposure Conjunctivitis or effects similar to those for acute exposure may occur.

Ingestion - Acute Exposure
SODIUM HYDROXIDE: Ingestion may cause a burning sensation in the mouth, corrosion of the lips, mouth, tongue and pharynx, and severe esophageal and abdominal pain, vomiting of blood and large pieces of mucosa, and bloody diarrhea Asphyxia can occur from swelling of the throat Mediastinitis, alkalemia, pallor, weak, slow pulse, cardiovascular collapse, shock, coma and death may occur Perforation of the alimentary tract and constrictive scarring may result Esophageal stricture may occur weeks, months, or even years later to make swallowing difficult The estimated fatal dose in man is 5 grams Cases of squamous cell carcinoma of the esophagus have occurred with latent periods of 12 to 42 years after ingestion These cancers were believed to be sequela of tissue destruction and possibly scar formation rather than the result of direct carcinogenic action of sodium hydroxide.

Ingestion - Chronic Exposure
SODIUM HYDROXIDE Depending on the concentration, repeated ingestion of alkaline substances may result in inflammatory and ulcerative effects on the oral mucous membranes and other effects as with acute ingestion.

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* * * Section 12 - ECOLOGICAL INFORMATION * * *

Component Analysis - Aquatic Toxicity

SODIUM HYDROXIDE	1310-73-2
Fish:	LC50 96 h Oncorhynchus mykiss 45.4 mg/L [static]

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* * * Section 13 - DISPOSAL CONSIDERATIONS * * *

Disposal Methods
Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D002.

Component Waste Numbers
The U.S. EPA has not published waste numbers for this product's components

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* * * Section 14 - TRANSPORT INFORMATION * * *

US DOT Information:
Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN/NA #: UN1823
Packing Group: II
Required Label(s): 8

TDG Information:
Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN#: UN1823
Packing Group: II
Required Label(s): 8

ADR Information:
Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN#: UN1823
Packing Group: II
Required Label(s): 8

ADR Tunnel Code Restrictions
This list contains tunnel restriction codes for those substances and/or chemically related entries which are found in chapter 3.2 of the ADR regulations
SODIUM HYDROXIDE (1310-73-2)
Restriction(s): E [UN1823] (II, solid); E [UN1824] (II, solution); E [UN1824] (III, solution)

RID Information:
Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN#: UN1823
Packing Group: II
Required Label(s): 8

IATA Information:
Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN#: UN1823
Packing Group: II
Required Label(s): 8

ICAO Information:
Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN#: UN1823
Packing Group: II
Required Label(s): 8

IMDG Information:
Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN#: UN1823
Packing Group: II

Component Marine Pollutants (IMDG)
Not regulated as dangerous goods.

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* * * Section 15 - REGULATORY INFORMATION * * *

US Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 311/312 (40 CFR 370.21), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan

SODIUM HYDROXIDE	1310-73-2
CERCLA:	1000 lb final RQ; 454 kg final RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C)
Acute Health: Yes **Chronic Health:** No **Fire:** No **Pressure:** No **Reactivity:** Yes

U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
SODIUM HYDROXIDE	1310-73-2	Yes	Yes	Yes	Yes	Yes

Not listed under California Proposition 65

Canadian WHMIS Ingredient Disclosure List (IDL)
Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which meet WHMIS criteria specified in the Controlled Products Regulations and are present above the threshold limits listed on the IDL

SODIUM HYDROXIDE	1310-73-2
	1 %

Germany Water Classification
SODIUM HYDROXIDE (1310-73-2)
ID Number 142 , hazard class 1 - low hazard to waters (footnote 8)

Symbol(s)
C Corrosive
Risk Phrases
R35 Causes severe burns.
R34 Causes burns.
R36/38 Irritating to eyes and skin.
Safety Phrases
S1/2 Keep locked up and out of the reach of children.
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37/39 Wear suitable gloves and eye/face protection.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Component Analysis - Inventory

Component	CAS#	US	CA	EU	AU	PH	JP	KR	CN	NZ
SODIUM HYDROXIDE	1310-73-2	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes

Globally Harmonized System of Classification and Labeling (GHS)

The listed component(s) of this material have been checked for country-specific published classifications according to the Globally Harmonized System of Classification and Labeling (GHS). The results of the queries are displayed below. Please see the individual country listings, as additional interpretations or reference information may be available. For a reference list of H- or P-statements, please visit ChemADVISOR's website at http://www.chemadvisor.com/product-resources/26-pure-substance-and-mixture-databases/247-ghs-hazard-and-physical-statements

Australia GHS Classifications
Classifications below published by Australia's Department of Employment and Workplace Relations, through the Office of the Australian Safety and Compensation Council (ASCC)
SODIUM HYDROXIDE (1310-73-2)
Skin corrosion/irritation Category 1A H314 Causes severe skin burns and eye damage

Australia GHS Labeling Information
Labeling information below according to classifications published by Australia's Department of Employment and Workplace Relations, through the Office of the Australian Safety and Compensation Council (ASCC)
SODIUM HYDROXIDE (1310-73-2)

Symbol(s)

Signal Word Danger
Hazard(s)
H314 Causes severe skin burns and eye damage
Prevention
P280 Wear protective gloves/protective clothing/eye protection/face protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 Wash contaminated clothing before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P321 Specific treatment (see label)
Storage
P405 Store locked up
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

European Union GHS Classifications
Classifications below according to Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures (CLP)
SODIUM HYDROXIDE (1310-73-2)
Skin corrosion/irritation Category 1A H314 Causes severe skin burns and eye damage

European Union GHS Labeling Information
Labeling information below is according to Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures (CLP)
SODIUM HYDROXIDE (1310-73-2)
Symbol(s)

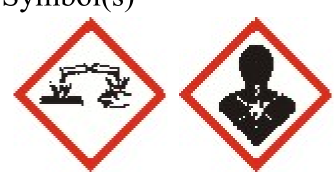
Signal Word Danger
Hazard(s)
H314 Causes severe skin burns and eye damage
Prevention
P280 Wear protective gloves/protective clothing/eye protection/face protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray

P264 Wash thoroughly after handling
Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 Wash contaminated clothing before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P321 Specific treatment (see label)
Storage
P405 Store locked up
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

Indonesia GHS Classifications No published information available This material may be hazardous according to published criteria for classification

Japan GHS Classifications
Classifications below published under Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
SODIUM HYDROXIDE (1310-73-2)
Skin corrosion/irritation Category 1 H314 Causes severe skin burns and eye damage Approval: 21B3010
Serious Eye Damage/Eye Irritation Category 1 H318 Causes serious eye damage Approval: 21B3010
Specific target organ toxicity - Single exposure Category 1 H370 Causes damage to organs (respiratory system) Approval: 21B3010
Hazardous to aquatic environment - acute hazard Category 3 H402 Harmful to aquatic life Approval: 21B3010

Japan GHS Labeling Information
Labeling information below according to classifications published by Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
SODIUM HYDROXIDE (1310-73-2)
Symbol(s)



Signal Word Danger
Hazard(s)
H314 Causes severe skin burns and eye damage
H318 Causes serious eye damage
H370 Causes damage to organs
H402 Harmful to aquatic life
Prevention
P280 Wear protective gloves/protective clothing/eye protection/face protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
P270 Do not eat, drink or smoke when using this product

P273 Avoid release to the environment
Response
P308+P313 IF exposed or concerned: Get medical advice/attention
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 Wash contaminated clothing before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P310 Immediately call a POISON CENTER or doctor/physician
P321 Specific treatment (see label)
Storage
P405 Store locked up
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

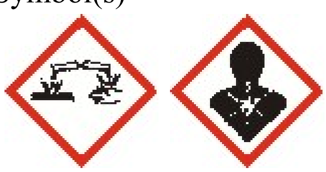
Korea GHS Classifications (SV)
Classifications below published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only)
SODIUM HYDROXIDE (1310-73-2)

MOE:	Corrosive to Metals Category 1 H290 May be corrosive to metals Acute toxicity Dermal Category 4 H312 Harmful in contact with skin Skin corrosion/irritation Category 1 H314 Causes severe skin burns and eye damage
MOEL:	Skin corrosion/irritation Category 1 H314 Causes severe skin burns and eye damage Serious Eye Damage/Eye Irritation Category 1 H318 Causes serious eye damage Specific target organ toxicity - Single exposure Category 1 H370 Causes damage to organs respiratory system

Korea GHS Labeling Information
Labeling information below according to classifications published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only)
SODIUM HYDROXIDE (1310-73-2)
Symbol(s)


Signal Word Danger
Hazard(s)
H290 May be corrosive to metals
H312 Harmful in contact with skin
H314 Causes severe skin burns and eye damage
Prevention
P234 Keep only in original container
P280 Wear protective gloves/protective clothing/eye protection/face protection

P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P302+P352 IF ON SKIN: Wash with plenty of soap and water
P310 Immediately call a POISON CENTER or doctor/physician
P312 Call a POISON CENTER or doctor/physician if you feel unwell
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P362+P364 Take off contaminated clothing and wash it before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P321 Specific treatment (see label)
P390 Absorb spillage to prevent material-damage
Storage
P405 Store locked up
P406 Store in corrosive resistant container with a resistant inner liner
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations
Symbol(s)

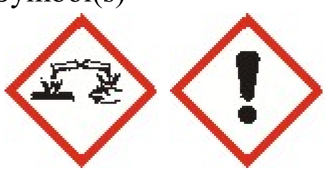


Signal Word Danger
Hazard(s)
H314 Causes severe skin burns and eye damage
H318 Causes serious eye damage
H370 Causes damage to organs
Prevention
P280 Wear protective gloves/protective clothing/eye protection/face protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
P270 Do not eat, drink or smoke when using this product
Response
P308+P313 IF exposed or concerned: Get medical advice/attention
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 Immediately call a POISON CENTER or doctor/physician
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 Wash contaminated clothing before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P310 Immediately call a POISON CENTER or doctor/physician
P321 Specific treatment (see label)
Storage
P405 Store locked up

Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

New Zealand GHS Classifications
Classifications below according to the Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended. For a reference list defining the alphanumeric categories, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_NZ.html
SODIUM HYDROXIDE (1310-73-2) Approval: HSR001547
Corrosive to Metals Category 1 H290 May be corrosive to metals
Acute toxicity Oral Category 4 H302 Harmful if swallowed
Acute toxicity Dermal Category 4 H312 Harmful in contact with skin
Skin corrosion/irritation Category 1B H314 Causes severe skin burns and eye damage
Serious Eye Damage/Eye Irritation Category 1 H318 Causes serious eye damage
Hazardous to aquatic environment - acute hazard Category 3 H402 Harmful to aquatic life (crustacean,fish)
Terrestrial Vertebrate Ecotoxicity Category 3 H433 Harmful to terrestrial vertebrates

New Zealand GHS Labeling Information
Labeling information below according to classifications published by New Zealand's Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended. For a reference list defining the alphanumeric categories, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_NZ.html
SODIUM HYDROXIDE (1310-73-2)
Symbol(s)



Signal Word Danger
Hazard(s)
H290 May be corrosive to metals
H302 Harmful if swallowed
H312 Harmful in contact with skin
H314 Causes severe skin burns and eye damage
H318 Causes serious eye damage
H402 Harmful to aquatic life
H433 Harmful to terrestrial vertebrates
Prevention
P234 Keep only in original container
P280 Wear protective gloves/protective clothing/eye protection/face protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
P270 Do not eat, drink or smoke when using this product
P273 Avoid release to the environment
Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P302+P352 IF ON SKIN: Wash with plenty of soap and water
P310 Immediately call a POISON CENTER or doctor/physician

P312 Call a POISON CENTER or doctor/physician if you feel unwell
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P362+P364 Take off contaminated clothing and wash it before reuse
P301+P312 IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P310 Immediately call a POISON CENTER or doctor/physician
P321 Specific treatment (see label)
P330 Rinse mouth
P390 Absorb spillage to prevent material-damage
Storage
P405 Store locked up
P406 Store in corrosive resistant container with a resistant inner liner
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

South Africa GHS Classifications
Information below presented according to the South African Bureau of Standards (SANS 10234:2008 - Globally Harmonized System (GHS) of Classification and Labeling of Chemicals). The information below identifies substances with recommended GHS classifications by CAS or RR numbers and chemical names; the data field contains the word "Present" along with any clarifying information in parenthesis. NOTE: Due to copyright laws on the standard, we are not able to publish the classification. Details about South Africa's implementation of GHS are available by ordering the Standard and its supplement through the South African Bureau of Standards website
SODIUM HYDROXIDE (1310-73-2)
Listing: Present (solution >=0.5% and <3% by mass)
Listing: Present (solution >=10% by mass)
Listing: Present (solution >=3% and <10% by mass)
Listing: Present (solid)

Taiwan GHS Classifications
Information below presented according to Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labelling) which provide guidance on classification and labeling of chemicals according to GHS
SODIUM HYDROXIDE (1310-73-2)

Taiwan:	Corrosive to Metals Category 1 H290 May be corrosive to metals
	Acute toxicity Dermal Category 4 H312 Harmful in contact with skin
	Skin corrosion/irritation Category 1 H314 Causes severe skin burns and eye damage
	Serious Eye Damage/Eye Irritation Category 1 H318 Causes serious eye damage

Taiwan GHS Labeling Information
Labeling information below according to classifications published by Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labelling) which provide guidance on classification and labeling of chemicals according to GHS
SODIUM HYDROXIDE (1310-73-2)
Symbol(s)

Signal Word Danger
Hazard(s)
H290 May be corrosive to metals
H312 Harmful in contact with skin
H314 Causes severe skin burns and eye damage
H318 Causes serious eye damage
Prevention
P234 Keep only in original container
P280 Wear protective gloves/protective clothing/eye protection/face protection
P260 Do not breathe dust/fume/gas/mist/vapours/spray
P264 Wash thoroughly after handling
Response
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P302+P352 IF ON SKIN: Wash with plenty of soap and water
P310 Immediately call a POISON CENTER or doctor/physician
P312 Call a POISON CENTER or doctor/physician if you feel unwell
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P362+P364 Take off contaminated clothing and wash it before reuse
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
P310 Immediately call a POISON CENTER or doctor/physician
P321 Specific treatment (see label)
P390 Absorb spillage to prevent material-damage
Storage
P405 Store locked up
P406 Store in corrosive resistant container with a resistant inner liner
Disposal
P501 Dispose of contents/container in accordance with local/regional/national/international regulations

Classification
No classification assigned.

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* * * Section 16 - OTHER INFORMATION * * *

Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP -

Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

Full text of R phrases in Section 3
R35 Causes severe burns

Other Information
Reasonable care has been taken in the preparation of this information; however, the manufacturer makes no warranty whatsoever including the warranty of merchantability, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental, consequential, or other such damages resulting from its use or misuse.

Disclaimer:
Supplier gives no warranty whatsoever, including the warranties of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser shall determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental, consequential or any other damages arising out of the use or misuse of this product. No information provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights. THIS SDS IS TO BE UTILIZED SOLELY AS A REFERENCE DOCUMENT AND IT IS NOT TO BE USED TO SATISFY THE DISTRIBUTION REQUIREMENTS OF OSHA'S HAZARD COMMUNICATION STANDARD (HCS) NOR CANADA'S CONTROLLED PRODUCT REGULATION (CPR). Read the Safety Data Sheet before handling product. Use of any information contained herein is provided at the reader's own risk and thus independent judgment by trained professionals must be utilized at all times.

Copyright

19164
①

Effective 01/01/04

PRODUCT NAME: **WaterWorks SP-400** **D.O.E./D.O.D./ EPA / NRC Grade**

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200.
Standard must be consulted for specific requirement

SECTION I MANUFACTURER'S INFORMATION

Manufacturer's Name & Address:

WaterWorks America Inc.
13676 York Road
North Royalton, OH 44133

24 hour Emergency Telephone Number
(440) 526-4815
Information Telephone Number:
(440) 237-0909
Fax Number (24 hour)
(440) 526-4907

SECTION II HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components: Paints, Preservatives, Solvents %

None

Hazardous mixtures of other liquids, solids, or gases %

None

Chemical name and synonyms

Acrylic Acrylate Resin

Chemical Family

Acrylic Anionic Polymer

Alloys and Metallic coatings %

None

Others %

None

Trade Name

WaterWorks SP-400

NFPA/HMIS: Health – 0 Fire – 1 Reactivity – 0 Special Hazards – **NONE**
D.O.T. Class: **Not Required**
EPA Registration: **Not Required**

U.S. Dept. of Commerce Universal Code Name **"Acyclic Acrylic Acrylate Co-Polymer"**

SECTION III PHYSICAL DATA/CHEMICAL CHARACTERISTICS

Boiling Point	N.A.	Bulk Density	0.8 g/cc
Vapor Pressure	N.A.	% Volatiles	N.A.
Vapor Density	N.A.	Evaporation Rate	N.A.
Solutability in Water	Insoluble	pH	7.0
Appearance and odor	White Granular no odor	Size	400 microns

DC 2-3-04

PRODUCT NAME: **WaterWorks SP-400** **D.O.E./D.O.D./ EPA / NRC Grade**

U.S. DEPARTMENT OF LABOR

Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200.
Standard must be consulted for specific requirement

SECTION IV FIRE AND EXPLOSION HAZARD DATA

Flash Point (method used)	**None**
Flammable Limits	**Not applicable** LEL_____ UEL _____
Extinguishing Media	**Any available – Water, CO_2, Dry Chemical, Foam** (although not flammable)
Special fire fighting procedures	**None**
Unusual fire and explosion hazards	**Not applicable**

SECTION V REACTIVITY DATA

Stability	**Stable**
Conditions to Avoid	**None Known**
Incompatibility (Materials to avoid)	**Strong oxidizers**
Hazardous decomposition or by-products of Thermal decomposition	**CO, CO_2, hydrocarbons**
Hazardous Polymerization	**Will not occur**

SECTION VI HEALTH HAZARD DATA

Threshold Limit Value	**LD 50- Less than 9000 mg/KG.**
Health Hazards (Acute and Chronic)	**Internal composition of approx. 0.5 gallons may produce nausea**
Emergency and First Aid Procedures	**If large quantity ingested, Induce vomiting**
Carcinogenicity	**None Established**
OSHA Regulated	**Not regulated**
Signs and Symptoms of Exposure	**None under normal use**
Medical Conditions Generally Aggravated by Exposure	**None under normal use**

PRODUCT NAME: **WaterWorks SP-400** **D.O.E./D.O.D./ EPA / NRC Grade**

U.S. DEPARTMENT OF LABOR

Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200.
Standard must be consulted for specific requirement

SECTION VII SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled	**Vacuum or sweep up with broom** **Avoid adding water, as the product can become slipper when wet**
Waste disposal method	**Follow normal waste disposal methods** **Follow Federal, State and Local regulations for solid waste disposal**

SECTION VIII SPECIAL PROTECTION INFORMATION

Respiratory Protection	**In dusty atmosphere or conditions, wear gauze air filter mask**
Ventilation – Local Exhaust	**As appropriate**
Mechanical (general)	**As appropriate**
Special	**None**
Protective Gloves	**None under normal use. May be used under prolonged use**
Eye protection	**None – Goggles to prevent dust**
Protective clothing/equipment	**None**

SECTION IX SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage	**Store in shipping container or any moderately air tight container** **Close bulk bags when not in use** **Avoid extremely high humidity**
Work/Hygienic Practices	**Use good housekeeping and personal grooming practices. Wash after use**
Other Precautions	**None known**

Attachment D-5

Photos of HWMA Unit Secondary Containment Devices

Portable Spill Pallet

Photo taken August 2013

Portable Spill Pallet (Inside View)
Photo taken August 2013

Attachment D-6

HFEF Secondary Containment Drawings

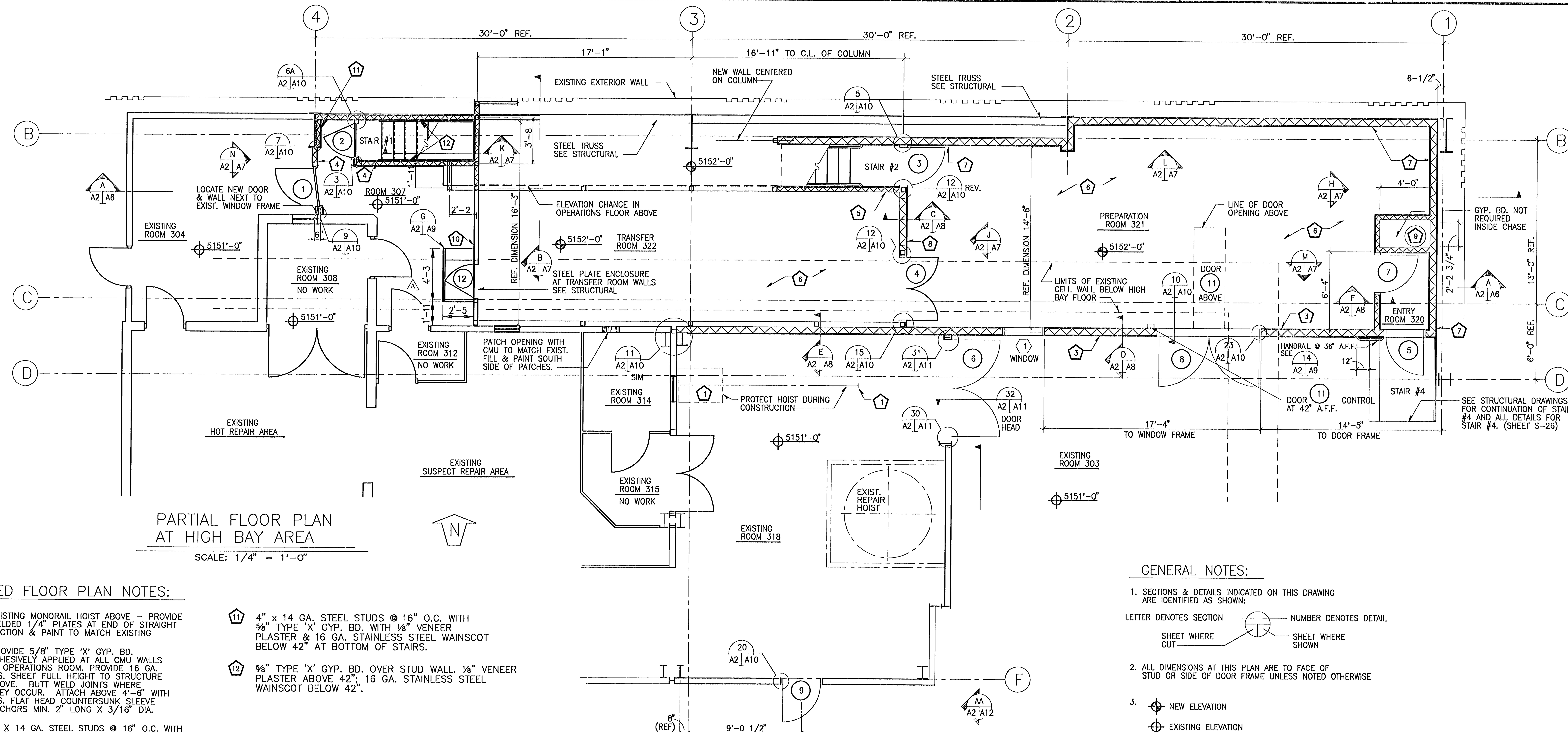
Transfer/Preparation Rooms Floor Plan, Elevation and Details

753686 (Alternate ID: W0353-0005-ED)

Decon Cell Spray Chamber Floor Plans, Elevation and Details

773439 (Alternate ID: H-6-2-0099) &

761331 (Alternate ID: H-6-2-0100)



PARTIAL FLOOR PLAN AT HIGH BAY AREA

SCALE: 1/4" = 1'-0"

KEYED FLOOR PLAN NOTES:

1. EXISTING MONORAIL HOIST ABOVE – PROVIDE WELDED 1/4" PLATES AT END OF STRAIGHT SECTION & PAINT TO MATCH EXISTING
2. PROVIDE 5/8" TYPE 'X' GYP. BD. ADHESIVELY APPLIED AT ALL CMU WALLS IN OPERATIONS ROOM. PROVIDE 16 GA. S.S. SHEET FULL HEIGHT TO STRUCTURE ABOVE. BUTT WELD JOINTS WHERE THEY OCCUR. ATTACH ABOVE 4'-6" WITH S.S. FLAT HEAD COUNTERSUNK SLEEVE ANCHORS MIN. 2" LONG X 3/16" DIA.
3. 6" X 14 GA. STEEL STUDS @ 16" O.C. WITH 5/8" TYPE 'X' GYP. BD. WITH 1/8" VENEER PLASTER BOTH SIDES ABOVE 42". 16 GA. STAINLESS STEEL WAINSCOT BELOW 42".
4. 4" X 18 GA. STEEL STUDS @ 16" O.C. WITH 5/8" TYPE 'X' GYP. BD. WITH 1/8" VENEER PLASTER BOTH SIDES.
5. 4" X 14 GA. STEEL STUDS @ 16" O.C. WITH 5/8" TYPE 'X' GYP. BD. WITH 1/8" VENEER PLASTER & 16 GA. STAINLESS STEEL WAINSCOT BELOW 42" AT OPERATIONS ROOM ONLY.
6. STEEL FLOORING – SEE STRUCTURAL DRAWINGS
7. 6" X 14 GA. STEEL STUDS @ 16" O.C. WITH 5/8" TYPE 'X' GYP. BD. BOTH SIDES. PROVIDE 1/8" VENEER PLASTER ABOVE 42" & 16 GA. STAINLESS STEEL WAINSCOT BELOW 42" AT PREP. ROOM SIDE
8. 6" X 14 GA. STEEL STUDS @ 16" O.C. PROVIDE 5/8" TYPE 'X' GYP. BD. AND 1/8" VENEER PLASTER ABOVE 42" AND 16 GA. STAINLESS STEEL WAINSCOT BELOW 42" ON OPERATIONS ROOM SIDE ONLY. DELETE GYP. BD., PLASTER & S.S. WAINSCOT BELOW OPERATIONS ROOM FLOOR.
9. EXISTING DUCT TO REMAIN – PROTECT DURING CONSTRUCTION.
10. SHEET METAL ON WEST SIDE OF WCC SUPPORT STRUCTURE
11. 4" x 14 GA. STEEL STUDS @ 16" O.C. WITH 5/8" TYPE 'X' GYP. BD. WITH 1/8" VENEER PLASTER & 16 GA. STAINLESS STEEL WAINSCOT BELOW 42" AT BOTTOM OF STAIRS.
12. 5/8" TYPE 'X' GYP. BD. OVER STUD WALL. 1/8" VENEER PLASTER ABOVE 42"; 16 GA. STAINLESS STEEL WAINSCOT BELOW 42".

GENERAL NOTES:

1. SECTIONS & DETAILS INDICATED ON THIS DRAWING ARE IDENTIFIED AS SHOWN:
   LETTER DENOTES SECTION — NUMBER DENOTES DETAIL
   SHEET WHERE CUT — SHEET WHERE SHOWN
2. ALL DIMENSIONS AT THIS PLAN ARE TO FACE OF STUD OR SIDE OF DOOR FRAME UNLESS NOTED OTHERWISE
3. NEW ELEVATION
   EXISTING ELEVATION
4. SEE SHEET A9 FOR STAIR PLANS, SECTIONS & DETAILS
5. ALL STEEL STUD PARTITIONS SHALL HAVE HORIZONTAL STEEL BRIDGING AT MAXIMUM 5'-0" O.C. (3 ROWS FOR 20' HIGH WALL) INSTALLED PER MANUFACTURES RECOMMENDATIONS
6. ELEVATIONS SHOWN ARE TO TOP OF STEEL FLOORING UNLESS OTHERWISE NOTED.
7. SEE STRUCTURAL SHEETS FOR FLOOR OVERBUILD AND MECHANICAL SHEETS FOR GANTRY CRANE AT PREPARATION ROOM.

SYM	APPR'D	CHANGE	BY	CHK'D	DATE
		SEE SHEET T-1			
2		SEE SHEET 1 FOR LATEST REVISION.	SLP	NER	6/92
01		REVISED			5/92

MICRO-FILMED DATE 3-21-94

UNLESS OTHERWISE NOTED: ALL DIMENSIONS ARE IN INCHES. REMOVE ALL BURRS AND SHARP EDGES. ALL MACHINED SURFACES TO BE 125/ OR FINER. STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1. DIMENSIONS & TOLERANCES IN ACCORDANCE WITH THE LATEST REVISION OF ANSI Y14.5M.

DRAWN BY: M. ZAUSCH	DATE: 5/92	SERVICE REQUEST: E6329-05/E6358-05	
CHECKED: R. HAYES	5/92	PROJECT ENGINEER	DATE
RESP. ENGINEER: C.L.W.	5/92	APPR'D/RELEASED: N.E. RUSSELL	4/26/93

PLOTDATE: 04-23-93 PLOT-SCALE: 1=48.00 CAD-STATION # CWW FILE: 0005DA02 002

BINDING ORDER: 3 OF 152

PART NO | NEXT ASSEMBLY | REQ'D

PREPARED BY: ALPHA ENGINEERS, INC. POCATELLO, IDAHO

THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

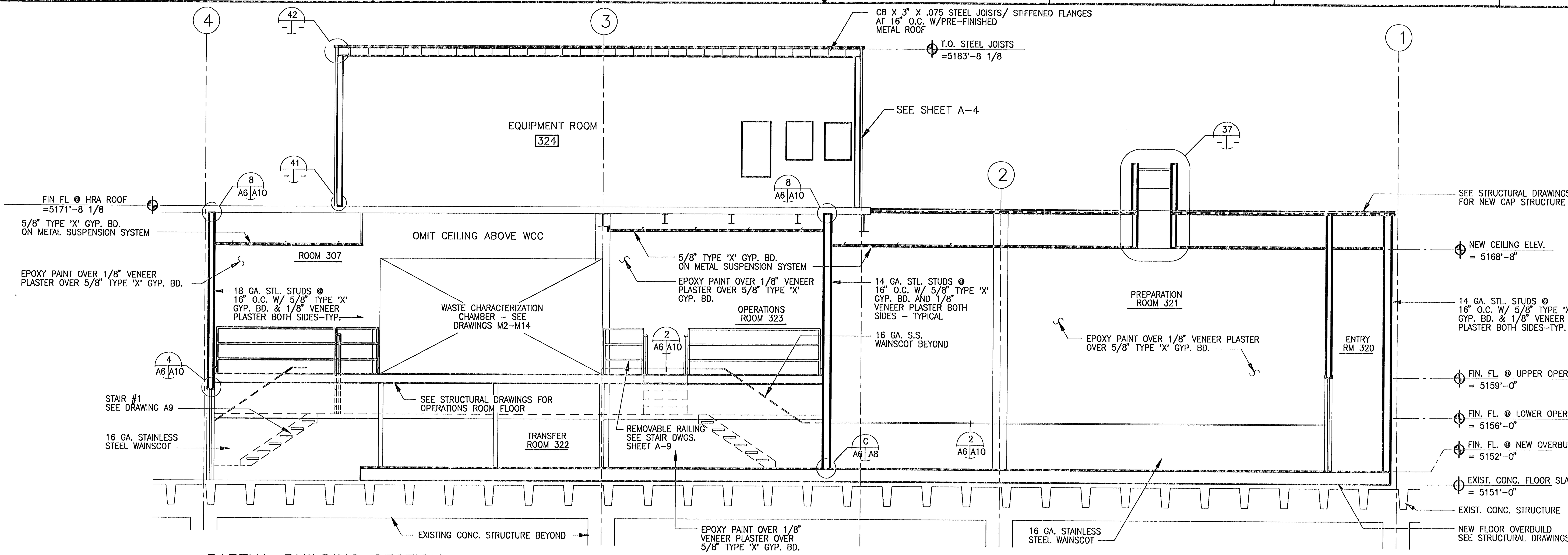
TITLE: WIPP WASTE FACILITY ENHANCEMENTS BLDG. 785

FLOOR PLAN AT HIGH BAY FLOOR

ARGONNE WEST — I.N.E.L.

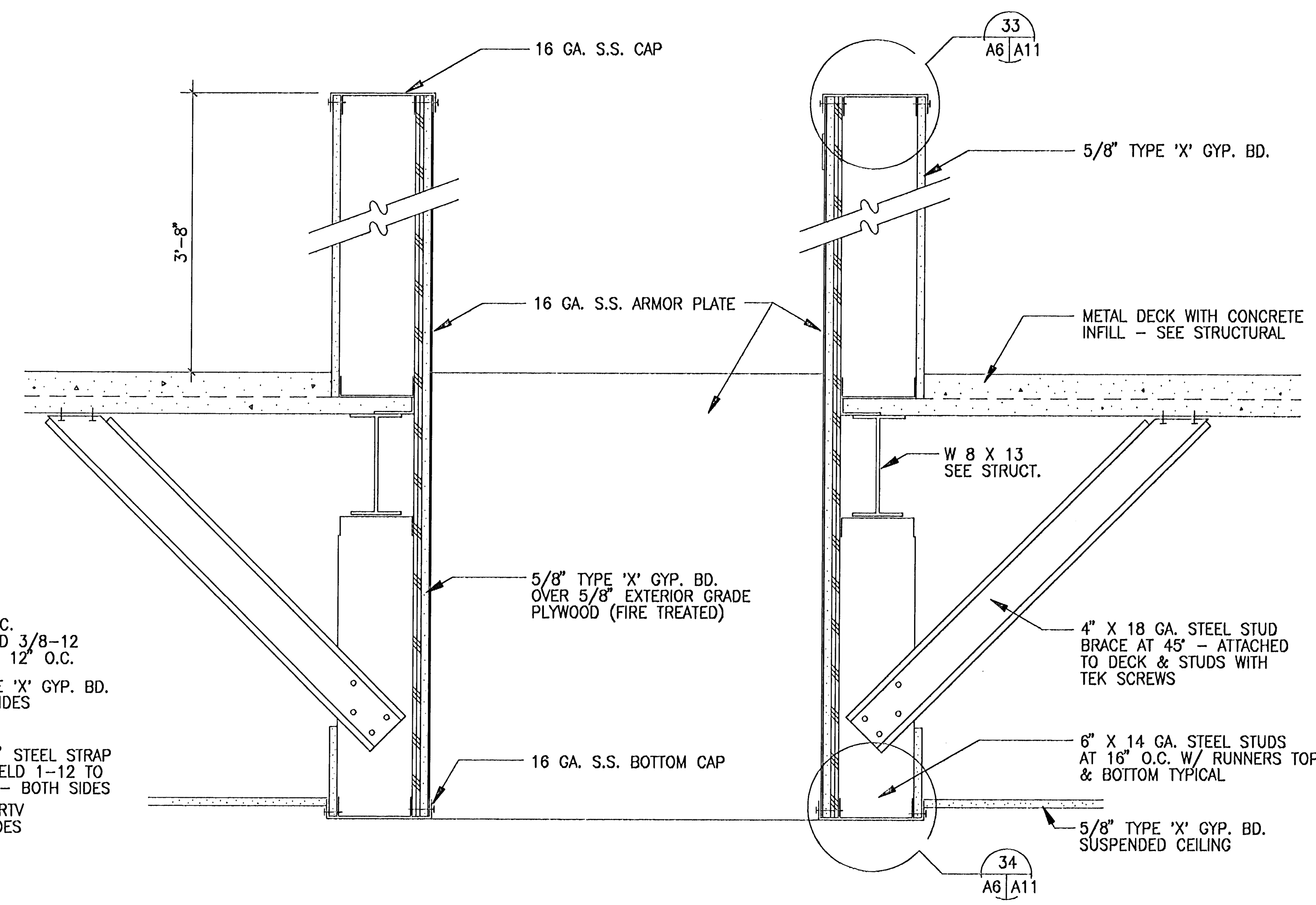
SHEET: A-2 — DRAWING NUMBER: W0353-0005-ED-03 — REV.

PLOT SCALE: 1:48
EDIT DATE: 5/92



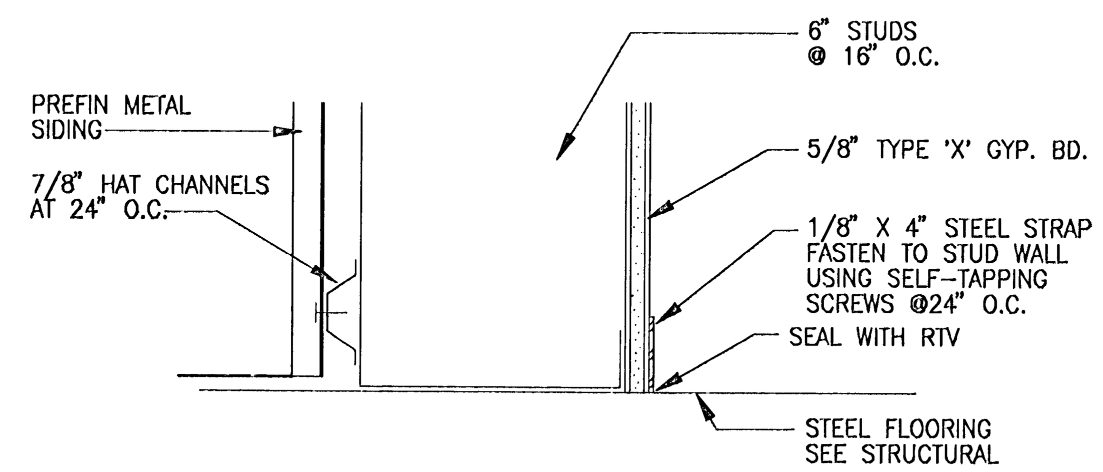
PARTIAL BUILDING SECTION (A / A2 A6)

SCALE: 1/4" = 1'-0"



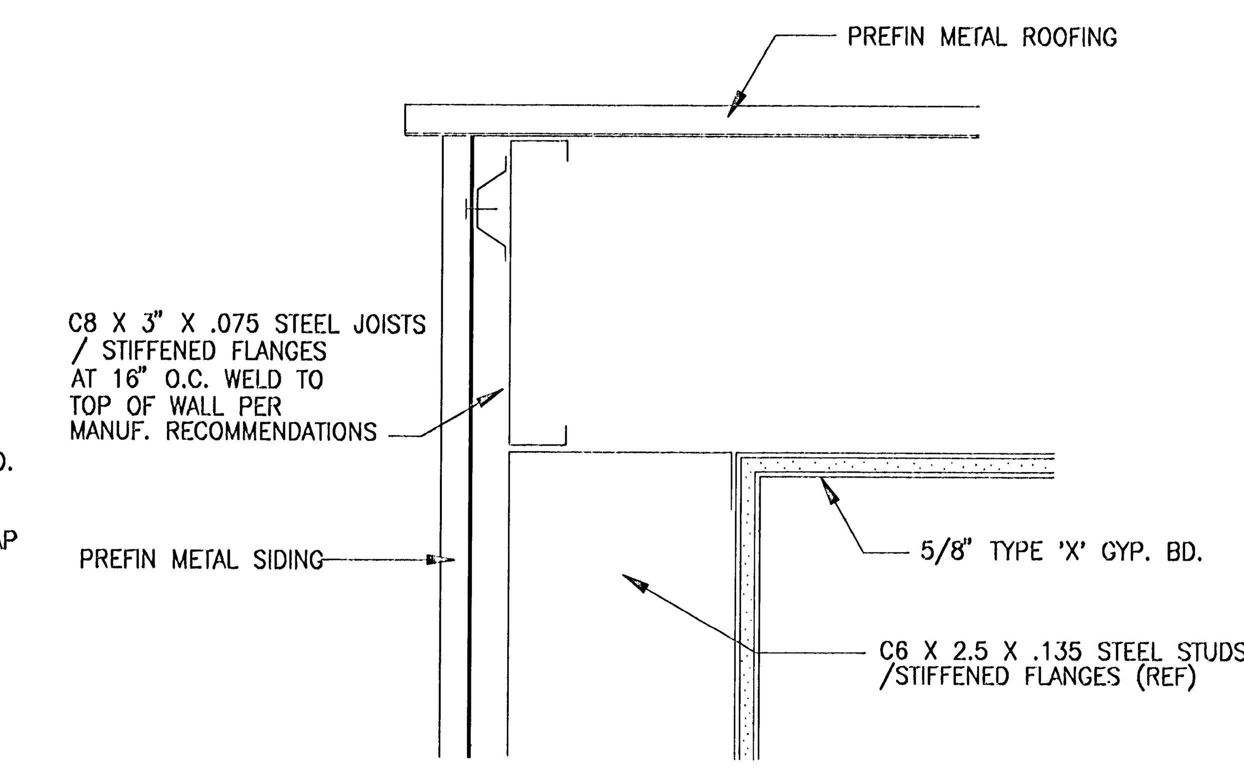
OVERHEAD COILING DOOR OPENING SECTION (37)

SCALE: 1/4" = 1'-0"



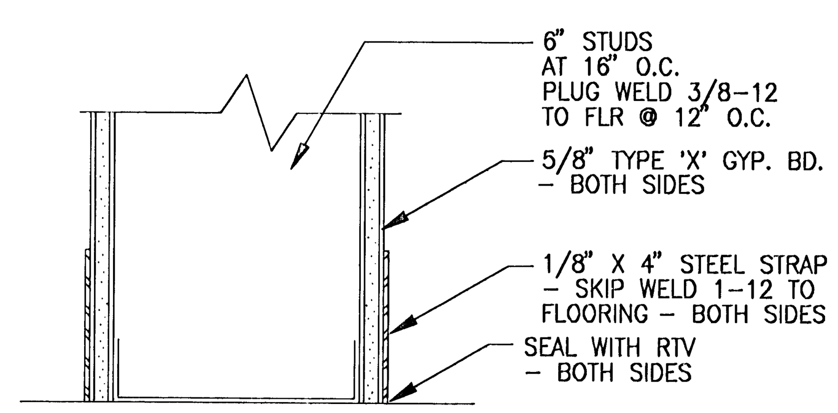
WALL / SILL DETAIL (41)

SCALE: 3" = 1'-0"



ROOF / WALL DETAIL (42)

SCALE: 3" = 1'-0"



INTERIOR WALLS / SILL DETAIL (47)

SCALE: 3" = 1'-0"

SYM	APPR'D	CHANGE	BY	CHK'D	DATE
2		SEE SHEET T-1 FOR LATEST REVISON.	SLP	NER	6/92
01		REVISED	MZ	RH	5/92

MICRO-FILMED DATE 3-21-94

UNLESS OTHERWISE NOTED: ALL DIMENSIONS ARE IN INCHES. REMOVE ALL BURRS AND SHARP EDGES. ALL MACHINED SURFACES TO BE 125/ OR FINER. STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1. DIMENSIONS & TOLERANCES IN ACCORDANCE WITH THE LATEST REVISION OF ANSI Y14.5M.

PLOTDATE: 04-12-93 PLOT-SCALE: 1=48.00 CAD-STATION # CWW FILE: 0005DA06

		DATE
DRAWN BY	M. ZAUSCH	5/92
CHECKED	R. HAYES	5/92
RESP. ENGINEER	C.L.W.	5/92

SERVICE REQUEST: E6329-05/E6358-05

PROJECT ENGINEER: KENT THERP FOR NEAL RUSSELL — DATE 4/13/93

APPR'D/RELEASED: N.E. RUSSELL — 10/20/93

BINDING ORDER: 7 OF 52

PART NO | NEXT ASSEMBLY | REQ'D

PREPARED BY: ALPHA ENGINEERS, INC. POCATELLO, IDAHO

THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

TITLE: WIPP WASTE FACILITY ENHANCEMENTS BLDG. 785

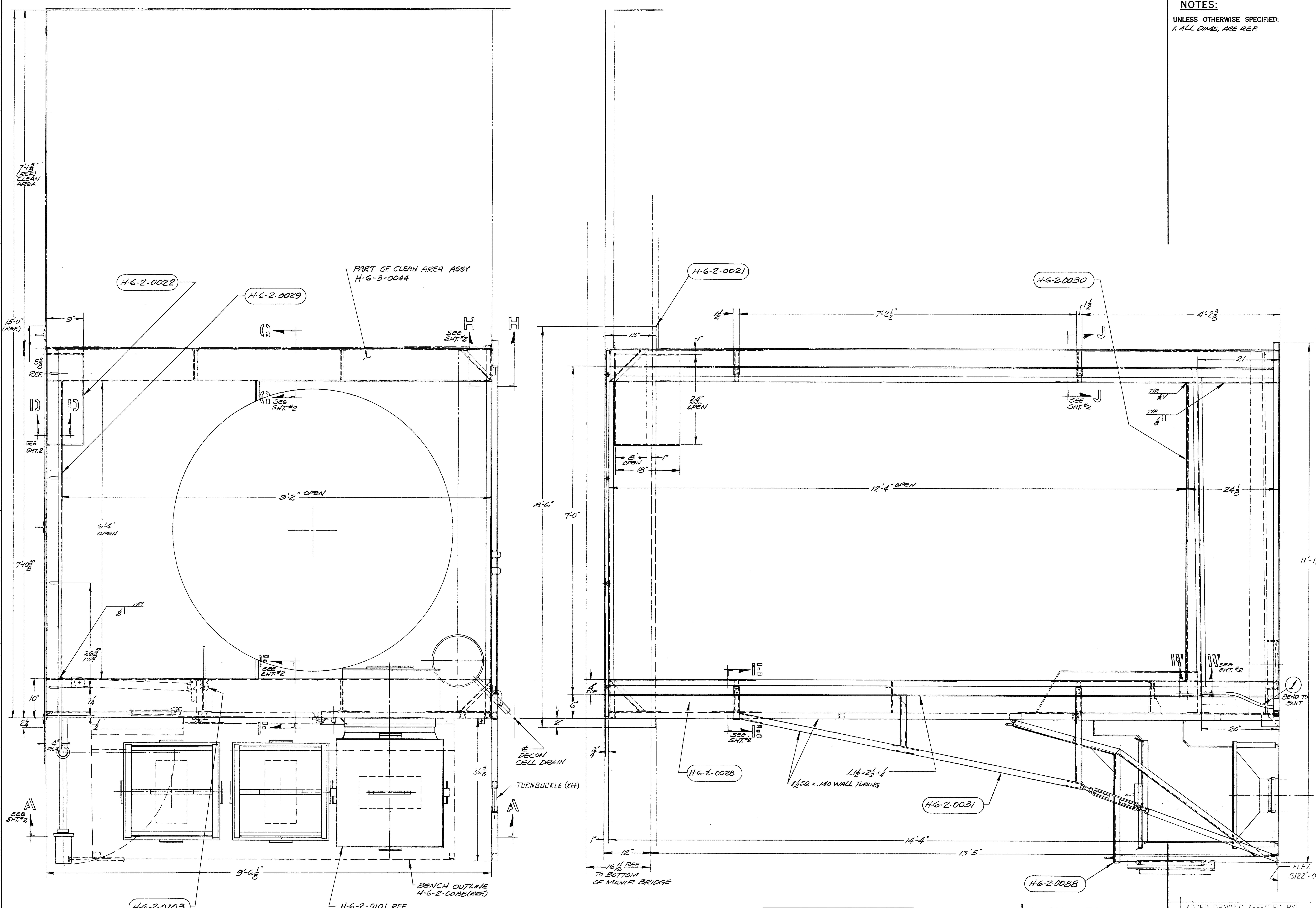
PARTIAL BUILDING SECTION

ARGONNE WEST — I.M.E.I.

SHEET: A-6 — DRAWING NUMBER: W0353-0005-ED-03 — REV.

PLOT SCALE: 1=48

EDIT DATE:



NOTES:

UNLESS OTHERWISE SPECIFIED:
1. ALL DIMS. ARE REF.

THIS DRAWING AFFECTED BY	
EJN / FCF NO.	NA
RIPOUT DWG NO.	NA
INSTALL DWG NO.	778328

INDEX CODE NUMBER				
AREA	TYPE	CL	ORIG	SERIAL
273	0785	42	081	773439

H-6-99-0002

NEXT ASSEMBLIES

DES. GR. LEADER	DATE	DRAWN BY	DATE
J R White	7/10/70	W. NEWMAN	4/17/70
PROJECT MGR.	8/14/70	CHECKED BY R. Kush	6-19-70
APPR. FOR CONST.		COGNIZANT ENGR. R.O. Case	7-6-70

MICRO-FILM
2-6-74(A)
6-2-75(B)

SCALE 1 1/2 = 1'-0"

SYM.	ZONE	CHANGE & DATE	BY	CHKD.	APPD.
3		ADDED DRAWING AFFECTED BY STATEMENT, SEE ECR-603066	3/16/12		
B		PER DCN #2865	JW 4-4-75	5-5-75	RAK 5/75
A		PER CR-1-22 2-3-72			2-15-72

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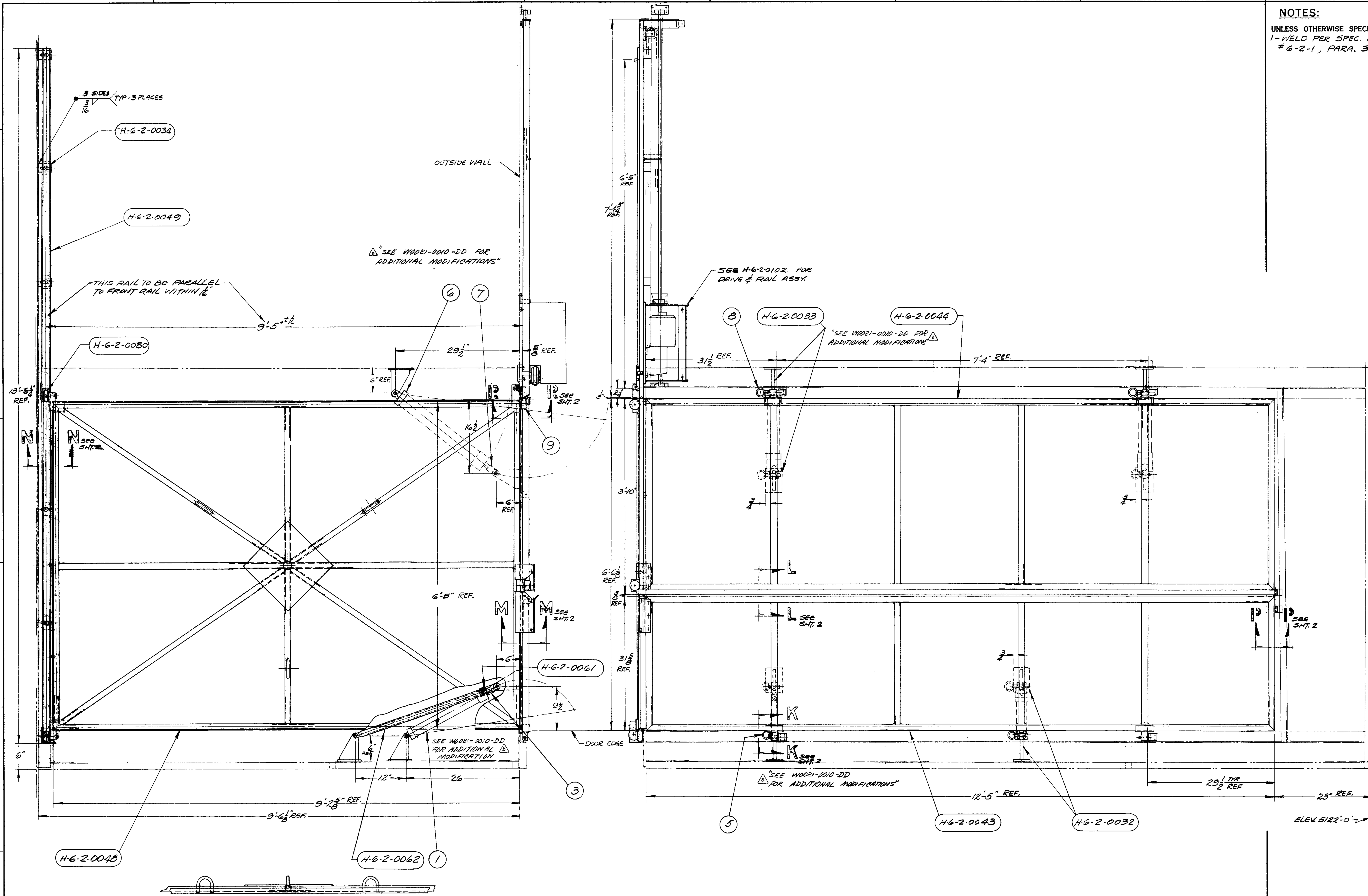
TITLE SPRAY CHAMBER PLAN AND FRONT ELEV. INSTALLATION & ASSY.

SHEET 1 OF 5 DRAWING No. H-6-2-0099 3



NOTES:

UNLESS OTHERWISE SPECIFIED:
1- WELD PER SPEC. HFEF #6-2-1, PARA. 3.3.2

SYM.	ZONE	CHANGE & DATE	BY	CHKD	APPD.
B		REV. PER DCN 91			
A		CHANGE PER CE-1-22			

H-6-99-0002

NEXT ASSEMBLIES

DES. GR. LEADER	DATE	DRAWN BY	DATE
B. J. R. White	7/10/70	W. NEWMAN	4-17-70
PROJECT MGR.		CHECKED BY	
	9/14/70	R. Cush	6-19-70
MGR. FOR CONST.		COGNIZANT ENGR.	
		R. G. Case	7-7-70

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TITLE HINGED DOORS AND MOVABLE ROOF - ASSY. AND INSTALLATION

Micro Film Date 2-6-74

SCALE 1/4" & NOTED

SHEET 1 OF 2

DRAWING No. H-6-2-0100 B

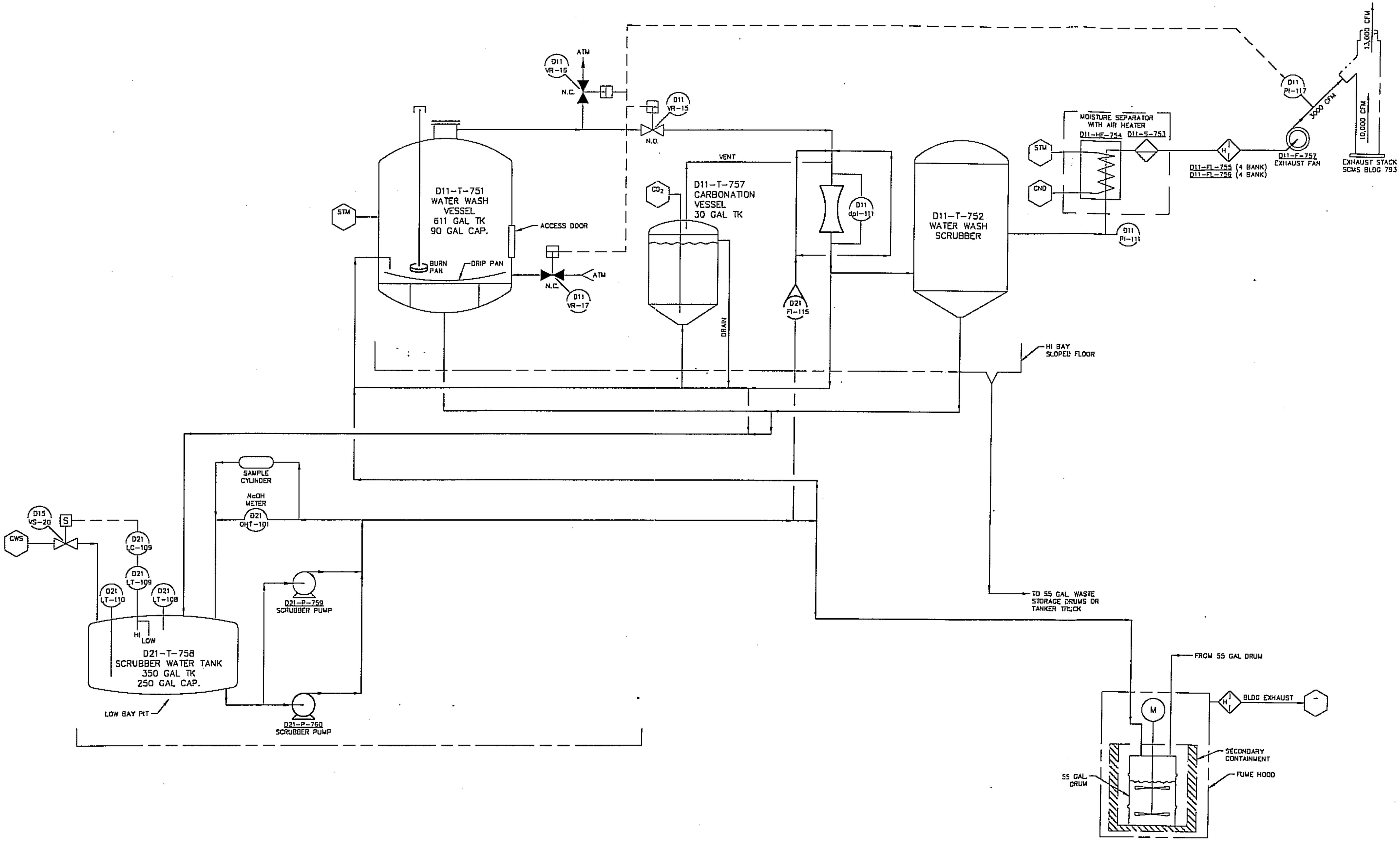
Attachment D-7

SCMS Water Wash and Carbonation Processes

Process Flow Diagram

File Name: 793-049 (D. Olson 6-19-2003)

Ref: 748459 (Sheet 1 of 1) (Alternate Id: W7930-0144-ED-00)



FILE NAME: 793-049
D. OLSON 6-19-2003

Attachment D-8

MFC Standard Process and Instrumentation Symbols

701387 (Sheet 1 of 1) (Alternate Id: F0000-0016-ED)

DWG. NO. F0000-0016-ED-04

PROCESS LINES

- PRIMARY PROCESS
- PRIMARY PROCESS (UNDERGROUND)
- SECONDARY PROCESS
- SECONDARY PROCESS (UNDERGROUND)
- BURIED OR EMBEDDED PIPE
- HEAT TRACING E–ELECTRICALLY TRACED (SHOWN) S–STEAM TRACED
- ANL–VENDOR INTERFACE (ANL | VENDOR)
- SEISMIC REQUIREMENTS APPLY BETWEEN FLAGS (FOR EXACT PHYSICAL DESCRIPTION OF SEISMIC BOUNDARIES REFER TO APPROPRIATE ISOMETRIC)

LINE BREAK/CONTINUATION

A/B–C–D–E ← LINE DESIGNATION
Y–X ← DRAWING NUMBER
SH. X (X–X) ← SHEET NUMBER/ZONE

PIPING SYMBOLS

- ATMOSPHERIC VENT (STRAIGHT VENT IS REQUIRED IN DRAINAGE SYSTEMS) (OR)
- SPRAY NOZZLE
- REDUCER/INCREASER
- FLOW SIGHT GLASS (FG)
- FLAME ARRESTOR
- DRAIN
- STRAINER
- EXPANSION JOINT
- HOSE
- CRIMPED TUBE
- FLEXIBLE CONNECTION
- QUICK DISCONNECT W/O CHECKS (SHOWN OPEN)
- QUICK DISCONNECT WITH CHECKS (SHOWN CLOSED)
- PLUG
- CAP
- BLIND FLANGE
- LOOP SEAL
- RESTRICTION ORIFICE PLATE
- REMOVABLE SPOOL
- WATER HAMMER ARRESTOR
- VAPOR TRAP
- HOSE BIBB
- ST–STEAM TRAP (SHOWN) DT–DRAIN TRAP AT–AIR TRAP CT–CONDENSATE TRAP (ST)
- MOISTURE SEPARATOR WITH AUTOMATIC DRAIN
- MOISTURE SEPARATOR WITH MANUAL DRAIN
- H HEPA FILTER (SHOWN), C COALESCING FILTER, S SCREEN FILTER, P PAPER ELEMENT FILTER, M METAL FILTER, F PREFILTER
- PLANT/INSTRUMENT AIR PORT (PA X) (IA X)
- PENETRATIONS: ARGON CELL (SHOWN) (ARGON X), AIR CELL, BOTH CELLS
- EDUCTOR
- AIR COOLED FINNED PIPE
- OPEN TO ATMOSPHERE

LINE DESIGNATION

D B A C E

1"AR1– X — LINE DESIGNATION
OR
ø3/8"T AR1– X — LINE DESIGNATION
OR
36"X24"D V3– X — LINE DESIGNATION

- A PIPE SIZE (NOMINAL)
- B TUBE SIZE (OUTSIDE DIAMETER)
- C LINE TYPE CALLOUT
- D DUCT SIZE
- E UNIQUE IDENTIFICATION

VALVE STATUS

N.O. N.C.

- L.O. – LOCKED OPEN
- L.C. – LOCKED CLOSED
- N.O. – NORMALLY OPEN (SHOWN)
- N.C. – NORMALLY CLOSED (SHOWN)
- F.O. – FAIL OPEN
- F.C. – FAIL CLOSED
- F.L. – FAIL LOCKED IN LAST POSITION
- F.I. – FAIL INDETERMINATE

SELF–ACTUATING REGULATORS

- TEMPERATURE REGULATOR (TCV X)
- DIFFERENTIAL–PRESSURE–REDUCING REGULATOR WITH INTERNAL AND EXTERNAL PRESSURE TAPS (PDCV X)
- BACKPRESSURE REGULATOR, SELF–CONTAINED (PCV X)
- PRESSURE–REDUCING REGULATOR, SELF–CONTAINED, WITH HANDWHEEL ADJUSTABLE SET POINT (PCV X)
- PRESSURE–REDUCING REGULATOR, WITH EXTERNAL PRESSURE TAP (PCV X)
- BACKPRESSURE REGULATOR WITH EXTERNAL PRESSURE TAP (PCV X)
- PRESSURE–REDUCING REGULATOR, WITH INTEGRAL OUTLET PRESSURE RELIEF VALVE OPTIONAL PRESSURE INDICATOR (PCV X) (PI)
- RUPTURE DISK PRESSURE (PSE X)
- RUPTURE DISK VACUUM (PSE X)
- VACUUM RELIEF (PSV X)
- PRESSURE RELIEF (PSV X)
- PRESSURE AND VACUUM RELIEF (PSV X) (VAC, PRESS)

VALVES

- GENERAL OR GATE
- GLOBE
- * CHECK
- THREE–WAY
- FOUR–WAY
- DIAPHRAGM OR PINCH
- BALL
- BALL–3 WAY
- BUTTERFLY
- RESTRICTION ORIFICE DRILLED IN VALVE
- PLUG
- COCK
- NEEDLE
- * STOP CHECK
- ANGLE
- SLIDE
- DAMPER OR LOUVER
- BACKDRAFT DAMPER

ACTUATORS

- HAND
- DIAPHRAGM
- DIAPHRAGM PRESSURE–BALANCED
- SOLENOID (S)
- MOTOR (M)
- CYLINDER WITH PILOT MOUNTING
- CYLINDER, SINGLE–ACTING SPRING–OPPOSED
- CYLINDER, DOUBLE–ACTING
- FLOAT
- DIAPHRAGM WITH POSITIONER
- SPRING OR WEIGHT
- LATCH–TYPE ACTUATOR WITH MANUAL RESET (S) (R)
- CONTROL VALVE WITH ATTACHED ELECTRO–PNEUMATIC SIGNAL CONVERTER (I/P) (TY X) (TCV X)
- CONTROL VALVE WITH SEPARATELY MOUNTED ELECTRO–PNEUMATIC SIGNAL CONVERTER (I/P) (TY X) (TCV X)
- MANOMETER

PUMPS AND COMPRESSORS

- COMPRESSOR
- BLOWER OR FAN (CENTRIFUGAL)
- CENTRIFUGAL PUMP
- RECIPROCATING PUMP
- RECIPROCATING PUMP WITH INTEGRAL PRESSURE RELIEF VALVE
- ROTARY PUMP
- PROPORTIONING PUMP
- AIR OPERATED DIAPHRAGM PUMP
- WET PIT VERTICAL PUMP
- CANNED VERTICAL PUMP
- SUBMERSIBLE VERTICAL PUMP
- POSITIVE DISPLACEMENT PUMP

DRIVERS

- MOTOR (M)
- SPEED REDUCER (GEAR DRIVEN) (SR)
- SPEED REDUCER (BELT DRIVEN)

HEAT TRANSFER

- WATER COOLED EXCHANGER
- WATER COOLED CONDENSER
- SHELL AND TUBE EXCHANGER
- HEATER
- SUPERHEATER OR REHEATER
- ELECTRICAL HEATER

VESSELS & TANKS

- OPEN STORAGE
- CLOSED STORAGE
- VESSEL
- PRESSURIZED GAS BOTTLE

DRYERS

- GENERAL
- DESSICANT

INSTRUMENT LINES

- UNDEFINED SIGNALS
- PNEUMATIC SIGNALS
- ELECTRICAL SIGNALS
- HYDRAULIC SIGNALS
- CAPILLARY TUBING
- PLC COMMUNICATIONS LINK

INSTRUMENT SYMBOLS

- UNDEFINED INTERLOCK LOGIC
- LIGHT
- INDICATING FLOWMETER (ROTAMETER) (FI X)
- INDICATING FLOWMETER WITH INTEGRAL THROTTLING VALVE (FI X)
- PRESSURE INDICATOR WITH INTEGRAL ISOLATION VALVE (PI X)
- H/O/A – HAND/OFF/AUTO (SHOWN), S/S – START/STOP, O/O – ON/OFF, O/A/C – OPEN/AUTO/CLOSE, O/C – OPEN/CLOSE, S/S/J – START/STOP/JOG (H/O/A HS X)
- TEMPERATURE ELEMENT WITH THERMOWELL (TE X)

GENERAL INSTRUMENT OR FUNCTION

DISCRETE INSTRUMENTS

- FIELD MOUNTED DEVICES (X X)
- PRIMARY LOCATION (PLC OR INTERFACE CABINET) CABINET LOCATION (X X, X–X)
- AUXILIARY LOCATION (NORMALLY INACCESSIBLE) (X X)
- NORMALLY INACCESSIBLE OR BEHIND–THE–PANEL (X X)

OPERATOR CONTROL STATION

- OCS SHARED DISPLAY INACCESSIBLE TO OPERATOR (X X)
- CONTROL LOGIC IN OCS ACCESSIBLE TO OPERATOR (X X)

PROGRAMMABLE LOGIC CONTROL

- CONTROL LOGIC IN PLC INACCESSIBLE TO OPERATOR (X X)
- CONTROL LOGIC IN PLC ACCESSIBLE TO OPERATOR (X X)
- COMPUTER FUNCTION FIELD MOUNT (X X)
- COMPUTER FUNCTION NORMALLY ACCESIBLE TO OPERATOR (X X)

LINE TYPE CALLOUT

- A1 PLANT AIR
- A2 INSTRUMENT AIR
- A4 DRYING AIR
- A5 SUSPECT AIR
- ACID ACID
- AD AIR LOCK DISCHARGE
- AR1 CLEAN ARGON
- AR2 FILTERED ARGON (SUSPECT)
- AR4 EMERGENCY ARGON
- ARV1 SUSPECT ARGON
- ATM ATMOSPHERE
- B BREATHING AIR
- BD BLOW DOWN
- C1 CONDENSATE 100 LB. MAX
- C3 CONDENSATE 300 LB. MAX
- CW COLD WATER SUPPLY
- CWR COOLING WATER RETURN
- CWS COOLING WATER SUPPLY
- D2 SUSPECT DRAINS
- D3 CLEARWATER DRAINS
- DS DECON SPRAY WATER
- DW DEMINERALIZED WATER
- F FIRE PROTECTION
- FRG REFRIGERANT HOT GAS
- FRL REFRIGERANT LIQUID
- FRS REFRIGERANT SUCTION
- H HYDROGEN GAS
- He HELIUM
- HF HYDRAULIC FLUID
- HW HOT POTABLE WATER
- IW INDUSTRIAL WASTE
- RLW RADIOACTIVE LIQUID WASTE
- OIL REFRIGERANT OIL
- PT PNEUMATIC TRANSFER
- RD ROOF DRAIN
- SS SANITARY SEWER
- S1 STEAM 100 LB. MAX
- SA BUILDING EXHAUST
- S3 STEAM 300 LB. MAX
- V STEAM VENTS
- VA VACUUM
- V2 SUSPECT WASTE VENT
- V3 SUSPECT EXHAUST
- V4 SAFETY EXHAUST SYSTEM
- V5 STACK EXHAUST
- W1 SUSPECT WATER
- WW SERVICE WATER
- Xe XENON TAGGING

EQUIPMENT IDENTIFIERS

- AV AIR OPERATED VALVE
- BLW BLOWER
- CAMR CAMERA
- CK CHECK VALVE
- CHR CHILLER
- CLH CLUTCH
- CMP COMPRESSOR
- FIL FILTER
- FUR FURNACE
- GRP GRIPPER
- HX HEAT EXCHANGER
- HTR HEATER
- M MOTOR
- P PUMP
- SETLR SETTLER
- SP SEAL POT
- SV SOLENOID VALVE
- TCH TORCH
- TK TANK
- STR STRAINER
- SEP SEPARATOR
- DRY DRYER
- EDUC EDUCTOR

INSTRUMENT IDENTIFICATION LETTERS

	FIRST–LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE			CONTROL	
D	USER'S CHOICE	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOTOR (USER'S CHOICE)	MOMENTARY			MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

MISCELLANEOUS

X — ROOM NUMBER

NOTES:

1. INSTRUMENT SYMBOLS AND IDENTIFICATION ARE BASED ON ISA STANDARDS ISA–S5.1–1984 AND ISA–S5.3–1983. FOR FURTHER DETAIL AND CLARIFICATION, REFER TO THESE STANDARDS.
2. GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS ARE BASED ON ASA STANDARD ASA–Y32.11–1961. FOR FURTHER DETAIL AND CLARIFICATION, REFER TO THIS STANDARD.
3. OTHER PIPE FITTINGS, VALVES, AND PIPING SYMBOLS MAY BE FOUND IN ASA STANDARD ASA–Z32.2.3–1949(R1988).
4. X=UNIQUE DESIGNATION OF 1 TO 4 CHARACTERS. Y=UNIQUE DESIGNATION OF 5 CHARACTERS
5. FOR TYPICAL INSTRUMENT IDENTIFICATION LETTER COMBINATIONS AND LOOP EXAMPLES SEE DWG. NO. F0000–0017–ED.

* NOT PER ABOVE STANDARDS.

SYM	APPR'D	CHANGE	BY	CHK'D	DATE
4		eCR–576249	DS	SV	02/23 2010
3	LAB	DCN F0000–054(976388–UC)	GO	JB	4–4 97
2	MDC	DCN F0000–022	JEB	LAB	7–21 93
1	WD	DCN F0000–013	JEB	PBS	9–5 91

MICRO–FILMED DATE

UNLESS OTHERWISE NOTED: ALL DIMENSIONS ARE IN INCHES. REMOVE ALL BURRS AND SHARP EDGES. ALL MACHINED SURFACES TO BE 125/ OR FINER. STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1. DIMENSIONS & TOLERANCES IN ACCORDANCE WITH THE LATEST REVISION OF ANSI Y14.5M.

DRAWN BY: WALTON/JEB	DATE: 3–5 91	SERVICE REQUEST NO.: D6496	
CHECKED: P.B. SNYDER	3–21 91	PROJECT MGR.: L.A. BUMB	DATE: 3–21 91
RESP. ENGINEER: L.A. BUMB	3–21 91	APPR'D/RELEASED: W. DANIELSON	3–21 91
MATERIAL: –			

INDEX CODE NUMBER

AREA	TYPE	CL	ORIG	SERIAL
273	0765	24	052	701387

PART NO. | NEXT ASSEMBLY | REQ'D

THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

TITLE: FCF STANDARD PROCESS AND INSTRUMENTATION SYMBOLS

SCALE: NONE | SHEET: 1 OF 1 | DRAWING NUMBER: F0000–0016–ED–04 | REV.

File: 701387.dwg Path: Y:\SMOUDJ\D10-0003\eCR-576249
Drawn in Model Space Date: 02/23/10 – 2:05 P.M. SMOUDJ

Attachment D-9

SCMS Process and Instrumentation Diagrams

748463 (sheet 1-5 of 5),
748462 (sheet 1 of 1),
748456 (sheet 1of 1) (Alternate Id: W7930-0141-ED),
748457 (sheet 1-2 of 2) (Alternate Id: W7930-0142-ED),
748454 (sheet 1-2 of 2),
718455 (sheet 1 of 3) (Alternate Id: W7930-0140-ED)

FMT-D1-INL, R-1

REV	DESCRIPTION	EFFECTIVE DATE:
5	REDRAWN WITH CHANGE SEE eCR-595839	8/31/2011

NOTES:

1. FOR STANDARD PROCESS AND INSTRUMENTATION SYMBOLS SEE DWG. NO. F0000-0016-ED.
2. Na/NaK CONTAINERS MAY BE CONFIGURED DIFFERENT WAYS ON A CASE-BY-CASE BASIS.
3. USE LINE AND CONTAINER HEATERS AS NECESSARY.

REFERENCE DRAWING:

W7930-0144-ED SCMS WATER WASH & CARBONATION PROCESS FLOW DIAGRAM

ALTERNATE ID: W7930-0148-ED

REQUESTER:	D. LEWIS
RESP ENGR:	W. BENJAMIN
DESIGN:	W. BENJAMIN
DRAWN:	E. IMPALA
PROJECT NO.	N/A
SPCL CODE	N/A
FOR REVIEW/APPROVAL SIGNATURES SEE ECR NO.	595839
EFFECTIVE DATE:	12/4/98

Idaho National Laboratory

MFC/SCMS BLDG 793
SODIUM COMPONENTS MAINTENANCE SHOP
WATER WASH & CARBONATION PROCESSES

PROCESS AND INSTRUMENTATION DIAGRAM

SIZE	CAGE CODE	AREA	TYPE	CL	ORIG	DWG NO.	REV
D	01MF3	273	0793	24	052	748463	5

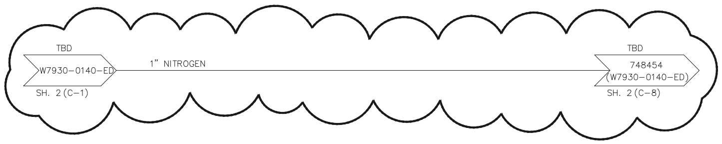
SCALE: NONE SHEET 1 OF 5

File: 748463R5.dwg Layout Name: SH 1 ID: IMPAEM
Path: Y:\Impaem\D11-0231 - SCMS High Bay Tent Services P&ID

FMT-D2-REV 4 (INL)
1-1/2"S3-10-110
W7930-0142-ED
SH. 1(B-1)
1"CO2 -1159
W7930-0141-ED
CO2 SYSTEM
SH. 1(B-1)
DCO2-3
D24
PCV-5
D24
PI-6
DCO2-9
D24-CK-11
D11
VR-16
ATM
OUTSIDE
N.C.
DS-15
D9-S-761
1-1/2"
2"
D11-HE-754
D11-S-753
D11
TI-114
TBD
W7930-0148-ED
SH. 3(C-8)
D9
CK-18
VACUUM
BREAKER
1-1/2"S3-10-111
MOISTURE
SEPARATOR
WITH AIR HEATER
3/4"
D9-ST-762
3/4"C3-10-106
W7930-0142-ED
SH. 1(C-8)
3/4"C3-10-106
DS-16
EQUIPMENT
PORT
D11
PI-110
D11
TI-110
D11
VR-15
N.O.
12"
VENT
1"
1"
0-200°F
D11
TI-111
D11-T-752
WATER WASH
SCRUBBER
D11
PI-111
0-100" H2O
D9
FI-700
DS-44
DS-43
TBD
W7930-0142-ED
SH. 2(C-1)
D11-T-751
WATER WASH
VESSEL
INNER CHANGE
ROOM
OUTER
CHANGE
ROOM
3000 CFM
EXHAUST FAN
AIR SUPPLY
BURN
PAN
DRIP PAN
ACCESS DOOR
ATM
DSW-14
D21
PI-110
D21-T-757
CARBONATION
VESSEL
D21
TI-118
D11
dpi-111
1/4"
1-1/2"
1-1/2"
DG-11
1/4"
GAS SAMPLE LINE
TBD
W7930-0143-ED
SH. 2(D-8)
DOP
TEST
PORT
D21
TI-113
D21
FI-115
DSW-5
DSW-11
DSW-15
DSW-8
N.C.
D11
VR-17
DRAIN
DSW-6
HI BAY
SLOPED FLOOR
TBD
W7930-0148-ED
SCRUBBER WATER
1/2"T
SH. 2(C-1)
DSW-16
DSW-17
DSW-18
1/2"
TBD
W7930-0148-ED
SH. 2(D-8)
2"SW-39-105
W7930-0148-ED
SH. 2(C-8)
2"SW-39-105
DA-13
DA-14
FROM
D11-PDS-114
3
B
5
TBD
W7930-0139-ED
SH. 1(C-1)
PLANT AIR
D23-FL-707
DA-68
D23-CK-32
DA-15
S
1/4"A2-3-121
1/4"A2-3-117
D11
VS-17
LOW
BAY
D23
PI-709
D23
SV-6
D23-T-704
AIR RECEIVER
D23
PI-115
DA-12
D11
VS-16
1/4"A2-3-114
1/4"A2-3-123
DA-11
1/4"A2-3-122
1/4"A2-3-113
DA-52
D11
VS-15
1"CWS-9A-104
W7930-0141-ED
RAW WATER
1"
SH. 1(D-1)
1-1/2"SW-39-103
W7930-0148-ED
SCRUBBER WATER
SH. 2(D-1)
1-1/2"SW-39-103
HIGH BAY AREA
DW-8
DW-12
1/2"
DW-20
1"
HYDRAULIC
JET UNIT
1-1/4"S3-10-100
W7930-0142-ED
SH. 2(B-3)
SIZE D
CAGE CODE 01MF3
INDEX CODE NUMBER
AREA 273
TYPE 0793
CL 24
ORIG 052
DWG-748463
REV 5
SCALE: NONE
SHEET 2
ID: IMPAEM
Layout Name: SH 2
File: 748463R5.dwg

FMT-D2-REV 4 (INL)

ID: IMPAEM
Layout Name: SH 2
File: 748463R5.dwg
Path: Y:\impaem\D11-0231 - SGMS High Bay Tent Services P&ID



NOTES:

1. FOR STANDARD PROCESS AND INSTRUMENTATION SYMBOLS SEE DWG. NO. F0000-0016-ED.

SIZE	CAGE CODE	AREA	TYPE	CL	ORIG	DWG-	REV
D	01MF3	273	0793	24	052	748463	5

SCALE: NONE SHEET 4

FMT-D2-REV 4 (INL)

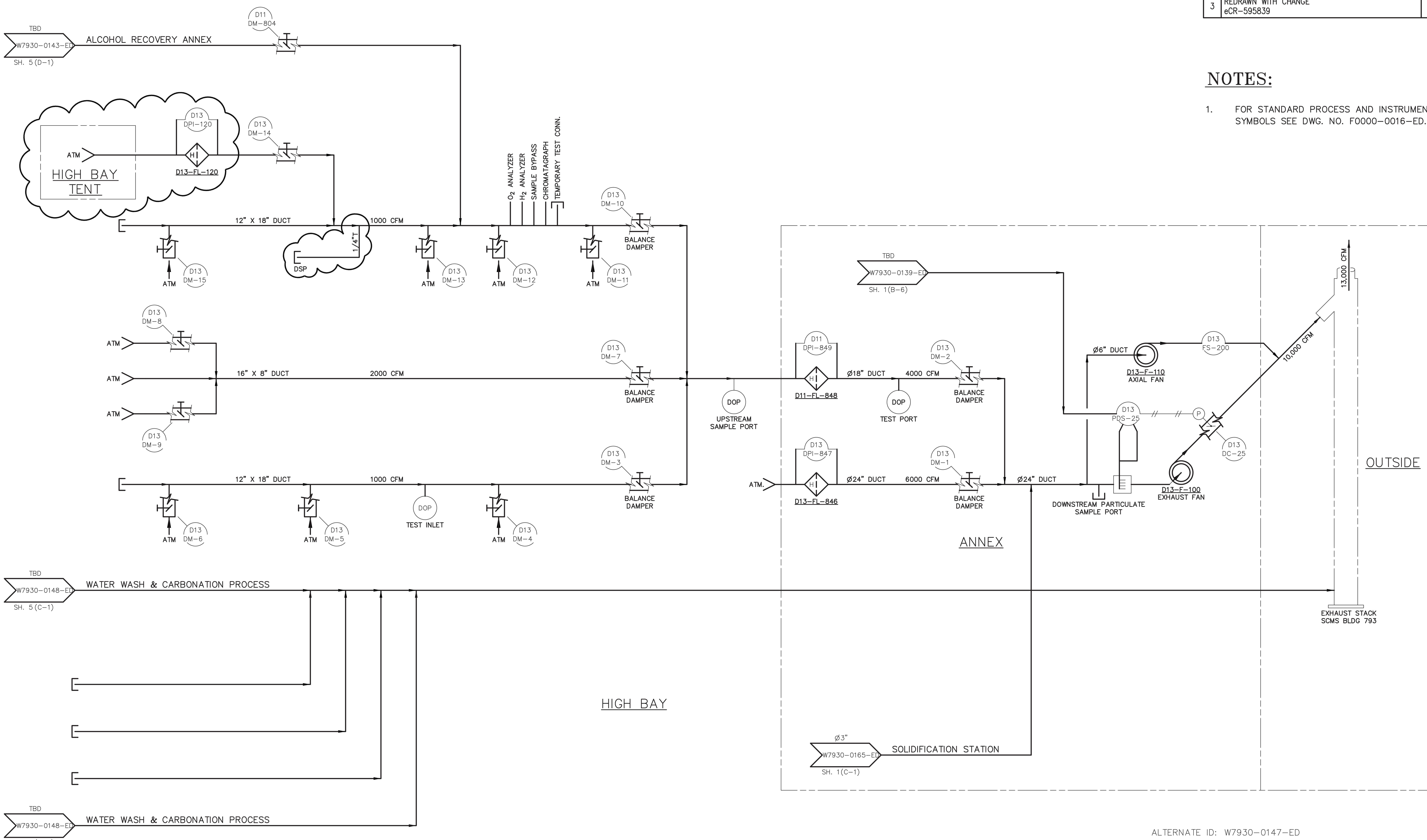
SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	CL	ORIG	DWG-	REV
D	01MF3	273	0793	24	052	748463	5

SCALE: NONE SHEET 5

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
3	REDRAWN WITH CHANGE eCR-595839	8/31/2011

NOTES:

1. FOR STANDARD PROCESS AND INSTRUMENTATION SYMBOLS SEE DWG. NO. F0000-0016-ED.



ALTERNATE ID: W7930-0147-ED

REQUESTER:	D. LEWIS
RESP ENGR:	W. BENJAMIN
DESIGN:	W. BENJAMIN
DRAWN:	E. IMPALA
PROJECT NO.	N/A
SPCL CODE	N/A
FOR REVIEW/APPROVAL SIGNATURES SEE ECR NO.	
EFFECTIVE DATE:	12/4/98

Idaho National Laboratory

MFC/SCMS BLDG 793
SODIUM COMPONENTS MAINTENANCE SHOP
PROCESS VENTILATION SYSTEM

PROCESS & INSTRUMENT DIAGRAM

SIZE	CAGE CODE	AREA	TYPE	CL	ORIG	DWG NO.	REV
D	01MF3	273	0793	24	052	748462	3

SCALE: NONE SHEET 1 OF 1

File: 748462R3.dwg
Path: Y:\impaem\D11-0231 - SCMS High Bay Tent Services P&ID As Builts\ECR-595839\11-03eKM
Layout Name: Layout1
ID: IMPAEM
FMT-D1-INL, R-1

DWG. NO. W7930-0141-ED-02
NOTES:
1. FOR STANDARD PROCESS AND INSTRUMENTATION SYMBOLS SEE DWG. NO. F0000-0016-ED.
RAW WATER
DI WATER
ANNEX
RESTROOM
WATER HEATER
W.C.
ULTRASONIC CLEANER
SWAMP COOLER
OUTSIDE
EYE WASH STATION
HIGH BAY
ALCOHOL RECOVERY ANNEX
LARGE HOSE CONNECTION
SMALL HOSE CONNECTION
D15 PCV-1 40 PSIG
D15 FM-1
D15 PI-200 0-160 PSIG
D15-S-778
D15-S-779
D15-S-777
D15 SV-1 50 PSIG
D15 SV-2 50 PSIG
D15 TI-101
D15 FI-114
D15-CK-17
D15 FI-805
D15 FT-805
D15 PI-790 CAL.
D15 TI-789
D15 FI-100
D15 FI-101
D15 FI-102
D15 FI-103
1 1/2"CWS-9A-101
1 1/4"CWS-9A-101
1/2"W-9A-106
1/2"W-9A-108
1"CWS-9A-104
1"CWS-9A-105
1"CWS-9A-103
3/4"CWS-9A-102
1/2"N-2-121 W7930-0140-ED SH. 3 (B-1)
1"CWS-9A-104 W7930-0148-ED SH. 3 (C-8)
1"CWS-9A-104 W7930-0148-ED SH. 2 (A-8)
1 1/4"CWS-9A-101 W7930-0143-ED SH. 3 (A-8)
1/2"W-9A-106 W7930-0143-ED SH. 4 (C-8)
TBD W7930-0143-ED SH. 4 (D-8)
TBD W7930-0143-ED SH. 4 (B-8)
1"CWS-9A-104 W7930-0143-ED SH. 2 (A-8)
1"CWS-9A-105 W7930-0143-ED SH. 2 (B-8)
1"CWS-9A-103 W7930-0143-ED SH. 2 (D-8)
3/4"CWS-9A-102 W7930-0143-ED SH. 2 (C-8)
1"CO2-1159 W7930-0148-ED SH. 2 (D-8)
1/2"T W7930-0165-ED SH. 1 (C-8)
1"CO2-1159 E5689-0047-ED SH. 1 (A-6)
D24 SV-1 100 PSIG
D24 PCV-1
PI
1/2"CO2-1160 W7930-0143-ED SH. 5 (D-8)
D24 CK-8
D24 CK-9
D24 CK-10
DEWAR 1
DEWAR 2
DEWAR 3
CO2
DW-40 DW-41 DW-42 DW-47 DW-48 DW-44 DW-53 DW-55 DW-58 DW-45 DW-46 DW-49 DW-50 DW-7 DW-56 DW-1 DW-4 DW-32 DW-10 DW-11 DW-13 DW-14 DW-21 DW-31 DW-5 DW-30 DW-6 DW-3 DW-2
DD-1 DD-2 DD-3
DCO2-1 DCO2-2 DCO2-4 DCO2-5 DCO2-6 DCO2-7 DCO2-11 DCO2-12
INDEX CODE NUMBER
AREA 273 TYPE 0793 CL 24 ORIG 052 SERIAL 748456
UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN INCHES ANGULAR TOL. ±1/4° REMOVE ALL BURRS AND SHARP EDGES. ALL MACHINED SURFACES TO BE 125/ OR FINER. STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1. DIMENSIONS & TOLERANCES IN ACCORDANCE WITH ASME Y14.5M-1994.
2 DAR-518117 RGG 7/23/07
1 JAM DCN W7930-088 TLS JE 1/11/00
SYM APPR'D CHANGE BY CHK'D DATE
SCAN DATE
ETA NO. MA-1998-012
MEAAL SYSTEM ID NO. MAIN-001
DRAWN BY R.D. KEPLER DATE 7-2-98
DRAFTING WORK REQUEST NO. EBR-II-6769
CHECKED W. BENJAMIN KER 12-4-98
PROJECT MGR.
RESP. ENGINEER W. BENJAMIN KER 12-4-98
APPR'D/RELEASED K. ROSENBERG 12-4-98
MATERIAL —
PART NO. NEXT ASSEMBLY REQ'D
THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY
TITLE MFC/SCMS BLDG 793 SODIUM COMPONENTS MAINTENANCE SHOP CO2, DI & RAW WATER SYSTEMS PROCESS & INSTRUMENTATION DIAGRAM
SCALE NONE SHEET 1 OF 1 DRAWING NUMBER W7930-0141-ED-02 REV.
File: 748456-2.dwg Path: P:\J110-9169
Date: 07/25/07 - 2:55 PM Layout Name: Model

2	1	SHEET	REV STATUS OF SHEETS	DWG. NO. W7930-0142-ED-01
1	1	REV		

NOTES:

1. FOR STANDARD PROCESS AND INSTRUMENTATION SYMBOLS SEE DWG. NO. F0000-0016-ED.

SYM	APPR'D	CHANGE	BY	CHK'D	DATE
1		DAR-518117	RGG		7/23/07

MICRO-FILMED DATE

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN INCHES REMOVE ALL BURRS AND SHARP EDGES.
ALL MACHINED SURFACES TO BE 125/ OR FINER.
STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1.
DIMENSIONS & TOLERANCES IN ACCORDANCE WITH THE LATEST REVISION OF ANSI Y14.5M.

INDEX CODE NUMBER				
AREA	TYPE	CL	ORIG	SERIAL
273	0793	24	052	748457

DRAWN BY R.D. KEPLER — DATE 98
SERVICE REQUEST NO. EBR-II-6769
CHECKED KER W. BENJAMIN — 12-4 98
PROJECT MGR. — DATE
RESP. ENGINEER KER W. BENJAMIN — 12-4 98
APPR'D/RELEASED K. ROSENBERG — 12-4 98
MATERIAL —

PART NO. | NEXT ASSEMBLY | REQ'D

THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

TITLE MFC/SCMS BLDG 793
SODIUM COMPONENTS MAINTENANCE SHOP
STEAM & CONDENSATE SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM

SCALE NONE | SHEET 1 OF 2 | DRAWING NUMBER W7930-0142-ED-01 | REV.

File: 748457-1.dwg Path: P:\J110-9169 Date: 07/25/07 - 3:05 PM Layout Name: SH 1 By GGR

DWG. NO.
W7930-0142-ED-01

INDEX CODE NUMBER				
AREA	TYPE	CL	ORIG	SERIAL
273	0793	24	052	748457

SYM	APPR'D	CHANGE	BY	CHK'D	DATE
		SEE SHEET 1			

MICRO-FILMED DATE

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN INCHES
REMOVE ALL BURRS AND SHARP EDGES.
ALL MACHINED SURFACES TO BE 125/ OR FINER.
STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1.
DIMENSIONS & TOLERANCES IN ACCORDANCE WITH THE LATEST REVISION OF ANSI Y14.5M.

DRAWN BY: R.D. KEPLER	DATE: 10-15-98	SERVICE REQUEST NO.: EBR-II-6769	
CHECKED: W. BENJAMIN KER	12-4-98	PROJECT MGR.	DATE
RESP. ENGINEER: W. BENJAMIN KER	12-4-98	APPR'D/RELEASED: K. ROSENBERG	12-4-98
MATERIAL		–	

PART NO.	NEXT ASSEMBLY	REQ'D

THIS DRAWING IS THE PROPERTY OF
ARGONNE NATIONAL LABORATORY

TITLE
MFC/SCMS BLDG 793
SODIUM COMPONENTS MAINTENANCE SHOP
STEAM & CONDENSATE SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM

SCALE	SHEET	DRAWING NUMBER	REV.
NONE	2 OF 2	W7930-0142-ED-01	

File: 748457-1.dwg
Path: P:\J110-9169
Date: 07/25/07 – 3:05 PM Layout Name: SH 2 GGR

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
4	REDRAWN WITH CHANGE eCR-595839	8/31/2011
5	ADDED DRAWING AFFECTED BY STATEMENT FOR EJ-475, eCR-596266	10/3/2011
6	INCORPORATED INFORMATION FROM EJ-475, INTERIM DRAWING 776471, AS-BUILT AS OF 9/24/2012 SEE eCR-608008	11/29/2012

ALTERNATE ID: W7930-0139-ED

NOTES:

1. FOR STANDARD PROCESS AND INSTRUMENTATION SYMBOLS SEE DWG. NO. F0000-0016-ED.

REQUESTER:	D. LEWIS
RESP ENGR:	W. BENJAMIN
DESIGN:	W. BENJAMIN
DRAWN:	R.D. KEPLER
PROJECT NO.	N/A
SPCL CODE	N/A
FOR REVIEW/APPROVAL SIGNATURES SEE ECR NO.	595839
EFFECTIVE DATE:	8/31/2011

Idaho National Laboratory

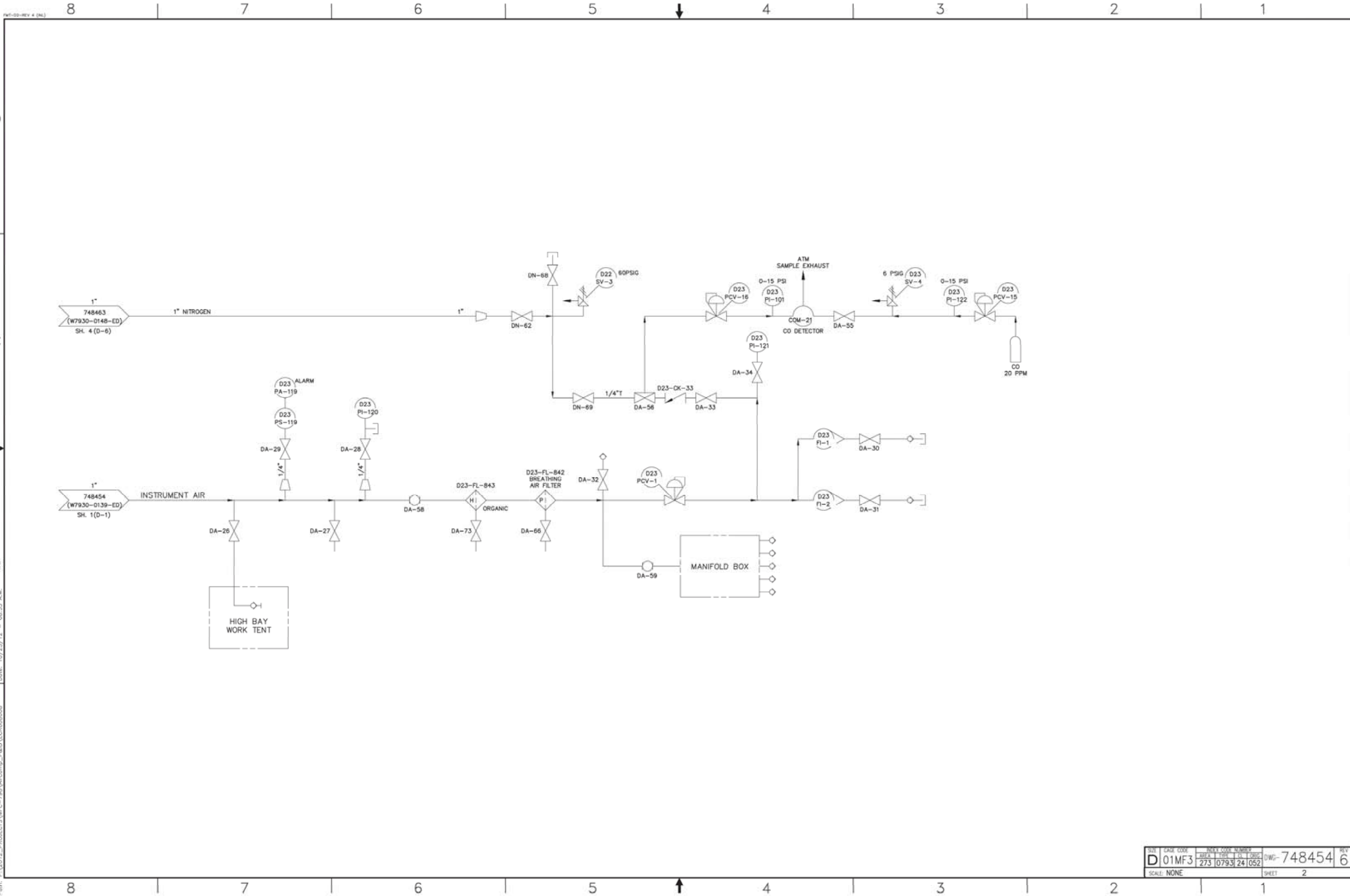
MFC/SCMS BLDG 793
SODIUM COMPONENTS MAINTENANCE SHOP
AIR COMPRESSOR SYSTEM

PROCESS AND INSTRUMENTATION DIAGRAM

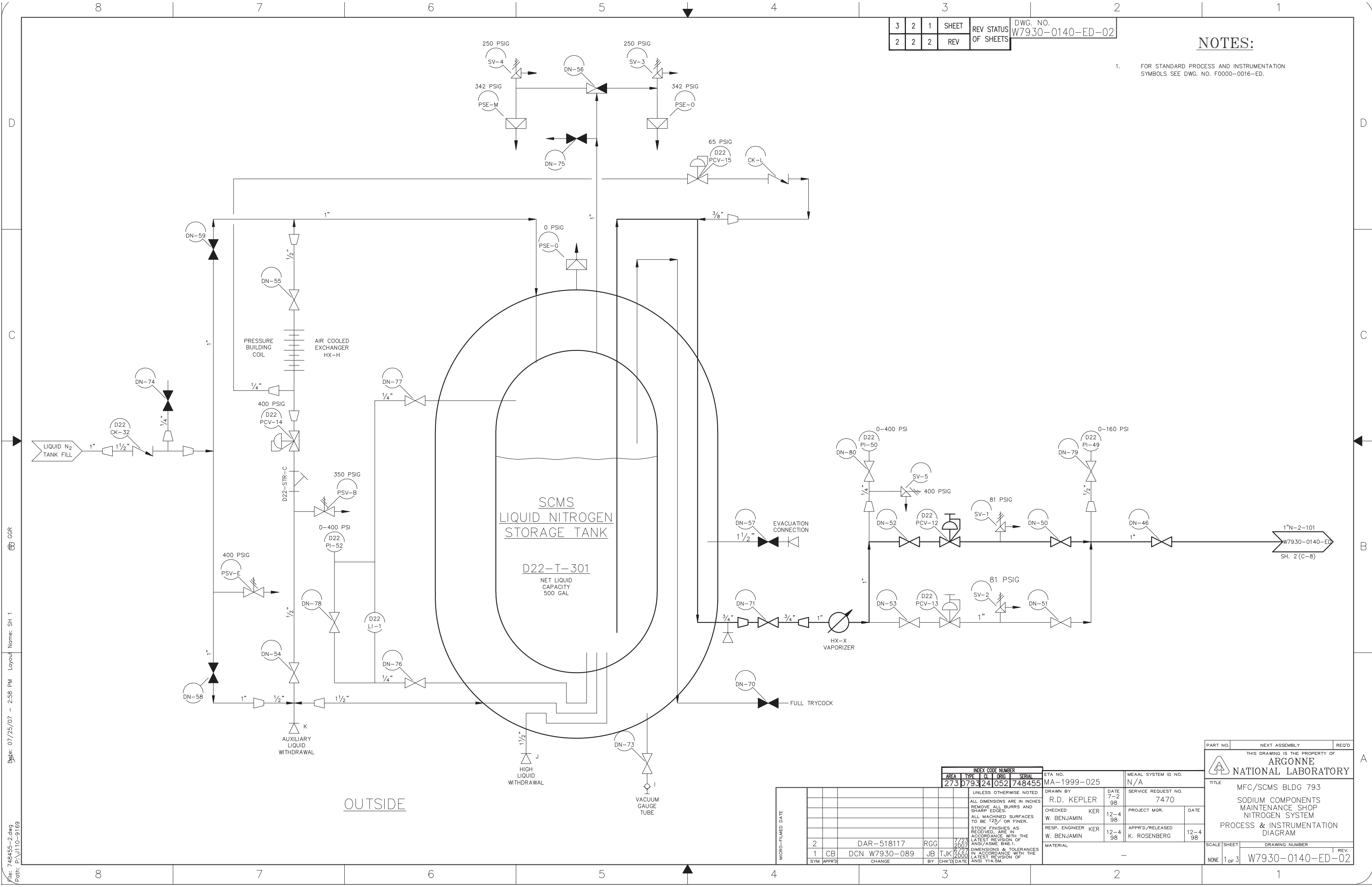
SIZE	CAGE CODE	AREA	TYPE	CL	ORIG	DWG NO.	REV
D	01MF3	273	0793	24	052	748454	6

SCALE: NONE — SHEET 1 OF 2

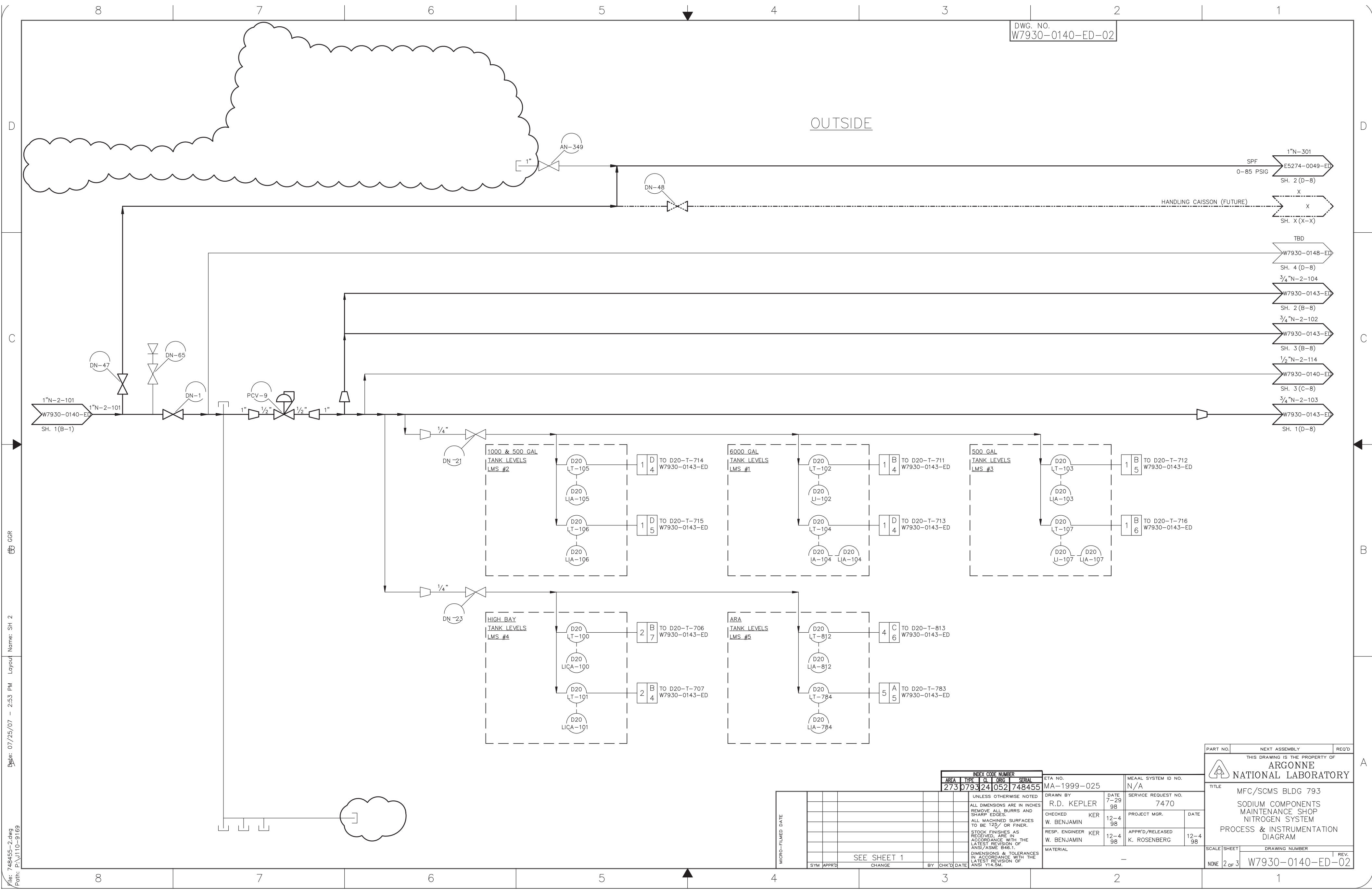
File: 748454R6.dwg
Path: P:\2012_PROJECTS\MFC-793\AirComp_P&ID\ECR608008
Layout Name: SH 1 Date: 11/29/12 - 1:58 P.M.
ID: PENCRT
FMT-D1-INL, R-1



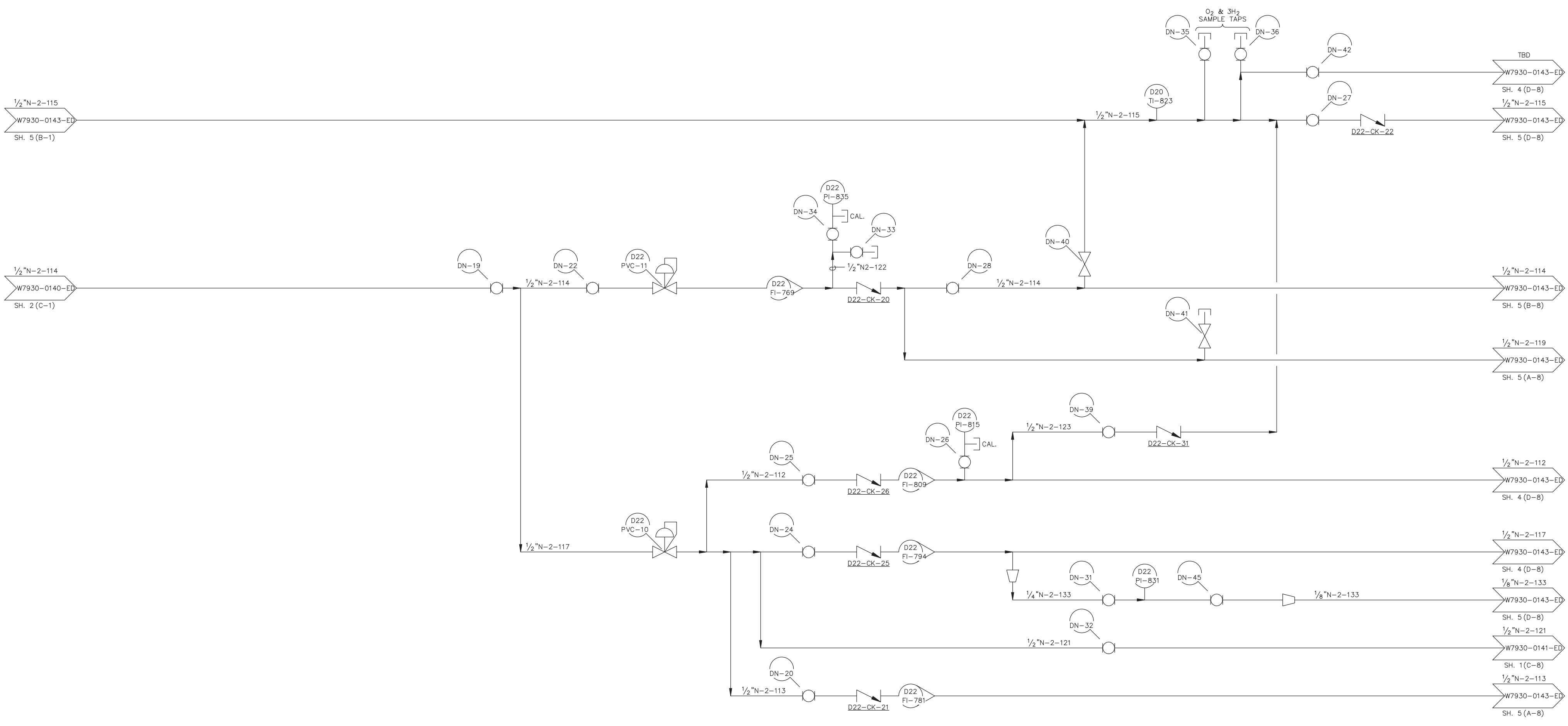
1"
748463
(W7930-0148-ED)
SH. 4 (D-6)
1" NITROGEN
1"
DN-62
DN-68
D22
SV-3
60PSIG
DN-69
1/4"T
DA-56
D23-CK-33
DA-33
D23
PCV-16
0-15 PSI
D23
PI-101
ATM
SAMPLE EXHAUST
COM-21
CO DETECTOR
DA-55
6 PSIG
D23
SV-4
0-15 PSI
D23
PI-122
D23
PCV-15
CO
20 PPM
D23
PI-121
DA-34
D23
PA-119
ALARM
D23
PS-119
DA-29
1/4"
D23
PI-120
DA-28
1/4"
1"
748454
(W7930-0139-ED)
SH. 1(D-1)
INSTRUMENT AIR
DA-26
DA-27
DA-58
D23-FL-843
H
ORGANIC
DA-73
D23-FL-842
BREATHING
AIR FILTER
P
DA-66
DA-32
D23
PCV-1
D23
FI-1
DA-30
D23
FI-2
DA-31
DA-59
MANIFOLD BOX
HIGH BAY
WORK TENT
SIZE D
CAGE CODE 01MF3
INDEX CODE NUMBER
AREA 273
TYPE 0793
CL 24
ORIG 052
DWG- 748454
REV 6
SCALE: NONE
SHEET 2



3 | 2 | 1 | SHEET
2 | 2 | 2 | REV
REV STATUS OF SHEETS
DWG. NO. W7930-0140-ED-02
NOTES:
1. FOR STANDARD PROCESS AND INSTRUMENTATION SYMBOLS SEE DWG. NO. F0000-0016-ED.
250 PSIG
SV-4
DN-56
250 PSIG
SV-3
342 PSIG
PSE-M
342 PSIG
PSE-O
DN-75
65 PSIG
D22 PCV-15
CK-L
0 PSIG
PSE-G
3/8"
1"
DN-59
DN-55
PRESSURE BUILDING COIL
AIR COOLED EXCHANGER HX-H
DN-74
DN-77
400 PSIG
D22 PCV-14
D22 CK-32
LIQUID N2 TANK FILL
D22-STR-C
350 PSIG
PSV-B
0-400 PSI
D22 PI-52
400 PSIG
PSV-E
DN-78
D22 LI-1
DN-54
DN-76
DN-58
K
AUXILIARY LIQUID WITHDRAWAL
SCMS LIQUID NITROGEN STORAGE TANK
D22-T-301
NET LIQUID CAPACITY 500 GAL
J
HIGH LIQUID WITHDRAWAL
DN-73
I
VACUUM GAUGE TUBE
OUTSIDE
DN-57
EVACUATION CONNECTION
DN-71
HX-X VAPORIZER
DN-70
FULL TRYCOCK
0-400 PSI
D22 PI-50
DN-80
SV-5
400 PSIG
DN-52
D22 PCV-12
81 PSIG
SV-1
DN-50
0-160 PSI
D22 PI-49
DN-79
DN-46
1"N-2-101
W7930-0140-ED
SH. 2 (C-8)
DN-53
D22 PCV-13
81 PSIG
SV-2
DN-51
INDEX CODE NUMBER
AREA 273 | TYPE 0793 | CL 24 | ORIG 052 | SERIAL 748455
UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN INCHES
REMOVE ALL BURRS AND SHARP EDGES.
ALL MACHINED SURFACES TO BE 125 OR FINER.
STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1.
DIMENSIONS & TOLERANCES IN ACCORDANCE WITH THE LATEST REVISION OF ANSI Y14.5M.
2 | | DAR-518117 | RGG | | 7/23 2007
1 | CB | DCN W7930-089 | JB | TJK | 6/27 2000
SYM | APPR'D | CHANGE | BY | CHK'D | DATE
MICRO-FILMED DATE
ETA NO. MA-1999-025
MEAAL SYSTEM ID NO. N/A
DRAWN BY R.D. KEPLER DATE 7-2 98
SERVICE REQUEST NO. 7470
CHECKED W. BENJAMIN KER 12-4 98
PROJECT MGR. DATE
RESP. ENGINEER W. BENJAMIN KER 12-4 98
APPR'D/RELEASED K. ROSENBERG 12-4 98
MATERIAL —
PART NO. | NEXT ASSEMBLY | REQ'D
THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY
TITLE MFC/SCMS BLDG 793
SODIUM COMPONENTS MAINTENANCE SHOP NITROGEN SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM
SCALE NONE | SHEET 1 OF 3 | DRAWING NUMBER W7930-0140-ED-02 | REV.
File: 748455-2.dwg
Path: P:\J110-9169
Date: 07/25/07 - 2:58 PM Layout Name: SH 1
GGR


DWG. NO.
W7930-0140-ED-02
OUTSIDE
AN-349
1"
1"N-301
SPF
0-85 PSIG
E5274-0049-ED
SH. 2 (D-8)
DN-48
HANDLING CAISSON (FUTURE)
X
SH. X (X-X)
TBD
W7930-0148-ED
SH. 4 (D-8)
3/4"N-2-104
W7930-0143-ED
SH. 2 (B-8)
3/4"N-2-102
W7930-0143-ED
SH. 3 (B-8)
1/2"N-2-114
W7930-0140-ED
SH. 3 (C-8)
3/4"N-2-103
W7930-0143-ED
SH. 1(D-8)
DN-47
DN-65
DN-1
PCV-9
1"N-2-101
W7930-0140-ED
SH. 1(B-1)
1"N-2-101
1"
1/2"
1/2"
1"
1/4"
DN-21
1000 & 500 GAL
TANK LEVELS
LMS #2
D20 LT-105
D20 LIA-105
D20 LT-106
D20 LIA-106
TO D20-T-714
W7930-0143-ED
TO D20-T-715
W7930-0143-ED
6000 GAL
TANK LEVELS
LMS #1
D20 LT-102
D20 LI-102
D20 LT-104
D20 IA-104
D20 LIA-104
TO D20-T-711
W7930-0143-ED
TO D20-T-713
W7930-0143-ED
500 GAL
TANK LEVELS
LMS #3
D20 LT-103
D20 LIA-103
D20 LT-107
D20 LI-107
D20 LIA-107
TO D20-T-712
W7930-0143-ED
TO D20-T-716
W7930-0143-ED
1/4"
DN-23
HIGH BAY
TANK LEVELS
LMS #4
D20 LT-100
D20 LICA-100
D20 LT-101
D20 LICA-101
TO D20-T-706
W7930-0143-ED
TO D20-T-707
W7930-0143-ED
ARA
TANK LEVELS
LMS #5
D20 LT-812
D20 LIA-812
D20 LT-784
D20 LIA-784
TO D20-T-813
W7930-0143-ED
TO D20-T-783
W7930-0143-ED
MICRO-FILMED DATE
SEE SHEET 1
SYM APPR'D CHANGE BY CHK'D DATE
INDEX CODE NUMBER
AREA 273 TYPE 0793 CL 24 ORG 052 SERIAL 748455
UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN INCHES
REMOVE ALL BURRS AND SHARP EDGES.
ALL MACHINED SURFACES TO BE 125 OR FINER.
STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1.
DIMENSIONS & TOLERANCES IN ACCORDANCE WITH THE LATEST REVISION OF ANSI Y14.5M.
ETA NO.
MA-1999-025
MEAAL SYSTEM ID NO.
N/A
DRAWN BY R.D. KEPLER DATE 7-29 98
SERVICE REQUEST NO. 7470
CHECKED W. BENJAMIN KER 12-4 98
PROJECT MGR. DATE
RESP. ENGINEER W. BENJAMIN KER 12-4 98
APPR'D/RELEASED K. ROSENBERG 12-4 98
MATERIAL
-
PART NO. NEXT ASSEMBLY REQ'D
THIS DRAWING IS THE PROPERTY OF
ARGONNE NATIONAL LABORATORY
TITLE
MFC/SCMS BLDG 793
SODIUM COMPONENTS MAINTENANCE SHOP NITROGEN SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM
SCALE NONE
SHEET 2 OF 3
DRAWING NUMBER W7930-0140-ED-02
REV.
File: 748455-2.dwg
Path: P:\J110-9169
Date: 07/25/07 - 2:53 PM Layout Name: SH 2
GGR

DWG. NO.
W7930-0140-ED-02



INDEX CODE NUMBER				
AREA	TYPE	CL	ORIG	SERIAL
273	0793	24	052	748455

SYM	APPR'D	CHANGE	BY	CHK'D	DATE
		SEE SHEET 1			

MICRO-FILMED DATE

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN INCHES
REMOVE ALL BURRS AND SHARP EDGES.
ALL MACHINED SURFACES TO BE 125 OR FINER.
STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1.
DIMENSIONS & TOLERANCES IN ACCORDANCE WITH THE LATEST REVISION OF ANSI Y14.5M.

ETA NO. MA-1999-025
MEAAL SYSTEM ID NO. N/A
DRAWN BY R.D. KEPLER — DATE 98
SERVICE REQUEST NO. 7470
CHECKED W. BENJAMIN KER — 12-4 98
PROJECT MGR. — DATE
RESP. ENGINEER W. BENJAMIN KER — 12-4 98
APPR'D/RELEASED K. ROSENBERG — 12-4 98
MATERIAL —

PART NO. | NEXT ASSEMBLY | REQ'D

THIS DRAWING IS THE PROPERTY OF
ARGONNE NATIONAL LABORATORY

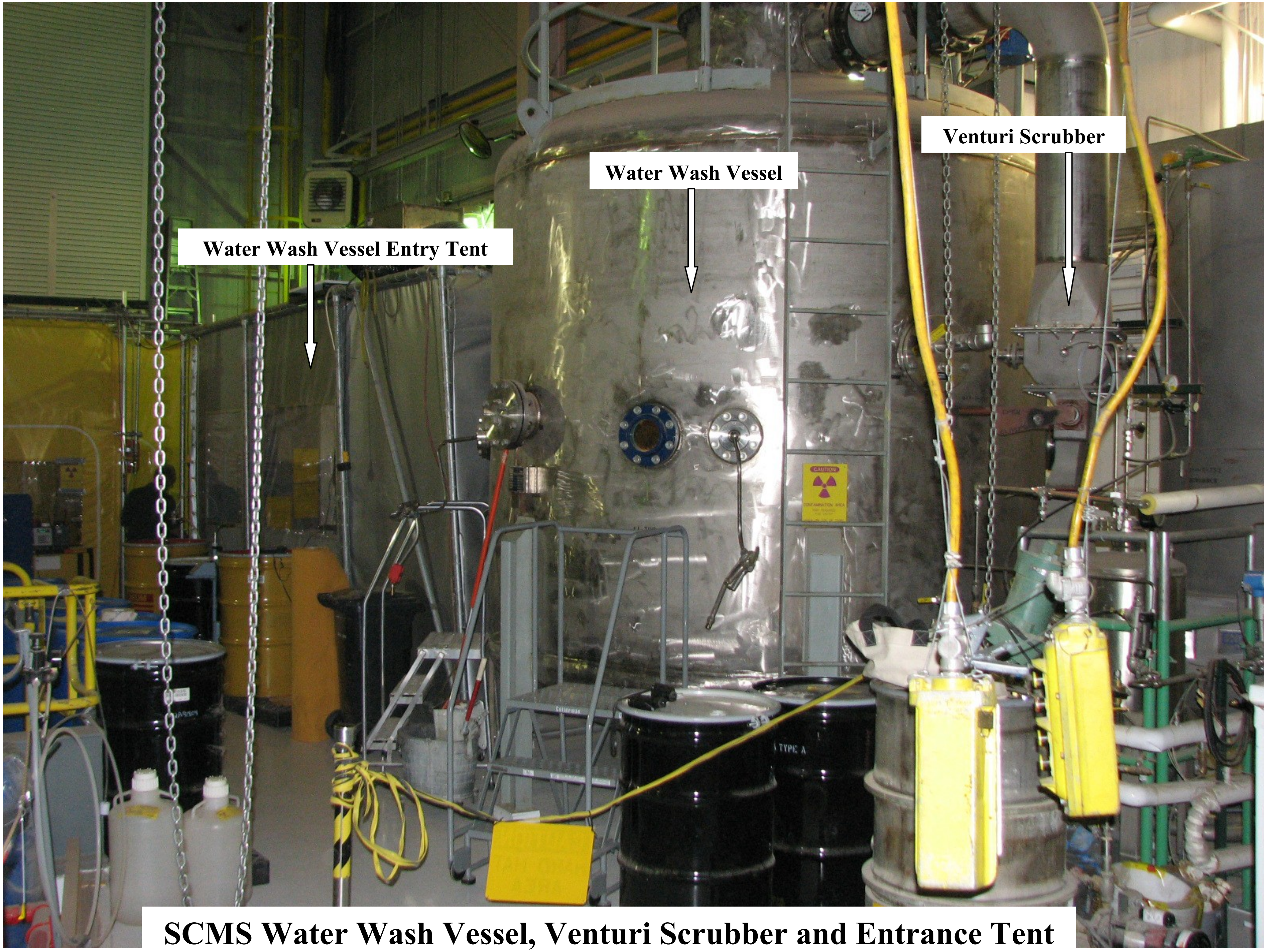
TITLE
MFC/SCMS BLDG 793
SODIUM COMPONENTS MAINTENANCE SHOP NITROGEN SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM

SCALE NONE | SHEET 3 OF 3 | DRAWING NUMBER W7930-0140-ED-02 | REV.

File: 748455-2.dwg Path: P:\J110-9169 Date: 07/25/07 - 2:52 PM Layout Name: SH 3 GGR

Attachment D-10

Photograph of SCMS Water Wash Vessel and Venturi Scrubber

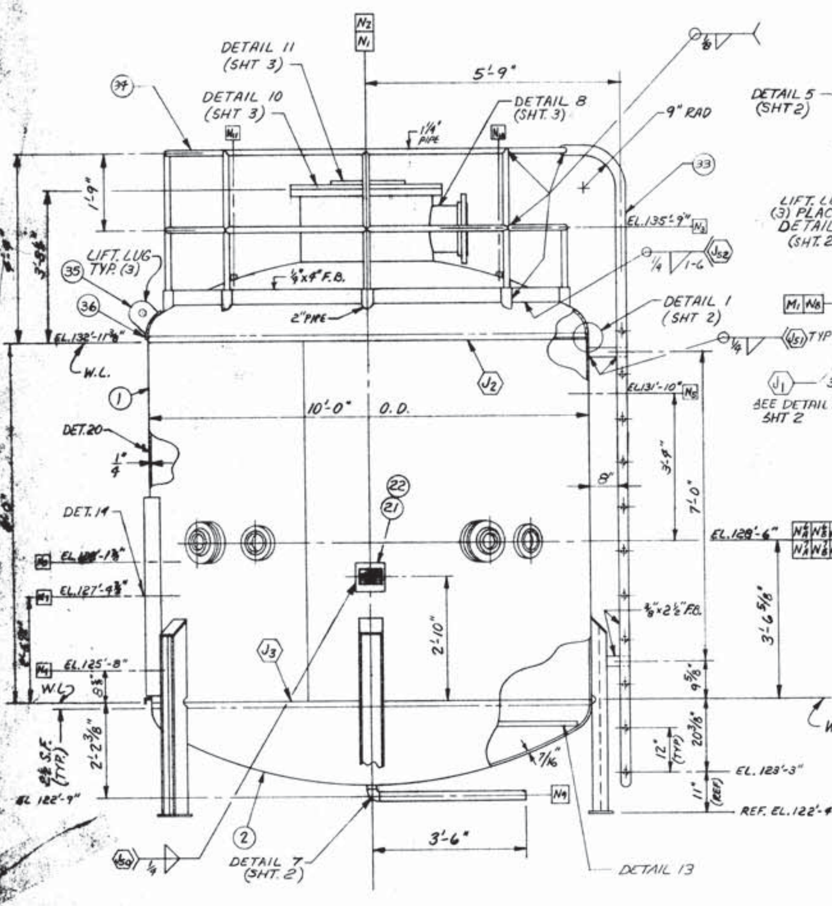


SCMS Water Wash Vessel, Venturi Scrubber and Entrance Tent
Photo taken August 2013

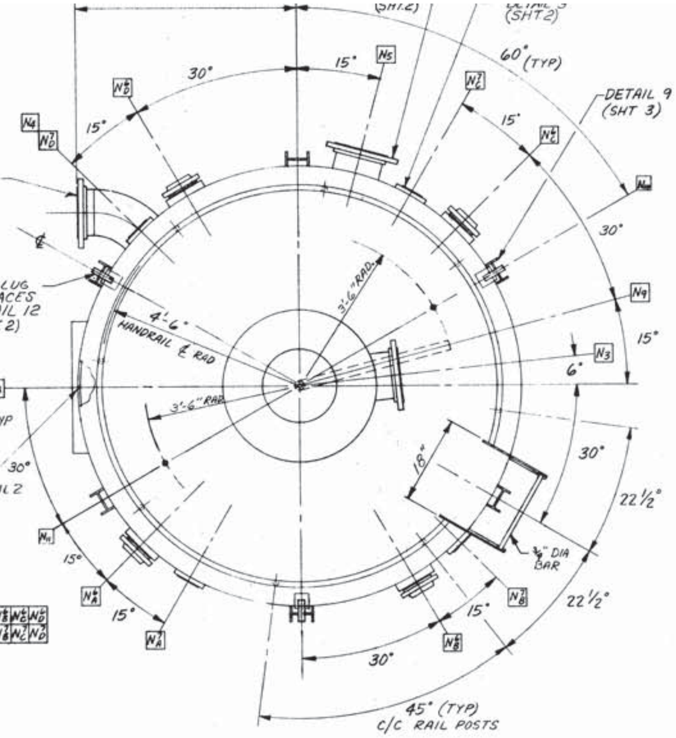
Attachment D-11

Drawing of SCMS Water Wash Vessel

692267 (Sheet 1-5 of 5) (Alternate Id: E5179-0005-DD)



ELEVATION
SCALE: ¾" = 1'-0"



PLAN VIEW

U	PX ENGINEERING CO. INC. WOBURN, MASSACHUSETTS
RT	50 PSI @ 200°F
	PSI @ °F
	625
HYDRO	
86 PSI	759
TAG NO	D11-T-751

LATER

...D 2-16-82(0)

					TO 10'-0" O.D. X 8'-0" LG CYLINDER)	
			2	2	7/16" THK X 10'-0" O.D. X 2½" S.F. ASME	SA 240-304
					F & D HEAD	
			3	4	1½" THK X 9¼ DIA RING (MACH. PER DET 3)	SA 240-304
			4	4	1½" X 11¼" DIA RING (MACH PER DET 4)	SA-240-304
			5	3	12"-150# RAISED FACE SLIP-ON FLNG.	SA-182-F304
			6	1	12"-SCH 40-S PIPE X 3 7/16" (MACH. PER DET 6)	SA-312-304
			7	1	12"-SCH 40-S 45° L.R ELBOW	SA-403-WP-304
			8	1	12"-SCH 40-S PIPE X 2" (LGTH TO SUIT DET 5)	SA-312-304
			9	2	16" OD X 12⅛" I.D X ¼" THK, REIN. COLLAR	SA-240-304
			10	1	12"-SCH 40-S PIPE X 7⅞" LG.	SA-312-304
			11	1	2"-SCH 40-S PIPE 1" LG.	SA-312-304
			12	1	2"-SCH 40-S 90° S.R ELBOW	SA-403-WP-304
			13	1	2"-SCH 40-S PIPE 3'-4" LG.	SA-312-304
			14	1	1'-8⅝" X 9'-4 3/16" X ¼" THK. (ROLL TO 36"	SA-240-304
					O.D. X 1'-8⅝" LG. CYL. W/2B FINISH INSIDE)	
			15	1	3'-4⅞" OD X 3'-0⅛" I.D. X 2½" THK	SA 240/304
					STEEL RING (MACH PER DET. #8)	
			16	1	12"-SCH 40-S PIPE X2" LG. (LGTH TO SUIT	SA-312-304
					DET #8)	
			17	6	W 6" X 9# WIDE FLANGE STEEL BEAM X 5' LG.	A-36
					(CUT PER DET. 9)	
			18	6	6" X 8" X ½" THK PLATE	A-36
			19	6	6" X 6" X ¼" PL (FIN. SIZE TO SUIT DET 9)	A-36
			20	1	3'-5¼" DIA X 1¼ THK STL. CIR. (MACH PER	SA-240/304
					DETAIL #10)	
			21	1	PXE NAMEPLATE	STN-STL
			22	1	NAMEPLATE BRKT.	STN-STL
			23	1	1'-7" DIA X ½ THK S/S PL (MACH PER DET. #11)	SA-240-304
			24	20	5/8"-11 UNC HEX HD. STEEL BOLTS	SA-193
					1¼" LG. UNDER HD THREADED FULL LNTH.	GB 7
			25	50	¾"-10 UNC X 6" LG. STEEL STDS	SA-193
					(FULL THREADED)	GB-7
			26	100	¾"-10 UNC HEX NUTS	SA-194 GR2H
			27	1	3'-1⅝" OD X 3'-0⅛" X ⅛" THK COMPRESSED	COMM
					ASBESTOS GASKET	
			28	1	1'-4" OD X 1'-0½" I.D X ⅛ THK COMPRESSED	COMM
					ASBESTOS GASKET	
			29	4	8" OD X 6" I.D X ⅛" THK. COMPRESSED	COMM
					ASBESTOS GASKET	
			30	4	6" SIZE FLANGED TYP. F CYCLOPS S/S	SA-316
					GLASS W/T-316 S/S INSERTS	GR 7
			31	2	6 DIA SF SPARE SIGHT GLASS [illegible]	T-316
			32	8	¾"-10 UNC HEX HD. BOLTS 2 [illegible]	SA-193
					UNDER HEAD FULL THREADED	GR B7
			33	1	LADDER AND ASSEMBLY	A-36
			34	1	1½" HAND RAILING AND ASSEMBLY	A-120
			35	3	6" X 10" X ¾" THK (CUT TO SUIT DETAIL 12)	SA-36
N/A			36	3	4" X 10" X ¼" THK (CUT TO SUIT DETAIL 12)	SA-36

"SEE SHT. 4 FOR CONTINUATION OF BILL OF MAT'L"
"SEE SHT. 4 FOR GENERAL NOTES"
1 VESSEL REQ'D

CONN	QTY.	SIZE	SERVICE	FACING	DET/SH
N_{10} & N_{11}	2	¾"	ELECTRICAL	CPLG	19/3
N9	1	2"	DRAIN	SQ. END	7/2
N8	1	4"	VIEWING WINDOW	1/16" RF	4/2
N7	4	4"	LANCE PENETRATION	1/16" RF	3/2
N6	4	6"	VIEWING WINDOW	1/16" RF	4/2
N5	1	12"	UTILITIES	1/16" RF	6/2
N4	1	12"	AIR INLET	1/16" RF	5/2
N3	1	12"	AIR OUTLET	1/16" RF	8/3
N2	1	12"	EQUIPMENT PORT	SPECIAL	11/3
N1	1	36"	EQUIPMENT PORT	1/16" RF	8/3
M1	1	30X48	MANHOLE	SPECIAL	

LIST OF CONNECTIONS

JOINT NO.	SPEC. NO.	PROCESS
J1 THRU J55	VP-010	VISUAL
J46, J47	LP-010	LIQUID PENAT.
J1, J2, J3, J15, 16, J25, J48	RT 012	100% X-RAY

NDE DATA

JOINT NO.	SPEC. NO.	PROCESS
J1 THRU J55	W-40	S/S SMAW
	W-45	S/S SAW
	W-42	C/S S/S SMAW
	W-59	C/S SMAW
	W-60	S/S GTAW

WELDING DATA

CORROSION ALLOWANCE .010"

CODE ASME SECTION VIII DIV I
SYMBOL STAMP U
OPER. PRESS. TEMP.
DESIGN PRESS. 50 PSIG TEMP. 200°F
MAWP TEMP.
VACUUM - 2.16 PSIG.
WEIGHT EMPTY 11,500 LBS.
WEIGHT FULL 63,900 LBS.
HYDROTEST @ 86 PSIG.
VACUUME TEST @ 30 PSIG FOR 30 MIN

RELEASED FOR FABRICATION

REV.

TOLERANCES UNLESS OTHERWISE NOTED
0" – 6" ± 1/16
6" – 24" ± 1/8
OVER 24" ± 1/4
ANGULAR ± 0° – 30'
DECIMALS: .xx ± .010" .xxx ± .005"
MACHINED SURFACES $\sqrt{250}$

CLEANING & PAINTING
☐ HAND TOOL SPEC.
SANDBLAST
INTERIOR SPEC. NOTE 6
EXTERIOR SPEC. NOTE 2 13
☒ WASH SPEC.
☐ OTHER SPEC.
☒ PAINTING
INTERIOR SPEC. N/A
EXTERIOR SPEC. NOTE 6

ECO	NO.	ZONE	DESCRIPTION	BY		
	2	A-3 C-2	J1 MOVED TO M1; REVISED WELD DATA; ADDED JOINT 55; ITEM 31 WAS 8" DIA	PRJ / LM		
	1		REVISED PER ARG. NAT. LAB. COMMENTS; THIS SHEET WAS 10...			

REVISIONS

px engineering company, inc.
225 MERRIMAC STREET WOBURN, MASSACHUSETTS

FOR: ARGONNE NATIONAL LABORATORY
EBR II PROJECT
ANL P.O. Nº 1F-39393

TITLE
SCMS WATER WASH VESSEL

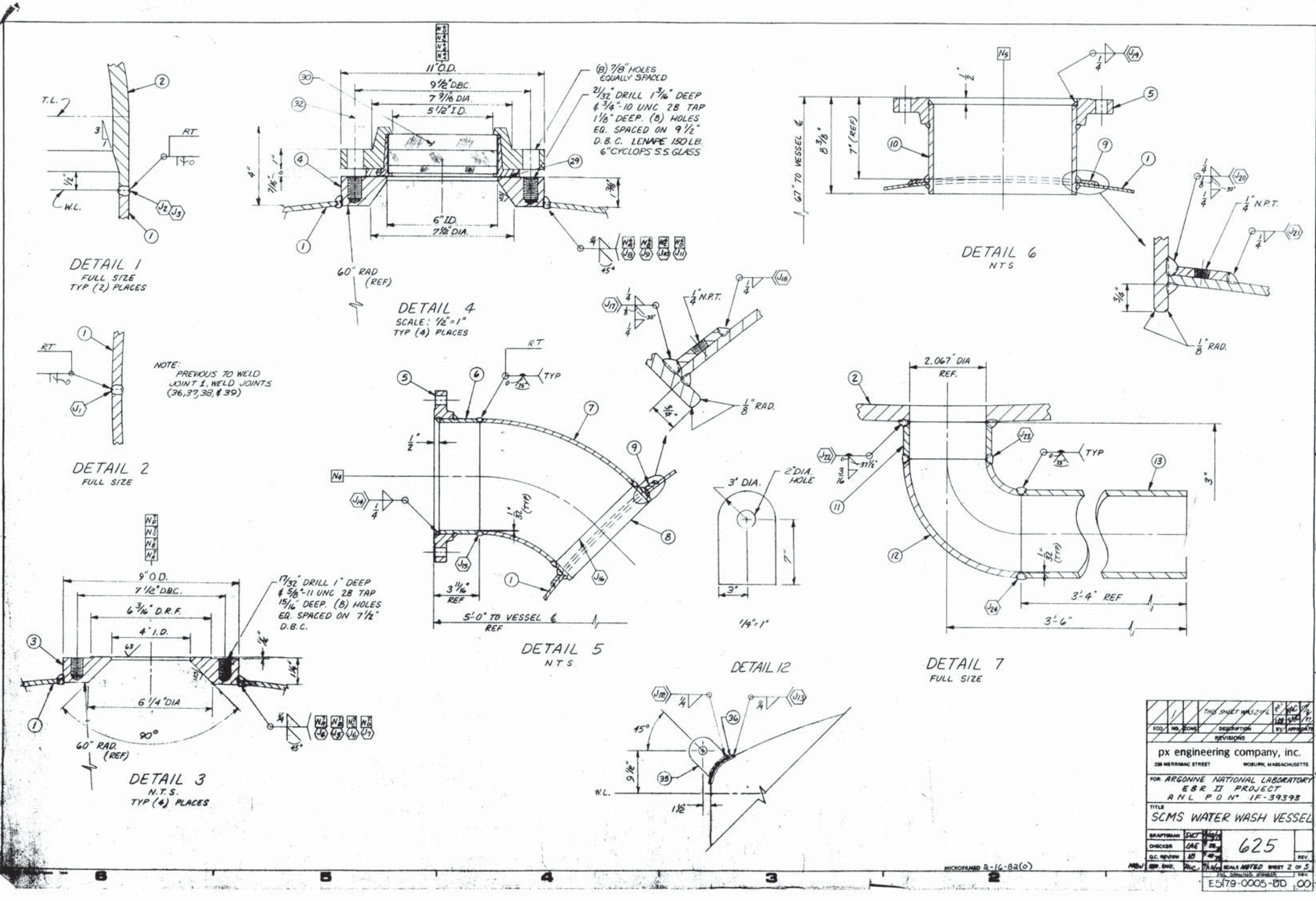
DRAFTSMAN PRJ
CHECKER LAE
Q.C. REVIEW LM
PROJ. ENG. REC

625

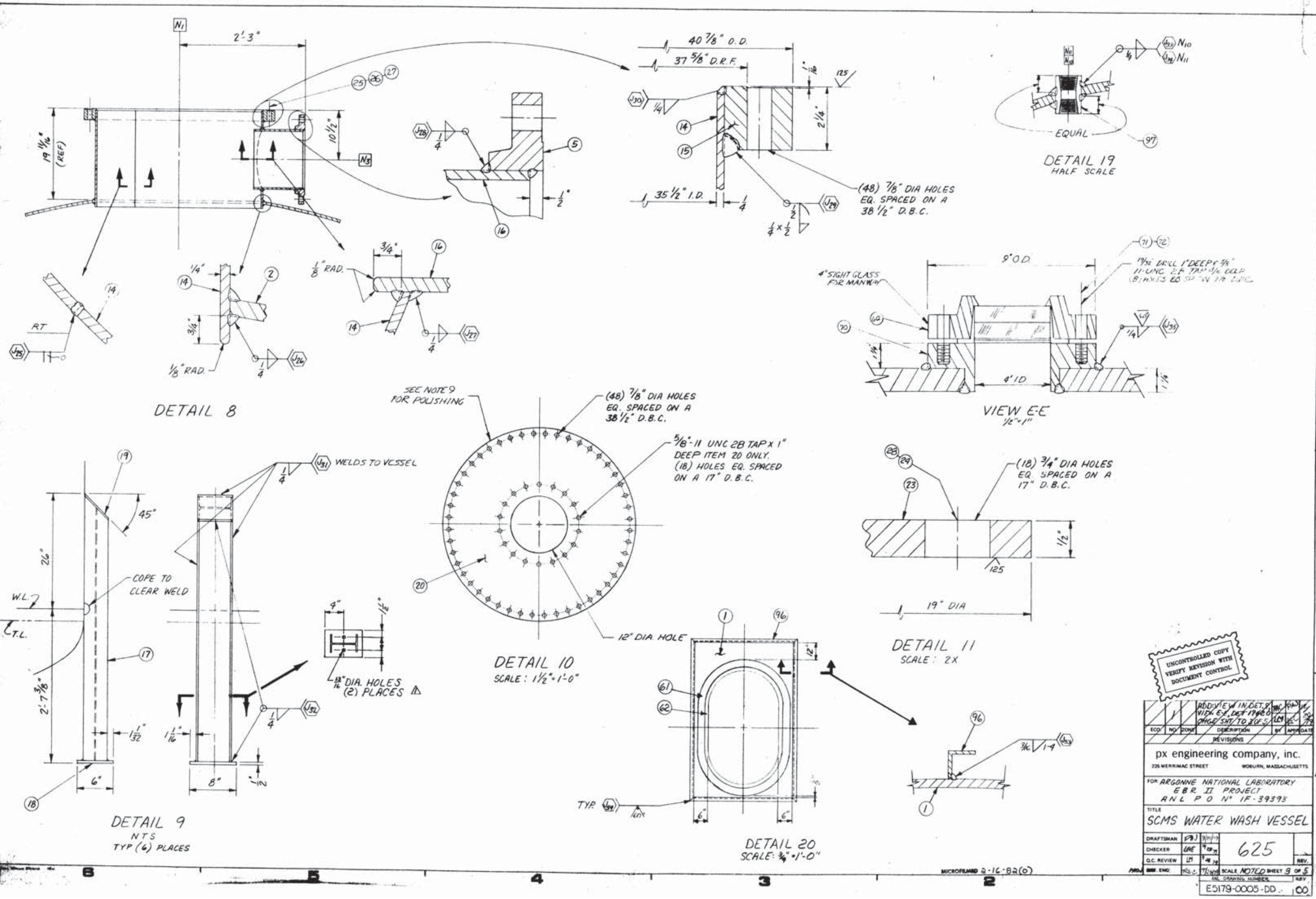
SCALE NOTED SHEET 1

E5179-0005-DD 00

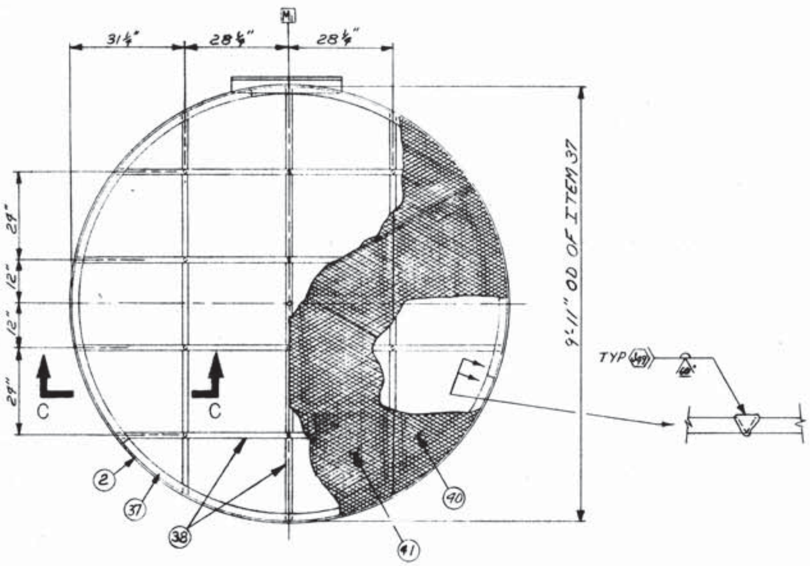
6 5 4 3 2



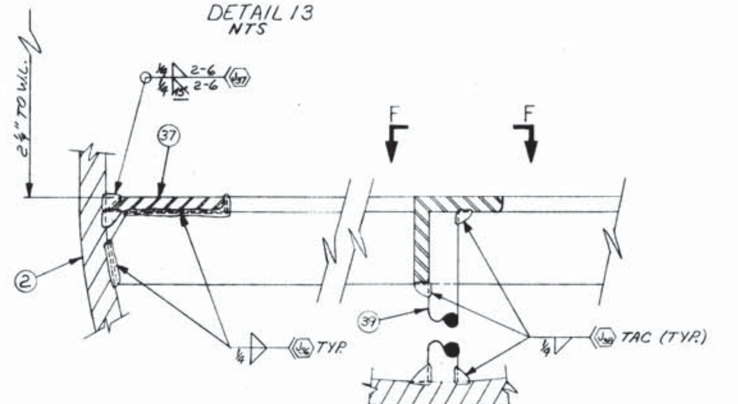
DETAIL 1
FULL SIZE
TYP (2) PLACES
DETAIL 2
FULL SIZE
NOTE:
PREVIOUS TO WELD JOINT 1, WELD JOINTS (36,37,38,& 39)
DETAIL 3
N.T.S.
TYP (4) PLACES
9" O.D.
7 1/2" D.B.C.
6 3/16" D.R.F.
4" I.D.
6 1/4" DIA
60" RAD. (REF)
17/32" DRILL 1" DEEP & 5/8"-11 UNC 2B TAP 15/16" DEEP. (8) HOLES EQ. SPACED ON 7 1/2" D.B.C.
DETAIL 4
SCALE: 1/2"=1"
TYP (4) PLACES
11" O.D.
9 1/2" DBC.
7 9/16 DIA.
5 1/2" I.D.
6" I.D.
7 1/2" DIA.
60" RAD (REF)
(8) 7/8" HOLES EQUALLY SPACED
21/32" DRILL 1 3/16" DEEP & 3/4"-10 UNC 2B TAP 1 1/8" DEEP. (8) HOLES EQ. SPACED ON 9 1/2" D.B.C. LENAPE 150 LB. 6" CYCLOPS S.S. GLASS
DETAIL 5
N.T.S.
3 11/16" REF
5'-0" TO VESSEL ℄ REF
DETAIL 6
NTS
67" TO VESSEL ℄
8 3/16"
7" (REF)
1/4" N.P.T.
1/8" RAD.
3" DIA.
2" DIA. HOLE
1/4"=1"
DETAIL 7
FULL SIZE
2.067" DIA REF.
3'-4" REF
3'-6"
DETAIL 12
W.L.
THIS SHEET WAS 2 OF 6
REVISIONS
px engineering company, inc.
238 MERRIMAC STREET WOBURN, MASSACHUSETTS
FOR: ARGONNE NATIONAL LABORATORY EBR II PROJECT ANL PO No 1F-39393
TITLE
SCMS WATER WASH VESSEL
625
SCALE NOTED SHEET 2 OF 5
MICROFILMED 2-16-82(0)
E5179-0005-BD 00



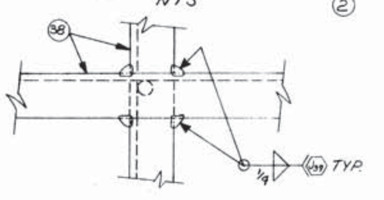
DETAIL 8
DETAIL 19
HALF SCALE
VIEW E-E
1/2"=1'
DETAIL 9
NTS
TYP (6) PLACES
DETAIL 10
SCALE: 1 1/2"=1'-0"
DETAIL 11
SCALE: 2X
DETAIL 20
SCALE: 3/4"=1'-0"
(48) 7/8" DIA HOLES EQ. SPACED ON A 38 1/2" D.B.C.
5/8"-11 UNC 2B TAP x 1" DEEP ITEM 20 ONLY. (18) HOLES EQ. SPACED ON A 17" D.B.C.
(18) 3/4" DIA HOLES EQ. SPACED ON A 17" D.B.C.
12" DIA. HOLE
SEE NOTE 9 FOR POLISHING
4" SIGHT GLASS FOR MANWAY
WELDS TO VESSEL
COPE TO CLEAR WELD
13/16" DIA. HOLES (2) PLACES
40 7/8" O.D.
37 5/8" D.R.F.
35 1/2" I.D.
9" O.D.
4" I.D.
19" DIA
UNCONTROLLED COPY VERIFY REVISION WITH DOCUMENT CONTROL
px engineering company, inc.
226 MERRIMAC STREET WOBURN, MASSACHUSETTS
FOR ARGONNE NATIONAL LABORATORY
EBR II PROJECT
ANL P O Nº IF-39393
SCMS WATER WASH VESSEL
625
SCALE NOTED
E5179-0005-DD
MICROFILMED 2-16-82(0)



DETAIL 13
NTS



VIEW C-C
NTS



VIEW F-F
NTS

NOTES

1. ALL INTERNAL WELD BEADS IN CONTRACT WITH INTERNAL SURFACES OF THE SHELL OR HEAD MUST BE GROUND TO MATCH THE FINISH OF THE SHELL.
2. PRIOR TO TESTING, THE VESSEL SHALL BE CLEANED OF SCALE, CHIPS, GREASE AND OTHER FOREIGN MATTER.
3. AFTER FABRICATION AND TESTING, THE VESSEL SHALL BE GIVEN A FINAL CLEANING IN PREPARATION FOR SHIPMENT. THE FINAL CLEANING WILL CONSIST OF A DETERGENT WASH OF THE INTERNAL SURFACES AND A CLEAN WATER RINSE. THE VESSEL SHALL BE CLEAN TO THE EXTENT THAT NO CONTAMINATION OF ANY SURFACE IS VISABLE WITHOUT MAGNIFICATION, TO A PERSON WITH NORMAL VISUAL ACUITY, NATURAL OR CORRECTED. AFTER CLEANING, ALL OPENINGS IN THE VESSEL SHALL BE PROVIDED WITH TEMPORARY CLOSURES.
4. HYDROSTATIC TEST: VESSEL @ 86 PSIG IN ACCORDANCE WITH PXE PROC. HTP-625. GLASS IS TO BE IN PLACE DURING HYDRO. ANY DETECTABLE LEAKS SHALL BE REPAIRED IN ACCORDANCE WITH ASME CODE AND RETESTED. REPORTS SUBMITTED AT TIME OF SHIPMENT.
5. VACUUM TEST: AFTER THE HYDROSTATIC TEST VACUUM TEST AT 6 IN. HG (-3 PSIG) THE VACUUM SHALL BE MAINTAINED FOR AT LEAST 30 MIN. WITH NO DETECTABLE CHANGE IN PRESSURE. A TEST REPORT WILL BE PREPARED & SUBMITTED AT FINAL SHIPMENT.
6. BLAST EXTERIOR CARBON STEEL SURFACES PER SSPL-SD-6. COAT WITH SHOP PRIMER.
7. PREPARATION FOR SHIPMENT: THE VESSEL SHALL BE ADEQUATELY PACKAGED AND SUPPORTED TO PRECLUDE DAMAGE DURING LOADING, SHIPING, AND OFF LOADING. ALL VESSEL OPENINGS SHALL BE SEALED TO PRECLUDE CONTAMINATION OF THE VESSEL INTERIOR DURING SHIPMENT. ALL GASKET SURFACES ON VESSEL FLANGES SHALL BE PROTECTED FROM DAMAGE. ALL VIEWING WINDOWS SHALL BE REMOVED FROM VESSEL AND PACKED SEPARATLY FOR SHIPMENT. METHODS OF PACKAGING AND SUPPORTING THE VESSEL SHALL BE AGREED TO BY PX ENG. AND THE LABORATORY PRIOR TO SHIPMENT. GRATING TO BE SHIPPED LOOSE
8. HEAD SEAMS TO BE 100% RADIOGRAPHED, POLISHED AND CODE STAMPED U-2 BY HEAD MANUFACTURERS. PARTIAL DATA REPORT TO BE INCLUDED IN FINAL DOC. PACKAGE
9. INSIDE SURFACE OF DOOR & TOP COVER ITEMS (20 & 63) TO BE POLISHED TO A 2B OR A SUPER FRENCH BRIGHT FINISH.
10. LONGITUDINAL WELDS IN SHELL ARE TO BE 100% RADIOGRAPHED.
11. SIGHT GLASS IS TO HAVE TEFLON COATING AND ABLE TO WITHSTAND NaOH ENVIROMENT.

BILL OF MATERIAL

MTR NO.	HEAT NO.	ITEM	QTY.	DESCRIPTION	MATERIAL
N/A		37	3	12' X 2" X 1/4" THK. FLAT BAR (ROLL HARDWAY TO 9'-11 1/2" OUTSIDE RADIUS)	COMM S/S T-304
		38	1	4 1 1/2" x 1 1/2" x 1/4" THK. 69'-5" LONG (CUT PER. DETAIL 13)	COMM S/S
		39	1	1/2" DIA. ROUND BAR 20' LONG (CUT PER DETAIL 13)	COMM S/S
		40	2	10' LG X 2'-7" X 3/4" THK. BUSTIN PROTECTO GRATING TYP P-6 (CUT TO SUIT DET. 13)	T-304 S/S
		41	2	10' LG X 2'-4 1/4" X 3/4" THK. BUSTIN PROTECTO GRATING TYP P-6 (CUT TO SUIT DET. 13)	T-304 S/S
		42-56	0	42 THRU 56 DELETED	
		57	12	1/16" DIA (.070) CROSS SECT. O RING X .864" I.D. - 70 DUR (12 SPARES) PARKER #2-020	NEOPRENE
		58-60	0	58 THRU 60 DELETED	
		61	1	40" X 40" X 3/4" THK PL (CUT & MACH. PER DET 14)	SA 240/T-304
		62	1	75" X 12" X 1 1/2" THK PL (CUT & ROLL PER DET 14)	SA 240/T-304
		63	1	35" X 53" X 1 1/4" THK PL (CUT & MACH PER DET 14)	SA 240/T-304
		64	2	1/2" DIA STEEL HINGE PIN X 2" LG. W/WASHER AND COTTER PIN	COMM/[illegible]
		65	4	7" X 12" X 1/2" THK PL (SEE DETAIL #17)	SA 240/T-304
		66	2	4" X 9" X 1/2" THK PL (SEE DETAIL #17)	SA 240/T-304
		67-68	0	67 AND 68 DELETED	
		69	1	4" CYCLOPS TYPE-F SIGHT GLASS ASS'Y WITH 6 3/16" S.F. TEFLON COATED	SA-515-70 & T-316 S/S
		70	1	2 1/2" THK X 9 1/2" DIA PL (MACH PER VIEW F-F)	SA 240/T-304
		71	8	5/8"-11-UNC X 2" LG BOLT	SA 193 GR/B-7
		72	1	6 3/16" O.D. X 4" I.D. X 1/8" COMP ASBESTOS GASKET	COMM
		73	1	4" CYCLOPS SPARE GLASS INSERT TYPE "F" (WITH 6 3/16" S.F.) FOR ITEM #69	TEFLON COAT. & T-316 S/S
		74	0	74 DELETED	
		75	4	4"-150# BLIND R.F. FLANGES FOR HYDROTEST.	SA-105
		76	4	6 3/16" DIA X 1/8" RUBBER GASKET	COMM
		77	3	12"-150# R.F. BLIND FLANGES FOR HYDROTEST	SA-105
		78	3	15" DIA X 1/8" THK RUBBER GASKET	COMM
		79	1	2" SCH 40 THAXTON STOPPER	COMM
		80		WOOD SKIDS	
		81		1/4" PLYWOOD FLANGE COVERS	
		82		STEEL BLANKS FOR SIGHT WINDOWS	
		83	1	60# SPOOL 1/8" DIA WELD FILLER METAL	SFA 5.9/ER-308
		84	60#	3/32 DIA FLUX-SFA 5.9 (LINCOLN ST-100, HOBART HS 300, ARCOSITE S-4)	SFA-5.9
		85	20#	1/8" DIA MILD STEEL ELECTRODES,	SA-5.1/E7018
		86	25#	1/8" DIA STAINLESS STEEL COVER ELECTRODE	SFA 5.4/310-16
		87	10#	3/32" DIA WELD FILLER METAL	SFA 5.9/ER-308
		88	40#	1/8" DIA S/S COVERED ELECTRODE	SFA 5.4/308-16
		89	6	1 1/2" DIA X 10" LG X 3/16 THK WALL TUB. (MACH PER DET 16)	SA 213/T-304
		90	6	1 1/8" DIA X 12" LG ROUND BAR (MACH PER DET 16)	SA 479/T-304
		91	12	3/4" X 1 1/2" X 14" LG FLAT BAR (BEND PER VIEW D-D)	SA 479/T-304
		92	6	BOSTON GEAR FLG. BEARING, CAT # FB-1620-8	BRONZE
		93	12	7/8"-9UNC HEAVY HEX NUTS	SA-194/GR-2H
		94	6	1/4" THK X 1" X 2 1/2" FLAT BAR	SA 240 T-304
		95	12	1/8" THK X 43 1/2" OD TO 42 1/2" I.D. RUBBER GASKET	BUNA "N" 50 DUR
		96	1	4 1 1/2" x 1 1/2" x 3/16" THK. 19'-0" LONG (CUT PER. DETAIL 20)	SA-36
		97	2	3/4"-3000# FULL THR'D COUPLING	SA-182 F304
		98	6	3/4" X 1 1/2" X 5 1/2" LG FLAT BAR (CUT TO SUIT)	SA 479 T304
N/A		99	6	3/4" X 3/4" X 1" BAR	SA 479 T-304

REVISIONS

ECO	NO.	ZONE	DESCRIPTION	BY
	3	B2	ITEM 98 WAS SA 479-T 304; ADD ITEM 99	[illegible]
	2		ADD: VIEW F-F & NOTES 10 & 11. CHANGE: DET. 13, NOTES #7, ITEMS 37-41, 84, 87 & 96	[illegible]
	1		DELETED ITEMS [illegible]	[illegible]

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CODE	
SYMBOL STAMP	
OPER. PRESS.	TEMP.
DESIGN PRESS.	TEMP.
MAWP	TEMP.
VACUUM	
WEIGHT EMPTY	
WEIGHT FULL	

RELEASED FOR FABRICATION

REV.

TOLERANCES UNLESS OTHERWISE NOTED

0" – 6" ± 1/32; 6" – 24" ± 1/16; OVER 24" ± 1/8; ANGULAR ± 0° – 30'

DECIMALS: .XX ± .010"; .XXX ± .005"; MACHINED SURFACES $\sqrt{250}$

CLEANING & PAINTING

HAND TOOL SPEC.; SANDBLAST INTERIOR SPEC.; EXTERIOR SPEC.; WASH SPEC.; OTHER SPEC.; PAINTING INTERIOR SPEC.; EXTERIOR SPEC.

JOINT NO.	SPEC. NO.	PROCESS	JOINT NO.	SPEC. NO.	PROCESS
NDE DATA			WELDING DATA		

px engineering company, inc.
225 MERRIMAC STREET WOBURN, MASSACHUSETTS

FOR: ARGONNE NATIONAL LABORATORY
EBR II PROJECT
ANL PO No. [illegible]

TITLE
SCMS WATER WASH VESSEL

DRAFTSMAN [illegible]
CHECKER LAE
Q.C. REVIEW LH
PROJ. ENG. [illegible]

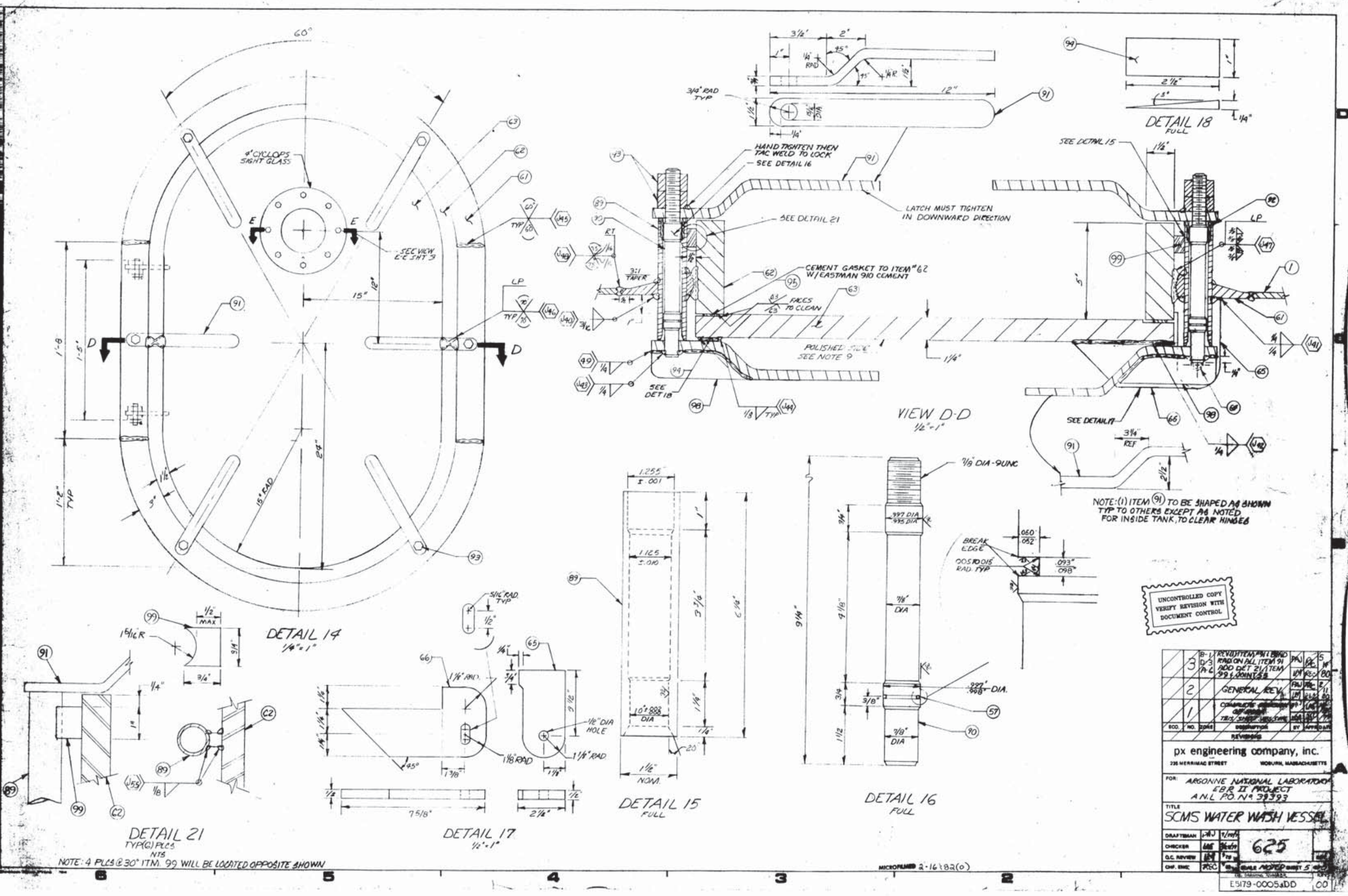
625

SCALE NOTED SHEET 4 OF [illegible]

ANL DRAWING NUMBER
E5179-0005-DD 00

MICROFILMED 2-16-82(0)

6 5 4 3 2

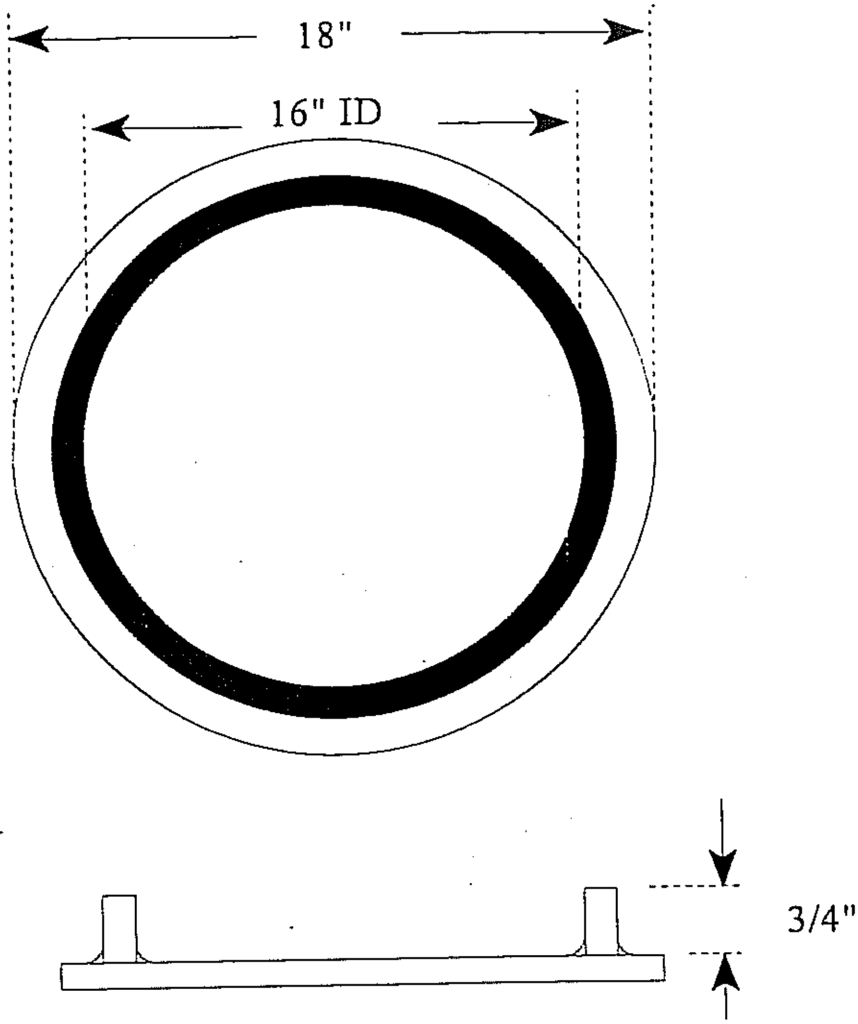

DETAIL 14
1/4"=1"
4" CYCLOPS SIGHT GLASS
SEE VIEW E-E SHT 3
15" RAD
DETAIL 18
FULL
HAND TIGHTEN THEN TAC WELD TO LOCK
SEE DETAIL 16
SEE DETAIL 21
LATCH MUST TIGHTEN IN DOWNWARD DIRECTION
CEMENT GASKET TO ITEM # 62 W/EASTMAN 910 CEMENT
FACES TO CLEAN
POLISHED SIDE SEE NOTE 9
3:1 TAPER
SEE DET 18
SEE DETAIL 15
SEE DETAIL 17
VIEW D-D
1/2"=1"
NOTE: (1) ITEM 91 TO BE SHAPED AS SHOWN TYP TO OTHERS EXCEPT AS NOTED FOR INSIDE TANK, TO CLEAR HINGES
7/8 DIA-9UNC
BREAK EDGE
.005 TO .015 RAD. TYP
DETAIL 15
FULL
DETAIL 16
FULL
DETAIL 17
1/2"=1"
DETAIL 21
TYP (G) PLCS
NTS
NOTE: 4 PLCS @ 30° ITM. 99 WILL BE LOCATED OPPOSITE SHOWN
UNCONTROLLED COPY VERIFY REVISION WITH DOCUMENT CONTROL
GENERAL REV
REVISIONS
px engineering company, inc.
235 MERRIMAC STREET WOBURN, MASSACHUSETTS
FOR: ARGONNE NATIONAL LABORATORY EBR II PROJECT A.N.L P.O. No 39393
TITLE SCMS WATER WASH VESSEL
DRAFTSMAN
CHECKER
Q.C. REVIEW
CHF. ENG.
625
MICROFILMED 2-16-82(0)
E5179-0005-DD
00
6 5 4 3 2

Attachment D-12

Drawing of SCMS Water Wash Vessel Burn Pan

Top
View

Front
Sectional
View



Burn Pan

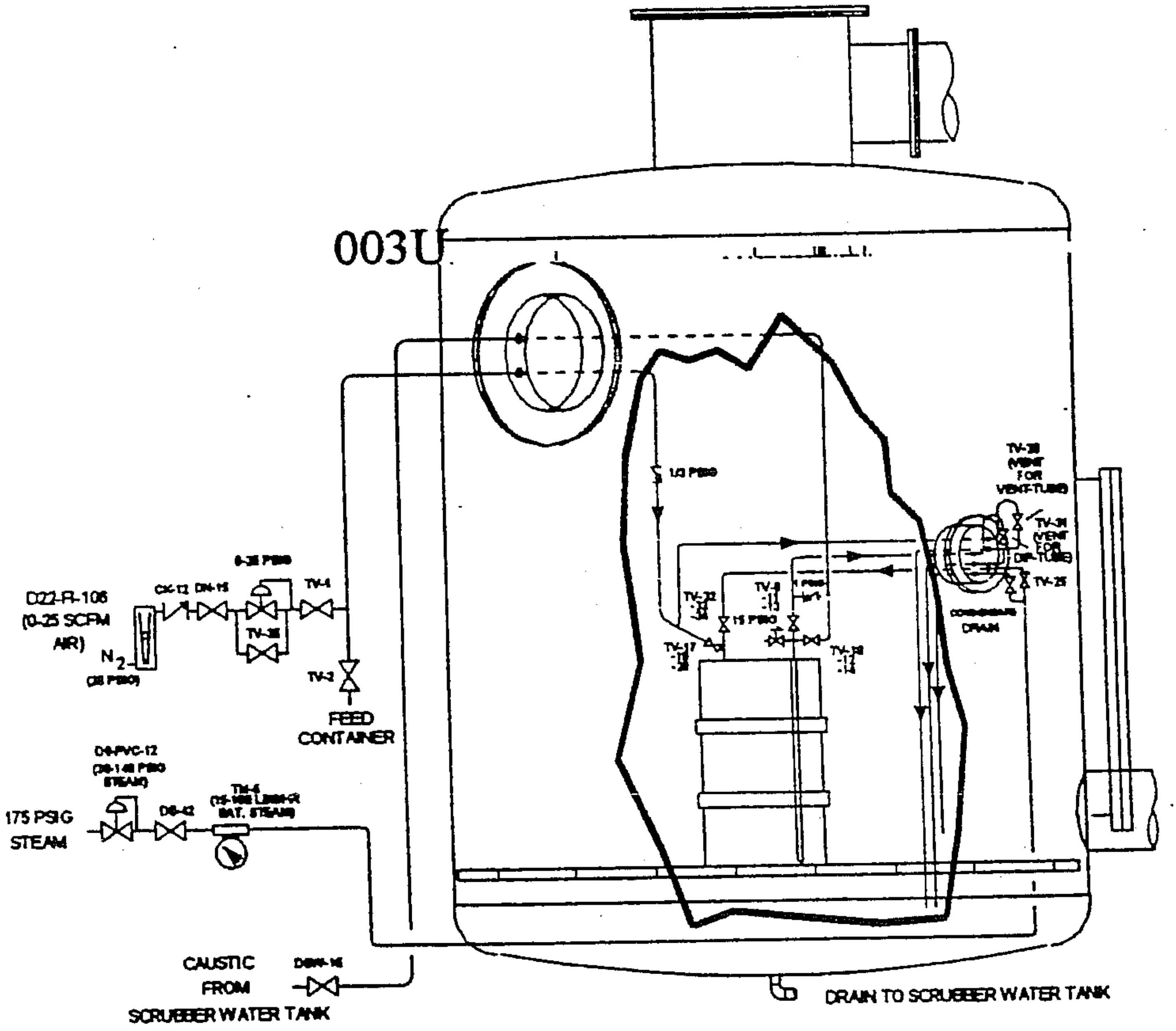
Notes:

- The burn pan bottom plate is 3/8" ASTM A36 carbon steel.
- The burn pan cylinder is rolled 3/8" ASTM A36 carbon steel, welded on the inner and outer surfaces to the bottom plate.

Attachment D-13

Drawing Showing Treatment of Debris and Container Residuals

in SCMS Water Wash Vessel


003U
D22-R-106
(0-25 SCFM
AIR)
N2
TV-4
TV-2
FEED
CONTAINER
175 PSIG
STEAM
CAUSTIC
FROM
SCRUBBER WATER TANK
DRAIN TO SCRUBBER WATER TANK

Attachment D-14

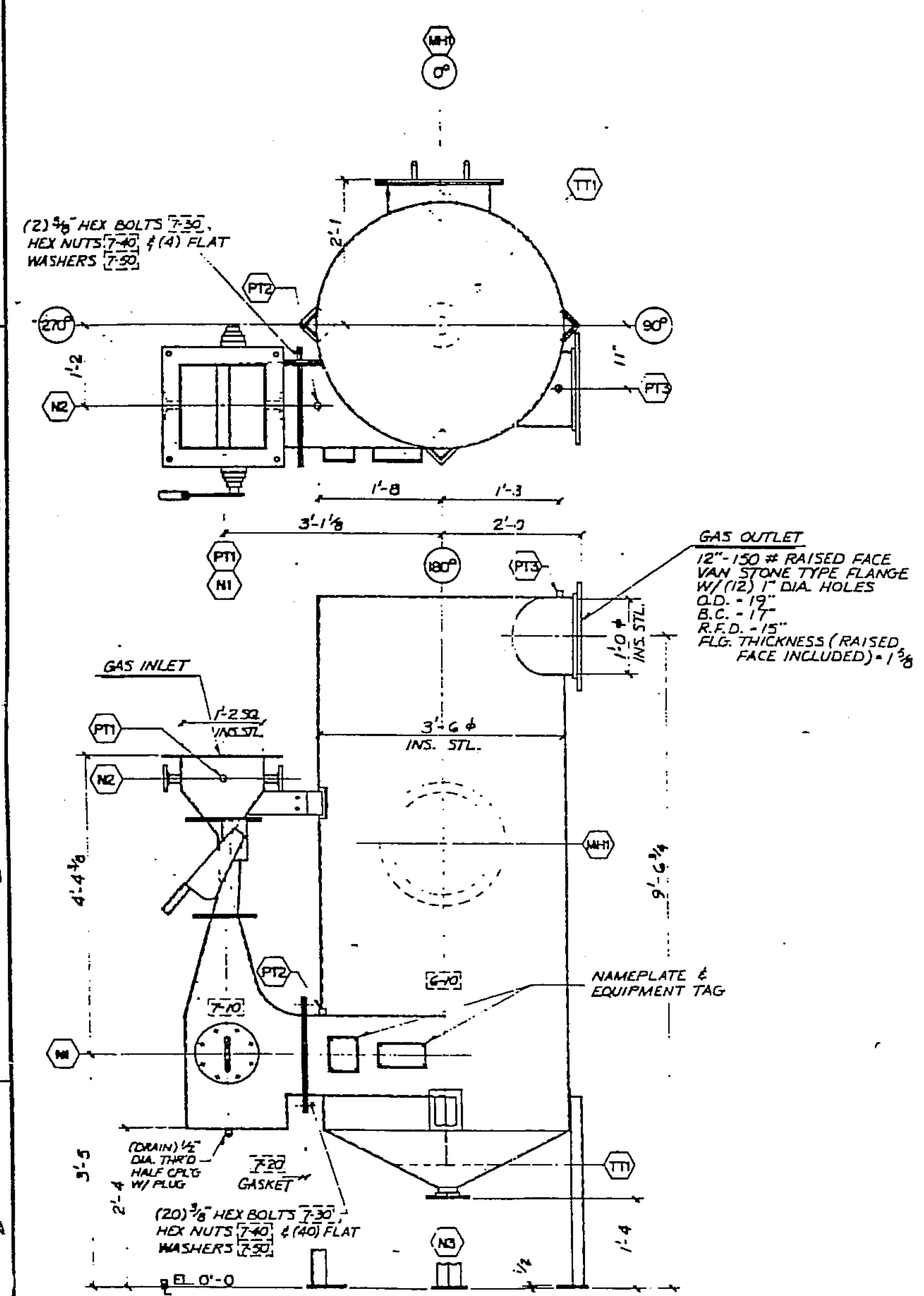
Drawing of SCMS Venturi Scrubber

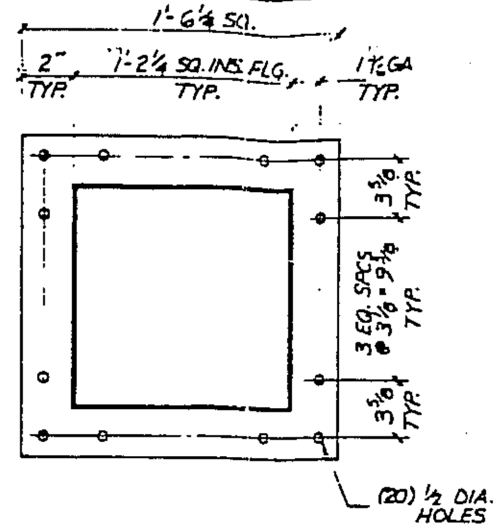
General Arrangement

378107D1 (Sheet 1 of 1)

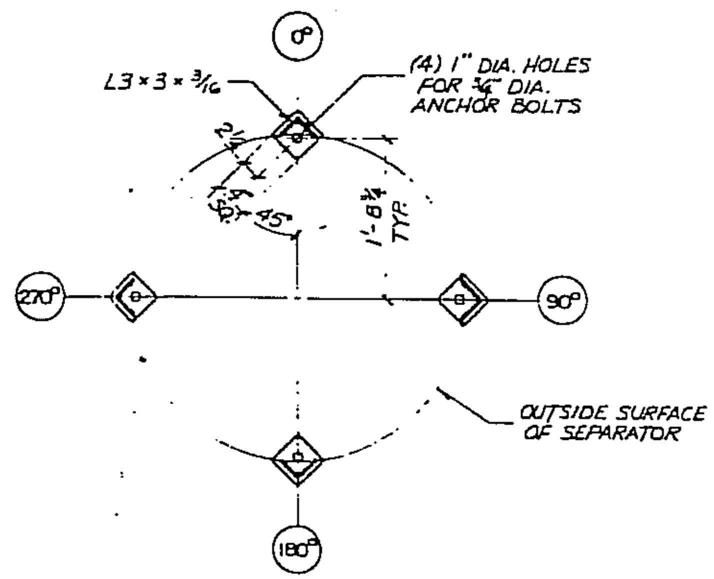
DWG NO 378107D1		

DCN Nº	ZONE	LTR	DESCRIPTION	BY	DATE	APP'D
REVISIONS						





GAS INLET



MOUNTING PLAN

GENERAL NOTES:

1. MATERIAL: 10 GA. 304L STAINLESS STEEL UNLESS OTHERWISE NOTED.

   FLANGES - 1/2" 304L STAINLESS STEEL

   SUPPORT LEGS - MILD STEEL WITH 304L STAINLESS STEEL BACK-UP PLATE

   PIPING - 304 STAINLESS STEEL WITH 150 LB. MILD STEEL VAN STONE TYPE FLANGE UNLESS OTHERWISE NOTED.

   GASKETS - 1/8" FULL FACED NEOPRENE 30-40 DUROMETER UNLESS OTHERWISE NOTED.

2. ALL WELDING TO CONFORM TO THE STRUCTURAL WELDING CODE - AWS D1.1 OF THE AMERICAN WELDING SOCIETY.

3. ALL BOLTS, NUTS AND GASKETS NECESSARY FOR ASSEMBLY OF UNIT ARE PROVIDED. BOLTS, NUTS AND GASKETS FOR CONNECTION TO OTHER EQUIPMENT ARE NOT PROVIDED.

4. UNIT DESIGNED TO WITHSTAND AN OPERATING PRESSURE OF -40" W.C. @ 150°F.

5. SUPPORT LEGS DESIGNED TO WITHSTAND WEIGHT OF UNIT FILLED WITH WATER TO BOTTOM OF FLOODED ELBOW. HORIZONTAL OR VERTICAL LOADS IMPOSED BY OTHER EQUIPMENT ARE NOT SUPPORTED. WIND LOADS ARE SUPPORTED.

6. ALL EXTERIOR MILD STEEL SURFACES TO RECEIVE ONE (1) SHOP PRIME COAT PRUFCOAT P-50 OR EQUAL WITH SURFACE PREPARATION TO BE IN ACCORDANCE WITH SSPC-PC3 BRUSH BLAST.

7. INDICATES SHIPPING NUMBERS "[ ]"

WEIGHT:

1,600 LBS. SHIPPING
2,500 LBS. OPERATING

ITEM	QTY	[illegible]	DESCRIPTION	[illegible]	[illegible]	RATING	FACING	TYPE	[illegible]
TT1	1	1/2"	TEMPERATURE TAP	~	~	2000-3000 #	F.N.P.T.	HALF COUPL'G	45°
PT3	1	1/2"	PRESSURE TAP	~	~	2000-3000 #	F.N.P.T.	HALF COUPL'G	~
PT2	1	1/2"	PRESSURE TAP	~	~	2000-3000 #	F.N.P.T.	HALF COUPL'G	~
PT1	1	1/2"	PRESSURE TAP	7'-5 1/8	~	2000-3000 #	F.N.P.T.	HALF COUPL'G	~
N3	1	2"	DRAIN	~	~	150 #	RAISED	VAN STONE	~
N2	2	1"	LIQUID INLET	7'-5 1/8	10"	150 #	RAISED	VAN STONE	~
N1	1	6"	[illegible] INSPECTION PORT	3'-5	~	~	~	~	~
MH1	1	18"	[illegible] MANHOLE	6'-6	~	~	~	~	0°

ARGONNE NATIONAL LABORATORY
IDAHO FALLS, IDAHO
P.O. Nº IF-39463

M.O. Nº 378107-075

ENVIRONMENTAL ELEMENTS CORPORATION

GENERAL ARRANGEMENT ENELCO VENTURI SCRUBBER MODEL 1503SS

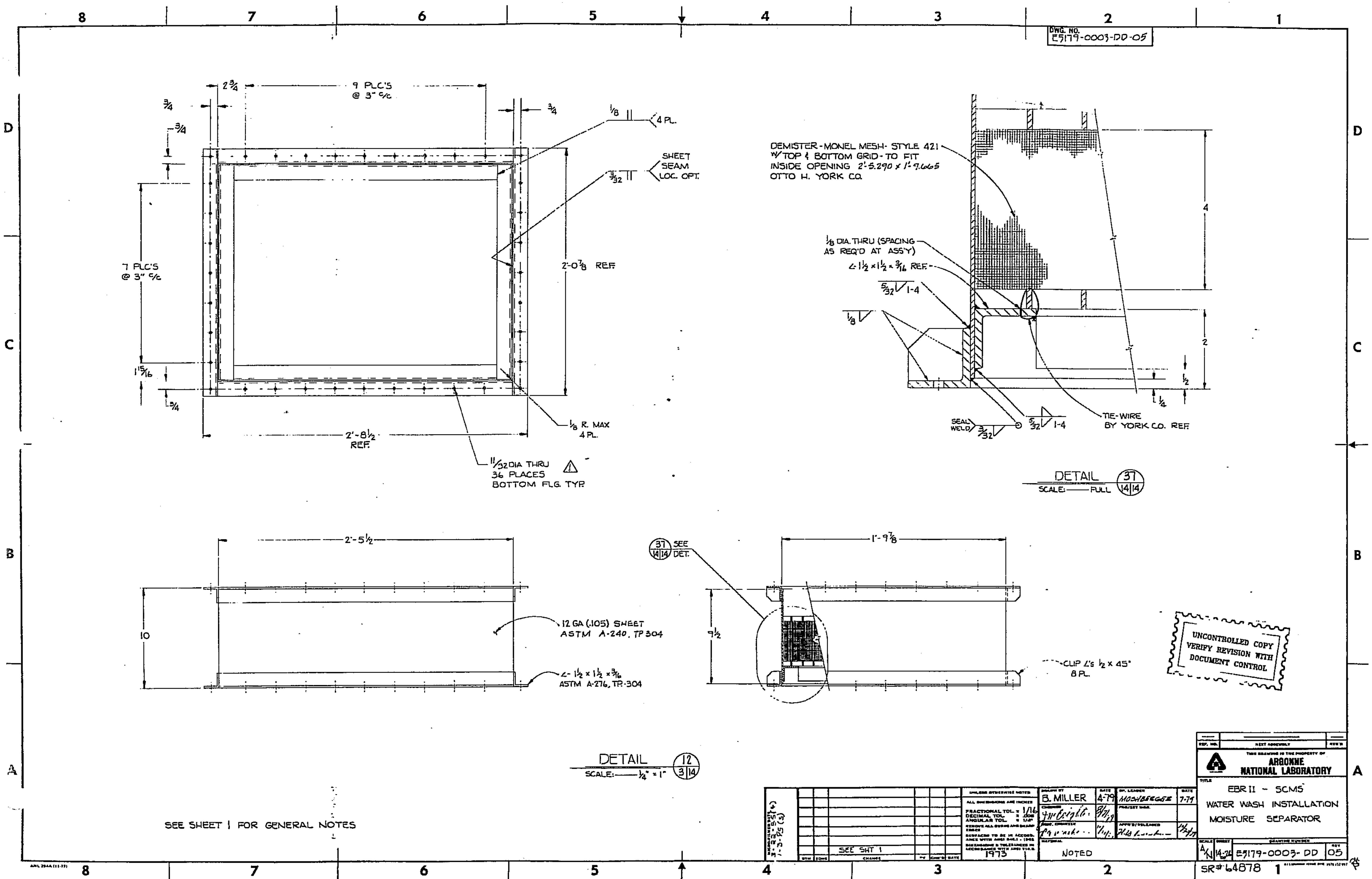
SIZE	FSCM NO.	DRAWING NO.	REV
D		378107D1	0

Attachment D-15

Drawing of SCMS Moisture Separator

EBR-II SCMS Water Wash Installation Moisture Separator

692265 (Sheet 14 of 26) (Alternate Id: E5179-0003-DD)


DWG. NO. E5179-0003-DD-05
9 PLC'S @ 3" C/C
2 3/4
3/4
1/8 4 PL.
SHEET SEAM LOC. OPT.
3/32
7 PLC'S @ 3" C/C
2'-0 7/8 REF.
1 15/16
2'-8 1/2 REF.
1/8 R. MAX 4 PL.
11/32 DIA THRU 36 PLACES BOTTOM FLG. TYP.
DEMISTER - MONEL MESH - STYLE 421 W/ TOP & BOTTOM GRID - TO FIT INSIDE OPENING 2'-5.290 x 1'-9.665 OTTO H. YORK CO.
1/8 DIA. THRU (SPACING AS REQ'D AT ASSY)
∠-1 1/2 x 1 1/2 x 3/16 REF.
5/32 1-4
1/8
SEAL WELD 3/32
TIE-WIRE BY YORK CO. REF.
DETAIL 37 14|14
SCALE: FULL
2'-5 1/2
10
12 GA (.105) SHEET ASTM A-240, TP 304
∠-1 1/2 x 1 1/2 x 3/16 ASTM A-276, TP-304
37 14|14 SEE DET.
1'-9 7/8
9 1/2
CLIP ∠'s 1/2 x 45° 8 PL.
UNCONTROLLED COPY VERIFY REVISION WITH DOCUMENT CONTROL
DETAIL 12 3|14
SCALE: 1/4" = 1"
SEE SHEET 1 FOR GENERAL NOTES
SEE SHT 1
ARGONNE NATIONAL LABORATORY
EBR II - SCMS
WATER WASH INSTALLATION
MOISTURE SEPARATOR
B. MILLER 4-79
MOSHBERGER 7-79
NOTED
1973
E5179-0003-DD 05
SR# 64878

Attachment D-16

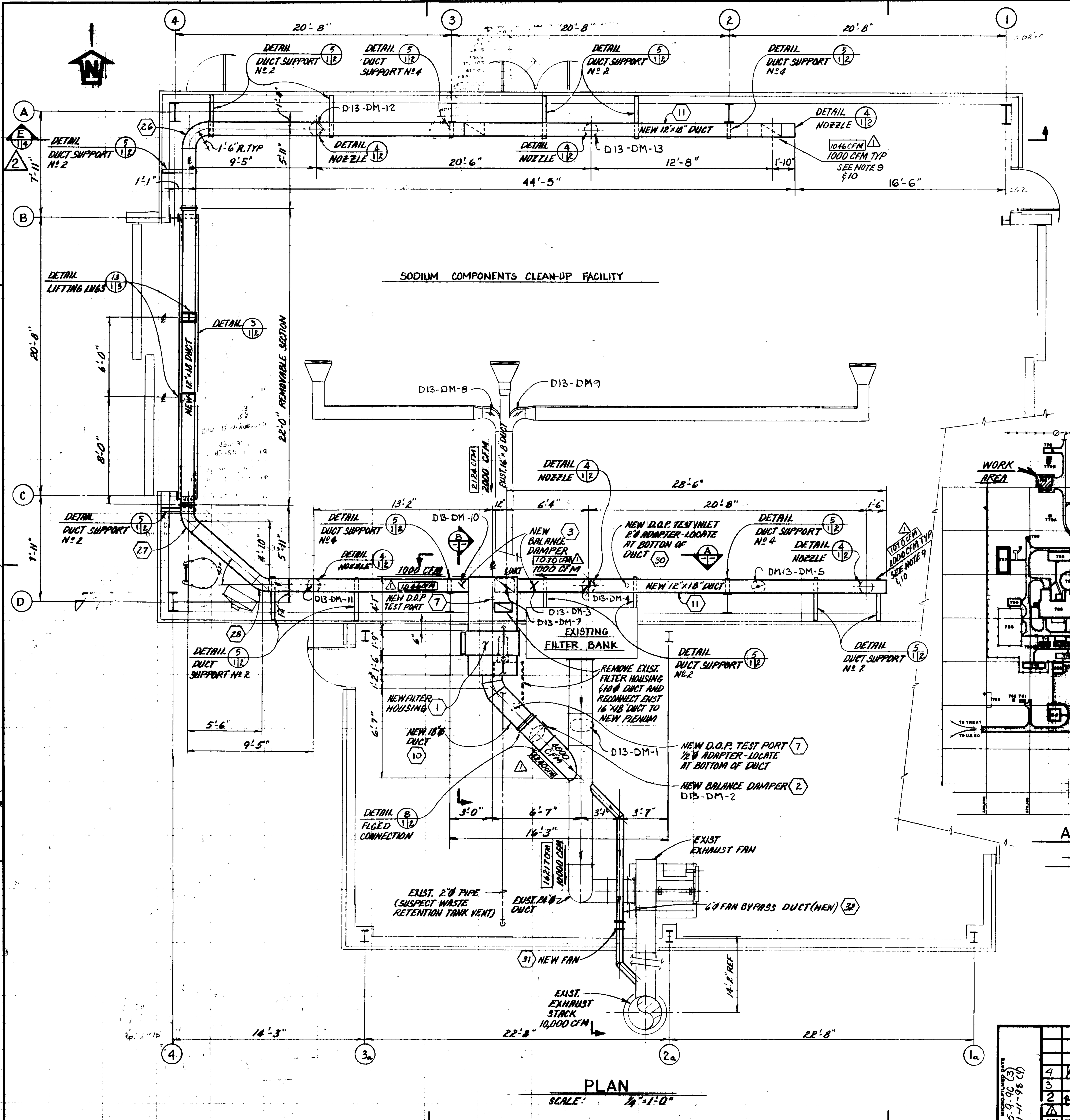
Drawings of SCMS Process Ventilation System

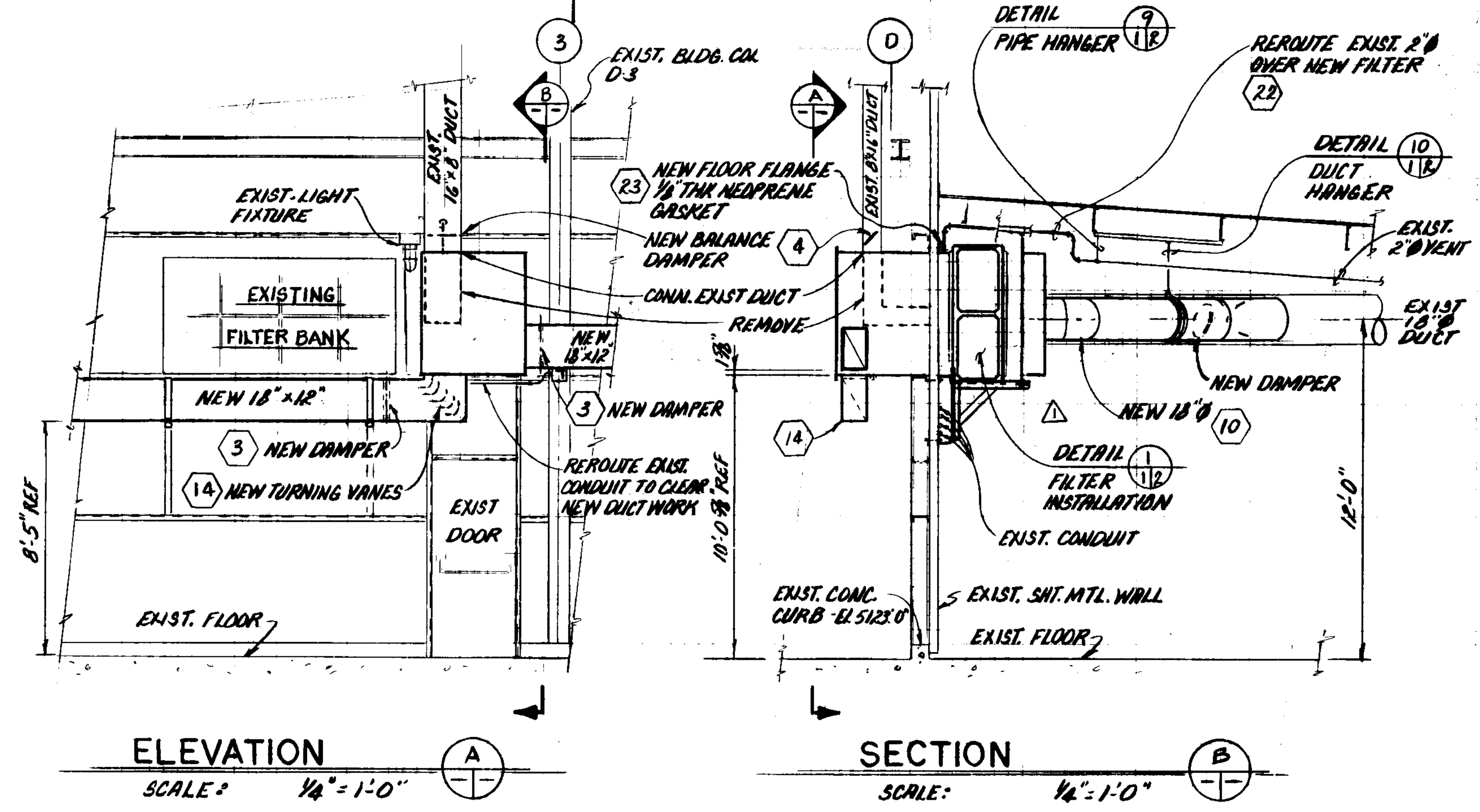
Process Ventilation System, SCMS Facility No. 793, Plans and Sectors

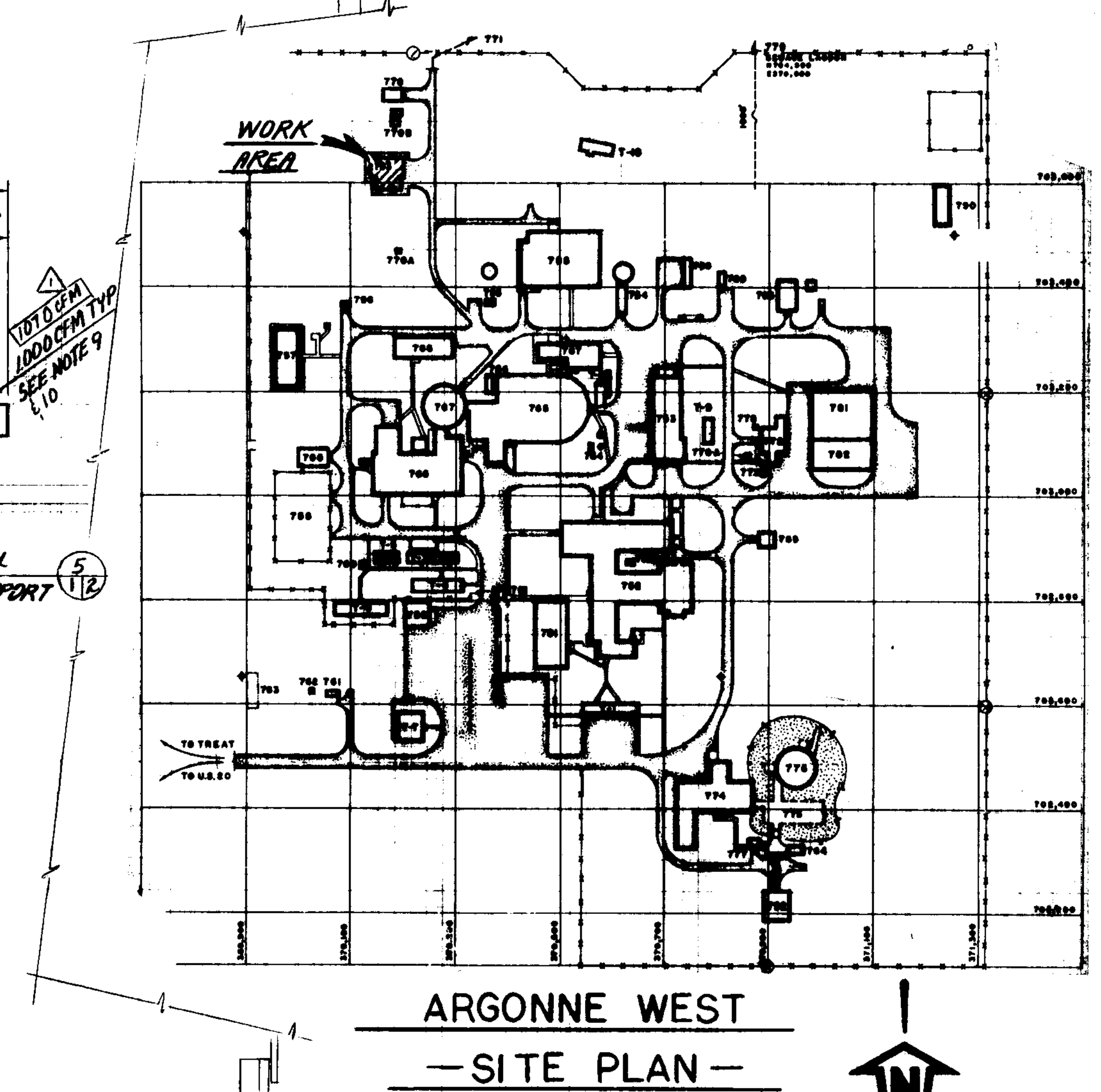
748529 (Sheet 1-2 of 4) (Alternate Id: W7930-0201-DD)

EBR-II SCMS Water Wash Installation Plan @ El. 148’-0”

692265 (Sheet 2 of 26) (Alternate Id: E5179-0003-DD)







GENERAL NOTES

1. SECTION AND DETAILS INDICATED ON THIS DRAWING ARE IDENTIFIED AS SHOWN
   LETTER DENOTES SECTION — NUMBER DENOTES DETAILS
   SHEET WHERE CUT — SHEET WHERE SHOWN
2. MAKE AND MODEL NUMBERS ARE SHOWN TO INDICATE THOSE ON WHICH THE DESIGN IS BASED, NOT TO ELIMINATE APPROVED EQUIVALENTS
3. NUMBERS INCLOSED IN A HEXAGON ⬡ INDICATES PARTS CALLED IN THE PARTS LIST, SEE DRAWING Nº W7930-0201-PL
4. EXCEPT AS NOTED TRANSVERSE JOINTS TO BE HEMMED 'S' SLIP / DRIVE SLIP AND SEALED ALL AROUND WITH SOLDER OR APPROVED EQUIVALENT.
5. FLAT AREAS OF DUCT OVER 18 INCHES WIDE SHALL BE STIFFENED BY CROSS BREAKING
6. PLENUM SIZE TO BE VERIFIED WITH FILTER HOUSING FOR PROPER FIT UP.
7. SHOP PRIME ALL DUCT SUPPORTS AND CARBON STEEL FRAMES AND FINISH PAINT TO MATCH EXISTING STRUCTURE
8. ALL WELDING TO BE INACCORDANCE WITH AWS D-111
9. DESIGN AIR FLOW AT EACH NOZZLE IS 1,000 CFM IF NO OTHER NOZZLE IN DUCT RUN HAS AIR FLOWING. IF MORE THAN ONE NOZZLE IS OPEN THEN THE AIR FLOW (AT EACH NOZZLE) IS SUBSEQUENTLY REDUCED.
10. △1 VOLUMES INDICATED THUS ▭ ARE FLOWS MEASURED 2/28/76

MICRO-FILMED DATE 5-9-90 (3) 1-11-95 (4)

SYM	ZONE	CHANGE	BY	CHK'D	DATE
4		DCN W7930-079 (ECA-5589)			
3		PER DCN W7930-071	G.H	JDL	5/7/90
2		PER DCN 7930-047			11-27-79
△1		REVISED PER DCN 7930-020	RGD	JDL	2/28/76

[redacted]

DRAWING CONSISTING OF 4 SHEETS

APPR'D	DATE	APPR'D	DATE
L.C. WITBECK	8/11/75	R.A. WASHBURN	8/13/75
J.W. AUER	8/11/75	C.M. HETTRICK	8/13/75
J.D. LEMAN	8/13/75		

DRAWN BY	DATE	SERVICE REQUEST
R.G. DALTON	6/16/75	80973/63988
CHECKED		PROJECT MGR.
J. LEWIS	6/24/75	J. D. LEMAN
RESP. ENGINEER		APPR'D/RELEASED
H Swanson		RP Nean
		DATE 6-16-75

REF. NO. | NEXT ASSEMBLY | REQ'D

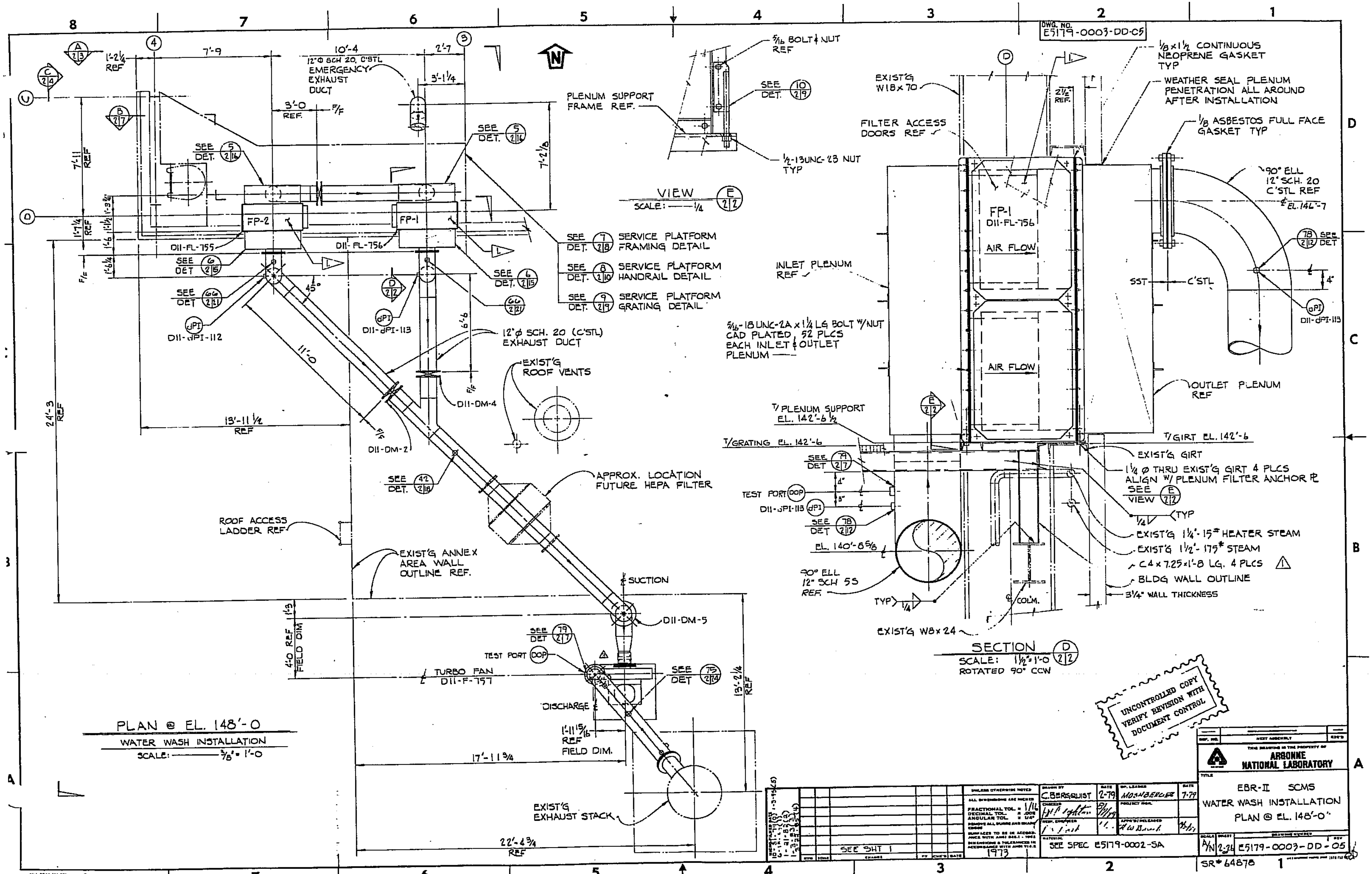
THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

TITLE: PROCESS VENTILATION SYSTEM
SCMS FACILITY Nº 793
PLANS AND SECTIONS
ARGONNE WEST — IDAHO

SHEET 1 of 4 — DRAWING NUMBER W7930-0201-DD-04

ANL-894


NEW FILTER INSTALLATION DETAIL 1/2
NEW FILTER SUPPORT DETAIL 2 SCALE: 3/4"=1'-0"
1 REQ'D
NEW REMOVABLE DUCT SECTION DETAIL 3 SCALE: 3/4" = 1'-0"
NOTE: FOR LIFTING LUGS SEE DETAIL 13 FOR LOCATION SEE PLAN ON SHT 1
NEW NOZZLE DETAIL 4 SCALE: 3/4" = 1'-0"
NEW FLANGED CONNECTION DETAIL 6 HALF SCALE TYPICAL - 2 PLACES
NEW FLANGED CONNECTION DETAIL 7 HALF SCALE TYPICAL - 2 PLACES
NEW FLANGED CONNECTION DETAIL 8 HALF SCALE TYPICAL - 2 PLACES
NOTE: FLANGE ANGLE MAY BE MADE UP FROM 11 GA SHEET
NEW PIPE HANGER DETAIL 9 SCALE: 3/4" = 1'-0" 7 REQ'D
NEW DUCT SUPPORT DETAIL 5 SCALE: 3/4" = 1'-0"
Nº 1 1 REQD AS SHOWN
Nº 5 1 REQD OPPOSITE HAND
Nº 2 12 PLACES
Nº 3 2 PLACES
Nº 4 4 PLACES
NEW DUCT HANGER DETAIL 10 SCALE: 3/4" = 1'-0" 1 REQ'D
DETAIL 11
UNCONTROLLED COPY - VERIFY REVISION WITH DOCUMENT CONTROL
ARGONNE NATIONAL LABORATORY
PROCESS VENTILATION SYSTEM
SCMS, FACILITY Nº 793
MISC. DETAILS
DRAWN BY DALTON
CHECKED J. LEWIS
SERVICE REQUEST 80973/63988
PROJECT MGR. J. D. LEMAN
DATE 6-16-75
ARGONNE WEST INEL
SHEET 2 OF 4
W7930-0201-DD-04


DWG. NO. E5179-0003-DD-05
PLAN @ EL. 148'-0
WATER WASH INSTALLATION
SCALE: 3/8" = 1'-0
12"φ SCH 20, C'STL EMERGENCY EXHAUST DUCT
SEE DET. 5 2|16
FP-2
FP-1
D11-FL-755
D11-FL-756
SEE DET 6 2|5
SEE DET 66 2|21
D11-dPI-112
D11-dPI-113
12"φ SCH. 20 (C'STL) EXHAUST DUCT
EXIST'G ROOF VENTS
D11-DM-4
D11-DM-2
SEE DET. 42 2|18
APPROX. LOCATION FUTURE HEPA FILTER
ROOF ACCESS LADDER REF
EXIST'G ANNEX AREA WALL OUTLINE REF.
SUCTION
D11-DM-5
TEST PORT DOP
SEE DET 79 2|7
TURBO FAN D11-F-757
DISCHARGE
SEE DET 75 2|24
1'-11 5/16 REF FIELD DIM.
4'-0 REF FIELD DIM
17'-11 3/4
22'-4 3/4 REF
13'-11 1/2 REF
24'-3 REF
13'-2 1/4 REF
EXIST'G EXHAUST STACK
PLENUM SUPPORT FRAME REF.
5/16 BOLT & NUT REF
SEE DET. 10 2|9
1/2-13UNC-2B NUT TYP
VIEW E 2|2
SCALE: — 1/4
SEE DET. 7 2|8 SERVICE PLATFORM FRAMING DETAIL
SEE DET. 8 2|10 SERVICE PLATFORM HANDRAIL DETAIL
SEE DET. 9 2|9 SERVICE PLATFORM GRATING DETAIL
EXIST'G W18x70
FILTER ACCESS DOORS REF
1/8x1 1/2 CONTINUOUS NEOPRENE GASKET TYP
WEATHER SEAL PLENUM PENETRATION ALL AROUND AFTER INSTALLATION
1/8 ASBESTOS FULL FACE GASKET TYP
90° ELL 12" SCH. 20 C'STL REF
EL. 144'-7
SEE DET 78 2|12
D11-dPI-113
FP-1 D11-FL-756
AIR FLOW
INLET PLENUM REF
5/16-18 UNC-2A x 1 1/4 LG BOLT W/NUT CAD PLATED, 52 PLCS EACH INLET & OUTLET PLENUM
SST
C'STL
OUTLET PLENUM REF
T/PLENUM SUPPORT EL. 142'-6 1/2
T/GRATING EL. 142'-6
T/GIRT EL. 142'-6
EXIST'G GIRT
1 1/4 φ THRU EXIST'G GIRT 4 PLCS ALIGN W/ PLENUM FILTER ANCHOR PL
SEE VIEW E 2|2
TYP
EXIST'G 1 1/4"-15# HEATER STEAM
EXIST'G 1 1/2"-175# STEAM
C4x7.25x1'-8 LG. 4 PLCS
BLDG WALL OUTLINE
3 1/4" WALL THICKNESS
TEST PORT DOP
D11-dPI-113
SEE DET 78 2|12
EL. 140'-8 5/8
90° ELL 12" SCH 5S REF.
COLM.
EXIST'G W8x24
SECTION D 2|2
SCALE: 1 1/2"=1'-0
ROTATED 90° CCW
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ARGONNE NATIONAL LABORATORY
EBR-II SCMS
WATER WASH INSTALLATION
PLAN @ EL. 148'-0"
C. BERGQUIST 2-79
SEE SPEC E5179-0002-SA
SEE SHT 1
1973
A/N 2-24 E5179-0003-DD-05 1
SR# 64878

Attachment D-17

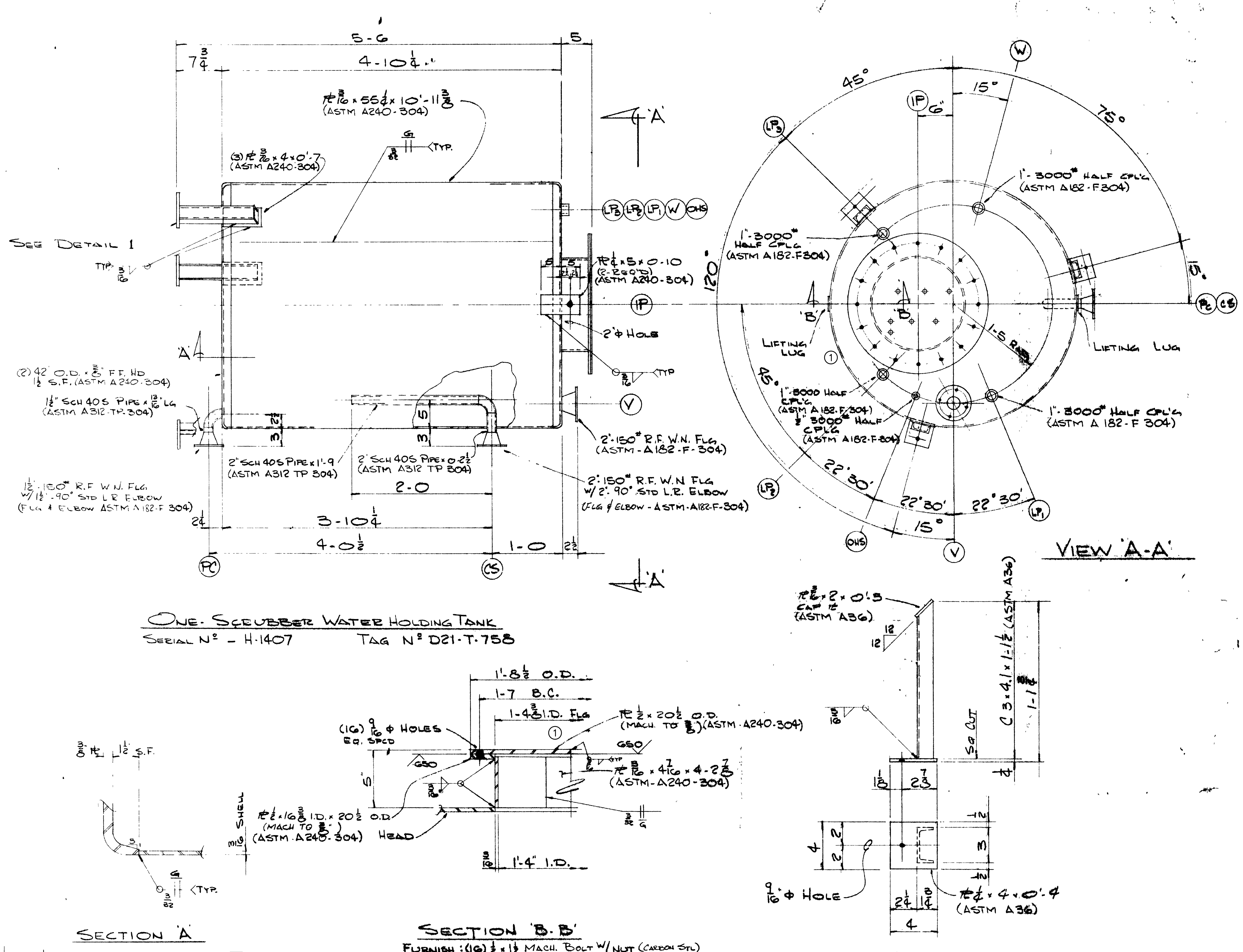
Photograph of SCMS Scrubber Water Tank

SCMS Scrubber Water Tank
Photo taken August 2013

Attachment D-18

Drawing of SCMS Scrubber Water Tank

692268 (Sheet 1 of 1) (Alternate Id: E5179-0006-DD)



Note:
1) All welds on inside of tank shall be ground smooth
2) Provide name plate with the following information -
Tank Name - Scrubber Water Holding Tank
Tag Number - D21-T-758
Design Pressure - Exterior 5 PSIG, Interior 60 Inches W.C. @ 200°F
Weight - 919 lbs
Capacity - 350 Gallons
Manuf. Name Titan Steel Corp
Date of Fabrication January 1980
3) For label use back side of old API label
4) Work with Customer Spec Sheet Items 1 thru 14
5) Interior to be cleaned of all foreign matter
6) Shop tolerance ± 3/16"

① 7. NEXT ASSEMBLY, DWG. 761127

MK Nº	TYPE	SERVICE
OHS	1/2" - 3000# Half Cplg	Sodium Hydroxide Sampling
W	1" - 3000# Half Cplg	Makeup Water
LP_3	1" - 3000# Half Cplg	Level Probe
LP_2	1" - 3000# Half Cplg	Level Probe
LP_1	1" - 3000# Half Cplg	Level Probe
V	2" - 150# R.F. W.N. Flg	Vent
IP	16" Manhole	
PC	1 1/2" - 150# RF WN Flg	Pump Caustic
CS	2" - 150# R.F. W.N. Flg	Caustic Supply

INDEX CODE NUMBER				
AREA	TYPE	CL	ORIG	SERIAL
273	0793	53	845	692268

SYM	ZONE	CHANGE	BY	CHK'D	DATE
1		SEE ECR 576927	ME		5/18 2010

NO.	DATE	MADE BY	CHK. BY	DESCRIPTION
4	2-13-80	PW		Changed Bolt To Carbon Steel
3	2-11-80	PW		Revised Per Customer Approval Print
2	1-21-80	PW		Added Handle To M.H., Notes 5 & 6, Weld Symbols Rev., Note 1 & Paint Rev.
1	1-11-80	PW		Added Lifting Lugs

REFERENCES: SK-5179-2

TITAN STEEL CORPORATION
205 East 21st South, Phone (801) 486-0721 — P.O. Box 15435, Salt Lake City, Utah 84115

SCRUBBER WATER HOLDING TANK
3'-6" Φ x 4-10 1/4
SERIAL Nº H-1407 TAG Nº D21-T-758

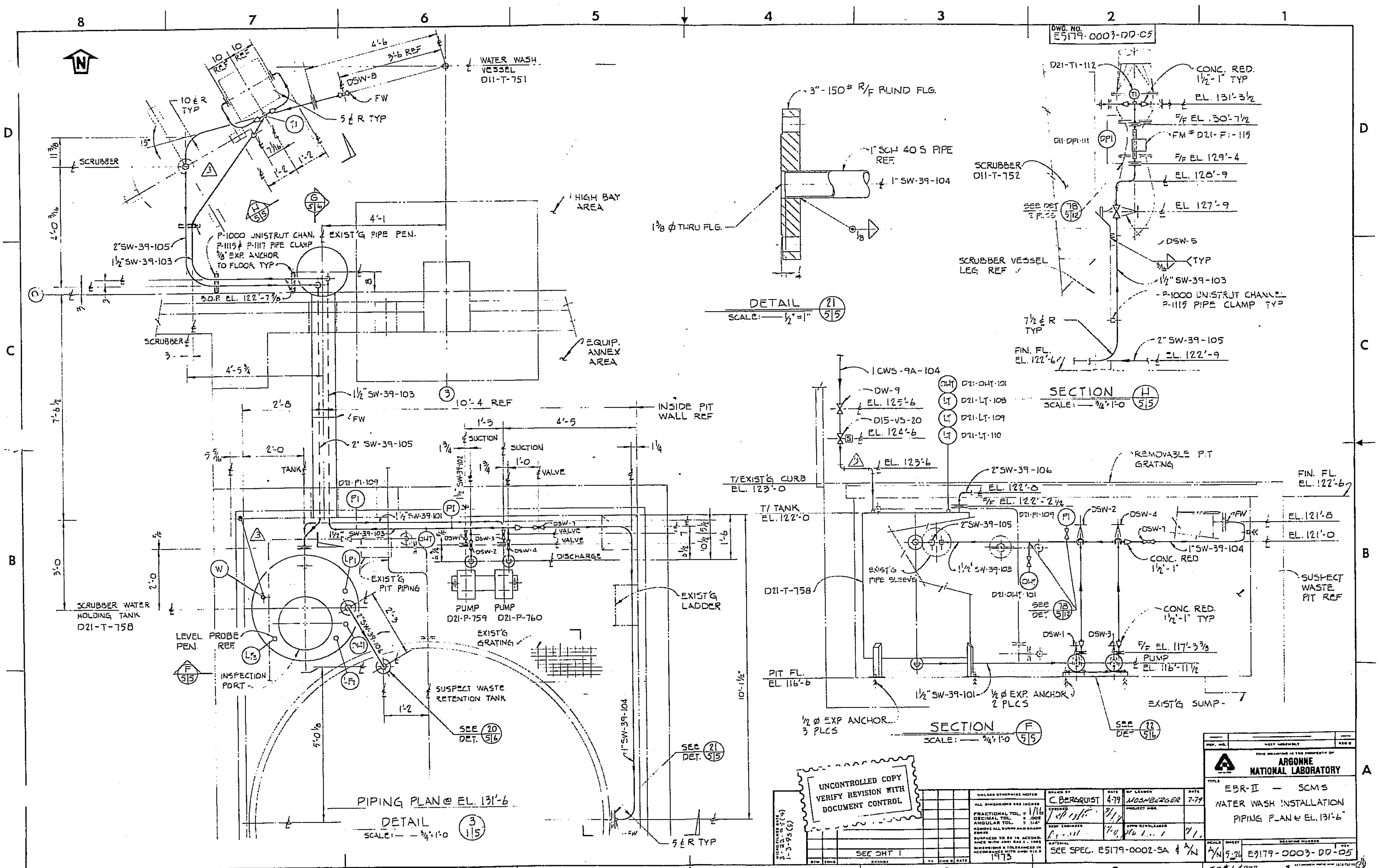
HOLES: As Noted
PAINT: No Paint Unl.
ENGINEER:
CUSTOMER: Argonne National Lab.
DR. BY: PW DATE: 1-8-80 CHK'D BY: DATE
P.O. IF-39988
JOB NO.: C-7820
SHEET 1 OF 1
ANL DRAWING NUMBER E5179-0006-DD - REV. 01

Attachment D-19

Drawing of SCMS Scrubber Water Tank and Pumps

EBR-II SCMS Water Wash Installation Piping Plan

692265 (Sheet 5 of 26) (Alternate Id: E5179-0003-DD)

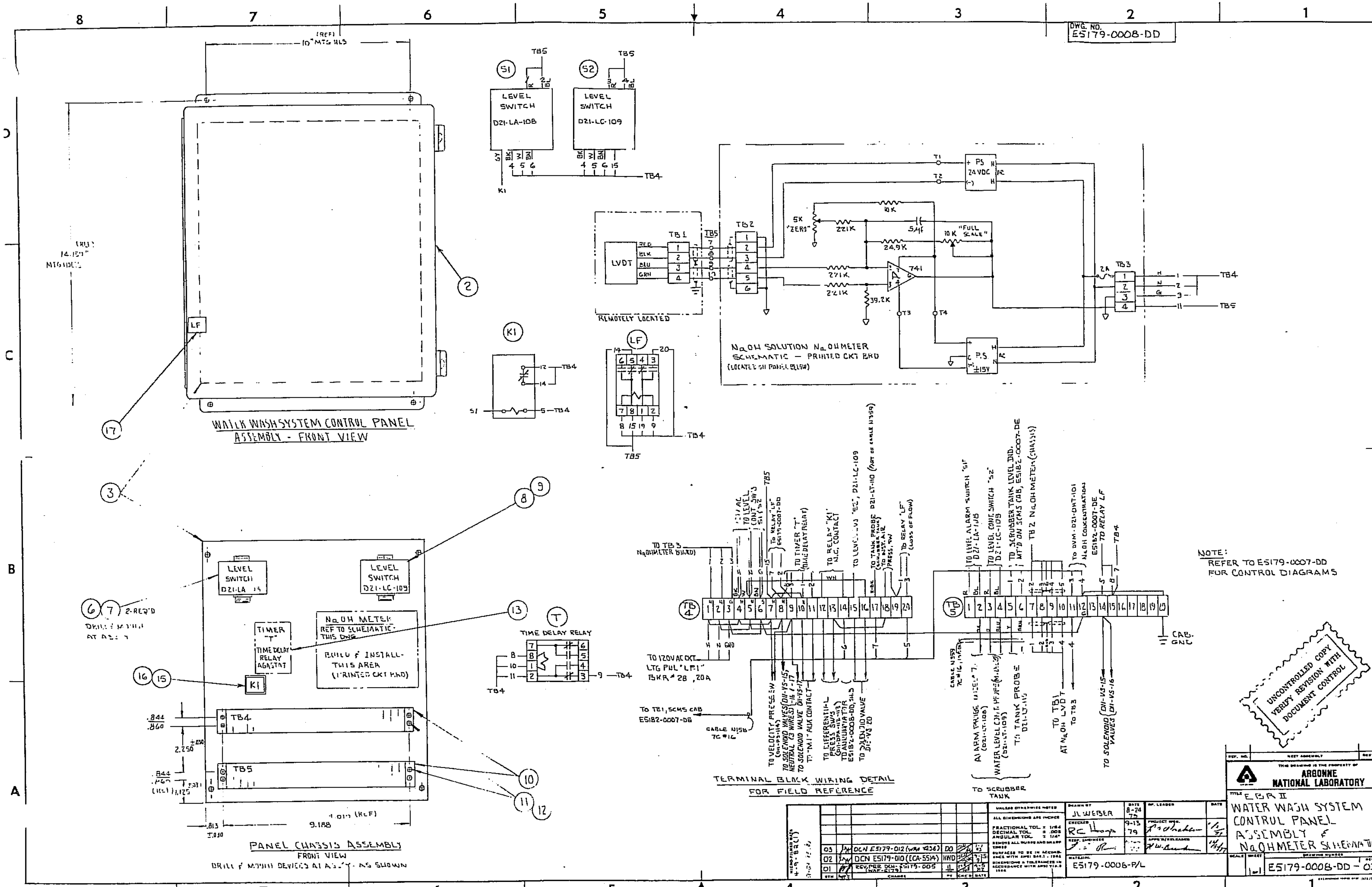

DWG. NO. E5179-0003-DD-C5
WATER WASH VESSEL D11-T-751
SCRUBBER
HIGH BAY AREA
EQUIP. ANNEX AREA
P-1000 UNISTRUT CHAN. P-1115 & P-1117 PIPE CLAMP 3/8" EXP. ANCHOR TO FLOOR TYP
EXIST'G PIPE PEN.
B.O.P. EL. 122'-7 3/8
2"SW-39-105
1 1/2"SW-39-103
INSIDE PIT WALL REF
SUCTION
VALVE
DISCHARGE
PUMP D21-P-759
PUMP D21-P-760
EXIST'G PIT PIPING
EXIST'G LADDER
EXIST'G GRATING
SCRUBBER WATER HOLDING TANK D21-T-758
LEVEL PROBE PEN.
INSPECTION PORT
SUSPECT WASTE RETENTION TANK
SEE DET. 20/5|6
SEE DET. 21/5|5
1"SW-39-104
5 ℄ R TYP
PIPING PLAN @ EL. 131'-6
DETAIL 3/1|5
SCALE: 3/4"=1'-0
3"-150# R/F BLIND FLG.
1" SCH 40 S PIPE REF.
1" SW-39-104
1 3/8 φ THRU FLG.
DETAIL 21/5|5
SCALE: 1/2"=1"
D21-TI-112
CONC. RED. 1 1/2"-1" TYP
EL. 131'-3 1/2
F/F EL. 130'-7 1/2
FM # D21-FI-115
D11-DPI-111
F/F EL. 129'-4
SCRUBBER D11-T-752
EL. 128'-9
EL. 127'-9
SEE DET 78/5|12 2 PLCS
DSW-5
SCRUBBER VESSEL LEG REF
1 1/2" SW-39-103
P-1000 UNISTRUT CHANNEL P-1115 PIPE CLAMP TYP
7 1/2 ℄ R TYP
2" SW-39-105
FIN. FL. EL. 122'-6
EL. 122'-9
SECTION H/5|5
SCALE: 3/4"=1'-0
1 CWS-9A-104
DW-9
EL. 125'-6
D15-VS-20
EL. 124'-6
EL. 123'-6
D21-OHT-101
D21-LT-108
D21-LT-109
D21-LT-110
REMOVABLE PIT GRATING
T/EXIST'G CURB EL. 123'-0
T/ TANK EL. 122'-0
2"SW-39-106
EL. 122'-8
F/F EL. 122'-2 1/2
D21-PI-109
DSW-2
DSW-4
DSW-7
EL. 121'-8
EL. 121'-0
1"SW-39-104
CONC. RED 1 1/2"-1"
SUSPECT WASTE PIT REF
D21-T-758
EXIST'G PIPE SLEEVE
CONC. RED. 1 1/2"-1" TYP
F/F EL. 117'-3 3/8
PUMP ℄ EL. 116'-11 1/2
PIT FL. EL. 116'-6
1 1/2"SW-39-101
1/2 φ EXP. ANCHOR 2 PLCS
EXIST'G SUMP
1/2 φ EXP ANCHOR 3 PLCS
SECTION F/5|5
SCALE: 3/4"=1'-0
SEE DET 22/5|6
UNCONTROLLED COPY VERIFY REVISION WITH DOCUMENT CONTROL
ARGONNE NATIONAL LABORATORY
EBR-II — SCMS
WATER WASH INSTALLATION
PIPING PLAN @ EL. 131'-6"
DRAWN BY C. BERGQUIST 4-79
MOSHBERGER 7-79
SEE SPEC. E5179-0002-SA & A/N
SEE SHT 1
E5179-0003-DD-05
1973

Attachment D-20

Drawing of SCMS Water Wash System Control Panel Assembly

and NaOH Meter Schematic

692270 (Sheet 1 of 1) (Alternate Id: E5179-0008-DD)



DWG. NO. E5179-0008-DD
10" MTG HLS (REF)
14.150" MTG HOLES (REF)
S1
LEVEL SWITCH D21-LA-108
S2
LEVEL SWITCH D21-LC-109
TB5
TB4
K1
LVDT
RED
BLK
BLU
GRN
TB1
TB2
TB3
REMOTELY LOCATED
+ PS 24 VDC (-)
5K "ZERO"
221K
10K
5μf
10K "FULL SCALE"
24.9K
741
221K
39.2K
T1
T2
T3
T4
2A
P.S ±15V
NaOH SOLUTION NaOH METER SCHEMATIC – PRINTED CKT BRD
(LOCATED ON PANEL BELOW)
LF
WATER WASH SYSTEM CONTROL PANEL ASSEMBLY – FRONT VIEW
T
TIME DELAY RELAY
LEVEL SWITCH D21-LA
LEVEL SWITCH D21-LC-109
TIMER "T" TIME DELAY RELAY AGASTAT
NaOH METER REF TO SCHEMATIC THIS DWG
BUILD & INSTALL THIS AREA (PRINTED CKT BRD)
2-REQ'D
DRILL & MOUNT AT ASSY
TB4
TB5
9.188
PANEL CHASSIS ASSEMBLY
FRONT VIEW
DRILL & MOUNT DEVICES AT ASSY AS SHOWN
TO TB3 NaOHMETER BOARD
TO 120VAC CKT LTG PNL "LP1" BKR #28, 20A
TO TB1, SCMS CAB E5182-0007-DB
CABLE N158 7C#16
TO VELOCITY PRESS SW
TO SOLENOID VALVES
TO SOLENOID VALVE
TO "M1" AUX CONTACT
TO DIFFERENTIAL PRESS SW
TO AUTO/VIATOR
TO SOLENOID VALVE
TO RELAY "LF"
TO TIMER "T" (TIME DELAY RELAY)
TO RELAY "K1" N.C. CONTACT
TO LEVEL SW'S "S2", D21-LC-109
TO TANK PROBE D21-LT-110 (PART OF CABLE N159)
TO RELAY "LF" (LOSS OF FLOW)
TO LEVEL ALARM SWITCH "S1" D21-LA-108
TO LEVEL CONT. SWITCH "S2" D21-LC-109
TO SCRUBBER TANK LEVEL IND. MT'D ON SCMS CAB, E5182-0007-DE
TB2 NaOH METER (CHASSIS)
TO DVM - D21-DHT-101 NaOH CONCENTRATION E5182-0007-DE
TO RELAY LF
ALARM PROBE
WATER LEVEL CONT. PROBE
TO TANK PROBE D21-LT-110
TO TB1 AT NaOH LVDT
TO TB3
TO SOLENOID VALVES (D11-VS-15, D11-VS-16)
TO SCRUBBER TANK
CAB. GND
TERMINAL BLOCK WIRING DETAIL FOR FIELD REFERENCE
NOTE: REFER TO E5179-0007-DD FOR CONTROL DIAGRAMS
UNCONTROLLED COPY VERIFY REVISION WITH DOCUMENT CONTROL
03 DCN E5179-012 (WAF 1236)
02 DCN E5179-010 (ECA-5514)
01 REV. PER DCN-E5179-005
DRAWN BY JL WEBER 8-24-79
CHECKED RC 9-13-79
ARGONNE NATIONAL LABORATORY
EBR II
WATER WASH SYSTEM CONTROL PANEL ASSEMBLY & NaOH METER SCHEMATIC
E5179-0008-DD - 03

Attachment D-21

Photographs of SCMS Carbonation Vessel

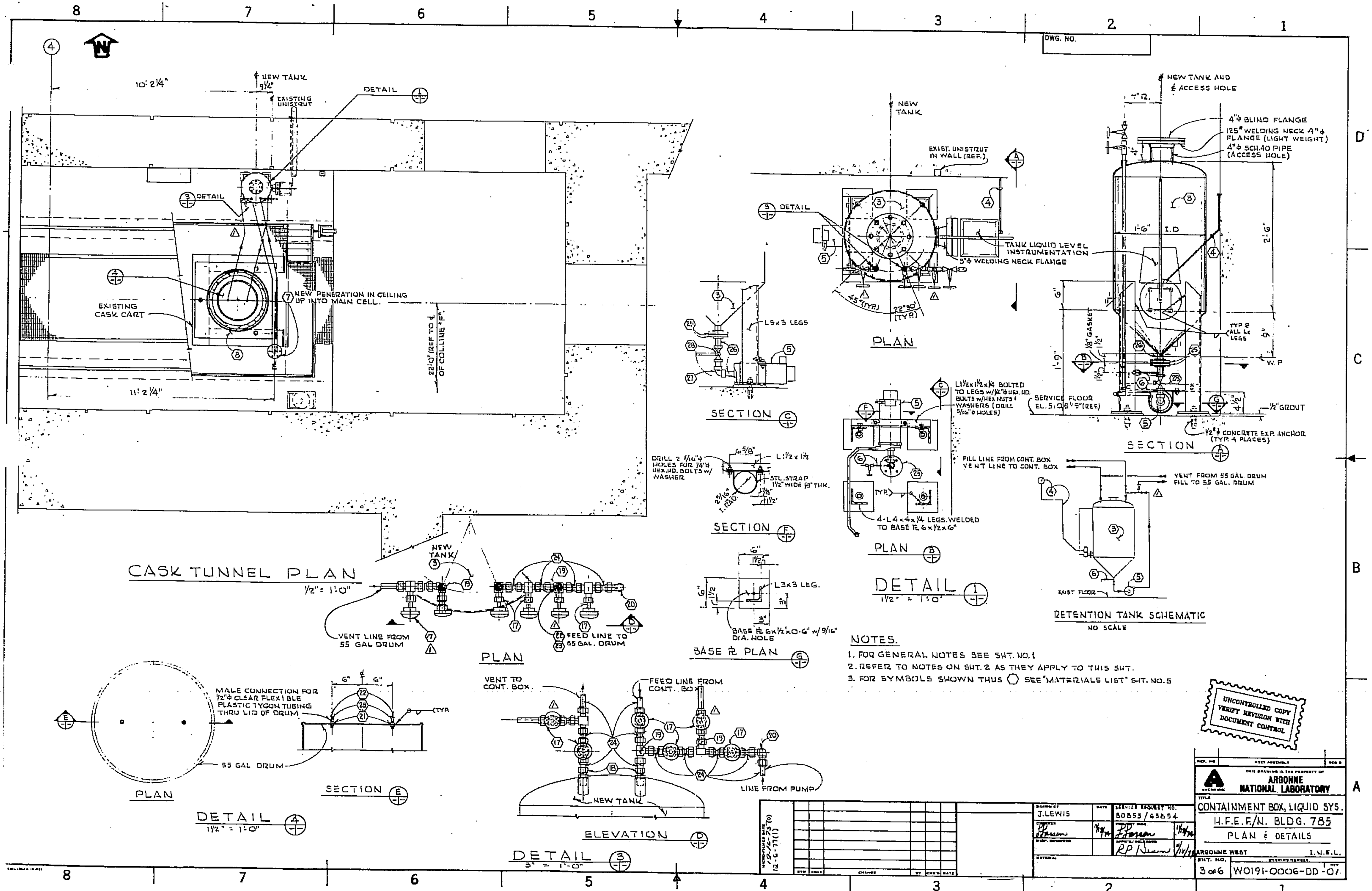
Sodium Components Maintenance Shop
Photo taken August 2013

Sodium Components Maintenance Shop
Photo taken August 2013

Attachment D-22

Drawing of SCMS Carbonation Vessel

737675 (Sheet 3 of 6) (Alternate Id: W0191-0006-DD)



NOTES.

1. FOR GENERAL NOTES SEE SHT. NO. 1
2. REFER TO NOTES ON SHT. 2 AS THEY APPLY TO THIS SHT.
3. FOR SYMBOLS SHOWN THUS ⬡ SEE 'MATERIALS LIST' SHT. NO. 5

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ARGONNE NATIONAL LABORATORY

CONTAINMENT BOX, LIQUID SYS.
H.F.E.F./N. BLDG. 785
PLAN & DETAILS

DRAWN BY J. LEWIS
SERVICE REQUEST NO. 80853/63854
ARGONNE WEST I.N.E.L.
SHT. NO. 3 of 6
W0191-0006-DD-07

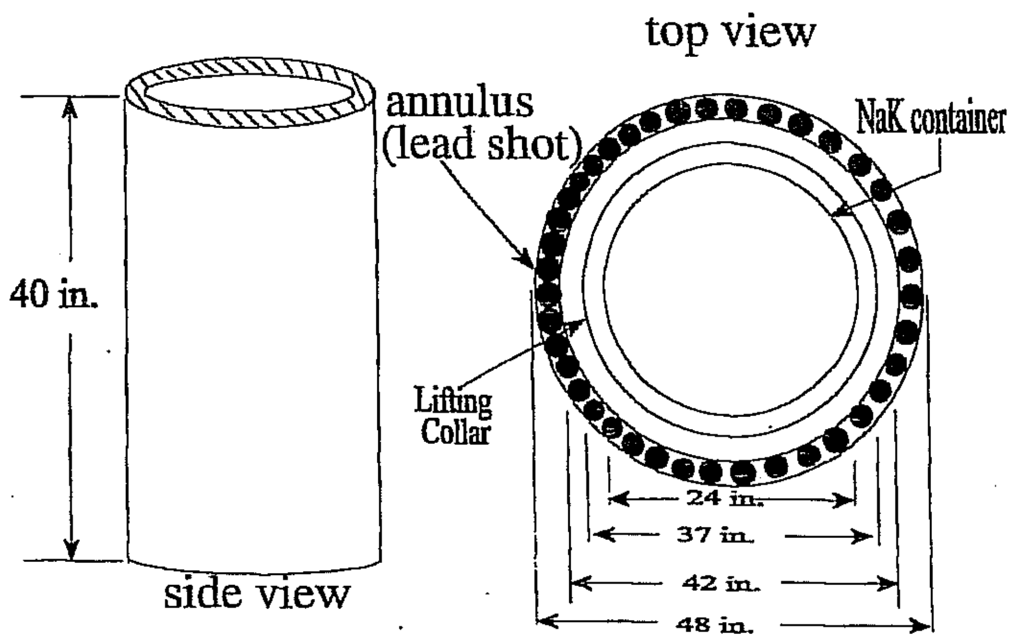
Attachment D-23

Photograph of SCMS Fixed Solidification Station

SCMS SOLIDIFICATION STATION
Photo taken August 2013

Attachment D-24

Example of Secondary Containment Overpack for 55-Gal Drum



Notes:

1. Material: 114 in. carbon steel.
2. The base is to be of all welded construction
3 Welding shall be in accordance with INL Welding Procedure.
4 All welds to be continuous and to be on the inside of pipe
5. All welds shall be visually inspected for holes and cracks. Any holes or cracks detected shall be repaired.

55-GALLON DRUM SHIELDED OVERPACK

Attachment D-25

Final Report for Certification of Addendum No.1 to the Treatment Documentation for Experimental Breeder Reactor I Sodium Potassium Alloy at the Sodium Components Maintenance Shop and Certification of System Installation

SCIE-COM-231-96

FINAL REPORT FOR CERTIFICATION OF ADDENDUM NO 1 TO THE TREATMENT DOCUMENTATION FOR EXPERIMENTAL BREEDER REACTOR I SODIUM POTASSIUM ALLOY AT THE SODIUM COMPONENTS MAINTENANCE SHOP AND CERTIFICATION OF SYSTEM INSTALLATION

Prepared for

Argonne National Laboratory - West

P.O. Box 2528
Idaho Falls, ID 83403-2528

Prepared by
C.L. Williams, P.E.
ALPHA Engineers
850 S. Main St.
Pocatello, ID 83204
and
M.A. Malone
SCIENTECH, Inc.
1585 N. Skyline Drive
Idaho Falls, ID 83402

January 8, 1996

FINAL REPORT FOR CERTIFICATION OF ADDENDUM NO. 1 TO THE TREATMENT DOCUMENTATION FOR EXPERIMENTAL BREEDER REACTOR I SODIUM POTASSIUM ALLOY AT THE SODIUM COMPONENTS MAINTENANCE SHOP AND CERTIFICATION OF SYSTEM INSTALLATION

The purpose of this final report is to certify in accordance with 40 CFR 264.192 (a) the "Addendum No. 1 to the Treatment Documentation for Experimental Breeder Reactor I Sodium Potassium Alloy at the Sodium Components Maintenance Shop" (Document No. W0001-2001-ES-01 dated January 6, 1996) prepared by J.A. Buzzell, attesting that the design of the Caustic Neutralization Vessel addition to the ARVFS NaK process has sufficient structural integrity and is acceptable for handling and treating hazardous waste in the form of 25% (KOH/NaOH) caustic solution by neutralization with carbon dioxide (CO_2). The subject addendum to the previously certified written assessment of the ARVFS NaK process, addresses the Caustic Neutralization Vessel addition to the existing system. The Written Assessment is required by RCRA in 40 CFR 264.192 and shows that the foundation, structural support, seams, connections, and pressure controls for the Caustic Neutralization Vessel are adequately designed, have sufficient structural strength, compatibility with the hazardous waste, and corrosion protection to ensure that they will not collapse, rupture, or fail during the design life of the ARVFS NaK process. This final report includes the comments provided on the initial version of the addendum dated January 2, 1996, Argonne's resolution of those comments, and certification of the revised addendum by a registered professional engineer.

In addition, this final report certifies the installation of the Caustic Neutralization Vessel addition in accordance with the applicable parts of 40 CFR 264.192 (b) through (h) and as required by 40 CFR 264.192 (g). The inspection of system installation ensures that no weld breaks, punctures, scrapes of protective coatings, cracks, corrosion, or other structural damage, or inadequate installation is present; that all new tanks and ancillaries have been tested for tightness and repaired as necessary; that all new ancillaries are supported and protected against physical damage and excessive stress; and that the type and the degree of corrosion protection necessary is provided. This final report includes a certification by a registered professional engineer that the Caustic Neutralization Vessel was properly installed.

Comments on the Addendum to the Written Assessment

1. The design standards of the additional piping and controls are assumed to be the same as the approved ARVFS NaK process. These design standards need to be stated or referenced in the written assessment for the neutralization modification per 40 CFR 264.192(a)(1).

2. The written assessment clearly states that the neutralization tank is a surplus tank designed and fabricated to specification W0191-0002-SA-00. The assessment should state that this specification to which the tank was built equals or exceeds the design requirements of the previously certified ARVFS NaK process with regard to pressure, temperature, and materials of construction, or simply state the applicable design standard for the tank per 40 CFR 264.192(a)(1)

3. The written assessment states that typical operations will never exceed an internal tank pressure of 8.5 psig. Additional discussion or justification (e.g., upset controls) should be provided as to why pressure and level controls for the tank are unnecessary per 40 CFR 264.192(c).

4. The P&ID for the modification does not include all the installed valves in the carbon dioxide supply and does not show the installed location of the pressure gauge. The P&ID should accurately represent the system and modifications.

5. The P&ID should show line sizes and valve sizes.

6. The P&ID should show tank volumes.

7. The P&ID should indicate what part of the system is existing and what part is new (neutralization modification).

8. The caustic neutralization tank is supported on four unbraced legs which are bolted to a wheeled dolly. The wheeled dolly is not anchored to the floor and could move during a seismic event or could be inadvertently moved by an operator. Movement of the dolly could cause the mechanical joints in the stainless steel tubing attached to the tank to leak or the dolly and tank could impact and damage other nearby systems. The dolly or the tank should be restrained from lateral movement and evaluated for overturning. The written assessment should address structural support of the neutralization tank system and state the design considerations per 40 CFR 264.192(a) and (a)(5)(ii).

9. It is assumed that the tank system foundations were assessed and certified for the Wash Water System and the approval is applicable to the neutralization tank modification. The written assessment should indicate the design considerations for the original foundation, per 40 CFR 264.192 (a) and (a)(5)(ii), and any impacts created by the modifications.

10. Since during the process of conducting the installation inspection of the neutralization tank modifications per 40 CFR 264.192(b), the system was also inspected for corrosion along with the other items indicated in the written assessment, then the written assessment should also indicate that item.

Argonne's Resolution of Comments

Argonne responded to the comments, with no exceptions taken, by providing additional information and modifying installation of the system. Argonne's resolution of all of the indicated comments were evidenced by modification of the Addendum (Document No. W0001-2001-ES-01, January 6, 1996) to the Written Assessment and modification of installation of the Caustic Neutralization Vessel system. Resolution of the comments was found to be satisfactory as evidenced by review of the revised Addendum to the Written Assessment and inspection of the modifications to the system installation.

Certifications

The following pages provide the descriptions, statements, and professional engineer certifications for the Addendum to the Written Assessment in accordance with 40 CFR 264.192 (a) and for the proper installation of the assessed system in accordance with 40 CFR 264.192 (g).

Certification of Written Assessment

The Addendum to the Written Assessment is certified, in accordance with 40 CFR 264.192 (a) and 40 CFR 270.11, as it attests that the design of the Caustic Neutralization Vessel system has sufficient structural integrity and is acceptable for handling and treating hazardous waste in the form of 25 % KOH/NaOH caustic solution. The Addendum includes all applicable information required by RCRA in 40 CFR 264.192 (a) and shows that the foundation, structural support, seams, connections, and pressure controls for the Caustic Neutralization Vessel system are adequately designed, have sufficient structural strength, compatibility with hazardous waste, and corrosion protection to ensure that they will not collapse, rupture, or fail during the design life of the system.

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 ARVFS NaK process, or those 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.

Charles L. Williams
1-9-96

C. L. Williams, P.E.
January 9, 1996

Certification of System Installation

The installation of the Caustic Neutralization Vessel system in the ARVFS NaK process is certified, in accordance with 40 CFR 264.192 (g) and 40 CFR 270.11, attesting that the system is properly installed in accordance with the requirements of paragraphs (b) through (f) of 40 CFR 264.192. Installation was verified through inspection of the installed system for weld breaks, punctures, scrapes of protective coatings, cracks, corrosion, or other structural damage, or inadequate installation is present; that all new tanks and ancillaries have been tested for tightness; that all new ancillaries are supported and protected against physical damage and excessive stress; and that the type and the degree of corrosion protection necessary is provided. In addition, any identified required repairs were performed and supervised or inspected prior to this certification.

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 ARVFS NaK process, or those 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.

Charles L. Williams
1-9-96

C. L. Williams, P.E.
January 9, 1996

Addendum No. 1

to the

Treatment Documentation

for

Experimental Breeder Reactor I

Sodium Potassium Alloy

at the

Sodium Components Maintenance Shop

Document No. W0001-2001-ES-01

Argonne National Laboratory

INEL, Idaho

January 6, 1996

Prepared By:

J. A. Buzzell

DESCRIPTION OF CAUSTIC NEUTRALIZATION VESSEL
(OPTIONAL PLAN)

The caustic neutralization vessel has been installed into the SCMS water wash system to provide an optional neutralization scenario to that previously described in this documentation (neutralization of caustic inside 55-gal drums). A demonstration of the drum neutralization process indicated that significant radiation exposure could be expected if this process was continued. Alternative neutralization methods were evaluated and the caustic neutralization vessel was adopted as the best alternative. It is expected that this optional method will prove acceptable and replace the drums as the preferred method.

The caustic neutralization vessel is a 30-gallon stainless steel tank with a conical bottom. It is classified as a new tank system and has been assessed, certified and tested in accordance with 40 CFR 265.192. The tank will be operated as a < 90-day accumulation tank in which treatment will occur under the provisions of 40 CFR 262.34. Inspections of the tank will be performed on a daily basis and recorded on the SCMS Operating Log and the Plant Services Roundsman Log. A record of waste added to and removed from the vessel will be maintained in accordance with the < 90-day requirements.

The tank is located next to the water wash vessel and over a diked concrete floor that has been painted with a corrosion resistant epoxy paint. The floor slopes to a drain leading to the suspect waste retention tank that provides additional secondary containment for the water wash system. Leak protection requirements are satisfied through the daily inspections.

Additional descriptions of the caustic neutralization vessel and the neutralization process are found in Addendum No. 1.

1 Purpose

This document provides a written assessment to incorporate the Caustic Neutralization Vessel as part of the ARVFS NaK process. Under the interim document, the KOH/NaOH caustic solution (resulting from reacting liquid sodium-potassium metal with water) was to be neutralized in 55-gallon drums prior to solidification. A full scale demonstration showed this approach to be impractical.

The neutralizing process is being modified to neutralize the caustic in a smaller stainless steel vessel connected to the water wash system. (The water wash system is previously approved for processing liquid sodium-potassium metal and recirculating the caustic.)

2 Description

(Refer to sketch TST317-7AA)

Caustic will be circulated through a 30-gallon stainless steel tank using the chemical pumps, piping and Scrubber Water Tank of the Water Wash System. The 25% KOH/NaOH caustic solution is being stored in the Scrubber Water Tank. Gaseous CO_2 will be injected into the recirculating flow in the Caustic Neutralization Vessel to neutralize the caustic. Once neutralized, the Caustic Neutralization Vessel will be drained and the neutralized caustic stored in the Scrubber Water Tank before solidification. Excess CO_2 is vented to the Water Wash System. Previously, gaseous CO_2 would have been injected into the caustic in 55-gallon drums just prior to solidification.

The tank selected was designed to hold rinse waste from metallography sample preparation but was never used. Its design is described in the Liquid Waste Transfer System for HFEF/N Station 2M Containment Box Design Criteria, specification W0191-0002-SA-00, and on drawings W0191-0006-DD-01 (6 sht's.).

This tank has been inspected for weld breaks, punctures, corrosion, and cracks. None were found. The tank is not coated. The original supports are being used. This tank is not subject to flotation, dislodgement or frost heaving. The tank is bolted to a 3 X 3 foot steel platform raised on casters and anchored to the concrete floor. The anchors are sufficiently strong to prevent horizontal motion during design-basis seismic events or inadvertent disturbances. In addition to the anchors, tipping is precluded by the platform base-to-tank height aspect. The foundation was previously approved for secondary containment.

Flow tests, using compressed air and water, were performed simulating conditions anticipated for neutralization. Prior to testing, the tank was successfully hydrostatically leak tested at 25 psig. Tank pressure never exceeded 8.5 psig during these tests. The design specification required the vessel be constructed of either 316 stainless steel or 304 stainless steel. Both steels are compatible with 25% KOH/NaOH.

Originally, neutralization was to occur in 55-gallon steel drums conforming to the ANSI standard for Material Handling (ANSI MH2-1991). The proposed tank, designed and fabricated per specification W0191-0002-SA-00, exceeds pressure, temperature and compatibility requirements for neutralization provided by the 55 gallon drum. Hydrostatic leak testing confirms this comparison.

The neutralization procedure limits temperature to less than 190°F. A thermocouple has been installed to verify this temperature is not exceeded. While the Caustic Neutralization Vessel is capable of withstanding pressures greater than 8.5 psig, the Water Wash Recirculation/Neutralization System, operating per the neutralization procedure, is incapable of greater pressures. Vessel pressure is relieved directly to the Water Wash Scrubber which operates at a negative pressure. Pressure is also monitored during neutralization. Caustic level is limited by the normal recirculating path - the Caustic Neutralization Vessel overflows to the Scrubber drain. Unintended overflow through the vent would return caustic to the drain. Flow and level are monitored through sight tubes in vent and overflow drain. After neutralization, the tank is verified empty through the overflow drain sight tube.

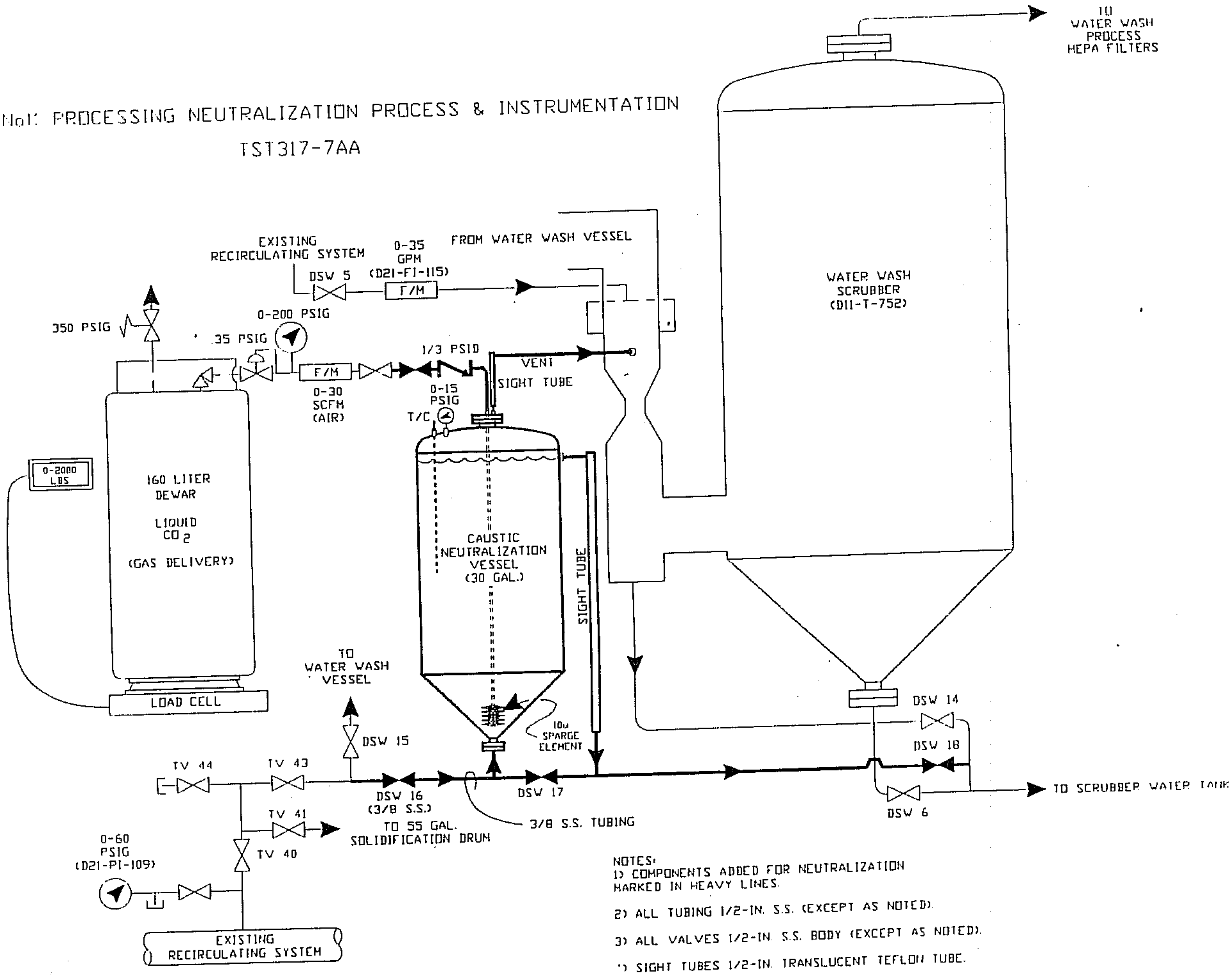
Tubing connections are made using same type fittings approved in the interim document as well as same type valves. Specifications for fittings and valves are stated in the attachment for Neutralization/Solidification System Set Up, TST317-H and conform to Swagelok and Whitey industrial standards. Connections have been pressurized with 3 psig argon gas and leak tested using a Gow Mac leak detector set on the most sensitive scale. Leaks have been repaired before the system is put into operation.

3 Conclusions

This assessment shows the tank and associated piping are suitable for containing 25% KOH/NaOH and gaseous CO_2 at anticipated pressures and temperatures. While equipment is being added, the process is fundamentally unchanged. All other conditions of the agreement will be met.

No1: PROCESSING NEUTRALIZATION PROCESS & INSTRUMENTATION

TS1317-7AA



NOTES:
1) COMPONENTS ADDED FOR NEUTRALIZATION MARKED IN HEAVY LINES.

2) ALL TUBING 1/2-IN. S.S. (EXCEPT AS NOTED).

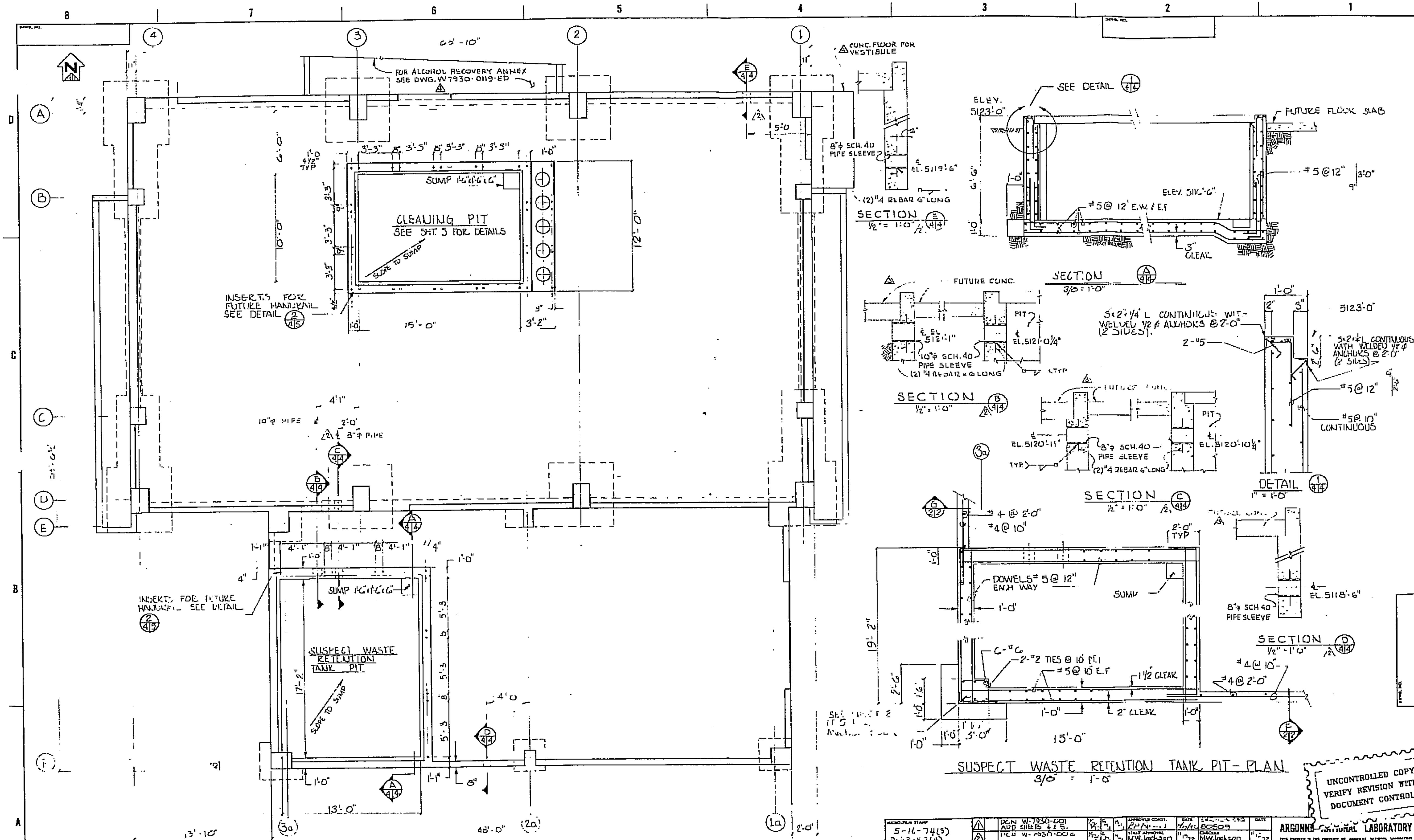
3) ALL VALVES 1/2-IN. S.S. BODY (EXCEPT AS NOTED).

4) SIGHT TUBES 1/2-IN. TRANSLUCENT TEFLON TUBE.

Attachment D-26

Drawing of SCMS Pit Plan and Details

749631 (Sheet 4 of 5) (Alternate ID: W7930-0101-DD)



SHEETS 4 & 5

DRAWING CONSISTING OF 2 SHEETS

APPR'D	DATE	APPR'D	DATE
J.W. AULT	11-17-72	J.R. DAVIS	11-17-72
R.C. WATSON	11-17-72	R.E. RICE	11-17-72
J. LEMAN	11-17-72	EARL D. GRAHAM	11-17-72
C.E. SEEVER	11-17-72		

MICRO-FILM STAMP: 5-16-74(3)

REV.	CHANGE
1	DCN W-7930-001 ADD SHEETS 4 & 5.
2	DCN W-7930-004
3	DCN W 7930-011
	FOR LATEST REV. SEE SHT. 1

STAFF APPROVAL: M.W. Jackson — CHECKED: M.W. Jackson
REPRESENTATIVE: H. LAWROSKI — DRAWN BY: J. OSTERHOUT 11-11-72

ARGONNE NATIONAL LABORATORY

SODIUM COMPONENTS CLEANUP FACILITY PHASE I
PIT PLAN & DETAILS
ARGONNE WEST

SCALE: AS NOTED | SHT. NO. 4 OF 5 | DATE 10-13-72

W7930-0101-DD-04

Attachment D-27

Documentation of Age of SCMS Water Wash Vessel

ARGONNE NATIONAL LABORATORY
SUPPLIER QUALITY CONTROL RELEASE

MO. / DAY / YR.	2. SUPPLIER NAME & LOCATION	3. SHIPPER NO. & MODE	4. ANL PROC. I.D. NO.
-24-80	PX ENGINEERING WOBURN, MA.	TRUCK	IF-3929

SHIPMENT NO.	6. PROJECT NAME/NO.	7. ANL PROC. REP.	8. ANL DESTINATION
PARTIAL SHIP ☐ FINAL SHIP ☑	EBR-II ANL-W	S. Wilson	ANL-W EBR-II SITE SCAVILLE, IDA

MATERIAL DESCRIPTION

NO.	PART OR MATERIAL NAME	PART NO.	TOTAL QTY.	LOT SIZE	QTY. INSP.	QTY. ACC.	SERIAL NO. USE ADD'L S IF REQUI
	WATER WASH VESSEL	SK5179-1	1	1	1	1	

CHECK LIST

A. MILL TEST REPORTS	✓	K. FIRST ARTICLE	N/A
B. CHECK ANALYSIS	✓	L. MANUAL & INSTR.	N/A
C. CERTIFICATE OF CONFORMANCE		M. PROCESS CERT.	✓
D. WELD REPORTS		N. IDENTIFICATION	✓
E. NDT REPORTS	✓	O. WELD SPECIMENS	✓
F. RADIOGRAPHIC FILM	✓	P. TEST BARS	✓
G. FUNCTIONAL TEST (PRESS & LEAK)	✓	Q. PARTS LIST	N/A
H. AS BUILT DRWG.	✓	R. I.D. AGE CONTROL	N/A
I. CODE CERTS.	✓	S. CLEANING	✓
J. PERSONNEL CERTS.		T. FINAL TEST REPORTS	✓
		U. PKG. WITNESS	✓

11. NONCONFORMANCES

SDR NO. CAR	PART NO.	QTY.	CL. YES
23842	SEE ABOVE	1	✓
23840	SEE ABOVE	1	✓

1. COMMENTS ANL Spec. E-5179-0001-SA-01

13. DOCUMENT PKG. FOR SQER ☑ DOCUMENT PKG. WITH SHIPMENT ☐

DOCUMENT PKG. SHIPPED TO S. Wilson NOTE: SHIPMENT NOT TO BE RELEASED WITHOUT COMPLETE DOCUMENT

SHIPMENT RELEASED:

CONDITIONAL (*) ☐ (*) EXPLAIN CONDITIONAL IN COMMENTS

UNCONDITIONAL ☑ BY SQER [signature] DATE 10, 24

THIS ANL SQC RELEASE DOES NOT CONSTITUTE FINAL ACCEPTANCE

0331 (5-72)

Job No.	Customer	Drawing No.	Spe. No.
625	ARGONNE NATIONAL LAB	625	IF-39393

Inspection Status: Source ☐ Receipt ☐ In-Process ☐ Final ☒

Item/ Description	Standards Applied	Actual Condition	Accept	Reject	Remarks/ Deficiency No.	Inspector Date
HYDROSTATIC TEST	86 PSIG	86 PSIG	✓			[signature] 10/1/80
	10 MINUTES MIN	10 MIN.	✓			
	GAUGE # 4	# 4	✓			
RESULTS	OK	OK	✓			

ARGONNE NATIONAL LABORATORY No. 26588

CUSTOMER DIV/BLDG. | MONTH / DAY / YEAR | DRWG. RT. NO. | REV.

SUPPLIER NAME | AUTHORIZATION DOCUMENT | ITEM NO.

PART OR MATERIAL NAME | J.C.R. | AQL NO.

MATERIAL CSID | LOT SIZE | QTY. INSP. | QTY. ACCEPTED | EXAMINERS IDENT.

SERIAL NOS.

REMARKS

REQUESTOR

CERTIFICATION

SIGNATURE BELOW AUTHENTICATES THE AVAILABILITY AND COMPLETENESS OF ALL ACCEPTANCE RECORDS REQUIRED BY ABOVE AUTHORIZATION DOCUMENT.

SPEC. NO. ____ AUTHORIZED SIGNATURE ____ DATE

WHITE—CUSTOMER BLUE—CS OR QC CANARY—POE GREEN—MATERIAL

ACCEPTED

BONDED STORAGE CSID #

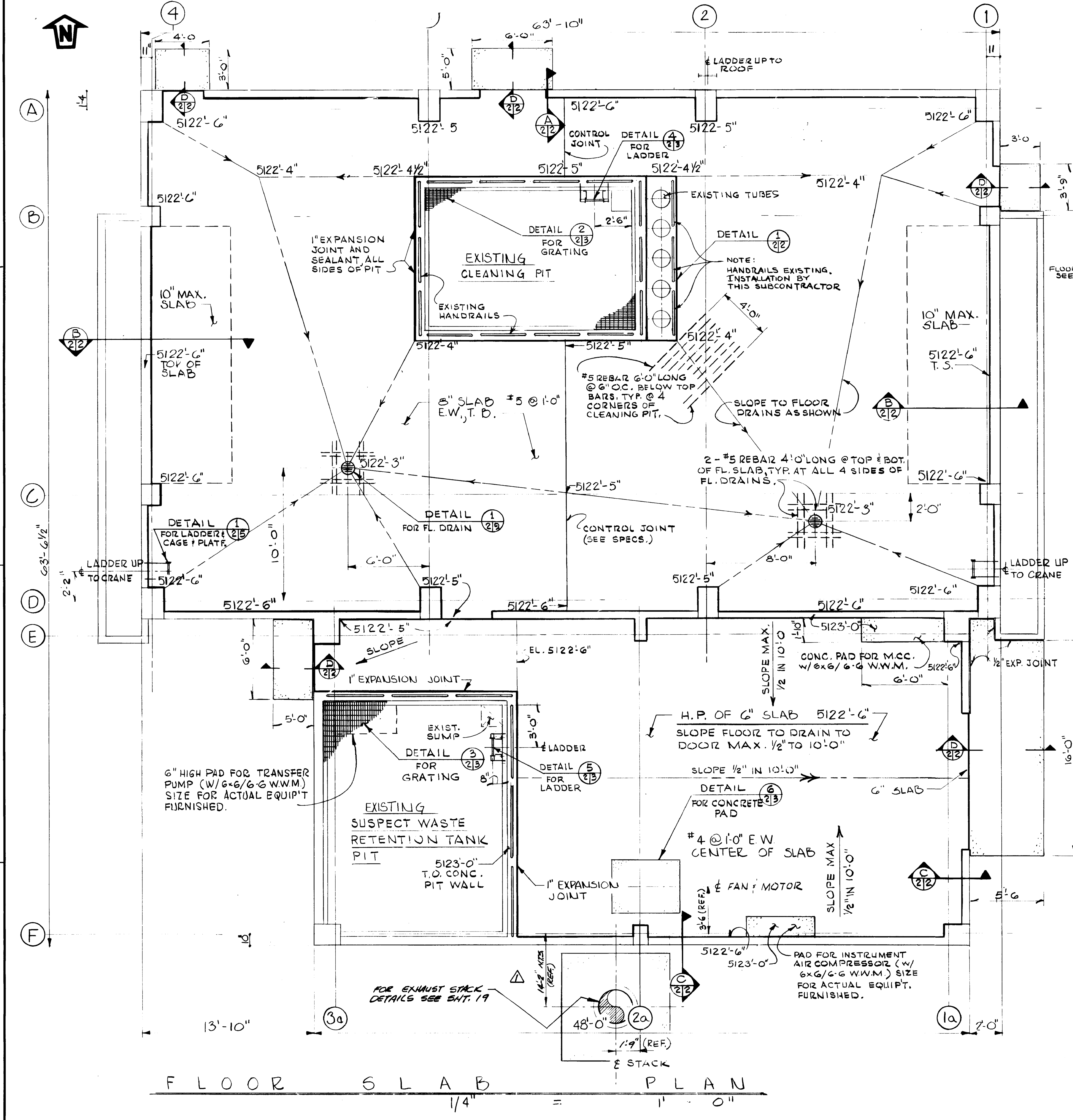
ANL-316 (1-77)

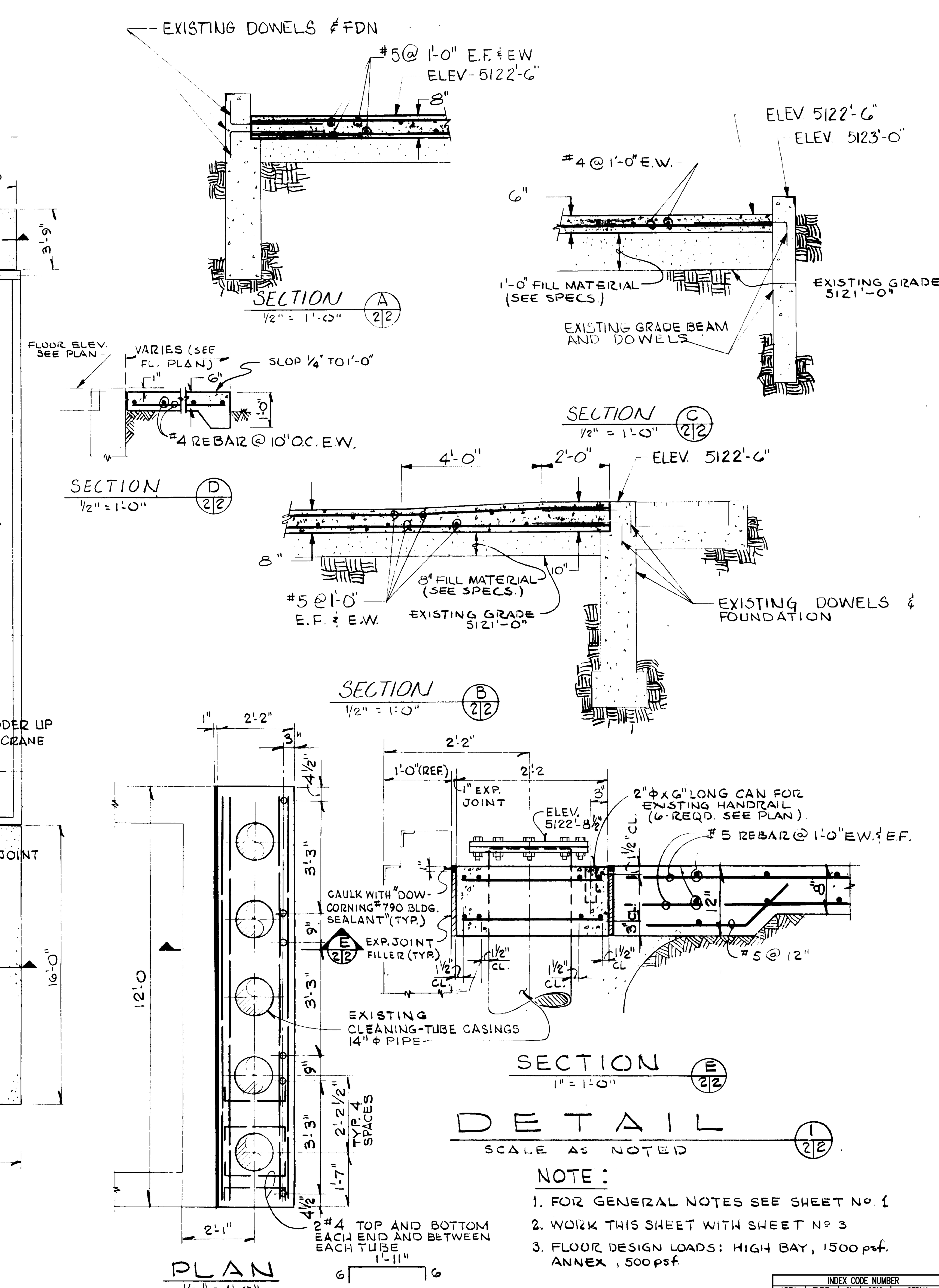
Attachment D-28

SCMS Secondary Containment

Drawing of SCMS High Bay Floor Plan and Details

748438 (Alternate ID: W7930-0111-DD)





NOTE :

1. FOR GENERAL NOTES SEE SHEET No. 1
2. WORK THIS SHEET WITH SHEET No 3
3. FLOOR DESIGN LOADS: HIGH BAY, 1500 psf. ANNEX, 500 psf.

INDEX CODE NUMBER				
AREA	TYPE	CL	ORIG	SERIAL
273	0793	00	052	748438

MICRO-FILM STAMP 1-17-95 (40)
10-7-87 (30) 09/XX/XX (41)
2-23-88 (31)
9-7-89 (32)
1-25-91 (33)
3-9-92 (34)
5-4-92 (35)
6-5-92 (36)
8-4-93 (37)
10-27-93 (38)
9-6-94 (39)

SYM.	CHANGE	DATE	BY	CH'K.
—	SEE SHEET 1	—		

APPROVED CONST.	DATE	SERVICE REQUEST NO.	
R P [signature]	1/7/74	80509/63437	
STAFF APPROVAL		CHECKED	
MW Jackson	12/7/73	RLK MWJ	12/6/73
REPRESENTATIVE		DRAWN BY	
WASHBURN	—	J. OSTERHOUT	11/73
~~TOLERANCES, UNLESS OTHERWISE NOTED~~			
SCALE	SHEET NO	DATE	
AS NOTED	2 OF 21	12/3/73	

ARGONNE NATIONAL LABORATORY

TITLE
SODIUM COMPONENTS CLEANUP FACILITY
PHASE II
FLOOR SLAB PLAN & DETAILS
ARGONNE WEST I.N.E.L.

DRWG NO. W7930-0111-DD-43

REORDER NO. 10-8D-10964

Attachment D-29

Field Testing Report for Cathodic Protection
of the RSWF Liners at ANL-W Site

CH2M HILL

Engineers
Planners
Economists
Scientists

August 17, 1989

BOI27770.A1.02

Mr. Royce L. Brookshier
Argonne National Laboratory
Argonne-West
P.O. Box 2528
Idaho Falls, Idaho 83403-2528

Dear Mr. Brookshier:

Subject: Phase 2 Report and Cathodic Protection Design for RSWF Liners at the ANL-W Site

Enclosed with this letter are one bound and one unbound copy of the final Phase 2 Field Testing and Cathodic Protection Design Report and Field Data. Under separate cover is one unbound copy of the Cathodic Protection Specifications and one mylar copy of the Cathodic Protection Drawings. We have incorporated your review comments in these documents. We have also shown the proposed Phase 1 Cathodic Protection Installation as Sheet 3 of the drawings.

We have enjoyed working with you and the other INEL personnel on this project. If you have any questions concerning this report or our design, please do not hesitate to call.

Very truly yours,

William S. Spickelmire

William S. Spickelmire
Corrosion Engineering

George H Silkworth

George H. Silkworth
Corrosion Control Services

BOIT010/011.50/jai

FIELD TESTING REPORT
FOR
CATHODIC PROTECTION OF THE RSWF LINERS AT ANL-W SITE

Prepared for

ARGONNE NATIONAL LABORATORY-WEST

Prepared by

CH2M HILL CENTRAL, INC.
Boise, Idaho

August 1989
BOI27770.A1.02

Prepared By George H. Silkworth

Approved By William S. Spickelmire

FIELD TESTING REPORT
FOR
CATHODIC PROTECTION OF THE RSWF LINERS AT ANL-W SITE

Prepared for

ARGONNE NATIONAL LABORATORY-WEST

Prepared by

CH2M HILL CENTRAL, INC.
Boise, Idaho

August 1989
BOI27770.A1.02

DESIGN CRITERIA
FOR
CATHODIC PROTECTION OF
THE RSWF LINERS AT ANL-W SITE

During the week of June 12, 1989, corrosion testing was performed at the RSWF site to determine the resistivity of the soil throughout the area in which the liners are presently buried. The electrical resistivity of the soil was measured by the "Wenner" four pin method. These tests consisted of 90 soil resistivity measurements to average depths of 2.5, 5.0, 7.5, 10.0, and 15.0 feet. Both average and layer resistivity calculations were made from these measurements for the layers 0 to 2.5 ft., 2.5 to 5.0 ft., 5.0 to 7.5 ft., 7.5 to 10.0 ft., and 10.0 to 15.0 ft. These layer resistivities were then plotted to show variations in the soil resistivity throughout the area in which the liners are buried. This information is shown in the appendix.

Cathodic protection measurements were made during 1989 testing on the 26" liners with galvanic anodes installed in 1978. During the 1989 testing, these liners had protected cathodic protection potentials. Potentials were higher (due to polarization) than in previous tests made in 1978 and 1982. Cathodic protection current had increased but was still acceptable. The current increase was probably due to coating deterioration. The results of these tests are shown on Data Sheets 7 and 8.

The cold trap shell was also tested and found to have protected cathodic protection potential levels. Potential to a reference electrode had increased (due to polarization).

Anode current had increased but was still acceptable. The current increase was probably due to coating deterioration. The results of the tests are shown on Data Sheets 7 and 8.

Cathodic protection for the coated 26" liners and the cold trap shell was provided by the existing galvanic anode system. These anodes should not need replacement for several years.

Cathodic protection tests were also made of the existing bare 16" liners to determine the amount of current required for protection. This information was used to determine the amount of current required for the new 16" and 24" liners. The results of the tests are shown on Data Sheets 2 and 3.

In order to provide a margin of safety, the design criterion used for protection of the liners is to obtain a structure to soil potential of -1.00 volts measured at the surface of the earth with the electrode placed approximately one foot from the liner.

The following criteria were used in designing the cathodic protection system for the RSWF liners:

1. The new liners should be installed without coating since the radioactivity of the material to be stored in the liner is unknown and its effect on coatings would therefore be unknown. If coatings were used, the cathodic protection system would still need to be designed for a bare liner since the life and effectiveness of the coating are unknown. For this reason, the cost of the cathodic protection system is the same whether the liners are coated or bare.

2. The current requirement for cathodic protection to a protective level of -1.00 volts is 5.28 mA/sq ft for an uncoated liner. The following table describes the surface area and current requirement for both liner sizes.

Liner Size (Dia.)	Surface Area (sq ft)	Current Required for Protection (mA)
16"	52	275
24"	79	417

3. The system will be designed so that one anode will protect four liners and the anode will be large enough to provide 15 to 20 years service. For the 16" liners a 3" x 60" graphite anode will be used. For the 24" liners a 4" x 80" graphite anode will be used.

4. Anodes will be buried so that the top of the coke breeze column will be located 3 feet below grade. This will ensure that any excavation for wire connections to the liners will not damage the anode. The anode will be buried in a 12" diameter hole with coke breeze backfill compacted around the anode and one foot above and below the anode.

5. Rectifiers will be 480-volt, 3-phase, air cooled, and will be pad-mounted on the inside of the RSWF fence. Four rectifiers will be located on the northeast side and 4 will be located on the southwest side. These locations were chosen so that the rectifiers can be checked monthly from the perimeter road inside the RSWF area. There is room between the road and fence for the rectifiers and they should be out of the way of any future expansion. Rectifiers will have a dc output of

60 amperes and 20 volts with sufficient taps so that the output can be adjusted to meet the needs of the system.

6. In the conceptual design, it was assumed that four or five rectifiers would be needed to provide protection to the existing 880 liners. With the expansion of the number and size of the liners in the RSWF site to 1300, eight rectifiers will be needed.

7. Cable for connection of the rectifier to the anodes and the rectifier to the liners will have high molecular weight polyethylene insulation. Cable sizes will be as follows:

Rectifier to Junction Box	#2 AWG Copper
Junction Box to Anode Splice	#4 AWG Copper
Junction Box to Liner Splice	#4 AWG Copper
Liner Splice to Liner	#8 AWG Copper
Anode Splice to Anode	#8 AWG Copper

8. All cables will be buried 2 feet below grade and will have a marking tape installed above the buried cable to prevent accidental damage to the cable.

9. Connections of the conductor to the liners will be made by the vertical exothermic welding process. The connection will be made above grade and the cable exposed so that a current measurement can be made with a clamp-on ammeter.

10. Junction boxes will be used to make connections between the rectifier and the anode strings. They will also be used for connections to various rows of liners.

11. The 26" liners that are presently protected with galvanic anodes should be connected to the new cathodic protection system when the anodes are installed in their area. This includes the cold trap liner.

12. Interference from the new system will exist for about 25 to 30 feet from an operating anode. If there are liners not connected to an operating system that are within the above distance, tests should be made to determine the best method of eliminating the interference. At some locations, bonding with resistance bonds may be required while others may be controlled by adjustment of the system.

13. It is assumed that the 480-volt ac supply will be furnished by INEL to an entrance switch at each rectifier.

14. The system is designed so that it can be built in different phases.

15. The junction boxes were installed in the rectifier slab.

16. A Phase 1 Cathodic Protection System was prepared to show the initial cathodic protection system required for protection of liners by legs 5 and 6.

17. A materials quantity estimate is included in the appendix for both the master cathodic protection plan and proposed Phase I installation.

The system is designed to provide sufficient cathodic protection current to polarize the steel liners. Current output will decrease as polarization occurs and the output of the rectifiers will need to be decreased. In actual operations the effect of polarization will act as a safety factor, since the polarized steel liner will require less current than provided by this system. Adjustments will need to be made several times during the first year of operation.

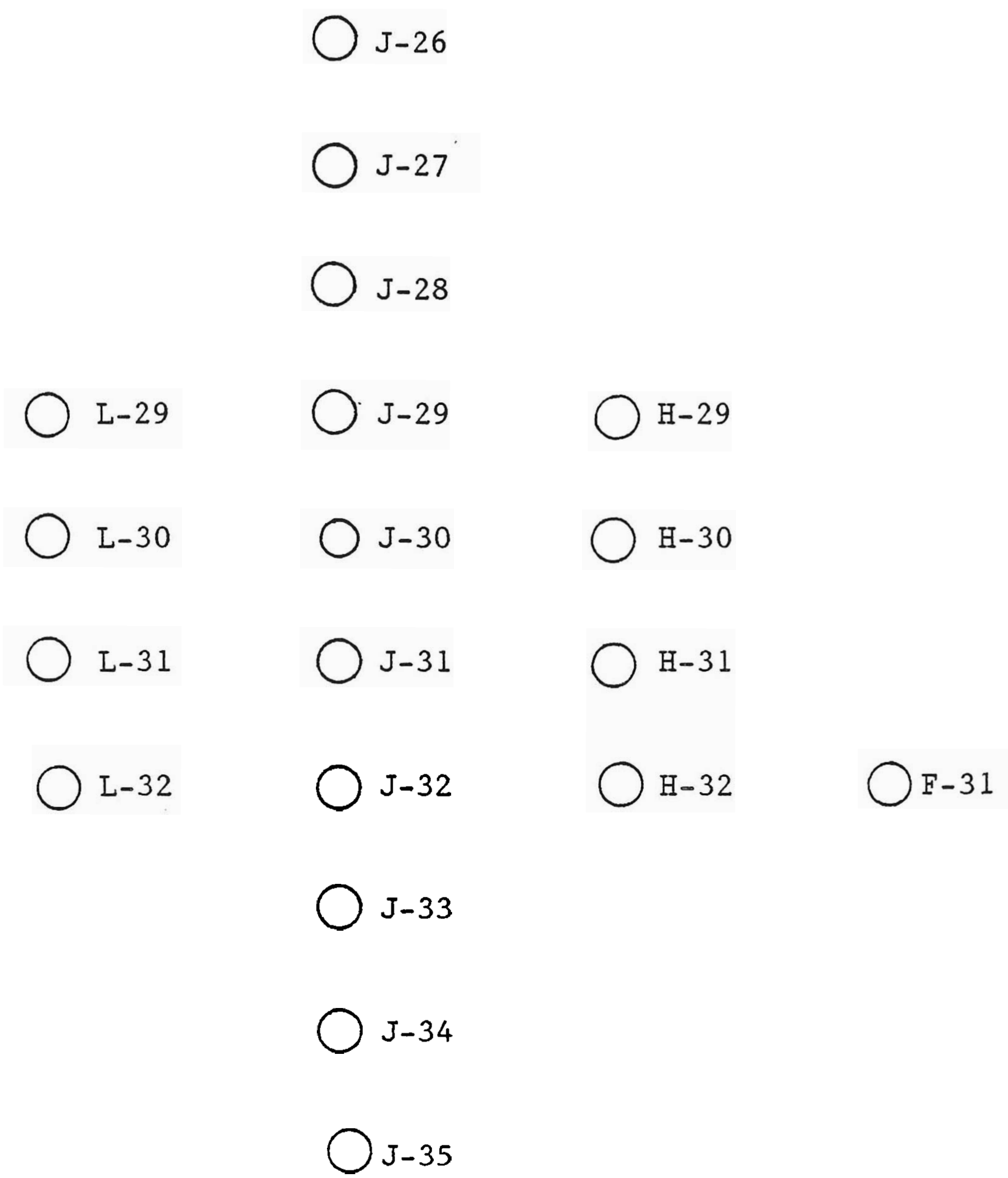
The rectifiers should be monitored monthly and a comprehensive survey should be made at least once a year.

BOIT010/001.WP/jai

CATHODIC PROTECTION DESIGN TESTS OF RSWF LINERS AT INEL

BY: GHS DATE: 6/13/89 SHEET 1 OF 8

GENERAL CONFIGURATION OF LINERS USED IN CATHODIC PROTECTION TESTS

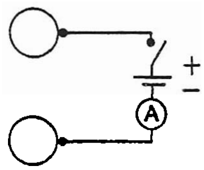


BOIT010/002.WP/jai

CURRENT REQUIREMENTS FOR PROTECTION OF ONE 16" LINER

Use J-30 as an anode

Use J-31 as the cathode



	Liner/Ref Electrode Potential	Cathodic Protection Current
Battery off	-0.440 volts	0
Battery on	-1.204 volts	375 mA

For protection level of -1 volt, current required is:

$$\frac{1.203 - 0.440}{375 \text{ mA}} = \frac{1.00 - 0.440}{x}$$

x = 274 mA--Current required per liner for -1.0 volt protective potential of 16-inch liner

BOIT010/003.WP/jai

Design of cathodic protection system for new 24" liners to be installed at the RSWF site.

Information from testing at the RSWF site showed that approximately 275 mA of current is required to obtain a -1.0-volt protective potential on one 16" liner. This amount of current protects 52 sq ft of pipe surface. The current requirement is therefore equal to 5.28 mA per sq ft of pipe surface.

Assuming the new 24" liners will require the same amount of current per sq ft of surface area as the 16" liners, the current requirement per 24" liner will be 79 sq ft x 5.28 mA per sq ft = 417 mA per liner.

BOIT010/004.WP/jai

Check interference on adjacent liners when using J-30 as an anode and J-31 as the cathode. (See Sheet No. 1 for location of liners).

Interrupted current of temporary cathodic protection system shown on Sheet No. 2.

Current	J-29	J-28	J-27	J-26
OFF--0	-0.385 v	-0.397 v	-0.391 v	-0.396 v
ON--375 mA	-0.406 v	-0.413 v	-0.398 v	-0.397 v

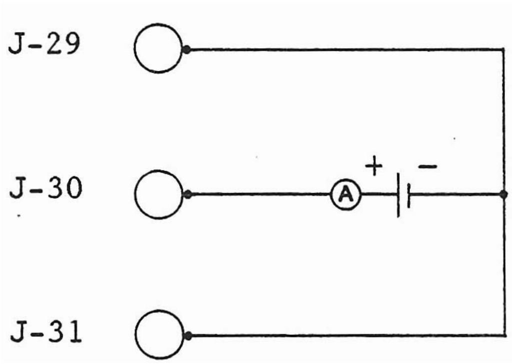
The interference effect of an anode protecting one liner is approximately 25 to 30 feet from the protected liner.

BOIT010/005.WP/jai

CATHODIC PROTECTION DESIGN TESTS OF RSWF LINERS AT INEL

BY: GHS   DATE: 6/13/89   SHEET 5 OF 8

Testing to determine current requirements using two liners as cathodes and one liner as an anode:



Use 410 mA for cathodic protection current.

Current	J-29 Liner/Ref Elect	J-31 Liner/Ref Elect
OFF	-0.412 v	-0.431 v
ON--410 mA	-0.789 v	-0.923 v

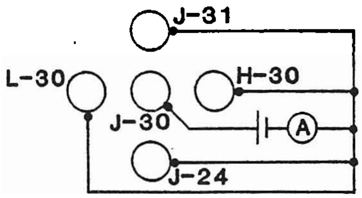
Increase total cathodic protection current to 580 mA.

Current	J-29 Liner/Ref Elect	J-31 Liner/Ref Elect
OFF	-0.416 v	-0.438 v
ON--580 mA	-1.020 v	-1.123 v

Measure current to each liner: J-29 = 280 mA
J-31 = 300 mA

Testing to determine current requirements using four liners as cathodes and one liner as an anode:

Use J-30 as the anode, and J-29, H-30, J-31, and L-30 as cathodes.



Adjusted current in circuit to one ampere

Current	L-30 Liner/Ref	J-29 Liner/Ref	H-30 Liner/Ref	J-31 Liner/Ref
OFF	-0.441 v	-0.426 v	-0.435 v	-0.455 v
ON--1 A	-0.990 v	-1.029 v	-0.987 v	-1.120 v

Assume equal current to each anode--250 ma to each. Approximately the same as in previous tests.

Testing for Interference

Current	J-32 Liner/Ref	J-34 Liner/Ref	J-35 Liner/Ref	F-31 Liner/Ref
OFF	-0.389 v	-0.383 v	-0.408 v	-0.392 v
ON--1 A	-0.406 v	-0.384 v	-0.408 v	-0.392 v
Voltage Change	-0.017 V	-0.001 v	0	0

Cathodic Protection Tests on the 26" RSWF Liners
with Galvanic Anodes Installed

Liner No.	MV	Str/Soil
T-50	0.24	-1092
T-49	0.21	-975
T-48	0.26	-1048
T-47	0.56	-1017
T-46	0.25	-1057
T-45	0.53	-1094
T-44	0.50	-998
T-43	0.34	-1062
T-42	0.44	-989
T-41	0.56	-1019
T-40	0.60	-1070
T-39	0.57	-1052
T-38	0.60	-992
T-37	0.57	-1049
T-36	0.58	-1084
T-35	0.33	-1038
T-34	0.26	-1008
T-33	0.70	-986
T-32	0.69	-1020
T-31	0.47	-990
T-30	0.34	-993

Average current to protect each liner = 45.7 mA

COLD TRAP SHELL

Structure/Soil Potential -1050 millivolts

Anode # 1 0.52 mv
Anode # 2 0.14 mv
Anode # 3 0.29 mv
Anode # 4 0.81 mv
Anode # 5 0.20 mv
Anode # 6 0.81 mv

Total current to protect the cold trap shell = 277 mA

BOIT010/009.WP/jai

Average current required for protection of the coated 26" liners and the average structure-to-soil potential from 1978 to the present is as follows:

Date	Average Current Required For Protection	Average Structure To Soil Potential
1978	14.7 mA	-1272.5 millivolts
1982	30.2 mA	-1108.9 millivolts
1989	45.7 mA	-1030.1 millivolts

Average current required for protection of the coated cold trap shell and the average structure-to-soil potential from 1978 to the present is as follows:

Date	Average Current Required For Protection	Average Structure To Soil Potential
1978	14.7 mA	-970 millivolts
1982	30.2 mA	-978 millivolts
1989	45.7 mA	-1050 millivolts

BOIT010/008.WP/jai

BILL OF MATERIALS
AND FIELD DATA

Client: INEL Argonne West
Project: CP RSWF Liners
Project No: BOI27770.A1.03
Location: Idaho Falls, Idaho
Sheet 1 of 2
By: WSS
Date: August 17, 1989
File name: Quanest2.wk1

MATERIAL QUANTITY ESTIMATE
FOR
INSTALLATION OF
CATHODIC PROTECTION SYSTEM
AT
INEL RSWF LINERS
FACILITY 771
SYSTEM MASTER PLAN

No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY REQUIRED	PLUS CONTING- ENCY	TOTAL QUANTITY ESTIMATED
1	Graphite Anode (3"x 60")	Ea.	250	5	255
2	Graphite Anode (4"x 80")	Ea.	75	2	77
3	Coke Breeze Backfill	Pds.	86,125	8,875	95,000
4	Anode Centalizers	Ea.	325	25	350
5	Reference Electrode	Ea.	6		6
6	Junction Box	Ea.	16		16
7	Pull Box	Ea.	0		0
8	Rectifier (20 volt, 60 amp)	Ea.	8		8
9	Ground Rod	Ea.	8		8
10	Ground Rod Clamp	Ea.	8		8
11	Bare Copper Ground Rod Wire	Ft.	64	16	80
12	Test Station	Ea.	6		6
13	Metal Fence Post	Ea.	0		0
14	No.2 AWG HMWPE Wire	Ft.	120	30	150
15	No.4 AWG HMWPE Wire	Ft.	11,000	1,000	12,000
16	No.8 AWG HMWPE Wire	Ft.	15,540	460	16,000
17	No.10 AWG Wire	Ft.	360	40	400
18	Shunts	Ea.	52	3	55
19	Thermite Weld Connections	Ea.	1,295	305	1,600
20	Conduit 2-inch w/ Fittings	Ft.	150	50	200
21	Conduit 1-inch w/ Fittings	Ft.	100	50	150
22	Compression Connectors	Ea.	1,620	80	1,700
23	Tap Splice Insulating Kit	Ea.	325	25	350
24	In-Line Splice Insulating Kit	Ea.	20		20
25	Multi-Splice Insulating Kit	Ea.	650	50	700
26	High Voltage Rubber Tape	Rolls	10		10
27	Vinyl Electrical Tape	Rolls	10		10
28	Cable Marking Tape	Ft.	5,760	740	6,500
29	Cable Marking Tags	Ea.	52	8	60
30	Cable Warning Signs	Ea.	8	2	10
31	Concrete	Cu.Yd.	11	1	12
32	Welded Wire Fabric	Sq.Ft.	240	10	250
33	Pit Run Gravel	Cu.Yd.	4	1	5

The quantity estimate presented herein is an "order of magnitude" estimate prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. Material estimate assumes cathodic protection system installation for a total of 1295 liners.

Client: INEL Argonne West
Project: CP RSWF Liners
Project No: BOI27770.A1.03
Location: Idaho Falls, Idaho
Sheet 2 of 2
By: WSS
Date: August 21, 1989
File name: Quanest3.wk1

MATERIAL QUANTITY ESTIMATE
FOR
INSTALLATION OF
CATHODIC PROTECTION SYSTEM
AT
INEL RSWF LINERS
FACILITY 771
PHASE 1 INSTALLATION

No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY REQUIRED	PLUS CONTING-ENCY	TOTAL QUANTITY ESTIMATED
1	Graphite Anode (3"x 60")	Ea.	25	1	26
2	Graphite Anode (4"x 80")	Ea.	25	1	26
3	Coke Breeze Backfill	Pds.	13,500	1,500	15,000
4	Anode Centalizers	Ea.	50	3	53
5	Reference Electrode	Ea.	1		1
6	Junction Box	Ea.	4		4
7	Pull Box	Ea.	4		4
8	Rectifier (20 volt, 60 amp)	Ea.	2		2
9	Ground Rod	Ea.	2		2
10	Ground Rod Clamp	Ea.	2		2
11	Bare Copper Ground Rod Wire	Ft.	16	4	20
12	Test Station	Ea.	1		1
13	Metal Fence Post	Ea.	4		4
14	No.2 AWG HMWPE Wire	Ft.	30	20	50
15	No.4 AWG HMWPE Wire	Ft.	1,700	300	2,000
16	No.8 AWG HMWPE Wire	Ft.	1,200	300	1,500
17	No.10 AWG Wire	Ft.	90	10	100
18	Shunts	Ea.	16	1	17
19	Thermite Weld Connections	Ea.	200	50	250
20	Conduit 2-inch w/ Fittings	Ft.	40	10	50
21	Conduit 1-inch w/ Fittings	Ft.	24	6	30
22	Compression Connectors	Ea.	258	12	270
23	Tap Splice Insulating Kit	Ea.	54	6	60
24	In-Line Splice Insulating Kit	Ea.	4	2	6
25	Multi-Splice Insulating Kit	Ea.	100	10	110
26	High Voltage Rubber Tape	Rolls	3		3
27	Vinyl Electrical Tape	Rolls	3		3
28	Cable Marking Tape	Ft.	1,000	100	1,100
29	Cable Marking Tags	Ea.	4	1	5
30	Cable Warning Signs	Ea.	6	2	8
31	Concrete	Cu.Yd.	3	1	4
32	Welded Wire Fabric	Sq.Ft.	60		60
33	Pit Run Gravel	Cu.Yd.	1		1

The quantity estimate presented herein is an "order of magnitude" estimate prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. Material estimate assumes cathodic protection system installation for a total of 200 liners as Phase 1 construction.

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*       S H A L L O W   S O I L   R E S I S T I V I T Y         *
*                M E A S U R E M E N T S                        *
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*                                                               *
*                                                               *
*                                                               *
*                                                               *
*   ELECTRICAL RESISTIVITY OF THE SOIL (RESISTANCE-OHMS)        *
*   WAS MEASURED BY THE "WENNER" FOUR PIN METHOD.  AVERAGE      *
*   SOIL RESISTIVITY (OHM-CM) WAS CALCULATED FOR SELECTED       *
*   DEPTHS OF 2.5 FEET, 5.0 FEET, 7.5 FEET, 10.0 FEET, AND      *
*   15.0 FEET, RESPECTIVELY.  LAYER SOIL RESISTIVITY WAS        *
*   CALCULATED USING THE "BARNES" METHOD.                       *
*                                                               *
*                                                               *
*                                                               *
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*                                                               *
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*    ARE FOR INTERPRETATION BY A PERSON SKILLED AND TRAINED     *
*    IN THE PARTICULAR AREA THIS PROGRAM DEALS WITH.            *
*                                                               *
*****************************************************************
    PROGRAM RUN DATE: 08/22/89     PROGRAM RUN TIME: 15:18:31
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CLIENT: ARGONNE WEST

PROJECT NAME: RADIOACTIVE SCRAP FACILITY

PROJECT NUMBER: BOI27770.A1

SHALLOW SOIL RESISTIVITY TESTS

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
1.0	2-OO (BASED ON INEL GRID SYSTEM, TYP)	2.5	4.400	2200	2200
		5.0	2.100	2100	2009
		7.5	1.500	2250	2625
		10.0	1.160	2320	2559
		15.0	0.760	2280	2204
2.0	2-MM	2.5	5.900	2950	2950
		5.0	2.500	2500	2169
		7.5	2.100	3150	6563
		10.0	1.300	2600	1706
		15.0	0.970	2910	3821
3.0	2-HH	2.5	4.800	2400	2400
		5.0	2.600	2600	2836
		7.5	1.900	2850	3529
		10.0	1.290	2580	2009
		15.0	0.890	2670	2870
4.0	2-DD	2.5	5.500	2750	2750
		5.0	2.900	2900	3067
		7.5	1.900	2850	2755
		10.0	1.360	2720	2393
		15.0	1.030	3090	4245
5.0	2-X	2.5	5.700	2850	2850
		5.0	2.700	2700	2565
		7.5	1.700	2550	2295
		10.0	1.330	2660	3055
		15.0	0.870	2610	2515
6.0	2-T	2.5	5.500	2750	2750
		5.0	2.400	2400	2129
		7.5	1.600	2400	2400
		10.0	1.170	2340	2177
		15.0	0.820	2460	2741
7.0	2-N	2.5	4.000	2000	2000
		5.0	1.900	1900	1810
		7.5	1.420	2130	2810
		10.0	0.960	1920	1482
		15.0	0.810	2430	5184

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

CLIENT: ARGONNE WEST

PROJECT NAME: RADIOACTIVE SCRAP FACILITY

PROJECT NUMBER: BOI27770.A1

SHALLOW SOIL RESISTIVITY TESTS

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
8.0	2-J	2.5	5.900	2950	2950
		5.0	2.800	2800	2665
		7.5	1.800	2700	2520
		10.0	1.280	2560	2215
		15.0	0.870	2610	2716
9.0	2-E	2.5	4.000	2000	2000
		5.0	1.800	1800	1636
		7.5	1.300	1950	2340
		10.0	1.100	2200	3575
		15.0	0.800	2400	2933
10.0	2-C	2.5	5.700	2850	2850
		5.0	2.400	2400	2073
		7.5	1.700	2550	2914
		10.0	1.100	2200	1558
		15.0	0.790	2370	2803
11.0	8-B	2.5	5.500	2750	2750
		5.0	2.700	2700	2652
		7.5	1.700	2550	2295
		10.0	1.160	2320	1826
		15.0	0.790	2370	2477
12.0	8-D	2.5	4.000	2000	2000
		5.0	2.000	2000	2000
		7.5	1.400	2100	2333
		10.0	1.080	2160	2363
		15.0	0.860	2580	4222
13.0	8-H	2.5	4.900	2450	2450
		5.0	1.000	1000	1423
		7.5	1.290	1935	2276
		10.0	1.050	2100	2822
		15.0	1.030	3090	54075
14.0	8-N	2.5	3.900	1950	1950
		5.0	2.100	2100	2275
		7.5	1.600	2400	3360
		10.0	1.100	2200	1760
		15.0	0.810	2430	3072

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

CLIENT: ARGONNE WEST
PROJECT NAME: RADIOACTIVE SCRAP FACILITY
PROJECT NUMBER: BOI27770.A1

SHALLOW SOIL RESISTIVITY TESTS

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
15.0	8-T	2.5	4.900	2450	2450
		5.0	2.400	2400	2352
		7.5	1.700	2550	2914
		10.0	1.200	2400	2040
		15.0	0.900	2700	3600
16.0	8-Z	2.5	6.100	3050	3050
		5.0	2.900	2900	2764
		7.5	2.100	3150	3806
		10.0	1.400	2800	2100
		15.0	0.950	2850	2956
17.0	8-FF	2.5	7.400	3700	3700
		5.0	2.800	2800	2252
		7.5	1.800	2700	2520
		10.0	1.440	2880	3600
		15.0	0.990	2970	3160
18.0	8-JJ	2.5	4.400	2200	2200
		5.0	3.200	3200	5067
		7.5	2.400	3600	4800
		10.0	1.600	3200	2400
		15.0	1.010	3030	2739
19.0	8-MM	2.5	3.700	1850	1850
		5.0	2.400	2400	3415
		7.5	1.700	2550	2914
		10.0	1.150	2300	1777
		15.0	0.760	2280	2241
20.0	8-PP	2.5	5.200	2600	2600
		5.0	2.300	2300	2062
		7.5	1.500	2250	2156
		10.0	1.000	2000	1500
		15.0	0.670	2010	2030
21.0	13-B	2.5	4.600	2300	2300
		5.0	2.200	2200	2100
		7.5	1.600	2400	2933
		10.0	1.200	2400	2400
		15.0	0.860	2580	3035

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

CLIENT: ARGONNE WEST
PROJECT NAME: RADIOACTIVE SCRAP FACILITY
PROJECT NUMBER: 30I27770.A1

SHALLOW SOIL RESISTIVITY TESTS

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
29.0	13-MM	2.5	3.300	1650	1650
		5.0	1.700	1700	1753
		7.5	1.250	1875	2361
		10.0	0.930	1860	1816
		15.0	0.640	1920	2052
30.0	13-PP	2.5	5.100	2550	2550
		5.0	2.600	2600	2652
		7.5	1.700	2550	2456
		10.0	1.300	2600	2763
		15.0	0.730	2190	1665
31.0	19-B	2.5	5.400	2700	2700
		5.0	2.600	2600	2507
		7.5	1.900	2850	3529
		10.0	1.270	2540	1915
		15.0	0.840	2520	2481
32.0	19-D	2.5	4.300	2150	2150
		5.0	1.500	1500	1152
		7.5	1.140	1710	2375
		10.0	1.030	2060	5337
		15.0	0.730	2190	2506
33.0	19-H	2.5	4.300	2150	2150
		5.0	2.200	2200	2252
		7.5	1.600	2400	2933
		10.0	1.100	2200	1760
		15.0	0.710	2130	2003
34.0	19-N	2.5	5.300	2650	2650
		5.0	2.400	2400	2193
		7.5	1.600	2400	2400
		10.0	1.200	2400	2400
		15.0	0.800	2400	2400
35.0	19-T	2.5	6.400	3200	3200
		5.0	3.100	3100	3006
		7.5	2.000	3000	2810
		10.0	1.400	2800	2333
		15.0	0.910	2730	2600

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

CLIENT: ARGONNE WEST

PROJECT NAME: RADIOACTIVE SCRAP FACILITY

PROJECT NUMBER: BOI27770.A1

SHALLOW SOIL RESISTIVITY TESTS

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
36.0	19-Z	2.5	4.900	2450	2450
		5.0	2.700	2700	3007
		7.5	1.800	2700	2700
		10.0	1.400	2800	3150
		15.0	0.950	2850	2956
37.0	19-FF	2.5	6.800	3400	3400
		5.0	3.300	3300	3206
		7.5	2.000	3000	2538
		10.0	1.400	2800	2333
		15.0	0.910	2730	2600
38.0	19-JJ	2.5	5.500	2750	2750
		5.0	3.300	3300	4125
		7.5	2.300	3450	3795
		10.0	1.600	3200	2629
		15.0	0.990	2970	2597
39.0	19-MM	2.5	4.400	2200	2200
		5.0	2.200	2200	2200
		7.5	1.400	2100	1925
		10.0	1.100	2200	2567
		15.0	0.800	2400	2933
40.0	19-PP	2.5	4.500	2250	2250
		5.0	2.500	2500	2812
		7.5	1.900	2850	3958
		10.0	1.340	2680	2273
		15.0	0.760	2280	1756
41.0	24-B	2.5	4.700	2350	2350
		5.0	2.300	2300	2252
		7.5	1.600	2400	2629
		10.0	1.200	2400	2400
		15.0	0.900	2700	3600
42.0	24-D	2.5	4.400	2200	2200
		5.0	2.400	2400	2640
		7.5	1.800	2700	3600
		10.0	1.300	2600	2340
		15.0	0.910	2730	3033

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

CLIENT: ARGONNE WEST

SHALLOW SOIL RESISTIVITY TESTS

PROJECT NAME: RADIOACTIVE SCRAP FACILITY

PROJECT NUMBER: 80I27770.A1

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
43.0	24-H	2.5	4.400	2200	2200
		5.0	2.300	2300	2410
		7.5	1.600	2400	2629
		10.0	1.100	2200	1760
		15.0	0.810	2430	3072
44.0	24-N	2.5	4.700	2350	2350
		5.0	2.200	2200	2068
		7.5	1.600	2400	2933
		10.0	1.200	2400	2400
		15.0	0.830	2490	2692
45.0	24-T	2.5	7.400	3700	3700
		5.0	3.600	3600	3505
		7.5	2.300	3450	3105
		10.0	1.500	3000	2156
		15.0	0.910	2730	2314
46.0	24-Z	2.5	4.300	2150	2150
		5.0	2.500	2500	2906
		7.5	2.000	3000	5000
		10.0	1.500	3000	3000
		15.0	1.100	3300	4125
47.0	24-FF	2.5	5.000	2500	2500
		5.0	2.400	2400	2300
		7.5	1.700	2550	2914
		10.0	1.300	2600	2763
		15.0	0.900	2700	2925
48.0	24-JJ	2.5	5.500	2750	2750
		5.0	2.800	2800	2852
		7.5	1.900	2850	2956
		10.0	1.500	3000	3562
		15.0	0.870	2610	2071
49.0	24-MM	2.5	6.100	3050	3050
		5.0	2.800	2800	2580
		7.5	1.700	2550	2164
		10.0	1.300	2600	2763
		15.0	0.800	2400	2000

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

CLIENT: ARGONNE WEST — SHALLOW SOIL RESISTIVITY TESTS

PROJECT NAME: RADIOACTIVE SCRAP FACILITY

PROJECT NUMBER: B0I27770.A1

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
50.0	24-PP	2.5	5.000	2500	2500
		5.0	2.600	2600	2708
		7.5	1.900	2850	3529
		10.0	1.300	2600	2058
		15.0	0.860	2580	2541
51.0	29-B	2.5	3.900	1950	1950
		5.0	1.700	1700	1507
		7.5	1.200	1800	2040
		10.0	0.970	1940	2530
		15.0	0.750	2250	3307
52.0	29-E	2.5	4.000	2000	2000
		5.0	2.100	2100	2211
		7.5	1.400	2100	2100
		10.0	0.960	1920	1527
		15.0	0.760	2280	3648
53.0	29-H	2.5	3.700	1850	1850
		5.0	1.900	1900	1953
		7.5	1.400	2100	2660
		10.0	0.990	1980	1690
		15.0	0.830	2490	5136
54.0	29-N	2.5	3.800	1900	1900
		5.0	2.000	2000	2111
		7.5	1.600	2400	4000
		10.0	1.100	2200	1760
		15.0	0.820	2460	3221
55.0	29-T	2.5	4.700	2350	2350
		5.0	2.300	2300	2252
		7.5	1.800	2700	4140
		10.0	1.400	2800	3150
		15.0	0.870	2610	2298
56.0	29-Z	2.5	4.200	2100	2100
		5.0	2.400	2400	2800
		7.5	1.800	2700	3600
		10.0	1.400	2800	3150
		15.0	1.100	3300	5133

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

CLIENT: ARGONNE WEST   SHALLOW SOIL RESISTIVITY TESTS

PROJECT NAME: RADIOACTIVE SCRAP FACILITY

PROJECT NUMBER: BOI27770.A1

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
57.0	29-FF	2.5	4.500	2250	2250
		5.0	2.200	2200	2152
		7.5	1.600	2400	2933
		10.0	1.300	2600	3467
		15.0	0.950	2850	3529
58.0	29-JJ	2.5	5.100	2550	2550
		5.0	2.900	2900	3361
		7.5	2.100	3150	3806
		10.0	1.300	2600	1706
		15.0	0.900	2700	2925
59.0	29-MM	2.5	5.100	2550	2550
		5.0	2.400	2400	2267
		7.5	1.700	2550	2914
		10.0	1.100	2200	1550
		15.0	0.810	2430	3072
60.0	29-PP	2.5	6.100	3050	3050
		5.0	2.600	2600	2266
		7.5	1.800	2700	2925
		10.0	1.100	2200	1414
		15.0	0.850	2550	3740
61.0	34-B	2.5	3.700	1850	1850
		5.0	2.000	2000	2176
		7.5	1.400	2100	2333
		10.0	1.100	2200	2567
		15.0	0.720	2160	2084
62.0	34-E	2.5	4.100	2050	2050
		5.0	1.800	1800	1604
		7.5	1.100	1650	1414
		10.0	0.950	1900	3483
		15.0	0.640	1920	1961
63.0	34-H	2.5	4.200	2100	2100
		5.0	2.300	2300	2542
		7.5	1.500	2250	2156
		10.0	1.280	2560	4364
		15.0	0.740	2220	1754

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

CLIENT: ARGONNE WEST SHALLOW SOIL RESISTIVITY TESTS

PROJECT NAME: RADIOACTIVE SCRAP FACILITY

PROJECT NUMBER: BOI27770.A1

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
64.0	34-N	2.5	3.300	1650	1650
		5.0	2.100	2100	2888
		7.5	1.600	2400	3360
		10.0	1.200	2400	2400
		15.0	0.810	2430	2492
65.0	34-T	2.5	5.800	2900	2900
		5.0	2.700	2700	2526
		7.5	1.800	2700	2700
		10.0	1.400	2800	3150
		15.0	0.840	2520	2100
66.0	34-Z	2.5	4.800	2400	2400
		5.0	2.500	2500	2609
		7.5	1.700	2550	2656
		10.0	1.500	3000	6375
		15.0	0.960	2880	2667
67.0	34-HH	2.5	4.600	2300	2300
		5.0	2.600	2600	2990
		7.5	1.900	2850	3529
		10.0	1.400	2800	2660
		15.0	0.910	2730	2600
68.0	34-LL	2.5	4.400	2200	2200
		5.0	2.300	2300	2410
		7.5	1.600	2400	2629
		10.0	1.200	2400	2400
		15.0	0.900	2700	3600
69.0	34-NN	2.5	4.600	2300	2300
		5.0	2.400	2400	2509
		7.5	1.600	2400	2400
		10.0	1.200	2400	2400
		15.0	0.700	2100	1680
70.0	34-PP	2.5	4.400	2200	2200
		5.0	2.200	2200	2200
		7.5	1.600	2400	2933
		10.0	1.100	2200	1760
		15.0	0.700	2100	1925

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

CLIENT: ARGONNE WEST
PROJECT NAME: RADIOACTIVE SCRAP FACILITY
PROJECT NUMBER: BOI27770.A1

SHALLOW SOIL RESISTIVITY TESTS

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
71.0	39-B	2.5	4.900	2450	2450
		5.0	2.400	2400	2352
		7.5	1.600	2400	2400
		10.0	1.300	2600	3467
		15.0	0.750	2250	1773
72.0	39-E	2.5	4.800	2400	2400
		5.0	2.000	2000	1714
		7.5	1.300	1950	1857
		10.0	0.920	1840	1574
		15.0	0.650	1950	2215
73.0	39-H	2.5	5.700	2850	2850
		5.0	2.600	2600	2390
		7.5	1.600	2400	2000
		10.0	1.200	2400	2400
		15.0	1.130	3390	19371
74.0	39-N	2.5	4.500	2250	2250
		5.0	2.200	2200	2152
		7.5	1.500	2250	2357
		10.0	1.100	2200	2062
		15.0	0.770	2310	2567
75.0	39-T	2.5	5.400	2700	2700
		5.0	2.900	2900	3132
		7.5	1.900	2850	2755
		10.0	1.300	2600	2058
		15.0	0.850	2550	2456
76.0	39-Z	2.5	4.500	2250	2250
		5.0	2.600	2600	3079
		7.5	1.800	2700	2925
		10.0	1.300	2600	2340
		15.0	0.870	2610	2630
77.0	39-HH	2.5	4.000	2000	2000
		5.0	2.200	2200	2444
		7.5	1.600	2400	2933
		10.0	1.200	2400	2400
		15.0	0.850	2550	2914

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
78.0	39-LL	2.5	4.300	2150	2150
		5.0	2.500	2500	2986
		7.5	1.700	2550	2656
		10.0	1.200	2400	2040
		15.0	0.800	2400	2400
79.0	39-NN	2.5	4.600	2300	2300
		5.0	2.700	2700	3268
		7.5	1.500	2250	1688
		10.0	1.200	2400	3000
		15.0	0.680	2040	1569
80.0	39-PP	2.5	5.800	2900	2900
		5.0	2.900	2900	2900
		7.5	1.200	1800	1024
		10.0	1.300	2600	<note 2>
		15.0	0.780	2340	1950
81.0	44-C	2.5	4.700	2350	2350
		5.0	2.000	2000	1741
		7.5	1.500	2250	3000
		10.0	1.110	2220	2135
		15.0	0.750	2250	2312
82.0	44-E	2.5	4.400	2200	2200
		5.0	2.000	2000	1833
		7.5	1.300	1950	1857
		10.0	0.910	1820	1517
		15.0	0.610	1830	1850
83.0	44-H	2.5	4.400	2200	2200
		5.0	2.100	2100	2009
		7.5	1.400	2100	2100
		10.0	0.990	1980	1690
		15.0	0.690	2070	2277
84.0	44-N	2.5	4.500	2250	2250
		5.0	2.200	2200	2152
		7.5	1.400	2100	1925
		10.0	1.100	2200	2567
		15.0	0.730	2190	2170

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT
(2) THIS LAYER RESISTIVITY CANNOT BE CALCULATED BY THE BARNES METHOD

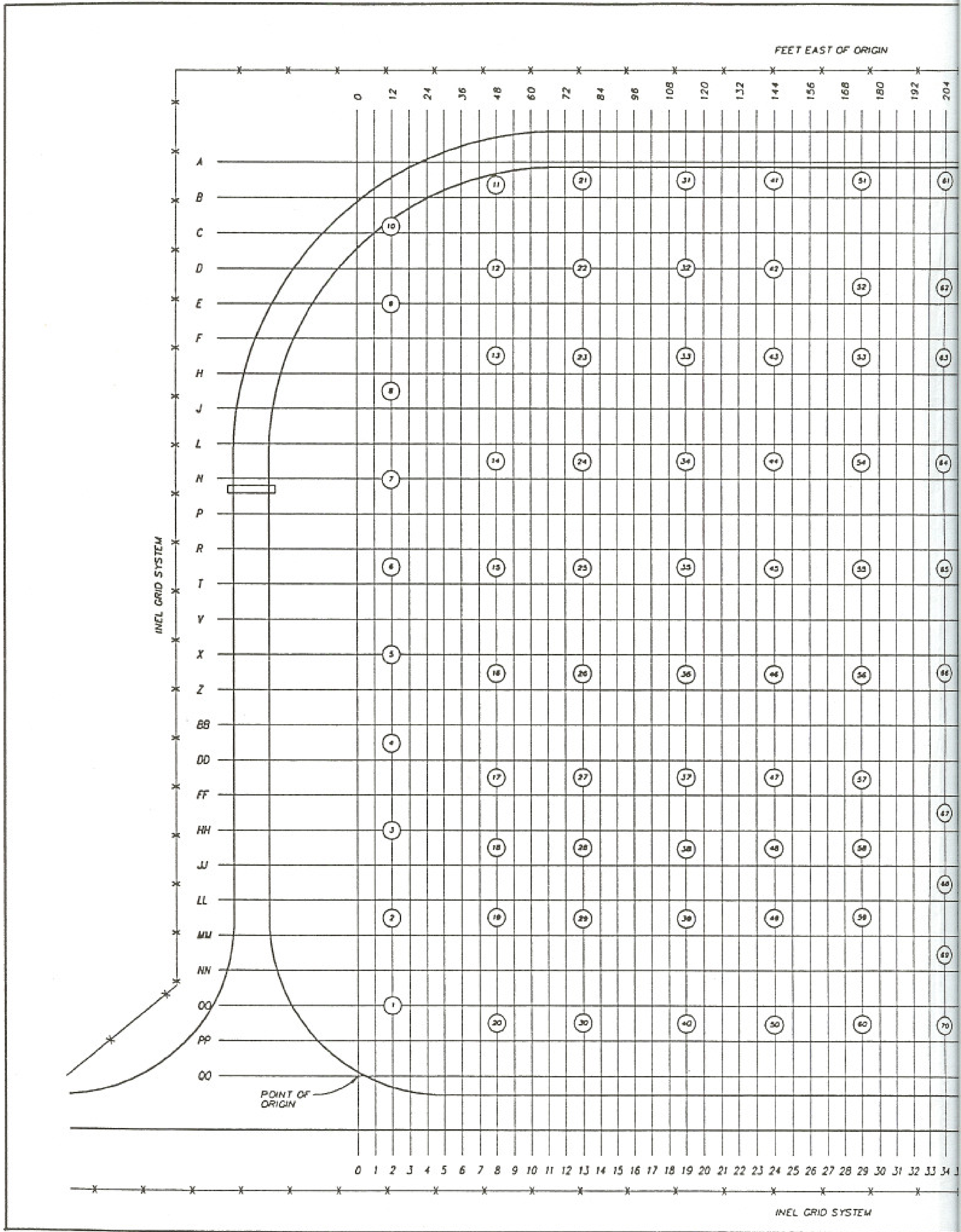
CLIENT: ARGONNE WEST   SHALLOW SOIL RESISTIVITY TESTS

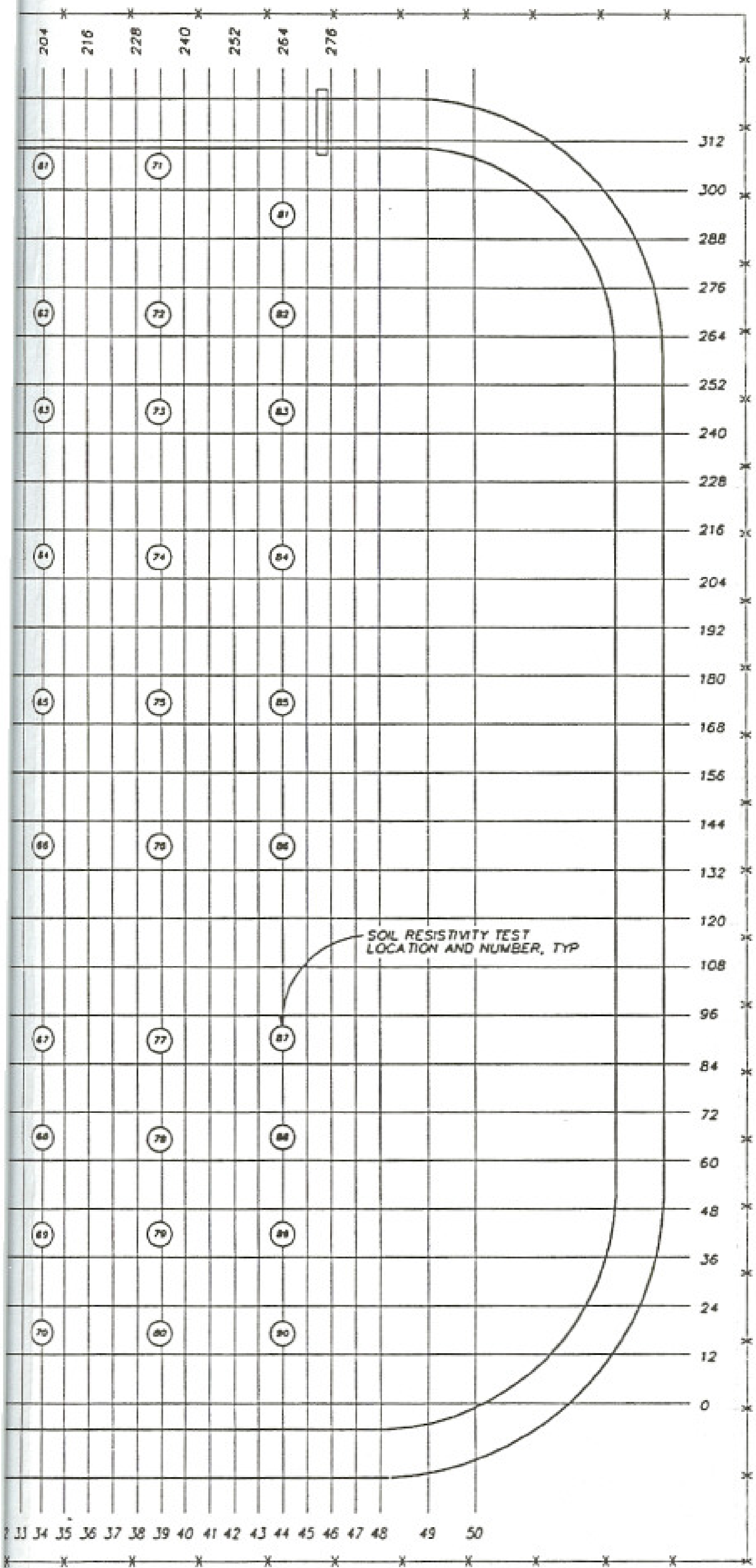
PROJECT NAME: RADIOACTIVE SCRAP FACILITY

PROJECT NUMBER: BOI27770.A1

TEST NUMBER	TEST LOCATION	DEPTH (FT)	RESISTANCE (OHMS)	AVERAGE RESISTIVITY (OHM-CM)	LAYER RESISTIVITY (OHM-CM)
85.0	44-T	2.5	6.000	3000	3000
		5.0	3.000	3000	3000
		7.5	1.800	2700	2250
		10.0	1.300	2600	2340
		15.0	0.810	2430	2149
86.0	44-Z	2.5	4.300	2150	2150
		5.0	2.100	2100	2052
		7.5	1.700	2550	4462
		10.0	1.100	2200	1550
		15.0	0.720	2160	2004
87.0	44-HH	2.5	4.400	2200	2200
		5.0	2.100	2100	2009
		7.5	1.500	2250	2625
		10.0	1.100	2206	2062
		15.0	0.750	2250	2357
88.0	44-LL	2.5	3.900	1950	1950
		5.0	2.100	2100	2275
		7.5	1.600	2400	3360
		10.0	1.100	2200	1760
		15.0	0.610	1830	1369
89.0	44-NN	2.5	5.400	2700	2700
		5.0	2.000	2000	1500
		7.5	1.500	2250	3000
		10.0	0.960	1920	1333
		15.0	0.720	2160	2000
90.0	44-PP	2.5	5.100	2550	2550
		5.0	2.700	2700	2869
		7.5	1.800	2700	2700
		10.0	1.300	2600	2340
		15.0	0.840	2520	2374

NOTES: (1) CORROSIVITY INDEX NOT CALCULATED FOR THIS PRINTOUT


FEET EAST OF ORIGIN
0 12 24 36 48 60 72 84 96 108 120 132 144 156 168 180 192 204
A B C D E F H J L N P R T V X Z BB DD FF HH JJ LL MM NN OO PP QQ
INEL GRID SYSTEM
POINT OF ORIGIN
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
INEL GRID SYSTEM



NOTES:

1. GRID BASED ON X, Y COORDINATE SYSTEM FROM ARGONNE NATIONAL LABORATORY DRAWING IPE-771-3.
2. SOIL RESISTIVITY TEST NUMBERS CORRELATE TO TEST NUMBERS ON DATA SHEETS.
3. SOIL RESISTIVITY TESTS TAKEN BY CH2M HILL IN JUNE OF 1989.

FIGURE 1

SOIL RESISTIVITY TEST LOCATION MAP

FACILITY 771
ARGONNE NATIONAL LABORATORY - WEST
IDAHO FALLS, IDAHO

CH2M HILL

2.5 FOOT LAYER RESISTIVITY

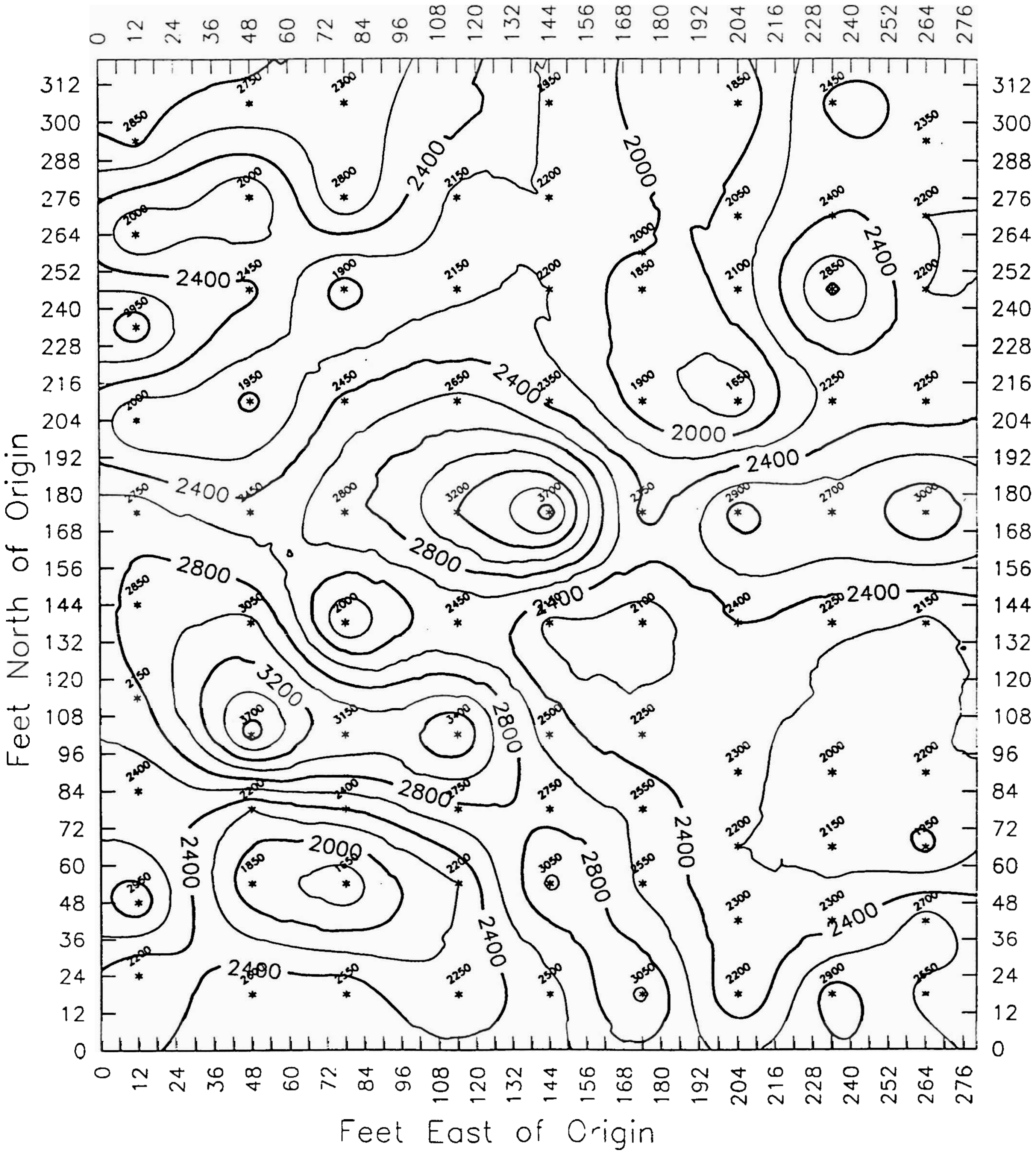


Figure 2
SOIL RESISTIVITY CONTOURS (ohm-cm)
ARGONNE NATIONAL LABORATORY - WEST
IDAHO FALLS, IDAHO

B27770

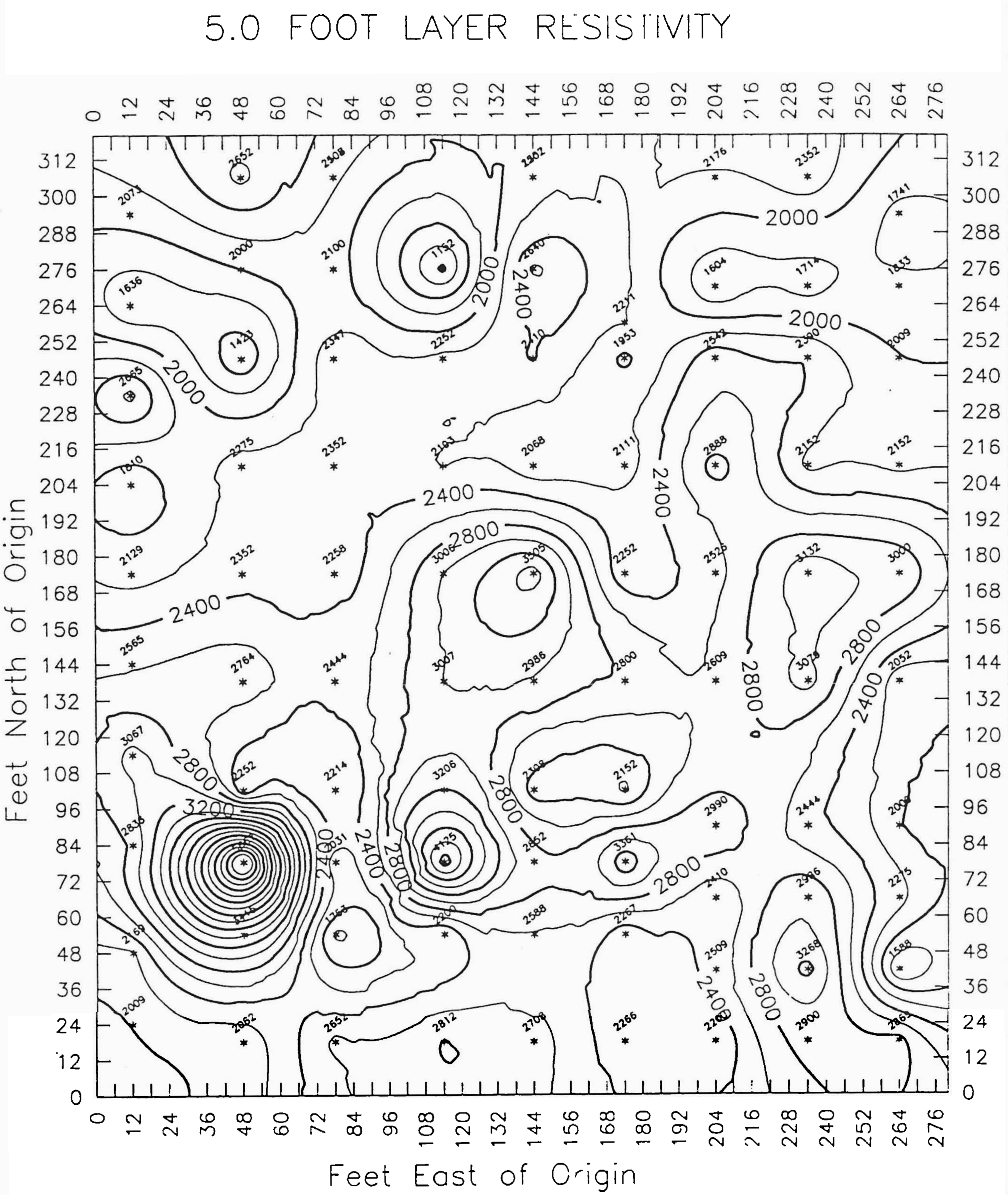


Figure 3
SOIL RESISTIVITY CONTOURS (ohm-cm)
ARGONNE NATIONAL LABORATORY - WEST
IDAHO FALLS, IDAHO

B27770

7.5 FOOT LAYER RESISTIVITY

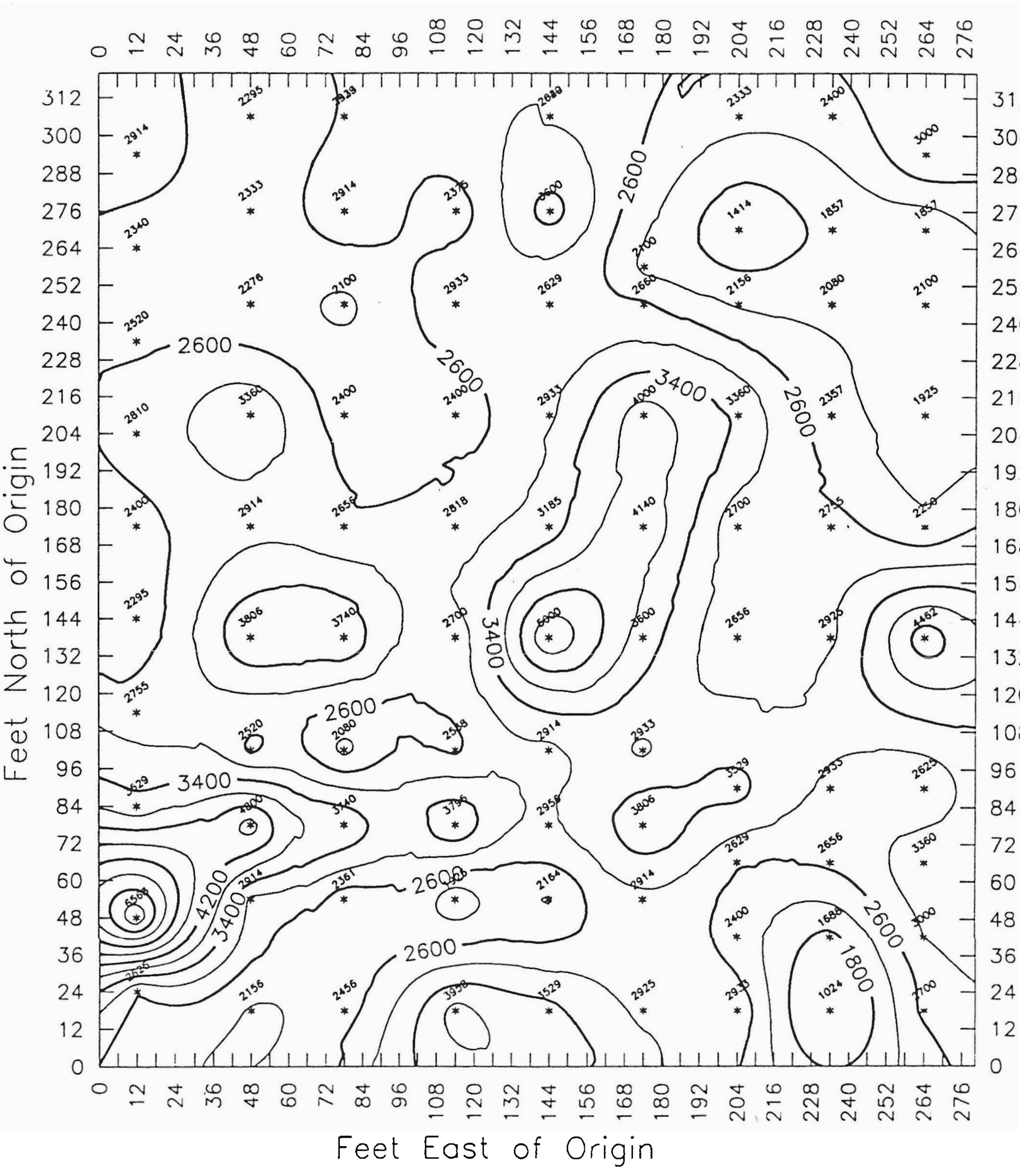


Figure 4
SOIL RESISTIVITY CONTOURS (ohm-cm)
ARGONNE NATIONAL LABORATORY - WEST
IDAHO FALLS, IDAHO

B27770

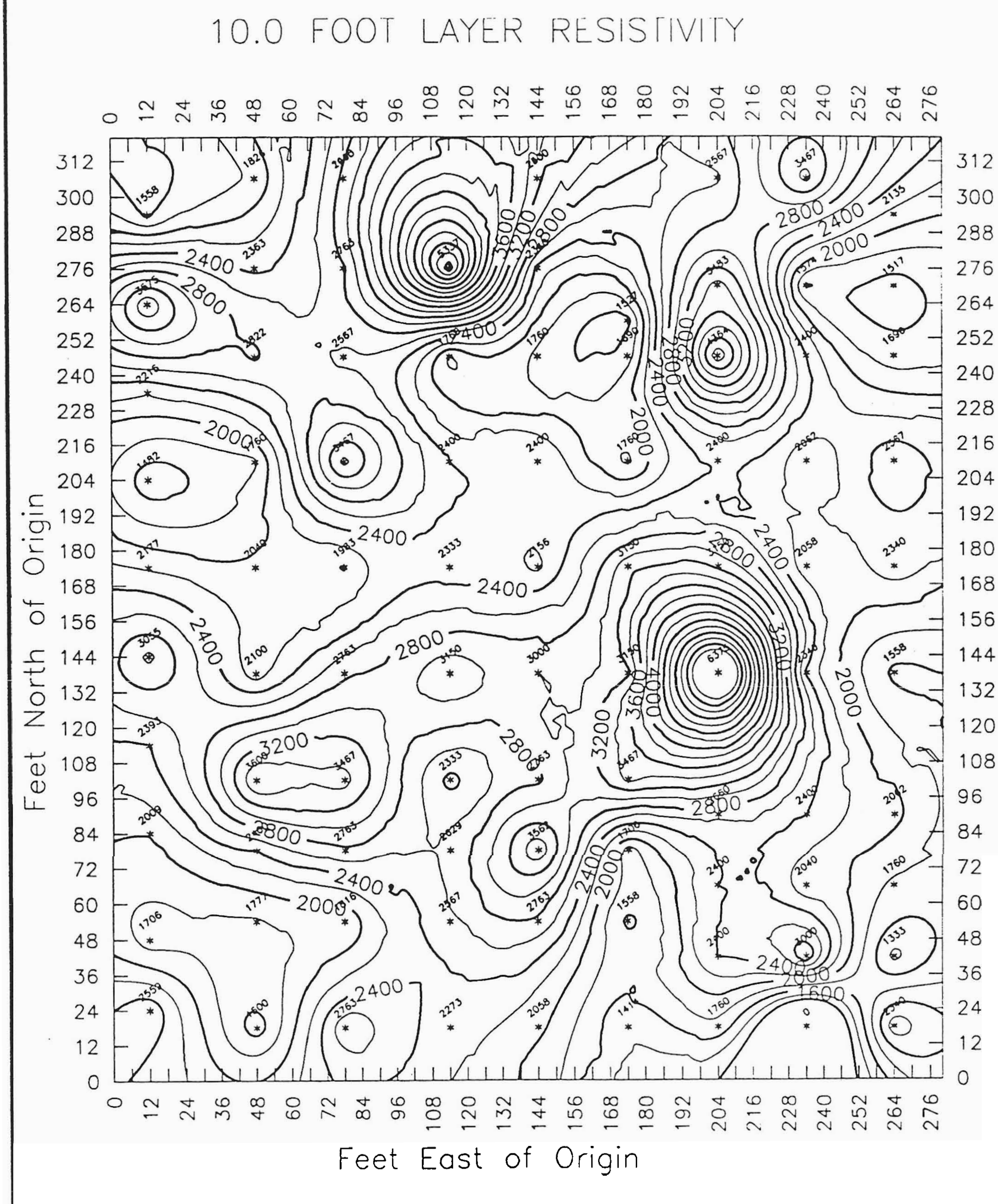


Figure 5
SOIL RESISTIVITY CONTOURS (ohm-cm)
ARGONNE NATIONAL LABORATORY - WEST
IDAHO FALLS, IDAHO

B27770

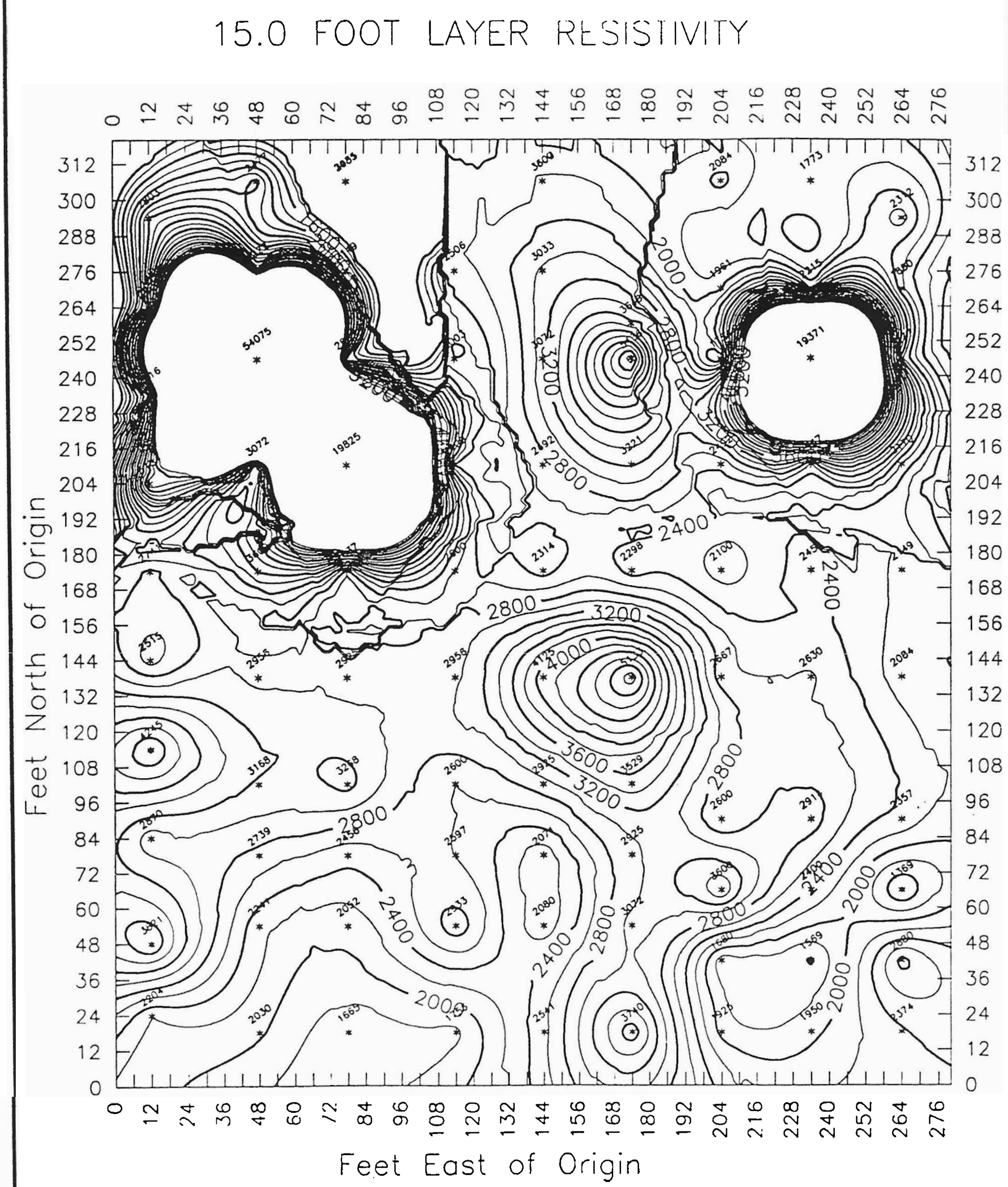


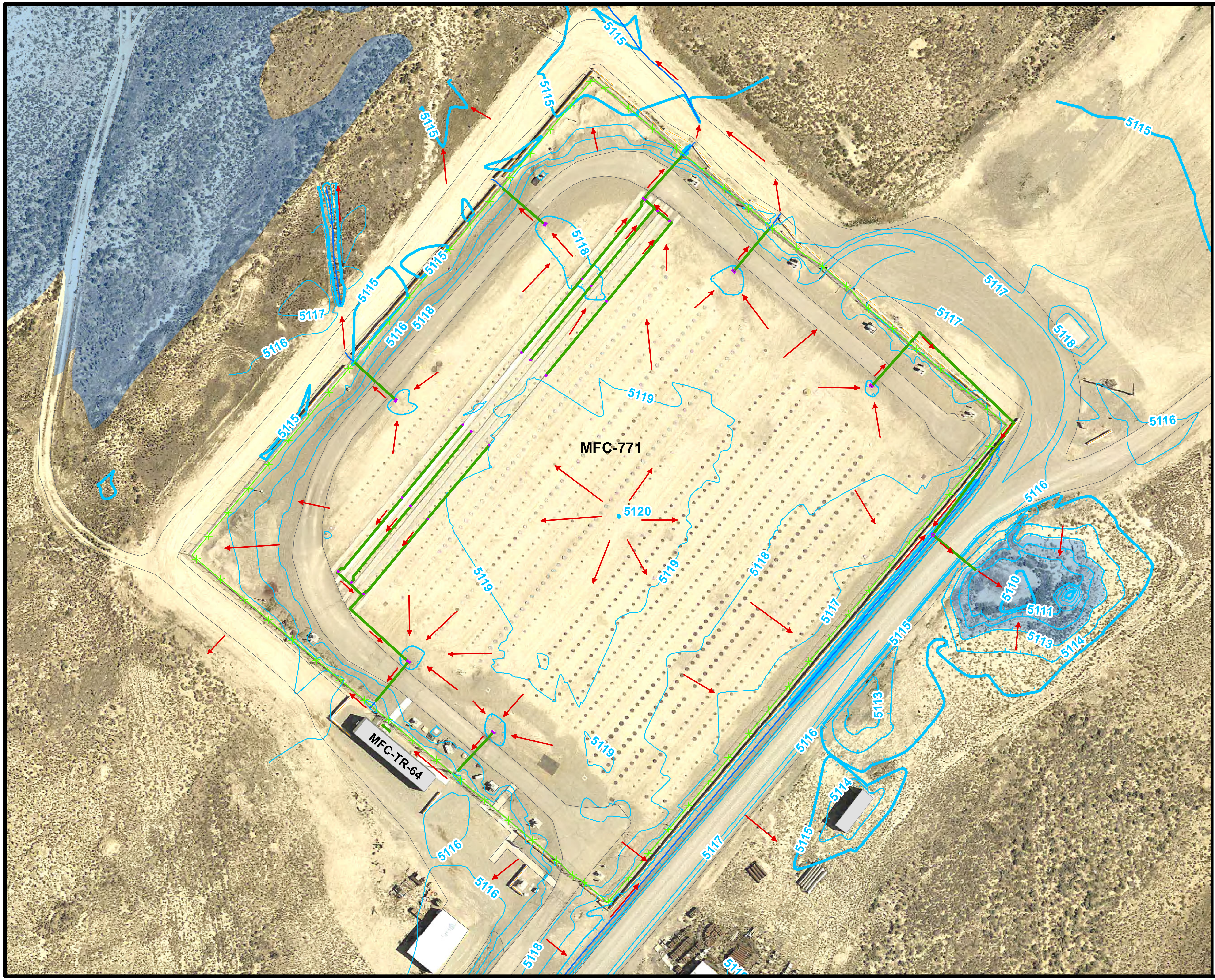
Figure 6
SOIL RESISTIVITY CONTOURS (ohm-cm)
ARGONNE NATIONAL LABORATORY - WEST
IDAHO FALLS, IDAHO

B27770

Attachment D-30

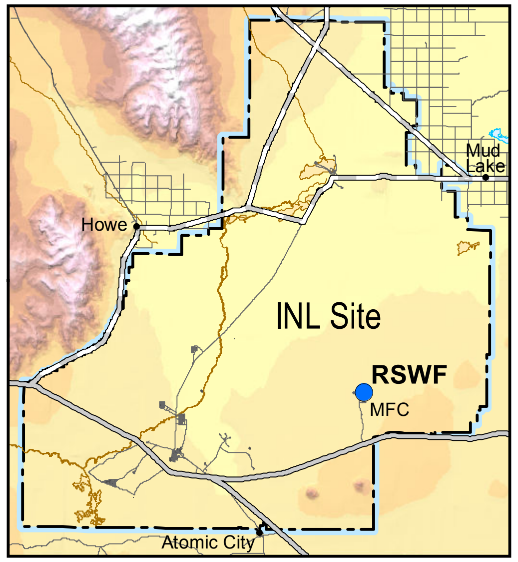
Drawing of RSWF Drainage System and
Assessment of Saturated Soil Conditions on the RSWF Cathodic Protection System

RSWF
Stormwater Drainage



Legend

- 1-ft interval contour
- 1-ft interval depression contour
- 5-ft index contour
- 5-ft index depression contour
- Flowpath
- Catch basin
- Drain pipe / culvert
- Ditch
- Stormwater runoff pond
- Building
- Road
- Fence
- Jersey barrier



Vicinity Map

NORTH

0 5 10 20 30 40 50 Meters

0 15 30 60 90 120 150 180 Feet

NOTE: elevations based on MFC site specific vertical datum.

GIS Analyst: Dan Mahnami
Date Drawn: 3/18/2015
Path: X:\gis_projects\anl\Permit_Maps\RSWF_Area
File Name: RSWF_Area_Stormwater_Runoff-bl_v1.mxd

February 24, 2015

Northwest Corrosion Engineering

10995 Warfield Road, Sedro-Woolley, WA 98284
Phone: (360) 826-4570 Fax: (360) 826-6321

Mr. Thomas Hipp, P.E.
Battelle Energy Alliance
Idaho National Laboratory
Materials and Fuels Complex

SUBJECT: Impact of Saturated Soil Conditions on the Cathodic Protection System of the Radioactive Scrap and Waste Facility

Mr. Hipp,

Northwest Corrosion Engineering was asked to provide an assessment as to what effect saturated soil conditions and possible pooling of water adjacent to the steel liners will have on the operation of the cathodic protection system at the Materials and Fuels Complex. This assessment addresses the requirements of SOW-12070, 'Evaluate Impact of Saturated Soil Conditions on the Cathodic Protection System of the Radioactive Scrap and Waste Facility'.

BACKGROUND

The Materials and Fuels Complex of the Idaho National Laboratory includes a Radioactive Scrap and Waste Facility (RSWF) that provides interim storage for spent fuel and remote-handled mixed and radioactive waste. The waste materials are housed in steel containers, which are placed into individual carbon steel liners. The steel liners are inserted vertically into the ground at varying depths. All liners are connected to an impressed current cathodic protection system that provides corrosion protection current to the liners' external surfaces.

EFFECTS OF SATURATED SOIL CONDITIONS

The proper operation of a cathodic protection system requires both electronic and ionic current transfer. Electron flow from the anode to the cathode is completed through the metallic path connecting the two materials. Concurrent oxidation and reduction reactions provide for ionic current exchange between the anode and cathode through the electrolyte. An electrolyte is any media that supports this ionic current exchange. The relative ease by which ion transfer occurs is due to the resistivity of the electrolyte surrounding, and between, the anode and cathode (steel liner) materials.

Saturating the soil environment will put more ions into solution enhancing ionic current exchange and increase the effectiveness of the impressed current cathodic protection system. Additionally, pooling of water at the surface of the liners will also provide for the transfer of cathodic protection current to the exposed steel.

Because cathodic protection requires a continuous electrolyte, any moisture on the surface of the steel that is not in contact with surface water or soil will support general surface corrosion at that site. However, the corrosion rates at these sites will be on the order of 1 – 2 mils per year (1-

inch = 1,000 mils) which is acceptable from a corrosion control standpoint. This minor surface corrosion can be likened to any metal object that is subjected to condensation or moisture (such as dew).

I have made multiple visits to the RSWF and have inspected the steel liner storage site on several occasions. My inspections have been completed when the soil conditions were both dry and saturated and I am satisfied that during times of soil saturation, the operation of the sites cathodic protection system is improved and is not compromised.

Sincerely
Northwest Corrosion Engineering

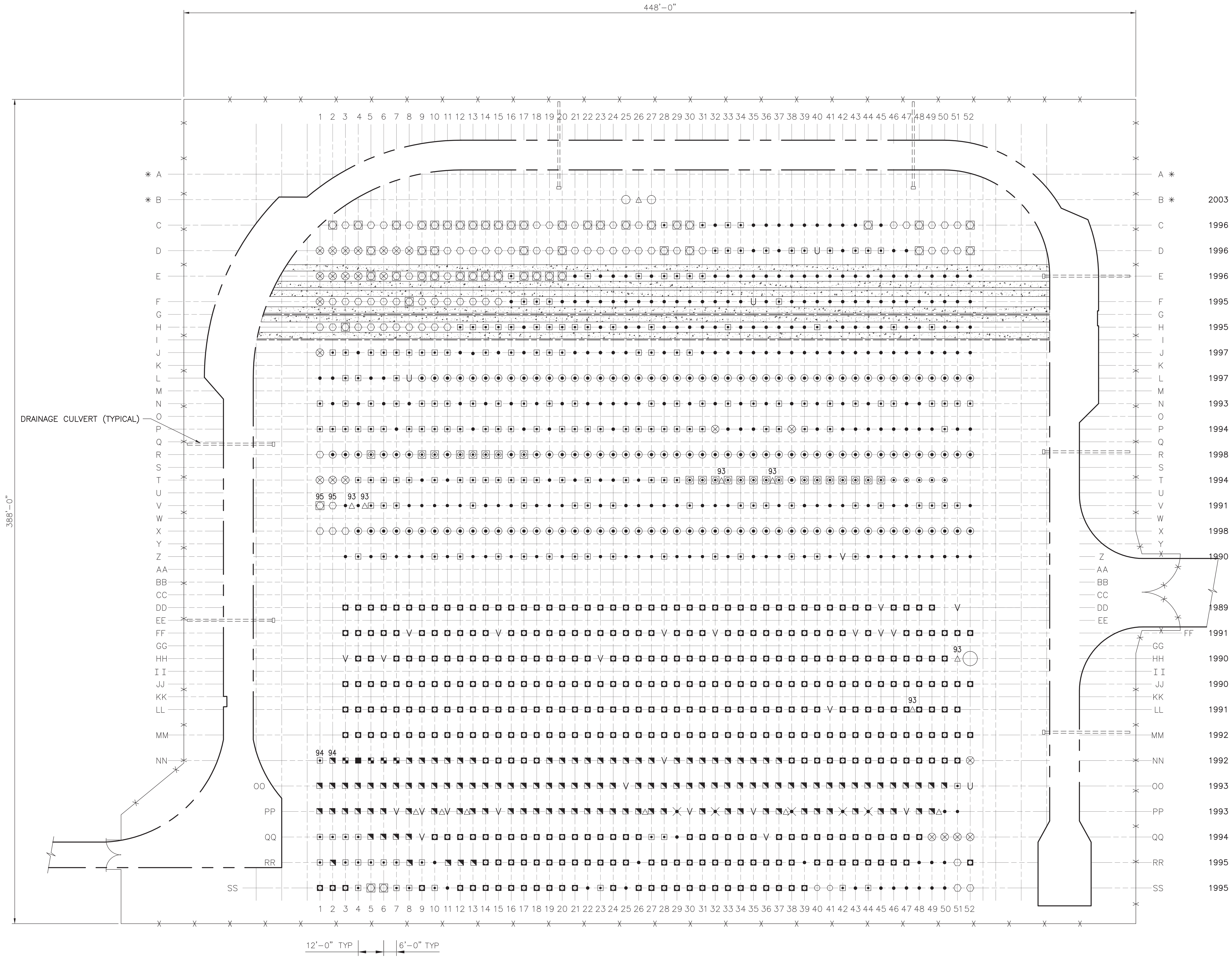
Jeremy A. Hailey, P.E.
NACE Corrosion Specialist, No. 5401

PROFESSIONAL ENGINEER
REGISTERED
10856
STATE OF IDAHO
JEREMY A. HAILEY
2/24/2015

Attachment D-31

Drawing of Liner Configuration

REV	DESCRIPTION	EFFECTIVE DATE:
10	REMOVED PREVIOUS REVISION HISTORY. CHANGED ANL WEST FORMAT TO INL FORMAT. REVISED TITLE, AS-BUILT AS OF 8/12/2008, SEE ECR-562482	8/13/2008
11	AS-BUILT AS OF 10/01/2010, SEE ECR 576118	10/07/2010
12	AS-BUILT AS OF 08/04/2011, SEE ECR 595881	08/30/2011
13	AS-BUILT AS OF 2/2/15, SEE ECR-628817	2/16/15



LEGEND

- △ 4 1/2" OD X 12'-4" RADIATION MONITORING TUBE
- 16" OD X 10'-0" LINER, EMPTY
- 16" OD X 10'-0" LINER, FULL
- 16" OD X 12'-4" LINER, EMPTY
- 16" OD X 12'-4" LINER, FULL
- 24" OD X 13'-8" LINER UNFLANGED, EMPTY
- 24" OD X 13'-8" LINER UNFLANGED, FULL
- 24" OD X 13'-8" LINER FLANGED, EMPTY
- 24" OD X 13'-8" LINER FLANGED, FULL
- 26" OD X 13'-0" LINER, EMPTY
- 26" OD X 13'-0" LINER, FULL
- 30" OD X 15'-1 1/4" LINER, EMPTY
- 30" OD X 15'-1 1/4" LINER, FULL
- 48" OD X 3'-9 3/4" LINERS (EBR-II NUCLIDE TRAPS)
- 60 3/4" OD X 11'-1" LINER (EBR-II PRIMARY COLD TRAP)
- 16" OD X 12'-4" CORROSION SURVEILLANCE LINER
- ⊗ LINER NOT INSTALLED DUE TO ROCK INTERFERENCE
- ✳ LINERS GENERALLY NOT INSTALLED IN ROW DUE TO SHALLOW ROCK
- R 1998 YEAR OF INSTALLATION OF LINERS IN ROW, UNLESS OTHERWISE NOTED ABOVE LINER (TYPICAL)
- 94 YEAR LINER INSTALLED, IF DIFFERENT THAN YEAR NOTED FOR ROW (TYPICAL)
- 3'-0" WIDE CONCRETE PADS, FULL LENGTH OF ROWS E, F AND H
- U UNUSABLE
- V VACATED SPACE. ENTIRE LINER REMOVED

RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF) PLAN

SCALE: 1" = 20.0'

REQUESTER:	D. ERICKSON
RESP ENGR:	TOM ZAHN
DESIGN:	TOM ZAHN
DRAWN:	S.L. PALMER
PROJECT NO.	NA
SPCL CODE	AS-BUILT
FOR REVIEW/APPROVAL SIGNATURES SEE ECR NO.	NA
EFFECTIVE DATE:	5/25/93

Idaho National Laboratory

RSWF
RADIOACTIVE SCRAP & WASTE FACILITY
771

LINER CONFIGURATION

SIZE	CAGE CODE	AREA	TYPE	SQ	DRWR	DWG NO.	REV
E	01MF3	273	0771	65	081	747635	13

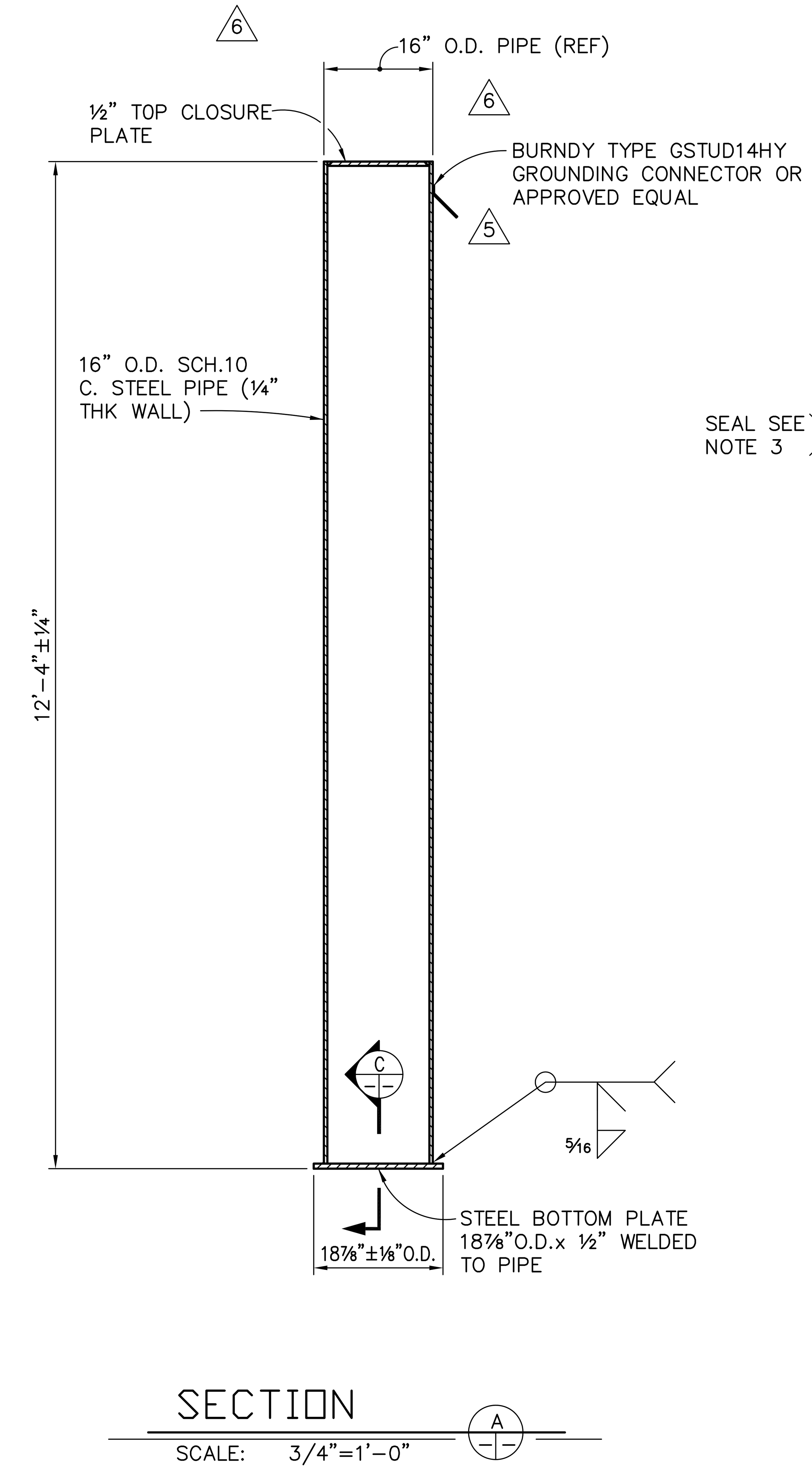
SCALE: NONE SHEET 1 OF 1

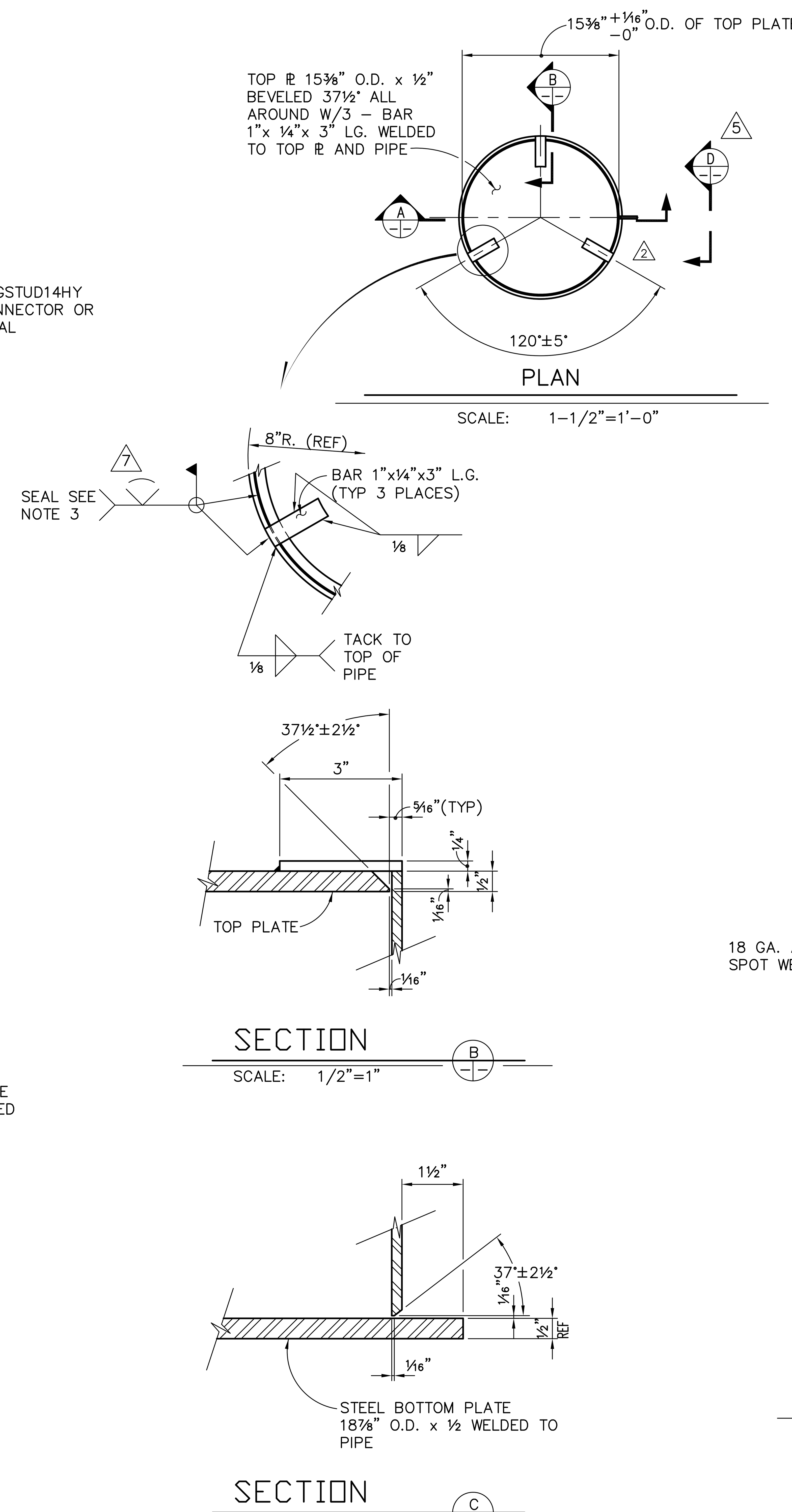
W7710-0301-EE

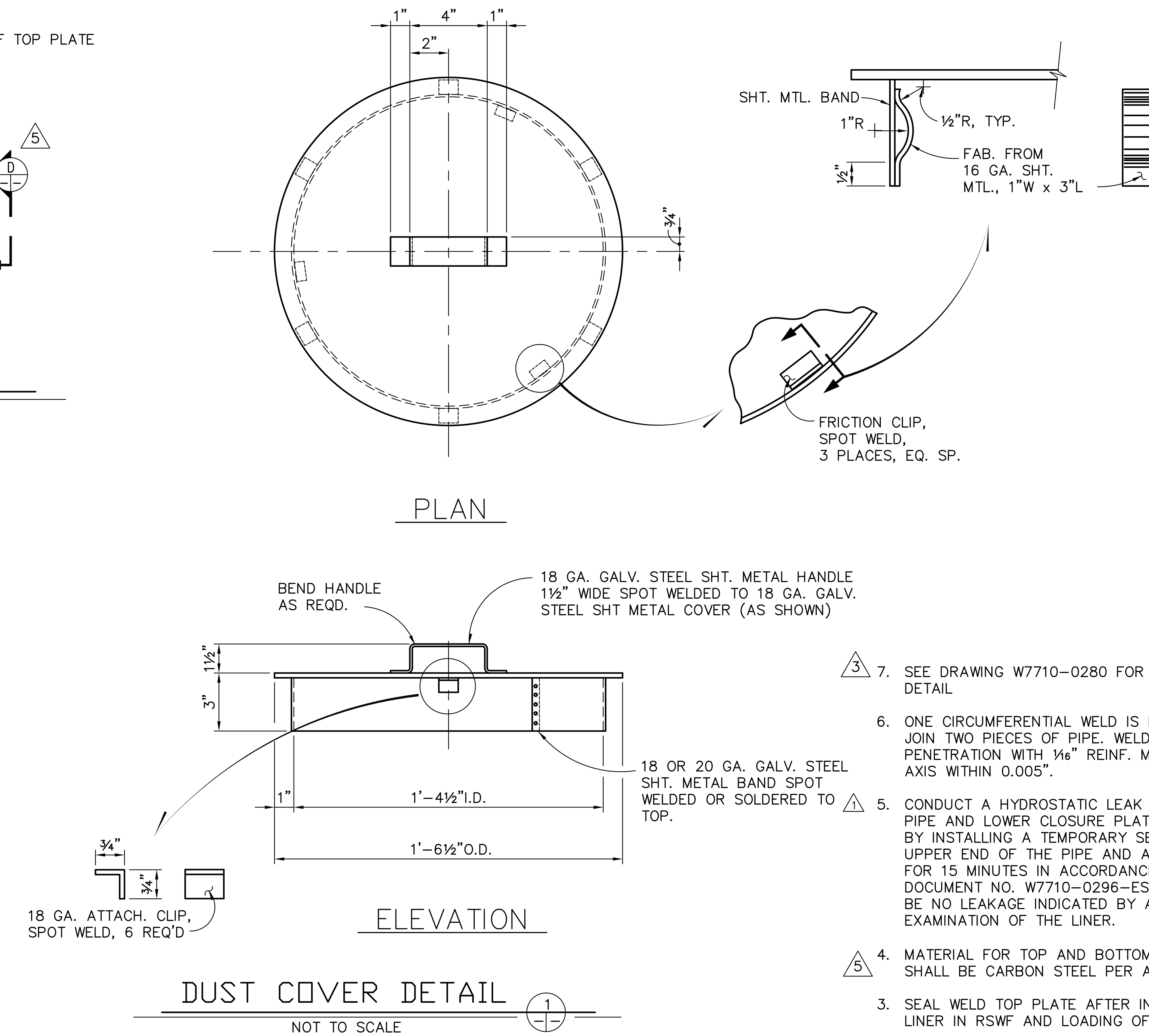
File: 747635r13.dwg
Path: P:\D15-0044
Layout Name: Sheet 1
Date: 02/17/2015 - 2:18 P.M.
ID: GCR

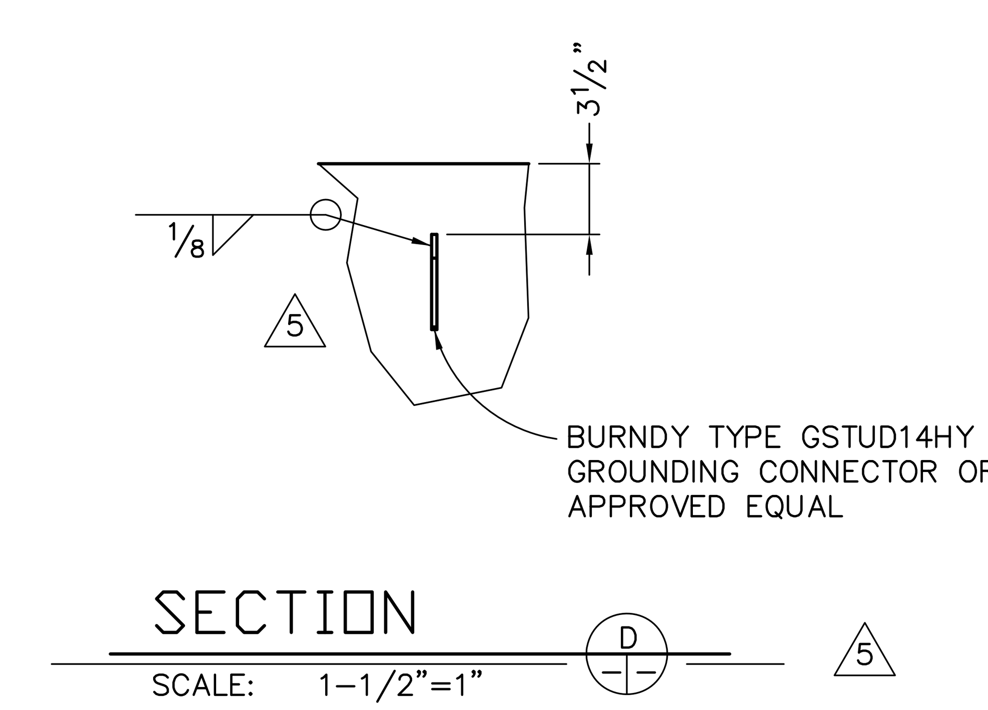
Attachment D-32

Drawings of Liner Types









NOTES

7. SEE DRAWING W7710-0280 FOR INSTALLATION DETAIL
6. ONE CIRCUMFERENTIAL WELD IS PERMITTED TO JOIN TWO PIECES OF PIPE. WELD SHALL BE FULL PENETRATION WITH 1⁄16" REINF. MAINTAIN PIPE AXIS WITHIN 0.005".
5. CONDUCT A HYDROSTATIC LEAK TEST OF THE PIPE AND LOWER CLOSURE PLATE ASSEMBLY BY INSTALLING A TEMPORARY SEAL PLUG IN THE UPPER END OF THE PIPE AND APPLYING 15 PSIG FOR 15 MINUTES IN ACCORDANCE WITH ANL-W DOCUMENT NO. W7710-0296-ES. THERE SHALL BE NO LEAKAGE INDICATED BY A VISUAL EXAMINATION OF THE LINER.
4. MATERIAL FOR TOP AND BOTTOM CLOSURE PLATES SHALL BE CARBON STEEL PER ASTM A-36
3. SEAL WELD TOP PLATE AFTER INSTALLATION OF LINER IN RSWF AND LOADING OF CONTENTS.
2. MATERIAL FOR LINER SHALL BE 16"ø SCHEDULE 10 CARBON STEEL PIPE PER ASTM A-53 TYPE E GRADE A OR B, API-5L GRADE X42 OR X60, OR APPROVED EQUAL.
1. ALL WELDING SHALL BE PER THE INL WELDING MANUAL WPS C6.1 (FCAW) C6.8 (GMAW-P) OR C3.0 ROOT AND FINAL PASSES OF WELDS SHALL BE VISUALLY INSPECTED FOR NO CRACKS THOROUGH FUSION AND UNDERSIZED WELDS.

SYM	APPR'D	CHANGE	BY	CHK'D	DATE
7		SEE ECR 559351.	MW		4/4/08
6	BGH	PER DCN # W7710-065	SLP	BGH	3/31/97
5	BGH	PER DCN # W7710-060	SLP	BGH	4/15/96
4	BGH	PER DCN # W7710-055	SLP	BGH	2/2/95
3	BGH	PER DCN # W7710-054	SLP	BGH	1/25/95
2	BGH	PER DCN # W7710-047	GMH	BGH	4/94
1	BGH	PER DCN # W7710-034	JMH	BGH	9/91

MICRO-FILMED DATE

INDEX CODE NUMBER

AREA	TYPE	CL	ORIG	SERIAL
273	0771	47	052	747632

AUTO-CAD GENERATED DRAWING
FILE : 0291D001.DWG
PLOT SCALE: 1=16 FOR 34 x 22 INCH PLOT
EDIT DATE: 04/02/97

DRAWING CONSISTING OF 1 SHEETS

APPR'D	DATE	APPR'D	DATE
L.E.HAMBERLIN	3/14/90		
L.C.WITBECK	3/14/90		
B.A.KIENLEN	3/14/90		
DRAWN BY: P.HUNTER	2/16/90	SERVICE REQUEST: D6300/WP1412/WP1422	
CHECKED: R. BROOKSHIER	3/14/90	PROJECT ENGINEER	
RESP. ENGINEER: R. BROOKSHIER	3/14/90	APPR'D/RELEASED: R. BLACK	3/15/90
MATERIAL			

PART NO	NEXT ASSEMBLY	REQ'D

THIS DRAWING IS THE PROPERTY OF
ARGONNE NATIONAL LABORATORY

RSWF

16" O.D. X 12'-4"
STORAGE LINER

PLAN, SECTIONS & DETAILS

ARGONNE WEST — I.N.E.L.

SHEET	DRAWING NUMBER	REV.
1 OF 1	W7710-0291-ED-	07

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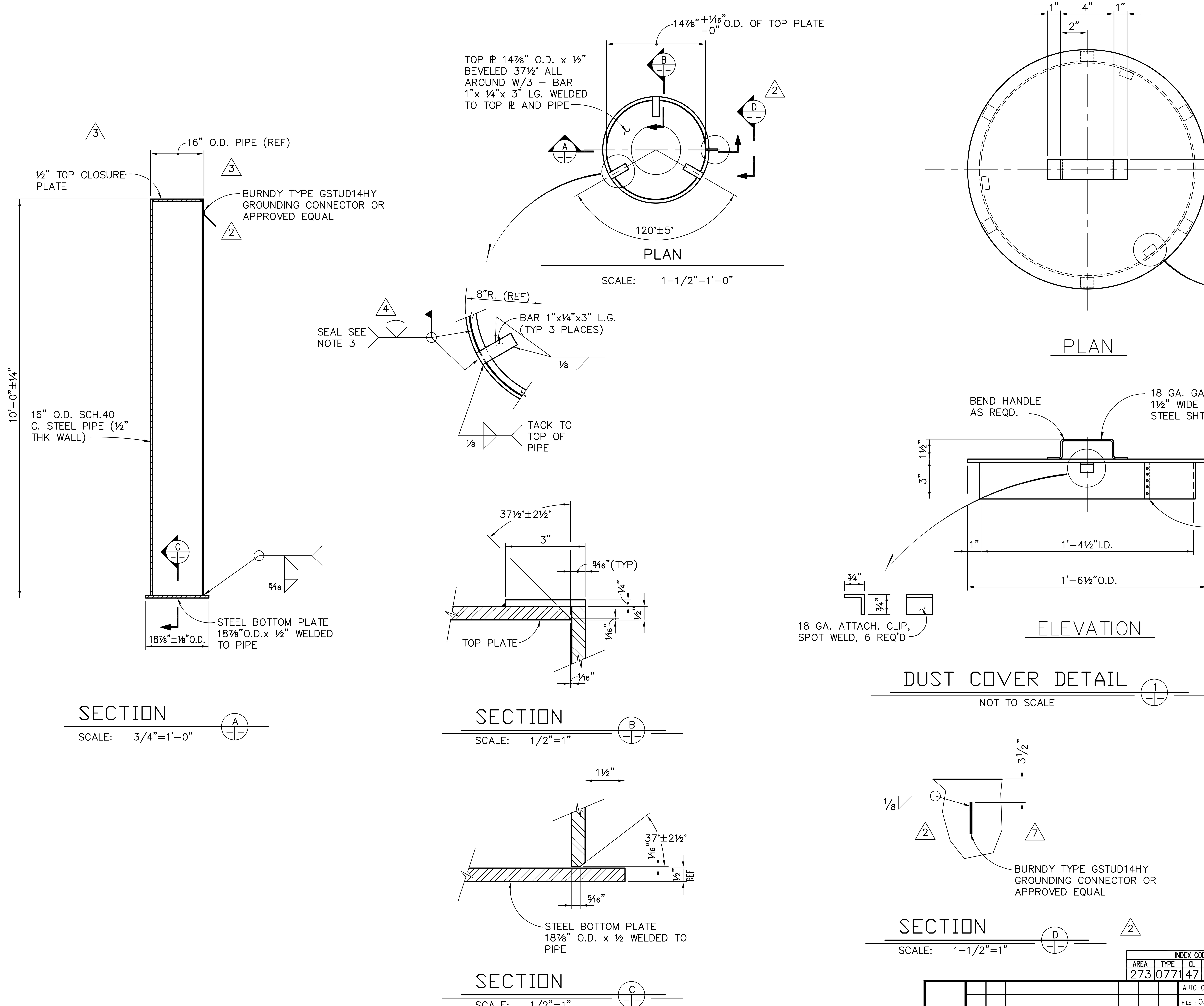
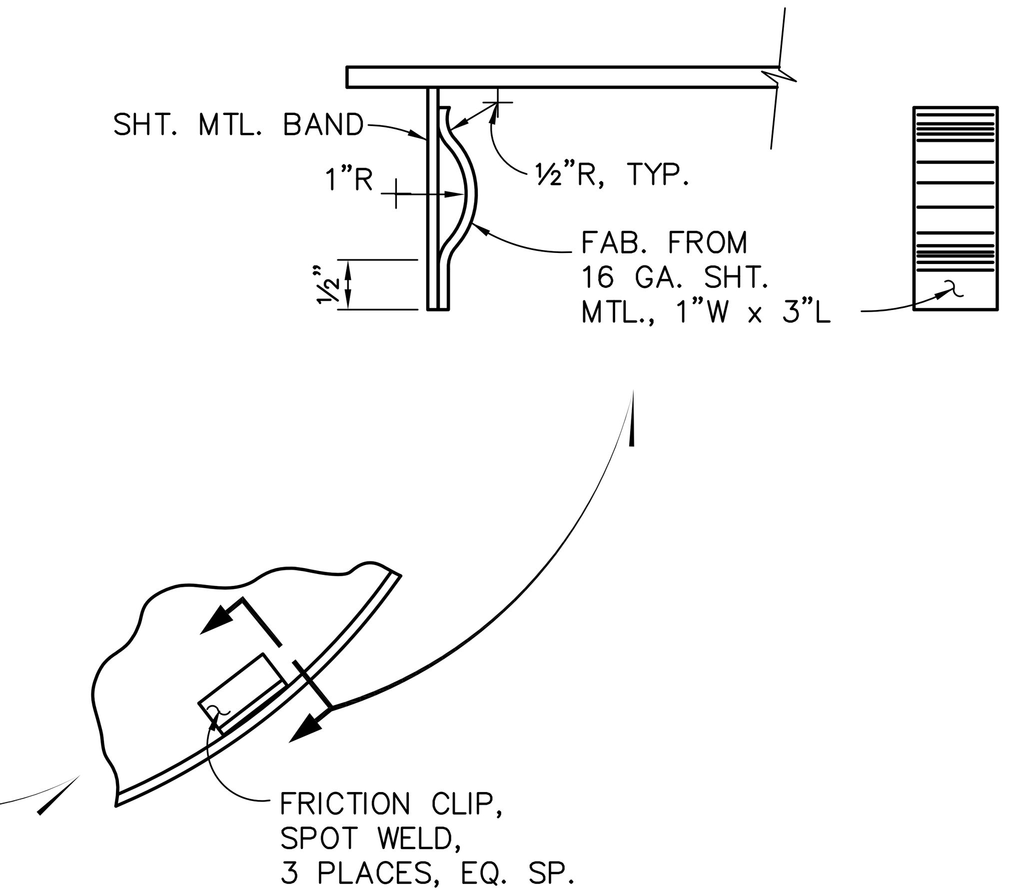




NOTES

7. SEE DRAWING W7710-0280 FOR INSTALLATION DETAIL
6. ONE CIRCUMFERENTIAL WELD IS PERMITTED TO JOIN TWO PIECES OF PIPE. WELD SHALL BE FULL PENETRATION WITH 1⁄16" REINF. MAINTAIN PIPE AXIS WITHIN 0.005".
5. CONDUCT A HYDROSTATIC LEAK TEST OF THE PIPE AND LOWER CLOSURE PLATE ASSEMBLY BY INSTALLING A TEMPORARY SEAL PLUG IN THE UPPER END OF THE PIPE AND APPLYING 15 PSIG FOR 15 MINUTES IN ACCORDANCE WITH ANL-W DOCUMENT NO. W7710-0296-ES. THERE SHALL BE NO LEAKAGE INDICATED BY A VISUAL EXAMINATION OF THE LINER.
4. MATERIAL FOR TOP AND BOTTOM CLOSURE PLATES SHALL BE CARBON STEEL PER ASTM A-36
3. SEAL WELD TOP PLATE AFTER INSTALLATION OF LINER IN RSWF AND LOADING OF CONTENTS.
2. MATERIAL FOR LINER SHALL BE 16"ø SCHEDULE 40 CARBON STEEL PIPE PER ASTM A-53 TYPE E GRADE A OR B, API-5L GRADE X42 OR X60, OR APPROVED EQUAL.
1. ALL WELDING SHALL BE PER THE INL WELDING MANUAL WPS C6.1 (FCAW) C6.8 (GMAW-P) OR C3.0 ROOT AND FINAL PASSES OF WELDS SHALL BE VISUALLY INSPECTED FOR NO CRACKS THOROUGH FUSION AND UNDERSIZED WELDS.

SYM	APPR'D	CHANGE	BY	CHK'D	DATE
4		SEE ECR 559351.	MW		4/24/08
03	BGH	DCN W7710-065	S.L.P.	BGH	3/31/97
02	BGH	DCN W7710-060	S.L.P.	BGH	4/15/96
01	G.H.	DCN W7710-057	S.L.P.	G.H.	9/14/95

MICRO-FILMED DATE

INDEX CODE NUMBER				
AREA	TYPE	CL	ORIG	SERIAL
273	0771	47	052	747681

AUTO-CAD GENERATED DRAWING
FILE : 0308D001.DWG
PLOT SCALE: 1=16 FOR 34 x 22 INCH PLOT
EDIT DATE: 04/02/97

DRAWING CONSISTING OF 1 SHEETS

APPR'D	DATE	APPR'D	DATE
TOM ZAHN	2/6/95		
LARSON E. HAMBERLIN	2/7/95		
D.L. NIELSEN	2/20/95		
DRAWN BY: S.L. PALMER	1/25/95	SERVICE REQUEST: E6408-00/976436-58	
CHECKED: B.G. HARRIS	2/6/95	PROJECT ENGINEER: B.G. HARRIS	2/6/95
RESP. ENGINEER: B.G. HARRIS	2/6/95	APPR'D/RELEASED: B.G. HARRIS	2/22/95
MATERIAL			

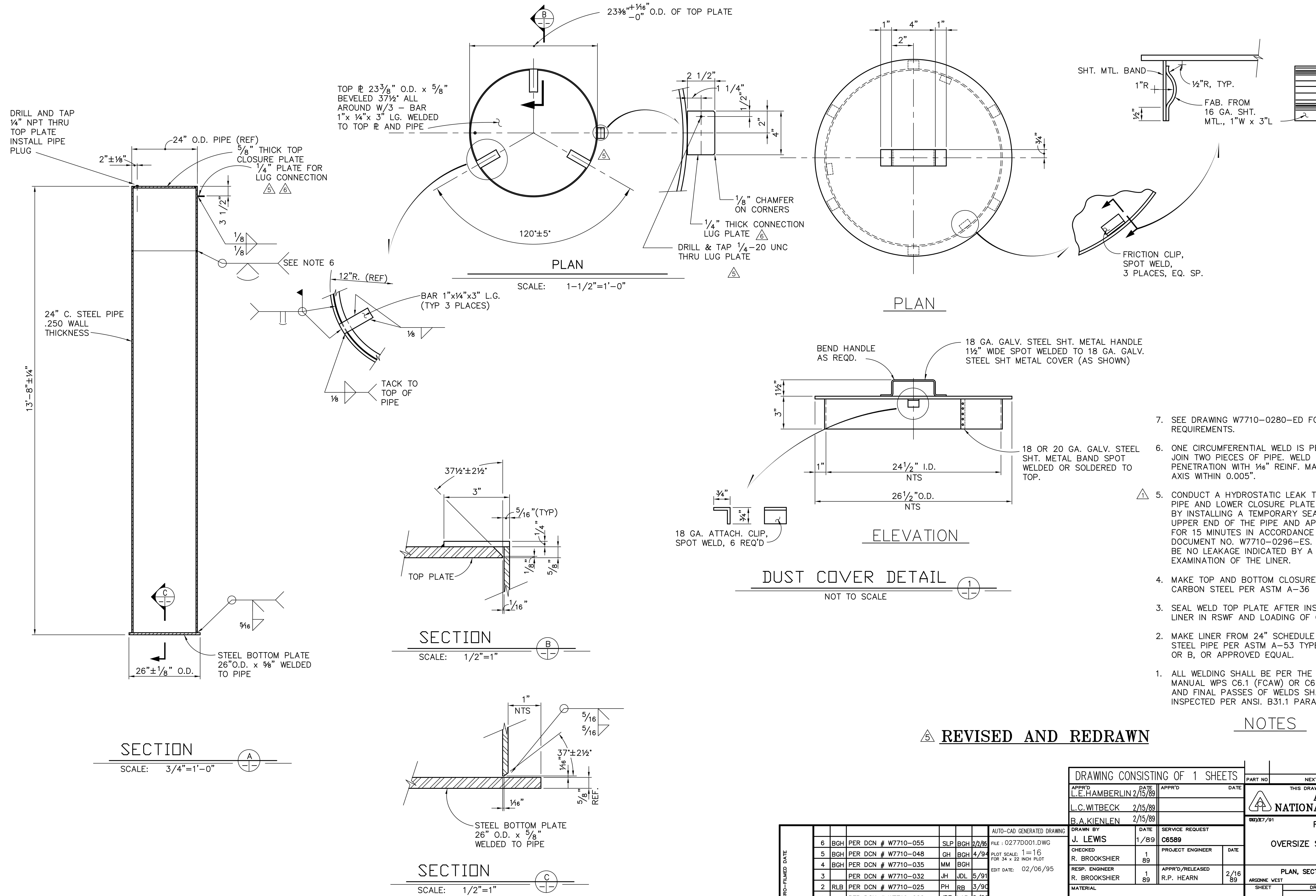
PART NO	NEXT ASSEMBLY	REQ'D

THIS DRAWING IS THE PROPERTY OF
ARGONNE NATIONAL LABORATORY

TITLE: RSWF
16" O.D. X 10'-0" STORAGE LINER
PLAN, SECTIONS & DETAILS
ARGONNE WEST — I.N.E.L.

SHEET: 1 OF 1 — DRAWING NUMBER: W7710-0308-ED-04 — REV. 1

File: 747681.dwg Path: X:\ CHAPJL2 Date: 04/16/10 – 10:38 AM Layout Name: Model



7. SEE DRAWING W7710-0280-ED FOR INSTALLATION REQUIREMENTS.

6. ONE CIRCUMFERENTIAL WELD IS PERMITTED TO JOIN TWO PIECES OF PIPE. WELD SHALL BE FULL PENETRATION WITH 1/16" REINF. MAINTAIN PIPE AXIS WITHIN 0.005".

5. CONDUCT A HYDROSTATIC LEAK TEST OF THE PIPE AND LOWER CLOSURE PLATE ASSEMBLY BY INSTALLING A TEMPORARY SEAL PLUG IN THE UPPER END OF THE PIPE AND APPLYING 15 PSIG FOR 15 MINUTES IN ACCORDANCE WITH ANL-W DOCUMENT NO. W7710-0296-ES. THERE SHALL BE NO LEAKAGE INDICATED BY A VISUAL EXAMINATION OF THE LINER.

4. MAKE TOP AND BOTTOM CLOSURE PLATES FROM CARBON STEEL PER ASTM A-36

3. SEAL WELD TOP PLATE AFTER INSTALLATION OF LINER IN RSWF AND LOADING OF CONTENTS.

2. MAKE LINER FROM 24" SCHEDULE 10 CARBON STEEL PIPE PER ASTM A-53 TYPE E GRADE A OR B, OR APPROVED EQUAL.

1. ALL WELDING SHALL BE PER THE INEL WELDING MANUAL WPS C6.1 (FCAW) OR C6.8 (GMAW-P) ROOT AND FINAL PASSES OF WELDS SHALL BE VISUALLY INSPECTED PER ANSI. B31.1 PARAGRAPH 136.4.2.

NOTES

5 **REVISED AND REDRAWN**

SYM	APPR'D	CHANGE	BY	CHK'D	DATE
6	BGH	PER DCN # W7710-055	SLP	BGH	2/2/95
5	BGH	PER DCN # W7710-048	GH	BGH	4/94
4	BGH	PER DCN # W7710-035	MM	BGH	
3		PER DCN # W7710-032	JH	JDL	5/91
2	RLB	PER DCN # W7710-025	PH	RB	3/90
1		PER DCN # W7710-022	JPF	LAB	8/89

MICRO-FILMED DATE

AUTO-CAD GENERATED DRAWING
FILE : 0277D001.DWG
PLOT SCALE: 1=16 FOR 34 x 22 INCH PLOT
EDIT DATE: 02/06/95

DRAWING CONSISTING OF 1 SHEETS

APPR'D	DATE	APPR'D	DATE
L.E.HAMBERLIN	2/15/89		
L.C.WITBECK	2/15/89		
B.A.KIENLEN	2/15/89		

DRAWN BY	DATE	SERVICE REQUEST	
J. LEWIS	1/89	C6589	
CHECKED		PROJECT ENGINEER	DATE
R. BROOKSHIER	1 89		
RESP. ENGINEER		APPR'D/RELEASED	
R. BROOKSHIER	1 89	R.P. HEARN	2/16 89
MATERIAL			

PART NO	NEXT ASSEMBLY	REQ'D

THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

09/17/91

RSWF

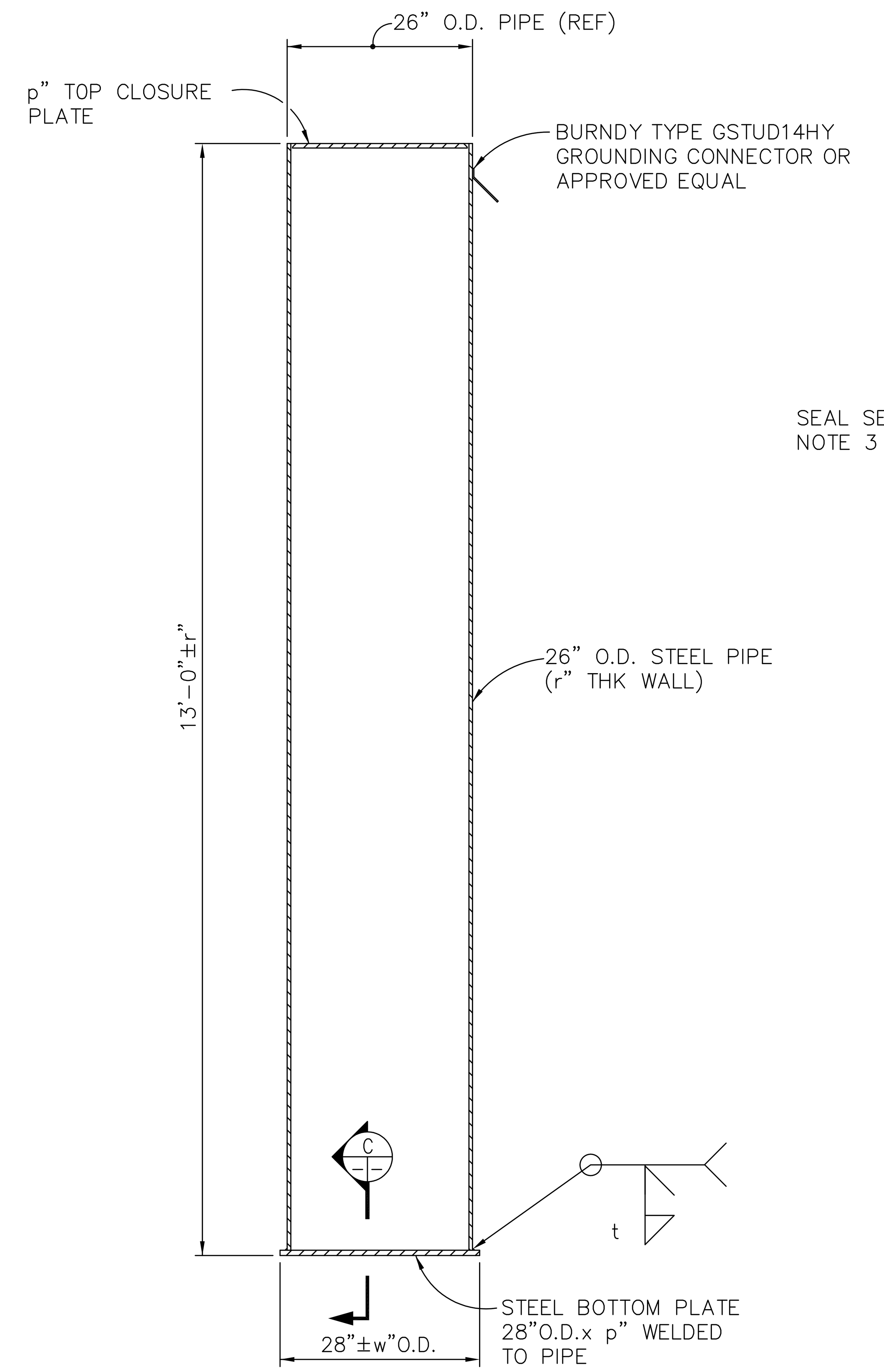
OVERSIZE STORAGE LINER

PLAN, SECTIONS & DETAILS

ARGONNE WEST I.N.E.L.

SHEET 1 OF 1 DRAWING NUMBER W7710-0277-ED- REV. 06

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1



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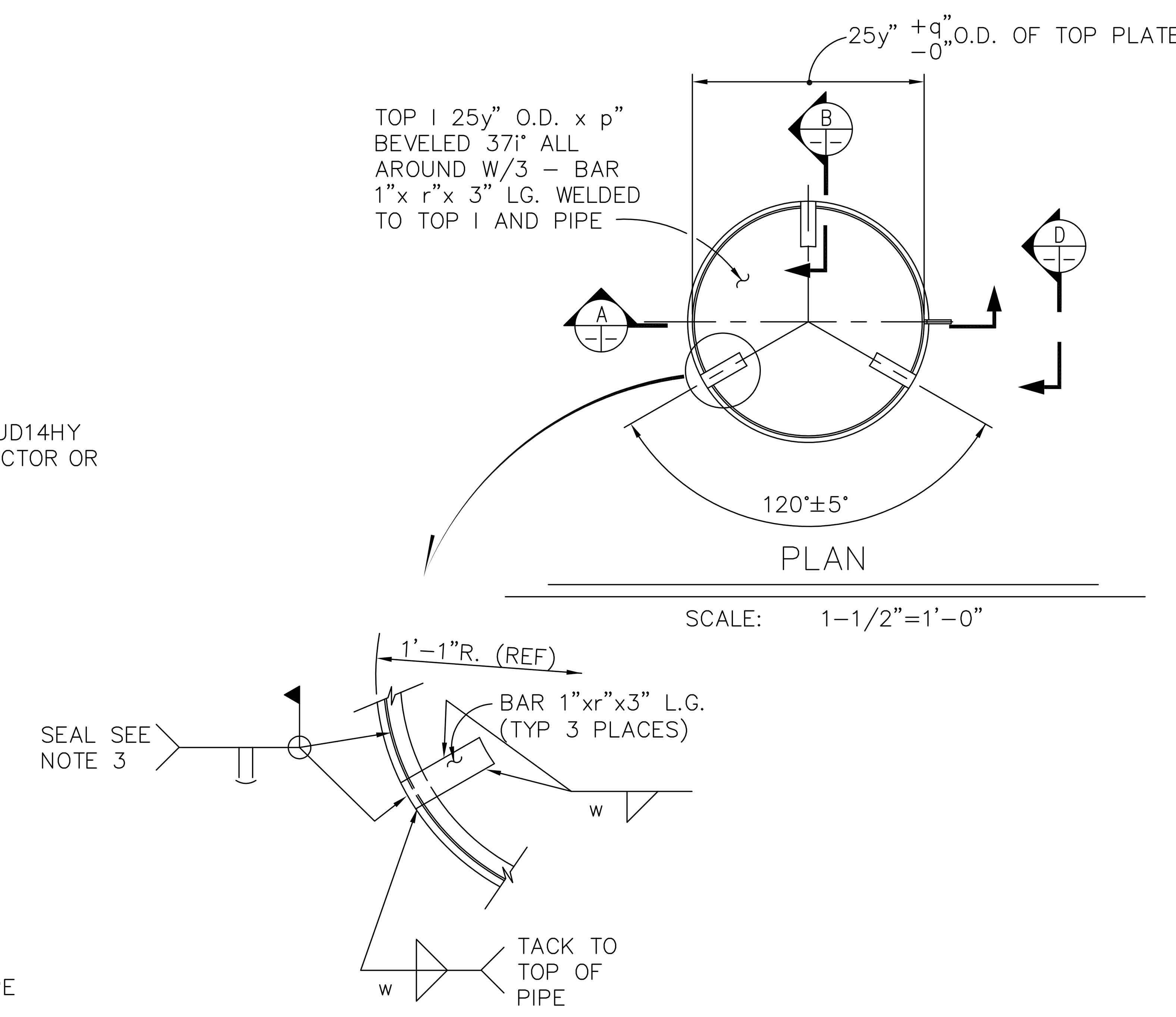
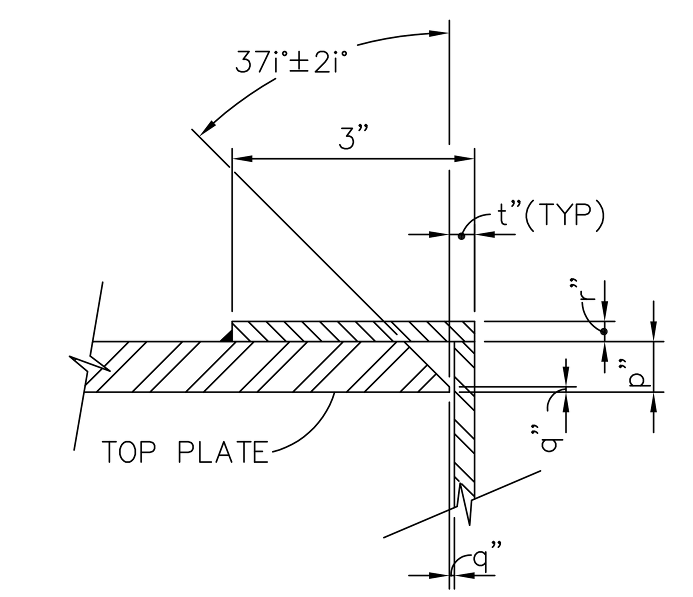
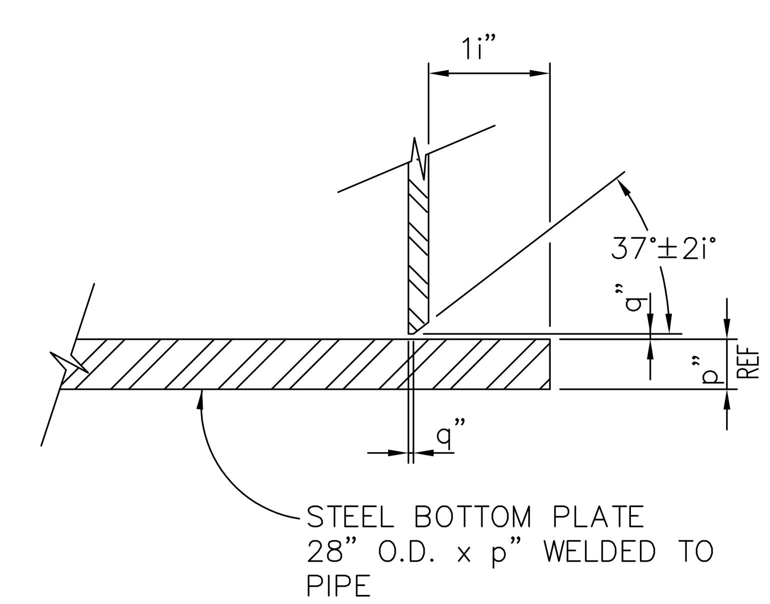


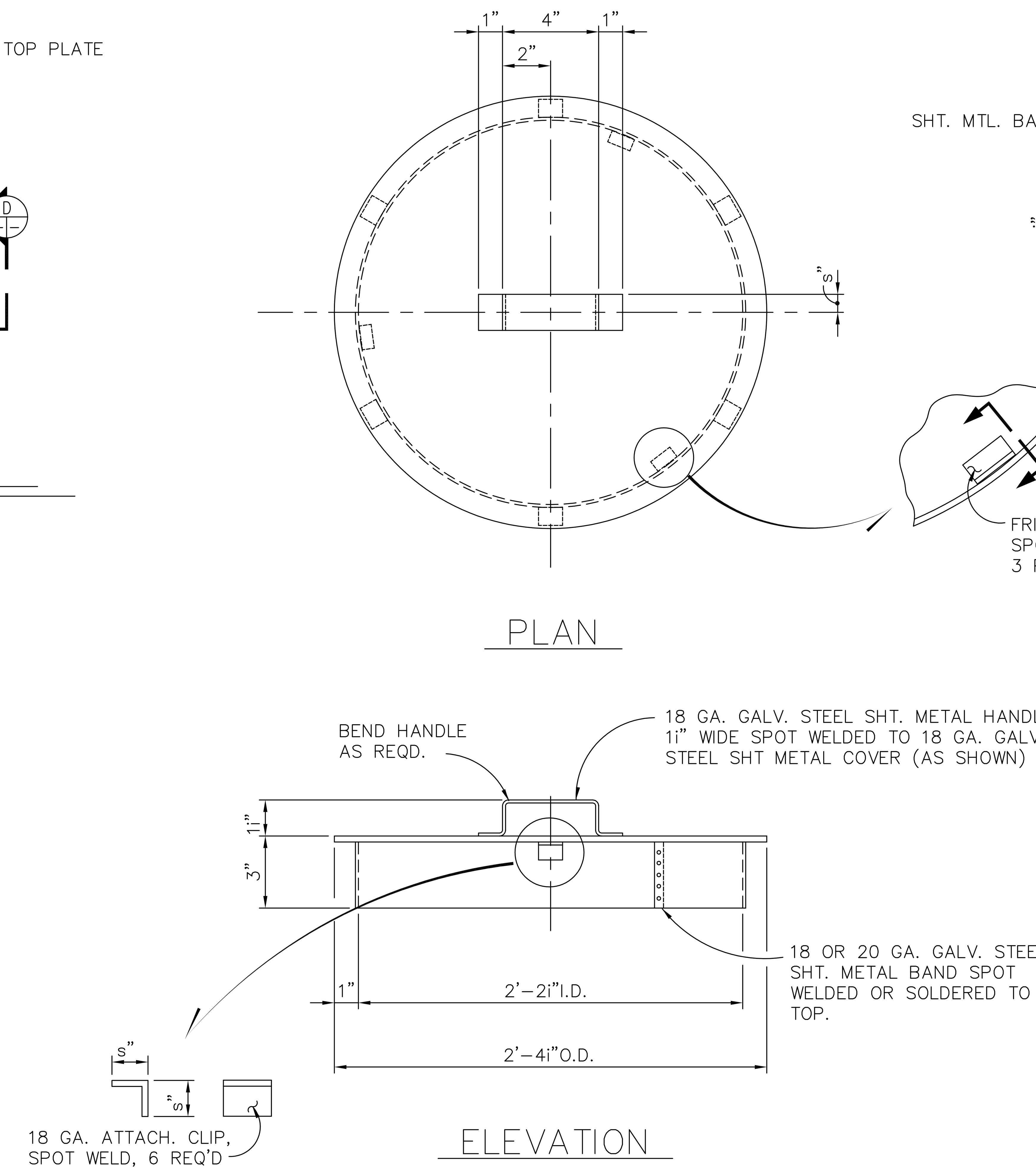
PLAN
SCALE: 1-1/2"=1'-0"

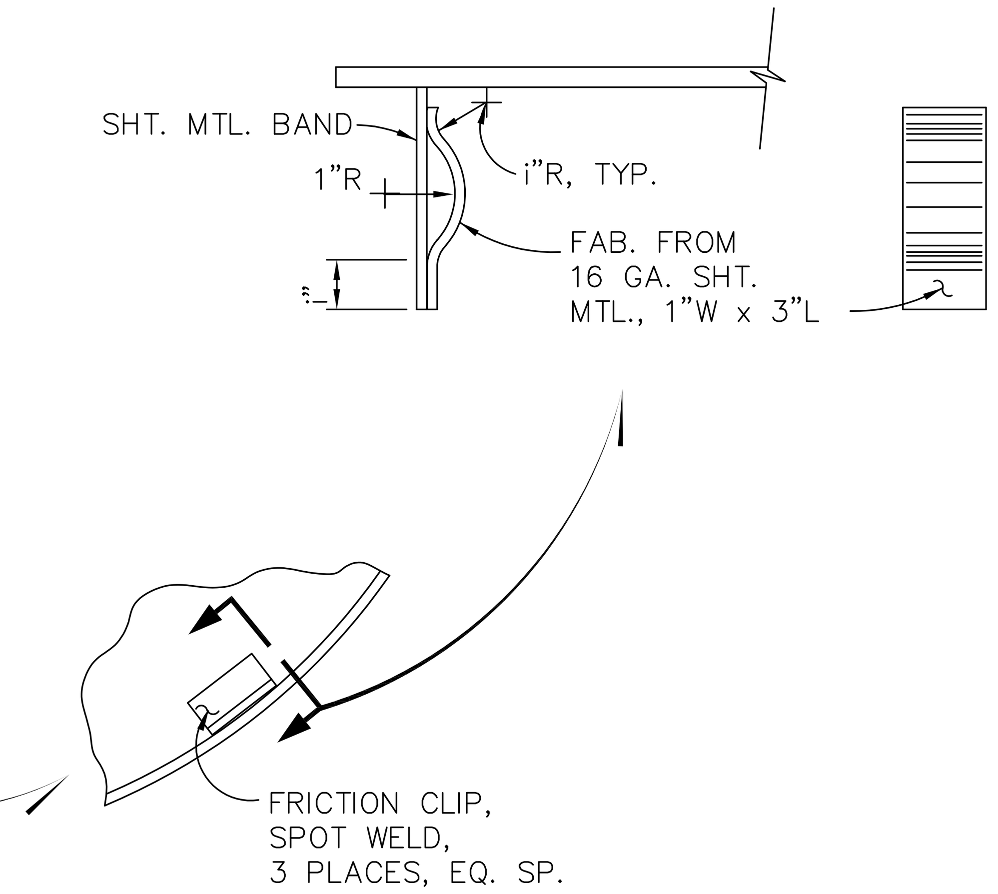


SECTION B
SCALE: 1/2"=1"

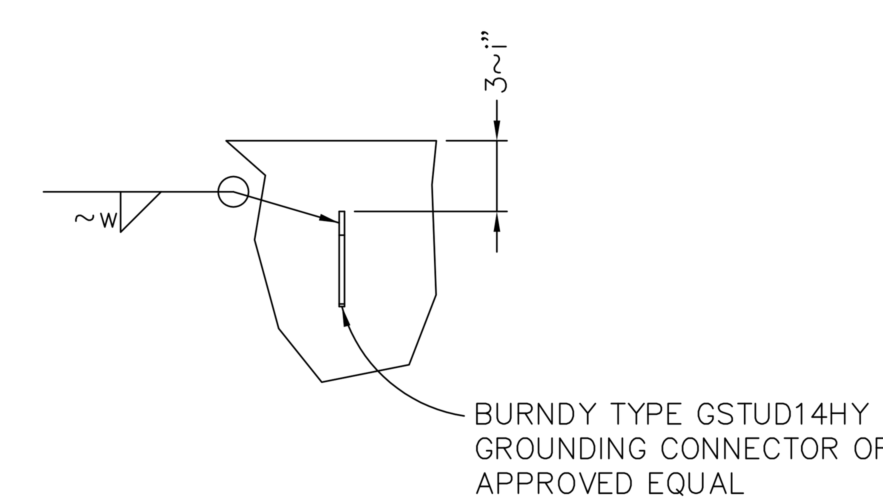


SECTION C
SCALE: 1/2"=1"





DUST COVER DETAIL 1
NOT TO SCALE



SECTION D
SCALE: 1-1/2"=1"

7. SEE DRAWING W7710-0280 FOR INSTALLATION DETAIL

6. ONE CIRCUMFERENTIAL WELD IS PERMITTED TO JOIN TWO PIECES OF PIPE. WELD SHALL BE FULL PENETRATION WITH q" REINF. MAINTAIN PIPE AXIS WITHIN 0.005".

5. CONDUCT A HYDROSTATIC LEAK TEST OF THE PIPE AND LOWER CLOSURE PLATE ASSEMBLY BY INSTALLING A TEMPORARY SEAL PLUG IN THE UPPER END OF THE PIPE AND APPLYING 15 PSIG FOR 15 MINUTES IN ACCORDANCE WITH ANL-W DOCUMENT NO. W7710-0296-ES. THERE SHALL BE NO LEAKAGE INDICATED BY A VISUAL EXAMINATION OF THE LINER.

4. MATERIAL FOR TOP AND BOTTOM CLOSURE PLATES SHALL BE CARBON STEEL PER ASTM A-36

3. SEAL WELD TOP PLATE AFTER INSTALLATION OF LINER IN RSWF AND LOADING OF CONTENTS.

2. MATERIAL FOR LINER SHALL BE 26"ø X r" WALL THICKNESS CARBON STEEL PIPE PER ASTM A-53 TYPE E GRADE A OR B, API-5L GRADE X42 OR X60, OR APPROVED EQUAL.

1. ALL WELDING SHALL BE PER THE INEL WELDING MANUAL WPS C6.1 (FCAW) OR C6.8 (GMAW-P) ROOT AND FINAL PASSES OF WELDS SHALL BE VISUALLY INSPECTED PER ANSI. B31.1 PARAGRAPH 136.4.2.

NOTES

MICRO-FILMED DATE	SYM	APPR'D	CHANGE	BY	CHK'D	DATE

AUTO-CAD GENERATED DRAWING
FILE: 0311D001.DWG
PLOT SCALE: 1=16 FOR 34 x 22 INCH PLOT
EDIT DATE: 04/02/97

DRAWING CONSISTING OF 1 SHEETS

APPR'D	DATE	APPR'D	DATE
TOM ZAHN	4/2/97		
LARSON E. HAMBERLIN	4/2/97		
D.L. NIELSON	4/2/97		
DRAWN BY S.L. PALMER	3/26/97	SERVICE REQUEST 976436-58	
CHECKED B.G. HARRIS	4/2 97	PROJECT ENGINEER B.G. HARRIS	4/2 97
RESP. ENGINEER B.G. HARRIS	4/2 97	APPR'D/RELEASED B.G. HARRIS	4/2 97
MATERIAL			

PART NO	NEXT ASSEMBLY	REQ'D

THIS DRAWING IS THE PROPERTY OF
ARGONNE NATIONAL LABORATORY

RSWF

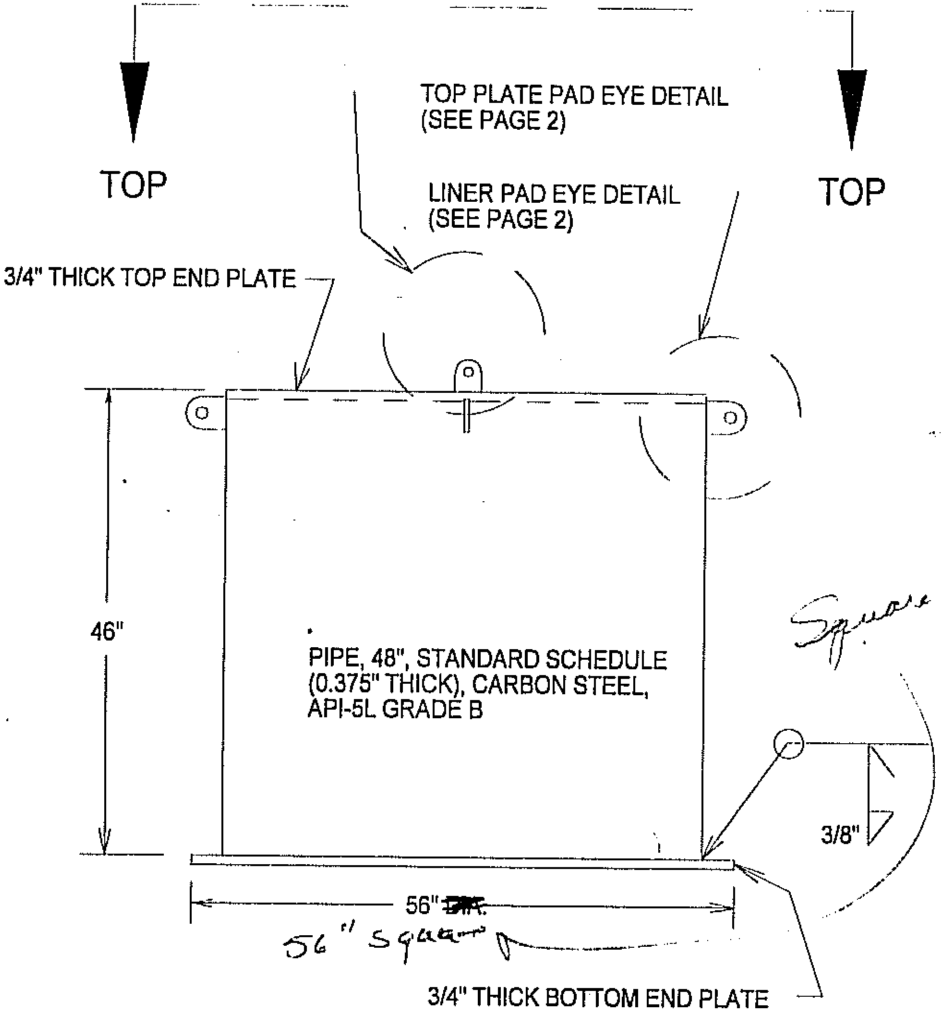
26" O.D. X 13'-0" STORAGE LINER

PLAN, SECTIONS & DETAILS

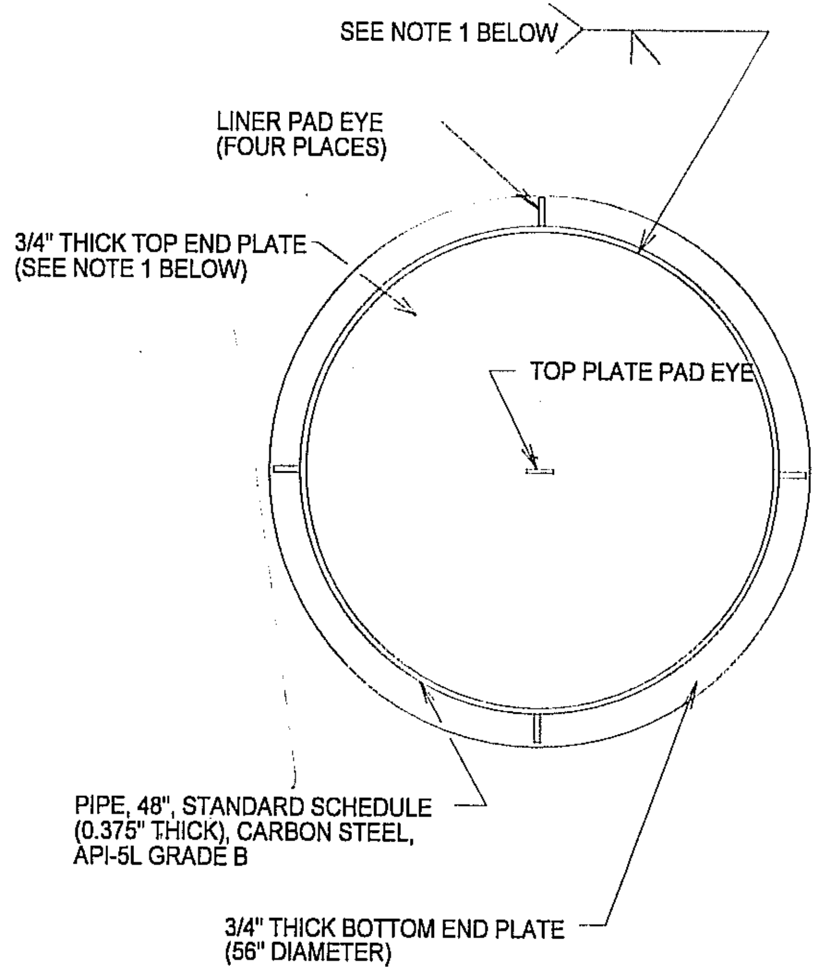
ARGONNE WEST | I.N.E.L.

SHEET 1 OF 1 | DRAWING NUMBER W7710-0311-ED- | REV. 00

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1



SIDE VIEW

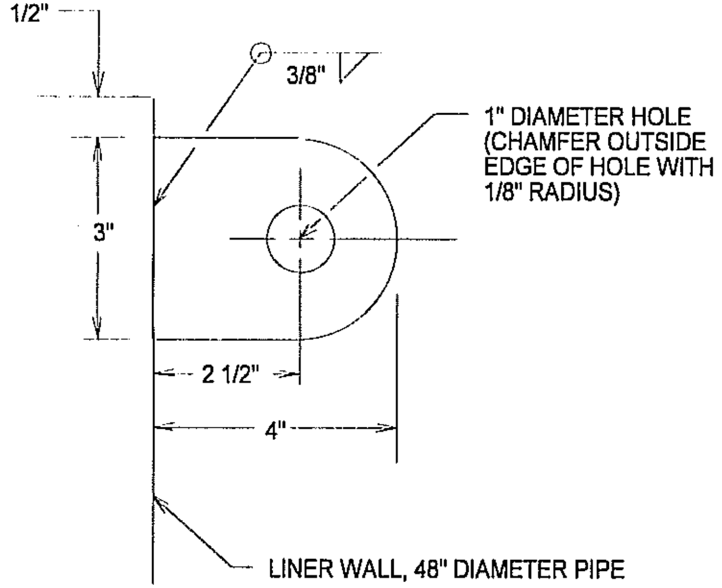


TOP VIEW

NOTES:
1. THE TOP END PLATE WILL BE WELDED TO THE 48 INCH DIAMETER PIPE AFTER THE NUCLIDE TRAP HAS BEEN INSTALLED. ALSO, A HYDROSTATIC LEAK TEST AT 15 PSIG FOR 15 MINUTES WILL BE PERFORMED ON THE PIPE AND BOTTOM END PLATE ASSEMBLY BEFOR THE TOP PLATE IS WELDED TO THE PIPE.
2. WELDING AND INSPECTION REQUIREMENTS WILL BE PER PAGE 3 OF THIS ENGINEERING SKETCH.

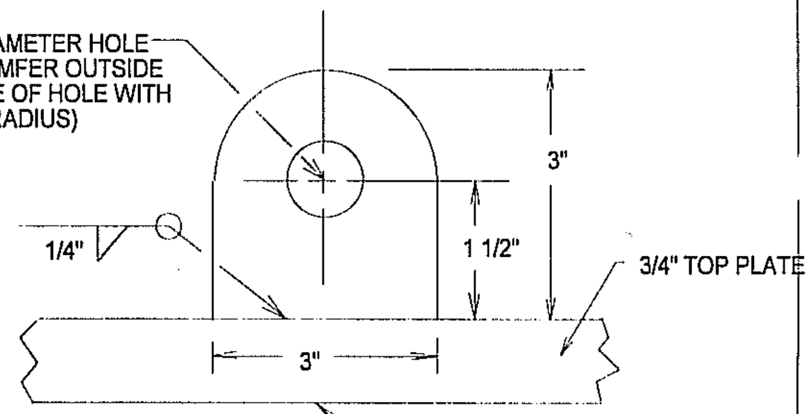
Attachment to Fab Request # 2638

Drwg by L. W. DUNCAN	Appvd by [signature] 9/14/	Title ETA-EN-01-005 FABRICATION DETAILS FOR THE TWO LINERS THAT WILL CONTAIN EBR-II NUCLIDE TRAPS AND BE STORED AT RSWF
Tol NA	R.Engr. L. W. DUNCAN	
Mat'l CARBON STEEL: PIPE: API-5L GRADE B, PLATE: ASTM-A36	Scale NA	Drwg SK-LWD-797-081701 PAGE 1 OF 3



NOTE: INSTALL THE FOUR LINER PAD EYES 90 DEGREES APART FROM ONE ANOTHER

LINER PAD EYE
(3/4" THICK PLATE)



ATTACH A WELD-ON TIE DOWN RING TO THE CENTER OF THE INSIDE SURFACE OF THE TOP PLATE. THIS WILL BE USED TO ATTACH ONE END OF THE LIFTING CABLES THAT WERE USED TO LOWER THE NUCLIDE TRAP DOWN INTO THE LINER. THE OTHER END OF THE CABLES WILL STILL BE ATTACHED TO THE TRAP. OBTAIN THE TIE DOWN RING FROM THE RESPONSIBLE ENGINEER.

TOP PLATE PAD EYE
(1/2" THICK PLATE)

Attachment To Fab. Request # 2638

Drwg by L. W. DUNCAN	Appvd. by [signature] 9/6/01	Title ETA-EN-01-005 FABRICATION DETAILS FOR THE TWO LINERS THAT WILL CONTAIN EBR-II NUCLIDE TRAPS AND BE STORED AT RSWF	
Tol. NA	R.Engr. L. W. DUNCAN		
Mat'l CARBON STEEL: PLATE: ASTM-A36		Scale NA	Drwg PAGE 2 OF 3 SK-LWD-797-081701

WELDING AND INSPECTION REQUIREMENTS

L. W. Duncan 10-09-01

WELDING NOTES: 1. ALL WELDING SHALL BE DONE IN ACCORDANCE WITH PAGES 1 AND 2 OF THIS DRAWING, AND IN ACCORDANCE WITH THE INEL WELDING PROCEDURE C2.0. or C6.8. THIS WELDING PROCEDURE SPECIFICATION MEETS THE REQUIREMENTS OF THE ASME B&PV CODE SECTION IX, 1998 EDITION.

2. QUALITY CONTROL WILL PERFORM A VISUAL ON THE ROOT AND FINAL WELD PASS AND A DYE PENETRANT EXAMINATION SHALL BE PERFORMED ON THE FINAL WELD PASS PER ANSI B31.1-1995. ACCEPTANCE STANDARDS FOR THE VISUAL AND DYE PENETRANT EXAMINATIONS WILL ALSO BE PERFORMED IN ACCORDANCE WITH ANSI B31.1-1995.

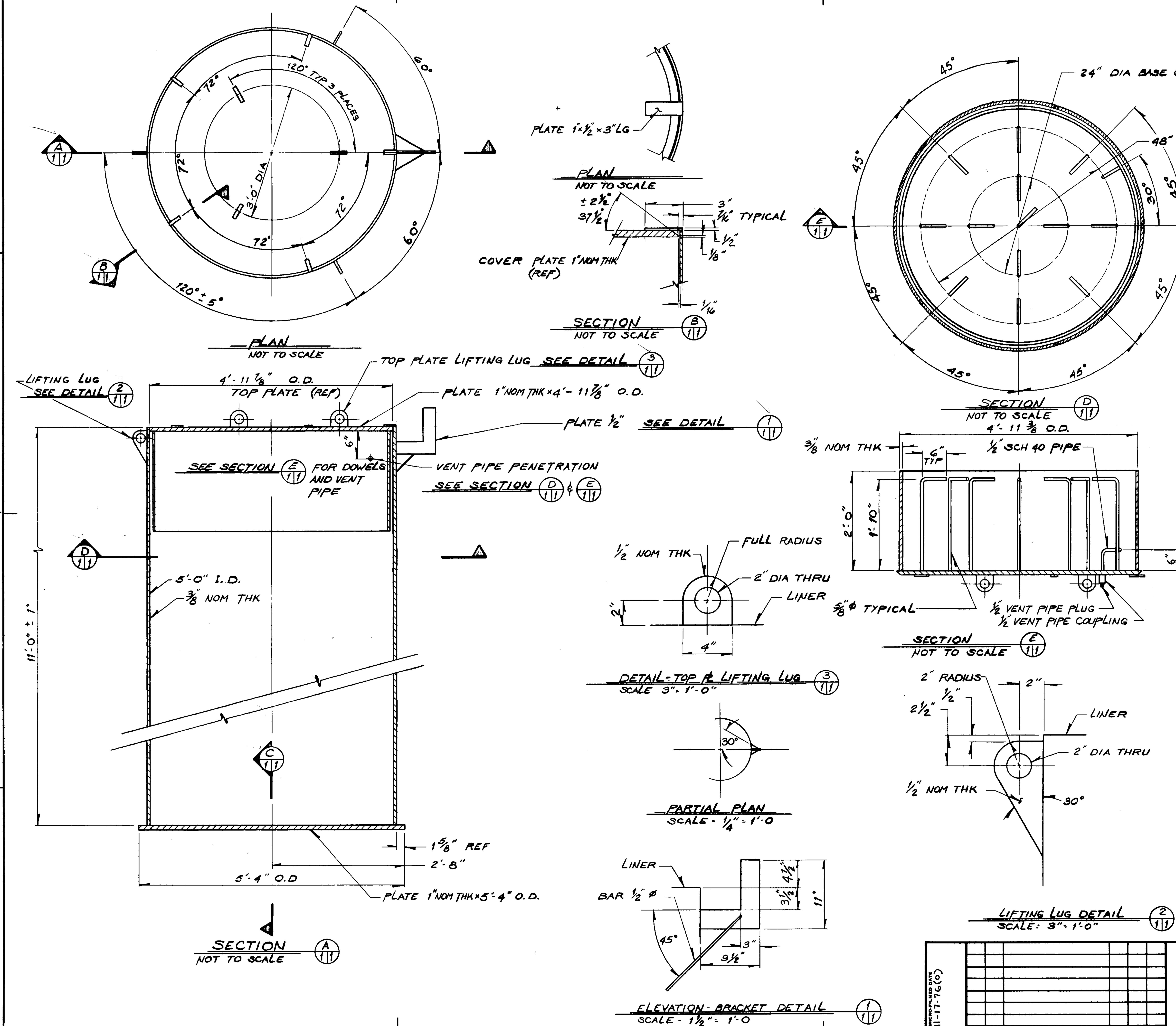
3. A PIPING WELD RECORD MUST BE COMPLETED FOR EACH WELD IN ACCORDANCE WITH THE ATTACHMENT TO THIS ENGINEERING SKETCH.

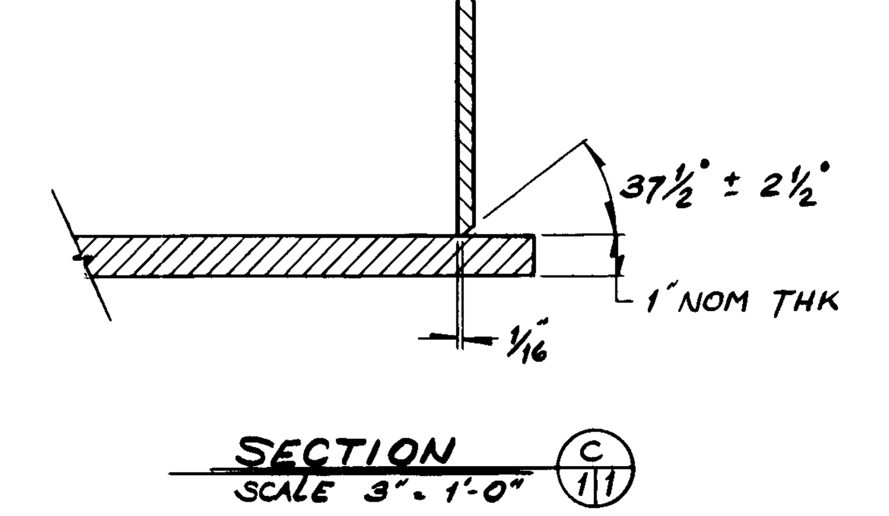
4. PRIOR TO WELDING THE TOP END PLATE TO THE LINER, A HYDROSTATIC LEAK TEST AT 15 PSIG FOR 15 MINUTES MUST BE PERFORMED ON THE LOWER END PLATE AND LNER PIPE ASSEMBLY. ONCE THIS HYDROSTATIC TEST HAS BEEN COMPLETED, THE NUCLIDE TRAP CAN BE INSTALLED AND THE TOP END PLATES CONNECTED.

Attachment To Fab Request # 2638

Drwg by L. W. DUNCAN Tol NA	Appvd. by [signature] R.I ngr. L. W. DUNCAN	Title ETA-EN-01-005 FABRICATION DETAILS FOR THE TWO LINERS THAT WILL CONTAIN EBR-II NUCLIDE TRAPS AND BE STORED AT RSWF		
Mat'l CARBON STEEL:		Scale NA	Drwg SK-LWD-797-081701	PAGE 3 OF 3

DWG. NO. W7710-0202-DD-00





GENERAL NOTES:

1. SECTIONS AND DETAILS INDICATED ON THIS DRAWING ARE IDENTIFIED AS SHOWN:

   LETTER DENOTES SECTION — NUMBER DENOTES DETAILS — SHEET WHERE CUT — SHEET WHERE DRAWN

2. MAKE AND MODEL NUMBERS ARE SHOWN TO INDICATE THOSE ON WHICH THE DESIGN IS BASED, NOT TO ELIMINATE APPROVED EQUIVALENTS.
3. ALL DESIGN AND FABRICATION SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE ASME BOILER & PRESSURE VESSEL CODE SECTION VIII, UNFIRED PRESSURE VESSELS, EXCEPT CODE STAMP IS NOT REQUIRED, DESIGN PRESSURE 15 PSIG (INTERNAL). TEST PRESSURE 22 1/2 PSIG (INTERNAL). USE E70XX LOW HYDROGEN ELECTRODE.
4. PAINT PER SPECS.
5. TOLERANCES SHALL BE IN ACCORDANCE WITH ASME BOILER AND PRESSURE CODE SECTION VIII UNLESS OTHERWISE SPECIFIED.
6. STEEL SHALL BE ASTM A283 GRADE C UNLESS OTHERWISE SPECIFIED.
7. STEEL BARS SHALL BE ASTM A36 OR EQUIVALENT
8. COVER SHALL NOT BE WELDED TO STORAGE VESSEL (LINER). PLATES 1" × 1/2" SHALL BE WELDED TO THE COVER AND TO THE LINER. ALL OTHER CONNECTIONS OF STEEL TO STEEL SHALL BE WELDED IN ACCORDANCE WITH NOTE 3

SYM	ZONE	CHANGE	BY	CHK'D	DATE

MICRO-FILMED DATE 11-17-76(O)

DRAWING CONSISTING OF 1 SHEET

APPR'D	DATE	APPR'D	DATE
V. G. AQUINO	9-1-76	D.W. CISSEL	9-1-76
J. D. LEMAN	9-1-76	J. W. AUER	9-1-76
L. C. WITBECK	9-1-76		
DRAWN BY D. NEWMAN	8-12-76	SERVICE REQUEST 81171/64336	
CHECKED J.D.LEWIS	8/76	PROJECT MGR. M.W. JACKSON	8-17-76
RESP. ENGINEER R.L. BLACK	8/17/76	APPR'D/RELEASED RP Nelson	9/1/76
MATERIAL			

REF. NO. | NEXT ASSEMBLY | REQ'D

THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

TITLE EBR II PRIMARY COLD TRAP STORAGE VESSEL FOR R.S. & W. FACILITY #771 PLAN, SECTIONS & ELEVATION

ARGONNE WEST I.N.E.L.

SHEET	DRAWING NUMBER	REV.
1 OF 1	W7710-0202-DD	00

ANL-284A (5-72)

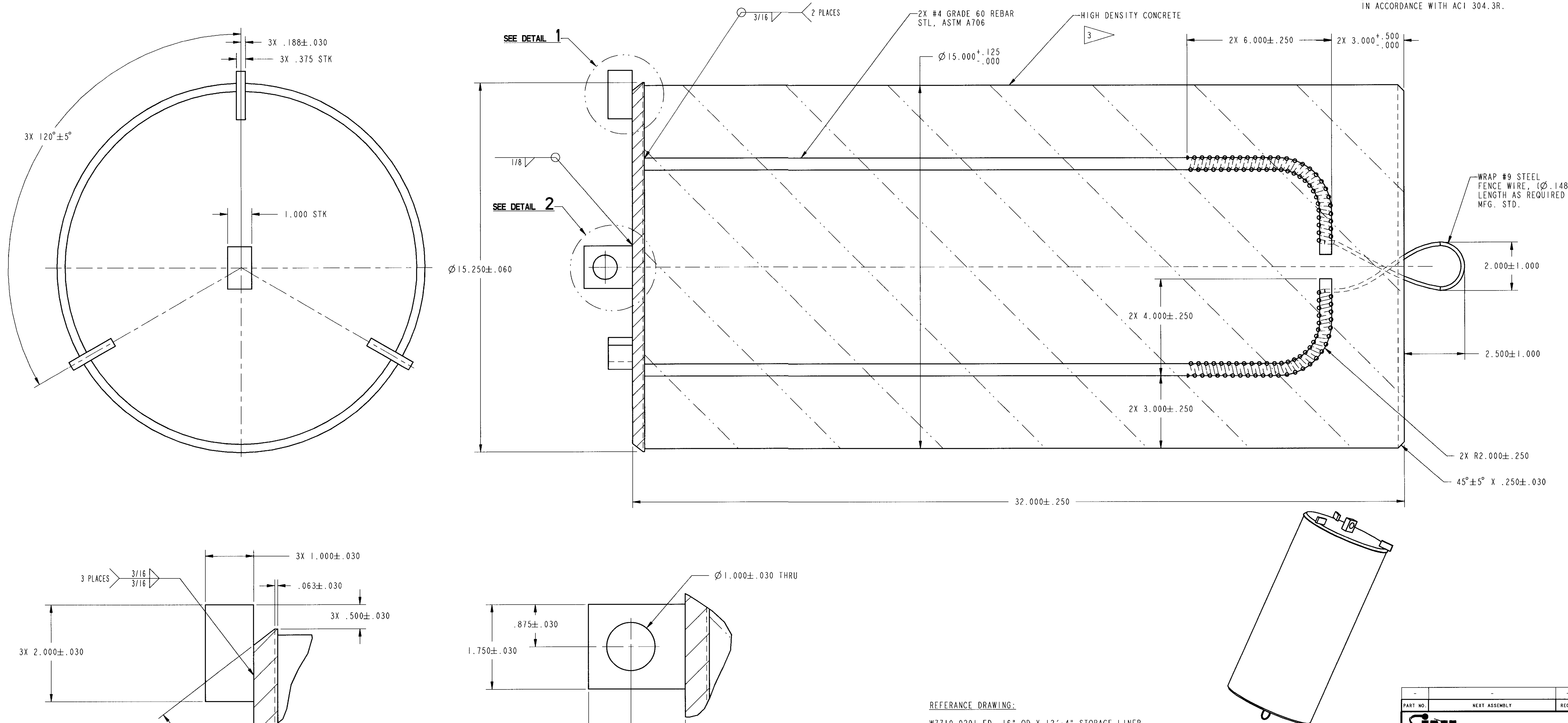
Attachment D-33

Drawings of Shield Plugs

DWG. NO.
W7710-0129-ED-00

NOTES:

1. WELD SYMBOLS PER AWS A2.4.
2. CARBON STEEL WELDING AND INSPECTION PER AWS D1.1-98. WELD ACCEPTANCE CRITERIA PER SECTION 6, STATICALLY LOADED. WELDING OF REBAR SHALL BE IN ACCORDANCE WITH AWS D1.4. ACCEPTANCE CRITERIA SECTION 4.4.
3. CONCRETE SHALL HAVE A MINIMUM DRY UNIT WEIGHT OF 240 LBS/CUBIC FOOT, AND MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 5000 PSI. A MIX DESIGN SHALL BE SUBMITTED FOR APPROVAL BY THE LABORATORY. CONCRETE WORK SHALL BE IN ACCORDANCE WITH ACI 304.3R.



REFERANCE DRAWING:

W7710-0291-ED 16" OD X 12'-4" STORAGE LINER

SYM	APPR'D	CHANGE	BY	CHK'D	DATE

SCAN DATE

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN INCHES
ANGULAR TOL. ±1/4°
REMOVE ALL BURRS AND SHARP EDGES.
ALL MACHINED SURFACES TO BE 125 OR FINER.
STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1.
DIMENSIONS & TOLERANCES IN ACCORDANCE WITH ASME Y14.5-1994.

ETA NO. N/A		MEAAL SYSTEM ID NO. RSWF-001		
DRAWN BY C. LIU	DATE 5/5 2004	DRAFTING WORK REQUEST NO. 8451		
CHECKED Forren	8/18 2005	PROJECT MGR.	DATE /	
RESP. ENGINEER [signature]	9/15 2005	APPR'D/RELEASED [signature]	10/4 05	
MATERIAL STL, ASTM A36 AND NOTED				

PART NO.	NEXT ASSEMBLY	REQ'D
-	-	-

Idaho National Laboratory

TITLE MFC/RSWF BLDG. 771

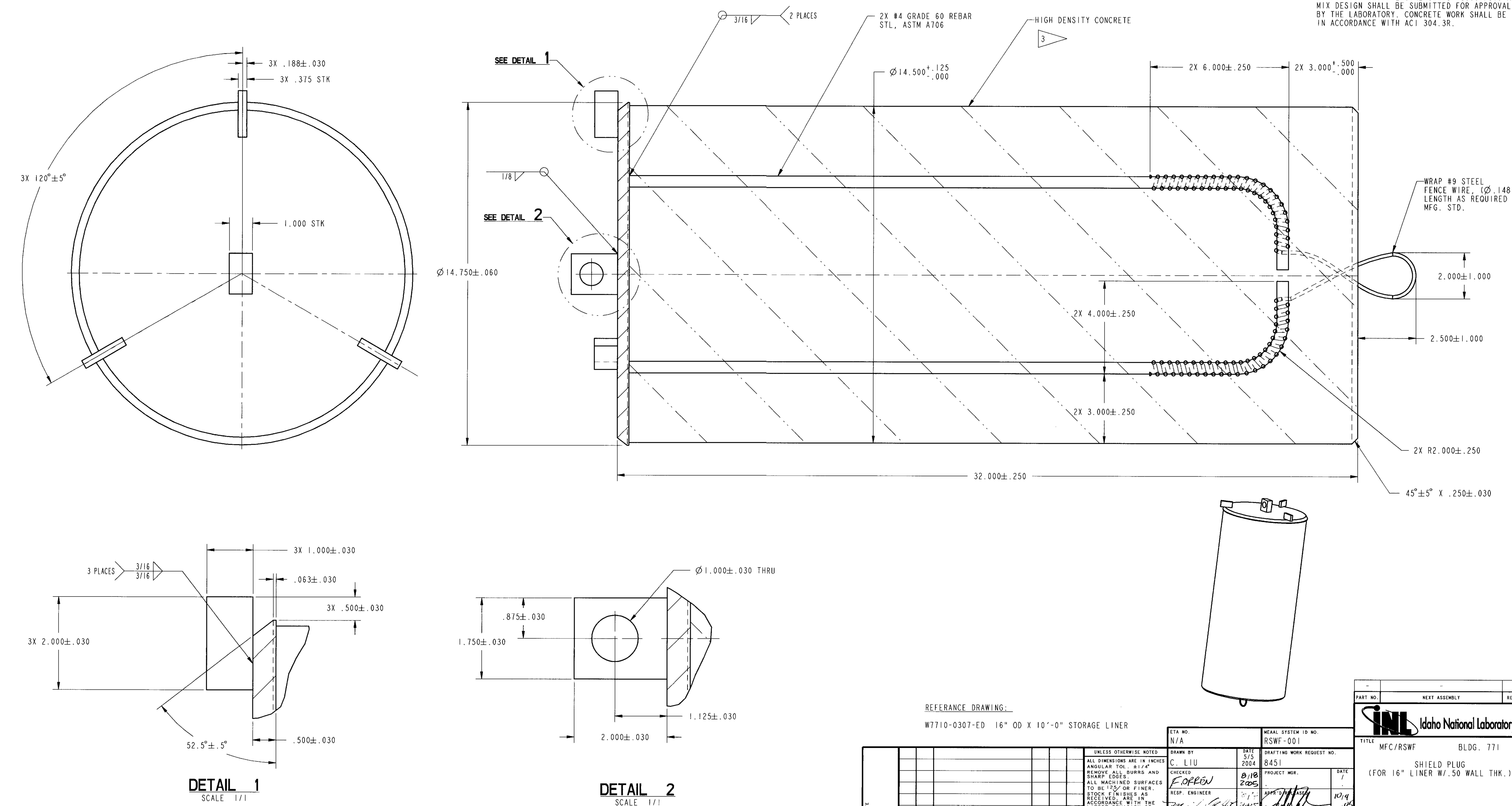
SHIELD PLUG
(FOR 16" LINER W/.25 WALL THK.)

SCALE	SHEET	PRO/E DRAWING NUMBER	REV.
1/2	1 OF 1	W7710-0129-ED	-00

DWG. NO. W7710-0128-ED -00

NOTES:

1. WELD SYMBOLS PER AWS A2.4.
2. CARBON STEEL WELDING AND INSPECTION PER AWS D1.1-98. WELD ACCEPTANCE CRITERIA PER SECTION 6, STATICALLY LOADED. WELDING OF REBAR SHALL BE IN ACCORDANCE WITH AWS D1.4. ACCEPTANCE CRITERIA SECTION 4.4.
3. CONCRETE SHALL HAVE A MINIMUM DRY UNIT WEIGHT OF 240 LBS/CUBIC FOOT, AND MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 5000 PSI. A MIX DESIGN SHALL BE SUBMITTED FOR APPROVAL BY THE LABORATORY. CONCRETE WORK SHALL BE IN ACCORDANCE WITH ACI 304.3R.



REFERANCE DRAWING:

W7710-0307-ED 16" OD X 10'-0" STORAGE LINER

SYM	APPR'D	CHANGE	BY	CHK'D	DATE

SCAN DATE

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE IN INCHES
ANGULAR TOL. ±1/4°
REMOVE ALL BURRS AND SHARP EDGES.
ALL MACHINED SURFACES TO BE 125 OR FINER.
STOCK FINISHES AS RECEIVED, ARE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/ASME B46.1.
DIMENSIONS & TOLERANCES IN ACCORDANCE WITH ASME Y14.5-1994.

ETA NO. N/A		MEAAL SYSTEM ID NO. RSWF-001		
DRAWN BY C. LIU	DATE 5/5 2004	DRAFTING WORK REQUEST NO. 8451		
CHECKED F. ORREN	8/18 2005	PROJECT MGR.	DATE /	
RESP. ENGINEER [signature]	8/ 2005	APPR'D/RELEASED [signature]	10/4 .05	
MATERIAL STL, ASTM A36 AND NOTED				

PART NO.	NEXT ASSEMBLY	REQ'D
-	-	-

Idaho National Laboratory

TITLE MFC/RSWF BLDG. 771

SHIELD PLUG
(FOR 16" LINER W/.50 WALL THK.)

SCALE	SHEET	PRO/E DRAWING NUMBER	REV.
1/2	1 OF 1	W7710-0128-ED	-00

NOTES:

1. WELDING SHALL BE PREFORMED IN ACCORDANCE WITH:

   FOR FABRICATION BY ANL-W SHOPS– I.N.E.L. WELD PROCEDURE C2.0* AND I.N.E.L. WELDING MANUAL SEC. 3*.

   FOR FABRICATION BY OUTSIDE VENDER. VENDER WELD PROCEDURE WHICH MEETS THE REQUIREMENTS OF AWS D1.1*. THE VENDER WELD PROCEDURE SHALL BE SUBMITTED TO ANL-W FOR APPROVAL PRIOR TO FABRICATION.

2. IDENTIFICATION SHALL BE STEEL IMPRESSION STAMPED WITH 3/8" HIGH CHARACTTERS. (STL FOR STEEL) OR (Pb FOR LEAD SHOT FILL).

3. REF. DRAWING W7710-0277-ED OVERSIZE LINER & COVER FOR R.S.W.F.

4. DYE PENETRANT CHECK PER ANSI/ASME B31.1 *PARAGRAPH 136.4.4. ANY UNACCEPTABLE INDICATIONS SHALL BE REPAIRED & RETESTED AFTER REPAIR

5. TEMPORARY TABS SHALL BE REMOVED AFTER WELDING SHIELD PLUG ONTO STORAGE LINER.

6. UNLESS OTHERWISE NOTED:
   ALL DIMENSIONS ARE INCHES
   FRACTIONAL TOLERANCE ±1/16
   DIMENSION/TOLERANCES IN ACCORDANCE WITH ANSI Y14.5.*

* FOR LATEST REVISION IN EFFECT AS OF FABRICATION DATE.

DRAWING CONSISTING OF 1 SHEET	REF. NO. / NEXT ASSEMBLY / REQ'D
APPR'D L.C WITBECK 11/29/89; H.A GREENHALGH 11/30/89; D.E SWANSON 12/1/89	APPR'D L.E. HAMBERLIN 12/5/89
DRAWN BY GARTH HURLEY DATE 9-12-89	SERVICE REQUEST C6670
CHECKED R. BROOKSHIER 9-29-89	PROJECT MGR. / DATE
RESP. ENGINEER R. BROOKSHIER 9-29-89	APPR'D/RELEASED RP [signature] 12/11/89
MATERIAL STL ASTM A635 GRADE AISI-1010-1020 & AS NOTED	SHEET 1 OF 1

THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

TITLE: RSWF SHIELD PLUG ASSEMBLY FOR OVERSIZED (24" O.D.) STORAGE LINER

ARGONNE WEST I.N.E.L.

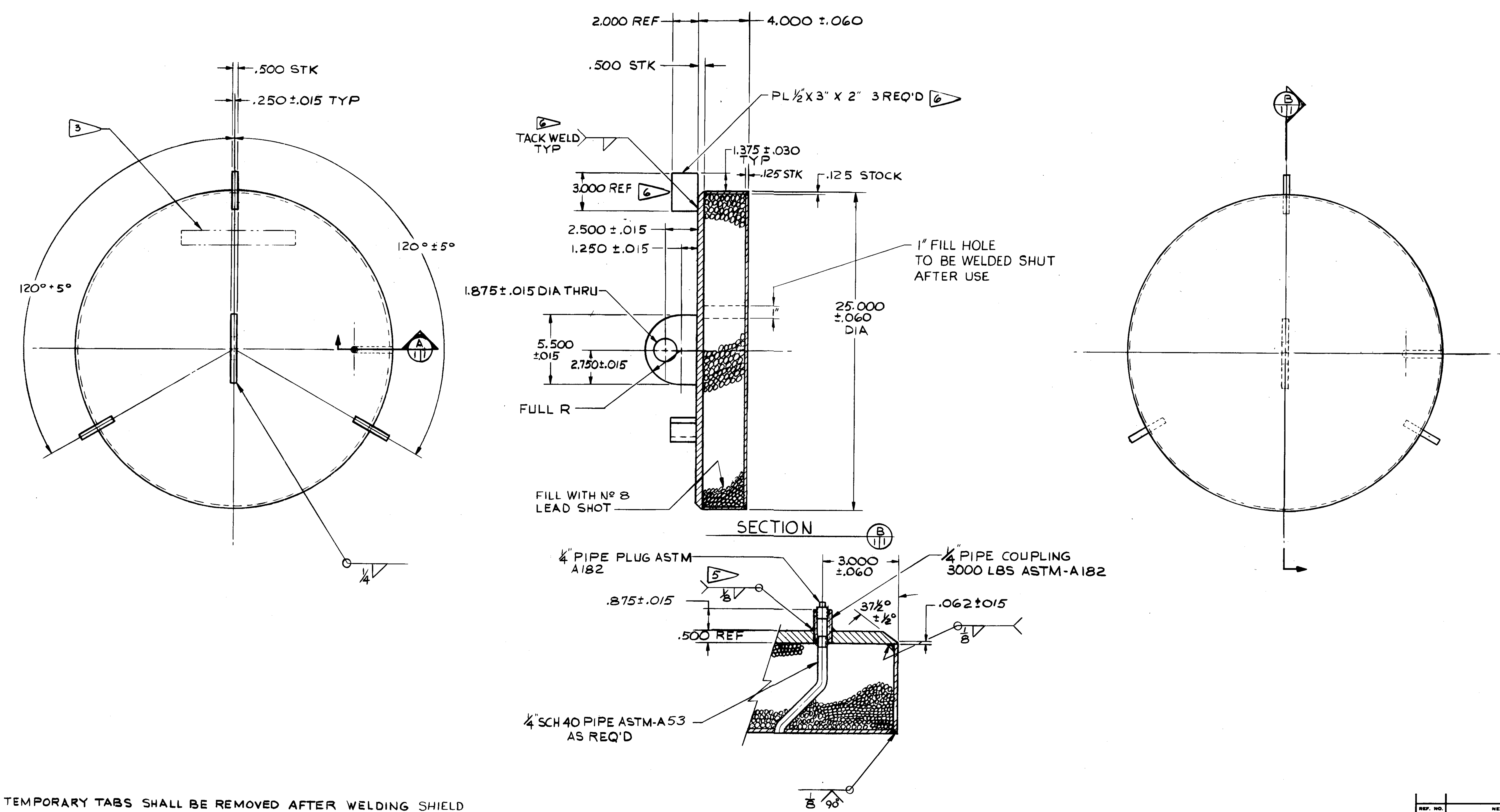
DRAWING NUMBER: W7710-0287-ED-00 REV.

PLOT SCALE: 1=4
EDIT DATE: 11-29-89

SYM	APPR'D	CHANGE	BY	CHK'D	DATE

MICRO-FILMED DATE 12-12-89

DWG. NO. W7710-0113-ED-00



SECTION A

SCALE: 1/2"=1"

6 TEMPORARY TABS SHALL BE REMOVED AFTER WELDING SHIELD PLUG INTO SODIUM LOOP SAFETY FACILTY WASTE STORAGE LINER.

5 DYE PENETRANT CHECK PER ASTM-E-165-65 PROCEDURE B3 ANY DISCONTINUITIES SHALL BE REMOVED REWELDED & RETESTED AFTER REPAIR.

4. REF DWG W7710-0106-DD SLSF LINER & COVER FOR R.S.W.F. FACILITY.

3 IDENTIFICATION SHALL BE STAMPED WITH 3/8" HIGH CHARACTERS. (W7710-0113-ED)

2. WELD PER AWS D1.1-77 SECTIONS 2, 3 & 4.

1. WELD SYMBOLS PER ANSI Y32.3 1969.

— NOTES —

MICRO-FILMED DATE 5-13-80(O)

SYM	ZONE	CHANGE	BY	CHK'D	DATE

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE INCHES
FRACTIONAL TOL. ± 1/64
DECIMAL TOL. ± .005
ANGULAR TOL. ± 1/4°
REMOVE ALL BURRS AND SHARP EDGES
SURFACES TO BE IN ACCORDANCE WITH ANSI B46.1 - 1962
DIMENSIONS & TOLERANCES IN ACCORDANCE WITH ANSI Y14.5

DRAWN BY	DATE	GP. LEADER	DATE
H.B HILL	7/20/79	[signature]	9/6/79
CHECKED: [signature]	9/5/79	PROJECT MGR.	
RESP. ENGINEER: Ralph Potts	9-6-79	APPR'D/RELEASED: R P [signature]	5/13/80

STL AISI - 1010-1020 & NOTED

REF. NO.	NEXT ASSEMBLY	REQ'D

THIS DRAWING IS THE PROPERTY OF ARGONNE NATIONAL LABORATORY

TITLE: ANL-W SHIELD PLUG ASSY. FOR R.S.W.F. S.L.S.F. WASTE STORAGE LINER

SCALE	SHEET	DRAWING NUMBER	REV.
1/4 & NOTED	1 of 1	W7710-0113-ED	00

SR# A6391 A6486

ANL-294A (11-77)

U.S. GOVERNMENT PRINTING OFFICE: 1978-752-997

Attachment D-34

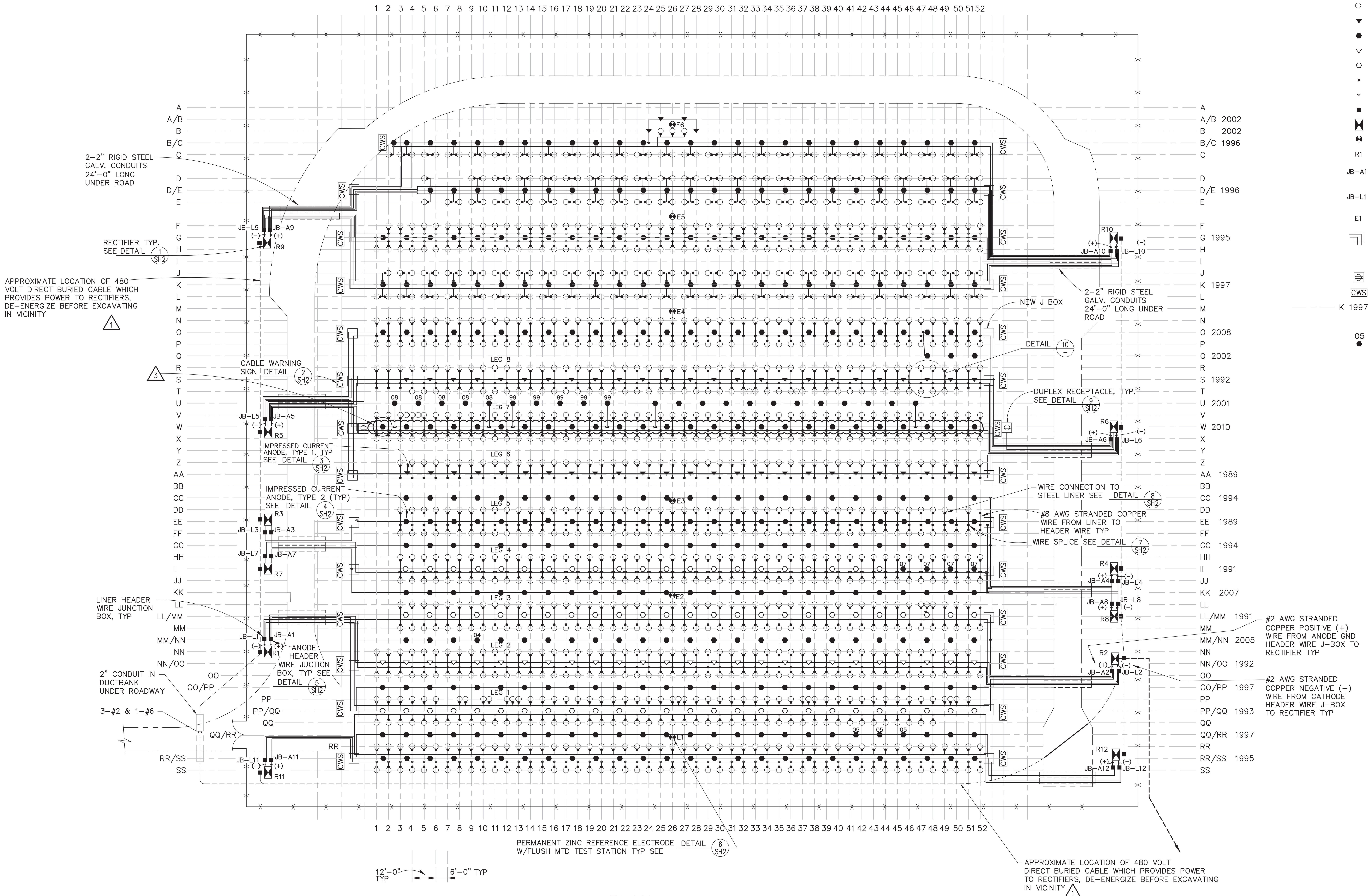
Drawing of RSWF Cathodic Protection System

REV	REVISIONS DESCRIPTION	EFFECTIVE DATE:
15	REVISED AND REDRAWN, TITLE BLOCK CHANGE, SEE eCR-628916	02/12/2015

LEGENDS

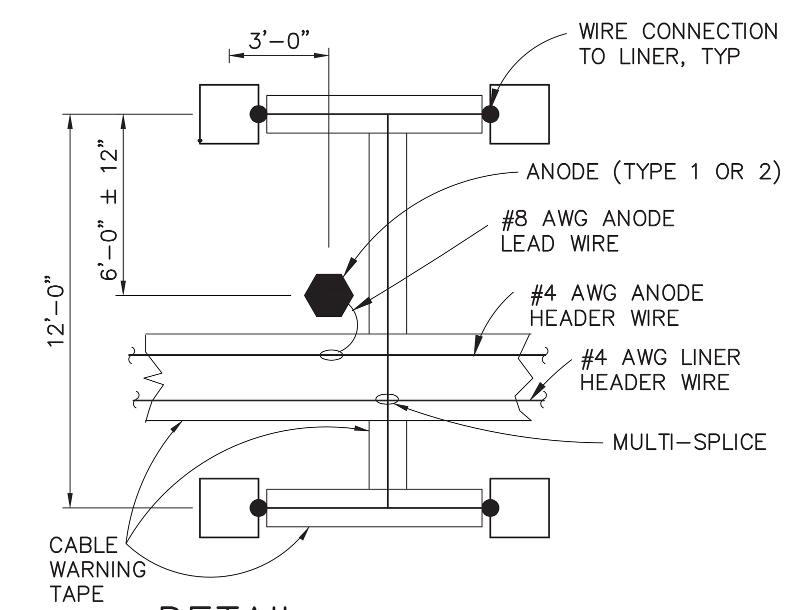
- ○ LINER
- ▼ 3" X 60" ANODE, TYPE 1
- ● 4" X 80" ANODE, TYPE 2
- ▽ 3" X 60" ANODE, TYPE 1 CANISTER
- ○ 4" X 80" ANODE, TYPE 2 CANISTER
- WIRE CONNECTION
- WIRE SPLICE
- JUNCTION BOX
- RECTIFIER
- REFERENCE ELECTRODE
- R1 TYPICAL RECTIFIER NUMBER
- JB-A1 TYPICAL NUMBER SYSTEM FOR ANODE WIRE JUNCTION BOX (+)
- JB-L1 TYPICAL NUMBER SYSTEM FOR LINER WIRE JUNCTION BOX (-)
- E1 TYPICAL REFERENCE ELECTRODE NUMBER
- PULL BOX, 9" X 12" MINIMUM OPENING, REINFORCED CAST CONCRETE, COVER WITH 1/4" THICK PLATE, DETERMINE SIZE IN FIELD, FASTEN 1 1/2" x 1 1/2" X 1/4" ANGLE, 2 PLACES, TO PREVENT SHIFTING
- RECEPTACLE ON CONCRETE PAD
- CWS CABLE WARNING SIGN
- K 1997 TYPICAL YEAR OF MOST RECENT INSTALLATION OF ANODES IN ROW (UNLESS OTHERWISE NOTED ABOVE ANODE)
- 05 TYPICAL YEAR OF MOST RECENT ANODE INSTALLATION IF DIFFERENT THAN YEAR NOTED FOR ROW

0 20 40 60 80
SCALE: 1"=20'



PLAN
RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF)

SCALE: 1"=20'-0"



DETAIL 10
SCALE: NTS

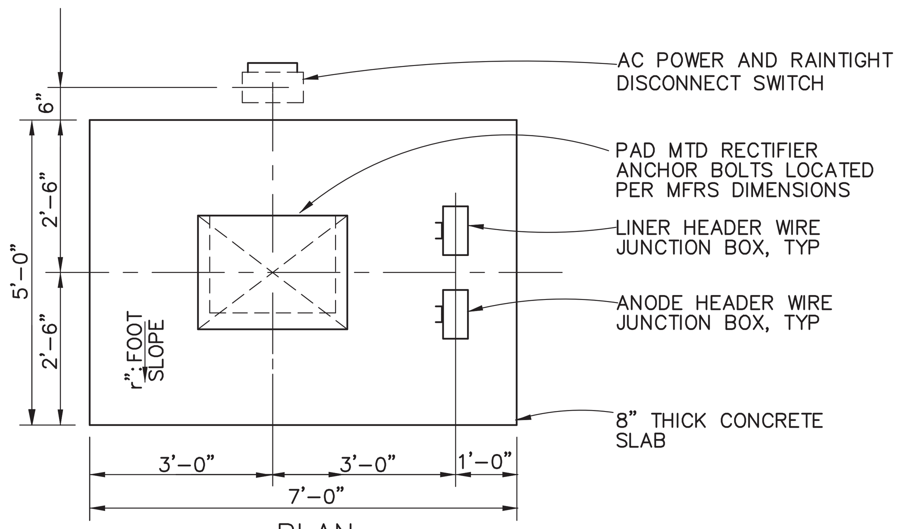
NOTES

1. BEWARE OF BURIED 480V 3Ø POWER LINES IN THIS AREA SEE DWG 747629 (W7710-0286-ED) FOR MORE INFORMATION AND APPROXIMATE LOCATION SHOWN AS
2. SEE DRAWING 747635 (W7710-0301-EE) FOR LINER CONFIGURATION AND SIZES.
3. ANODE SHORTENED BY 22 INCHES DUE TO INTERFERENCE WITH LAVA ROCK.
4. MAKE AND MODEL NUMBERS ARE SHOWN TO INDICATE THOSE ON WHICH THE DESIGN IS BASED. NOT TO ELIMINATE APPROVED EQUIVALENTS.

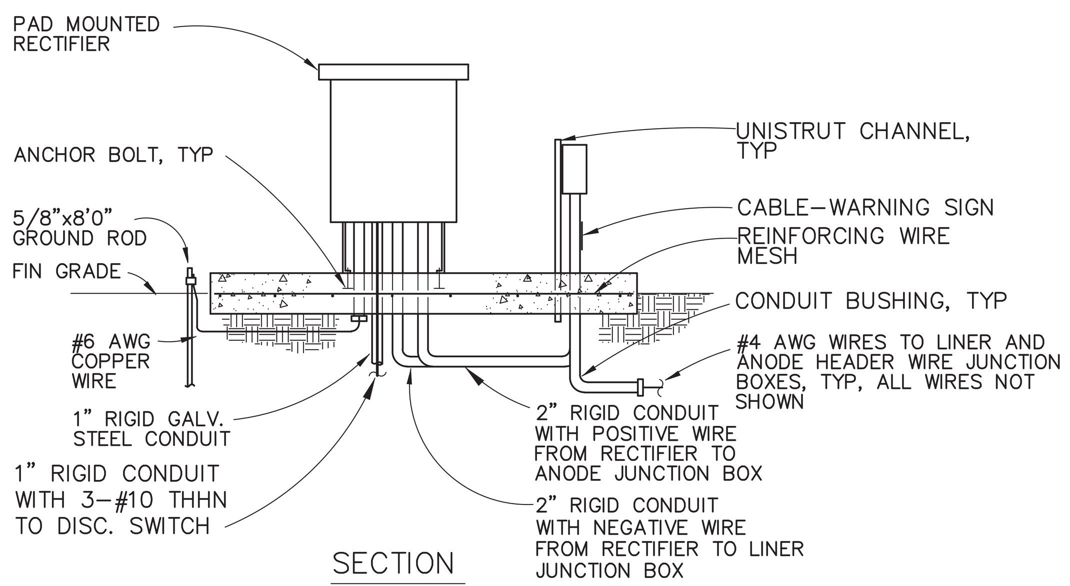
ALTERNATE ID: W7710-0828-EE

REQUESTER: B.G. HARRIS	Idaho National Laboratory
RESP ENGR: D.S. FERGUSON	MFC-771
DESIGN: D.S. FERGUSON	RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF)
DRAWN: G. HURLEY	
PROJECT NO.	
SPCL CODE	CATHODIC PROTECTION SYSTEM
FOR REVIEW/APPROVAL SIGNATURES SEE ECR NO.	SIZE: E; CAGE CODE: 01MF3; INDEX CODE NUMBER: AREA 273, TYPE 0771, CL 10, ORIG 052; DWG NO. 747628; REV 15
EFFECTIVE DATE: 8/5/91	SCALE: NOTED; SHEET 1 OF 2

File: 747628R15.dwg



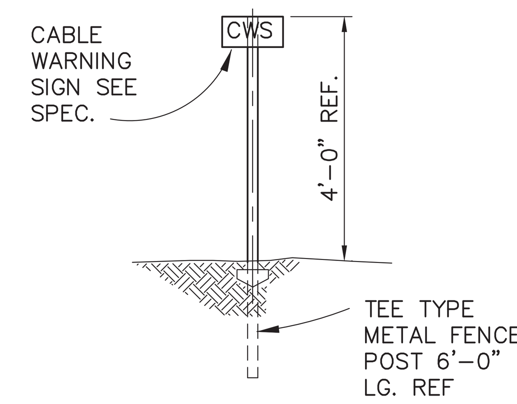
PLAN



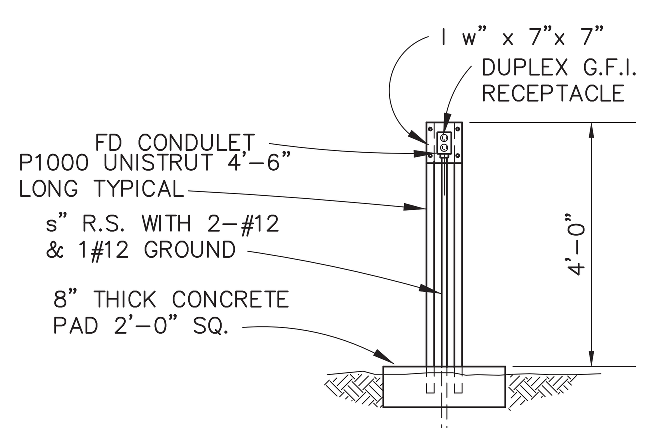
SECTION

SLAB MOUNTED RECTIFIER

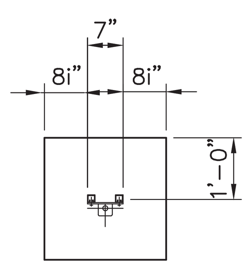
DETAIL 1 SH1
SCALE: NTS



DETAIL 2 SH1
SCALE: NTS

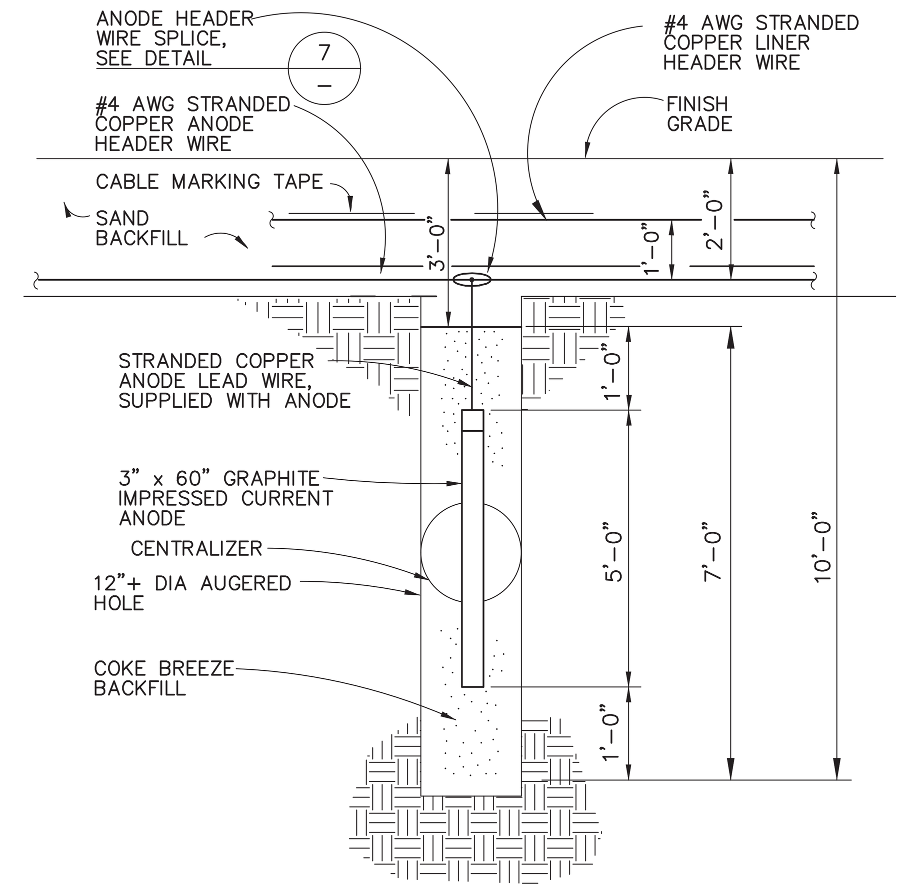


ELEVATION



PLAN

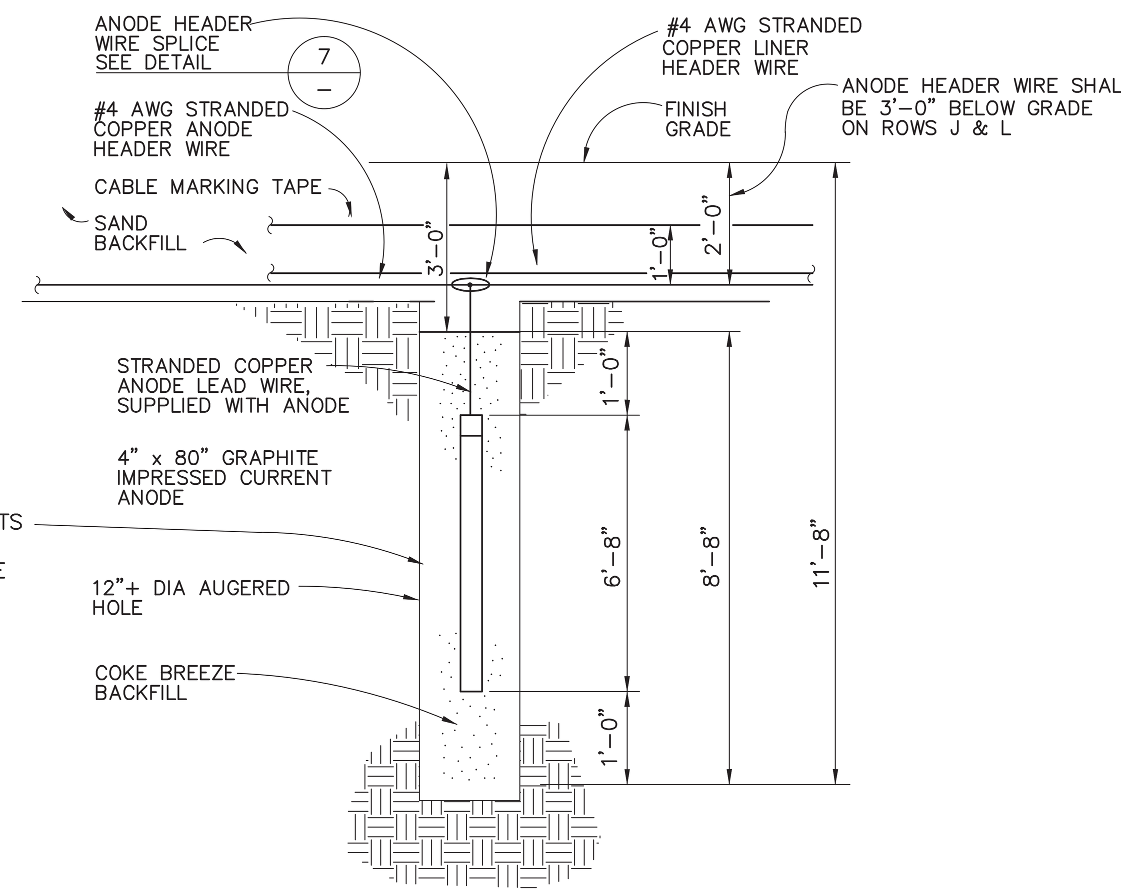
DETAIL 9 SH1
SCALE: NTS



VERTICAL ANODE INSTALLATION TYPE 1

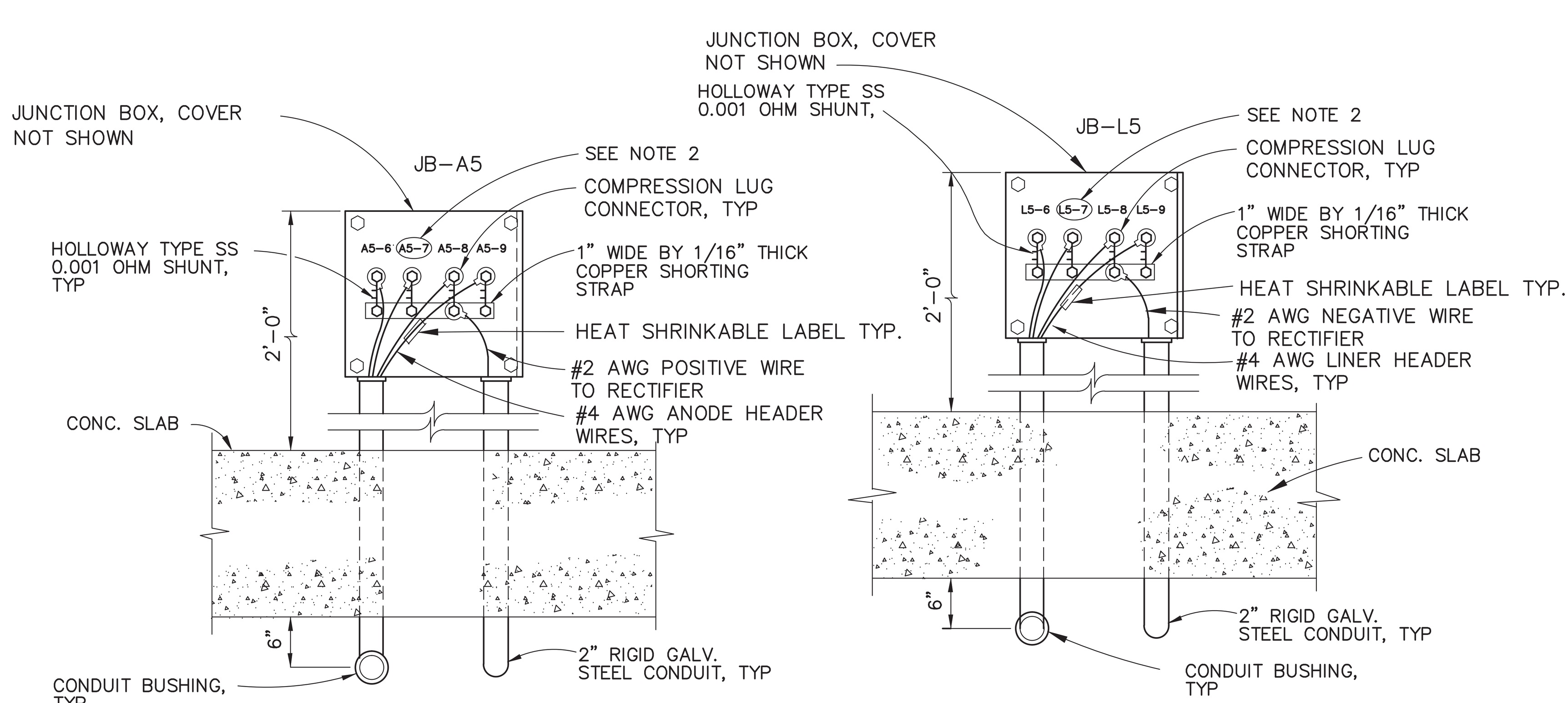
DETAIL 3 SH1
SCALE: NTS

TAMP COKE BREEZE AT 6" LIFTS OR IRRIGATE WITH WATER TO ACCOMPLISH PACKING OF COKE BREEZE. DO NOT USE CENTRALIZERS.



VERTICAL ANODE INSTALLATION TYPE 2

DETAIL 4 SH1
SCALE: NTS



ANODE HEADER WIRE

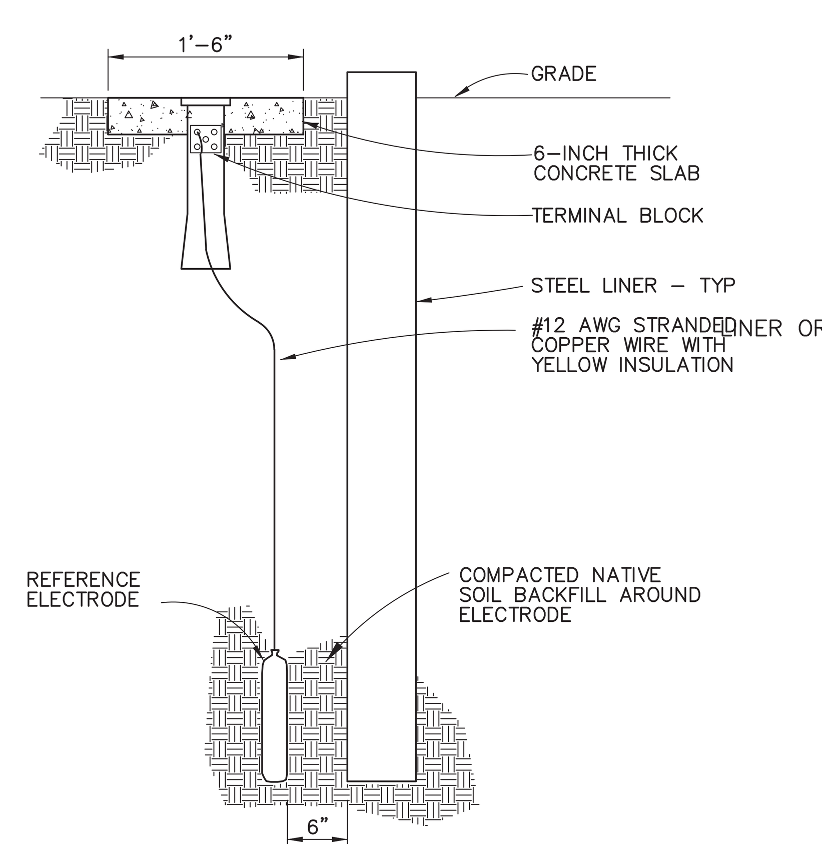
LINER HEADER WIRE

JUNCTION BOXES

DETAIL 5 SH1
SCALE: NTS

NOTES

1. IDENTIFY JUNCTION BOX TERMINALS ACCORDING TO JUNCTION BOX NO. AND LEG NO. TERMINAL IDENTIFICATIONS FOR J BOXES JB-A5 AND JB-L5 SHOWN.
2. A5 = JUNCTION BOX NUMBER, TYP
   7 = LEG NUMBER, TYP

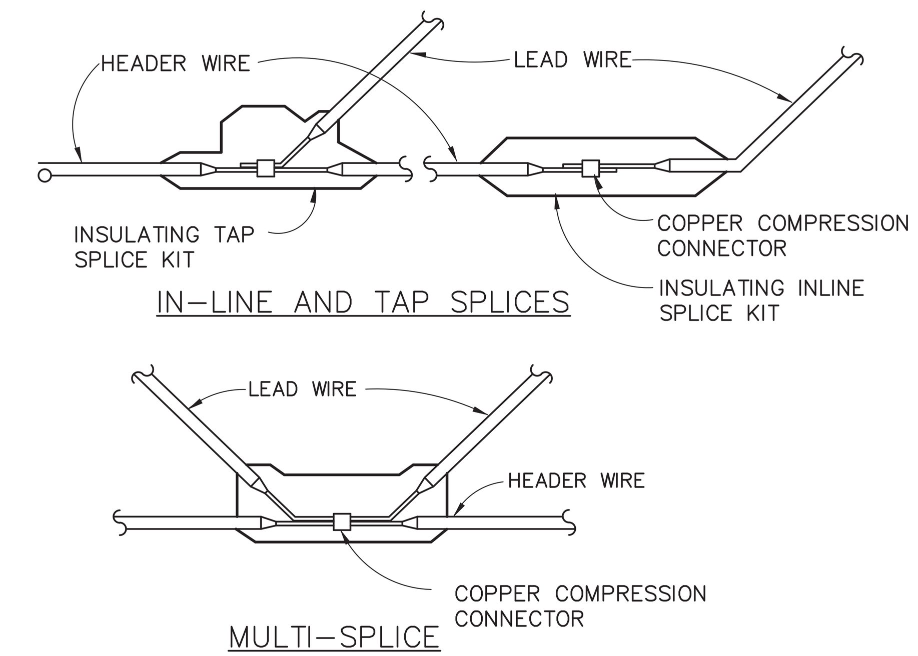


PERMANENT REFERENCE ELECTRODE INSTALLATION DETAIL

DETAIL 6 SH1
SCALE: NTS

NOTES

1. BOTTOM OF REFERENCE ELECTRODE ELEVATION TO MATCH BOTTOM OF LINER ELEVATION.
2. REFERENCE ELECTRODE INSTALLED ON OPPOSITE SIDE OF LINER FROM ANODE.

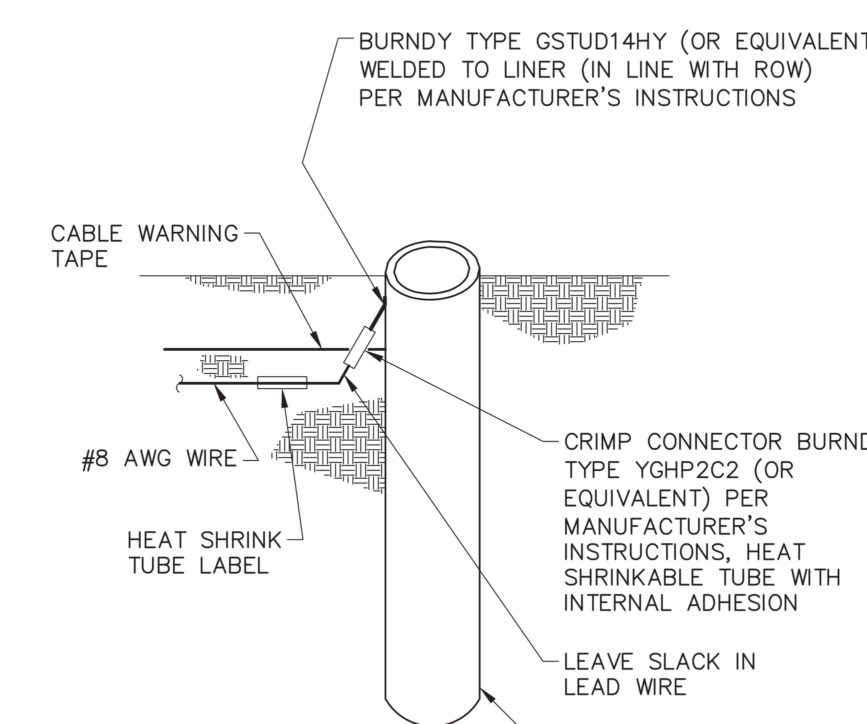


WIRE SPLICES

DETAIL 7 – 7 SH1
SCALE: NTS

NOTES

1. EPOXY SPLICE KITS SHALL BE CURED A MINIMUM OF 2 HOURS AND HEAT SHRINK SPLICE KITS COOLED A MINIMUM OF 1 HOUR BEFORE BURIAL OR SUBMERSION.
2. THE SILICONE GEL SPLICE INSULATING KIT SHALL BE INSPECTED FOR PROPER OUT FLOW OF SILICONE GEL BEFORE BURIAL



WIRE CONNECTION FOR STEEL LINERS

DETAIL 8 SH1
SCALE: NTS

SIZE	CAGE CODE	INDEX CODE NUMBER				DWG-	REV
		AREA	TYPE	E-XL	SEQ		
E	01MF3	273	0771	10	052	747628	15

SCALE: NONE SHEET 2

Attachment D-35

2001Corrosion Assessment Report for RSWF Cathodic Protection System

2001 CORROSION ASSESSMENT REPORT

for the

CATHODIC PROTECTION SYSTEM

of the

RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF)

Prepared for Argonne National Laboratory - West

by

Lloyd R. Hardy, Craig L. Porter, P.E.

and John Sagers

October 10, 2001

JETSEAL

Engineering and Technical Services, LLC

INTRODUCTION

To support research and development at the Argonne National Laboratory (ANL-W) the Radioactive Scrap and Waste Facility (RSWF) was built and placed in service in 1965. In 1988 it was determined that the facility required upgrading which included installing new liners for all waste and protecting those liners with an impressed cathodic protection system. The upgraded RSWF is permitted as a Miscellaneous Unit under the ANL-W Part B RCRA Permit. One of the Permit conditions for the upgraded RSWF requires that "no later than four (4) years after installation, an empty liner shall be pulled and inspected...the results of this inspection shall be the basis of a report evaluating the effectiveness of the impressed cathodic protection system."[1] Additionally, "The Permittee shall propose a liner pull/inspection schedule to the Director for Approval based on the findings of the corrosion report." The initial evaluation was performed under the direction of an independent corrosion engineer in 1997 and included a recommendation that the spare liners continue to be pulled and inspected on the 4 year frequency initially specified in the subject Permit.[2] The purpose of this report is to document the second evaluation conducted in compliance with the RCRA Permit requirements.

Assessment Team

The key personnel of the Jetseal assessment team are Craig L. Porter, P.E., Project Manager, Lloyd R. Hardy, Corrosion Specialist, and John Sagers, statistician. Mr. Porter has a Bachelors Degree in Chemical Engineering and a Masters Degree in Environmental Remediation and Waste Management. He is a professional engineer registered in the State of Idaho. He has over twenty years of experience in piping system design and testing within the chemical and nuclear industries. His experience includes eight years supporting environmental compliance work similar to that being accomplished via the subject project. Mr. Hardy has 26 years of experience in the nuclear and waste management arena. The majority of his experience (21 years) has been in designing, constructing and monitoring cathodic protection systems for

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[1] INEL Permit ID4890008952, Condition IV.M.2, Module IV, page 37, January 24, 1994.

[2] *Cathodic Assessment Report for the Cathodic Protection System of the Radioactive Scrap and Waste Facility (RSWF)*, L.R. Hardy and C.L. Porter, October 7, 1997.

underground tanks and piping. He was formerly a T10 Committee member (Underground Corrosion Control) for the National Association of Corrosion Engineers (NACE). He is very familiar with the cathodic protection systems at the INEEL. Mr. Sagers has both a Bachelors and Masters Degree in Statistics. He has over 16 years experience as a Senior Statistician in the aerospace and steel industries.

His work has included experimental design, statistical process control, and aging and surveillance studies. He has been a part-time instructor of Statistics at Brigham Young University for the past seven years, and is former President of the Utah Chapter of the American Statistical Association.

BACKGROUND INFORMATION

This section provides an overview of the subject facility, a description of the cathodic protection system and the corrosion monitoring program, and a summary of the technical approach followed for evaluating the effectiveness of the cathodic protection system.

Facility Overview

The RSWF is an outdoor storage facility that is approximately 388 ft wide and 448 ft long. Site preparation included grading several feet of gravel and soil over the storage area to slope gently from the centerline to the parallel sides. This grade promotes run-off, reducing percolation, and also serves to prevent run-on into the area from normal or anticipated abnormal events. Storage of waste (solid waste consisting of reactor and coolant loop components that are contaminated with elemental sodium and NaK) is in vertical carbon steel storage liners that are buried in the soil. The installation procedure requires backfilling the annulus between the liner and the soil with a sand slurry, providing a 4 in. noncorrosive layer between the native soil and the liner. The liners are constructed of Schedule 10 (0.25 in.) carbon steel pipe with an oversized thick steel plate welded on the bottom. The majority of the liners are 16 in. OD and 148 inches long and are arranged in a grid of 27 rows spaced 12 feet apart with approximately 50 storage sites per row.

Cathodic Protection

System Description -The cathodic protection system for the RSWF is a distributed anode impressed current system. It consists of graphite anodes placed equidistant from each group of four liners. The anode boring is backfilled with coke breeze. Reference electrodes are cast of special high grade zinc as specified in

ASTM B 6-77. Continuous DC power is supplied via rectifiers rated at 20 volts and 60 amps. No. 2 AWG wire connects the rectifiers to the liner and anode header wire junction boxes. The anode and liner header wires (No. 4 AWG) and the anode and liner lead wires (No. 8 AWG) are single-conductor, stranded copper wire with 600-volt High Molecular Weight Polyethylene insulation. The liner lead wires are cadwelded to the steel liners approximately 8 inches from the top of the liner. The anodes and liner header cables run down the center of every other row, 2 feet below the surface.

Periodic Inspection Program - The cathodic protection system inspection program consists of weekly, monthly and semiannual inspections. Weekly inspections of the rectifier indicator lights verify that the rectifiers are receiving power and operating. The monthly inspections verify proper operation by measuring and evaluating the following items:

- rectifier voltage and current
- power consumption
- rectifier efficiency

The semiannual inspections are more detailed and include the following measurements and inspections:

- anode and liner shunt voltages
- wiring connections
- continuity
- liner-to-buried zinc reference electrode at the bottom of selected liners
- ground cable impedance
- liner-to-soil potential

Corrosion Monitoring

The inspection program for the cathodic protection system verifies that the cathodic protection system is operating properly. The corrosion monitoring program verifies that the system is adequately protecting the waste liners from corrosion. Due to the radioactive fields associated with the active liners, they cannot be directly monitored for corrosion. Consequently, corrosion monitoring tubes were installed in areas of high corrosivity and between liners containing radioactive mixed waste. These tubes are 160 in. long, 4 in. OD, Schedule 10 (0.25 in. thick walls) pipes of the same material as the liners. They are connected to the cathodic protection system and maintained with the same level of impressed current per unit area as the liners. These tubes are installed in the same manner as the liners and therefore are subjected to the same environmental conditions as the liners. By annually measuring the wall thickness of the corrosion surveillance tubes (via Ultrasonic Thickness Examination) and comparing the measurements to the installed thicknesses the effectiveness of the cathodic protection system is verified.

The final aspect of the corrosion monitoring program involves spare liners that have been installed in the most corrosive regions of the facility. At least every four years a spare liner is removed and examined to determine the extent of corrosion. The data resulting from the inspection and examination of the extracted spare liner is used to further verify the effectiveness of the cathodic protection system..

Technical Approach

In order to evaluate the effectiveness of the cathodic protection system the following steps were performed:

1. Review relevant documents regarding facility, liner and cathodic protection system design, construction, and operation, including soil resistivity studies
2. Review reports and data from monthly and semiannual inspection of the cathodic protection system
3. Observe spare liner extraction and visually inspect the exposed liner
4. Observe spare liner NDE consisting of thickness measurements (via UT) every 1" of the entire length at 45 degree intervals[3]
5. Perform depth measurements at areas of localized corrosion

DISCUSSION

<u>Record Review</u> - The review of relevant documents regarding the facility, liners, and cathodic protection system confirmed that:

- the spare liners are installed such that the corrosion they experience would represent worst case corrosion relative to the other liners in the system due to their placement in the most corrosive regions of the facility

[3] The technical justification for the NDE of the spare liner is found in "Comparison of RSWF Empty Liner Examination Approaches", Jetseal, Inc., L.R. Hardy and C.L. Porter, September 9, 1997.

- except for a few out-of-spec readings (the causes of which were promptly investigated and remedied) the inspection data from the last four years indicate that the cathodic protection system has been operating properly
- the data from the annual corrosion surveillance tubes wall thickness measurements indicate no measurable degradation of wall thickness. The readings are all consistent and within the manufacturer's tolerance for new pipe.

Inspection Results - Spare liner from location PP-9 was pulled and visually inspected on September 7, 2001. As shown in Figures 1,2 and 3, no general corrosion was evident along the length of the liner. The gouging evident on Figure 1 is from the soil auger used to remove the soil surrounding the liner just prior to the pull. Some localized corrosion was evident in regions where native soil was in contact with the liner (see Figure 4). Overall, the liner was in very good condition. The localized regions were characterized as minor corrosion. Table 1 summarizes the results of the mean, standard deviation and min/max of the 144 thickness measurements along each linear traverse. All the measurements are within the ±12.5% variance of the nominal wall thickness allowed by the ASTM standards for pipe manufacture. The full report of the thickness measurements is included as Appendix A.

Table 1 - Statistical Summary of Spare Liner PP-9 Thickness Measurements

Radial Location	Mean (in.)	Std. Dev.	Min/Max (in.)
0°	0.260	0.007	0.248/ 0.279
45°	0.253	0.003	0.248/ 0.275
90°	0.252	0.002	0.247/ 0.260
135°	0.253	0.002	0.245/ 0.259
180°	0.257	0.003	0.252/ 0.277
225°	0.256	0.002	0.251/ 0.260
270°	0.255	0.002	0.251/ 0.267
315°	0.255	0.002	0.251/ 0.261

Figure 1 – Spare Liner PP-9 Immediately After Being Pulled

Figure 2– Spare Liner PP-9 Rotated Approximately 90 Degrees

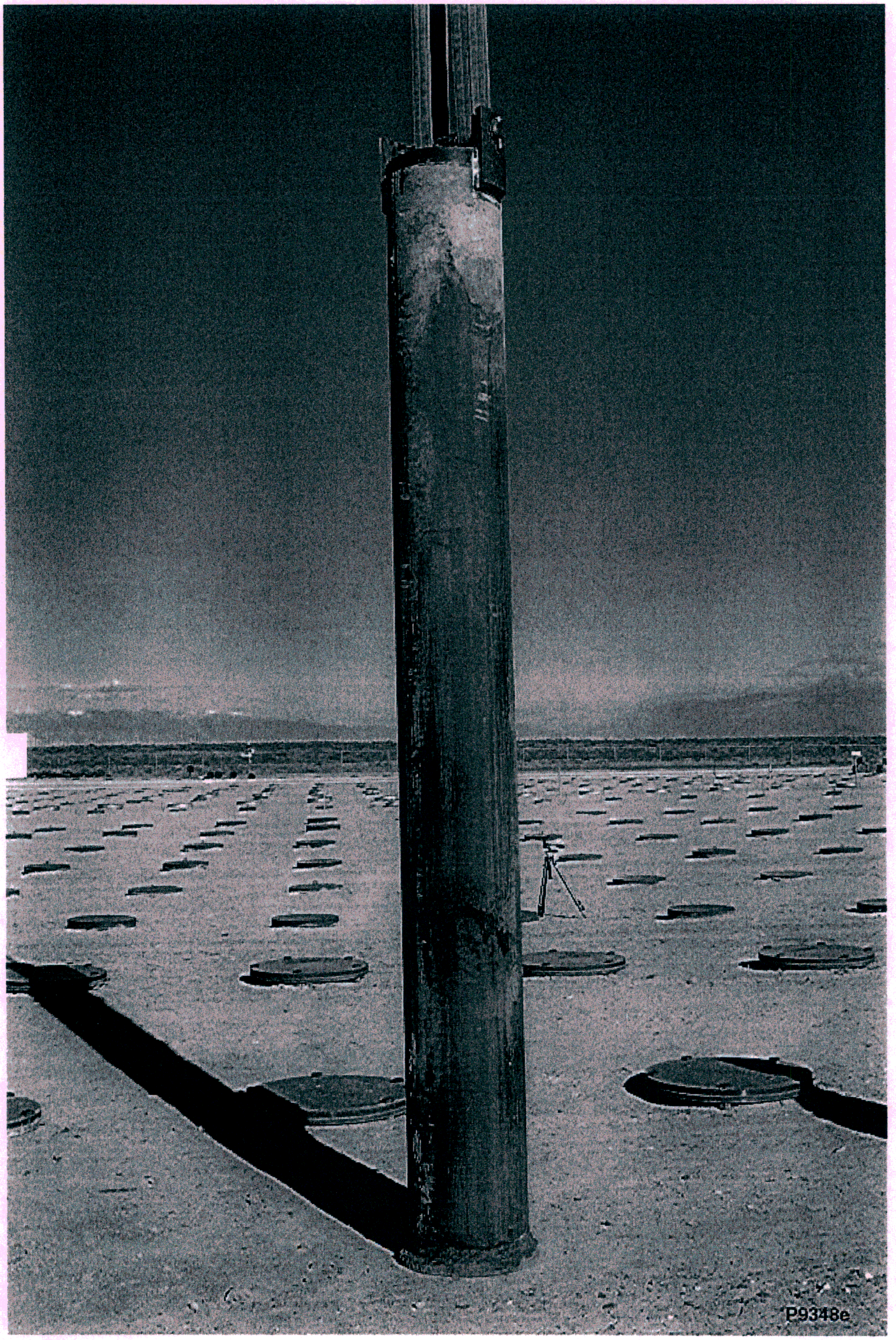


Figure 3– Spare Liner PP-9 After Additional Rotation

Figure 4 – Close-up of Localized Corrosion Due to Native Soil Adhering to Liner PP-9

Wall thickness measurements in and around the area of localized corrosion resulted in measurements consistent with the readings in Table 1. This minor corrosion after eight years is not significant but underscores the importance of strict adherence to the backfilling procedure when installing new liners.

CONCLUSION

General corrosion would be indicated by a general loss of wall thickness. The results of the wall thickness measurements from the corrosion surveillance tubes indicate that general corrosion is not occurring. This conclusion is verified by the wall thickness measurements from the spare liner removed from location PP-9.

The periodic inspection results from the cathodic protection system indicate that the system has been operating properly over the last four years. Figures 5 and 6 are a side-by-side comparison of the general appearance of liner PP-7 after four years in the ground and liner PP-9 after eight years. The overall condition is comparable. This evidence, along with the absence of general corrosion on the corrosion surveillance tubes and the spare liner (which have been continually connected to the cathodic protection system) supports the overall conclusion that the cathodic protection system is effective in protecting the liners of the RSWF from general external corrosion.

Figure 5 – After Four Years

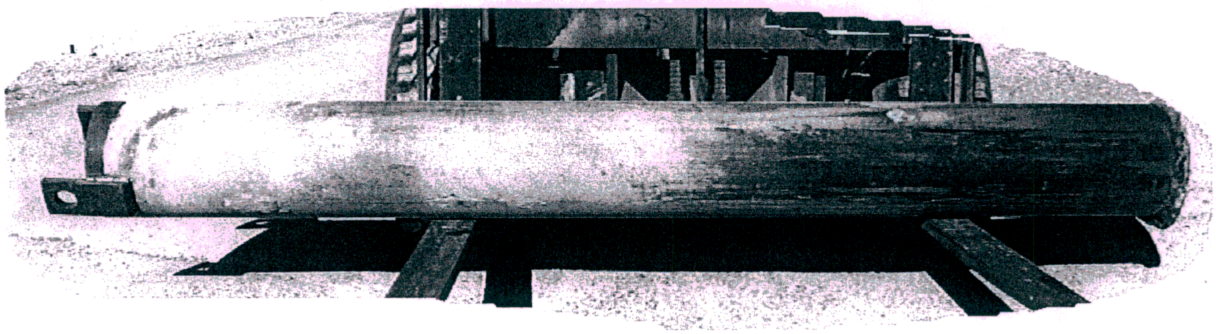
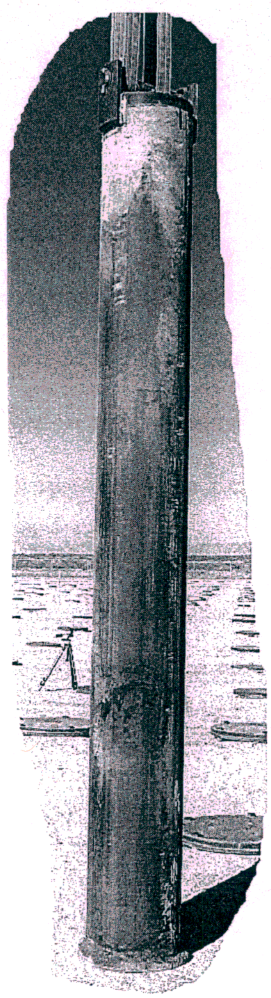


Figure 6 – Liner PP-9 After Eight Years



RECOMMENDATIONS

When the RSWF system was initially permitted a monitoring and inspection program was included as a permit condition to ensure that the waste is being properly contained. [4] As explained earlier in this assessment, the periodic inspection program focuses on ensuring proper and continuous operation of the cathodic protection system. The corrosion monitoring program verifies that the cathodic protection system as designed and operated adequately protects the liners from corrosion. The results from eight years of monitoring warrant a re-evaluation of the redundant aspects of the periodic inspection and corrosion monitoring programs.

Periodic Inspection Program

As covered in more detail in the main body of this assessment report, the periodic inspection program consists of weekly, monthly, and semi-annual inspection and testing. The weekly indicating light inspections serve to warn of a major power or equipment failure. The monthly testing of the rectifiers provides a more specific warning of a problem. Abrupt changes in the DC output or AC input would indicate a problem. Investigation of the problem requires troubleshooting by immediately performing the tests of the semi-annual inspection. The semi-annual testing includes two tests that indicate breakdown in cable insulation. Similarly, two different tests check to ensure the proper potential is applied to the liners.

It is recommended that the frequency of the semi-annual inspection be changed to an annual basis. The justification for this recommendation is three-fold: 1) if a problem is indicated via the monthly tests the more comprehensive testing of the semi-annual inspection program is immediately used to troubleshoot, 2) due to the overlapping nature of the monthly and semi-annual inspections and testing a severe problem would be

[4] Attachment 1.C, D-23 thru D-27 of INEEL: Partial Permit, Permit Number: ID4890008952, January 24, 1994.

reflected in the monthly rectifier readings, and 3) an annual frequency is consistent with the recommendation of the designers of the cathodic protection system.[5]

Corrosion Monitoring Program

There are three major elements of the corrosion monitoring program:

1. Annually, UT wall thickness measurements are taken on twelve 4-inch surveillance tubes. Nearly a quarter of a million readings are taken each year. To obtain the measurements each tube is filled with water (the couplant) and a special fixturing device is inserted.
2. Every four years a spare liner is extracted and examined to determine the extent of corrosion. The examination involves contact UT wall thickness measurements combined with visual inspection.
3. An empty liner must have UT wall thickness measurements performed within four years of being utilized. This is accomplished using a procedure similar to that used on the 4-inch tubes (UT measurements via a special fixturing device using water as the couplant).

The first two elements of the corrosion monitoring program are redundant in that they both verify adequate liner protection via the cathodic protection system. The differences between the two methods relate to time frame, and accuracy of the data. The annual basis of the 4-inch tube monitoring serves as an early warning of a potential corrosion trend. However, the data from the last eight years confirms that with a properly operating cathodic protection system the corrosion rate is slow enough that annual surveillance is unnecessary. It is somewhat analogous to timing an event that occurs over decades with a stopwatch that measures seconds. Two additional factors bring the utility of the annual 4-inch tube inspections into question. From a corrosion standpoint, adding water to the tubes is one of the worst things that can be done. Over time the residual moisture from the immersion UT procedure will induce corrosion that will render the tubes non-representative of the conditions in the rest of the RSWF. The annual inspection report of the four inch corrosion monitoring tubes describes several factors of the procedure that affect the readings. These include the backwall signal and the fixturing device:

> Back wall signal:The back wall signal is dependent on the fixturing device to keep the transducer perpendicular to the back wall. If the amplitude of the back wall signal decreases, the ability of

[5] Silkworth and Spickelmire, *Field Testing Report for Cathodic Protection of the RSWF Liners at the ANL-W Site*, CH2M Hill Central, Inc., August 1989, page 6.

the floating gate to monitor the back wall signal is challenged. Air bubbles between the transducer and the tube wall can have a detrimental effect on the back wall signal as well.

Fixturing Device: The fixturing device is a thirteen foot one and a half inch threaded aluminum pipe mounted on a flange. An AC variable speed motor and drive gears rotate the transducer down the tube. The flange of the fixturing device sits directly on the flange of the tube under inspection. The squareness of the welded flange and the out-of-roundness of the tube can have an effect on the alignment of the transducer. Travel of the fixturing device is also affected by the top end motion and wind. Too much movement in the fixturing device creates a signal on the Epoch III that is difficult to interpret. (taken from R.B. Lee to T.P. Zahn, *RSWF 2001 Annual Inspection Report of Four Inch Corrosion Monitoring Tubes*, September 24, 2001)

The challenge of controlling these factors leads to erroneous readings. This is reflected in the standard deviation of the mean thickness readings. A typical standard deviation of the mean thickness readings from the four inch tubes is 0.010 inches with a range of .003 to .064. By comparison the typical standard deviation of the mean thickness readings from the contact UT procedure used with the spare liners is .002 inches. In light of these factors it was considered recommending that the four inch corrosion tube monitoring requirement either be reduced in frequency or deleted all together from the permit. To ensure no significant trending has developed over eight years of data a statistical analysis was undertaken. The results of the analysis (included in Appendix A) show that "none of the tubes show a negative correlation over time, meaning there is no evidence of corrosion over the last eight years on the monitoring tubes." The analysis also indicated a bias for all readings on a given tube in a given year. This is most likely associated with the fixturing device.

Based on the data, analysis, and conclusions of this assessment the following recommendations are provided:

1. It is recommended that the spare liners continue to be pulled and inspected on the 4 year frequency initially specified in the subject Permit condition for the RSWF.
2. It is recommended that the annual monitoring of the four inch corrosion tubes be discontinued
3. It is recommended that Permit Condition IV.E.1.a. be modified (or interpreted) such that when UT wall thickness measurements are required they are limited to contact UT measurements of accessible portions of the empty liner rather than the entire length via the immersion technique.
4. It is recommended that the frequency of the semi-annual inspection be changed to an annual basis.

APPENDIX A

ARGONNE
NATIONAL
LABORATORY

INTRA-LABORATORY MEMO

September 12, 2001

TO: T. Zahn

FROM: W. R. Sayer WRS RPS/QCI NDT

SUBJECT: Contact Ultrasonic Thickness Measurement RSWF Liner PP9

ATTACHMENTS: Thickness Measurement Spread Sheet
Statistical Data Report (Max/Min)
Ultrasonic Equipment Report
2D Contour Map

The contact Ultrasonic examination on liner PP9 has been completed using the Panametrics 26DL Plus Thickness Gauge. The data was collected and down loaded to the Viewsonics UDA Program, which provides the data analysis system. The attachments reflect the test results.

The test liner was set up in a grid of columns (A through H) with measurements taken approximately every inch. This method resulted in 144 readings per column. This random examination revealed a minimum thickness of .233 inches to a maximum of .284 inches. Minor mechanical cleaning was required to prepare the surface for the examination.

A cursory visual examination of the exterior pipe wall showed several areas of gouges, most likely attributed to the use of the auger to drill soil prior to removing. There appears to be more damage to the material thickness of the liner from the extraction process than that of exterior corrosion from the soil.

Should you have further questions, please contact me at 3-7218. The liner remains behind building 781.

cc: B. Meppen (No Attachments)
R. B. Lee
ITF/NDT RSWF PP9

File: PP9.00X

	A	B	C	D	E	F	G	H
1:	0.275	0.250	0.251	0.254	0.255	0.259	0.259	0.251
2:	0.271	0.257	0.247	0.256	0.261	0.254	0.259	0.253
3:	0.273	0.262	0.249	0.254	0.258	0.254	0.257	0.257
4:	0.273	0.249	0.252	0.253	0.257	0.257	0.256	0.256
5:	0.275	0.253	0.249	0.255	0.266	0.254	0.257	0.254
6:	0.274	0.255	0.249	0.254	0.257	0.253	0.254	0.258
7:	0.279	0.253	0.250	0.256	0.258	0.257	0.261	0.256
8:	0.276	0.261	0.250	0.258	0.258	0.257	0.255	0.261
9:	0.272	0.254	0.258	0.259	0.261	0.256	0.252	0.257
10:	0.273	0.255	0.257	0.252	0.260	0.255	0.253	0.254
11:	0.272	0.254	0.253	0.257	0.260	0.255	0.256	0.260
12:	0.273	0.253	0.253	0.257	0.258	0.257	0.258	0.255
13:	0.269	0.252	0.252	0.256	0.257	0.259	0.254	0.257
14:	0.276	0.252	0.254	0.251	0.256	0.260	0.253	0.256
15:	0.270	0.254	0.253	0.250	0.258	0.256	0.251	0.260
16:	0.266	0.255	0.252	0.253	0.257	0.253	0.255	0.256
17:	0.266	0.254	0.254	0.252	0.258	0.255	0.253	0.255
18:	0.266	0.256	0.251	0.255	0.256	0.256	0.254	0.254
19:	0.272	0.256	0.251	0.254	0.256	0.255	0.252	0.255
20:	0.265	0.257	0.254	0.253	0.255	0.252	0.251	0.254
21:	0.272	0.252	0.251	0.250	0.256	0.255	0.253	0.253
22:	0.279	0.251	0.255	0.251	0.255	0.255	0.253	0.254
23:	0.276	0.253	0.253	0.253	0.257	0.254	0.253	0.254
24:	0.269	0.252	0.252	0.253	0.255	0.258	0.254	0.253
25:	0.264	0.252	0.253	0.253	0.260	0.253	0.254	0.254
26:	0.267	0.254	0.251	0.253	0.257	0.254	0.253	0.253
27:	0.266	0.254	0.252	0.253	0.256	0.254	0.253	0.255
28:	0.266	0.254	0.251	0.254	0.257	0.255	0.252	0.255
29:	0.263	0.253	0.251	0.255	0.257	0.253	0.253	0.253
30:	0.262	0.252	0.251	0.254	0.255	0.254	0.251	0.254
31:	0.266	0.257	0.252	0.254	0.256	0.253	0.253	0.254
32:	0.261	0.257	0.254	0.255	0.256	0.254	0.254	0.255
33:	0.261	0.256	0.255	0.254	0.256	0.255	0.254	0.254
34:	0.258	0.256	0.250	0.256	0.252	0.256	0.255	0.254
35:	0.262	0.255	0.252	0.252	0.256	0.254	0.252	0.256
36:	0.261	0.254	0.251	0.255	0.253	0.255	0.255	0.255
37:	0.260	0.253	0.251	0.254	0.254	0.254	0.257	0.254
38:	0.261	0.254	0.252	0.253	0.258	0.256	0.257	0.255
39:	0.262	0.254	0.252	0.253	0.254	0.255	0.267	0.253
40:	0.260	0.253	0.253	0.257	0.260	0.255	0.255	0.254
41:	0.261	0.253	0.254	0.256	0.257	0.256	0.257	0.254
42:	0.260	0.255	0.251	0.256	0.255	0.253	0.257	0.254
43:	0.265	0.252	0.260	0.255	0.263	0.256	0.254	0.256
44:	0.261	0.251	0.252	0.254	0.254	0.256	0.258	0.253
45:	0.261	0.252	0.251	0.254	0.255	0.255	0.256	0.254
46:	0.263	0.251	0.254	0.255	0.253	0.255	0.259	0.254
47:	0.256	0.250	0.251	0.255	0.254	0.253	0.255	0.256
48:	0.258	0.253	0.253	0.255	0.254	0.251	0.254	0.255
49:	0.258	0.251	0.256	0.254	0.255	0.252	0.259	0.254
50:	0.258	0.251	0.251	0.253	0.254	0.257	0.255	0.255
51:	0.258	0.254	0.250	0.253	0.255	0.254	0.253	0.254
52:	0.257	0.251	0.253	0.251	0.256	0.255	0.257	0.254
53:	0.256	0.250	0.253	0.253	0.255	0.255	0.258	0.254
54:	0.258	0.251	0.254	0.255	0.255	0.257	0.257	0.257
55:	0.258	0.251	0.251	0.254	0.254	0.256	0.254	0.254
56:	0.260	0.248	0.251	0.253	0.255	0.255	0.256	0.254
57:	0.258	0.253	0.253	0.252	0.277	0.256	0.257	0.254
58:	0.260	0.253	0.251	0.251	0.255	0.256	0.255	0.254
59:	0.260	0.252	0.251	0.251	0.259	0.255	0.256	0.256
60:	0.258	0.254	0.251	0.251	0.260	0.255	0.259	0.254
61:	0.258	0.256	0.251	0.254	0.256	0.254	0.257	0.254
62:	0.261	0.253	0.251	0.251	0.256	0.255	0.254	0.254
63:	0.262	0.252	0.253	0.253	0.254	0.255	0.255	0.255
64:	0.260	0.250	0.249	0.250	0.257	0.254	0.255	0.254
65:	0.258	0.252	0.250	0.254	0.256	0.259	0.256	0.257
66:	0.259	0.251	0.251	0.254	0.256	0.256	0.256	0.254
67:	0.260	0.253	0.253	0.254	0.254	0.257	0.256	0.256
68:	0.262	0.256	0.251	0.253	0.256	0.260	0.255	0.253
69:	0.260	0.254	0.250	0.252	0.256	0.257	0.256	0.254
70:	0.267	0.255	0.252	0.252	0.254	0.257	0.257	0.255
71:	0.263	0.255	0.250	0.253	0.255	0.255	0.256	0.259
72:	0.261	0.254	0.251	0.251	0.256	0.255	0.256	0.254
73:	0.260	0.256	0.252	0.252	0.255	0.255	0.259	0.257
74:	0.260	0.275	0.250	0.251	0.256	0.255	0.257	0.256
75:	0.260	0.263	0.250	0.253	0.257	0.254	0.257	0.257
76:	0.260	0.255	0.250	0.255	0.255	0.257	0.256	0.256
77:	0.264	0.254	0.249	0.253	0.255	0.256	0.255	0.259
78:	0.262	0.254	0.250	0.251	0.254	0.257	0.256	0.255
79:	0.257	0.254	0.252	0.255	0.255	0.257	0.259	0.261
80:	0.258	0.253	0.248	0.254	0.256	0.255	0.255	0.256
81:	0.260	0.254	0.255	0.252	0.256	0.255	0.255	0.253
82:	0.261	0.259	0.251	0.253	0.257	0.255	0.255	0.258
83:	0.260	0.253	0.253	0.252	0.257	0.257	0.255	0.257
84:	0.266	0.254	0.249	0.251	0.257	0.257	0.256	0.257
85:	0.260	0.253	0.250	0.254	0.257	0.260	0.255	0.259
86:	0.257	0.251	0.251	0.251	0.255	0.258	0.255	0.256
87:	0.258	0.252	0.253	0.253	0.255	0.257	0.255	0.254

88:	0.257	0.253	0.252	0.253	0.255	0.257	0.253	0.256
89:	0.277	0.258	0.250	0.251	0.256	0.257	0.255	0.258
90:	0.260	0.255	0.249	0.254	0.256	0.255	0.255	0.256
91:	0.257	0.256	0.253	0.255	0.255	0.257	0.254	0.255
92:	0.259	0.251	0.252	0.250	0.256	0.255	0.255	0.253
93:	0.255	0.251	0.250	0.245	0.255	0.257	0.256	0.257
94:	0.256	0.251	0.251	0.251	0.255	0.258	0.254	0.254
95:	0.260	0.251	0.249	0.250	0.257	0.257	0.254	0.251
96:	0.260	0.254	0.251	0.255	0.256	0.255	0.255	0.254
97:	0.263	0.252	0.251	0.253	0.255	0.258	0.253	0.256
98:	0.257	0.253	0.249	0.255	0.253	0.258	0.254	0.252
99:	0.258	0.253	0.248	0.254	0.255	0.256	0.253	0.255
100:	0.259	0.254	0.249	0.254	0.257	0.257	0.253	0.255
101:	0.256	0.254	0.252	0.252	0.257	0.257	0.253	0.251
102:	0.256	0.252	0.253	0.254	0.257	0.253	0.253	0.255
103:	0.258	0.253	0.252	0.252	0.256	0.256	0.252	0.254
104:	0.255	0.253	0.250	0.253	0.255	0.257	0.253	0.257
105:	0.255	0.252	0.249	0.252	0.257	0.256	0.252	0.253
106:	0.255	0.252	0.248	0.255	0.258	0.258	0.251	0.253
107:	0.254	0.252	0.249	0.255	0.256	0.258	0.253	0.256
108:	0.255	0.252	0.248	0.255	0.257	0.256	0.255	0.254
109:	0.257	0.251	0.249	0.255	0.257	0.257	0.252	0.251
110:	0.256	0.253	0.250	0.255	0.257	0.256	0.252	0.253
111:	0.261	0.253	0.250	0.254	0.257	0.257	0.253	0.252
112:	0.252	0.251	0.250	0.251	0.257	0.256	0.254	0.254
113:	0.254	0.248	0.251	0.253	0.255	0.256	0.255	0.253
114:	0.249	0.250	0.249	0.250	0.260	0.256	0.254	0.256
115:	0.253	0.251	0.250	0.252	0.259	0.259	0.253	0.255
116:	0.253	0.251	0.252	0.254	0.259	0.257	0.254	0.255
117:	0.251	0.252	0.251	0.251	0.263	0.258	0.255	0.256
118:	0.250	0.253	0.250	0.255	0.258	0.257	0.254	0.255
119:	0.251	0.251	0.249	0.252	0.260	0.257	0.255	0.257
120:	0.252	0.253	0.252	0.255	0.260	0.259	0.255	0.255
121:	0.253	0.254	0.251	0.254	0.260	0.257	0.256	0.254
122:	0.250	0.253	0.256	0.255	0.259	0.257	0.255	0.254
123:	0.251	0.254	0.254	0.256	0.258	0.256	0.254	0.256
124:	0.253	0.254	0.253	0.252	0.258	0.257	0.255	0.255
125:	0.251	0.253	0.253	0.253	0.258	0.256	0.255	0.255
126:	0.251	0.254	0.253	0.256	0.256	0.257	0.255	0.255
127:	0.250	0.253	0.252	0.252	0.258	0.257	0.255	0.256
128:	0.254	0.253	0.252	0.254	0.257	0.257	0.255	0.255
129:	0.255	0.253	0.253	0.254	0.257	0.255	0.253	0.256
130:	0.251	0.253	0.253	0.252	0.256	0.256	0.254	0.256
131:	0.253	0.253	0.252	0.255	0.257	0.255	0.253	0.256
132:	0.253	0.252	0.251	0.254	0.257	0.256	0.256	0.255
133:	0.253	0.253	0.250	0.256	0.255	0.257	0.254	0.255
134:	0.252	0.254	0.252	0.253	0.255	0.256	0.254	0.255
135:	0.253	0.253	0.253	0.254	0.255	0.256	0.254	0.253
136:	0.253	0.253	0.253	0.254	0.255	0.255	0.255	0.254
137:	0.250	0.253	0.253	0.252	0.255	0.254	0.255	0.255
138:	0.253	0.253	0.254	0.255	0.254	0.253	0.252	0.256
139:	0.250	0.252	0.253	0.255	0.254	0.251	0.254	0.255
140:	0.252	0.252	0.253	0.254	0.254	0.254	0.254	0.255
141:	0.254	0.257	0.253	0.253	0.256	0.255	0.254	0.255
142:	0.252	0.252	0.254	0.255	0.254	0.256	0.253	0.254
143:	0.248	0.251	0.252	0.248	0.253	0.257	0.254	0.258
144:	0.257	0.251	0.249	0.257	0.256	0.256	0.254	0.255

Color Scale

0.000 to 0.251
0.252 to 0.256
0.257 to 0.262
0.263 to 0.268
0.269 to 0.273
0.274 to 0.279

UDA - File: PP9.00X 9/12/2001 9:27AM Row: 1 to 144

Column	Mean	Std. Dev.	Min	Max
A	0.260	0.007	0.248	0.279
B	0.253	0.003	0.248	0.275
C	0.252	0.002	0.247	0.260
D	0.253	0.002	0.245	0.259
E	0.257	0.003	0.252	0.277
F	0.256	0.002	0.251	0.260
G	0.255	0.002	0.251	0.267
H	0.255	0.002	0.251	0.261

No.:

ULTRASONIC THICKNESS MEASUREMENT RECORD

Procedure No.:NDT-78

Rev.:2

M.[illegible]No.:

Q.C.Call No.:

System No.:

Plant:ANL-W RSWF

Unit:

Date:9/11/01

omponent:PP9

omponent Location:RSWF

Area Examined:Longitudinal contact 45 degree increments at 144 measurements er column.

aterial:steel pipe

Material Temp:ambient

Surface Condition (as found):Satisfactory with auger type gouges.

Examination Surface Condition:Good

nstrument Brand:Panametrics Model:26 DL Plus Ser.No.:92091511

ransducer Brand:Panametrics Model:D790SM Ser.No.:1092107

Size:1/2 inch Freq:5 Mhz /Couplant:Ultragel II

istance Cal blk.No.:2218E

eference thick. used for Calib. : (1).05 (2)1.5 (3)

Reference VELOCITY:..23 X 10 exp 6 inches per second

riginal Design Thickness:SCH 10 Pipe Min Thickness Found:.245

emarks: This contact UT thickness examination is being used to verify cathodic protection of steel at RSWF.

miner Richard Lee Level I Date 9-12-01

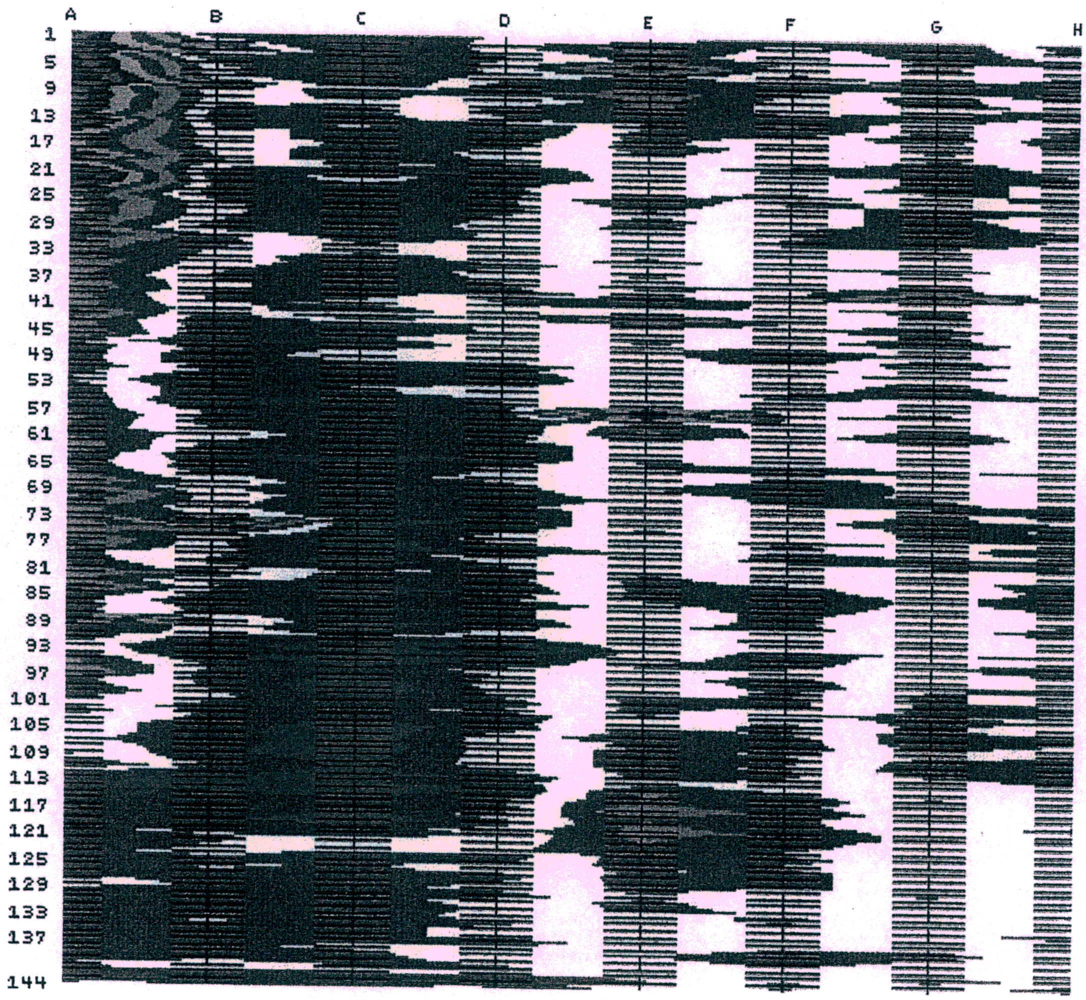
ort Reviewer WKSnyder Date 9/12/01

report is supplemented by Data Sheet No.

eptance / Rejection of component is by the responsible supervisor

ort and Attachments received by ________ Date ________

2D Contour Map for PP9.00X - 9/11/01



0.248 0.251 0.254 0.259 0.262 0.265 0.268 0.271 0.273 0.276 0.279

MEMO

October 9, 2001

To: Craig Porter, P.E., Assessment Team Project Manager

From: John Sagers, Senior Statistician

Subject: Statistical Time-Line Correlations of 4 Inch Corrosion Monitoring Tubes

A statistical analysis was performed on twelve 4-inch corrosion monitoring tubes to determine whether corrosion has taken place over a period of eight years, as indicated by a decrease in the average wall thickness of the tubes over time.

For each tube the average thickness was calculated from "thickness measurements recorded circumferentially every .25 inches… the fixturing device moves down .25 inches each revolution for over 550 revolutions and approximately 20,000 measurements per tube." [taken from annual inspection report of the four inch tubes]. The average thickness (in inches) for each tube is shown in the table below by year.

	Year of Observation							
Tube	1994	1995	1996	1997	1998	1999	2000	2001
HH505	0.233	0.249	0.243	0.245	0.245	0.247	0.244	0.245
LL475	0.233	0.242	0.244	0.245	0.245	0.247	0.241	0.242
PP105	0.227	0.239	0.244	0.237	0.239	0.241	0.236	0.251
PP125	0.223	0.235	0.232	0.235	0.236	0.239	0.233	0.249
PP265	0.224	0.236	0.232	0.233	0.234	0.237	0.231	0.246
PP375	0.233	0.244	0.239	0.239	0.239	0.242	0.236	0.254
PP495	0.237	0.250	0.243	0.247	0.243	0.250	0.243	0.246
PP85	0.236	0.244	0.243	0.248	0.246	0.249	0.246	0.261
T325	0.232	0.237	0.242	0.247	0.243	0.249	0.243	0.236
T365	0.230	0.250	0.244	0.252	0.245	0.251	0.245	0.239
V35	0.231	0.227	0.243	0.243	0.242	0.246	0.241	0.231
V45	0.241	0.238	0.247	0.247	0.249	0.251	0.247	0.238

The average thickness was plotted against the year of observation, and a Pearson's Correlation Coefficient (PCC) was calculated for each tube. A PCC can range from −1.0 to 1.0, with large negative values indicating strong negative correlations, values close to zero indicating no correlation, and values close to 1.0 indicating strong positive correlations. The first page of the attachment shows examples of four correlations over time (a strong negative, mild negative, no correlation, and mild positive).

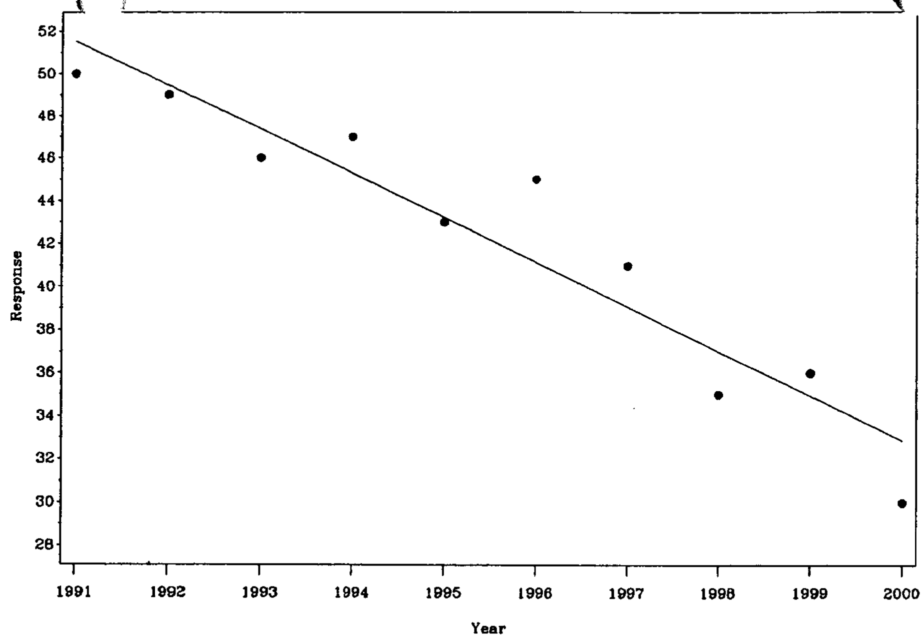
For the purposes of this study, we are only interested in detecting negative correlations, indicating a decrease in wall thickness over time. The Pearson's Correlation Coefficients for each of the twelve corrosion monitotring tubes is listed below:

Tube	PCC
HH505	0.4346
LL475	0.4571
PP105	0.6205
PP125	0.7787
PP265	0.6797
PP375	0.5353
PP495	0.3035
PP85	0.8314
T325	0.3808
T365	0.2086
V35	0.3181
V45	0.2201

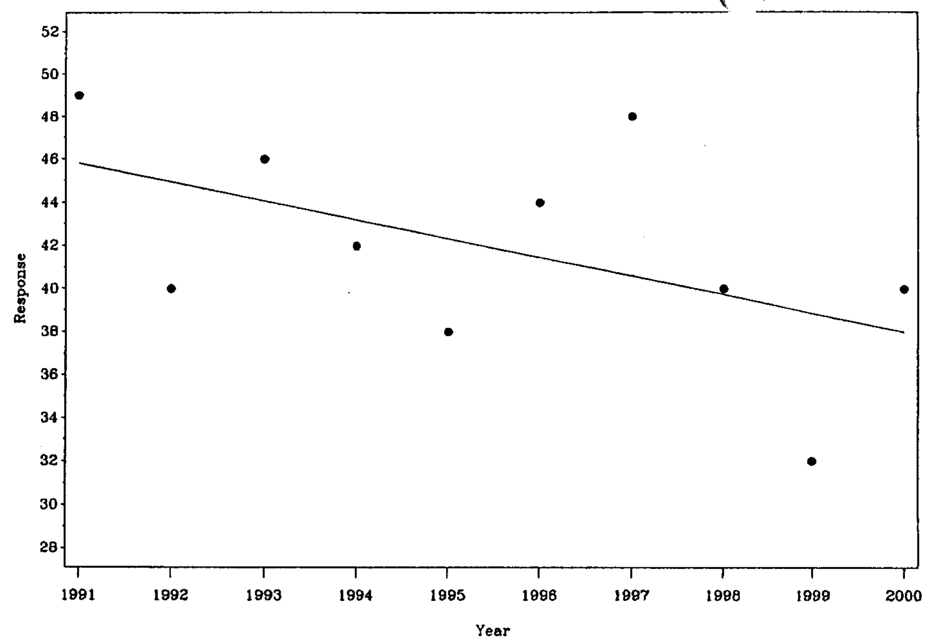
The correlations are shown graphically for each tube on pages 2-4 of the attachment.
The results show that none of the tubes show a negative correlation over time, meaning there is no evidence of corrosion over the last eight years on the monitoring tubes.

John Sagers

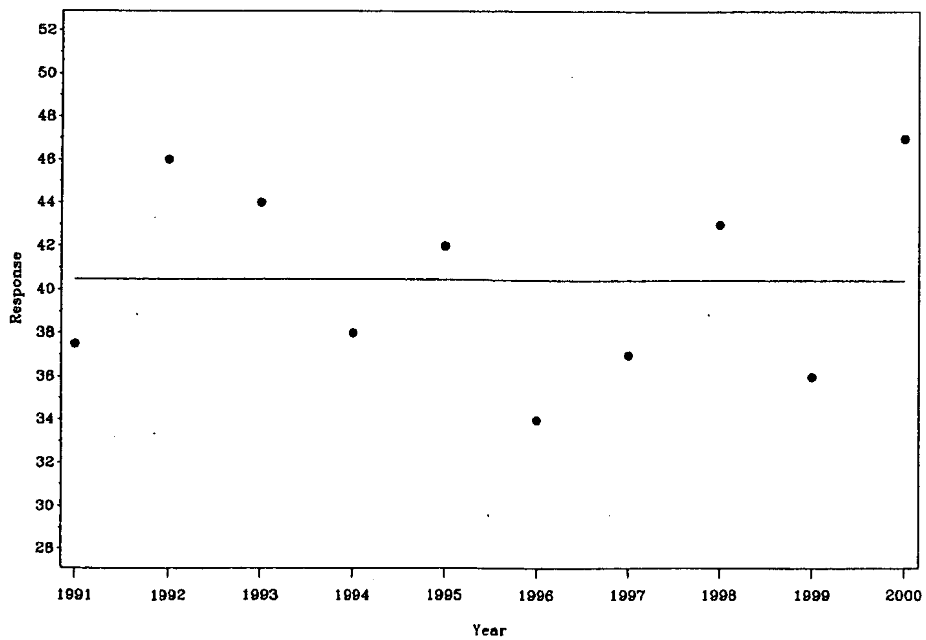
(Correlation Coefficient = −0.9489)



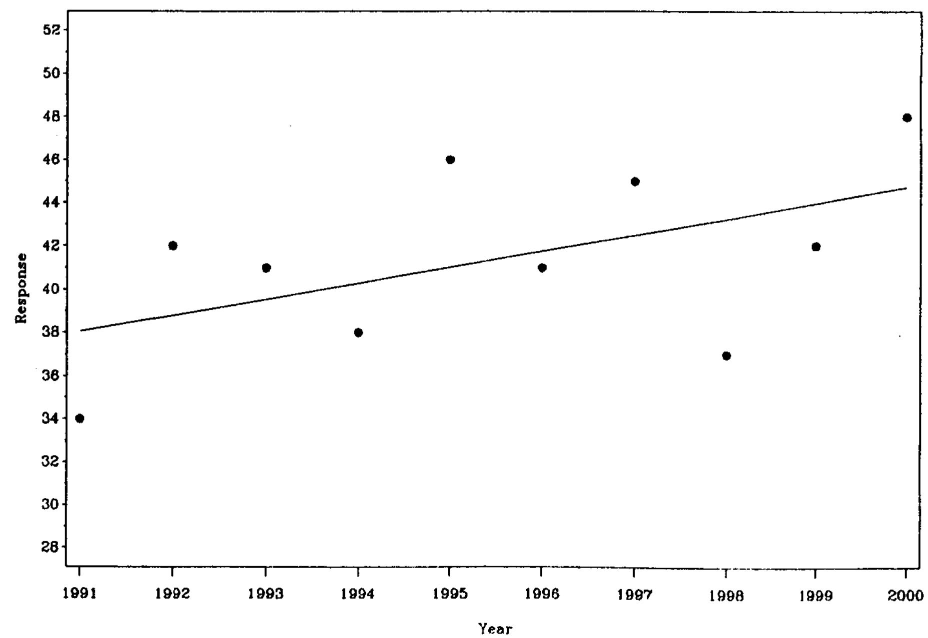
(Correlation Coefficient = −0.5158)



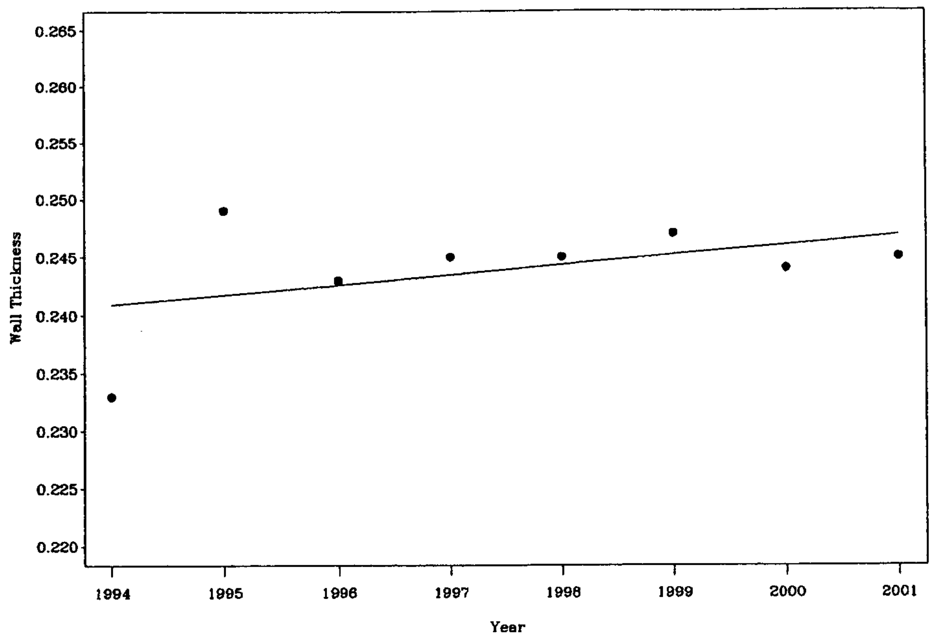
No Correlation
(Correlation Coefficient = −0.0020)



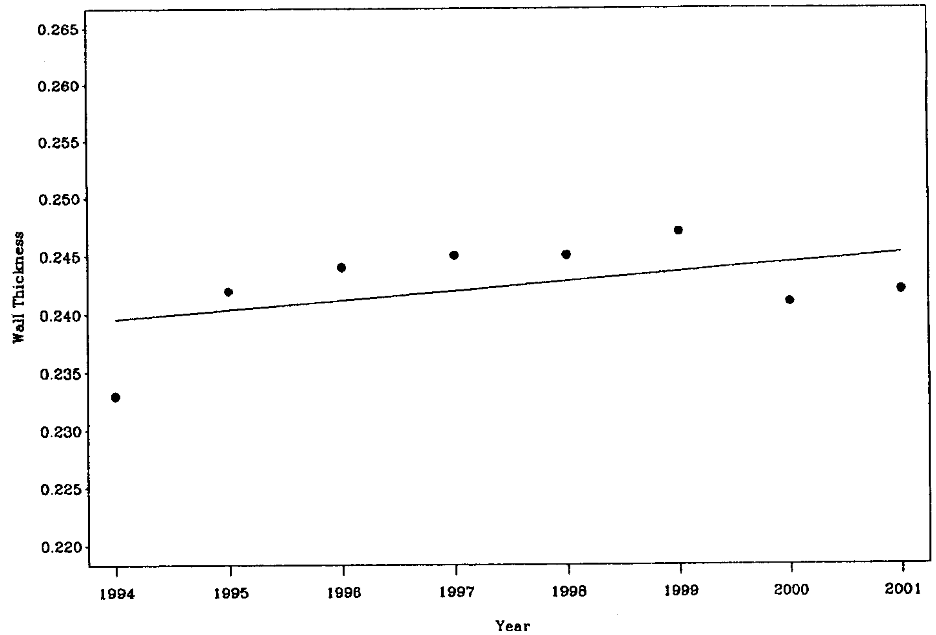
Mild Positive Correlation
(Correlation Coefficient = 0.5238)



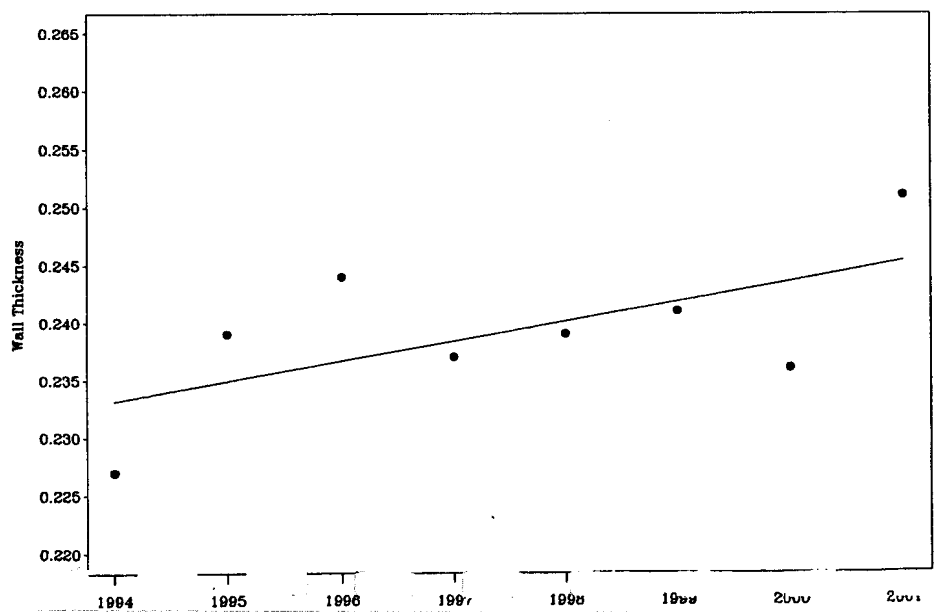
Avg Wall Thickness of Tube HH505
(Correlation Coefficient = 0.4346)



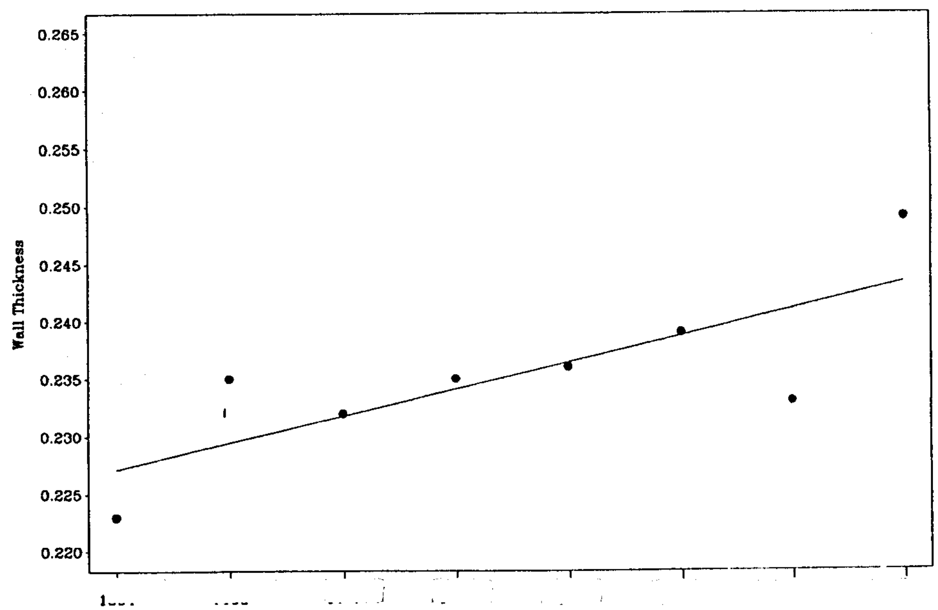
Avg Wall Thickness of Tube LL475
(Correlation Coefficient = 0.4571)



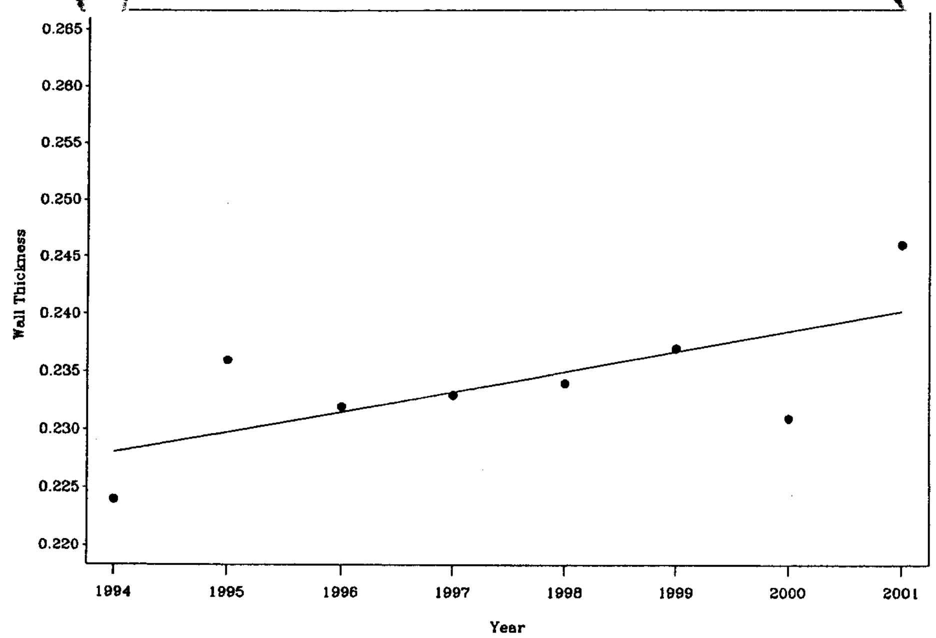
Avg Wall Thickness of Tube PP105
(Correlation Coefficient = 0.6205)



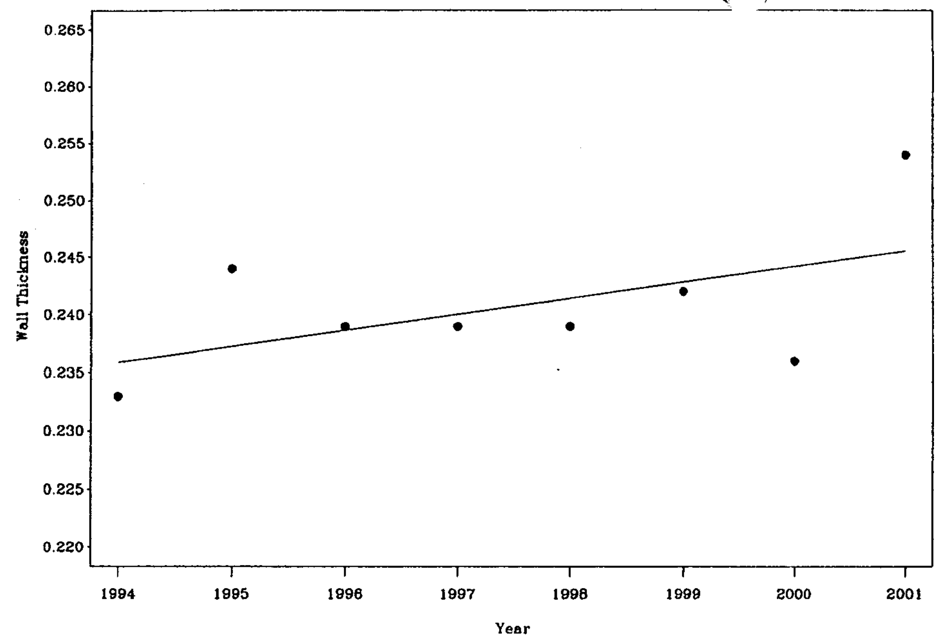
Avg Wall Thickness of Tube PP125
(Correlation Coefficient = 0.7786)



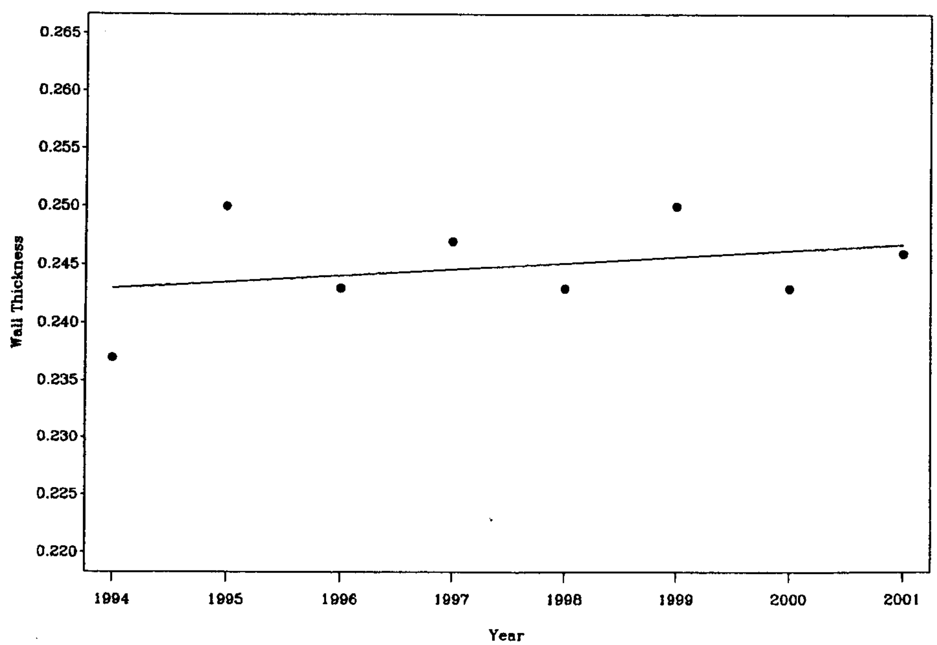
(Correlation Coefficient = 0.6797)



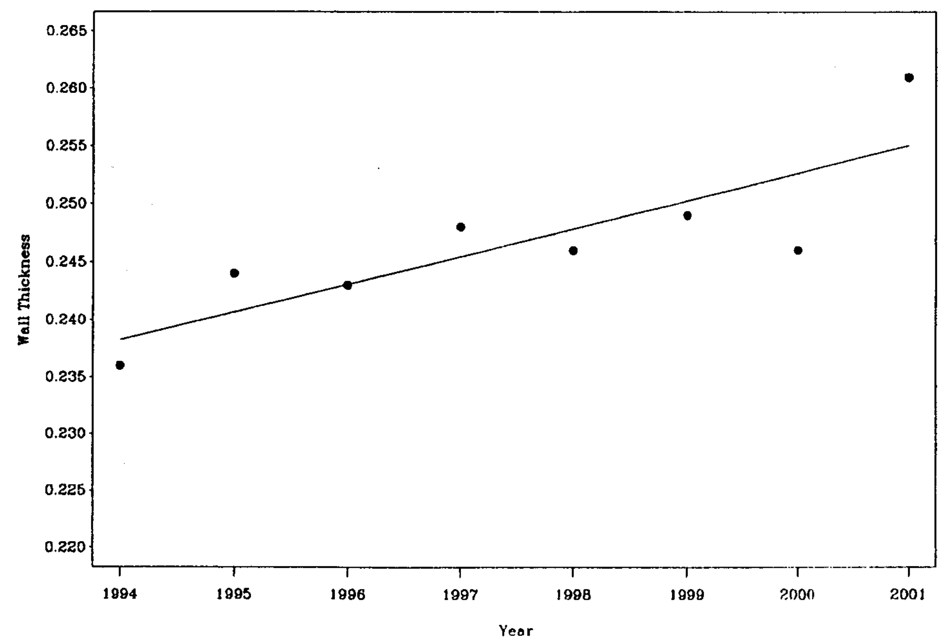
(Correlation Coefficient = 0.5353)



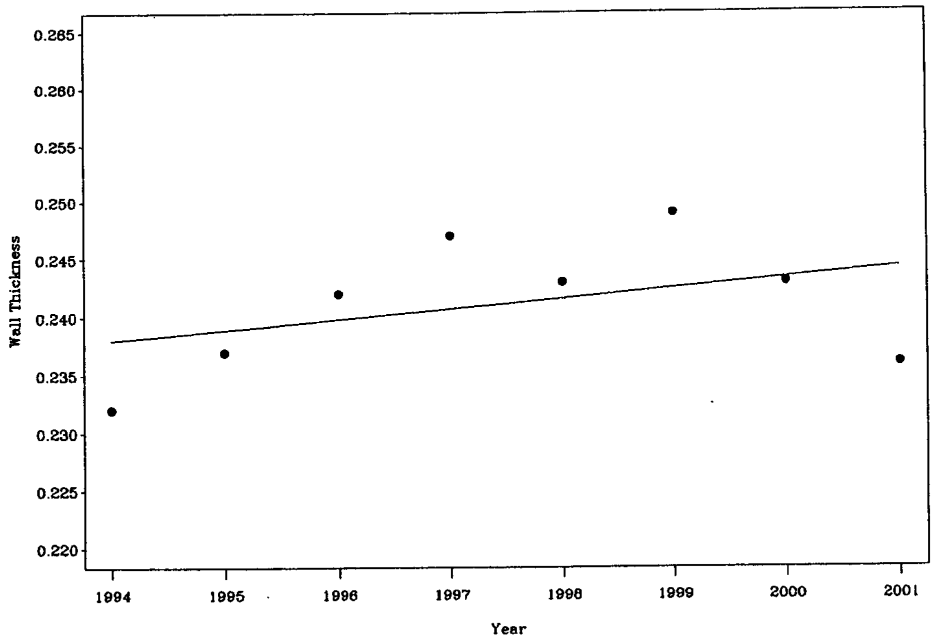
Avg Wall Thickness of Tube PP495
(Correlation Coefficient = 0.3035)



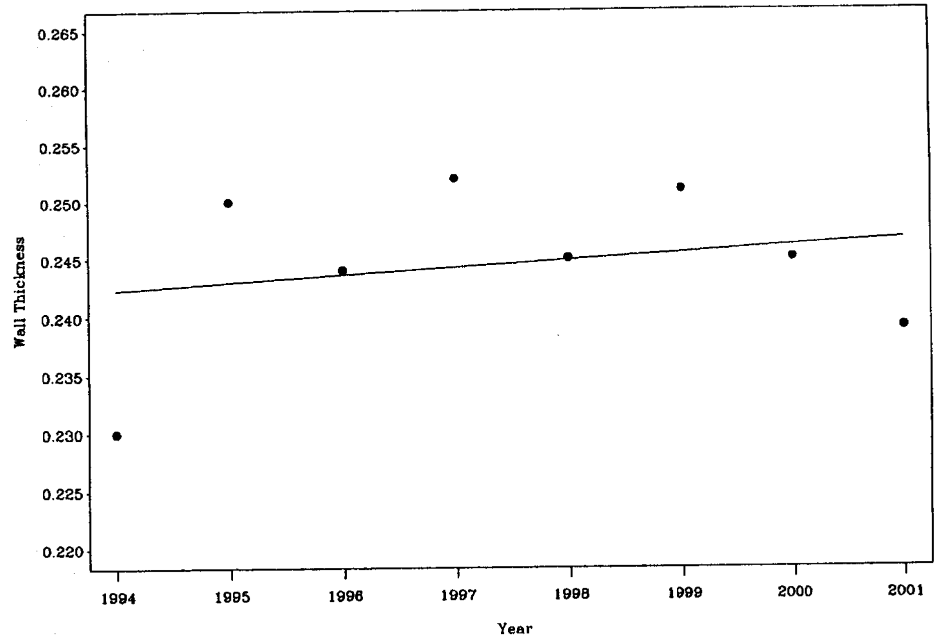
Avg Wall Thickness of Tube PP85
(Correlation Coefficient = 0.8314)



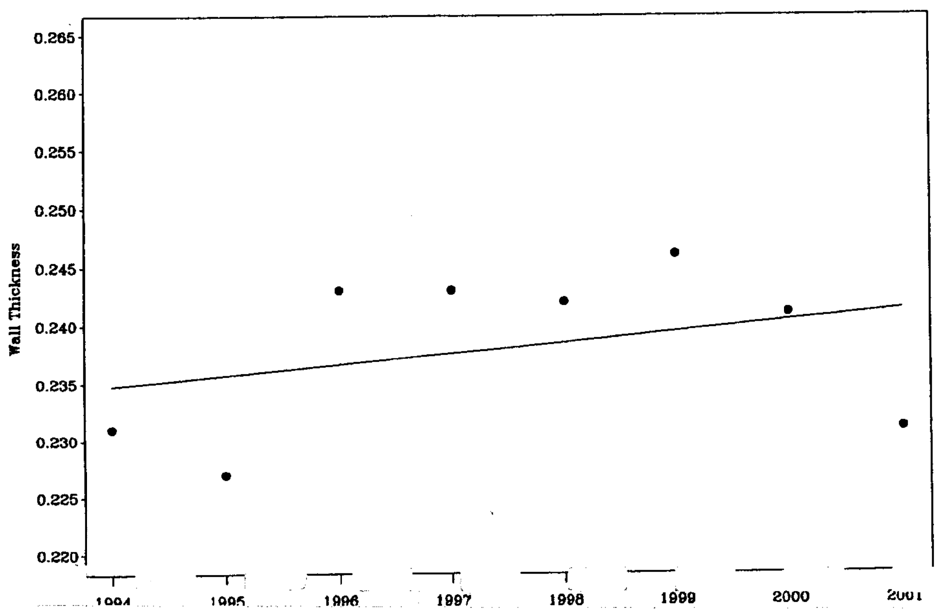
Avg Wall Thickness of Tube T325
(Correlation Coefficient = 0.3808)



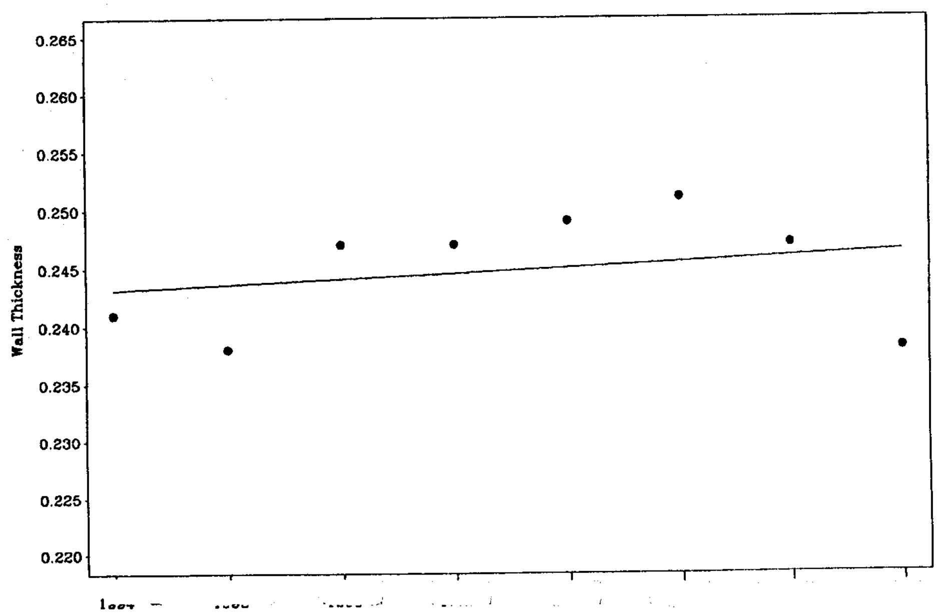
Avg Wall Thickness of Tube T365
(Correlation Coefficient = 0.2086)



Avg Wall Thickness of Tube V35
(Correlation Coefficient = 0.3181)



Avg Wall Thickness of Tube V45
(Correlation Coefficient = 0.2201)



Attachment D-36

Photograph of RSWF Transport Cask

Radioactive Scrap Waste Facility
Estimated date of photo 1996

EPA ID No: 4890008952

HWMA RCRA Storage and Treatment Permit Application

for the

Materials and Fuels Complex

Book 2 of 2

Experimental Fuels Facility (EFF)

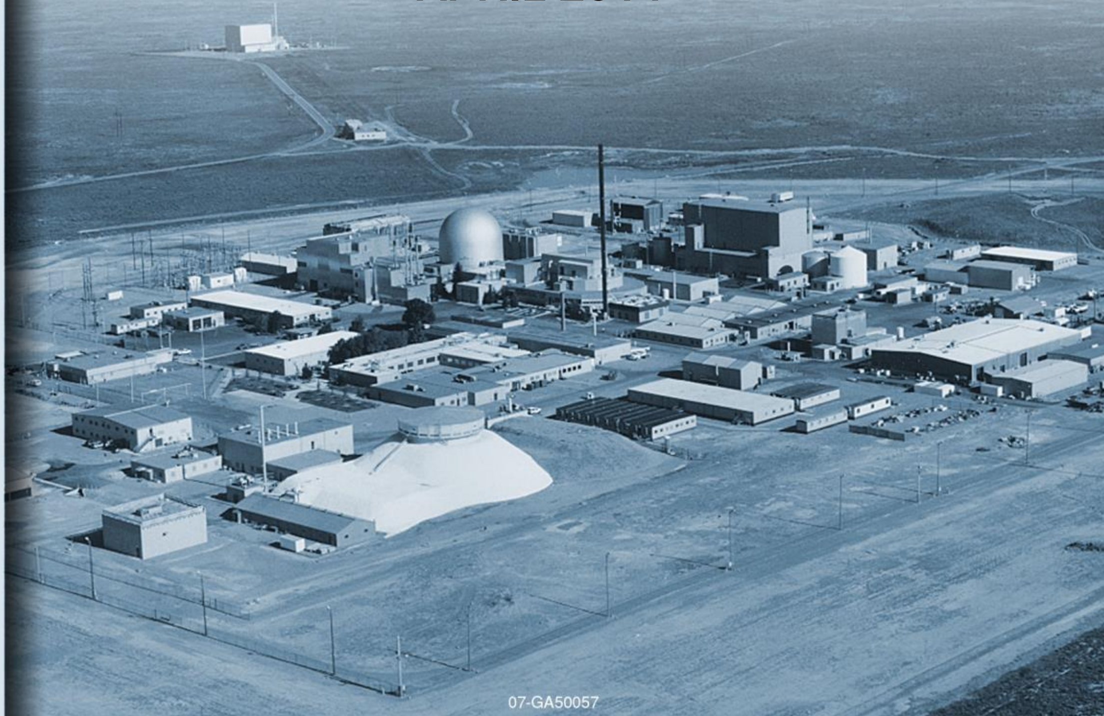
Hot Fuel Examination Facility (HFEF)

Radioactive Scrap and Waste Facility (RSWF)

Sodium Components Maintenance Shop (SCMS)

Sodium Storage Building (SSB)

APRIL 2014



Idaho National Laboratory

Attachment 2
Waste Analysis Plan

CONTENTS

TABLES

ATTACHMENTS

C. WASTE CHARACTERISTICS [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR 264.13 and 270.14(b)(2)]

In accordance with the requirements of Idaho Administrative Procedures Act (IDAPA) 58.01.05.008 and 58.01.05.012; 40 Code of Federal Regulations (CFR) 264.13 and 270.14(b)(1), this section of the Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) Permit Application describes the chemical and physical characteristics of the hazardous waste / mixed waste (HW/MW) to be received/managed at the Materials and Fuels Complex (MFC) HWMA units, and the waste analysis plan (WAP), including sampling and quality assurance, that will be implemented at each MFC HWMA unit to ensure that the HW/MW are handled in a manner that will protect human health and the environment.

The information provided in this section is organized by subsection as follows:

- Subsection C-1, HW/MW Chemical and Physical Analysis Methods and Requirements
- Subsection C-2, Waste Analysis Plan
- Subsection C-3, Requirements Pertaining to Land Disposal Restrictions (LDR)
- Subsection C-4, MFC HWMA Units Subparts AA, BB and CC Applicability.

C-1 HW/MW Chemical and Physical Analysis Methods and Requirements [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(2) and 264.13(a)]

C-1(a) HW/MW Received/Managed and Services Provided at MFC HWMA Units

The MFC HWMA units will receive/manage solid, liquid, and debris HW/MW in containers, tanks, and at miscellaneous units. A detailed description of each MFC HWMA unit and the types of HW/MW each unit will receive/manage is provided in Attachment 1, Section B, MFC Facility Description. A physical description of each waste type being managed at each HWMU is provided in Attachment C-6. A detailed description of each MFC HWMA unit process (storage and/or treatment) is provided in Attachment 1, Facility Description, Section D, Process Description.

C-1(b) Containerized HW/MW and HW/MW Debris [IDAPA 58.01.05.012; 40 CFR 270.15(b)(1)]

The MFC HWMA units may receive/manage ignitable, reactive, corrosive, toxic, or listed HW/MW (either solid, liquid, or debris) in various-sized containers. Examples of the types of containers that may be received are described in Attachment 1, Facility Description, Section D, Process Description. As there is some variability in the types of HW/MW that each of the MFC HWMA units can receive/manage, the specific waste types are listed in Attachment 1, Part A, for each of the HWMA units.

Material Safety Data Sheets (MSDSs) and the Integrated Waste Tracking System (IWTS) profiles describe the chemical and physical characteristics of the ignitable, reactive, corrosive, toxic, and/or listed HW/MW [and/or potential underlying hazardous constituents (UHCs)] that HWMA units currently have in storage (or for the approved waste streams that may typically be received at the HWMA unit). Examples of IWTS profiles representing four typical HW/MW types managed at MFC, and two typical MSDSs, are provided in Attachments C-1 and C-2.

C-1(c) HW/MW in Tank Systems [IDAPA 58.01.05.008; 40 CFR 264.191(b)(2) and 264.192(a)(2)]

The MFC HWMA unit that may receive/manage and treat HW/MW in tank systems is the Sodium Components Maintenance Shop (SCMS). The types and forms of HW/MW that the SCMS tanks may receive/store/treat are listed in Attachment 1, Part A.

The HW/MW to be treated in the SCMS tank systems is primarily Sodium (Na) and Sodium-potassium alloys (Nak). The HW/MW is deactivated in a controlled process via water reaction/water washing, where the ignitable and reactive hazardous waste reacts with air and water ultimately forming a hydroxide solution or sodium hydroxide. The sodium hydroxide solution generated is returned to the scrubber water tank for reuse in the SCMS process. Analytical data and process knowledge was used to determine the possible hazardous constituents of the HW/MW. The only potential HW/MW would be the Universal Treatment Standard (40 CFR 268.40) toxic metals shown in Table C-1.

Table C- 1. Potential inorganic toxic constituents.

Hazardous Constituents	
Antimony	Lead
Arsenic	Mercury
Barium	Nickel
Beryllium	Selenium
Cadmium	Silver
Chromium (total)	Thallium

If the liquid waste generated within the tank system is removed, the HW/MW will be solidified or stabilized to meet UTS and/or disposal facility WAC criteria or sent off-site for treatment and proper disposal.

The SCMS tanks are constructed of stainless steel for corrosion resistance, see Attachment 1, Section D, MFC Process Description, D-4 Tank Systems.

C-2 Waste Analysis Plan [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(3) and 264.13(b) and (c)]

C-2(a) Waste Acceptance Criteria

All HW/MW to be received at a MFC HWMA unit will be required to meet waste specific analysis (characterization) requirements and HWMA unit-specific waste acceptance criteria (WAC), tailored to address HW/MW and radiation hazards, and the safety of workers. The characterization of the HW/MW will be based on several methods or combinations of methods to include sampling and laboratory analysis and, when appropriate, acceptable knowledge. Acceptable knowledge is defined as (1) existing published or documented waste analysis data or studies prepared previously for the HW/MW such as manufacturers' specifications, (2) previous analytical data for the same HW/MW stream, or (3) detailed information on specific HW/MW, such as listed waste (F, P, U) from a specific source. Acceptable knowledge can be used alone or in conjunction with fingerprint analysis and full-scale sampling and laboratory analysis. This strategy for HW/MW analysis is discussed in the guidance document, "Environmental Protection Agency (EPA)

Waste Analysis at Facilities that Generate, Store, Treat and Dispose of Hazardous Waste."[1,2]

When feasible, the preferred method to meet waste analysis (characterization) requirements is to conduct sampling and laboratory analysis. However, there are situations where it may be appropriate to apply acceptable knowledge, such as if HW/MW is a listed waste with a well documented process, if there are unwarranted risks to the health and safety of personnel due to radiation or reactive characteristic HW/MW should a container be opened for sampling, or if the physical nature of the waste does not lend itself to taking a laboratory sample (such as debris, piping).[1 2]

The "Joint Nuclear Regulatory Commission (NRC)/EPA Guidance on Testing Requirements for Mixed Radioactive and Hazardous Wastes"[2] stresses the value of acceptable waste knowledge and the flexibility allowed in testing MW to minimize radiation hazards. The guidance offers the following two strategies for characterizing MW: use a sample of <100 grams, as long as the test is sufficiently sensitive, and use of surrogate material, as long as it is chemically identical to the MW and represents the hazardous constituents expected to be present in the MW.

Once a generator/owner has completed the characterization process, the characterization data will be documented by the generator/owner on the INL IWTS profile, or equivalent. Using this IWTS profile (or an equivalent profile form) is a standard practice among HW/MW generators/owners.

The HW/MW characterization data documented on the IWTS profile includes the following:

- Waste stream-specific information
- Generator waste analysis certification and approval signature
- Physical, chemical, and radiological characteristics
- Regulatory status information (EPA waste numbers, UHCs)
- Waste generation dates, container identification number, and container configurations.

[1] "EPA Waste Analysis at Facilities that Generate, Store, Treat and Dispose of Hazardous Waste" (PB94-96303).
[2] "Joint EPA/NRC Guidance on Testing Requirements for Mixed Radioactive and Hazardous Waste," *Federal Register*, November 20, 1997 (62 FR 62079-62094).

The IWTS profile, or equivalent, is used by the HW/MW generator/owner to:

- Document detailed chemical and physical data for the HW/MW
- Certify the quality of the characterization data they are providing to MFC
- Track the HW/MW from generation through disposal.

The IWTS profile, or equivalent, is also used by the MFC HWMA unit manager receiving the HW/MW to:

- Ensure the HW/MW is adequately characterized prior to receipt for storage or treatment
- Approve the HW/MW for acceptance at the HWMA unit following review
- Track the HW/MW while present in the MFC HWMA unit
- Maintain an inventory of all HW/MW on the MFC site.

Examples of IWTS profiles are provided in Attachment C-1.

Prior to shipment of HW/MW to the HWMA unit, the following activities will occur:

- The generator will provide detailed, certified, characterization data for each HW/MW stream documented on the IWTS profile, or equivalent documentation.
- The generator-certified IWTS data, or equivalent documentation, will be reviewed and approved by the HWMA unit manager, or designee.

All containers of HW/MW accepted at an MFC HWMA unit will be:

- Accepted/managed only if the wastes are known and have the approved EPA hazardous waste numbers (HWNs) identified in Attachment 1, Part A.
- Verified, through visual waste verification (also referred to as "fingerprint analysis"). At the discretion of the HWMA unit manager, on-Site[3] HW/MW may be fingerprint analyzed when the HW/MW is received at an HWMA unit.
- Labeled with barcode labels and entered in the IWTS database, or equivalent, which will allow tracking of the HW/MW container movements.

[3] On-Site means HW/MW generated at a facility physically located on the INL site or HW/MW from a generator that is a contractor or subcontractor of the INL Management and Operations contractor.

- Stored in the MFC HWMA-permitted storage facilities identified in Attachment 1, Facility Description, Section B, MFC Facility Description.
- Managed and stored appropriately in waste-compatible containers and, if applicable, with other compatible wastes.

Fingerprint analysis will verify the contents of an HW/MW container as it is opened prior to connection to a HWMA unit treatment/process system. This analysis will provide additional assurance that incompatible materials will not be accidentally introduced into the HWMA unit systems. A record of each analysis will be maintained as part of the HWMA unit operating records. A further description of the fingerprint analysis is provided in Subsection C-2(f).

The unit specific waste acceptance criteria for each MFC HWMUs is listed in Table C-2.

Table C-2. Unit specific waste acceptance criteria.

Facility	Allowed Waste Types	Allowed EPA Hazardous Waste Codes	Other Waste Acceptance Criteria
EFF	Ignitable, Corrosive, Reactive, Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Spent or used solvents, hydrogen fluoride, and hydrofluoric acid. Solids, liquids, and debris	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, F001, F002, F005, U134	None
HFEF	Ignitable, Corrosive, Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Endrin, Lindane, Methoxychlor, Toxaphene, 2,4 D, 2,4,5-TP (Silvex), Benzene, Carbon tetrachloride, Chlordane, Chlorobenzene, Chloroform, o-Cresol, m-Cresol, p-Cresol, Cresol, 1,4-Dichlorobenzene, 1,2-Dichloroethane, 1,1-Dichloroethylene, 4-Dinitrotoluene, Heptachlor and its epoxide, Hexachlorobenzene, Hexachlorobutadiene, Hexachloroethane, Methyl ethyl ketone, Nitrobenzene, Pentachlorophenol, Pyridine, Tetrachloroethylene, Trichloroethylene, 2,4,5-Trichlorophenol, 2,4,6-Trichlorolphenol, Vinyl chloride, Spent or used solvents, other listed wastes from non-specific sources, and a variety of both acutely hazardous and toxic chemicals. Solids, liquids, and debris	D001, D002, D004, D005, D006, D007, D008, D009, D010, D011, D012, D013, D014, D015, D016, D017, D018, D019, D020, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D031, D032, D033, D034, D035, D036, D037, D038, D039, D040, D041, D042, D043, F001, F002, F003, F004, F005, F006, F007, F008, F009, F039, P005, P012, P022, P024, P027, P028, P030, P031, P056, P073, P077, P098, P104, P105, P106, P113, P116, P119, P120, U003, U004, U007, U009, U012, U014, U019, U020, U032, U037, U044, U048, U052, U069, U079 - U081, U083, U084, U102, U103, U108, U116, U118, U120, U122, U123, U127, U128, U131, U133 - U135, U138, U140, U144, U145, U147, U151, U159, U162, U165, U169, U170, U171, U182, U188, U190, U191, U196, U201, U204, U207, U208, U210, U211, U215, U217-U220, U225-U228, U239, U328	No Reactive waste (D003)

Facility	Allowed Waste Types	Allowed EPA Hazardous Waste Codes	Other Waste Acceptance Criteria
RSWF	Ignitable, Reactive, Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, (mercury-contaminated solid waste only); Selenium; Silver Solids and debris only	D001, D003, D004, D005, D006, D007, D008, D009, D010, D011	No free liquids (including NaK or Mercury) are allowed in newly received waste
SCMS	Ignitable, Corrosive, Reactive, Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Na or NaK, and mixed radioactive wastes. Solids, liquids, and debris	D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011	None
SSB	Ignitable, Reactive, Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Na, NaK, Radioactive, and Non-radioactive waste. Solids, liquids, and debris	D001, D003, D004, D005, D006, D007, D008, D009, D010, D011	No corrosive waste (D002)

C-2(b) HW/MW Analysis Parameters and Rationale [IDAPA 58.01.05.008; 40 CFR 264.13(b)(1)]

The MFC HWMA units may only receive/manage HW/MW that meets the following parameters:

- Has been characterized by the generator/owner in accordance with Subsection C-2(a) and the chemical and physical analysis data and/or acceptable knowledge data is certified by the generator/owner
- Has the EPA HWNs identified in Attachment 1, Part A, and meets the WAC of the HWMA unit that will receive and manage the HW/MW.

The specific parameters and rationale (defined in Table C-3) were chosen to address the following:

- Ensure HWMA unit WAC are met
- Provide adequate and accessible information in case of an emergency
- Ensure proper HW/MW handling, treatment, storage, and disposal
- Meet regulatory requirements.

As discussed in previous subsections, all HW/MW characterization data are documented on the IWTS profile, or equivalent. The HWMA unit manager, or designee, receives the IWTS profiles, or equivalent, for review and approval prior to receiving the HW/MW (i.e., physical and chemical properties are known and documented).

If required by the HWMA unit manager, fingerprint analysis can be chosen to verify HW/MW accepted at the HWMA unit is as expected.

C-2(c) HW/MW Analysis Test Methods [IDAPA 58.01.05.008; 40 CFR 264.13(b)(2)]

HW/MW must be sampled and analyzed in accordance with EPA Method SW-846, or equivalent methods, as listed in Table C-3. MFC may require fingerprint analysis to confirm the reported analysis and data recorded on the IWTS profile, or equivalent documentation.

HWMA unit procedures, or the sampling and analysis plan (SAP) prepared for a specific waste stream, will identify modified EPA SW-846 procedures listed in the NRC/EPA *Federal Register* guidance that can be used. These modifications include, for example, MFC Analytical Laboratory (AL) SW-846 equivalent test methods. MFC modified the EPA SW-846 protocols specifically to reduce personnel radiation exposure during testing of radioactive samples. The modifications involved decreasing sample sizes and changing test equipment. It is recognized that remote handling limitations may prevent verbatim compliance to the details of the methods described in EPA SW-846. Whenever deviation is necessary, the actual method details must be equal (or superior) to EPA SW-846 details. The rigor and reliability of EPA SW-846 must be maintained whenever an equivalent method is used. Changes to EPA SW-846 or other EPA-recognized methods that do not affect the chemistry, such as minor equipment substitutions or minor differences in the preparation of standards or reagents, are allowed within the scope of SW-846 and do not require agency approval.

Table C-3. Waste analysis parameters, methods, and rationale.

<table>
<tr><th>Parameter</th><th colspan="3">Method</th><th>Rationale (see key)</th></tr>
<tr><td>Physical state</td><td colspan="3">As required</td><td>1</td></tr>
<tr><td>Radioactivity</td><td colspan="3">Acceptable knowledge, if appropriate, may be used. Alpha and beta detectors, gamma spectroscopy, etc.</td><td>2</td></tr>
<tr><td>Ignitability</td><td colspan="3">EPA SW-846 1010, Pensky-Martens Closed-Cup Method for Determining Ignitability, and/or 1020, Setaflash Closed-Cup Method for Determining Ignitability. Acceptable knowledge, if appropriate, may be used.</td><td>1, 3, 4,5</td></tr>
<tr><td>Corrosivity</td><td colspan="3">EPA SW-846 1110, Corrosivity Toward Steel; 9040, pH Electrometric Measurement; and/or 9041, pH Paper. Acceptable knowledge, if appropriate, may be used.</td><td>1, 3, 4</td></tr>
<tr><td>Reactivity (cyanides, sulfides)</td><td colspan="3">EPA SW-846 9010, 9013, 9014, 9030, 9031, 9034. Acceptable knowledge, if appropriate, may be used.</td><td>1, 3, 4,5</td></tr>
<tr><td>Toxicity</td><td colspan="3">1311, Toxicity Characteristic Leaching Procedure or EPA SW-846 1311, Toxicity Characteristic Leaching Procedure. Acceptable knowledge, if appropriate, may be used.</td><td>3, 4</td></tr>
<tr><td rowspan="15">Metals</td><td>Hazardous Constituent</td><td>EPA SW-846 Method</td><td>Measurement Technique</td><td rowspan="15">1, 3, 4</td></tr>
<tr><td>Arsenic</td><td>7000, Atomic Absorption Methods.</td><td>Hydride</td></tr>
<tr><td>Antimony</td><td>6010, Inductively Coupled Plasma—Mass Spectrometry, or 7000</td><td>ICP/Flame</td></tr>
<tr><td>Barium</td><td>6010 or 7000</td><td>ICP/Flame</td></tr>
<tr><td>Beryllium</td><td>6010 or 7000</td><td>ICP/Flame</td></tr>
<tr><td>Cadmium</td><td>7000</td><td>Furnace</td></tr>
<tr><td>Chromium</td><td>6010 or 7000</td><td>ICP/Flame</td></tr>
<tr><td>Lead</td><td>6010 or 7000</td><td>ICP/Flame</td></tr>
<tr><td>Mercury</td><td>7000</td><td>Cold Vapor</td></tr>
<tr><td>Nickel</td><td>6010 or 7000</td><td>ICP/Flame</td></tr>
<tr><td>Selenium</td><td>7000</td><td>Hydride</td></tr>
<tr><td>Silver</td><td>6010 or 7000</td><td>ICP/Flame</td></tr>
<tr><td>Thallium</td><td>6010 or 7000</td><td>ICP/Flame</td></tr>
<tr><td colspan="3">Acceptable knowledge, if appropriate, may be used.</td></tr>
<tr><td>Volatile[a]</td><td colspan="3">EPA SW-846 8015, 8010/8240, 8020/8260, or process knowledge</td><td>1, 3, 4</td></tr>
<tr><td>Semi-volatile[a]</td><td colspan="3">EPA SW-846 8250/8270 or process knowledge</td><td>1, 3, 4</td></tr>
<tr><td>Free liquids</td><td colspan="3">9095, Paint Filter Liquids Test Procedure; EPA SW-846 9095, Paint Filter Liquids Test. Acceptable knowledge, if appropriate, may be used.</td><td>1</td></tr>
<tr><td>F,P,U Listed</td><td colspan="3">Acceptable knowledge</td><td>1, 3, 4</td></tr>
<tr><td colspan="5">Key: 1 - Ensure safe waste handling, storage, and/or treatment.
2 - Determine if the waste is HW or MW and any applicable radiological control limits (Hazard-Category-3 threshold quantities must not be exceeded).
3 - Determine if waste is regulated under the HWMA/RCRA.
4 - Determine LDR and treatment standards.
5 – Sodium is ignitable/reactive.</td></tr>
<tr><td colspan="5">a. HFEF Only</td></tr>
</table>

C-2(c)(1) Test Methods for Debris [IDAPA 58.01.05.008; 40 CFR 264.13(b)(2)]

The heterogeneous nature of debris HW/MW streams makes collection of representative samples impractical and, as a result, characterization through sampling and analysis is not a reasonable option. Characterization of the debris HW/MW streams, therefore, relies heavily on generator acceptable knowledge documented on the IWTS profile, or equivalent documentation. EPA has recognized the inherent difficulty of debris characterization by promulgating alternative debris treatment standards based on performance and/or design and operating standards rather than numerical, concentration-based standards. As standard test methods for debris are not available, each debris HW/MW stream treated at the HWMA unit will be evaluated separately.

C-2(d) HW/MW Sampling Methods [IDAPA 58.01.05.008; 40 CFR 264.13(b)(3)]

A SAP will be developed for any waste stream needing verification prior to HW/MW receipt, and, if treated, the SAP will also cover post-treatment sampling of the waste. Sampling will be conducted in accordance with Chapter 9 of SW-846 and approved procedures. In general, where standard samples are collected, the following basic sampling procedure is used:

- Obtain samples using pre-cleaned sample equipment, in accordance with the applicable method.
- Document necessary information in the field record (e.g., location, time, characteristics). Fill sample containers. Uniquely identify and label each sample (Attachment C-3).
- Place containers in a durable ice-filled cooler or container for storage or transport to the laboratory. The sample containers may be wrapped in bubble packing or other protective material before placement in the cooler or container, if necessary.
- Install custody seals to ensure sample integrity (Attachment C-3).
- Complete the chain-of-custody (COC) record, and retain an administrative copy (Attachment C-4).
- Review all paperwork and attach the COC record to the cooler or comparable receptacle.
- Seal the coolers or containers, and mark them in accordance with Department of Transportation and/or procedural requirements.
- Transport samples to the MFC or off-Site analytical laboratory.

C-2(e) Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) is conducted to obtain defensible and valid data from sampling and analysis events. Defensible and valid data require the implementation of the process of field and laboratory control samples, data validation, performance assessments, and, as necessary, corrective action(s).

C-2(e)(1) Field Control Samples

Control samples are QC samples that are intended to monitor the performance of the sampling event. In accordance with this WAP, the following field control samples may be collected:

- Field duplicates
- Equipment rinsate
- Trip blank-sample.

C-2(e)(2) Laboratory QA/QC

MFC and off-Site analytical laboratories, used for sample analysis of received or treated waste, are required to have an approved QA/QC program. The analytical laboratory QA/QC program provides the guidelines and requirements to achieve QC during sample analysis. Depending on the data end-use and overall data quality objectives (DQOs), the laboratory QA/QC control samples may include:

- Matrix spike
- Matrix duplicate
- Matrix spike duplicate.

C-2(e)(3) Data Validation

Data in the analytical laboratory is validated through the analysis of QC samples, where available and applicable prior to, or concurrent with, the analysis of samples and through the use of control charts (as deemed needed). In addition, depending on the data end-use and overall project DQOs, data validation may include evaluation of the following subjects:

- Completeness of laboratory records with regard to processing of all required samples and analyses
- Implementation of appropriate procedures

- Evaluation of sample analytical data to required detection and quantity
- Evaluation of QC analytical data to applicable control criteria
- Comparison of sample holding times to the required holding times prescribed by this WAP.

All deviations are documented and corrective actions implemented, as necessary.

C-2(e)(4) Corrective Action

Corrective action measures fall into the following two categories:

Project Corrective Action—Corrective actions are performed when the project objectives are not met, when conditions adverse to quality have been identified, or when an assessment of data reveals questionable or unknown data quality. Conditions adverse to quality are identified promptly and corrected as soon as possible. When significant conditions adverse to quality are identified, the causes are determined, and corrective actions to prevent their recurrence are performed and documented.

Laboratory Corrective Actions—The contract laboratory possesses a QA program plan identifying warning, control, and rejection limits and what actions will be taken when the warning, control, and rejection limits are exceeded. Warning conditions may only require more frequent observations of a piece of equipment, while rejection conditions require instrument maintenance and re-analysis of all samples run in the out-of-control condition.

C-2(f) Frequency of Analysis [IDAPA 58.01.05.008; 40 CFR 264.13(b)(4) and 268.45]

Initial Analysis—Prior to acceptance at the HWMA unit, initial analyses (characterization), either through review of analytical data or acceptable knowledge (depending on generator/owner category), will have been completed. Initial analysis will be used to determine waste composition and EPA HWNs.

Fingerprint Analysis—Prior to receipt or treatment at the HWMA unit, fingerprint analysis may be performed (if required by HWMA unit manager) for HW/MW on all containers of HW/MW, as each container is opened. Fingerprint analysis will be used to verify container contents and ensure the HW/MW is as documented on the IWTS profile or equivalent.

Post-Treatment Analysis—Prior to shipment to an appropriate disposal facility, post-treatment sampling and analysis is performed, as appropriate, to ensure the

HW/MW treatment residuals meet LDR and the WAC of the disposal facility. Treated HW/MW will be analyzed for UHCs to ensure they meet Universal Treatment Standards (UTS). All treated HW/MW streams will be analyzed for the hazardous constituents detected during the initial sampling and analysis by the generator/owner and any confirmatory sampling and analyses performed by MFC personnel.

If the UTS limits are not exceeded, no additional sampling and analyses are required to demonstrate compliance with LDR. If the UTS limits are exceeded in any HW/MW stream, an additional sample will be taken from the sampled container. If the backup sample yields the same results, the containers of HW/MW treated in the same batch will be divided into groups of eight or less. Two random samples from each group will be analyzed. The basis for the sampling scheme is based on two samples per drum up to eight drums per day for a batch process. Batch processes are based on the number of drums going through the solidification system per day, which have historically been eight per day. If the UTS limits for the group of containers are again exceeded, that group will be set aside for further treatment. If the UTS limits for the group of containers are not exceeded, that group of containers will be sent to an appropriate disposal facility. In addition, if UTS limits are exceeded the waste can be rejected without further treatment and disposition to an off-site facility for treatment and disposal.

Debris Post-Treatment Analysis—HW/MW must meet standards presented in 40 CFR 268.45. No sampling is required to demonstrate post-treatment standards, although treatment residues resulting after the treatment of debris will be further treated and tested in accordance with this WAP.

C-2(g) Requirements for HW/MW Received from Off-Site Generators/Owners [IDAPA 58.01.05.008; 40 CFR 264.13(b)(5), 264.13(c), and 264.73(b)]

No off-site HW/MW is received at MFC. This section in not applicable.

C-2(h) Requirements for Ignitable, Reactive, or Incompatible HW/MW [IDAPA 58.01.05.008; 40 CFR 264.13(b)(6) and 264.17]

As specified in Attachment 1, Facility Description, Section B, MFC Facility Description, Table B-1, several HWMA units have been designed as storage and/or treatment facilities for ignitable and reactive HW/MW. The ignitable/reactive HW/MW that will be received and managed at the HWMA unit will be segregated during storage and treated separately from HW/MW that are incompatible with the reactive metals (such as HW/MW containing water). In addition, the routine characterization requirements identified in this WAP, and the review and approval process prior to accepting HW/MW for storage and treatment, are in place to prevent the accidental mixing of incompatible materials.

Additional precautions for ignitable and reactive HW/MW are found in Attachment 6, Section F, Procedures to Prevent Hazards.

C-3 Requirements Pertaining to LDR [IDAPA 58.01.05.008; 40 CFR 264.73 and Part 268]

C-3(a) HW/MW LDR-Related Parameters and Rationale

Generators/owners must test their HW/MW, or an extract derived from the HW/MW, or use acceptable knowledge of the HW/MW (as applicable), to determine if the HW/MW is restricted from land disposal under IDAPA 58.01.05.011 and 40 CFR 268. If the generator/owner determines the HW/MW is a restricted HW/MW that does not meet the applicable treatment standards, the generator must notify the HWMA unit manager, or designee. The LDR require generators to provide notification and certification to the treatment and storage facilities that essentially explains the restrictions applicable to their HW/MW.

Generators/owners will be required to complete and submit an LDR Notification Form prior to shipment of the HW/MW to the off-site HWMA unit. An example of an LDR Notification Form is provided in Attachment C-5. The LDR Notification Form will be used to inform the HWMA unit manager that the shipment contains restricted HW/MW that does not meet the applicable treatment standards set forth in IDAPA 58.01.05.011 and 40 CFR 268, Subpart D, or that exceeds the applicable prohibition levels set forth in IDAPA 58.01.05.011 and 40 CFR 268.32, or RCRA Section 3004(d).

MFC HWMA units that treat HW/MW must sample and analyze the treated HW/MW and/or residues in accordance with the frequency specified in Subsection C-2(f). When analysis results indicate the HW/MW can be land disposed, an LDR Notification will be sent with each HW/MW shipment to the appropriate disposal facility that includes the following information:

- EPA HWNs
- Treatment standards (including the applicable five-letter treatment code listed in IDAPA 58.01.05.011 and 40 CFR 268.42, Table 1) for restricted waste, either included or referenced by including the applicable non-wastewater category per IDAPA 58.01.05.011 and 40 CFR 268.2(d), the applicable subdivisions made within a waste code based on waste-specific

criteria, and the CFR section(s) and paragraph(s) where the applicable treatment standard appears

- Manifest number associated with the shipment of HW/MW
- Waste analysis data, where available.

MFC will also submit a certification with each shipment of a restricted HW/MW to the appropriate disposal facility, stating that the HW/MW has been treated in compliance with the applicable performance standards specified in IDAPA 58.01.05.011 and 40 CFR 268, Subpart D. This certification statement will read as stated in IDAPA 58.01.05.011 and 40 CFR 268.7(b) or (d), as applicable.

In addition, MFC will place in its files a one-time notification/certification for waste no longer exhibiting a characteristic in accordance with IDAPA 58.01.05.011 and 40 CFR 268.9(d). This notification and/or certification will also include the applicable UHCs. MFC will retain a copy of this notification/certification and update the information if the process changes, or the disposal facility receiving the HW/MW changes.

C-3(b) HW/MW LDR-Related Analysis Test Methods

Analysis and test methods are identified in Subsection C-2(c).

C-3(c) HW/MW LDR-Related Sampling Methods

Sampling methods are identified in Subsection C-2(d).

C-3(d) HW/MW LDR-Related Frequency of Analysis

Frequency of analysis methods are identified in Subsection C-2(f).

C-4 MFC HWMA Units Subparts AA, BB and CC Applicability [IDAPA 58.01.05.008; 40 CFR 264.1030, 264.1050, and 264.1080]

C-4(a) 40 CFR 264 Subpart AA Applicability

The requirements contained in 40 CFR 264 Subpart AA do not apply, since the MFC HWMA units contain no process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations.

C-4(b) 40 CFR 264 Subpart BB Applicability

The requirements contained in 40 CFR 264 Subpart BB do not apply, since the MFC HWMA units have no equipment that contains or contacts hazardous wastes with organic concentrations of at least 10% by weight.

C-4(c) 40 CFR 264 Subpart CC Applicability

The requirements contained in 40 CFR 264 Subpart CC do not apply to the MFC HWMA units, since the MFC HWMA units will only store or treat hazardous waste and hazardous debris that is exempt from 40 CFR 264 Subpart CC, as provided in 40 CFR 264.1080 or 264.1082.

Attachment C-1

Examples of IWTS Profiles

Integrated Waste Tracking System Material Profile

Information Only

Material Profile Define ANL180CH

Material Profile No.:	ANL180CH
Profile Date:	2/13/1998 12:00:00 AM
Name of Waste or Material:	Debris and Equipment Contaminated with Sodium - Contact Handled
Site Treatment Plan ID:	CH-ANL-180 SODIUM - LLW
Generating Unit (e.g. Building or Process):	MFC-767 : MFC 767 EBR-II Reactor Plant Building
Material or Waste Type and Action:	MLLW: CH, to be treated at the SCMS

Record Status:	Inactive	**Record Lock Parameters:**	04/09/1998 06:52:07	GarciaJ
		Insert Parameters:	02/15/1998 12:47:40	iwts

Inactivation allows a record to remain selectable for historical profiles prior to the inactivation date. The inactivation data defaults to the date/time of inactivation, but can be changed to a user defined date/time. A canceled record will not be selectable by past, present, or future records. After a record is cancelled, a historical profile may continue to reference it, but any attempt to update the reference will require a new selection.

Integrated Waste Tracking System Material Profile

Information Only

Certification, Review & Approval ANL180CH

Certified	Name: Nancy Stewart Date: 08/17/2001 Phone: 2085337399 Fax: 2085337376 E-Mail Nancy.Stewart@inl.gov	A waste determination process for this waste stream has been performed. Characterization data was derived by approved analytical methods or process knowledge information and any data limitations have been documented. Legally and scientifically defensible data was used for characterization whenever possible. The required data provided in this Material & Waste Characterization Profile is complete and accurate based on the analytical data or process knowledge information used for characterization.
Reviewed	Name: Nancy Stewart Date: 08/17/2001 Phone: 2085337399 Fax: 2085337376 E-Mail Nancy.Stewart@inl.gov	A review of the Material and Waste Characterization Profile has shown that a waste determination was performed and that the required profile data is complete and accurate based on the analytical data or process knowledge information provided. The characterization data is sufficient to justify an approval or disapproval for the material or waste to be offered for disposition.
Approved	Name: Roy Grant Date: 10/15/2001 Phone: 2088812611 Fax: E-Mail rpgrant@energysolutions.com	The Material and Waste Characterization Profile characterization data meets the INL RRWAC (or a contracted Off-Site Vendors acceptance criteria) for the associated material or waste type and action. A regulatory based disposition is identified for the material or waste defined by this profile. Independent review was performed and comments from the review addressed. Approval to offer this material or waste for disposition is granted.

Last Profile Update and Approval ANL180CH

Update/Approvals	Name: Jonathan Jacobson Date: 09/13/2012 Phone: 2085337057 Fax: E-Mail jonathan.jacobson@inl.gov	Waste defined by this Material and Waste Characterization Profile is currently being generated. An update and approval (as defined by the original approval statement) of this profile has been performed per the annual approval requirement established in the IWAC.

	First Name	Last Name	Phone	Fax	E-Mail	Mail Stop
Generator Contact:	Nancy	Stewart	2085337399	2085337376	Nancy.Stewart@inl.gov	6000
Technical Contact:	Roy	Grant	2088812611		rpgrant@energysolutions.com	
Charge No:						

Material Profile Rejection Log ANL180CH

User	Date	Process Rejected	Comments
watsonr	07/05/2001	Approval	Clear approval screen.

Revision History ANL180CH

Char_id	Profile Name	Profile Date	Record Status
ANL180CH	Debris and Equipment Contaminated with Sodium - Contact Handled	02/13/1998	Inactive

Material Profile Process ANL180CH

1. Yes **Will material and waste characterization be fully capable of complying with applicable Waste Acceptance Criteria?**

   a. **Waste Acceptance Criteria requirements not met (list each):**

   b. **Receiving organization approval letter number for nonstandard material or waste:**

2. **Waste Generated from:** Routine Operations

   Cleanup/Stabilization Activity:

   Generating Status: On-going

   Is this secondary waste?

3. **Generating Process description (describe the process and/or operations generating material, be specific):**

   Debris from facility operations; heavy metal, ignitable, and reactive hazards

   This waste stream was generated at ANL-767, EBR-II Reactor Building during nuclear reactor operations including maintenance activities on control systems. Some maintenance activities in Bldg. 767 involve working on and replacement of sodium wetted equipment associated with the EBR-II cooling systems. If the waste equipment cannot be cleaned of the sodium metal, it is stored in the RSSF or SCMS. Also, the secondary cooling systems at EBR-II occasionally leaked sodium metal. Cleanup operations generated sodium-contaminated wastes.

   This waste stream was and is generated at ANL-767, EBR-II Reactor and ANL-766, Sodium Boiler Building. Currently, the EBR-II Reactor is undergoing closure. The secondary and primary sodium described in waste stream CH-ANL-506 has been pumped from the systems and treated at SPF. Closure activities will generate sodium containing or contaminated waste as components and piping are removed from these systems, and these will be identified as CH-ANL-180. The sodium residual in pipes, components etc. will be treated at Sodium Component Maintenance Shop, Bldg. 793.

4. **Physical state at 70 degrees F:** solid

5. No **Does material contain free liquids?**

6. Yes **Current waste minimization plan?** **Reference:** W0001-1005-OP-03

Special Characteristic ANL180CH

Characteristic
Debris - RCRA

Integrated Waste Tracking System Material Profile

Information Only

Characterization Requirements ANL180CH

1. Yes **Is this DOT regulated hazardous material ?**

   If yes, identify DOT primary hazard: Class 4, Class 7 **and DOT subsidiary hazard(s):** 4.3, dangerous when wet material

2. Yes **At the point of generation did this material contain any RCRA "F", "K", "U", or "P" Listed waste either in pure form, as a mixture, or as a treatment residue (i.e., ash, leachate, spill cleanup), or "D" Characteristic waste?**

   Waste Description: Solid waste from operations, maintenance or cleanup

   Source Code: G13 Other Intermittent Events or Processes: Cleaning out process equipment

   Source Code Comments:

   Form Code: W002 Mixed Media/Debris/Devices: Contaminated debris: paper/clothing/rags/wood, empty containers, glass/piping/other solids

   Form Code Comments:

3. **RCRA hazardous waste determination was made by:** Both

4. No **Does this Material Profile contain Lab Packs?**

5. Yes **Was an Underlying Hazardous Constituent (UHC) determination performed?**

   No **If a UHC determination was performed, were any detected in concentrations exceeding the Universal Treatment Standards? List on UHC Screen.**

6. Yes **Is supporting documentation submitted? If yes, list:**

   EBR-II Primary and Secondary Sodium analysis results are on file at ANL-W in facility operating records.

7. No **Additional narrative:**

8. **Is the material LDR Compliant?**

Generation Active Estimates ANL180CH

Estimate Date	Start Date	End Date	Vol Qty	Vol Units	Mass Qty	Mass Units	Data Entered By	Active	Estimate Type	Inactivated By	Inactivated Date
07/07/1999	01/01/2000	12/31/2000	5	M3	5463	KG	grantr	Yes	CY		
07/07/1999	01/01/2001	12/31/2001	5	M3	5463	KG	grantr	Yes	CY		
08/17/2001	01/01/2002	12/31/2002	2.5	M3	2732	KG	StewartN	Yes	CY		
08/17/2001	01/01/2003	12/31/2003	2.5	M3	2732	KG	StewartN	Yes	CY		
08/17/2001	01/01/2004	12/31/2004	2.5	M3	2732	KG	StewartN	Yes	CY		
08/17/2001	01/01/2005	12/31/2005	2.5	M3	2732	KG	StewartN	Yes	CY		

Integrated Waste Tracking System Material Profile

Information Only

Generation Inactive Estimates ANL180CH

Estimate Date	Start Date	End Date	Vol Qty	Vol Units	Mass Qty	Mass Units	Data Entered By	Active	Est Type	Inactivated By	Inactivated Date
02/16/1998	01/01/1998	12/31/1998	0.02	M3	27	KG	ThiesenTJ	No	CY	grantr	07/07/1999
02/16/1998	01/01/1999	12/31/1999	0.02	M3	27	KG	ThiesenTJ	No	CY	grantr	07/07/1999
10/13/1998	01/01/1998	12/31/1998	0.63	M3	340	KG	StewartNA	No	CY	grantr	07/07/1999
10/13/1998	01/01/1999	12/31/1999	0.63	M3	340	KG	StewartNA	No	CY	grantr	07/07/1999
10/13/1998	01/01/2000	12/31/2000	0.63	M3	340	KG	StewartNA	No	CY	grantr	07/07/1999
10/13/1998	01/01/2001	12/31/2001	0.63	M3	340	KG	StewartNA	No	CY	grantr	07/07/1999
10/13/1998	01/01/2002	12/31/2002	0.63	M3	340	KG	StewartNA	No	CY	grantr	07/07/1999
07/07/1999	01/01/2002	12/31/2002	5	M3	5463	KG	grantr	No	CY	stewartn	08/17/2001
07/07/1999	01/01/2003	12/31/2003	5	M3	5463	KG	grantr	No	CY	stewartn	08/17/2001
07/07/1999	01/01/2004	12/31/2004	5	M3	5463	KG	grantr	No	CY	stewartn	08/17/2001

Layers ANL180CH

Layer or Phase	Physical State at 70 F	Range of Percentage From	Range of Percentage To	Units	Color
1	solid	100	100	wt%	various

Physical Characteristics ANL180CH

1. **Density of material or waste (may not be required for hazardous waste and recyclable material):**

   Liquid: **To:** **g/ml** **Solid:** **To:**

2. No **Is this aqueous waste? If yes, give total solids range:**

   From: **To:** **g/ml**

3. No **Is this incinerable liquid? If yes, give viscosity range:**

   From: **To:** **SSU**

Physical Composition ANL180CH

Char. No.	Related Characteristic (Use *Other* Where NA)	Name of Material	Carcinogen	Composition Range From	To	Units
0	*Other*	Alloy Steel	No	25	50	wt%
0	*Other*	Asbestos	No	0	10	wt%
0	*Other*	Halogentated Plastic Debris	No	0	25	wt%
0	*Other*	Mild Steel	No	25	50	wt%
0	*Other*	Sodium Contaminated Scrap Metal	No	0	100	wt%
0	*Other*	Wood/Paper/Rags	No	0	25	wt%
8	Water reactives	sodium metal	No	0	50	wt%

Flash Point, Incinerable Properties, and RCRA ANL180CH

1. No Is flash point applicable? If yes, complete the following:

   Flash Point: **To:** **Method used:**

   (Specify Other):

2. **Information for incinerable waste only:**

   a. **Heat of combustion:** **To:** **BTU/lb**

   b. **Ash content:** **To:** **wt%**

   c. **Total halogen content:** **To:** **ppm**

   d. **Water content:** **To:** **wt%**

   e. **Suspended particulates content:** **To:** **ppm**

3. Yes **Was a RCRA Waste analysis performed? If yes, enter data using "EPA Codes" screen.**

4. Yes **Were the sampling and analysis protocols used in full compliance with SW-846 protocol or other equivalent regulatory agency approved methods?**

EPA Codes ANL180CH

Hazardous Constituents

			Expected Range			Representative Sample			Detection Limit	
EPA Code ID	**TCLP Value**	**Type of Analysis**	**From**	**To**	**Units**	**From**	**To**	**Units**	**Limit**	**Units**
D001G	No	Process Knowledge	0	10	wt%					
Ignitable Ignitable characteristic wastes, that are managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.										
D002I	Yes									
Corrosive - Alkaline Corrosive charac (Alkaline) waste that are managed in non-CWA/non-CWA equivalent/non-Class I SDWA systems										
D003F	No	Process Knowledge	0	10	wt%					
Reactive Water reactives based on 261.23(a)(2),(3), and (4)										

Underlying Hazardous Constituents ANL180CH

	TCLP	Type of	Expected Range			Representative Sample			Detection Limit	
CAS	**Value**	**Analysis**	**From**	**To**	**Units**	**From**	**To**	**Units**	**Limit**	**Units**
7439-92-1	Yes	Both				0	11	ppm		
Lead										

Chemical Composition ANL180CH No Data Available

Radiological Characteristics ANL180CH

1. Y **Is fissile material present?** **Is fissile material >=.04 g/kg, waste matrix group is:**

2. **Total transuranic activity per gram of waste is:**

   Y **<= 10 nCi/g (LLW)**

   > 10 nCi/g and <= 100 nCi/g (alpha LLW)

   > 100 nCi/g (TRU)

3. **Expected radiation dose rate:**

at contact of waste package(s)	0.1	**to**	500	**mrem/hr**
at 30cm from waste package(s)		**to**		**mrem/hr**
at 1-meter from waste package(s)	0.1	**to**	100	**mrem/hr**

4. N **Is the waste greater than Class C as defined in 10 CFR 61.55?**

Isotopes - TRU U233, U-235 ANL180CH

Isotope	Activity Range or Sample Data					Fissionable Material Range or Sample Data			
	From	To	Sample	Units		From	To	Sample	Units
Am-241				Ci/m3					nCi/g
Np-237				Ci/m3					nCi/g
Pu-238				Ci/m3					nCi/g
Pu-239		7.000E-04		Ci/m3					g/ft3
Pu-240				Ci/m3					nCi/g
Pu-241				Ci/m3					nCi/g
Pu-242				Ci/m3					nCi/g
U-235				Ci/m3					g/ft3

Isotopes - Other ANL180CH

Isotope	From	To	Sample	Units
	Activity Range or Sample Data			
Ag-110m			1.000E+00	nCi/g
Au-198				nCi/g
Ba-137m				nCi/g
Ba-140				nCi/g
Ce-144				nCi/g
Co-58				nCi/g
Co-60			1.000E+02	nCi/g
Cr-51				nCi/g
Cs-134			1.000E+00	nCi/g
Cs-137			1.000E+01	nCi/g
Eu-154				nCi/g
Eu-155				nCi/g
Fe-55				nCi/g
H-3			1.000E+02	nCi/g
I-131				nCi/g
In-113m				nCi/g
La-140				nCi/g
Mn-54			2.000E+00	nCi/g
Na-22			1.000E+02	nCi/g
Na-24				nCi/g
Nb-95				nCi/g
Pm-147				nCi/g
Po-210				nCi/g
Pr-144				nCi/g
Pr-144m				nCi/g
Rh-106				nCi/g
Ru-106				nCi/g
Sb-124				nCi/g
Sb-125			2.000E+00	nCi/g
Sn-113			1.000E+02	nCi/g
Sn-117m				nCi/g
Sr-89				nCi/g
Sr-90			1.000E+01	nCi/g
Te-132				nCi/g
U-238				nCi/g
Y-90				nCi/g

Containers ANL180CH

Container Barcode	Container Date	Size	Container Units	Type	Common Name of Materials	Decommissioned
14888K	11/06/1997	55	GAL	DM	Sodium- LLW: Primary sodium contaminated components- individually bagged sodium	Yes
14889K	11/06/1997	55	GAL	DM	Sodium- LLW: Primary sodium contaminated components- individually bagged sodium	Yes
14891K	11/06/1997	55	GAL	DM	Sodium LLW : Primary sodium contaminated components	Yes
14892K	11/07/1997	55	GAL	DM	SODIUM - LLW :EBR-II sodium items from SCMS	Yes
14893K	11/06/1997	55	GAL	DM	Sodium- LLW: Primary sodium contaminated components	Yes
16932K	11/07/1997	55	GAL	DM	SODIUM - LLW- Drum contains 3 bags of Water Wash System Vapor Trap mesh	Yes
16936K	11/14/1997	75	GAL	CW	SODIUM - HFEF: 2 MK-II loops in secondary cans (Loops E-4 and H-2)	No
16937K	11/07/1997	30	GAL	CW	SODIUM - LLW- FTP Hex Tube	Yes
16938K	12/15/1997	20	GAL	CM	Molecular Sieve - Na Vapor Mesh	Yes
16956K	10/17/1997	30	GAL	DM	Sodium plates from ZPPR	Yes
16958K	11/06/1997	52	GAL	CM	SODIUM - LLW- CGCS Aersol Filter	No
16975K	03/26/1998	1	GAL	CM	SODIUM - Sample waste from AL-B-127	Yes
16976K	03/26/1998	1	GAL	CM	SODIUM - AL: RPI/Fermi sample waste	Yes
16991K	12/04/1997	83	GAL	DM	SODIUM - LLW-SLST T-7 experiment	No
16993K	11/07/1997	55	GAL	DM	SODIUM -Contaminated components from EBR-II	Yes
16994K	11/07/1997	55	GAL	DM	SODIUM - LLW-Origin 767. Drum contains individually bagged Na containing/contam. items	Yes
16995K	11/07/1997	55	GAL	DM	SODIUM - LLW: Sodium contaminated components	Yes
17197K	12/15/1997	80	GAL	CM	Charging Tank - bottom drained, residual primary sodium	No
17198K	12/15/1997	24	GAL	CM	ACS Vapor Trap 1	Yes
17211K	01/23/1998	24	GAL	CM	ACS SODIUM VAPOR TRAP	Yes
17212K	01/23/1998	24	GAL	CM	ACS SODIUM VAPOR TRAP	Yes
17213K	01/23/1998	1	GAL	CM	SODIUM -Sodium residue from ACS vapor trap removal.	Yes
17214K	01/28/1998	20	GAL	CM	ACS Molecular Sieve	Yes
17215K	01/27/1998	20	GAL	CM	ACS Molecular Sieve	Yes
17216K	01/27/1998	1	GAL	CM	SODIUM- Residue from molecular sieves	Yes
17222K	06/25/1998	70	GAL	CM	ACS DC Turbine	Yes
17223K	06/25/1998	70	GAL	CM	ACS DC Turbine	Yes
17224K	03/13/1998	20	FT3	CM	Throttle Valve	No
17225K	03/13/1998	20	FT3	CM	Throttle Valve	No
17228K	05/28/1998	39	GAL	CM	EBR-II Failed Failed Fuel Transfer System Extension Tube	Yes
19800P	02/11/1998	2	GAL	CM	Sodium from ACS Vapor Traps removal	Yes

19801P	02/11/1998	2	GAL	CM	Sodium from ACS Vapor Traps removal - Primary sodium	Yes
19802P	07/01/1998	80	GAL	CW	Control Rod Pull Pipe	Yes
19804P	07/19/1998	15	GAL	CM	ACS FUM Vapor Trap	No
19805P	04/05/1998	15	GAL	CM	N-1 Vapor Trap Can	Yes
21009P	07/28/1998	2	GAL	CM	EBR-II Argon Cooling System (ACS) Sodium from the A-3 nozzle removal operations	Yes
21010P	07/28/1998	25	GAL	CM	ACS A-3 Nozzle Outlet Piping	No
21011P	09/01/1998	30	GAL	CM	EBR-II ACS DC Turbine Unit 2 Primary Na	Yes
21026P	10/01/1998	10	GAL	CM	N-1 Nozzle Vapor Trap, No. 1	No
21028P	12/03/1998	1	GAL	CM	EBR-II Secondary Sodium Drain Tank, sodium scrapings from maintenance operations	Yes
21029P	12/03/1998	1	GAL	DM	EBR-II Secondary Sodium Drain Tank, sodium scrapings from Maintenance Operations	Yes
21030P	12/03/1998	1	GAL	CM	SBB Secondary Sodium Storage Tank, 2" pipe 26.5" long with ~1/2-gal of Na	Yes
21031P	10/30/1998	4	GAL	DM	Control Rod Bellows Pipe w/ Primary Na Residue	No
21032P	10/30/1998	4	GAL	DM	Control Rod Bellows Pipe w/ Primary Na Residue.	No
21033P	10/30/1998	4	GAL	DM	Control Rod Bellows Pipe w/ Primary Na Residue.	No
21268P	10/16/1998	55	GAL	CM	Primary Sodium Acoustic Monitor inside wash tube	No
21280P	12/21/1998	55	GAL	DM	Na Contaminated ACS Lines	Yes
21281P	12/21/1998	55	GAL	DM	Na Contaminated ACS Lines	Yes
21282P	12/21/1998	55	GAL	DM	Na Contaminated ACS Lines	Yes
21283P	01/07/1999	1	GAL	CM	~100 g of sodium from SPF spill of Fermi Na in a 1-gal paint can	Yes
21288P	01/27/1999	55	GAL	DM	Piping from the Secondary Sodium Cold Trap Removal	Yes
21289P	01/27/1999	55	GAL	DM	Secondary Sodium Piping from Cold Trap Removal	No
21290P	10/01/1994	116	GAL	CM	EBR-II Secondary Sodium Cold Trap: Includes both sodium and NaK	No
21291P	01/27/1999	50	GAL	CM	Large valve from the secondary sodium tank encased in heat resistant lagging	No
21292P	02/09/1999	1	GAL	CM	Secondary Na Cold Trap removal, 1-gal paint can contains 1/2-gal of Na pieces	Yes
21293P	01/28/1999	2	GAL	CM	2-gal paint can with Na contaminated valves	Yes
21294P	01/28/1999	1	GAL	CM	1-gal paint can, Na Drain Valves.	Yes
21295P	01/28/1999	1	GAL	CM	1-gal paint can with SPF Dip Tube Na valve	Yes
21296P	02/05/1999	55	GAL	DM	Control Rod Drive Pull Pipe (cut up) pieces containing residual Na	Yes
21297P	02/05/1999	20	GAL	CM	Fuel Transfer Port w/ Na Aersol	No
23324P	02/05/1999	30	GAL	CW	Fuel Transfer Port HEX Tube	Yes
23325P	05/26/1999	55	GAL	DM	Secondary Sodium Boiler Building Sampling Station Piping	Yes
23326P	02/09/1999	1	GAL	CM	MLLW Primary Na Piping	No

23327P	02/09/1999	2	GAL	DM	MLLW Primary Na FTP Metal Lower Seat	Yes
23333P	02/02/1999	2	GAL	CM	SPF Dip Tubes, 2 tbsp of Na; room for more Na	Yes
23334P	02/02/1999	0	GAL	CM	One plugged sodium valve from melting station at SPF #8 inside a one pint can	Yes
23343P	02/26/1999	3	M3	CW	ACS Heat Exchanger - Primary Na	No
23373P	03/13/1999	1	GAL	CM	Pan containing sand and sodium from EBR-II.	Yes
23374P	05/06/1999	5	GAL	CM	ACS Vapor Trap Mesh Na Contaminated	Yes
23375P	05/06/1999	5	GAL	CM	ACS Vapor Trap Mesh Na Contaminated	Yes
ANL000062	02/04/2000	1	GAL	CM	1-gal Paint can of 1/2 cup of Na from Depressed Area	Yes
ANL000063	02/04/2000	5	GAL	CF	Two Dip Tubes for Connex Fittings from SPF	Yes
ANL000064	02/04/2000	5	GAL	CF	Two Na Dip Tubes for Connex Fittings - from SPF	Yes
ANL000065	02/04/2000	5	GAL	CF	Two Na Dip Tubes for Connex Fittings - from SPF	Yes
ANL000089	04/24/2000	0	GAL	CM	Debris and Equipment Contaminated with Sodium - Contact Handled	Yes
ANL000283	08/18/2000	1	GAL	CM	Secondary Sodium Pieces	Yes
ANL000348	11/15/2000	1	PT	CM	Na TEDs (total of 7 TEDs) in a 1/2 Pint Metal Can	Yes
ANL000446	01/03/2001	55	GAL	DM	Sodium and Sodium Contaminated Piping and Sodium inside a Pipe	Yes
ANL010075	02/06/2001	55	GAL	DM	CGCS Aerosol Filter Assembly with Two Na Contaminated Filters- void space inside the drum	Yes
ANL010200	05/18/2001	64	FT3	CW	Debris and Equipment Contaminated with Sodium - From Plant Closure Activities 12/99-5/01.	Yes
ANL010240	08/27/2001	55	GAL	DM	19 1-gal Paint Cans with 5 pounds of Na (Sized for H2O Washing)	Yes
ANL010306	09/06/2001	36	GAL	CM	FFTF Shipping Container Contaminated w/ Na Aerosol	No
ANL010345	04/26/2002	479	GAL	CW	Vapor Trap (VT-B) and Associated Heaters and Metal Piping	Yes
ANL020023	02/27/2002	30	GAL	DM	Debris and Equipment Contaminated with MEDEC Sodium - ~15-20 grams total	No
ANL020024	03/13/2002	401	GAL	CW	FFTS Shafts Contaminated with Sodium - CS-81-47	No
ANL020025	03/14/2002	653	GAL	CW	H-1 Pulling Pipe Contaminated with Sodium - CS-84-10	Yes
ANL020026	03/14/2002	41	GAL	CW	Shaft Special FFTS Contaminated with Sodium - CS-84-26	No
ANL020027	03/14/2002	449	GAL	CW	Instat Cutters Contaminated with Sodium - CS-88-06	No
ANL020028	03/14/2002	770	GAL	CW	Main Core Gripper Contaminated with Sodium - CS-89-06	No
ANL020029	03/13/2002	53	GAL	CW	FPTF Mandrel and Bellow Assembly - CS-90-04	Yes
ANL020030	03/13/2002	97	GAL	CW	FPTF Shield Tube, Incot Bellows Contaminated with Sodium - CS-90-05	Yes
ANL020406	10/16/2002	8	GAL	DM	FASB MEDEC Tests in Glovebox Debris - 2 filters, 3 empty Na containers, 1 NaCO3	No
ANL030171	03/03/2003	85	GAL	DM	Debris and Equipment Contaminated with Sodium - Contact Handled	Yes

ANL030262	06/03/2003	1	QT	DM	Debris and Equipment Contaminated with Sodium - Contact Handled	Yes
ANL030319	07/14/2003	10	GAL	DM	Debris and Equipment Contaminated with Sodium - Contact Handled	No
ANL030334	06/30/2003	8	GAL	DM	Debris and Equipment Contaminated with Sodium - Contact Handled	Yes
ANL1418	08/26/1994	55	GAL	DM	ETR/SLSF SODIUM DEBRIS	Yes
ANL1419	08/26/1994	55	GAL	DM	ETR/SLSF SODIUM DEBRIS	Yes
ANL1420	08/26/1994	55	GAL	DM	ETR/SLSF LOOP SODIUM	Yes
ANL1421	08/26/1994	59	GAL	CM	OLSS HOLD TANK	No
ANL1422	08/26/1994	2	GAL	CM	VAPOR TRAP	No
ANL1423	08/26/1994	2	GAL	CM	VAPOR TRAP	No
ANL1424	08/26/1994	4	GAL	CM	ELECTROMAGNETIC SODIUM PUMP	Yes
ANL1425	08/26/1994	15	GAL	CM	ETR SLSF Cold Trap	No
ANL1426	08/26/1994	15	GAL	CM	ETR SLSF Cold Trap	No
ANL1427	08/26/1994	21	GAL	CM	SODIUM DRAIN TANK	No
ANL1437	06/22/1982	2	GAL	CM	Miscellaneous elemental Na and waste from A. L. B-127 glove box. Sodium originally from EBR-II primary Na system	No
ANL1438	01/03/1983	5	GAL	CM	EBR-II primary sodium system 1lb. of Na in sand	Yes
ANL1439	01/03/1983	5	GAL	CM	EBR-II primary sodium system - 1 lb. of Na in sand	Yes
ANL1441	01/01/1976	2	GAL	DM	Distilled sodium form analyses of EBR -II primary and secondary sodium samples	Yes
ANL1442	06/22/1982	5	GAL	DM	Miscellaneous elemental sodium and waste from Analytical Laboratory B-127 glove box	Yes
ANL1443	06/22/1982	2	GAL	CM	Miscellaneous elemental sodium and waste from Analytical Laboratory B-127 glove box	Yes
ANL1444	01/03/1983	5	GAL	CM	EBR-II primary sodium system- 1lb. Na in sand	Yes
ANL1445	01/01/1976	2	GAL	DM	Distilled sodium from analyses of EBR -II primary and secondary sodium samples	Yes
ANL1446	04/04/1974	3	GAL	CM	TREAT - Unknown Na amount/use (small pieces <0.01 m dia. unknown quantity)	Yes
ANL1447	01/03/1983	5	GAL	CM	Misc.glove box waste and approx. 1 pound of Primary Sodium	Yes
ANL1448	12/27/1978	15	GAL	CM	Pipe containing Na scrap from TREAT "R" series experiments	No
ANL1449	04/04/1974	20	GAL	DM	TREAT R-3 series waste Na	Yes
ANL1450	04/01/1974	20	GAL	DM	SODIUM (TREAT) 1 to 3 gal. of sodium	Yes
ANL1451	04/02/1993	30	GAL	DM	Sodium Pot In 30. Gal. Drum.	No
ANL1452	12/02/1994	2	GAL	CM	Elemental Sodium.	Yes
ANL1454	12/27/1978	15	GAL	CM	SODIUM- Pipe containing Na scrap from TREAT "R" series experiments	No
ANL1455	04/01/1974	13	GAL	DM	SODIUM-from TREAT inside a 3-gal can	Yes
ANL1456	10/22/1979	13	GAL	DM	Sodium scrap from TREAT "R" series	Yes

ANL1457	05/08/1992	30	GAL	DM	Waste Na metal from FMF, FASB Na spill cleanup materials and FASB Na-contam. metal parts	Yes
ANL1458	04/04/1974	3	GAL	CM	SODIUM-TREAT Unknown amount/use (small pieces <0.01 m dia. unknown quantity)	Yes
ANL1459	06/05/1974	1	FT3	CW	SODIUM - TREAT sodium scrap; R-2,3,4&5 sodium filters	No
ANL1465	09/28/1990	55	GAL	DM	SODIUM/LAGGING	Yes
ANL1466	09/28/1990	55	GAL	DM	SODIUM/LAGGING	Yes
ANL1467	09/28/1990	55	GAL	DM	SODIUM/ASBESTOS	Yes
ANL1468	11/29/1978	11	FT3	CM	SODIUM - TREAT "R" series sodium scrap - Transfer Tank	No
ANL1469	01/01/1976	16	GAL	CM	SODIUM - EBR-II sodium (in beer keg)	No
ANL1470	05/19/1982	0	FT3	CM	SODIUM - TREAT Scrap sodium in metal pipe	No
ANL1475	01/01/1976	1	GAL	CM	SODIUM - FASB Scrap sodium in paint can	Yes
ANL1476	01/01/1976	2	GAL	DM	SODIUM - EBR-II primary and secondary sample waste	Yes
ANL1480	05/19/1982	19	GAL	CM	SODIUM-TREAT Scrap sodium	Yes
ANL1481	05/01/1974	55	GAL	DM	SODIUM-EBR-II Sample/maintenance sodium in paint cans.	Yes
ANL1482	01/01/1976	55	GAL	DM	SODIUM- TREAT Scrap sodium	Yes
ANL1483	01/01/1976	55	GAL	DM	SODIUM-TREAT Scrap sodium	No
ANL1486	01/01/1976	13	GAL	DM	TREAT R-series waste Sodium	No
ANL1487	10/22/1979	13	GAL	DM	TREAT "R" series Sodium	Yes
ANL1488	10/22/1979	13	GAL	DM	TREAT "R" series Sodium	Yes
ANL1489	12/27/1978	13	GAL	CM	TREAT "R" series experiments Sodium	No
ANL1490	01/01/1976	55	GAL	DM	TREAT R-3 series waste Sodium	Yes
ANL1491	01/01/1976	55	GAL	DM	TREAT R-series experiments Sodium	No
ANL1492	01/01/1976	55	GAL	DM	TREAT R-4 series waste Sodium	Yes
ANL1493	01/01/1976	55	GAL	DM	TREAT R-5 experiment Sodium	No
ANL1494	01/09/1978	55	GAL	DM	SODIUM-TREAT Scrap sodium from R -8 U-tube	No
ANL1495	01/08/1990	3	FT3	CM	SODIUM-EBR-II Scrap sodium in metal container	No
ANL1497	09/04/1980	4	FT3	CM	SODIUM-Secondary Cold Trap	No
ANL1529	03/07/1997	5	GAL	CM	SODIUM - FASB Scrap: Rejected TED, sodium pot	Yes
ANL990101	07/13/1999	2	GAL	CM	Secondary Na Parts from the Sampling Station	Yes
ANL990102	07/13/1999	2	GAL	CM	Secondary Na Parts from the Sampling Station	Yes
ANL990103	09/09/1999	1	GAL	CM	SPF Na Supply Lines to Reaction Vessel	Yes
ANL990104	09/09/1999	2	GAL	CM	Na Filter, Na Supply lines to Reaction Vessel	Yes
ANL990105	09/09/1999	2	GAL	CM	Na Supply lines to SPF Reaction Vessel, Na Filter	Yes
ANL990106	09/09/1999	1	GAL	CM	Secondary Sodium Lines in 1-gal paint can	Yes
ANL990107	09/14/1999	18	GAL	CM	Cut Yard Pipe w/ Secondary Sodium Residual	Yes

ANL990108	09/14/1999	18	GAL	CM	Cut Yard Line w/ residual Secondary Sodium	Yes
ANL990109	09/14/1999	1	GAL	CM	2 Small Metal Pipes w/ Residual Secondary Sodium in 1-gal can	Yes
ANL990118	12/15/1999	5	GAL	CM	Primary Na in Sand	Yes
ANL990119	12/03/1999	128	FT3	CW	4'x4'x8' Box of Na Contaminted ACS Piping	Yes
ANL990120	12/15/1999	1	M3	CW	F1 Nozzle w/ Na Aersol	No
ANL990122	12/15/1999	1	M3	CW	Hex Tube w/ Na Aersol	No
ANL990123	12/16/1999	5	GAL	CM	SPD Na Filled Dip Tube	No
CCT	03/19/2003	270	GAL	CM	SPF Caustic Cooling Tank Residual for Radionuclide Inventory Reporting	Yes
DTA	03/19/2003	0	GAL	CM	SPF Day Tank A Residual for Radionuclide Inventory Reporting	Yes
DTB	03/19/2003	0	GAL	CM	SPF Day Tank B Residual for Radionuclide Inventory Reporting	Yes
INEL10174	06/05/1997	45	GAL	CM	Sodium: Secondary sodium pump	No
INEL10175	06/05/1997	45	GAL	CM	Sodium: Secondary sodium pump	No
INEL10176	11/07/1997	55	GAL	DM	SODIUM - Sodium waste in 10 2-gallon paint cans inside this drum.	No
MFC080147	06/16/2008	300	GAL	IP	Debris and Equipment Contaminated with Sodium - Contact Handled	Yes
MFC090025	02/05/2009	0	M3	DM	Debris and Equipment Contaminated with Sodium - Contact Handled	No
MFC090168	07/24/2009	0	M3	DM	Debris and Equipment Contaminated with Sodium - Contact Handled	Yes
MFC100112	04/12/2010	85	GAL	DM	TREAT R-3 series waste Sodium	No
MFC100113	04/12/2010	85	GAL	DM	Sodium - LLW:EBR-II sodium items from SCMS	No
MFC120095	09/10/2012	85	GAL	DM	Debris and Equipment Contaminated with Sodium - Contact Handled	No
MFC130132	07/08/2013	85	GAL	DM	Debris and Equipment Contaminated with Sodium - Contact Handled	No
SST	03/19/2003	1	GAL	CM	SPF Sodium Storage Tank Residual for Radionuclide Inventory Reporting	Yes
TL	03/20/2003	80	GAL	CM	Debris and Equipment Contaminated with Sodium - Contact Handled	Yes

Comments ANL180CH No Data Available

Quality Record ANL180CH

Screen	Column	Trans. Type	Before Change	After Change	Reason for Change	Inserted By	Insert Date
Process	Generating Process Description	Update	This waste stream was generated at ANL-767, EBR-II Reactor Building during nuclear reactor operations including maintenance activities on control systems.	Sodium contaminated debris from reactor operations; heavy metal, ignitable, and reactive hazards This waste stream was generated at ANL-767, EBR-II Reactor	Update the Generating Process Description first line to meet the Biennial Hazardous Waste Report requirements.	TygerG	11/02/2001

Some maintenance activities in Bldg. 767 involve working on and replacement of sodium wetted equipment associated with the EBR-II cooling systems. If the waste equipment cannot be cleaned of the sodium metal, it is stored in the RSSF or SCMS. Also, the secondary cooling systems at EBR-II occasionally leaked sodium metal. Cleanup operations generated sodium-contaminated wastes. This waste stream was and is generated at ANL-767, EBR-II Reactor and ANL-766, Sodium Boiler Building. Currently, the EBR-II Reactor is undergoing closure. The secondary and primary sodium described in waste stream CH-ANL-506 has been pumped from the systems and treated at SPF. Closure activities will generate sodium containing or contaminated waste as components and piping are removed from these systems, and these will be identified as	Building during nuclear reactor operations including maintenance activities on control systems. Some maintenance activities in Bldg. 767 involve working on and replacement of sodium wetted equipment associated with the EBR-II cooling systems. If the waste equipment cannot be cleaned of the sodium metal, it is stored in the RSSF or SCMS. Also, the secondary cooling systems at EBR-II occasionally leaked sodium metal. Cleanup operations generated sodium-contaminated wastes. This waste stream was and is generated at ANL-767, EBR-II Reactor and ANL-766, Sodium Boiler Building. Currently, the EBR-II Reactor is undergoing closure. The secondary and primary sodium described in waste stream CH-ANL-506 has been pumped from the systems and treated at SPF. Closure activities will generate sodium

			CH-ANL-180. The sodium residual in pipes, components etc. will be treated at Sodium Component Maintenance Shop, Bldg. 793.	containing or contaminated waste as components and piping are removed from these systems, and these will be identified as CH-ANL-180. The sodium residual in pipes, components etc. will be treated at Sodium Component Maintenance Shop, Bldg. 793.			
Process	Generating Process Description	Update	Sodium contaminated debris from reactor operations; heavy metal, ignitable, and reactive hazards This waste stream was generated at ANL-767, EBR-II Reactor Building during nuclear reactor operations including maintenance activities on control systems. Some maintenance activities in Bldg. 767 involve working on and replacement of sodium wetted equipment associated with the EBR-II cooling systems. If the waste equipment cannot be cleaned of the sodium metal, it is stored in the RSSF or SCMS. Also, the secondary cooling systems at EBR-II occasionally	Debris from facility operations; heavy metal, ignitable, and reactive hazards This waste stream was generated at ANL-767, EBR-II Reactor Building during nuclear reactor operations including maintenance activities on control systems. Some maintenance activities in Bldg. 767 involve working on and replacement of sodium wetted equipment associated with the EBR-II cooling systems. If the waste equipment cannot be cleaned of the sodium metal, it is stored in the RSSF or SCMS. Also, the secondary cooling systems at EBR-II occasionally leaked sodium	Update the Generating Process Description first line to meet the Biennial Hazardous Waste Report requirements and update the source code.	TygerG	11/14/2001

			leaked sodium metal. Cleanup operations generated sodium-contaminated wastes. This waste stream was and is generated at ANL-767, EBR-II Reactor and ANL-766, Sodium Boiler Building. Currently, the EBR-II Reactor is undergoing closure. The secondary and primary sodium described in waste stream CH-ANL-506 has been pumped from the systems and treated at SPF. Closure activities will generate sodium containing or contaminated waste as components and piping are removed from these systems, and these will be identified as CH-ANL-180. The sodium residual in pipes, components etc. will be treated at Sodium Component Maintenance Shop, Bldg. 793.	metal. Cleanup operations generated sodium-contaminated wastes. This waste stream was and is generated at ANL-767, EBR-II Reactor and ANL-766, Sodium Boiler Building. Currently, the EBR-II Reactor is undergoing closure. The secondary and primary sodium described in waste stream CH-ANL-506 has been pumped from the systems and treated at SPF. Closure activities will generate sodium containing or contaminated waste as components and piping are removed from these systems, and these will be identified as CH-ANL-180. The sodium residual in pipes, components etc. will be treated at Sodium Component Maintenance Shop, Bldg. 793.			
EPA Codes	EPA Code ID	Insert		D002I	Add D002I for caustic Cooling Tank that has residual NaOH in it in SPF for fissile inventory.	StewartN	03/20/2003
Isotopes-TRU	Isotope	Insert		Am-241	Sodium contaminated with Am-241	TurnageJ	06/04/2003
Isotopes-TRU	Isotope	Insert		Np-237	Sodium contaminated with Np-237	TurnageJ	06/04/2003
Isotopes-Other	Isotope	Insert		U-238	To add U238	StewartN	06/25/2003
Define	Record Status	Update	1	2	Inactivate per Jason Orme	WatersM	12/14/2006
Define	Record Status	Update	2	1	Resuming waste treatment	ZahnT	06/18/2008
Isotopes-TRU	Isotope	Insert		Pu-238	update	AllenRB	07/08/2009
Isotopes-TRU	Isotope	Insert		Pu-240	update	AllenRB	07/08/2009

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Screen	Column	Trans. Type	Before Change	After Change	Reason for Change	Inserted By	Insert Date
Isotopes-TRU	Isotope	Insert		Pu-241	update	AllenRB	07/08/2009
Isotopes-TRU	Isotope	Insert		Pu-242	update	AllenRB	07/08/2009
Isotopes-Other	Isotope	Insert		Eu-154	update	AllenRB	07/08/2009
Composition	Name of Material	Insert		Sodium Contaminated Scrap Metal: 0	update	AllenRB	07/09/2009
Isotopes-TRU (Am-241)	Activity Units	Update	nCi/g	Ci/m3	update	AllenRB	07/10/2009
Isotopes-TRU (Np-237)	Activity Units	Update	nCi/g	Ci/m3	update	AllenRB	07/10/2009
Isotopes-TRU (Pu-238)	Activity Units	Update	nCi/g	Ci/m3	update	AllenRB	07/10/2009
Isotopes-TRU (Pu-239)	Activity Units	Update	nCi/g	Ci/m3	update	AllenRB	07/10/2009
Isotopes-TRU (Pu-240)	Activity Units	Update	nCi/g	Ci/m3	update	AllenRB	07/10/2009
Isotopes-TRU (Pu-241)	Activity Units	Update	nCi/g	Ci/m3	update	AllenRB	07/10/2009
Isotopes-TRU (Pu-242)	Activity Units	Update	nCi/g	Ci/m3	update	AllenRB	07/10/2009
Isotopes-TRU (U-235)	Activity Units	Update	nCi/g	Ci/m3	update	AllenRB	07/10/2009
Isotopes-Other (Ag-110m)	Activity Sample Data	Update		6e-6	update	AllenRB	07/10/2009
Isotopes-Other (Ag-110m)	Activity Sample Data	Update	6.0E-6	6.0E-1	update	AllenRB	07/10/2009
Isotopes-Other (Ag-110m)	Activity Sample Data	Update	0.6	1.	update	AllenRB	07/10/2009
Isotopes-Other (Cs-134)	Activity Sample Data	Update		1	update	AllenRB	07/10/2009
Isotopes-Other (Cs-137)	Activity Sample Data	Update		2	update	AllenRB	07/10/2009
Isotopes-Other (H-3)	Activity Sample Data	Update		10	update	AllenRB	07/10/2009
Isotopes-TRU (Pu-239)	Activity Range to	Update		7e-4	update	AllenRB	07/10/2009
Isotopes-Other (Na-22)	Activity Sample Data	Update		10	update	AllenRB	07/10/2009
Isotopes-Other (Sb-125)	Activity Sample Data	Update		2	update	AllenRB	07/10/2009
Isotopes-Other (Sn-113)	Activity Sample Data	Update		10	update	AllenRB	07/10/2009
Isotopes-Other (Mn-54)	Activity Sample Data	Update		2	update	AllenRB	07/10/2009
Isotopes-Other (Sr-90)	Activity Sample Data	Update		10	update	AllenRB	07/10/2009
Isotopes-Other (Cs-137)	Activity Sample Data	Update	2	10	update	AllenRB	07/10/2009
Isotopes-Other (H-3)	Activity Sample Data	Update	10	100	update	AllenRB	07/10/2009
Isotopes-Other (Na-22)	Activity Sample Data	Update	10	100	update	AllenRB	07/10/2009
Isotopes-Other (Sn-113)	Activity Sample Data	Update	10	100	update	AllenRB	07/10/2009
Isotopes-Other (Co-60)	Activity Sample Data	Update		100	update	AllenRB	07/10/2009
Define	Record Status	Update	2	1	activate the material profile	WinderTA	04/15/2010

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Screen	Column	Trans. Type	Before Change	After Change	Reason for Change	Inserted By	Insert Date
Define	Record Status	Update	2	1	update	JacobsonJ	09/13/2012

Edit Log ANL180CH

Explanation and References

Name/Date/Time	Explanation
IWTS 09/15/2013 00:00:00	Material Profile inactivated on 2013-09-15 due to lack of yearly reapproval.
JacobsonJ 09/13/2012 12:45:31	Material Profile: ANL180CH BEGIN VALIDATION FOR MATERIAL PROFILE ANNUAL REVIEW JACOBSONJ. WGS-BEA. Call Point-7. Authorized on Generating Unit (ANL767). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION EPA CODES PASSED SOURCE CODE/FORM CODE PASSED WASTE DESCRIPTION PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED
jacobsonj 09/13/2012 12:45:24	update
JacobsonJ 09/13/2012 12:45:17	JACOBSONJ. WGS-BEA. Call Point-4. Authorized on Generating Unit (ANL767).
IWTS 04/18/2010 00:00:00	Material Profile inactivated on 2010-04-18 due to lack of yearly reapproval.
winderta 04/15/2010 07:20:21	activate the material profile
WinderTA 04/15/2010 07:20:04	WINDERTA. WGS-BEA. Call Point-4. Authorized on Generating Unit (ANL767).
IWTS 12/13/2009 00:00:00	Material Profile inactivated on 2009-12-13 due to lack of yearly reapproval.
AllenRB 07/10/2009 14:05:28	ALLENRB. WGS. Call Point-4. Authorized on Generating Unit (ANL767).
allenrb 07/10/2009 14:01:36	update
AllenRB 07/10/2009 11:44:01	ALLENRB. WGS. Call Point-4. Authorized on Generating Unit (ANL767).
allenrb 07/10/2009 11:40:13	update nuclide data
AllenRB 07/09/2009 08:15:03	ALLENRB. WGS. Call Point-4. Authorized on Generating Unit (ANL767).
allenrb 07/09/2009 08:11:12	update
AllenRB 07/08/2009 16:08:12	ALLENRB. WGS. Call Point-4. Authorized on Generating Unit (ANL767).
allenrb 07/08/2009 16:04:25	add nuclides
zahnt 06/18/2008 12:33:11	Reactivate
ZahnT 06/18/2008 12:32:56	ZAHNT. MFC. Call Point-4. Authorized on Generating Unit (ANL767).
watersm 12/14/2006 14:36:54	Inactivate per Jason Orme
WatersM 12/14/2006 14:36:50	WATERSM. SITE_ADMIN. Call Point-4. Authorized on Generating Unit (ANL767).
StewartN 06/25/2003 08:26:17	STEWARTN. ANL. Call Point-4. Authorized on Generating Unit (ANL767).

Edit Log ANL180CH

Explanation and References

Name/Date/Time	Explanation
stewartn 06/25/2003 08:26:10	add U238
StewartN 06/05/2003 15:31:01	STEWARTN. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
stewartn 06/05/2003 15:30:42	Remove D002I
TurnageJ 06/04/2003 11:26:58	TURNAGEJ. DATA_ENTRY. Call Point-4. Authorized on Generating Unit (ANL767).
TurnageJ 06/04/2003 11:26:39	Add radionuclides
stewartn 03/20/2003 08:02:43	Add D002I for caustic Cooling Tank that has residual NaOH in it in SPF for fissile inventory.
StewartN 03/20/2003 07:59:36	STEWARTN. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
tygerg 11/14/2001 08:33:48	Update the Generating Process Description first line to meet the Biennial Hazardous Waste Report requirements and update the source code.
TygerG 11/14/2001 08:22:15	TYGERG. WGS. Call Point-4. Authorized on Generating Unit (ANL767).
tygerg 11/02/2001 10:13:06	Update the Generating Process Description first line to meet the Biennial Hazardous Waste Report requirements.
TygerG 11/02/2001 10:02:04	TYGERG. WGS. Call Point-4. Authorized on Generating Unit (ANL767).
GrantR 10/15/2001 12:10:04	BEGIN VALIDATION FOR MATERIAL PROFILE APPROVE GRANTR. ANL. Call Point-7. Authorized on Generating Unit (ANL767). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION SOURCE CODE/FORM CODE PASSED EPA CODES PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED
grantr 10/15/2001 11:57:55	Text changes in General Information - 7. Generating process description; marking "no" on 16a.; removinglead from list on Characteristics , line 2.d. since the waste will not be incinerated.
GrantR 10/15/2001 11:51:45	GRANTR. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
StewartN 08/17/2001 10:53:30	BEGIN VALIDATION FOR MATERIAL PROFILE REVIEW STEWARTN. ANL. Call Point-6. Authorized on Generating Unit (ANL767). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION SOURCE CODE/FORM CODE PASSED EPA CODES PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED

Edit Log ANL180CH

Explanation and References

Name/Date/Time	Explanation
StewartN 08/17/2001 10:53:23	BEGIN VALIDATION FOR MATERIAL PROFILE CERTIFY STEWARTN. ANL. Call Point-5. Authorized on Generating Unit (ANL767). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION SOURCE CODE/FORM CODE PASSED EPA CODES PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED
stewartn 08/17/2001 10:47:05	update
StewartN 08/17/2001 10:46:19	STEWARTN. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
WatsonR 07/05/2001 15:36:33	WATSONR. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
watsonr 07/05/2001 15:35:36	Clear approval screen.
stewartn 05/21/2001 16:06:59	add radionuclides
stewartn 05/21/2001 16:05:06	STEWARTN. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
stewartn 04/18/2001 15:52:44	Update source and form codes for the biennial report.
stewartn 04/18/2001 15:51:48	STEWARTN. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
stewartn 06/21/2000 10:21:04	add Ba-137m & Y-90
stewartn 06/21/2000 10:20:55	STEWARTN. wgs. Call Point-4. Authorized on Generating Unit (ANL767).
grantr 07/07/1999 11:25:24	five yr forecast and general check
grantr 07/07/1999 11:25:00	GRANTR. generator. Call Point-4. Authorized on Generating Unit (ANL767). Overall Authorization Passed.
StewartNA 10/13/1998 13:10:37	STEWARTNA. GI. Call Point-5. Authorized on Unit. Authorized on Action. Overall Authorization Passed.
StewartNA 10/13/1998 13:10:33	STEWARTNA. GI. Call Point-6. Authorized on Unit. Authorized on Action. Overall Authorization Passed.
StewartNA 10/13/1998 13:10:27	NAS didn't finish approval process. Database moved to ANL180RH in Radionuclide section? Approval to allow container transfers from 793 to 797.
StewartNA 10/13/1998 13:09:03	STEWARTNA. GI. Call Point-4. Authorized on Unit. Authorized on Action. Overall Authorization Passed.
StewartNA 10/13/1998 12:37:18	NAS is reviewing and updating profile to approve and certify the information to allow container transfers from SCMS - 793 to RSSF - 797.
StewartNA 10/13/1998 12:36:01	STEWARTNA. GI. Call Point-4. Authorized on Unit. Authorized on Action. Overall Authorization Passed.
GarciaJ 04/09/1998 06:52:05	GARCIAJ. SITE_ADMIN. Authorized.
GarciaJ 04/09/1998 06:51:53	GARCIAJ. SITE_ADMIN. Authorized.
ThiesenTJ 02/17/1998 11:51:33	THIESENTJ. GENERATOR. Call Point-2. Authorized on Unit. Authorized on Action.
ThiesenTJ 02/17/1998 11:51:30	THIESENTJ. GENERATOR. Call Point-3. Authorized on Unit. Authorized on Action.

Integrated Waste Tracking System Material Profile

Information Only

Material Profile Define ANL182CH

Material Profile No.:	ANL182CH
Profile Date:	2/16/1998 3:59:11 PM
Name of Waste or Material:	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy
Site Treatment Plan ID:	CH-ANL-182 SODIUM POTASSIUM NaK
Generating Unit (e.g. Building or Process):	MFC-767 : MFC 767 EBR-II Reactor Plant Building
Material or Waste Type and Action:	MLLW: CH, to be treated at the SCMS

Record Status:	Inactive	**Record Lock Parameters:**	04/09/1998 06:53:38	GarciaJ
		Insert Parameters:	02/16/1998 15:57:56	ThiesenTJ

Inactivation allows a record to remain selectable for historical profiles prior to the inactivation date. The inactivation data defaults to the date/time of inactivation, but can be changed to a user defined date/time. A canceled record will not be selectable by past, present, or future records. After a record is cancelled, a historical profile may continue to reference it, but any attempt to update the reference will require a new selection.

Integrated Waste Tracking System Material Profile

Information Only

Certification, Review & Approval ANL182CH

Certified	Name: Nancy Stewart Date: 08/17/2001 Phone: 2085337399 Fax: 2085337376 E-Mail Nancy.Stewart@inl.gov	A waste determination process for this waste stream has been performed. Characterization data was derived by approved analytical methods or process knowledge information and any data limitations have been documented. Legally and scientifically defensible data was used for characterization whenever possible. The required data provided in this Material & Waste Characterization Profile is complete and accurate based on the analytical data or process knowledge information used for characterization.
Reviewed	Name: Nancy Stewart Date: 08/17/2001 Phone: 2085337399 Fax: 2085337376 E-Mail Nancy.Stewart@inl.gov	A review of the Material and Waste Characterization Profile has shown that a waste determination was performed and that the required profile data is complete and accurate based on the analytical data or process knowledge information provided. The characterization data is sufficient to justify an approval or disapproval for the material or waste to be offered for disposition.
Approved	Name: Roy Grant Date: 10/15/2001 Phone: 2088812611 Fax: E-Mail rpgrant@energysolutions.com	The Material and Waste Characterization Profile characterization data meets the INL RRWAC (or a contracted Off-Site Vendors acceptance criteria) for the associated material or waste type and action. A regulatory based disposition is identified for the material or waste defined by this profile. Independent review was performed and comments from the review addressed. Approval to offer this material or waste for disposition is granted.

Last Profile Update and Approval ANL182CH

Update/Approvals	Name: Date: Phone: Fax: E-Mail	

	First Name	Last Name	Phone	Fax	E-Mail	Mail Stop
Generator Contact:	Nancy	Stewart	2085337399	2085337376	Nancy.Stewart@inl.gov	6000
Technical Contact:	Roy	Grant	2088812611		rpgrant@energysolutions.com	
Charge No:						

Material Profile Rejection Log ANL182CH

User	Date	Process Rejected	Comments
watsonr	07/05/2001	Approval	clear approval screen.

Revision History ANL182CH

Char_id	Profile Name	Profile Date	Record Status
ANL182CH	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy	02/16/1998	Inactive

Material Profile Process ANL182CH

1. Yes Will material and waste characterization be fully capable of complying with applicable Waste Acceptance Criteria?

   a. Waste Acceptance Criteria requirements not met (list each):

   b. Receiving organization approval letter number for nonstandard material or waste:

2. **Waste Generated from:** Routine Operations | **Cleanup/Stabilization Activity:** | **Generating Status:** On-going

   Is this secondary waste?

3. **Generating Process description (describe the process and/or operations generating material, be specific):**

   Liquid waste from reactor maintenance; heavy metal, ignitable and reactive hazards.

   This waste stream was generated at ANL-767, EBR-II Reactor Building during routine maintenance activities on control systems. Specifically, spent cold traps and bubble pots had auxilliary cooling systems that circulated NaK as a heat exchange (cooling) medium. The traps and pots were designed to remove impurities in the argon cover gas system of the EBR-II. During Plant Closure Project activities NaK containing waste is being generated and entered into the container IWTS. D001 waste number is included in the event that one item has sodium contamination with NaK in a separate tube/container. Chromium has been detected in containers holding Nak, so a D007 waste code has been added.

4. **Physical state at 70 degrees F:** liquid

5. Yes **Does material contain free liquids?**

6. Yes **Current waste minimization plan?** **Reference:** W0001-1005-OP-03

Special Characteristic ANL182CH

Characteristic
Debris - RCRA

Integrated Waste Tracking System Material Profile

Information Only

Characterization Requirements ANL182CH

1. Yes **Is this DOT regulated hazardous material ?**

   If yes, identify DOT primary hazard: Class 4, Class 7 **and DOT subsidiary hazard(s):** 4.2 Spontaneously Combustible

2. Yes **At the point of generation did this material contain any RCRA "F", "K", "U", or "P" Listed waste either in pure form, as a mixture, or as a treatment residue (i.e., ash, leachate, spill cleanup), or "D" Characteristic waste?**

   Waste Description:

   Source Code: G13 Other Intermittent Events or Processes: Cleaning out process equipment

   Source Code Comments:

   Form Code: W119 Inorganic Liquids: Other inorganic liquid

   Form Code Comments:

3. **RCRA hazardous waste determination was made by:** Both

4. No **Does this Material Profile contain Lab Packs?**

5. Yes **Was an Underlying Hazardous Constituent (UHC) determination performed?**

   Yes **If a UHC determination was performed, were any detected in concentrations exceeding the Universal Treatment Standards? List on UHC Screen.**

6. Yes **Is supporting documentation submitted? If yes, list:**

   Sample record s are maintained in the Facility Operating Record. Analytical Sample Record # 082372 shows the chromium level in Container ANL010212.

7. No **Additional narrative:**

8. **Is the material LDR Compliant?**

Generation Active Estimates ANL182CH

Estimate Date	Start Date	End Date	Vol Qty	Vol Units	Mass Qty	Mass Units	Data Entered By	Active	Estimate Type	Inactivated By	Inactivated Date
08/17/2001	01/01/2001	12/31/2001	0.21	M3	182	KG	StewartN	Yes	CY		
08/17/2001	01/01/2002	12/31/2002	0.15	M3	91	KG	StewartN	Yes	CY		
08/17/2001	01/01/2003	12/31/2003	0	M3	0	KG	StewartN	Yes	CY		
08/17/2001	01/01/2004	12/31/2004	0	M3	0	KG	StewartN	Yes	CY		
08/17/2001	01/01/2005	12/31/2005	0	M3	0	KG	StewartN	Yes	CY		
08/17/2001	01/01/2006	12/31/2006	0	M3	0	KG	StewartN	Yes	CY		

Generation Inactive Estimates ANL182CH

Estimate Date	Start Date	End Date	Vol Qty	Vol Units	Mass Qty	Mass Units	Data Entered By	Active	Est Type	Inactivated By	Date
02/16/1998	01/01/1998	12/31/1998	1.25	M3	4	KG	ThiesenTJ	No	CY	grantr	07/07/1999
05/24/1999	01/01/1999	12/31/1999	0.344	M3	700	LBS	StewartNA	No	CY	grantr	07/07/1999
07/07/1999	01/01/2000	12/31/2000	0.21	M3	182	KG	grantr	No	CY	grantr	10/15/2001
07/07/1999	01/01/2001	12/31/2001	0.21	M3	182	KG	grantr	No	CY	grantr	10/15/2001
05/24/1999	01/01/2000	12/31/2000	0.344	M3	700	LBS	IWTS	No	CY		
05/24/1999	01/01/2001	12/31/2001	0.344	M3	700	LBS	IWTS	No	CY		
05/24/1999	01/01/2002	12/31/2002	0.344	M3	700	LBS	IWTS	No	CY		
05/24/1999	01/01/2003	12/31/2003	0.344	M3	700	LBS	IWTS	No	CY		

Layers ANL182CH

Layer or Phase	Physical State at 70 F	Range of Percentage From	To	Units	Color
1	liquid	100	100	wt%	gray/silver

Physical Characteristics ANL182CH

1. Density of material or waste (may not be required for hazardous waste and recyclable material):

Liquid: 0.847 **To:** **g/ml** **Solid:** **To:**

2. No **Is this aqueous waste? If yes, give total solids range:**

From: **To:** **g/ml**

3. No **Is this incinerable liquid? If yes, give viscosity range:**

From: **To:** **SSU**

Physical Composition ANL182CH

Char. No.	Related Characteristic (Use *Other* Where NA)	Name of Material	Carcinogen	Composition Range From	To	Units
0	*Other*	Alloy Steels	No	25	50	wt%
0	*Other*	Mild Steel	No	25	50	wt%
7	Air reactives	Sodium Potassium Alloy (NaK)	No	25	50	wt%
8	Water reactives	Sodium Potassium Alloy (NaK)	No	25	50	wt%

Integrated Waste Tracking System Material Profile

Information Only

Flash Point, Incinerable Properties, and RCRA ANL182CH

1. No Is flash point applicable? If yes, complete the following:

Flash Point: To: Method used:

(Specify Other):

2. Information for incinerable waste only:

a. Heat of combustion: To: BTU/lb

b. Ash content: To: wt%

c. Total halogen content: To: ppm

d. Water content: To: wt%

e. Suspended particulates content: To: ppm

3. No Was a RCRA Waste analysis performed? If yes, enter data using "EPA Codes" screen.

4. Were the sampling and analysis protocols used in full compliance with SW-846 protocol or other equivalent regulatory agency approved methods?

EPA Codes ANL182CH

Hazardous Constituents

EPA Code ID	TCLP Value	Type of Analysis	Expected Range From	Expected Range To	Expected Range Units	Representative Sample From	Representative Sample To	Representative Sample Units	Detection Limit Limit	Detection Limit Units
D001G	No	Process Knowledge								
Ignitable Ignitable characteristic wastes, that are managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.										
D003F	No	Process Knowledge								
Reactive Water reactives based on 261.23(a)(2),(3), and (4)										
D007A	Yes	Both	0	543	ppm	0	543	ppm		
Chromium Chromium (Total)										

Underlying Hazardous Constituents ANL182CH

CAS	TCLP Value	Type of Analysis	Expected Range From	Expected Range To	Expected Range Units	Representative Sample From	Representative Sample To	Representative Sample Units	Detection Limit Limit	Detection Limit Units
7440-02-0	No	Approved Methods	0	338	ppm	0	199	ppm		
Nickel										

Chemical Composition ANL182CH No Data Available

Radiological Characteristics ANL182CH

1. Y **Is fissile material present?** **Is fissile material >=.04 g/kg, waste matrix group is:**

2. **Total transuranic activity per gram of waste is:**

   Y **<= 10 nCi/g (LLW)**

   > 10 nCi/g and <= 100 nCi/g (alpha LLW)

   > 100 nCi/g (TRU)

3. **Expected radiation dose rate:**

at contact of waste package(s)	0.1	**to**	500	**mrem/hr**
at 30cm from waste package(s)		**to**		**mrem/hr**
at 1-meter from waste package(s)	0.1	**to**	100	**mrem/hr**

4. N **Is the waste greater than Class C as defined in 10 CFR 61.55?**

Isotopes - TRU U233, U-235 ANL182CH

Isotope	Activity Range or Sample Data					Fissionable Material Range or Sample Data			
	From	To	Sample	Units		From	To	Sample	Units
Pu-239				nCi/g					g/ft3
U-235				nCi/g					g/ft3

Isotopes - Other ANL182CH

	Activity Range or Sample Data			
Isotope	From	To	Sample	Units
Ag-110m				nCi/g
Au-198				nCi/g
Ba-140				nCi/g
Co-58				nCi/g
Co-60				nCi/g
Cr-51				nCi/g
Cs-134				nCi/g
Cs-137				nCi/g
Fe-59				nCi/g
H-3				nCi/g
I-131				nCi/g
In-113m				nCi/g
La-140				nCi/g
Mn-54				nCi/g
Na-22				nCi/g
Nb-95				nCi/g
Po-210				nCi/g
Sb-124				nCi/g
Sb-125				nCi/g
Sn-113				nCi/g
Sn-117m				nCi/g
Sr-89				nCi/g
Sr-90				nCi/g
Te-132				nCi/g

Containers ANL182CH

Container Barcode	Container Date	Size	Container Units	Type	Common Name of Materials	Decommissioned
16931K	11/06/1997	0	M3	DM	SODIUM POTASSIUM - NaK containing or contaminated components from EBR-II	No
16934K	11/06/1997	8	GAL	CM	SODIUM POTASSIUM - NaK-Cold finger	No
16960K	11/17/1997	1	M3	CM	SODIUM POTASSIUM - NaK	Yes
23376P	05/26/1999	55	GAL	DM	Primary sodium system Na/NaK Heat Exchanger	No
23377P	05/26/1999	0	M3	DM	Secondary Sodium Storage Tank Level Probe with sodium contamination and NaK tubing	Yes
ANL010041	01/24/2001	1	GAL	CM	NaK Cleanup from 789 Crucible Melter Project	No
ANL010042	01/24/2001	1	GAL	CM	NaK Cleanup from 789 Crucible Melter Project	No
ANL010043	01/24/2001	1	GAL	CM	NaK Cleanup from 789 Crucible Melter Project	No
ANL010044	01/24/2001	1	GAL	CM	NaK Cleanup from 789 Crucible Melter Project	No
ANL010094	04/03/2001	120	GAL	CM	EBR-II Primary Purification System NaK	No
ANL010095	04/03/2001	120	GAL	CM	EBR-II Primary Purification System NaK	No
ANL010212	05/24/2001	30	GAL	CM	30-gal MSA Container w/ NaK	No
ANL010213	05/24/2001	55	GAL	DM	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy	No
ANL010214	05/24/2001	1	L	CM	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy	No
ANL010215	05/24/2001	5	GAL	CM	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy - NaK Covered w/ Sand	No
ANL010216	05/24/2001	3	GAL	CM	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy - NaK/Sand Nak Oxidized	No
ANL010223	06/26/2001	1	GAL	CM	NaK Tubing from Treatment of Secondary Na Level Probe	No
ANL010225	07/16/2001	1	GAL	CM	NaK Fitting	No
ANL010226	07/16/2001	5	GAL	CM	2-gal can of NaK packed in soda ash inside a 5-gal can	No
ANL010227	07/16/2001	10	GAL	CM	2-gal can of NaK packed in soda ash inside a 10-gal can	No
ANL010228	07/16/2001	5	GAL	CM	1-gal can of Nak packed in soda ash inside a 5-gal can	No
ANL010236	07/30/2001	3	GAL	CM	1-gal can with Sodium-Potassium (NaK) Alloy/Soda Ash	No
ANL1498	11/22/1974	4	FT3	CM	NaK Bubble Pot	No
ANL1499	11/22/1974	4	FT3	CM	NaK Bubble Pot	No
ANL1500	01/08/1990	0	FT3	CM	Sodium Potassium Alloy (NaK)	Yes
ANL990124	12/16/1999	113	GAL	CW	NaK Filled Pressure Transmitters	Yes
MFC090161	07/23/2009	0	M3	DM	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy	No

Comments ANL182CH No Data Available

Screen	Column	Trans. Type	Before Change	After Change	Reason for Change	Inserted By	Insert Date
Process	Generating Process Description	Update	This waste stream was generated at ANL-767, EBR-II Reactor Building during routine maintenance activities on control systems. Specifically, spent cold traps and bubble pots had auxilliary cooling systems that circulated NaK as a heat exchange (cooling) medium. The traps and pots were designed to remove impurities in the argon cover gas system of the EBR-II. During Plant Closure Project activities NaK containing waste is being generated and entered into the container IWTS. D001 waste number is included in the event that one item has sodium contamination with NaK in a separate tube/container. Chromium has been detected in containers holding Nak, so a D007 waste code has been added.	Sodium-Potassium liquid from reactor maintenance; heavy metal, ignitable and reactive hazards. This waste stream was generated at ANL-767, EBR-II Reactor Building during routine maintenance activities on control systems. Specifically, spent cold traps and bubble pots had auxilliary cooling systems that circulated NaK as a heat exchange (cooling) medium. The traps and pots were designed to remove impurities in the argon cover gas system of the EBR-II. During Plant Closure Project activities NaK containing waste is being generated and entered into the container IWTS. D001 waste number is included in the event that one item has sodium contamination with NaK in a separate tube/container. Chromium has been detected in containers holding Nak, so a D007 waste code has been added.	Update the Generating Process Description first line to meet the Biennial Hazardous Waste Report requirements.	TygerG	11/02/2001

Integrated Waste Tracking System Material Profile

Information Only

Screen	Column	Trans. Type	Before Change	After Change	Reason for Change	Inserted By	Insert Date
Process	Generating Process Description	Update	Sodium-Potassium liquid from reactor maintenance; heavy metal, ignitable and reactive hazards. This waste stream was generated at ANL-767, EBR-II Reactor Building during routine maintenance activities on control systems. Specifically, spent cold traps and bubble pots had auxilliary cooling systems that circulated NaK as a heat exchange (cooling) medium. The traps and pots were designed to remove impurities in the argon cover gas system of the EBR-II. During Plant Closure Project activities NaK containing waste is being generated and entered into the container IWTS. D001 waste number is included in the event that one item has sodium contamination with NaK in a separate tube/container. Chromium has been detected in containers holding Nak, so a D007 waste code has been added.	Liquid waste from reactor maintenance; heavy metal, ignitable and reactive hazards. This waste stream was generated at ANL-767, EBR-II Reactor Building during routine maintenance activities on control systems. Specifically, spent cold traps and bubble pots had auxilliary cooling systems that circulated NaK as a heat exchange (cooling) medium. The traps and pots were designed to remove impurities in the argon cover gas system of the EBR-II. During Plant Closure Project activities NaK containing waste is being generated and entered into the container IWTS. D001 waste number is included in the event that one item has sodium contamination with NaK in a separate tube/container. Chromium has been detected in containers holding Nak, so a D007 waste code has been added.	Provide more generic descripiton of the waste	TygerG	12/11/2001

Quality Record ANL182CH

Screen	Column	Trans. Type	Before Change	After Change	Reason for Change	Inserted By	Insert Date
Char. Req.	Source Code	Update	G15	G13	Change source code to reflect liquid.	TygerG	12/12/2001
Char. Req.	Form Code	Update	W307	W119	NaK is liquid not a solid.	StewartN	12/12/2001
Define	Record Status	Update	1	2	Inactivate per Jason Orme	WatersM	12/14/2006
Define	Record Status	Update	2	1	Unlocked to re-activate per request from Roy Grant. MFC personnel have been treating mixed waste assigned to the Sodium Components Maintenance Shop STP Backlog. During the container opening, sorting and treatment process, some waste is segregated	TallmanR	07/28/2009

Edit Log ANL182CH

Explanation and References

Name/Date/Time	Explanation
IWTS 12/13/2009 00:00:00	Material Profile inactivated on 2009-12-13 due to lack of yearly reapproval.
tallmanr 07/28/2009 11:49:53	Unlocked to re-activate per request from Roy Grant. MFC personnel have been treating mixed waste assigned to the Sodium Components Maintenance Shop STP Backlog. During the container opening, sorting and treatment process, some waste is segregated for future treatment as it does not fit into the current treatment methods or system. When this happens, the remaining waste is placed into containers with new IWTS barcodes and placed into the appropriate Material Profile. Recently, two container were partially treated and the remaining contents should be placed in Material Profiles that are inactive. I am requesting that IWTS Material Profiles ANL180RH and ANL182CH be reactivated so we can place the newly barcoded containers in those profiles. This will allow the STP treatment status queries to pick up the proper volume changes for the quarterly reports. Please call me at 6-9559 if you have questions. Roy
TallmanR 07/28/2009 11:49:41	TALLMANR. SITE_ADMIN. Call Point-4. Authorized on Generating Unit (ANL767).
watersm 12/14/2006 14:37:37	Inactivate per Jason Orme
WatersM 12/14/2006 14:37:30	WATERSM. SITE_ADMIN. Call Point-4. Authorized on Generating Unit (ANL767).
tygerg 12/12/2001 09:34:03	Change source code to reflect liquid
StewartN 12/12/2001 09:31:16	STEWARTN. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
stewartn 12/12/2001 09:29:48	Correct source and form codes to represent NaK as a liquid.
TygerG 12/12/2001 09:21:07	TYGERG. WGS. Call Point-4. Authorized on Generating Unit (ANL767).
tygerg 12/11/2001 13:45:49	Revise description to be more generic
TygerG 12/11/2001 13:32:58	TYGERG. WGS. Call Point-4. Authorized on Generating Unit (ANL767).
tygerg 11/02/2001 10:16:00	Update the Generating Process Description first line to meet the Biennial Hazardous Waste Report requirements.
TygerG 11/02/2001 10:04:59	TYGERG. WGS. Call Point-4. Authorized on Generating Unit (ANL767).

Edit Log ANL182CH

Explanation and References

Name/Date/Time	Explanation
GrantR 10/15/2001 16:24:34	BEGIN VALIDATION FOR MATERIAL PROFILE APPROVE GRANTR. ANL. Call Point-7. Authorized on Generating Unit (ANL767). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION SOURCE CODE/FORM CODE PASSED EPA CODES PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED
grantr 10/15/2001 16:11:34	Adding DOO7 code and associated profile update information.
GrantR 10/15/2001 16:09:09	GRANTR. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
StewartN 08/17/2001 10:45:22	BEGIN VALIDATION FOR MATERIAL PROFILE REVIEW STEWARTN. ANL. Call Point-6. Authorized on Generating Unit (ANL767). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION SOURCE CODE/FORM CODE PASSED EPA CODES PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED
StewartN 08/17/2001 10:45:16	BEGIN VALIDATION FOR MATERIAL PROFILE CERTIFY STEWARTN. ANL. Call Point-5. Authorized on Generating Unit (ANL767). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION SOURCE CODE/FORM CODE PASSED EPA CODES PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED

Explanation and References

Name/Date/Time	Explanation
StewartN 08/17/2001 10:43:32	BEGIN VALIDATION FOR MATERIAL PROFILE CERTIFY STEWARTN. ANL. Call Point-5. Authorized on Generating Unit (ANL767). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION SOURCE CODE/FORM CODE PASSED EPA CODES PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION COMPOSITION FAILED: The following Chemical Characteristics must be listed on the Composition screen: Water reactives OVERALL VALIDATION FAILED
stewartn 08/17/2001 10:35:13	update
StewartN 08/17/2001 10:34:41	STEWARTN. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
WatsonR 07/05/2001 15:44:21	WATSONR. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
watsonr 07/05/2001 15:43:21	Clear approval screen.
stewartn 04/19/2001 10:50:10	Update source and form codes for biennial report.
stewartn 04/19/2001 10:49:12	STEWARTN. ANL. Call Point-4. Authorized on Generating Unit (ANL767).
grantr 07/07/1999 13:29:23	5 yr forecast
grantr 07/07/1999 13:29:04	GRANTR. generator. Call Point-4. Authorized on Generating Unit (ANL767). Overall Authorization Passed.
StewartNA 05/24/1999 15:50:53	change physical state to liquid
StewartNA 05/24/1999 15:50:33	STEWARTNA. GI. Call Point-4. Authorized on Unit. Authorized on Action. Overall Authorization Passed.
StewartNA 05/11/1999 09:24:15	STEWARTNA. GI. Call Point-5. Authorized on Unit. Authorized on Action. Overall Authorization Passed.
StewartNA 05/11/1999 09:24:11	STEWARTNA. GI. Call Point-6. Authorized on Unit. Authorized on Action. Overall Authorization Passed.
StewartNA 05/11/1999 09:24:01	verification of data
StewartNA 05/11/1999 09:23:36	STEWARTNA. GI. Call Point-4. Authorized on Unit. Authorized on Action. Overall Authorization Passed.
StewartNA 02/17/1999 15:48:06	
StewartNA 02/17/1999 15:47:30	STEWARTNA. GI. Call Point-4. Authorized on Unit. Authorized on Action. Overall Authorization Passed.
GarciaJ 04/09/1998 06:53:37	GARCIAJ. SITE_ADMIN. Authorized.
GarciaJ 04/09/1998 06:53:20	GARCIAJ. SITE_ADMIN. Authorized.
ThiesenTJ 02/17/1998 11:52:01	THIESENTJ. GENERATOR. Call Point-2. Authorized on Unit. Authorized on Action.
ThiesenTJ 02/17/1998 11:51:59	THIESENTJ. GENERATOR. Call Point-3. Authorized on Unit. Authorized on Action.

Integrated Waste Tracking System Material Profile

Information Only

Material Profile Define 4807N.R2

Material Profile No.: 4807N.R2

Profile Date: 7/12/2011 8:33:17 AM

Name of Waste or Material: Site-Wide RCRA Characteristic Metal Debris

Site Treatment Plan ID: ID-INL-1YR MLLW RCRA waste in storage < 1yr

Generating Unit (e.g. Building or Process): MFC : MFC Generation area

Material or Waste Type and Action: Mixed Low Level Waste: Contact Handled

Record Status: Active

Record Lock Parameters: 07/12/2011 10:50:01 jacobsonj

Insert Parameters: 07/12/2011 08:33:17 JacobsonJ

Inactivation allows a record to remain selectable for historical profiles prior to the inactivation date. The inactivation data defaults to the date/time of inactivation, but can be changed to a user defined date/time. A canceled record will not be selectable by past, present, or future records. After a record is cancelled, a historical profile may continue to reference it, but any attempt to update the reference will require a new selection.

Integrated Waste Tracking System Material Profile

Information Only

Certification, Review & Approval 4807N.R2

Certified	Name: Jonathan Jacobson Date: 07/12/2011 Phone: 2085337057 Fax: E-Mail jonathan.jacobson@inl.gov	A waste determination process for this waste stream has been performed. Characterization data was derived by approved analytical methods or process knowledge information and any data limitations have been documented. Legally and scientifically defensible data was used for characterization whenever possible. The required data provided in this Material & Waste Characterization Profile is complete and accurate based on the analytical data or process knowledge information used for characterization.
Reviewed	Name: Ann OHagan Date: 07/14/2011 Phone: 2085338060 Fax: E-Mail Ann.Ohagan@inl.gov	An independent review of the Material and Waste Characterization Profile has shown that a waste determination was performed and that the required profile data is complete and accurate based on the analytical data or process knowledge information provided. All comments from this review have been addressed. The characterization data is sufficient to justify an approval or disapproval for the material or waste to be offered for disposition.
Approved	Name: Charlyss D Lee Date: 07/14/2011 Phone: 2085337616 Fax: 2085337689 E-Mail Charlyss.Lee@inl.gov	The Material and Waste Characterization Profile has been certified and independently reviewed. A regulatory based disposition path has been identified for the material defined by this profile. Approval to offer this material or waste for disposition is granted.

Last Profile Update and Approval 4807N.R2

Update/Approvals	Name: Aaron Winder Date: 08/01/2013 Phone: 2085337973 Fax: E-Mail Aaron.Winder@inl.gov	Waste defined by this Material and Waste Characterization Profile is currently being generated. An update and approval (as defined by the original approval statement) of this profile has been performed per the annual approval requirement established in the IWAC.

	First Name	Last Name	Phone	Fax	E-Mail	Mail Stop
Generator Contact:	INL	BEA	2085261361		Donald.Darrington@inl.gov	1310
Technical Contact:	Jonathan	Jacobson	2085337057		jonathan.jacobson@inl.gov	
Charge No:	1018563WG					

Material Profile Rejection Log 4807N.R2 No Data Available

Revision History 4807N.R2

Char_id	Profile Name	Profile Date	Record Status
4807N	Site-Wide RCRA Characteristic Metal Debris	11/07/2005	Inactive
4807N.R1	Site-Wide RCRA Characteristic Metal Debris	09/28/2009	Inactive
4807N.R2	Site-Wide RCRA Characteristic Metal Debris	07/12/2011	Active

Material Profile Process 4807N.R2

1. Yes **Will material and waste characterization be fully capable of complying with applicable Waste Acceptance Criteria?**

   a. **Waste Acceptance Criteria requirements not met (list each):**

   b. **Receiving organization approval letter number for nonstandard material or waste:**

2. **Waste Generated from:** Routine Operations

   Cleanup/Stabilization Activity:

   Generating Status: On-going

   Is this secondary waste?

3. **Generating Process description (describe the process and/or operations generating material, be specific):**

   Site-Wide RCRA Characteristic Metal Debris, accumulated from routine facility maintenance (i.e. paint chips, brass fittings, elemental lead, circuit boards, light bulbs, asbestos, batteries, etc.).

   TSCA regulated site-wide characteristic metal debris may or may not apply on individual containers.

   Also to include site-wide routine accumulated/generated facility hot cell waste contaminated with RCRA metals from maintenance/cleanup/ refurbishment/ modifications/etc. [i.e. blotter paper/terri towels/etc., poly/plastic/herculite/etc., misc. ppe, misc. decon materials (mop heads/rags/etc), misc. metal scrap, filters, etc.].

4. **Physical state at 70 degrees F:** solid

5. No **Does material contain free liquids?**

6. Yes **Current waste minimization plan?** **Reference:** DOE/ID-10333

Special Characteristic 4807N.R2

Characteristic
Debris - RCRA
Nonfriable asbestos
PCB >= 50 ppm
Scrap Metal
Soil
Spill cleanup

Integrated Waste Tracking System Material Profile

Information Only

Characterization Requirements 4807N.R2

1. Yes **Is this DOT regulated hazardous material ?**

   If yes, identify DOT primary hazard: Class 7 **and DOT subsidiary hazard(s):**

2. Yes **At the point of generation did this material contain any RCRA "F", "K", "U", or "P" Listed waste either in pure form, as a mixture, or as a treatment residue (i.e., ash, leachate, spill cleanup), or "D" Characteristic waste?**

   Waste Description: Solid waste from operations, maintenance or cleanup

   Source Code: G13 Other Intermittent Events or Processes: Cleaning out process equipment

   Source Code Comments:

   Form Code: W002 Mixed Media/Debris/Devices: Contaminated debris: paper/clothing/rags/wood, empty containers, glass/piping/other solids

   Form Code Comments:

3. **RCRA hazardous waste determination was made by:** Both

4. No **Does this Material Profile contain Lab Packs?**

5. Yes **Was an Underlying Hazardous Constituent (UHC) determination performed?**

   No **If a UHC determination was performed, were any detected in concentrations exceeding the Universal Treatment Standards? List on UHC Screen.**

6. Yes **Is supporting documentation submitted? If yes, list:**

   WDDF, container specific ECARs included in WGS files.

7. No **Additional narrative:**

8. No **Is the material LDR Compliant?**

Generation Active Estimates 4807N.R2

Estimate Date	Start Date	End Date	Vol Qty	Vol Units	Mass Qty	Mass Units	Data Entered By	Active	Estimate Type	Inactivated By	Inactivated Date
08/01/2013	08/01/2013	12/31/2013	5000	FT3			WinderTA	Yes	CY		

Generation Inactive Estimates 4807N.R2 No Data Available

Layers 4807N.R2

Layer or Phase	Physical State at 70 F	Range of Percentage From	Range of Percentage To	Units	Color
1	solid		100	wt%	misc

Integrated Waste Tracking System Material Profile

Information Only

Physical Characteristics 4807N.R2

1. **Density of material or waste (may not be required for hazardous waste and recyclable material):**

Liquid: **To:** **g/ml** **Solid:** 0.5 **To:** 900 lbs/cf

2. No **Is this aqueous waste? If yes, give total solids range:**

From: **To:** **g/ml**

3. No **Is this incinerable liquid? If yes, give viscosity range:**

From: **To:** **SSU**

Physical Composition 4807N.R2

Char. No.	Related Characteristic (Use *Other* Where NA)	Name of Material	Carcinogen	Composition Range From/To/Units		
0	*Other*	Batteries: drained lead acid, nickel cadmium, lithium ion and other dry cell.	No	0	10	wt%
0	*Other*	Crushed and whole light bulbs: Mercury vapor, sodium vapor, HID, etc.	No	0	100	wt%
0	*Other*	Electrical components: balances, scanners, circuit boards, etc.	No	0	100	wt%
0	*Other*	Lead bricks, plugs, pigs, sheet, shot, scrap, blankets, etc.	No	0	100	wt%
0	*Other*	Metal structural debris and misc scrap metal pieces.	No	0	100	wt%
0	*Other*	Metal structural debris with circuit boards, brass valves/fittings, etc.	No	0	100	wt%
0	*Other*	Misc PPE (gloves, rubber boots, tyvek, etc), poly, paper, plastic, wood debris	No	0	100	wt%
0	*Other*	Misc PPE, poly, paper, plastic, paint chips, etc	No	0	49	wt%
0	*Other*	Misc. RCRA Scrap Metal: brass, brass w/copper, copper with solder, Wire, etc.	No	0	100	wt%
0	*Other*	Plastic structural debris with curcuit boards, brass valves/fittings, etc.	No	0	100	wt%
0	*Other*	Sediment material, sand, gravel, concrete, sludge, etc	No	0	49	wt%
3	Absorbents	Packaging material, vermiculite, kitty litter, desiccant, aquaset, etc.	No	0	90	wt%
19	Asbestos - Radioactively Contaminated	Components with non-friable asbestos	Yes	0	100	wt%
27	Filters, HEPA	HEPA Filters	No	0	100	wt%
28	Filters, Other	Pre filters, etc.	No	0	100	wt%
29	Glass	Glass windows w/ lead	No	1	100	wt%
66	PCBs >= 50 ppm	PCB Bulk Product- painted items	Yes	0	100	wt%

Integrated Waste Tracking System Material Profile

Information Only

Flash Point, Incinerable Properties, and RCRA 4807N.R2

1. No **Is flash point applicable? If yes, complete the following:**

   Flash Point: **To:** **Method used:**

   (Specify Other):

2. **Information for incinerable waste only:**

   a. **Heat of combustion:** **To:** **BTU/lb**

   b. **Ash content:** **To:** **wt%**

   c. **Total halogen content:** **To:** **ppm**

   d. **Water content:** **To:** **wt%**

   e. **Suspended particulates content:** **To:** **ppm**

3. Yes **Was a RCRA Waste analysis performed? If yes, enter data using "EPA Codes" screen.**

4. No **Were the sampling and analysis protocols used in full compliance with SW-846 protocol or other equivalent regulatory agency approved methods?**

EPA Codes 4807N.R2

Hazardous Constituents

EPA Code ID	TCLP Value	Type of Analysis	Expected Range From	Expected Range To	Expected Range Units	Representative Sample From	Representative Sample To	Representative Sample Units	Detection Limit Limit	Detection Limit Units
D001G	No	Process Knowledge								
Ignitable Ignitable characteristic wastes, that are managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.										
D003F	No	Process Knowledge								
Reactive Water reactives based on 261.23(a)(2),(3), and (4)										
D004A	No	Process Knowledge			mg/L			mg/L		mg/L
Arsenic										
D005A	No	Process Knowledge			mg/L			mg/L		mg/L
Barium										
D006A	No	Process Knowledge			mg/L			mg/L		mg/L
Cadmium										
D006D	No	Process Knowledge			mg/L			mg/L		mg/L
Cadmium Radioactively contaminated cadmium containing batteries										
D007A	No	Process Knowledge			mg/L			mg/L		mg/L
Chromium Chromium (Total)										
D008A	No	Process Knowledge			mg/L			mg/L		mg/L
Lead										
D008C	No	Process Knowledge			mg/L			mg/L		mg/L
Lead Radioactive lead solids										
D009A	No	Process Knowledge			mg/L					
Mercury Elemental mercury contaminated with radioactive materials										
D009D	No	Process Knowledge			mg/L			mg/L		mg/L
Mercury Low mercury <260 mg/kg total mercury										
D009G	No	Process Knowledge								
Mercury High-mercury inorganic subcategory (>=260 mg/kg total) inorganic, including incinerator and RMERC residues.										
D009I	No	Process Knowledge			mg/L			mg/L		mg/L
Mercury Radioactively contaminated mercury containing batteries										
D010A	No	Process Knowledge			mg/L			mg/L		mg/L
Selenium										

EPA Codes 4807N.R2

Hazardous Constituents

EPA Code ID	TCLP Value	Type of Analysis	Expected Range From	Expected Range To	Expected Range Units	Representative Sample From	Representative Sample To	Representative Sample Units	Detection Limit Limit	Detection Limit Units
D011A	No	Process Knowledge			mg/L			mg/L		mg/L
Silver										
D011C	No	Process Knowledge			mg/L			mg/L		mg/L
Silver Radioactively contaminated silver containing batteries.										
F001A	No	Process Knowledge								
Spent halogenated solvents used in degreasing 1,1,1-Trichloroethane										
F001C	No	Process Knowledge								
Spent halogenated solvents used in degreasing Carbon tetrachloride										
F001F	No	Process Knowledge								
Spent halogenated solvents used in degreasing Trichloroethylene										
F002B	No	Process Knowledge								
Spent halogenated solvents 1,1,1-Trichloroethane										
F002H	No	Process Knowledge								
Spent halogenated solvents Tetrachloroethylene										
F002I	Yes	Process Knowledge								
Spent halogenated solvents Trichloroethylene										
F002K	No	Process Knowledge								
Spent halogenated solvents Carbon Tetrachloride										
F005C	No	Process Knowledge								
Spent non-halogenated solvents Benzene										
F005D	No	Process Knowledge								
Spent non-halogenated solvents Carbon disulfide										
F005G	No	Process Knowledge								
Spent non-halogenated solvents Pyridine										
F005H	No	Process Knowledge								
Spent non-halogenated solvents Toluene										
U134	No	Process Knowledge								
Hydrogen fluoride Fluoride (measured in wastewaters only)										

Underlying Hazardous Constituents 4807N.R2

CAS	TCLP Value	Type of Analysis	Expected Range From	Expected Range To	Expected Range Units	Representative Sample From	Representative Sample To	Representative Sample Units	Detection Limit Limit	Detection Limit Units
1336-36-3	No	Process Knowledge	50	500	ppm					
Polychlorinated biphenyls (PCBs)										
7440-36-0	No	Both								
Antimony										

Integrated Waste Tracking System Material Profile

Information Only

Chemical Composition 4807N.R2

CAS	Flam-mable	EPCRA	TSCA	TCLP Value	Type of Analysis	Expected Range From	Expected Range To	Expected Range Units	Representative Sample From	Representative Sample To	Representative Sample Units	Detection Limit Limit	Detection Limit Units
7440-50-8 Copper		Yes	No	No	Process Knowledge	0	1	wt%					
7439-89-6 Iron		No	No	No	Process Knowledge	0	2	wt%					
7439-92-1 Lead		Yes	No	No	Process Knowledge	0	5000	ppm					
7440-22-4 Silver		No	No	No	Process Knowledge	0	0.5	wt%					

Radiological Characteristics 4807N.R2

1. Y **Is fissile material present?** **Is fissile material >=.04 g/kg, waste matrix group is:**

2. Total transuranic activity per gram of waste is:

Y **<= 10 nCi/g (LLW)**

Y **> 10 nCi/g and <= 100 nCi/g (alpha LLW)**

N **> 100 nCi/g (TRU)**

3. Expected radiation dose rate:

at contact of waste package(s)	0.1	**to**	500	**mrem/hr**
at 30cm from waste package(s)		**to**		**mrem/hr**
at 1-meter from waste package(s)	0.1	**to**	50	**mrem/hr**

4. N **Is the waste greater than Class C as defined in 10 CFR 61.55?**

Isotopes - TRU U233, U-235   4807N.R2

Isotope	Activity Range or Sample Data From	To	Sample	Units		Fissionable Material Range or Sample Data From	To	Sample	Units
Am-241	6.600E-10	3.300E-03		Ci/m3					nCi/g
Am-242m	0.000E+00	3.952E-07		Ci/m3					nCi/g
Am-243	0.000E+00	3.952E-07		Ci/m3					nCi/g
Cm-243	5.000E-12	5.000E-07		Ci/m3					nCi/g
Cm-244	3.100E-11	5.200E-06		Ci/m3					nCi/g
Cm-248	5.000E-10	9.000E-02		Ci/m3					nCi/g
Np-237	2.000E-09	2.500E-02		Ci/m3					nCi/g
Pu-238	3.100E-10	7.020E-04		Ci/m3					nCi/g
Pu-239	2.100E-09	5.000E-02		Ci/m3					nCi/g
Pu-240	2.100E-09	2.500E-01		Ci/m3					nCi/g
Pu-241	7.600E-08	2.250E-02		Ci/m3					nCi/g
Pu-242	1.000E-10	1.000E-04		Ci/m3					nCi/g
U-233	5.000E-14	5.000E-02		Ci/m3					nCi/g
U-235	5.020E-16	5.020E-03		Ci/m3					nCi/g

Isotopes - Other 4807N.R2

Isotope	From	To	Sample	Units
	Activity Range or Sample Data			
Ag-110m	2.730E-11	3.880E-07		Ci/m3
Ba-137m	1.720E-07	1.000E+02		Ci/m3
Ba-140	4.500E-11	6.400E-07		Ci/m3
Be-10	6.000E-11	4.000E-07		Ci/m3
Bi-210	0.000E+00	3.000E-05		Ci/m3
Bi-214	0.000E+00	5.000E-05		Ci/m3
C-14	5.000E-09	5.000E-04		Ci/m3
Ca-45	1.000E-19	4.000E-07		Ci/m3
Ce-141	4.430E-11	4.000E-03		Ci/m3
Ce-144	1.690E-07	1.990E-01		Ci/m3
Co-58	2.470E-09	7.210E-03		Ci/m3
Co-60	1.070E-07	3.620E-03		Ci/m3
Cr-51	1.500E-18	4.560E-07		Ci/m3
Cs-134	1.540E-08	2.000E-02		Ci/m3
Cs-135	2.750E-12	5.000E-03		Ci/m3
Cs-137	1.850E-07	2.500E+02		Ci/m3
Eu-152	1.310E-11	5.860E-06		Ci/m3
Eu-154	1.730E-09	1.000E-02		Ci/m3
Eu-155	1.470E-08	4.700E-03		Ci/m3
Fe-55	5.900E-06	8.390E-01		Ci/m3
Fe-59	1.270E-13	2.620E-06		Ci/m3
H-3	3.000E-10	4.500E-02		Ci/m3
I-129	3.000E-09	3.000E-04		Ci/m3
Kr-85	1.000E-12	5.000E-01		Ci/m3
La-140	3.920E-11	1.130E-04		Ci/m3
Mn-54	1.750E-06	4.550E-02		Ci/m3
Mo-93	3.850E-10	5.480E-06		Ci/m3
Na-22	9.820E-11	1.590E-04		Ci/m3
Nb-93m	6.290E-11	8.940E-07		Ci/m3
Nb-94	4.830E-09	3.210E-05		Ci/m3
Nb-95	7.240E-11	1.030E-03		Ci/m3
Nd-144	5.000E-11	5.000E-03		Ci/m3
Ni-59	1.550E-07	6.870E-04		Ci/m3
Ni-63	3.000E-15	7.440E-04		Ci/m3
Pa-234m	0.000E+00	4.500E-05		Ci/m3
Pb-210	0.000E+00	4.200E-05		Ci/m3

Pb-214	0.000E+00	4.200E-05	Ci/m3
Pm-147	5.000E-10	5.000E-02	Ci/m3
Po-210	0.000E+00	4.260E-03	Ci/m3
Po-214	0.000E+00	5.380E-05	Ci/m3
Po-218	0.000E+00	5.200E-05	Ci/m3
Pr-142	2.500E-12	2.500E-03	Ci/m3
Pr-144	1.690E-07	1.000E-01	Ci/m3
Pr-144m	2.040E-09	2.890E-05	Ci/m3
Ra-226	0.000E+00	2.300E-03	Ci/m3
Rh-106	1.180E-07	1.000E+00	Ci/m3
Rn-222	0.000E+00	5.380E-05	Ci/m3
Ru-103	0.000E+00	1.000E-01	Ci/m3
Ru-106	1.180E-07	1.000E+00	Ci/m3
Sb-124	0.000E+00	9.900E-02	nCi/g
Sb-125	1.380E-08	9.900E-02	Ci/m3
Sm-151	5.510E-09	7.810E-05	Ci/m3
Sn-119m	1.850E-11	2.640E-07	Ci/m3
Sn-123	4.840E-11	6.890E-07	Ci/m3
Sr-90	1.370E-07	1.000E+02	Ci/m3
Tc-99	6.320E-11	8.980E-05	Ci/m3
Te-125m	0.000E+00	2.400E-04	Ci/m3
Te-127m	3.490E-11	4.950E-07	Ci/m3
Th-228	0.000E+00	4.630E-05	Ci/m3
Th-230	0.000E+00	4.630E-05	Ci/m3
Th-231	0.000E+00	2.000E-06	Ci/m3
Th-232	0.000E+00	4.630E-05	Ci/m3
Th-234	0.000E+00	4.500E-06	Ci/m3
U-232	5.000E-15	5.000E-09	Ci/m3
U-234	3.000E-15	7.890E-02	Ci/m3
U-236	3.000E-15	4.000E-05	Ci/m3
U-237	0.000E+00	9.000E-06	Ci/m3
U-238	6.470E-11	1.290E-04	Ci/m3
V-49	4.190E-12	3.600E-07	Ci/m3
Y-90	1.300E-07	1.000E+02	Ci/m3
Zr-93	5.510E-12	7.810E-08	Ci/m3
Zr-95	3.260E-11	4.630E-05	Ci/m3

Containers 4807N.R2

Container Barcode	Container Date	Size	Container Units	Type	Common Name of Materials	Decommissioned
13617-4	05/31/2011	111	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-02-10	02/06/2002	72	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-03-04	02/19/2003	18	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-03-05	02/26/2003	26	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-03-09	10/16/2003	23	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-81-62	10/22/1981	9	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-82-33	07/09/1982	7	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-83-28	06/21/1983	88	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-84-12	05/25/1984	72	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-84-14	05/25/1984	72	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-95-10	10/03/1995	15	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
CS-97-09	09/18/1992	29	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC100095	04/16/2010	55	GAL	DM	Site-Wide RCRA Characteristic Metal Debris	No
MFC100269	10/21/2010	64	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC100303	12/01/2010	64	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110085	04/07/2011	30	GAL	DM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110100	04/28/2011	5	GAL	DM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110109	07/18/2011	95	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110125	06/10/2011	25	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110126	06/10/2011	20	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110162	07/14/2011	85	GAL	DM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110181	07/28/2011	42	FT3	CW	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110182	07/26/2011	90	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110272	11/01/2011	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110290	12/14/2011	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110299	12/19/2011	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC110311	12/20/2011	50	FT3	IP	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC120005	01/09/2012	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC120009	02/01/2012	55	GAL	DM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC120044	02/29/2012	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes

MFC120049	03/21/2012	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC120052	07/20/2012	20	GAL	DM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC120054	07/20/2012	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC120075	06/18/2012	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC120125	10/15/2012	22	FT3	DM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC130019	04/04/2013	55	GAL	DM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC130031	03/06/2013	1	FT3	BA	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC130063	04/10/2013	55	GAL	IP	Site-Wide RCRA Characteristic Metal Debris	No
MFC130066	04/18/2013	55	GAL	DM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC130114	05/22/2013	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	No
MFC130115	05/20/2013	1280	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	Yes
MFC130121	06/06/2013	64	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	No
MFC130128	06/12/2013	96	FT3	CM	Site-Wide RCRA Characteristic Metal Debris	No
MFC130135	07/16/2013	96	FT3	IP	Site-Wide RCRA Characteristic Metal Debris	No

Comments 4807N.R2 No Data Available

Integrated Waste Tracking System Material Profile

Information Only

Quality Record 4807N.R2

Screen	Column	Trans. Type	Before Change	After Change	Reason for Change	Inserted By	Insert Date
Isotopes-Other	Isotope	Insert		Pa-234m	Add Isotope	JacobsonJ	11/21/2011
Isotopes-Other	Isotope	Insert		Ra-226	Add Isotope	JacobsonJ	11/21/2011
Isotopes-Other	Isotope	Insert		Th-231	Add Isotope	JacobsonJ	11/21/2011
Isotopes-Other	Isotope	Insert		Te-125m	Add Isotope	JacobsonJ	11/21/2011
Isotopes-Other	Isotope	Insert		Th-234	Add Isotope	JacobsonJ	11/21/2011
Isotopes-Other	Isotope	Insert		Bi-210	add isotopes	JacobsonJ	12/07/2011
Isotopes-Other	Isotope	Insert		Bi-214	add isotopes	JacobsonJ	12/07/2011
Isotopes-Other	Isotope	Insert		Pb-210	add isotopes	JacobsonJ	12/07/2011
Isotopes-Other	Isotope	Insert		Pb-214	add isotopes	JacobsonJ	12/07/2011
Isotopes-Other	Isotope	Insert		Po-210	add isotopes	JacobsonJ	12/07/2011
Isotopes-Other	Isotope	Insert		Po-214	add isotopes	JacobsonJ	12/07/2011
Isotopes-Other	Isotope	Insert		Rn-222	add isotopes	JacobsonJ	12/07/2011
Isotopes-Other	Isotope	Insert		Po-218	add isotopes	JacobsonJ	12/07/2011
Analyte (7439-92-1)	Expected Range to	Update	25	5000	Update lead chemical comp	JacobsonJ	04/03/2012
Analyte (7439-92-1)	Expected Range units	Update	wt%	ppm	Update	JacobsonJ	04/03/2012
Composition	Name of Material	Insert		Metal structural debris and misc scrap metal pieces. : 0	Update physical comp	JacobsonJ	04/09/2012
Isotopes-Other (Te-125m)	Activity Range to	Update	2.4E-8	2.4e-4	Update activity range for Te-125m	JacobsonJ	04/12/2012
Define	Record Status	Update	2	1	update	LeeC	07/23/2012
Isotopes-Other (Nb-95)	Activity Range to	Update	0.000103	0.00103	increase range	JacobsonJ	05/20/2013
Isotopes-Other	Isotope	Insert		Kr-85	Add isotope Kr-85 per ECAR 2258.	AndersenT	05/23/2013
Isotopes-Other (Kr-85)	Activity Range to	Update	0.00407	0.5	update	LeeC	05/23/2013
Composition	Name of Material	Insert		Glass windows w/ lead: 29	add phys comp tab	JacobsonJ	05/29/2013
Composition	Name of Material	Insert		Misc. RCRA Scrap Metal: brass, brass w/copper, copper with solder, Wire, etc.: 0	added item to physical comp	WinderTA	08/01/2013
Approvals	Charge No.	Update	101623WGS	1018563WG	updated charge number	WinderTA	08/01/2013
Process	Reference	Update	INEEL P2 Plan DOE/ID-10333	DOE/ID-10333	Updated P2 plan	WinderTA	08/01/2013
Define	Record Status	Update	2	1	activate the material profile	WinderTA	08/01/2013

Edit Log 4807N.R2

Explanation and References

Name/Date/Time	Explanation
winderta 08/05/2013 07:01:09	add to physical composition
WinderTA 08/05/2013 07:00:52	WINDERTA. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
winderta 08/01/2013 08:16:19	activate the material profile
WinderTA 08/01/2013 08:16:10	WINDERTA. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
WinderTA 08/01/2013 08:05:23	Material Profile: 4807N.R2 BEGIN VALIDATION FOR MATERIAL PROFILE ANNUAL REVIEW WINDERTA. WGS-BEA. Call Point-7. Authorized on Generating Unit (MFC). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION EPA CODES PASSED SOURCE CODE/FORM CODE PASSED WASTE DESCRIPTION PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED
winderta 08/01/2013 07:54:23	add to physical comp
WinderTA 08/01/2013 07:54:07	WINDERTA. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
IWTS 07/21/2013 00:00:00	Material Profile inactivated on 2013-07-21 due to lack of yearly reapproval.
jacobsonj 05/29/2013 11:10:25	Update
JacobsonJ 05/29/2013 11:10:22	JACOBSONJ. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
Leec 05/23/2013 13:20:32	update Kr-85 range.
LeeC 05/23/2013 13:20:24	LEEC. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
andersent 05/23/2013 09:29:45	Add isotope Kr-85 per ECAR 2258.
AndersenT 05/23/2013 09:29:19	ANDERSENT. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
jacobsonj 05/20/2013 07:20:51	update
JacobsonJ 05/20/2013 07:20:46	JACOBSONJ. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
andersent 10/08/2012 14:45:34	Add F005 for MEK.
AndersenT 10/08/2012 14:45:15	ANDERSENT. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
Leec 07/23/2012 08:34:56	activate
LeeC 07/23/2012 08:34:51	LEEC. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).

Edit Log 4807N.R2

Explanation and References

Name/Date/Time	Explanation
LeeC 07/20/2012 15:05:24	Material Profile: 4807N.R2 BEGIN VALIDATION FOR MATERIAL PROFILE ANNUAL REVIEW LEEC. WGS-BEA. Call Point-7. Authorized on Generating Unit (MFC). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION EPA CODES PASSED SOURCE CODE/FORM CODE PASSED WASTE DESCRIPTION PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED
IWTS 07/15/2012 00:00:00	Material Profile inactivated on 2012-07-15 due to lack of yearly reapproval.
jacobsonj 04/12/2012 13:17:20	Update
JacobsonJ 04/12/2012 13:17:15	JACOBSONJ. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
jacobsonj 04/09/2012 10:09:04	Update physical comp
JacobsonJ 04/09/2012 10:08:45	JACOBSONJ. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
jacobsonj 04/03/2012 09:35:14	Update
JacobsonJ 04/03/2012 09:35:05	JACOBSONJ. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
winderta 12/23/2011 07:59:52	add chromium
WinderTA 12/23/2011 07:59:45	WINDERTA. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
jacobsonj 12/07/2011 11:10:08	add isotopes
JacobsonJ 12/07/2011 11:09:58	JACOBSONJ. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
jacobsonj 11/21/2011 13:49:26	Add Isotope
JacobsonJ 11/21/2011 13:49:17	JACOBSONJ. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
LeeC 07/14/2011 09:58:56	Material Profile: 4807N.R2 BEGIN VALIDATION FOR MATERIAL PROFILE APPROVE LEEC. WGS-BEA. Call Point-7. Authorized on Generating Unit (MFC). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION EPA CODES PASSED SOURCE CODE/FORM CODE PASSED WASTE DESCRIPTION PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED

Edit Log 4807N.R2

Explanation and References

Name/Date/Time	Explanation
OHaganA 07/14/2011 08:58:22	Material Profile: 4807N.R2 BEGIN VALIDATION FOR MATERIAL PROFILE REVIEW OHAGANA. WGS-BEA. Call Point-6. Authorized on Generating Unit (MFC). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION EPA CODES PASSED SOURCE CODE/FORM CODE PASSED WASTE DESCRIPTION PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED
jacobsonj 07/12/2011 12:47:41	Update
JacobsonJ 07/12/2011 12:47:37	JACOBSONJ. WGS-BEA. Call Point-4. Authorized on Generating Unit (MFC).
JacobsonJ 07/12/2011 10:49:59	Material Profile: 4807N.R2 BEGIN VALIDATION FOR MATERIAL PROFILE CERTIFY JACOBSONJ. WGS-BEA. Call Point-5. Authorized on Generating Unit (MFC). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION EPA CODES PASSED SOURCE CODE/FORM CODE PASSED WASTE DESCRIPTION PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED

Integrated Waste Tracking System Material Profile

Information Only

Material Profile Define 5399N

Material Profile No.:	5399N
Profile Date:	8/28/2007 4:33:52 PM
Name of Waste or Material:	Transuranic samples from the AL
Site Treatment Plan ID:	CH-ANL-553 WCA MIXED WASTE
Generating Unit (e.g. Building or Process):	MFC-752 : MFC 752 Laboratory and Office Building
Material or Waste Type and Action:	Mixed Transuranic: Contact Handled

Record Status: Active

Record Lock Parameters:	08/10/2010 11:27:30	jacobsonj
Insert Parameters:	08/28/2007 16:34:50	LeeC

Inactivation allows a record to remain selectable for historical profiles prior to the inactivation date. The inactivation data defaults to the date/time of inactivation, but can be changed to a user defined date/time. A canceled record will not be selectable by past, present, or future records. After a record is cancelled, a historical profile may continue to reference it, but any attempt to update the reference will require a new selection.

Integrated Waste Tracking System Material Profile

Information Only

Certification, Review & Approval 5399N

Certified	Name: Jonathan Jacobson Date: 08/10/2010 Phone: 2085337057 Fax: E-Mail jonathan.jacobson@inl.gov	A waste determination process for this waste stream has been performed. Characterization data was derived by approved analytical methods or process knowledge information and any data limitations have been documented. Legally and scientifically defensible data was used for characterization whenever possible. The required data provided in this Material & Waste Characterization Profile is complete and accurate based on the analytical data or process knowledge information used for characterization.
Reviewed	Name: Date: Phone: Fax: E-Mail	
Approved	Name: Date: Phone: Fax: E-Mail	

Last Profile Update and Approval 5399N

Update/Approvals	Name: Date: Phone: Fax: E-Mail	

	First Name	Last Name	Phone	Fax	E-Mail	Mail Stop
Generator Contact:	Roy	Grant	2088812611		rpgrant@energysolutions.com	
Technical Contact:	Charlyss D	Lee	2085337616	2085337689	Charlyss.Lee@inl.gov	6164
Charge No:	101669DLW					

Material Profile Rejection Log 5399N No Data Available

Revision History 5399N

Char_id	Profile Name	Profile Date	Record Status
5399N	Transuranic samples from the AL	08/28/2007	Active

Integrated Waste Tracking System Material Profile

Information Only

Material Profile Process 5399N

1. Yes **Will material and waste characterization be fully capable of complying with applicable Waste Acceptance Criteria?**

   a. **Waste Acceptance Criteria requirements not met (list each):**

   b. **Receiving organization approval letter number for nonstandard material or waste:**

2. **Waste Generated from:** Routine Operations

   Cleanup/Stabilization Activity:

   Generating Status: On-going

   Is this secondary waste?

3. **Generating Process description (describe the process and/or operations generating material, be specific):**

   Mixed transuranic waste that carries both listed and characteristic codes.

   Solid sludge samples from Rocky Flats generated MTRU drums. The waste drums contained ID-300, IDC-700 and IDC-801 sludges.

4. **Physical state at 70 degrees F:** solid

5. No **Does material contain free liquids?**

6. Yes **Current waste minimization plan?** **Reference:** DOE/ID-10333

Special Characteristic 5399N

Characteristic
Debris - RCRA

Integrated Waste Tracking System Material Profile

Information Only

Characterization Requirements 5399N

1. Yes **Is this DOT regulated hazardous material ?**

   If yes, identify DOT primary hazard: Class7, Class 9 **and DOT subsidiary hazard(s):**

2. Yes **At the point of generation did this material contain any RCRA "F", "K", "U", or "P" Listed waste either in pure form, as a mixture, or as a treatment residue (i.e., ash, leachate, spill cleanup), or "D" Characteristic waste?**

   Waste Description: Solid laboratory analytical waste

   Source Code: G22 Pollution Control & Waste Mgmt Process Residuals: Laboratory analytical wastes (used chemicals)

   Source Code Comments:

   Form Code: W002 Mixed Media/Debris/Devices: Contaminated debris: paper/clothing/rags/wood, empty containers, glass/piping/other solids

   Form Code Comments: Sludge samples from verification of Rocky Flats transuranic waste.

3. **RCRA hazardous waste determination was made by:** Both

4. No **Does this Material Profile contain Lab Packs?**

5. Yes **Was an Underlying Hazardous Constituent (UHC) determination performed?**

   No **If a UHC determination was performed, were any detected in concentrations exceeding the Universal Treatment Standards? List on UHC Screen.**

6. Yes **Is supporting documentation submitted? If yes, list:**

   EDF-8310

7. No **Additional narrative:**

8. No **Is the material LDR Compliant?**

Generation Active Estimates 5399N

Estimate Date	Start Date	End Date	Vol Qty	Vol Units	Mass Qty	Mass Units	Data Entered By	Active	Estimate Type	Inactivated By	Inactivated Date
09/05/2007	09/05/2007	09/30/2007	5	GAL			LeeC	Yes	FY		

Generation Inactive Estimates 5399N No Data Available

Layers 5399N

Layer or Phase	Physical State at 70 F	Range of Percentage From	Range of Percentage To	Units	Color
1	solid		100	vol%	

Integrated Waste Tracking System Material Profile

Information Only

Physical Characteristics 5399N

1. **Density of material or waste (may not be required for hazardous waste and recyclable material):**

   Liquid: **To:** **g/ml** **Solid:** 0.8 **To:** 1.5 g/cc

2. No **Is this aqueous waste? If yes, give total solids range:**

   From: **To:** **g/ml**

3. No **Is this incinerable liquid? If yes, give viscosity range:**

   From: **To:** **SSU**

Physical Composition 5399N

Char. No.	Related Characteristic (Use *Other* Where NA)	Name of Material	Carcinogen	Composition Range From/To/Units		
27	Filters, HEPA	HEPA Filters	No	0	100	vol%
34	Metal combinations or assemblies	Metal, drums	No	0	50	vol%
41	Sludge	Solid sludge from sampling of Rocky Flats generated drums.	No	0	100	vol%

Flash Point, Incinerable Properties, and RCRA 5399N

1. No **Is flash point applicable? If yes, complete the following:**

   Flash Point: **To:** **Method used:**

   (Specify Other):

2. **Information for incinerable waste only:**

   a. **Heat of combustion:** **To:** **BTU/lb**

   b. **Ash content:** **To:** **wt%**

   c. **Total halogen content:** **To:** **ppm**

   d. **Water content:** **To:** **wt%**

   e. **Suspended particulates content:** **To:** **ppm**

3. No **Was a RCRA Waste analysis performed? If yes, enter data using "EPA Codes" screen.**

4. No **Were the sampling and analysis protocols used in full compliance with SW-846 protocol or other equivalent regulatory agency approved methods?**

EPA Codes 5399N

Hazardous Constituents

EPA Code ID	TCLP Value	Type of Analysis	Expected Range From	Expected Range To	Expected Range Units	Representative Sample From	Representative Sample To	Representative Sample Units	Detection Limit Limit	Detection Limit Units
D005A Barium	No	Process Knowledge								
D006A Cadmium	No	Both								
D007A Chromium Chromium (Total)	No	Both								
D008A Lead	No	Both								

Integrated Waste Tracking System Material Profile

Information Only

EPA Codes 5399N

Hazardous Constituents

EPA Code ID	TCLP Value	Type of Analysis	Expected Range From	Expected Range To	Expected Range Units	Representative Sample From	Representative Sample To	Representative Sample Units	Detection Limit Limit	Detection Limit Units
D009D	No	Both								
Mercury Low mercury <260 mg/kg total mercury										
D011A	No	Process Knowledge								
Silver										
D022A	No	Process Knowledge								
Chloroform Chloroform managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.										
D028A	No	Both								
1,2-Dichloroethane 1,2-Dichloroethane managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.										
D029A	No	Process Knowledge								
1,1-Dichloroethylene 1,1-Dichloroethylene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.										
D036A	No	Process Knowledge								
Nitrobenzene Nitrobenzene managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems.										
F001A	No	Process Knowledge								
Spent halogenated solvents used in degreasing 1,1,1-Trichloroethane										
F001B	No	Process Knowledge								
Spent halogenated solvents used in degreasing 1,1,2-Trichloro-1,2,2-trifluoroethane										
F001C	No	Process Knowledge								
Spent halogenated solvents used in degreasing Carbon tetrachloride										
F001D	No	Process Knowledge								
Spent halogenated solvents used in degreasing Methylene chloride										
F001E	No	Process Knowledge								
Spent halogenated solvents used in degreasing Tetrachloroethylene										
F001F	No	Process Knowledge								
Spent halogenated solvents used in degreasing Trichloroethylene										
F001G	No	Process Knowledge								
Spent halogenated solvents used in degreasing Trichloromonofluoromethane										
F002A	No	Process Knowledge								
Spent halogenated solvents o-Dichlorobenzene										
F002B	No	Process Knowledge								
Spent halogenated solvents 1,1,1-Trichloroethane										
F002C	No	Process Knowledge								
Spent halogenated solvents 1,1,2-Trichloro-1,2,2-trifluoroethane										
F002D	No	Process Knowledge								
Spent halogenated solvents 1,1,2-Trichloroethane										
F002E	No	Process Knowledge								
Spent halogenated solvents Chlorobenzene										
F002F	No	Process Knowledge								
Spent halogenated solvents Methylene chloride										
F002H	No	Process Knowledge								
Spent halogenated solvents Tetrachloroethylene										
F002I	No	Process Knowledge								
Spent halogenated solvents Trichloroethylene										
F002J	No	Process Knowledge								
Spent halogenated solvents Trichloromonofluoromethane										
F002K	No	Process Knowledge								
Spent halogenated solvents Carbon Tetrachloride										
F003A	No	Process Knowledge								
Spent non-halogenated solvents Acetone										
F003B	No	Process Knowledge								
Spent non-halogenated solvents Cyclohexanone										

EPA Codes 5399N

Hazardous Constituents

			Expected Range			Representative Sample			Detection Limit	
EPA Code ID	TCLP Value	Type of Analysis	From	To	Units	From	To	Units	Limit	Units
F003C	No	Process Knowledge								
Spent non-halogenated solvents Ethyl acetate										
F003D	No	Process Knowledge								
Spent non-halogenated solvents Ethyl benzene										
F003E	No	Process Knowledge								
Spent non-halogenated solvents Ethyl ether										
F003F	No	Process Knowledge								
Spent non-halogenated solvents Methanol										
F003G	No	Process Knowledge								
Spent non-halogenated solvents Methyl isobutyl ketone										
F003H	No	Process Knowledge								
Spent non-halogenated solvents n-Butyl alcohol										
F003I	No	Process Knowledge								
Spent non-halogenated solvents Xylenes - mixed isomers										
F005A	No	Process Knowledge								
Spent non-halogenated solvents 2-Ethoxyethanol										
F005B	No	Process Knowledge								
Spent non-halogenated solvents 2-Nitropropane										
F005C	No	Process Knowledge								
Spent non-halogenated solvents Benzene										
F005D	No	Process Knowledge								
Spent non-halogenated solvents Carbon disulfide										
F005E	No	Process Knowledge								
Spent non-halogenated solvents Isobutyl alcohol										
F005F	No	Process Knowledge								
Spent non-halogenated solvents Methyl ethyl ketone										
F005G	No	Process Knowledge								
Spent non-halogenated solvents Pyridine										
F005H	No	Process Knowledge								
Spent non-halogenated solvents Toluene										

Underlying Hazardous Constituents 5399N No Data Available

Chemical Composition 5399N No Data Available

Radiological Characteristics 5399N

1. Y Is fissile material present? Is fissile material >=.04 g/kg, waste matrix group is:

2. Total transuranic activity per gram of waste is:

   N <= 10 nCi/g (LLW)

   N > 10 nCi/g and <= 100 nCi/g (alpha LLW)

   Y > 100 nCi/g (TRU)

3. Expected radiation dose rate:

at contact of waste package(s)	0	to	10	mrem/hr
at 30cm from waste package(s)		to		mrem/hr
at 1-meter from waste package(s)	0	to	1	mrem/hr

4. Y Is the waste greater than Class C as defined in 10 CFR 61.55?

Isotopes - TRU U233, U-235 5399N

Isotope	Activity Range or Sample Data					Fissionable Material Range or Sample Data			
	From	To	Sample	Units		From	To	Sample	Units
Am-241	0.000E+00	6.500E-05		Ci/g					nCi/g
Pu-238	0.000E+00	2.000E-05		Ci/g					nCi/g
Pu-239	0.000E+00	5.200E-05		Ci/g					nCi/g
Pu-240	0.000E+00	1.200E-05		Ci/g					nCi/g
Pu-241	0.000E+00	3.200E-05		Ci/g					nCi/g
Pu-242	0.000E+00	8.490E-10		Ci/g					nCi/g
U-235	0.000E+00	1.500E-10		Ci/g					nCi/g

Isotopes - Other 5399N No Data Available

Containers 5399N

Container Barcode	Container Date	Size	Container Units	Type	Common Name of Materials	Decommissioned
MFC070193	08/28/2007	5	GAL	DM	Transuranic samples from the AL	Yes
MFC090132	02/17/2010	55	GAL	DM	Transuranic samples from the AL	No
MFC100060	02/24/2010	55	GAL	DM	Transuranic samples from the AL	No

Comments 5399N No Data Available

Quality Record 5399N No Data Available

Explanation and References

Name/Date/Time	Explanation
allenm 09/13/2010 10:50:19	change isotope ranges
AllenM 09/13/2010 10:50:10	ALLENM. WGS-BEA. Call Point-4. Authorized on Generating Unit (ANL752).
allenm 09/13/2010 09:11:23	add to composition
AllenM 09/13/2010 09:11:18	ALLENM. WGS-BEA. Call Point-4. Authorized on Generating Unit (ANL752).
allenm 08/27/2010 10:27:42	add to composition
AllenM 08/27/2010 10:27:34	ALLENM. WGS-BEA. Call Point-4. Authorized on Generating Unit (ANL752).
JacobsonJ 08/10/2010 11:27:28	Material Profile: 5399N BEGIN VALIDATION FOR MATERIAL PROFILE CERTIFY JACOBSONJ. WGS-BEA. Call Point-5. Authorized on Generating Unit (ANL752). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION EPA CODES PASSED SOURCE CODE/FORM CODE PASSED WASTE DESCRIPTION PASSED SITE TREATMENT PLAN VALIDATION PASSED COMPOSITION VALIDATION PASSED OVERALL VALIDATION PASSED
LeeC 09/05/2007 15:18:42	Material Profile: 5399N BEGIN VALIDATION FOR MATERIAL PROFILE CERTIFY LEEC. WGS. Call Point-5. Authorized on Generating Unit (ANL752). RAD DATA VALIDATION PASSED HAZ DATA VALIDATION WASTE DESCRIPTION PASSED SITE TREATMENT PLAN VALIDATION STP FAILED: Site Treatment Plan number required. COMPOSITION VALIDATION PASSED OVERALL VALIDATION FAILED

Attachment C-2

Examples of MSDSs

Safety Data Sheet
Material Name: CADMIUM
SDS ID: OHS03720
Issue Date: 2011-12-20
Revision: 1.3600

Other Sections

* * * Section 1 - PRODUCT AND COMPANY IDENTIFICATION* * *

Material Name: CADMIUM

ChemADVISOR, Inc.

Stone Quarry Crossing

811 Camp Horne Road, Suite 220

Pittsburgh, PA 15237

E-mail: info@chemadvisor.com

MSDS is for reference use only; please contact manufacturer for emergency response information, routine product inquiries and orders.

Chemical Family
metal

Synonyms
CADMIUM ELEMENT; CADMIUM BLUE; C.I. 77180; Cd

* * * Section 2 - HAZARDS IDENTIFICATION* * *

EMERGENCY OVERVIEW
Color: white
Physical Form: powder
Health Hazards: potentially fatal if inhaled, respiratory tract irritation, kidney damage, cancer hazard (in humans)
Physical Hazards: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS

Inhalation
Short Term: potentially fatal if inhaled, irritation, cough, metallic taste, chills, fever, nausea, vomiting, chest pain, difficulty breathing, headache, dizziness, bluish skin color, lung congestion, lung damage, blood disorders, kidney damage, liver damage
Long Term: cough, tooth discoloration, weight loss, difficulty breathing, fatigue, mood swings, lung damage, blood disorders, bone disorders, kidney damage, liver damage, nerve damage, cancer

Skin Contact
Short Term: irritation
Long Term: irritation

Eye Contact
Short Term: irritation
Long Term: irritation

Ingestion
Short Term: nausea, vomiting, diarrhea, stomach pain, headache, dizziness, muscle cramps, blurred vision, kidney damage, liver damage
Long Term: kidney damage

* * * Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS* * *

CAS EC No Registration No	Component Synonyms	67/548 EEC (DSD)	1272/2008 (CLP)	Percent
7440-43-9 231-152-8 --	CADMIUM	T+ N; R:45-26-48/23/25-62-63-68-50/53 Note(s): E	Acute Inh. Tox. 2 Muta. 2 Carc. 1B Repr. 2_fd H361fd STOT RE 1 Aquatic Acute 1 Aquatic Chronic 1	100

Component Related Regulatory Information
This product may be regulated, have exposure limits or other information identified as the following: Cadmium compounds, Cadmium inorganic compounds.

* * * Section 4 - FIRST AID MEASURES* * *

Inhalation
If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

Skin
Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

Eyes
Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion
If a large amount is swallowed, get medical attention.

Antidote
calcium disodium edetate/dextrose, intravenous; calcium disodium edetate/procaine, intramuscular.

* * * Section 5 - FIRE FIGHTING MEASURES* * *

See Section 9 for Flammability Properties

NFPA Ratings:
Health: 4 **Fire:** 3 **Reactivity:** 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Flammable Properties
Negligible fire and explosion hazard in bulk form. Finely divided material may ignite or explode.

Extinguishing Media
regular dry chemical, dry sand, lime, soda ash

Large fires: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn.

Fire Fighting Measures
Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

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* * * Section 6 - ACCIDENTAL RELEASE MEASURES* * *

Water Release
Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

Occupational spill/release
Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Do not get water directly on material. Do not get water inside container. **Small spills:** Collect spilled material in appropriate container for disposal. Move containers away from spill to a safe area. **Large spills:** Dike for later disposal. Cover with plastic sheet or tarp to minimize spreading and protect from contact with water. Only personnel trained for the hazards of this material should perform clean up and disposal. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

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* * * Section 7 - HANDLING AND STORAGE* * *

Handling Procedures
Use methods to minimize dust.

Storage Procedures
Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

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* * * Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION* * *

Component Exposure Limits
CADMIUM (7440-43-9)

ACGIH:	0.01 mg/m3 TWA; 0.002 mg/m3 TWA (respirable fraction)
	9 mg/m3 IDLH (dust)
OSHA (US):	5 µg/m3 TWA (Do not eat, drink or chew tobacco or gum or apply cosmetics in regulated areas. Carcinogen - dust can cause lung and kidney

	disease, See 29 CFR 1910.1027); 2.5 µg/m3 Action Level 0.1 mg/m3 TWA (fume, applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect); 0.2 mg/m3 TWA (dust, applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect); 5 µg/m3 TWA 0.3 mg/m3 Ceiling (applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect, fume); 0.6 mg/m3 Ceiling (applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect, dust)
Mexico:	0.01 mg/m3 TWA LMPE-PPT (total dust); 0.002 mg/m3 TWA LMPE-PPT (respirable dust)

Exposure Limits for Chemicals which may be generated during processing
This material has no components listed.

Ventilation
Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eyes/Face
Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Protective Clothing
Wear appropriate chemical resistant clothing.

Glove Recommendations
Wear appropriate chemical resistant gloves. OSHA REGULATED SUBSTANCES: U.S. OSHA 29 CFR 1910.1027.

Respiratory Protection
The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
OSHA Standard:
Respirator selection should comply with 29 CFR 1910.134, 29 CFR 1910.1027, and the final rule published in the Federal Register on August 24, 2006.
NIOSH Recommendations:
At any detectable concentration -
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Any supplied-air respirator with a full facepiece that is operated in a 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.
Escape -
Any air-purifying, full-facepiece respirator equipped with an N100, R100, or P100 filter.
Any appropriate escape-type, self-contained breathing apparatus.

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* * * Section 9 - PHYSICAL AND CHEMICAL PROPERTIES* * *

Physical State: Solid	**Appearance:** lustrous
Color: white	**Physical Form:** powder
Odor: Not Available	**Odor Threshold:** Not available

Melting Point: 321 °C	**Boiling Point:** 765 °C
Vapor Pressure: 1 mmHg 394 °C	**Vapor Density (air = 1):** Not applicable
Density: Not available	**Specific Gravity (water = 1):** 8.642
Water Solubility: insoluble	**Coeff. Water/Oil Dist:** Not available
Molecular Weight: 112.41	**Molecular Formula:** Cd

Solvent Solubility
Soluble: acids, ammonium nitrate solutions, hot sulfuric acid, hydrochloric acid

* * * Section 10 - STABILITY AND REACTIVITY* * *

Chemical Stability
Stable at normal temperatures and pressure.

Conditions to Avoid
Dangerous gases may accumulate in confined spaces. Keep out of water supplies and sewers.

Incompatible Materials
oxidizing materials, acids, metals

CADMIUM:
AMMONIUM NITRATE (FUSED): Violent or explosive reaction.
HYDRAZOIC ACID: May explode violently.
NITRYL FLUORIDE: Incandescent reaction when heated slightly.
OXIDIZERS (STRONG): Fire and explosion hazard.
SELENIUM: Exothermic reaction.
SULFUR: Fire and explosion hazard.
TELLURIUM: Incandescent reaction in hydrogen atmosphere.
ZINC: Intense exothermic reaction.

Hazardous Decomposition Products
oxides of cadmium

Thermal decomposition products: oxides of cadmium.

Possibility of Hazardous Reactions
Will not polymerize.

* * * Section 11 - TOXICOLOGICAL INFORMATION* * *

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and the following selected endpoints are published:

CADMIUM (7440-43-9)

Oral LD50 Rat 2330 mg/kg; Inhalation LC50 Rabbit 8 mg/L 4 h

RTECS Acute Toxicity (selected)
The components of this material have been reviewed, and RTECS publishes the following endpoints:

CADMIUM (7440-43-9)

Inhalation:	25 mg/m3/30 minute(s) Inhalation Rat LC50
Oral:	2330 mg/kg Oral Rat LD50

Acute Toxicity Level
CADMIUM (7440-43-9)

Highly Toxic:	inhalation
Moderately Toxic:	ingestion

Component Carcinogenicity
CADMIUM (7440-43-9)

ACGIH:	A2 - Suspected Human Carcinogen
IARC:	Monograph 100C [in preparation]; Monograph 58 [1993]; Supplement 7 [1987] (Group 1 (carcinogenic to humans))
NTP:	Known Human Carcinogen
DFG:	Category 1 (causes cancer in man)
OSHA:	Present
	Carcinogen - dust can cause lung and kidney disease - See 29 CFR 1910.1027

RTECS Irritation
The components of this material have been reviewed and RTECS publishes no data as of the date on this document.

Local Effects
CADMIUM (7440-43-9)

Irritant:	inhalation

Target Organs
CADMIUM (7440-43-9)

kidneys

Exposure to cadmium has been associated with an increased risk of lung cancer.

Medical Conditions Aggravated by Exposure
kidney disorders,respiratory disorders

RTECS Tumorigenic
The components of this material have been reviewed, and RTECS publishes the following endpoints:

CADMIUM (7440-43-9)

45 mg/kg Intramuscular Rat TD (4 week); 63 mg/kg Intramuscular Rat TD; 70 mg/kg Intramuscular Rat TD; 40 mg/kg Intramuscular Rat TDLo (4 week); 3372 ug/kg Subcutaneous Rat TDLo; 1200 mg/kg Unreported Rat TDLo; 129 ug/m3 Inhalation Woman TCLo (20 year(s))

RTECS Mutagenic
The components of this material have been reviewed, and RTECS publishes the following endpoints:

CADMIUM (7440-43-9)
1 umol/L hamster; 10 umol/L human; 250 umol/L/1 hour human; 5 nmol/L/24 hour mouse; 6 umol/L mouse

RTECS Reproductive Effects
The components of this material have been reviewed, and RTECS publishes the following endpoints:

CADMIUM (7440-43-9)
2 mg/kg Parenteral Hamster TDLo (pregnant 8 day(s)); 1686 ug/kg Intraperitoneal Mouse TDLo (pregnant 7 day(s)); 1700 mg/kg Oral Mouse TDLo (pregnant 8-12 day(s)); 62 mg/kg Oral Mouse TDLo (pregnant 1 day (s), post 10 day(s), continuous); 448 mg/kg Oral Mouse TDLo (Multigeneration); 1124 ug/kg Intraperitoneal Rat TDLo (male 1 day(s)); 8 mg/kg Intravenous Rat TDLo (pregnant 8-15 day(s)); 1250 ug/kg Intravenous Rat TDLo (pregnant 9 day(s)); 1250 ug/kg Intravenous Rat TDLo (pregnant 14 day(s)); 220 mg/kg Oral Rat TDLo (pregnant 1-22 day (s)); 23 mg/kg Oral Rat TDLo (pregnant 1-22 day(s)); 155 mg/kg Oral Rat TDLo (male 13 week, prior to copulation 13 week, pregnant 3 week, continuous); 21500 ug/kg Oral Rat TDLo (Multigeneration); 250 ug/kg Subcutaneous Rat TDLo (pregnant 19 day(s))

Additional Data
Smoking may result in higher blood lead levels.

Deficiencies in iron, calcium, zinc, protein and vitamins C and D may enhance the toxic effects. Alterations of drug metabolizing activity have been induced in animals.

Inhalation - Acute Exposure
CADMIUM: The average concentration of fume responsible for fatalities is 40-50 mg/m3 for 1 hour or 9 mg/m3 for 5 hours. Early symptoms may include mild irritation of the upper respiratory tract, rhinitis, vertigo, a sensation of constriction of the throat, a metallic taste in the mouth and cough. A latent period from 1-10 hours may precede the onset of rapidly progressing dyspnea, cyanosis, substernal or precordial chest pain, and a flu-like syndrome with weakness, malaise, nausea, vomiting, headache, fever, chills, shivering, profuse sweating, and muscular pains in the back and limbs. Cough with foamy or bloody sputum and pulmonary rales mark the onset of acute pulmonary edema which usually develops within 24 hours and reaches a maximum by 3 days. If death from asphyxia does not occur, and exposure was mild, symptoms may resolve within a week. In more severe exposures, all symptoms including proliferative interstitial pneumonitis may persist from 3-10 days. Permanent pulmonary fibrosis and hypertrophy of bronchial vessels may occur. The fatality rate has been estimated to be between 15-20%. Acute renal necrosis and/or liver damage may develop following massive acute exposure. Sequelae from non-fatal exposure may include microcytic, hypochromic anemia, testicular atrophy, cardiovascular effects, emphysema, anemia and osteomalacia.

Inhalation - Chronic Exposure
CADMIUM: Cadmium is highly cumulative. Repeated or prolonged exposure may cause irreversible lung injury of the emphysematous type with cough and shortness of breath, abnormal lung function, airways obstruction and possibly pulmonary fibrosis. Ulceration of the nasal septum and yellow discoloration of the teeth may occur. Cadmium induced kidney damage is irreversible and may progress after exposure ceases. Proteinuria may be the first sign of damage and may be associated with glucosuria, aminoaciduria, impaired excretion, decreased concentrating capacity, increased excretion of calcium and phosphorus, and increased plasma creatinine. Calciuria may favor the development of kidney stones. Some cases of kidney failure have been reported. Osteomalacia, osteoporosis, and spontaneous fractures may occur and may be manifested as back pain, pain in the extremities, difficulty in walking, and pain on bone pressure. Other symptoms may include damage to the olfactory nerve and anosmia, hemolytic and iron-deficiency anemia, weight loss, and irritability. Some studies suggest a relationship between cadmium levels in air and human cardiovascular disease and hypertension, but causal association has not been proven. Long-term

sequelae may include renal tubular necrosis, cardiovascular effects, and liver damage. Occupational exposure to cadmium is implicated in a significant increase in the incidence of prostatic and respiratory cancers. One study also reports a significant increase in renal cancers in those with inferred occupational exposure to cadmium. There is also limited information suggesting that cadmium may interfere with sperm production in humans.

Skin Contact - Acute Exposure
CADMIUM: Direct contact may result in irritation.

Skin Contact - Chronic Exposure
CADMIUM: Repeated or prolonged exposure to irritants may cause dermatitis.

Eye Contact - Acute Exposure
CADMIUM: Direct contact may cause irritation, redness, pain and smarting, but no injury has been reported.

Eye Contact - Chronic Exposure
CADMIUM: Repeated or prolonged exposure to irritants may cause conjunctivitis.

Ingestion - Acute Exposure
CADMIUM: Cadmium is a powerful emetic which induces vomiting so that less is retained and absorbed. If sufficient amounts are absorbed systemic toxicity may occur. Symptoms, which may begin within 1-60 minutes after ingestion, are salivation, choking, severe nausea, persistent vomiting, diarrhea, tenesmus, abdominal pain, blurred vision, dizziness, vertigo, headache, muscular cramps and rarely, convulsions, exhaustion, collapse, shock and unconsciousness. If death occurs, it is usually within 24 hours from shock due to fluid loss, or, it may be delayed 7-14 days and result from acute renal failure or cardiopulmonary depression. If victim survives, delayed liver and/or kidney damage may occur. A dose exceeding 300 mg may be fatal.

Ingestion - Chronic Exposure
CADMIUM: Cadmium is highly cumulative. Prolonged low level exposure may cause irreversible renal tubular dysfunction as described in chronic inhalation. Animal experiments indicate antagonistic activity between cadmium and zinc such that abnormal zinc metabolism was found to contribute significantly to the toxic syndrome following prolonged ingestion of cadmium. Functional changes in the liver, pancreas and adrenal glands which alter glucose metabolism may occur. Although inconclusive, some studies suggest a relationship between prolonged exposure to cadmium and human cardiovascular disease and hypertension. A study which supports this theory was reported where female rats exhibited hypertension after chronically ingesting cadmium through their drinking water. Reproductive effects such as congenital abnormalities, increased mortality, and reduced rates of growth have been found in animals after prolonged ingestion of cadmium.

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* * * Section 12 - ECOLOGICAL INFORMATION* * *

Component Analysis - Aquatic Toxicity
CADMIUM (7440-43-9)

Fish:	96 Hr LC50 Oncorhynchus mykiss: 0.003 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 0.006 mg/L [static]; 96 Hr LC50 Cyprinus carpio: 0.002 mg/L; 96 Hr LC50 Cyprinus carpio: 4.26 mg/L [semi-static]; 96 Hr LC50 Cyprinus carpio: 0.24 mg/L [static]; 96 Hr LC50 Lepomis macrochirus: 21.1 mg/L [flow-through]; 96 Hr LC50 Oryzias latipes: 0.016 mg/L; 96 Hr LC50 Pimephales promelas: 0.0004-0.003 mg/L
Invertebrate:	48 Hr EC50 Daphnia magna: 0.0244 mg/L [Static]

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* * * Section 13 - DISPOSAL CONSIDERATIONS* * *

Disposal Methods

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. Hazardous Waste Number(s): D006. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 1.0 mg/L.

Component Waste Numbers
CADMIUM (7440-43-9)

RCRA: 1.0 mg/L regulatory level

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* * * Section 14 - TRANSPORT INFORMATION* * *

US DOT Information
Shipping Name: Flammable solid, toxic, inorganic, n.o.s. (Contains: CADMIUM)
Hazard Class: 4.1
UN/NA #: UN3179
Packing Group: II
Required Label(s): 4.1, 6.1

Component Marine Pollutants
This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS #	Minimum Concentration
CADMIUM	7440-43-9	DOT regulated severe marine pollutant (related to Cadmium compounds)

TDG Information
Shipping Name: Flammable solid, toxic, inorganic, n.o.s. (Contains: CADMIUM)
Hazard Class: 4.1
UN #: UN3179
Packing Group: II
Required Label(s): 4.1, (6.1)

Component Marine Pollutants (TDG)
This material contains one or more of the following chemicals required by CA TDG to be identified as marine pollutants.

CADMIUM (7440-43-9)

UN2570 (related to Cadmium compounds)

ADR Information
Shipping Name: Flammable solid, toxic, inorganic, n.o.s. (Contains: CADMIUM)
Hazard Class: 4.1
UN #: UN3179
Packing Group: II
Required Label(s): 4.1, 6.1

ADR Tunnel Code Restrictions
This list contains tunnel restriction codes for those substances and/or chemically related entries which are found in chapter 3.2 of the ADR regulations.

CADMIUM (7440-43-9)

Restriction (s): C/E [UN2570] (I); D/E [UN2570] (II); E [UN2570] (III, related to Cadmium compounds)

RID Information
Shipping Name: Flammable solid, toxic, inorganic, n.o.s. (Contains: CADMIUM)
Hazard Class: 4.1
UN #: UN3179
Packing Group: II
Required Label(s): 4.1, 6.1

IATA Information
Shipping Name: Flammable solid, toxic, inorganic, n.o.s. (Contains: CADMIUM)
Hazard Class: 4.1
UN #: UN3179
Packing Group: II
Required Label(s): 4.1, 6.1

ICAO Information
Shipping Name: Flammable solid, toxic, inorganic, n.o.s. (Contains: CADMIUM)
Hazard Class: 4.1
UN #: UN3179
Packing Group: II
Required Label(s): 4.1, 6.1

IMDG Information
Shipping Name: Flammable solid, toxic, inorganic, n.o.s. (Contains: CADMIUM)
Hazard Class: 4.1
UN #: UN3179
Packing Group: II
Required Label(s): 6.1

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* * * Section 15 - REGULATORY INFORMATION* * *

U.S. Federal Regulations
This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 311/312 (40 CFR 370.21), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

CADMIUM (7440-43-9)

SARA 313: 0.1 % de minimis concentration

CERCLA: 10 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 4.54 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)

SARA Section 311/312 (40 CFR 370 Subparts B and C)
Acute Health: Yes **Chronic Health:** Yes **Fire:** Yes **Pressure:** No **Reactive:** No

U.S. State Regulations
The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
CADMIUM	7440-43-9	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.
WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

Component Analysis
CADMIUM (7440-43-9)

Carc:	carcinogen, initial date 10/1/87
Repro/Dev. Tox:	developmental toxicity, initial date 5/1/97
	male reproductive toxicity, initial date 5/1/97

Canadian WHMIS Ingredient Disclosure List (IDL)
Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which meet WHMIS criteria specified in the Controlled Products Regulations and are present above the threshold limits listed on the IDL.

CADMIUM (7440-43-9)
0.1 %

REACH List of Substances Subject to Restriction (Annex XVII) - Reg. (EU) No. 1907/2006
This list includes substances subject to Restriction. Under REACH, these substances are subject to restrictions on manufacture, placing on the market and use of certain dangerous substances, mixtures and articles.

CADMIUM (7440-43-9)
Use restricted. See item 23.; Use restricted. See item 28.

Symbol(s)
T+ Very Toxic
N Dangerous for the Environment

Risk Phrases
R26 Very toxic by inhalation.
R45 May cause cancer.
R48/23/25 Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
R50 Very toxic to aquatic organisms.
R53 May cause long-term adverse effects in the aquatic environment.
R62 Possible risk of impaired fertility.
R63 Possible risk of harm to the unborn child.
R68 Possible risk of irreversible effects.

Safety Phrases
S53 Avoid exposure - obtain special instructions before use.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S60 This material and its container must be disposed of as hazardous waste.
S61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

Component Analysis - Inventory

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ

CADMIUM	7440-43-9	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes

Globally Harmonized System of Classification and Labelling (GHS)
The listed component(s) of this material have been checked for country-specific published classifications according to the Globally Harmonized System of Classification and Labelling (GHS). The results of the queries are displayed below. Please see the individual country listings, as additional interpretations or reference information may be available. For a reference list of H- or P-statements, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_H&Pphrases.html.

Australia GHS Classifications
No published information available. This material may be hazardous according to published criteria for classification.

European Union GHS Classifications
Classifications below according to Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP).

CADMIUM (7440-43-9)

Acute toxicity - Inhalation - Category 2 **H330** Fatal if inhaled.

Germ cell mutagenicity - Category 2 **H341** Suspected of causing genetic defects.

Carcinogenicity - Category 1B **H350** May cause cancer.

Reproductive Toxicity - Category 2 **H361fd** Suspected of damaging fertility. Suspected of damaging the unborn child.

Specific target organ toxicity - Repeated exposure - Category 1 **H372** Causes damage to organs through prolonged or repeated exposure.

Hazardous to aquatic environment - acute hazard - Category 1 **H400** Very toxic to aquatic life.

Hazardous to aquatic environment - chronic hazard - Category 1 **H410** Very toxic to aquatic life with long lasting effects.

European Union GHS Labelling Information
Labelling information below is according to Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP).

CADMIUM (7440-43-9)

Symbol(s):

Signal Word: Danger

Hazard(s):

H330: Fatal if inhaled

H341: Suspected of causing genetic defects

H350: May cause cancer

H361fd: Suspected of damaging fertility. Suspected of damaging the unborn child.

H372: Causes damage to organs through prolonged or repeated exposure

H410: Very toxic to aquatic life with long lasting effects

Prevention:

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P284: Wear respiratory protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

P273: Avoid release to the environment.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P310: Immediately call a POISON CENTER or doctor/physician.

P320: Specific treatment is urgent (see ... on this label).

P391: Collect spillage.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Indonesia GHS Classifications
No published information available. This material may be hazardous according to published criteria for classification.

Japan GHS Classifications
Classifications below published under Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

CADMIUM (7440-43-9)

Acute toxicity - Oral - Category 4 **H302** Harmful if swallowed.

Acute toxicity - Inhalation - Dust and Mist - Category 1 **H330** Fatal if inhaled.

Germ cell mutagenicity - Category 2 **H341** Suspected of causing genetic defects.

Carcinogenicity - Category 1A **H350** May cause cancer.

Toxic to reproduction - Category 2 **H361** Suspected of damaging fertility or the unborn child.

Specific target organ toxicity - Single exposure - Category 1 **H370** Causes damage to lung and/or respiratory system.

Specific target organ toxicity - Repeated exposure - Category 1 **H372** Causes damage to blood, bones, kidneys, lung, and/or respiratory system through prolonged or repeated exposure.

Hazardous to aquatic environment - chronic hazard - Category 4 **H413** May cause long lasting harmful effects to aquatic life.

Japan GHS Labelling Information
Labelling information below according to classifications published by Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

CADMIUM (7440-43-9)

Symbol(s):

Signal Word: Danger

Hazard(s):

H302: Harmful if swallowed

H330: Fatal if inhaled

H341: Suspected of causing genetic defects

H350: May cause cancer

H361: Suspected of damaging fertility or the unborn child

H370: Causes damage to organs

H372: Causes damage to organs through prolonged or repeated exposure

H413: May cause long lasting harmful effects to aquatic life

Prevention:

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P284: Wear respiratory protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

P273: Avoid release to the environment.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P310: Immediately call a POISON CENTER or doctor/physician.

P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P320: Specific treatment is urgent (see ... on this label).

P330: Rinse mouth.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Korea GHS Classifications (SV)
Classifications below published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only).

CADMIUM (7440-43-9)

MOE:

Acute toxicity - Inhalation - Category 1 **H330** Fatal if inhaled.

Germ cell mutagenicity - Category 2 **H341** Suspected of causing genetic defects.

Carcinogenicity - Category 1 **H350** May cause cancer.

Reproductive Toxicity - Category 2 **H361** Suspected of damaging fertility or the unborn child.

Specific target organ toxicity - Repeated exposure - Category 1 **H372** Causes damage to organs through prolonged or repeated exposure.

Hazardous to aquatic environment - acute hazard - Category 1 **H400** Very toxic to aquatic life.

Hazardous to aquatic environment - chronic hazard - Category 1 **H410** Very toxic to aquatic life with long lasting effects.

MOEL:

Acute toxicity - Oral - Category 4 **H302** Harmful if swallowed.

Acute toxicity - Inhalation - Dust and Mist - Category 1 **H330** Fatal if inhaled.

Germ cell mutagenicity - Category 2 **H341** Suspected of causing genetic defects.

Carcinogenicity - Category 1A **H350** May cause cancer.

Reproductive Toxicity - Category 2 **H361** Suspected of damaging fertility or the unborn child.

Specific target organ toxicity - Single exposure - Category 1 **H370** Causes damage to lung and/or respiratory system.

Specific target organ toxicity - Repeated exposure - Category 1 **H372** Causes damage to blood, bones, kidneys, lung, and/or respiratory system through prolonged or repeated exposure.

Hazardous to aquatic environment - chronic hazard - Category 4 **H413** May cause long lasting harmful effects to aquatic life.

Korea GHS Labelling Information
Labelling information below according to classifications published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only).

CADMIUM (7440-43-9)

Symbol(s):

Signal Word: Danger

Hazard(s):

H330: Fatal if inhaled

H341: Suspected of causing genetic defects

H350: May cause cancer

H361: Suspected of damaging fertility or the unborn child

H372: Causes damage to organs through prolonged or repeated exposure

H410: Very toxic to aquatic life with long lasting effects

Prevention:

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P284: Wear respiratory protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

P273: Avoid release to the environment.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P310: Immediately call a POISON CENTER or doctor/physician.

P320: Specific treatment is urgent (see ... on this label).

P391: Collect spillage.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Symbol(s):

Signal Word: Danger

Hazard(s):

H302: Harmful if swallowed

H330: Fatal if inhaled

H341: Suspected of causing genetic defects

H350: May cause cancer

H361: Suspected of damaging fertility or the unborn child

H370: Causes damage to organs

H372: Causes damage to organs through prolonged or repeated exposure

H413: May cause long lasting harmful effects to aquatic life

Prevention:

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P284: Wear respiratory protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

P273: Avoid release to the environment.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P310: Immediately call a POISON CENTER or doctor/physician.

P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P320: Specific treatment is urgent (see ... on this label).

P330: Rinse mouth.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

New Zealand GHS Classifications
Classifications below according to the Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended. For a reference list defining the alphanumeric categories, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_NZ.html

CADMIUM (7440-43-9) Approval: HSR001530

Acute toxicity - Oral - Category 2 **H300** Fatal if swallowed.

Acute toxicity - Inhalation - Category 3 **H331** Toxic if inhaled.

Germ cell mutagenicity - Category 1 **H340** May cause genetic defects.

Carcinogenicity - Category 1 **H350** May cause cancer.

Reproductive Toxicity - Category 1 **H360** May damage fertility or the unborn child.

Specific target organ toxicity - Repeated exposure - Oral - Category 1 **H372** Causes damage to kidneys through prolonged or repeated exposure if swallowed.

Hazardous to aquatic environment - acute hazard - Category 1 **H400** Very toxic to aquatic life.

Soil Ecotoxicity - Category 3 **H423** Harmful to the soil environment.

Terrestrial Vertebrate Ecotoxicity - Category 2 **H432** Toxic to terrestrial vertebrates.

New Zealand GHS Labelling Information
Labelling information below according to classifications published by New Zealand's Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended. For a reference list defining the alphanumeric categories, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_NZ.html

CADMIUM (7440-43-9)

Symbol(s):

Signal Word: Danger

Hazard(s):

H300: Fatal if swallowed

H331: Toxic if inhaled

H340: May cause genetic defects

H350: May cause cancer

H360: May damage fertility or the unborn child

H372: Causes damage to organs through prolonged or repeated exposure

H400: Very toxic to aquatic life

H423: Harmful to the soil environment

H432: Toxic to terrestrial vertebrates

Prevention:

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

P273: Avoid release to the environment.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P311: Call a POISON CENTER or doctor/physician.

P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P321: Specific treatment (see ... on this label).

P330: Rinse mouth.

P391: Collect spillage.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

South Africa GHS Classifications

No published information available. This material may be hazardous according to published criteria for classification.

Taiwan GHS Classifications

Information below presented according to Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labelling) which provide guidance on classification and labelling of chemicals according to GHS.

CADMIUM (7440-43-9)

Taiwan:

Acute toxicity - Oral - Category 5 **H303** May be harmful if swallowed.

Acute toxicity - Inhalation - Category 1 **H330** Fatal if inhaled.

Germ cell mutagenicity - Category 2 **H341** Suspected of causing genetic defects.

Carcinogenicity - Category 1 **H350** May cause cancer.

Reproductive Toxicity - Category 2 **H361** Suspected of damaging fertility or the unborn child.

Specific target organ toxicity - Repeated exposure - Category 1 **H372** Causes damage to organs through prolonged or repeated exposure.

Hazardous to aquatic environment - chronic hazard - Category 1 **H410** Very toxic to aquatic life with long lasting effects.

Taiwan GHS Labelling Information

Labelling information below according to classifications published by Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labelling) which provide guidance on classification and labelling of chemicals according to GHS.

CADMIUM (7440-43-9)

Symbol(s):

Signal Word: Danger

Hazard(s):

H303: May be harmful if swallowed

H330: Fatal if inhaled

H341: Suspected of causing genetic defects

H350: May cause cancer

H361: Suspected of damaging fertility or the unborn child

H372: Causes damage to organs through prolonged or repeated exposure

H410: Very toxic to aquatic life with long lasting effects

Prevention:

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P284: Wear respiratory protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

P201: Obtain special instructions before use.

P202: Do not handle until all safety precautions have been read and understood.

P270: Do not eat, drink or smoke when using this product.

P273: Avoid release to the environment.

Response:

P308+P313: IF exposed or concerned: Get medical advice/attention.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P310: Immediately call a POISON CENTER or doctor/physician.

P312: Call a POISON CENTER or doctor/physician if you feel unwell.

P320: Specific treatment is urgent (see ... on this label).

P391: Collect spillage.

Storage:

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Classification
No classification assigned.

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* * * Section 16 - OTHER INFORMATION* * *

Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Communicty; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Farenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

Full text of R phrases in Section 3
R26 Very toxic by inhalation.
R45 May cause cancer.
R48/23/25 Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R62 Possible risk of impaired fertility.
R63 Possible risk of harm to the unborn child.
R68 Possible risk of irreversible effects.

Other Information
Reasonable care has been taken in the preparation of this information; however, the manufacturer makes no warranty whatsoever including the warranty of merchantability, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental, consequential, or other such damages resulting from its use or misuse. **Disclaimer:** Supplier gives no warranty whatsoever, including the warranties of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser shall determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental, consequential or any other damages arising out of the use or misuse of this product. No information provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights. THIS MSDS IS TO BE UTILIZED SOLEY AS A REFERENCE DOCUMENT AND IT IS NOT TO BE USED TO SATISFY THE DISTRIBUTION REQUIREMENTS OF OSHA'S HAZARD COMMUNICATION STANDARD (HCS) NOR CANADA'S CONTROLLED PRODUCT REGULATION (CPR). Read the Material Safety Data Sheet before handling product. Use of any information contained herein is provided at the reader's own risk and thus independent judgment by trained professionals must be utilized at all times.

Copyright

Safety Data Sheet
Material Name: SODIUM METAL
SDS ID: OHS20850
Issue Date: 2011-09-16
Revision: 1.2400

Other Sections
02 03 04 05 06 07 08 09 10 11 11B 12 13 14 15 16

* * * Section 1 - PRODUCT AND COMPANY IDENTIFICATION* * *

Material Name: SODIUM METAL

ChemADVISOR, Inc.
Stone Quarry Crossing
811 Camp Horne Road, Suite 220
Pittsburgh, PA 15237
E-mail: info@chemadvisor.com

MSDS is for reference use only; please contact manufacturer for emergency response information, routine product inquiries and orders.

Chemical Family
metal

Synonyms
SODIUM; SODIUM-23; SODIUM ATOM; METALLIC SODIUM; ATOMIC SODIUM; UN 1428

* * * Section 2 - HAZARDS IDENTIFICATION* * *

EMERGENCY OVERVIEW
Color: gray
Physical Form: solid
Odor: odorless
Health Hazards: respiratory tract burns, skin burns, eye burns, mucous membrane burns
Physical Hazards: Extremely flammable. May ignite spontaneously on exposure to air. Reacts violently with water. May polymerize. Containers may rupture or explode.

POTENTIAL HEALTH EFFECTS

Inhalation
Short Term: cough, burns, difficulty breathing, dizziness, bluish skin color, lung congestion
Long Term: same as effects reported in short term exposure, digestive disorders

Skin Contact
Short Term: burns
Long Term: same as effects reported in short term exposure

Eye Contact

Short Term: burns, eye damage, blindness
Long Term: same as effects reported in short term exposure

Ingestion
Short Term: burns, vomiting, diarrhea, difficulty breathing, kidney damage
Long Term: same as effects reported in short term exposure

* * * Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS* * *

CAS EC No Registration No	Component Synonyms	67/548 EEC (DSD)	1272/2008 (CLP)	Percent
7440-23-5 231-132-9 --	SODIUM METAL	F C; R:14/15-34	Water-react. 1 Skin Corr. 1B	100.0

* * * Section 4 - FIRST AID MEASURES* * *

Inhalation
If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin
Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse. Destroy contaminated shoes.

Eyes
Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion
If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention.

Note to Physicians
For inhalation, consider oxygen.
Avoid gastric lavage or emesis.

* * * Section 5 - FIRE FIGHTING MEASURES* * *

See Section 9 for Flammability Properties

NFPA Ratings:
Health: 3 **Fire:** 3 **Reactivity:** 2 **Other:** W
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe
Flammable Properties
Severe fire hazard. Vapor/air mixtures are explosive. May ignite on exposure to air.

Extinguishing Media
regular dry chemical, dry sand, lime, soda ash

Large fires: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn.

Fire Fighting Measures
Do not use water. Do not use foam. Move container from fire area if it can be done without risk. Use extinguishing agents appropriate for surrounding fire. Do not get water inside container. Avoid inhalation of material or combustion by-products.

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* * * Section 6 - ACCIDENTAL RELEASE MEASURES* * *

Soil Release
Dig holding area such as lagoon, pond or pit for containment.

Water Release
Cover with absorbent sheets, spill-control pads or pillows.

Occupational spill/release
Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Stop leak if possible without personal risk. Do not get water directly on material. Small dry spills: Collect material into suitable, loosely covered container for disposal. Move containers away from spill to a safe area. Small liquid spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. **Large spills:** Dike for later disposal. Powder spills: Cover with plastic sheet or tarp to minimize spreading and protect from contact with water. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

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* * * Section 7 - HANDLING AND STORAGE* * *

Handling Procedures
Use methods to minimize dust.

Storage Procedures
Store and handle in accordance with all current regulations and standards. Protect from physical damage. Keep out of water supplies and sewers. Store at room temperature. Store under an inert atmosphere. Store under an oxygen-free liquid (e.g., certain petroleum oils). Keep separated from incompatible substances. Store outside or in a detached building.

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* * * Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION* * *

Component Exposure Limits
ACGIH, NIOSH, EU, OSHA (US) and Mexico have not developed exposure limits for any of this product's components.

Exposure Limits for Chemicals which may be generated during processing
This material has no components listed.

Ventilation
Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

Eyes/Face
Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Protective Clothing
Wear appropriate chemical resistant clothing.

Glove Recommendations
Wear appropriate chemical resistant gloves.

Respiratory Protection
Under conditions of frequent use or heavy exposure, respiratory protection may be needed.
Respiratory protection is ranked in order from minimum to maximum.
Consider warning properties before use.
Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100 or P100.
Any air-purifying full-facepiece respirator equipped with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100 or P100.
Any powered, air-purifying respirator with a high-efficiency particulate filter.
Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with a full facepiece that is operated in a 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.
Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

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* * * Section 9 - PHYSICAL AND CHEMICAL PROPERTIES* * *

Physical State: Solid	**Appearance:** Not available
Color: gray	**Physical Form:** solid
Odor: odorless	**Odor Threshold:** Not available
Melting Point: 97 - 98 °C	**Boiling Point:** 883 °C
Autoignition: >115 °C	**Vapor Pressure:** 1.2 mmHg 400 °C
Vapor Density (air = 1): Not applicable	**Density:** Not available
Specific Gravity (water = 1): 0.97	**Water Solubility:** reacts violently
Coeff. Water/Oil Dist: Not available	**Viscosity:** 0.680 cP 100 °C
Molecular Weight: 22.99	**Molecular Formula:** Na

Solvent Solubility
Insoluble: benzene, naphtha, kerosene, ether

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* * * Section 10 - STABILITY AND REACTIVITY* * *

Chemical Stability
May ignite on exposure to air. Polymerizes with evolution of heat. Avoid contact with light. Reacts violently with water.

Conditions to Avoid
Avoid contact with air. Keep dry. Keep out of water supplies and sewers.

Incompatible Materials
acids, combustible materials, oxidizing materials, reducing agents, halo carbons, halogens, amines, metals, metal oxides, metal salts, bases

SODIUM METAL:
ACIDS: Explosive reaction, particularly with aqueous solutions.
ALKYL OXALATES: Form shock-sensitive mixtures.
AMMONIUM NITRATE: Forms explosive compound.
CARBON DIOXIDE: Incompatible.
CARBON DISULFIDE: Forms shock-sensitive mixtures.
CARBON TETRACHLORIDE: Incompatible.
DIAZOMETHANE: Explodes on contact.
DIMETHYLFORMAMIDE: Vigorous reaction when heated.
ETHANOL: Exothermic reaction.
FLUORINATED COMPOUNDS: Explode at elevated temperatures.
HALIDE OXIDES: Form shock-sensitive mixtures.
HALOCARBONS: Form shock-sensitive mixtures.
HALOGENS: May ignite or form shock-sensitive mixtures.
HYDRAZINE: Forms explosive compound.
HYDROXYLAMINE: Forms spontaneously flammable compound.
INTERHALOGENS: May ignite or form shock-sensitive mixture.
IODATES: Forms shock-sensitive mixture.
MALEIC ANHYDRIDE: Explosive decomposition reaction.
MERCURY: Violent exothermic reaction.
MERCURY OXIDE: May explode.
METAL HALIDES: Form shock-sensitive mixtures.
METAL OXIDES: Incandescent reaction and possible ignition.
MONOAMMONIUM PHOSPHATE: Possible explosive reaction.
NAPHTHALENE + AMMONIA: May explode on drying.
NITRIC ACID: Possible ignition.
NITROGEN CONTAINING EXPLOSIVES: May increase shock-sensitivity.
NITROSYL FLUORIDE: Incandescent reaction.
NITRYL FLUORIDE: Incandescent reaction.
NON-METALS: Vigorous or possibly violent reaction.
NON-METAL HALIDES: May ignite or explode.
NON-METAL OXIDES: May ignite or form explosive mixtures.
SODIUM NITRATE: Forms explosive compound.
SODIUM PEROXIDE: Explosive reaction.
SULFIDE OXIDES: Form shock-sensitive mixture.
2,2,3,3-TETRAFLUOROPROPANOL: May cause violent ignition.

Hazardous Decomposition Products
oxides of sodium

Thermal decomposition products: sodium monoxide.

Possibility of Hazardous Reactions
Polymerizes with evolution of heat. Avoid contact with light.

* * * Section 11 - TOXICOLOGICAL INFORMATION* * *

Component Analysis - LD50/LC50
The components of this material have been reviewed in various sources and no selected endpoints have been identified.

RTECS Acute Toxicity (selected)
The components of this material have been reviewed and RTECS publishes no data as of the date on this document.

Component Carcinogenicity
None of this product's components are listed by ACGIH, IARC, NTP, DFG or OSHA.

RTECS Irritation
The components of this material have been reviewed and RTECS publishes no data as of the date on this document.

Local Effects
SODIUM METAL (7440-23-5)

Corrosive: inhalation, skin, eye, ingestion

Inhalation - Acute Exposure
ALKALINE CORROSIVES: May cause irritation of the respiratory tract with coughing, choking, pain, and possibly burns of the mucous membranes. In some cases, pulmonary edema may develop, either immediately in severe cases or more often with a latent period of 5-72 hours. The symptoms may include tightness in the chest, dyspnea, frothy sputum, cyanosis, and dizziness. Physical findings may include hypotension, weak and rapid pulse and moist rales. Severe cases may be fatal.

Inhalation - Chronic Exposure
ALKALINE CORROSIVES: Depending on the concentration and duration of exposure, repeated or prolonged exposure may cause inflammatory and ulcerative changes in the mouth. There may also be bronchial and gastrointestinal disturbances leading to effects similar to those in acute exposure.

Inhalation - Other Toxicity Information
SODIUM METAL: May react with moisture to form sodium hydroxide, an alkaline corrosive. See information on alkaline corrosives.

Skin Contact - Acute Exposure
ALKALINE CORROSIVES: Direct contact may cause severe pain, burns and possibly brownish stains. The corroded areas may be soft, gelatinous, and necrotic. Tissue destruction may be deep.

Skin Contact - Chronic Exposure
ALKALINE CORROSIVES: Effects depend on the concentration and duration of exposure. Repeated or prolonged contact may cause dermatitis or effects similar to acute exposure.

Skin Contact - Other Toxicity Information
SODIUM METAL: May react with moisture to form sodium hydroxide, an alkaline corrosive. See information on alkaline corrosives.

Eye Contact - Acute Exposure
ALKALINE CORROSIVES: Direct contact may cause pain and burns. There may be edema, destruction of epithelium, corneal opacification and iritis. When damage is less than excessive, these symptoms tend to ameliorate. In severe burns, the full extent of the injury may not be immediately apparent. Late complications may include persistent edema, vascularization and scarring of the cornea, permanent opacity, staphyloma, cataract, symblepharon and blindness.

Eye Contact - Chronic Exposure
ALKALINE CORROSIVES: Effects depend on concentration and duration of exposure. Repeated or prolonged contact may result in conjunctivitis or effects as in acute exposure.

Eye - Other Toxicity Information
SODIUM METAL: May react with moisture to form sodium hydroxide, an alkaline corrosive. See information on alkaline corrosives.

Ingestion - Acute Exposure
ALKALINE CORROSIVES: May cause immediate pain, circumoral burns and corrosion of the mucous membranes which at first turn white and soapy and then become brown, edematous and ulcerated. There may be profuse salivation and difficulty or inability to swallow or speak. Even when there is no evidence of oral burns, the esophagus and stomach may be involved with burning pain, vomiting and diarrhea. The vomitus may be thick and slimy with mucous, and later contain blood and shreds of mucosa. Epiglottal edema may result in respiratory distress and possibly asphyxia. Shock with marked hypotension, weak and rapid pulse, shallow respiration, and clammy skin may occur. Circulatory collapse may ensue, and if uncorrected, lead to renal failure. In severe cases, esophageal or gastric perforation are possible and may be accompanied by mediastinitis, substernal pain, peritonitis, abdominal rigidity, and fever. Esophageal, and possibly gastric or pyloric stricture, may occur within a few weeks, but may be delayed for months or even years. Death may result within a short time from asphyxia, circulatory collapse, or aspiration of even minute amounts. If death is delayed it may be due to the complications of perforation, pneumonia, or the effects of stricture formation.

Ingestion - Chronic Exposure
ALKALINE CORROSIVES: Depending on the concentration, repeated ingestion may result in inflammatory and ulcerative effects on the oral mucous membranes and other effects as with acute ingestion.

Ingestion - Other Toxicity Information
SODIUM METAL: May react with moisture to form sodium hydroxide, an alkaline corrosive. See information on alkaline corrosives.

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* * * Section 12 - ECOLOGICAL INFORMATION* * *

Component Analysis - Aquatic Toxicity
No LOLI ecotoxicity data are available for this product's components.

---

* * * Section 13 - DISPOSAL CONSIDERATIONS* * *

Disposal Methods
Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D003.

Component Waste Numbers
The U.S. EPA has not published waste numbers for this product's components.

---

* * * Section 14 - TRANSPORT INFORMATION* * *

US DOT Information
Shipping Name: Sodium
Hazard Class: 4.3
UN/NA #: UN1428
Packing Group: I

Required Label(s): 4.3

TDG Information
Shipping Name: Sodium
Hazard Class: 4.3
UN #: UN1428
Packing Group: I
Required Label(s): 4.3

ADR Information
Shipping Name: Sodium
Hazard Class: 4.3
UN #: UN1428
Packing Group: I
Required Label(s): 4.3

ADR Tunnel Code Restrictions
This list contains tunnel restriction codes for those substances and/or chemically related entries which are found in chapter 3.2 of the ADR regulations.

SODIUM METAL (7440-23-5)

Restriction (s):	B/E [UN1428] (I)

RID Information
Shipping Name: Sodium
Hazard Class: 4.3
UN #: UN1428
Packing Group: I
Required Label(s): 4.3

IATA Information
Shipping Name: Sodium
Hazard Class: 4.3
UN #: UN1428
Packing Group: I
Required Label(s): 4.3

ICAO Information
Shipping Name: Sodium
Hazard Class: 4.3
UN #: UN1428
Packing Group: I
Required Label(s): 4.3

IMDG Information
Shipping Name: Sodium
Hazard Class: 4.3
UN #: UN1428
Packing Group: I

---

* * * Section 15 - REGULATORY INFORMATION* * *

U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 311/312 (40 CFR 370.21), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

SODIUM METAL (7440-23-5)
CERCLA: 10 lb final RQ; 4.54 kg final RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C)
Acute Health: Yes **Chronic Health:** No **Fire:** Yes **Pressure:** No **Reactive:** Yes

U.S. State Regulations
The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
SODIUM METAL	7440-23-5	Yes	Yes	No	Yes	Yes

Not listed under California Proposition 65

Germany Water Classification
SODIUM METAL (7440-23-5)
ID Number 772, hazard class 1 - low hazard to waters

Symbol(s)
F Highly Flammable
C Corrosive

Risk Phrases
R14 Reacts violently with water.
R15 Contact with water liberates extremely flammable gases.
R34 Causes burns.

Safety Phrases
S1/2 Keep locked-up and out of the reach of children.
S5 Keep contents under protective liquid.
S8 Keep container dry.
S43 In case of fire, use dry chemical, sand, earth, water or regular foam.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Component Analysis - Inventory

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ
SODIUM METAL	7440-23-5	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes

Globally Harmonized System of Classification and Labelling (GHS)
The listed component(s) of this material have been checked for country-specific published classifications according to the Globally Harmonized System of Classification and Labelling (GHS). The results of the queries are displayed below. Please see the individual country listings, as additional interpretations or reference information may be available. For a reference list of H- or P-statements, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_H&Pphrases.html.

Australia GHS Classifications
No published information available. This material may be hazardous according to published criteria for classification.

European Union GHS Classifications
Classifications below according to Regulation (EC) No 1272/2008 on classification, labelling and packaging of

substances and mixtures (CLP).

SODIUM METAL (7440-23-5)

Substances and mixtures which in contact with water emit flammable gases - Category 1 **H260** In contact with water releases flammable gases which may ignite spontaneously.

Skin corrosion/irritation - Category 1B **H314** Causes severe skin burns and eye damage.

European Union GHS Labelling Information
Labelling information below is according to Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP).

SODIUM METAL (7440-23-5)

Symbol(s):

Signal Word: Danger

Hazard(s):

H260: In contact with water releases flammable gases which may ignite spontaneously

H314: Causes severe skin burns and eye damage

Prevention:

P223: Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231+P232: Handle under inert gas. Protect from moisture.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

Response:

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310: Immediately call a POISON CENTER or doctor/physician.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P363: Wash contaminated clothing before reuse.

P335+P334: Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.

P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P321: Specific treatment (see ... on this label).

P370+P378: In case of fire: Use ... for extinction.

Storage:

P402+P404: Store in a dry place. Store in a closed container.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Supplemental:

EUH014: Reacts violently with water.

Indonesia GHS Classifications
No published information available. This material may be hazardous according to published criteria for classification.

Japan GHS Classifications
Classifications below published under Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

SODIUM METAL (7440-23-5)

Substances and mixtures which in contact with water emit flammable gases - Category 1 **H260** In contact with water releases flammable gases which may ignite spontaneously.

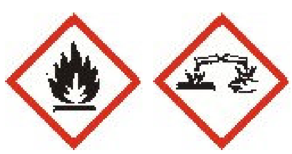
Skin corrosion/irritation - Category 1 **H314** Causes severe skin burns and eye damage.

Serious eye damage/eye Irritation - Category 1 **H318** Causes serious eye damage.

Japan GHS Labelling Information
Labelling information below according to classifications published by Japan's Chemicals Classification Program according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

SODIUM METAL (7440-23-5)

Symbol(s):



Signal Word: Danger

Hazard(s):

H260: In contact with water releases flammable gases which may ignite spontaneously

H314: Causes severe skin burns and eye damage

H318: Causes serious eye damage

Prevention:

P223: Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231+P232: Handle under inert gas. Protect from moisture.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

Response:

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310: Immediately call a POISON CENTER or doctor/physician.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P363: Wash contaminated clothing before reuse.

P335+P334: Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.

P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P310: Immediately call a POISON CENTER or doctor/physician.

P321: Specific treatment (see ... on this label).

P370+P378: In case of fire: Use ... for extinction.

Storage:

P402+P404: Store in a dry place. Store in a closed container.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Korea GHS Classifications (SV)
Classifications below published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only).

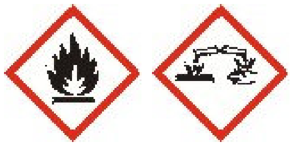
SODIUM METAL (7440-23-5)

MOE:	Substances and mixtures which in contact with water emit flammable gases - Category 1 **H260** In contact with water releases flammable gases which may ignite spontaneously. Skin corrosion/irritation - Category 1 **H314** Causes severe skin burns and eye damage.
NEMA:	Substances and mixtures which in contact with water emit flammable gases - Category 1 **H260** In contact with water releases flammable gases which may ignite spontaneously.

Korea GHS Labelling Information
Labelling information below according to classifications published by Korea's Ministry of Environment (MOE), Ministry of Employment and Labor (MOEL) or Office of National Emergency Management (NEMA, physical hazards only).

SODIUM METAL (7440-23-5)

Symbol(s):



Signal Word: Danger

Hazard(s):

H260: In contact with water releases flammable gases which may ignite spontaneously

H314: Causes severe skin burns and eye damage

Prevention:

P223: Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231+P232: Handle under inert gas. Protect from moisture.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

Response:

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310: Immediately call a POISON CENTER or doctor/physician.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P363: Wash contaminated clothing before reuse.

P335+P334: Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.

P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P321: Specific treatment (see ... on this label).

P370+P378: In case of fire: Use ... for extinction.

Storage:

P402+P404: Store in a dry place. Store in a closed container.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Symbol(s):

Signal Word: Danger

Hazard(s):

H260: In contact with water releases flammable gases which may ignite spontaneously

Prevention:

P223: Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231+P232: Handle under inert gas. Protect from moisture.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response:

P335+P334: Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.

P370+P378: In case of fire: Use ... for extinction.

Storage:

P402+P404: Store in a dry place. Store in a closed container.

Disposal:

P501: Dispose of contents/container to ...

New Zealand GHS Classifications
Classifications below according to the Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended. For a reference list defining the alphanumeric categories, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_NZ.html

SODIUM METAL (7440-23-5) Approval: HSR001293

Substances and mixtures which in contact with water emit flammable gases - Category 1 **H260** In contact with water releases flammable gases which may ignite spontaneously.

Skin corrosion/irritation - Category 1B **H314** Causes severe skin burns and eye damage.

Serious eye damage/eye Irritation - Category 1 **H318** Causes serious eye damage.

Hazardous to aquatic environment - acute hazard - Category 3 **H402** Harmful to aquatic life.

New Zealand GHS Labelling Information
Labelling information below according to classifications published by New Zealand's Environmental Risk Management Authority's (ERMA) Hazardous Substances and New Organisms (HSNO) Act, as amended. For a reference list defining the alphanumeric categories, please visit ChemADVISOR's website at www.chemadvisor.com\sdsoncommand\ghs_NZ.html

SODIUM METAL (7440-23-5)

Symbol(s):

Signal Word: Danger

Hazard(s):

H260: In contact with water releases flammable gases which may ignite spontaneously

H314: Causes severe skin burns and eye damage

H318: Causes serious eye damage

H402: Harmful to aquatic life

Prevention:

P223: Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231+P232: Handle under inert gas. Protect from moisture.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

P273: Avoid release to the environment.

Response:

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310: Immediately call a POISON CENTER or doctor/physician.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P363: Wash contaminated clothing before reuse.

P335+P334: Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.

P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P310: Immediately call a POISON CENTER or doctor/physician.

P321: Specific treatment (see ... on this label).

P370+P378: In case of fire: Use ... for extinction.

Storage:

P402+P404: Store in a dry place. Store in a closed container.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

South Africa GHS Classifications
Information below presented according to the South African Bureau of Standards (SANS 10234:2008 - Globally Harmonized System (GHS) of Classification and Labelling of Chemicals). The information below identifies substances with recommended GHS classifications by CAS or RR numbers and chemical names; the data field contains the word "Present" along with any clarifying information in parenthesis. NOTE: Due to copyright laws on

the standard, we are not able to publish the classification. Details about South Africa's implementation of GHS are available by ordering the Standard and its supplement through the South African Bureau of Standards website.

SODIUM METAL (7440-23-5)

Listing: Present

Taiwan GHS Classifications

Information below presented according to Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labelling) which provide guidance on classification and labelling of chemicals according to GHS.

SODIUM METAL (7440-23-5)

Taiwan: Substances and mixtures which in contact with water emit flammable gases - Category 1 **H260** In contact with water releases flammable gases which may ignite spontaneously.

Skin corrosion/irritation - Category 1 **H314** Causes severe skin burns and eye damage.

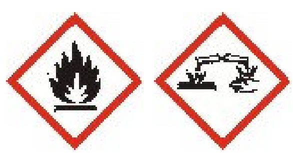
Serious eye damage/eye Irritation - Category 1 **H318** Causes serious eye damage.

Taiwan GHS Labelling Information

Labelling information below according to classifications published by Taiwan's Bureau of Standards, Metrology and Inspection (BSMI) of the Ministry of Economic Affairs. This agency has published a series of standards (CNS 15030 1-27 Chemical Classification and Labelling) which provide guidance on classification and labelling of chemicals according to GHS.

SODIUM METAL (7440-23-5)

Symbol(s):



Signal Word: Danger

Hazard(s):

H260: In contact with water releases flammable gases which may ignite spontaneously

H314: Causes severe skin burns and eye damage

H318: Causes serious eye damage

Prevention:

P223: Keep away from any possible contact with water, because of violent reaction and possible flash fire.

P231+P232: Handle under inert gas. Protect from moisture.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P260: Do not breathe dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

Response:

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310: Immediately call a POISON CENTER or doctor/physician.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P363: Wash contaminated clothing before reuse.

P335+P334: Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.

P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P310: Immediately call a POISON CENTER or doctor/physician.

P321: Specific treatment (see ... on this label).

P370+P378: In case of fire: Use ... for extinction.

Storage:

P402+P404: Store in a dry place. Store in a closed container.

P405: Store locked up.

Disposal:

P501: Dispose of contents/container to ...

Classification
No classification assigned.

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* * * Section 16 - OTHER INFORMATION* * *

Key / Legend
ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Communicty; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Farenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of LIsts™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

Full text of R phrases in Section 3
R14/15 Reacts violently with water, liberating extremely flammable gases.
R34 Causes burns.

Other Information

Reasonable care has been taken in the preparation of this information; however, the manufacturer makes no warranty whatsoever including the warranty of merchantability, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental, consequential, or other such damages resulting from its use or misuse. **Disclaimer:** Supplier gives no warranty whatsoever, including the warranties of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser shall determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental, consequential or any other damages arising out of the use or misuse of this product. No information provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights. THIS MSDS IS TO BE UTILIZED SOLEY AS A REFERENCE DOCUMENT AND IT IS NOT TO BE USED TO SATISFY THE DISTRIBUTION REQUIREMENTS OF OSHA'S HAZARD COMMUNICATION STANDARD (HCS) NOR CANADA'S CONTROLLED PRODUCT REGULATION (CPR). Read the Material Safety Data Sheet before handling product. Use of any information contained herein is provided at the reader's own risk and thus independent judgment by trained professionals must be utilized at all times.

Copyright

Attachment C-3

Examples of a Sample Label and a Custody Seal

MFC COC SAMPLE SEAL

Collection Date/Time ____________________
Sample ID Number ______________________
Sample Location ________________________
Signature ______________________________

FRM-1022

Example Custody Seal.

MFC COC SAMPLE LABEL

Sample ID Number ______________________________

Collection Date/Time ____________________________

Name of Sampler (print) _________________________

Sample Location _________________________________

Waste Type/Sample Type__________________________

Preservative Added (check) ❑ **Yes** ❑ **No**

FRM-1021

Example Sample Label.

Attachment C-4

Example of a Chain of Custody Record

FRM-1020
11/12/09
Rev. 0

MATERIAL AND FUELS COMPLEX CHAIN OF CUSTODY RECORD

Date:	Sampled By: (Print Name)	Signature:	Waste Generating Process:

Analytical Sample Record Included ☐ No ☐ Yes Form #	Field Comments/Observations:

Date Collected	Time Collected	Sample ID Number	Number of Containers	Sample Location	Sample Matrix	Type and Amount of Preservative Added	Date and Time Preservative Added	Remarks

Relinquished By: (Print Name)	Signature	Organization	Date	Time			
Received By: (Print Name)	Signature	Organization	Date	Time	Y	N	
							Received with seal intact
							Label(s), Seals, COC(s) agree
Relinquished By: (Print Name)	Signature	Organization	Date	Time			
Received By: (Print Name)	Signature	Organization	Date	Time	Y	N	
							Received with seal intact
							Label(s), Seals, COC(s) agree
Relinquished By: (Print Name)	Signature	Organization	Date	Time			
Received By: (Print Name)	Signature	Organization	Date	Time	Y	N	
							Received with seal intact
							Label(s), Seals, COC(s) agree

Attachment C-5

Example of a LDR Notification Form

435.59
06/06/2013
Rev. 06

Idaho National Laboratory

Land Disposal Notification and Certification Form Phase IV

Bar Code(s): ____________________

Generator: INL for U.S. DOE Facility: ____________________

TSDF Profile No.: ____________________ Manifest No.: ____________________

Treatability Group: ☐ Wastewater ☐ Non-wastewater

U.S. EPA Only (Subcategories)

☐ D001 (High TOC)	☐ D005	☐ D010	☐ D020	☐ D030	☐ D040
☐ D001 (Except high TOC)	☐ D006	☐ D011	☐ D021	☐ D031	☐ D041
☐ D002	☐ D006 (Batteries)	☐ D012	☐ D022	☐ D032	☐ D042
☐ D003 (Reactive cyanide)	☐ D007	☐ D013	☐ D023	☐ D033	☐ D043
☐ D003 (Reactive sulfide)	☐ D008	☐ D014	☐ D024	☐ D034	
☐ D003 (Explosives)	☐ D008 (Lead acid batteries)	☐ D015	☐ D025	☐ D035	☐ F001
☐ D003 (Water reactives)	☐ D008 (Radioactive lead solids)	☐ D016	☐ D026	☐ D036	☐ F002
☐ D003 (Unexploded ordinance)	☐ D009 (Org. Hg ≥ 260 mg/kg)	☐ D017	☐ D027	☐ D037	☐ F003
☐ D003 (Other reactives)	☐ D009 (Inorg. Hg ≥ 260 mg/kg)	☐ D018	☐ D028	☐ D038	☐ F004
☐ D004	☐ D009 (Hg < 260 mg/kg)	☐ D019	☐ D029	☐ D039	☐ F005

☐ Other (list code and subcategory as applicable):

Solvent Constituents (F001 through F005) ☐ Check here if TSDF will check for all spent solvents.

☐ Acetone (F003)	☐ Ethyl benzene (F003)	☐ Ortho-dichlorobenzene (F002)
☐ Benzene (F005)	☐ Ethyl ether (F003)	☐ Pyridine (F005)
☐ Carbon disulfide (F005)	☐ Isobutanol (F005)	☐ Tetrachloroethylene (F001/F002)
☐ Carbon tetrachloride (F001)	☐ Methanol (F003)	☐ Toluene (F005)
☐ Chlorinated fluorocarbons (F001)	☐ Methyl ethyl ketone (F005)	☐ 1,1,2-Trichloro-1,2,2-trifluoroethane (F002)
☐ Chlorobenzene (F002)	☐ Methyl isobutyl ketone (F003)	☐ 1,1,1-Trichloroethane (F001/F002)
☐ Cresols (F004)	☐ Methylene chloride (F001, F002)	☐ 1,1,2-Trichloroethane (F002)
☐ Cresylic acid (F004)	☐ n-Butyl alcohol (F003)	☐ Trichloroethylene (F001/F002)
☐ Cyclohexanone (F003)	☐ Nitrobenzene (F004)	☐ Trichlorofluoromethane (F002)
☐ 2-Ethoxyethanol (F005)	☐ 2-Nitropropane (F005)	☐ Xylene (F003)
☐ Ethyl acetate (F003)		

Underlying Hazardous Constituents

☐ No UHCs present ☐ Treat for UHCs (see attached Form 435.63) ☐ Check for UHCs

Certification Statements

NOTE 1: *States authorized by EPA to manage the LDR program may have regulatory citations different from the 40 CFR citations listed below. Where these regulatory citations differ, your certification will be deemed to refer to those state citations instead of the 40 CFR citations.*

NOTE 2: *The generator has considered 40 CFR Part 268, Subpart C and D in development of this LDR.*

☐ RESTRICTED WASTE REQUIRES TREATMENT PER LAND DISPOSAL RESTRICTIONS

This waste must be treated to the applicable treatment standards set forth in 40 CFR 268.40.

☐ For hazardous debris: "This hazardous debris is subject to the alternative treatments standards of 40 CFR 268.45."

☐ For contaminated soil: "This contaminated soil is subject to the alternative treatment standards of 40 CFR 268.49"

AND it contains a concentration of < 1,000 mg/kg halogenated organic compounds.

"This contaminated soil [does/does not] contain listed hazardous waste and [does/does not] exhibit a characteristic of hazardous waste and [is subject to/complies with] soil treatment standards as provided by 40 CFR 268.49(c) or the universal treatment standards."

☐ DECHARACTERIZED WASTE REQUIRES TREATMENT FOR UHCs [40 CFR 268.7(b)(4)(iv)]

"I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 or 268.49 to remove the hazardous characteristic. This decharacterized waste contains underlying hazardous constituents that require further treatment to meet treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

☐ RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT FURTHER TREATMENT [40 CFR 268.7(a)(3)]

"I certify under penalty of law that I have personally examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards in 40 CFR part 268 subpart D. I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment."

☐ Other (See Attached)

I hereby certify that all information in this and associated documents is true, complete, and accurate to the best of my knowledge.

____________________ ____________________

Print/Sign (qualified WTS) Date

Idaho National Laboratory

Land Disposal Notification and Certification Form Phase IV

Additional Certification Statements

Bar Code(s): ______________________________

☐ RESTRICTED WASTE TREATMENT TO PERFORMANCE STANDARDS [40 CFR 268.7(b)(4)]
"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so to comply with the treatment standards specified in 40 CFR 268.40 without impermissible dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment."

☐ GOOD FAITH AND ANALYTICAL CERTIFICATION - FOR INCINERATED ORGANICS [40 CFR 268.7(b)(4)(iii)]
"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information. I believe that the non-wastewater organic constituents have been treated by combustion units as specified in 40 CFR 268.42, Table 1. I have been unable to detect the non-wastewater organic constituents, despite having used best good faith efforts to analyze for such constituents. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

☐ RESTRICTED WASTE SUBJECT TO A VARIANCE
This waste is subject to a national capacity variance, a treatability variance, or a case-by-case extension. Enter the effective date of prohibition:

☐ For hazardous debris: "This hazardous debris is subject to the alternative treatments standards of 40 CFR 268.45."

☐ WASTE NOT CURRENTLY SUBJECT TO PART 268 RESTRICTIONS
This waste is newly identified waste that is not currently subject to any 40 CFR Part 268 restrictions.

Attachment C-6

Example of Waste Streams Managed at each MFC HWMU

Experimental Fuels Facility (EFF, MFC-794)							
Originating Facility	**Containers**	**STP Waste Stream ID**	**Material Profile**	**Material or Waste Type**	**Waste Type**	**Treatment**	**Destination**

Note: No HW/MW is being stored at this time.

Hot Fuels Examination Facility (HFEF, MFC-785)							
Originating Facility	**Containers**	**STP Waste Stream ID**	**Material Profile**	**Material or Waste Type**	**Waste Type**	**Treatment**	**Destination**
MFC	Drum	CH-ANL-505Ta	3657P	Glovebox Debris from: Testing , Alpha, & Special Projects, Casting Labs , etc.	MTRU-CH	WIPP Disposal	offsite disposal
MFC	Drums	CH-ANL-553	5399N	Transuranic samples from the AL, HEPA Filters	MTRU-CH	WIPP Disposal	offsite disposal
MFC	Boxes	CH-ANL-716CH	4807N.R2	Site-Wide RCRA Characteristic Metal Debris	MLLW	Commercial treatment	offsite disposal

Radioactive Scrap Waste Facility (RSWF, MFC-771)							
Originating Facility	**Containers**	**STP Waste Stream ID**	**Material Profile**	**Material or Waste Type**	**Waste Type**	**Treatment**	**Destination**
MFC	paint cans, HFEF 5 Cans, SLSF Cans, nonstandard containers	CH-ANL-180RH	ANL180RH	Debris and Equipment Contaminated with Sodium-Remote Handled	MLLW	RWDP	offsite disposal
MFC	paint cans, HFEF 5 Cans, SLSF Cans, nonstandard containers	CH-ANL-180RH	6516Q	RH-MLLW due to Sodium Content	MLLW	RWDP	offsite disposal
MFC	HFEF-5 Cans	CH-ANL-182RH	6517Q	RH-MLLW due to Sodium - Potassium Alloy (NaK) Content	MLLW	RWDP	offsite disposal
MFC	HFEF-5 Cans, SLSF Cans	CH-ANL-241Ta	ANL241T	RH-MTRU (Solidified fuel samples, debris contaminated with RCRA Metals (Cd, Cr, Ba and/or Pb) and HEPAs	MTRU-RH	RWDP	offsite disposal
MFC	Paint cans, HFEF-5 Cans, SLSF Cans	CH-ANL-716RH	6518Q	RH-MLLW due to RCRA Metals	MLLW	RWDP	offsite disposal
MFC	HFEF-5 Cans	CH-ANL-716RH	5212N	RH-MLLW (FCF Hot-Cells generated Misc. Rags, Tools, Filters, Sweepings, Plastics, etc.)	MLLW	RWDP	offsite disposal
Non-standard container - cold trap, EBR-II nuclide traps							

Sodium Components Maintenance Shop (SCMS, MFC-793)							
Originating Facility	**Containers**	**STP Waste Stream ID**	**Material Profile**	**Material or Waste Type**	**Waste Type**	**Treatment**	**Destination**
MFC	Drums, Non-Standard containers	CH-ANL-180CH	ANL180CH	Debris and Equipment Contaminated with Sodium - Contact Handled	MLLW	Deact	offsite disposal
MFC	Drum	CH-ANL-180CH	6825N	Sodium metal or sodium filled equipment (radioactive)	MLLW	Deact	offsite disposal
MFC	Non-Standard container	CH-ANL-182CH	ANL182CH	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy	MLLW	Deact	offsite disposal
MFC	Boxes	CH-ANL-716CH	4807N.R2	Site-Wide RCRA Characteristic Metal Debris	MLLW	Commercial Treatment	offsite disposal
MFC	Drum	CH-ANL-722	5447N.R1	Radioactive Contaminated Alkali Metal	MLLW	Deact	offsite disposal
MFC	Drum	NA	6435N.R1	Broken Lead Acid Batteries at MFC	HAZ	Commercial Treatment	offsite disposal
Nonstandard container - Process components							

Sodium Storage Building (SSB, MFC-703)							
Originating Facility	Containers	STP Waste Stream ID	Material Profile	Material or Waste Type	Waste Type	Treatment	Destination
MFC	Drums, Boxes	CH-ANL-179	ANL179	Tin-Bismuth Alloy contaminated with Sodium	MLLW	Deact	offsite disposal
MFC	Drums, Non-Standard containers	CH-ANL-180CH	ANL180CH	Debris and Equipment Contaminated with Sodium - Contact Handled	MLLW	Deact	offsite disposal
MFC	Drums	CH-ANL-180CH	6825N	Sodium metal or sodium filled equipment (radioactive)	MLLW	Deact	offsite disposal
MFC	Non-Standard container	CH-ANL-180RH	ANL180RH	Debris and Equipment Contaminated with Sodium-Remote Handled	MLLW	RWDP	offsite disposal
MFC	Drums, Non-Standard container	CH-ANL-182CH	ANL182CH	Debris or Equipment Contaminated with Sodium-Potassium (NaK) Alloy	MLLW	Deact	offsite disposal
MFC	Drums	CH-ANL-241Ta	ANL241T	RH-MTRU (Solidified fuel samples, debris contaminated with RCRA Metals (Cd, Cr, Ba and/or Pb) and HEPAs	MTRU-RH	RWDP	offsite disposal
MFC	Non-Standard container	CH-ANL-722	2225P	Lithium Hydride/Lithium Chloride/Potassium Chloride	MLLW	Deact	offsite disposal
MFC	Drum	CH-ANL-722	7262Q	Radioactive Contaminated Alkali Metal Newly Generated	MLLW	Deact	offsite disposal
Non-standard container - Process equipment							

Attachment 3 Security

CONTENTS

ATTACHMENTS

F. PROCEDURES TO PREVENT HAZARDS (IDAPA 58.01.05.008 and 012; 40 CFR 264.14. 15, 17, 32, 33, 35, 174 176, 177, 195, 198, 602, and 270.14-16)

In accordance with the requirements of Idaho Administrative Procedures Act (IDAPA) 58.01.05.008 and 012; 40 Code of Federal Regulations (CFR) 264.14, 15, 17, 32, 33, 35, 174, 176, 177, 195, 198 and 602, and 270.14–16, this section of the Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) Permit Application describes the procedures that will be taken to prevent hazards during hazardous waste (HW)/mixed waste (MW) storage, repackaging and/or treatment at the Materials and Fuels Complex (MFC) HWMA units. For reference, the locations of the MFC HWMA units discussed in this section are shown in Attachment 1, Facility Description, Section B, MFC Facility Description.

The information provided in this section is organized by subsection as follows:

- Subsection F-1, Security
- Subsection F-2, Inspections
- Subsection F-3, Prevention and Preparedness
- Subsection F-4, Preventive Procedures, Structures, and Equipment
- Subsection F-5, Ignitable, Reactive, and Incompatible Wastes.

F-1 Security [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(4) and 264.14]

F-1(a) Security Procedures and Equipment [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(4) and 264.14]

MFC HWMA units [excluding the Radioactive Scrap and Waste Facility (RSWF)] are located within MFC property protection areas (PPAs), which are controlled access areas patrolled by INL security police officers (SPOs) and defined by security fences. The RSWF is a controlled area outside of a PPA, but is also patrolled by INL security and defined by security fences. Details of in-place security procedures and equipment are described in the following subsections.

F-1(a)(1) Twenty-four Hour Surveillance System [IDAPA 58.01.05.008; 40 CFR 264.14(b)(1)]

The MFC PPAs have 24-hr surveillance systems and key card entry systems to control access. Also, 24-hr surveillance of the areas is provided by SPOs who patrol the areas and monitor the perimeters with surveillance cameras. An intrusion-detection system constantly monitors the entire main MFC PPA perimeter.

RSWF is illuminated by perimeter lighting with security patrols providing 24-hour coverage, and includes motion detectors and cameras that are monitored in the Central Alarm Station.

F-1(a)(2) Barrier and Means to Control Entry

F-1(a)(2)(a) Barriers [IDAPA 58.01.05.008; 40 CFR 264.14(b)(2)(i)]

The HWMA units, with the exception of RSWF, are located within the MFC PPAs. The PPAs are defined and surrounded by security fences; either double or single, 8-ft tall, chain-link fences topped with razor wire. A map showing the barrier fencing is provided in Attachment 1, Facility Description, Section B, MFC Facility Description.

The RSWF is enclosed by a 7-ft high security fence. The INL SPOs are staffed 24 hours a day and seven days a week.

F-1(a)(2)(b) Means to Control Entry [IDAPA 58.01.05.008; 40 CFR 264.14(b)(ii)]

Access to the MFC PPAs is controlled by eight gates. The majority of personnel and vehicular traffic enters and exits the MFC PPAs through the main gate, which is staffed by MFC SPOs. A single controlled access roadway funnels personnel and vehicular traffic to the main gate. Other gates, used on an as-needed basis, are otherwise locked and monitored by 24-hr surveillance.

The MFC Security Building (Bldg. 701), also known as the guardhouse, is located at the main gate and is the main ingress/egress point to MFC facilities. Only authorized personnel and escorted, authorized visitors, holding appropriate identification badges, are allowed entry. The guardhouse is staffed by INL SPOs, 24 hours a day, and seven days a week.

Access to the HWMA units may be further controlled by key card entry systems, locked doors/gates, and/or 24-hr surveillance systems. A photograph of a HWMA unit with access controls is provided in Attachment F-1. Access to the HWMA units is restricted to personnel who are qualified in accordance with facility-specific training requirements and authorized by the HWMA unit management. The training records documenting completion of required HWMA facility-specific training are maintained in accordance with Attachment 5, Section H, Personnel Training. Access by other individuals (such as visitors or tour groups) may be granted, provided they are continuously escorted by qualified personnel and authorized by the HWMA unit manager, or designee.

Access to RSWF is gained through the personnel trailer via its personnel gate or two chain link gates (locked) located at the southwest corner and the northeast center of the facility. The INL SPOs are staffed 24 hours a day and seven days a week.

F-1(a)(3) Warning Signs [IDAPA 58.01.05.008; 40 CFR 264.14(c)]

HWMA unit access doors/gates are posted with warning signs into the active portions of the HWMUs, which include each entrance gate into RSWF. There are typically several messages depending on the HW/MW managed in the HWMA unit. At a minimum, there will always be a posting with the message:

DANGER, UNAUTHORIZED PERSONNEL KEEP OUT.

A photograph of this warning sign is provided in Attachment F-2.

Attachment F-1

Photographs of MFC Security Barrier Fencing and Postings


NOTICE
THIS AREA IS MONITORED BY
PHYSICAL PROTECTION
SURVEILLANCE EQUIPMENT
No Trespassing
United States
Department of Energy
ATTENTION
BY ENTERING THIS AREA YOU CONSENT TO
THESE PROCEDURES:
ALL PERSONS, VEHICLES, AND ITEMS
ENTERING AND LEAVING THIS AREA
WILL BE SEARCHED.
PROHIBITED AND UNAUTHORIZED ARTICLES
FOUND MAY BE SEIZED
Searches on entry are to prevent the introduction of prohibited articles. Prohibited articles include firearms or other weapons, explosives, incendiary devices, or other items capable of causing personal injury or property damage; cameras, copying or reproducing devices; recording or transmitting devices; alcohol or illegal drugs; or other devices with similar purpose or effect.
Searches on exit are to prevent the unauthorized removal of special nuclear material, classified documents, or other government property.


#1
CAUTION
SPECIAL INSTRUCTIONS
CAUTION
CONTROLLED AREA

Attachment F-2

Photograph of HWMA Unit Access Door Warning Sign

(Danger Sign Only)


DANGER
UNAUTHORIZED
PERSONNEL
KEEP OUT

Attachment 4
Inspections

F-2 Inspection Schedule [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(5) and 264.15]

The objective of performing regular MFC HWMA unit inspections, as required by IDAPA 58.01.05.008 and 40 CFR 264.15(a), is to detect and correct the malfunction or damage of safety and emergency equipment, the deterioration of containers, tanks, and miscellaneous units where HW/MW is stored, repackaged and/or treated, before there is any threat to human health or the environment. The HWMA unit inspection program, as described in the following subsections, provides the written documentation to meet this objective.

The overall HWMA unit inspection and preventative maintenance program consists of the following:

- Weekly container storage area inspections (when waste is present)
- Daily container process area inspections when processing containers
- Daily container transfer/receipt area inspections when transferring or receiving containers
- Daily tank and tank storage/process area inspections (when waste is present or when processing)
- Weekly/quarterly/annual or multi-year miscellaneous unit inspections (when waste is present)
- Monthly/annual/safety and emergency equipment inspections (when waste is present)
- Quarterly/annual safety and emergency equipment preventative maintenance (when waste is present)
- Monthly/annual miscellaneous unit preventative maintenance (when waste is present).

The HWMA unit inspection program is implemented by employees possessing the appropriate training.

Implementation of the HWMA unit inspection programs helps ensure the early detection of problems and also ensures corrective actions are immediately implemented. Attachment F-3 provides a detailed summary matrix of the HWMA unit inspection program, including details on the items to inspect, types of problems that may occur, the frequency of the inspections, MFC personnel responsible to conduct the inspections, the title of the document that outlines the inspection programs, and how the results of each inspection are recorded.

F-2(a) General Inspection Requirements [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(5), 264.15(a), (b), (c), (d), and 264.33]

Results of HWMA unit inspections conducted by HWMA unit personnel and/or support personnel are recorded on HWMA unit inspection logs. Examples of the various HWMA unit inspection logs are provided in Attachment F-4. The HWMA unit inspection logs are maintained at the facility as part of the HWMA unit operating record. The logs are designed to:

- Define the HWMA/RCRA-required inspection requirements for containers, tanks, and miscellaneous units to prevent, detect, or respond to human health or environmental hazards.
- Identify the various elements and types of problems anticipated, including equipment malfunctions, deterioration, damage, and accessibility.
- Specifically include the containers and tanks systems, associated containment and control systems, and other factors that, if failing or deficient, could result in the release of HW/MW.
- Document any deficiencies identified during an inspection and the remedial actions taken.

The HWMA unit inspection logs are maintained as a part of the HWMA unit operating record for at least three years.

Results of HWMA unit inspections conducted by HWMA unit personnel and/or support personnel are recorded as specified in the HWMA Unit Inspection Schedule provided in Attachment F-3.

In addition to the inspections, operational checks and preventative maintenance (PM) of equipment is conducted on a regular basis to ensure operability. PM work orders are developed, reviewed, scheduled and issued to qualified personnel responsible for maintaining and testing of the equipment. Typical PM activities performed include:

- Site emergency signals/alarms,
- Fire control equipment (e.g., fire extinguishers, fire alarm pullboxes),
- Universal spill control equipment
- Emergency shower/eyewash stations.

Any discrepancies or problems are noted in the PM work orders and corrective action is initiated and completed in accordance with the work control process. These facility communications or alarm systems, fire control equipment, spill control equipment and decontamination equipment (e.g., emergency shower/eyewash stations) are tested and maintained at regular frequencies as specified in the HWMA Unit Inspection Schedule provided in Attachment F-3.

The following subsections describe the structure of the inspection program, inspection schedule, and log sheets used to document results of HWMA unit inspections, and the corrective action process.

F-2(a)(1) Types of Problems [IDAPA 58.01.05.008; 40 CFR 264.15(b)(3)]

The types of container, tank, and miscellaneous storage and/or process unit problems that may be identified during a HWMA unit inspection are specified in the HWMA unit inspection schedule provided in Attachment F-3, and identified on the HWMA unit inspection logs provided in Attachment F-4. During any inspection, all items inspected that are noted as “unsatisfactory” on the inspection logs are identified as deficiencies. The HWMA unit manager, or designee, as part of the overall inspection process, is notified of any deficiencies, and verifies that they are satisfactorily corrected or are scheduled to be corrected. Corrective actions are described on the inspection log, as well as the date the corrective action was completed. Following resolution of the deficiency, the HWMA unit manager, or designee, reviews, signs, and dates the inspection log. The inspection log is maintained in the HWMA unit operating record.

F-2(a)(2) Frequency of Inspections [IDAPA 58.01.05.008; 40 CFR 264.15(b)(4) and 264.195]

HWMA unit inspections are performed by MFC HWMA unit and support personnel at the frequencies specified in Attachment F-3.

F-2(b) Specific Process Inspection Requirements

F-2(b)(1) Container Inspection (IDAPA 58.01.05.008; 40 CFR 264.174)

HWMA unit containers and container storage areas are inspected weekly when waste is present. Containers in process and container process areas (when processing) are inspected daily. Container transfer areas are inspected daily when containers are transferred into or out of the HWMA unit. Inspection results are documented on the HWMA unit inspection logs shown in Attachment F-4. All completed HWMA unit inspection logs are maintained as a part of the HWMA unit operating record for a minimum of three years.

F-2(b)(1)(a) High Radiation Area Container Inspection

There may be MW containers in the HWMA units that have radiation levels that exceed 100 mRem/hr at 1.0 ft. These containers are required to be stored in a high radiation area. Shielding may also be provided to maintain radiation levels in adjacent areas to acceptable levels. High radiation containers are seldom handled after placement in storage and are not likely to incur damage or deterioration. The containers are placed in the storage area in such a way that there is adequate spacing for inspections. Additional requirements must be met in order to enter a high radiation area, including an approved Job Specific Radiation Work Permit. In addition, MFC is required by 10 CFR 835, DOE Occupational Radiation Protection, to develop and maintain an effective Exposure Control Program implementing the as-low-as-reasonably-achievable (ALARA) principle for personnel radiation exposure. The key element of the Radiation Protection Guidance for Federal Agencies for Occupational Exposure is the following:

> *There should not be any occupational exposure of workers to ionizing radiation without the expectation of an overall benefit from the activity causing the exposure.*

The high radiation area inspection protocol described in this section reduces personnel exposure to ionizing radiation compared to the exposure anticipated using the standard weekly inspection protocol. If high radiation levels on the waste in storage prohibit MFC personnel from performing the standard inspection protocol, containers in the area will be set up and inspections will be performed as follows:

High Radiation Area ***Setup***. Any new container placed into a high radiation area receives an inspection prior to placement, and the storage area is entered and inspected after the transfer. The containers are positioned in the storage area so that there is adequate spacing for inspections from the boundary of the high radiation area. If the configuration or size of a high radiation area does not allow for standard inspection from the boundary of the high radiation area, it will be noted in the operating record, so future inspections using the monthly inspection protocol may be instituted.

Weekly Inspections. Inspections of containers in high radiation areas are conducted from outside the high radiation area boundary from a vantage point(s) that allows visible surfaces to be checked for leaks, spills, and corrosion, and to ensure that the containers are closed and properly labeled.

Monthly Inspections. If the configuration or size of the high radiation area does not allow for the standard inspection protocol, the area will be entered at least once each month by completing the required radiation work permits and entering the high radiation area to perform the container inspection in accordance with the standard inspection requirements. The inspector notes on the HWMA unit inspection log that the high radiation area was entered for inspection.

F-2(b)(1)(b) Hot Fuel Examination Facility Decontamination Cell Inspections

Due to severe radiological hazards present, remote-handled waste stored in the Hot Fuel Examination Facility (HFEF) shielded Decontamination Cell (DC) is not routinely accessible to personnel. Therefore, inspections must be performed through shielded cell windows. Containers used in the cell have been designed to ensure durability and compatibility with the waste and compatibility with in-cell waste handling equipment, while maintaining criticality safety controls. In addition, the waste in the container is free of liquids. Remote-handled MW containers are elevated above the floor to facilitate inspection and/or placed in racks/ports to support the containers in the cell, which prevents inspection of all surfaces of each container. Weekly inspections are performed to check container position and condition. Inspections focus on visible surfaces to check for leaks, damage, and corrosion.

F-2(b)(2) Tank System Inspections (IDAPA 58.01.05.008; 40 CFR 264.195)

There is one HWMA unit addressed by the MFC HWMA/RCRA Permit Application that has tank storage and process areas: the Sodium Components Maintenance Shop (SCMS). The tanks and tank process areas in this unit are inspected daily when processing, or when waste is present, as identified in Attachment F-3. Inspection results are documented on the inspection logs shown in Attachment F-4. All completed HWMA unit inspection logs are maintained as a part of the HWMA unit operating record for a minimum of three years.

F-2(b)(2)(a) Certification for Major Tank Repairs [IDAPA 58.01.05.008; 40 CFR 264.196(f)]

Information regarding certification of major tank repairs is addressed in Attachment 7, Section G, Contingency Plan.

F-2(b)(2)(b) Tank System External Corrosion and Releases [IDAPA 58.01.05.008; 40 CFR 264.195(c)(1)]

The SCMS tank storage/process areas are inspected daily when processing, or when waste is present, to detect corrosion or release of HW/MW. Inspections are documented on the HWMA unit inspection logs provided in Attachment F-4.

F-2(b)(2)(c) Tank System Construction Materials and Surrounding Area [IDAPA 58.01.05.008; 40 CFR 264.195(c)(2)]

The SCMS tank storage/process areas are inspected daily when processing, or when waste is present, to detect material failure and release of HW/MW. Inspections are documented on the HWMA unit inspection logs provided in Attachment F-4.

F-2(b)(2)(d) Tank System Overfilling Control Equipment [IDAPA 58.01.05.008; 40 CFR 264.195(a)]

Controls and practices to prevent spills and overflows include process equipment design controls, operational administrative limits for tank filling, systems/component lockout/tagout, instrumentation that monitors for overfilling, monitoring performed by facility personnel on duty during operations, and daily inspection of the tank's systems. Overfilling controls for the tank systems in SCMS are described below.

Water Wash System. When the water wash system is in operation, ignitable and reactive HW/MW is placed in a burn pan inside the water wash vessel (WWV), or is transferred through stainless-steel tubing from the melt, drain, and transfer system feed container into the burn pan inside the WWV. The WWV burn pan is administratively controlled to contain a maximum amount of ignitable and reactive HW/MW at any one time, but never to exceed 156 gallons/day. A detailed engineering evaluation is maintained in the facility operating record to document the maximum amount of ignitable and reactive HW/MW that can be treated in the WWV at any one time, and to determine safety and administrative limits. These limits are implemented through operating procedures to prevent over-pressurization of the WWV.

The feed container sits on a load cell, which allows the weight of the HW/MW transferred to the WWV to be monitored. Water and/or hydroxide solutions used or resulting from the deactivation of the ignitable and reactive HW/MW are gravity-drained to the scrubber water tank through a 2-inch drain line from the center bottom head of the vessel. The maximum operating water volume in the WWV is administratively controlled at 90 gallons. Operating procedures and manual valve controls ensure this limit is not exceeded. The WWV is emptied after each use or at the end of each operating day.

Scrubber Water System. When the scrubber water system is in operation, make-up to the scrubber water tank (service water or hydroxide solution from the WWV) is monitored and controlled by three separate level probes for level control, indication, and high-level alarm. The level control probe has two setpoints that feed a level control switch. At the low setpoint, the switch opens a solenoid valve in the service water supply line to the tank. When water reaches the high level setpoint, the switch closes the solenoid valve, shutting off makeup flow to the tank. The level indicator probe generates a linear signal to feed a meter (calibrated from 0–100%) on the High Bay instrumentation and control (I&C) panel. The alarm probe closes a switch on tank high level to actuate an alarm on the High Bay I&C alarm panel. A reading on the local level indicator for the scrubber water tank is required every half-hour during HW/MW processing.

Carbonation System. When the carbonation system is in operation, hydroxide solution from the scrubber water tank flows into the conical bottom of the carbonation vessel, filling the carbonation vessel. The vessel level is maintained at the outlet line location on the side of the vessel as the solution flows back to the scrubber water tank. Level indication is provided by the sight tube connected to the vessel outlet on the side of the vessel. A freeboard area is maintained in the vessel above the outlet line. This freeboard area is vented to the water wash venturi scrubber, so any vessel overfill would flow through the vent line and return to the scrubber water tank.

F-2(b)(2)(e) Tank System Monitoring and Leak Detection Equipment [IDAPA 58.01.05.008; 40 CFR 264.195(b)]

When in operation, daily inspection of the SCMS tank systems is performed by HWMA unit personnel as described in Attachment F-3. Monitor readings are recorded during processing operations as part of the operating requirements for SCMS treatment systems and are documented in the SCMS operating record.

F-2(b)(3) Miscellaneous Unit Inspections (IDAPA 58.01.05.008; 40 CFR 264.602)

The proper operation of the RSWF cathodic protection system is assured through a combination of inspections and a monitoring or preventative maintenance program. The inspections ensure that the cathodic protection system is operating, and the monitoring or preventative maintenance program evaluates the effectiveness of the system. The inspection and preventative maintenance schedule and methods were developed based on the recommendations of the National Association of Corrosion Engineers (NACE) Standard, IDAPA 58.01.05.08, 40 CFR 264 tank regulations, and the recommendations of the system designers. The monitoring program was devised to detect any potential inadequacies in the facility design that could lead to a loss of waste containment.

Inspections. The miscellaneous HWMA unit, RSWF, is inspected as identified in Attachment F-3. Inspection results are documented on the inspection logs as shown in Attachment F-4. All completed HWMA unit inspection logs are maintained as a part of the HWMA unit operating record for at least three years.

The inspection items for the RSWF unit represent “sat/unsat” inspection criteria and are as follows:

- Fence and Gates – damage is an "unsat" condition
- Cathodic protection rectifier lights – lights off is an "unsat" condition
- Radiation monitoring tubes – elevated radiation reading is an "unsat" condition
- Exposed portion of liners – visible cracks, corrosion is an "unsat" condition
- Empty pulled liner – corrosion is an "unsat" condition.

To perform the empty pulled liner inspection, one corrosion surveillance liner (i.e., one of the designated empty standard 16-in. surrogate liners in Row PP) is pulled and inspected at least every four years to monitor the effectiveness of the cathodic protection system. The inspection, performed by an independent corrosion engineer, includes a visual surface inspection and contact ultrasonic thickness measurements every one inch of the entire liner length at 45-degree intervals. Depth measurements are performed at areas of localized corrosion, as required. The evaluation also includes a review of relevant facility documents and monthly and annual surveillance reports. The corrosion assessment report, provided to the Idaho Department of Environmental Quality (DEQ), summarizes the results of the inspection, the overall effectiveness of the cathodic protection system, and a revised liner pull inspection schedule, if warranted. Examples of the statement-of-work document and the most recent corrosion surveillance liner assessment report are included in Attachment F-5.

Operational Checks and Preventative Maintenance. Monthly and annual operational checks and preventative maintenance of the cathodic protection system is performed. Rectifier efficiency is evaluated monthly, and the liner-to-soil potentials of all liners and rectifier wiring integrity are assessed annually. Rectifier efficiency is an indication of operability that is calculated from field readings typically obtained from a watt-hour meter. Engineering assesses the resulting efficiencies and recommends adjustments or maintenance for those rectifiers, as necessary, to maintain adequate impressed current on each liner.

For the annual operational and preventative maintenance testing, qualified electricians collect liner-to-soil potential readings for each liner over a period of several days/weeks. Liners that do not meet the cathodic protection action level liner-to-soil potential of at least -0.85 volts-direct-current are evaluated further by Engineering to determine whether each liner is adequately protected from corrosion [e.g., a liner-to-soil potential greater (i.e., less negative) than -0.85 volts-direct-current does not mean that the cathodic protection system is not operating, but does indicate that operational adjustments or preventative maintenance is required]. Maintenance activities that restore or increase cathodic protection levels to the action level include rectifier adjustments, repair of anode bed wiring, and replacement of depleted anodes. The annual maintenance also includes a check of rectifier wiring integrity, during which warm connections within the rectifier cabinets are tightened, or dismantled, cleaned, and retightened. All adjustments and repairs made during and as a result of operations and preventative maintenance are conducted in accordance with the current work control process.

Surface maintenance requirements are performed to prevent and correct soil erosion and allow drainage from RSWF. A visual site inspection is performed in the spring (following the winter thaw) to determine that water is adequately drained from the facility (additional inspections are performed following periods of inclement weather). In accordance with operational instruction RSWF-OI-006, *Maintenance and Surveillance Requirements*, culverts are visually inspected weekly for sediment accumulation in the culvert and adequate drainage for water runoff. Culverts are cleaned when necessary. The cleaning of the drainage ditches and culverts is also performed no less than semi-annual to allow proper drainage, per a scheduled maintenance activity as identified in Attachment F-3. This includes:

- Cleaning the ditches and culverts in RSWF of weeds, debris, and soil buildup as directed by Operations personnel.

- Using a water truck to flush water into each drain basin located between the concrete rows inside RSWF. When all drains flow freely, flush water through the large drain basins at the East and West ends of RSWF to ensure sediment/debris has been rinsed from the culverts.

In accordance with operational instruction RSWF-OI-006, *Maintenance and Surveillance Requirements*, soil erosion is identified by routine visual inspections of the berm and perimeter fence line performed weekly (or after periods of inclement weather), looking for eroded banks or cracks in the soil. A service request is submitted for any needed grading or ground maintenance. Material Services personnel will perform grading and landscaping activities as required, but no less than annually, per a scheduled maintenance activity as noted in Attachment F-3.The grading and landscaping is conducted using heavy equipment and laborers to correct erosion and ensure adequate draining from the facility. An example of the preventative maintenance model work order used to perform the annual grading and landscaping work is included in Attachment F-6.

Vegetation growth is controlled by regularly scheduled maintenance for weed control and ground sterilization.

If any deficiencies are noted, facility management is informed immediately to remedy drainage and erosion concerns to berms, grading, fencing or culverts. A standing work order process ensures resources are scheduled to correct noted deficiencies in a timely manner.

Attachment F-3

HWMA Unit Inspection Schedule

Materials and Fuels Complex Hazardous Waste Management Area (HWMA) Unit Inspection Schedule					
Item to Inspect	Types of Problems	Inspection Frequency	Inspection Responsibility	Implementing Document	Record Method
Weekly Container Storage and Daily Container Process Area and Transfer Area Inspections					
Telephones	Malfunctioning, damaged	Weekly[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Labels-hazardous/barcode	Missing, damaged, not legible	Weekly[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Container condition	Deterioration, leaking	Weekly[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Container position	Tipped, lid not secure, not elevated	Weekly[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Secondary containment-spill pallets	Cracked, leaking, liquid present	Weekly[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Floor coating-secondary containment	Cracked, chipped, lifting	Weekly[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Aisle space	< 3ft for ingress/egress	Weekly[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Transfer/staging areas	Evidence of releases	Per transfer	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Daily Tank/Tank Area Inspections					
Tank/tank system piping	Leaking, deterioration	Daily[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Tank/tank system containment	Gaps, cracks, leaks, liquids	Daily[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Tank monitoring equipment	Off-normal readings	Daily[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Floor coating-secondary containment	Cracks, chips, lifting	Daily[1]	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Miscellaneous Unit Inspection					
Fence and gates	Damaged	Weekly	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Cathodic protection rectifier lights	Lights off	Weekly	Inspector	HWMA Unit Procedure	HWMA Inspection Log

MFC HWMA Unit Inspection Schedule (continued)					
Item to Inspect	Types of Problems	Inspection Frequency	Inspection Responsibility	Implementing Document	Record Method
Radiation monitoring tubes	Elevated radiation readings	Annually	Inspector	HWMA Unit Procedure	HWMA Operating Record
Exposed portion of liners	Cracks, corrosion[2], deterioration	Quarterly	Inspector	HWMA Unit Procedure	HWMA Operating Record
Radiation readings	Elevated radiation readings	Annually	Inspector	HWMA Unit Procedure	HWMA Operating Record
Empty pulled liner	Corrosion	4 year basis	Inspector	HWMA Unit Procedure	HWMA Operating Record
Monthly Hazard and Emergency Equipment Inspections					
Danger Unauthorized Personnel Keep Out sign(s) on access door(s)/gates	Missing, damaged, not legible	Monthly	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Fire extinguishers	Missing, inaccessible	Monthly	Inspector	HWMA Unit Procedure	HWMA Inspection Log
Fire alarm pullboxes	Inaccessible	Monthly	Inspector	HWMA Unit Procedure	HWMA Inspection Log

MFC HWMA Unit Inspection Schedule (continued)					
Item to Inspect	Types of Problems	Inspection Frequency	Inspection Responsibility	Implementing Document	Record Method
Emergency showers/eye wash stations(facility specific)	Missing, inaccessible, inoperable	Monthly	Inspector	HWMA Unit Procedure	HWMA Inspection Logs
Spill control equipment(facility specific)	Missing, inaccessible	Monthly	Inspector	HWMA Unit Procedure	HWMA Inspection Log

1. For containers when waste is present and for tank systems when waste is present or every day the tank is in operation (i.e., storing or treating hazardous waste). If the tank and all associated ancillary equipment are completely emptied by gravity draining, the tank system is considered not in operation, and daily inspections will not be required.

2. Corrosion is defined as visual signs of pitting and/or flaking.

HWMA Unit Operational Checks and Preventative Maintenance Activities					
Item to Test	Types of Problems	Frequency	Responsibility	Implementing Document	Record Method
Fire extinguishers	Malfunctioning	Quarterly	LSS Personnel	LSS Procedure	LSS Data Management
Fire alarm pullboxes	Malfunctioning	Annually	LSS Personnel	LSS Procedure	LSS Data Management
Emergency showers/eye wash stations	Malfunctioning	Annually	Maintenance and Ops Personnel	PM Schedule/HWMA Unit Procedure	Operating record
Site emergency signals/alarms/notifications	Malfunctioning	Annually	Maintenance or Ops Personnel	PM Schedule/HWMA Unit Procedure	Operating record
RSWF Cathodic protection system — Rectifier efficiency	Unsatisfactory per Engineering	Monthly	Maintenance personnel	PM Schedule	Operating record
RSWF Cathodic protection system — Liner-to-soil potentials — Rectifier wiring integrity	Unsatisfactory per Engineering	Annually	Maintenance personnel	PM Schedule	Operating record
Universal Spill control equipment (HFEF, EFF, SCMS)	Verify contents have not degraded and are useable	Annually	Ops personnel	HWMA Unit Procedure	Operating record
RSWF Culvert Cleaning	Unsatisfactory per Operations	Semi-Annual	Maintenance personnel	PM Schedule/HWMA Unit Procedure	Operating record
RSWF Erosion Repair	Unsatisfactory per Operations	Annually	Maintenance personnel	PM Schedule/HWMA Unit Procedure	Operating record
LSS – Life Safety Systems					

Attachment F-4

Examples of HWMA Unit Inspection Forms

and Preventative Maintenance Data Sheets

FRM-378
05/17/12
Rev. 3
Entire Document Change

ALL CONTAINER STORAGE FACILITIES DAILY CONTAINER TRANSFER INSPECTION FORM

(Instructions on Page 2)

Section I: Facility from:		Facility to:	
TSD Inspector: (Please Print Full Name)		Date:	Time:

CONTAINERS TRANSFERRED								
Bar Code No.	Type		Bar Code No.	Type		Bar Code No.	Type	
	In	Out		In	Out		In	Out

INSPECTION/DOCUMENTATION		
Item	Acceptance Criteria	Results
Section II: INSPECTION/DOCUMENTATION – PRE-TRANSFER		
1. Container(s) structural integrity	No leaks, spills, and/or deterioration caused by corrosion or other factors; no missing or improperly sealed lids or other openings	❑Sat ❑Unsat
2. Container labeling (i.e., hazardous waste label, barcode)	Affixed and legible	❑Sat ❑Unsat
Section III: ITEM DESCRIPTION/DOCUMENTATION – POST-TRANSFER		
1. Transfer area	Area cleared; no indication of leaks.	❑Sat ❑Unsat
2. Container(s) structural integrity	No leaks, spills, and/or deterioration caused by the transfer.	❑Sat ❑Unsat
3. Container position	Elevated and on/in secondary containment if there is liquid in the container.	❑Sat ❑Unsat
4. Aisle width	Three feet for ingress and egress maintained.	❑Sat ❑Unsat

DEFICIENCIES		
	Corrective Action	
Deficiency Description	Description	Completion Date
❑N/A	❑N/A	

REVIEW			
TSD Shift Supervisor (TSD SS):		Date:	

ALL CONTAINER STORAGE FACILITIES DAILY CONTAINER TRANSFER INSPECTION FORM

INSTRUCTIONS		
[1]	TSD Inspector: Perform the following:	
	[a]	Print your name and record the date and the time.
	[b]	Record the container(s) bar code number and type of transfer (in or out).
	[c]	Complete the "Inspection Requirements" checklist for each requirement by marking ✓ **Sat**=satisfactory, **Unsat**=unsatisfactory, or **N/A**=not applicable.
	[d]	If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ **Sat**; and describe the corrective action taken (e.g., replaced label).
	[e]	If you are not able to take immediate action, mark ☑ **Unsat,** describe the deficiency, and immediately contact the TSD Staff Specialist, Shift Supervisor, or TSD Manager.
	[f]	Place the completed log in the designated location for the TSD FS to review.
[2]	TSD Staff Specialist or Shift Supervisor: Perform the following:	
	[a]	Record that the inspection was performed on the RCRA Inspection Tracking Index.
	[b]	Review the log, and facility if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
	[c]	Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (such as, TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
	[d]	When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

Comments ____

EXPERIMENTAL FUELS FACILITY (EFF) (794) DAILY/WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS/DEBRIS & CONTAINER/DEBRIS STORAGE/PROCESS AREAS

COMPLETION					
EFF Technician: (Please Print Full Name)		Date:		Time:	

INSPECTION TYPE
❑ Daily (during container/debris processing/treatment operations).
❑ Weekly (during normal container/debris - storage operations).

INSPECTION		
Item	Results	
	East Room	West Room
1. Inspect East and West Rooms. If no HW/MW is present, then check the "No HW/MW present" box. No inspection is required for items 2 through 6. If HW/MW is present check the "HW/MW present" box and complete remaining inspection items.	❑ No HW/MW present ❑ HW/MW Present	❑ No HW/MW present ❑ HW/MW present
2. Hazardous waste and barcode labels are in place, legible, and not damaged.	❑ Sat ❑ Unsat	❑ Sat ❑ Unsat
3. Containers/debris position: upright, elevated, and lids/covers secured (unless in process).	❑ Sat ❑ Unsat	❑ Sat ❑ Unsat
4. Containers/debris condition: intact with no evidence of leaks or deterioration caused by corrosion, pitting, rusting, dents, or swelling.	❑ Sat ❑ Unsat	❑ Sat ❑ Unsat
5. Portable secondary containment: no gaps, cracks, leaks, or liquids	❑ Sat ❑ Unsat ❑ N/A	❑ Sat ❑ Unsat ❑ N/A
6. An aisle maintained of at least 3 ft for ingress and egress. An aisle space of 2 ft is maintained for containers/debris with adequate spacing for visual inspection between containers/debris.	❑ Sat ❑ Unsat ❑ Sat ❑ Unsat	❑ Sat ❑ Unsat
7. Telephones are working and accessible	❑ Sat ❑ Unsat	❑ Sat ❑ Unsat
8. Spill control materials are in place and accessible. • 5 gallon spill-X-A • 5 gallon spill-X-C • Two universal chemical spill kits.		❑ Sat ❑ Unsat ❑ Sat ❑ Unsat ❑ Sat ❑ Unsat

DEFICIENCIES AND CORRECTIVE ACTIONS		
	Corrective Action	
Deficiency Description	Description	Completion Date
Previously Identified ❑Yes ❑No	Scheduled ❑Yes ❑No	

REVIEW			
Shift Supervisor (SS):		Date:	

EXPERIMENTAL FUELS FACILITY (EFF) (794) DAILY/WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS/DEBRIS & CONTAINER/DEBRIS STORAGE/PROCESS AREAS

INSTRUCTIONS

[1] EFF Technician: Perform the following:

- **[a]** Prior to performing the inspection, review the RCRA Remedial Description Log (located upstairs in MFC-787).
- **[b]** If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on this and subsequent inspection logs until the corrective action has been completed.
- **[c]** Print your name and record the date and the time.
- **[d]** Perform inspections weekly during normal on-going container/debris storage operations and daily during container/debris processing/treatment operations.
- **[e]** Complete the "Inspection Requirements" checklist for each requirement by marking ✓ Sat=satisfactory, Unsat=unsatisfactory, or N/A=not applicable.
- **[f]** If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ Sat; and describe the corrective action taken (e.g., replaced label).
- **[g]** If you are not able to take immediate action mark ☑ Unsat, describe the deficiency, and immediately contact the SS or EFF Manager.
- **[h]** Place the completed log in the designated location for the SS to review.

[2] SS: Perform the following:

- **[a]** Record that the inspection was performed on the RCRA Inspection Tracking Index.
- **[b]** Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
- **[c]** Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (for example, EFF-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
- **[d]** When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

NOTE: *Debris means solid material exceeding a 60-mm particle size that is intended for disposal and that is a manufactured object, or plant or animal matter, or natural geologic material. Examples at MFC include pipes, valves, scrap metal, and industrial equipment.*

Comments ____

FRM-374
12/09/13
Rev. 6

EXPERIMENTAL FUELS FACILITY (EFF) (794) MONTHLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINER STORAGE AREA

(Instructions on the reverse side)

EFF Technician: (Please Print)		Date:		Time:	

SIGNS	
THE FOLLOWING ACCESS DOORS ARE POSTED WITH A LEGIBLE SIGN THAT STATES: "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"	
1. East door	❑Sat ❑Unsat
2. West door	❑Sat ❑Unsat
FIRE ALARM PULLBOXES AT THE FOLLOWING LOCATIONS ARE ACCESSIBLE:	
1. East door	❑Sat ❑Unsat
2. West door	❑Sat ❑Unsat
EYE WASH STATION AND EMERGENCY SHOWER ARE PRESENT, ACCESSIBLE, AND OPERABLE (see Note)	
Eye Wash Station: East room	❑Sat ❑Unsat
Emergency Shower: East room	❑Sat ❑Unsat
FIRE EXTINGUISHERS ARE PRESENT, ACCESSIBLE, AND OPERABLE (see Note)	
1. ABC, east room south of roll-up door	❑Sat ❑Unsat
2. ABC, east room north of roll-up door	❑Sat ❑Unsat
3. ABC, near west door	❑Sat ❑Unsat

DEFICIENCIES AND CORRECTIVE ACTIONS

Deficiency Description	Previously Identified	Corrective Action		
		Description	Scheduled	Completion Date
	❑Yes ❑No		❑Yes ❑No	
	❑Yes ❑No		❑Yes ❑No	

REVIEW

Shift Supervisor (SS):		Date:	

EXPERIMENTAL FUELS FACILITY (EFF) (794) MONTHLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINER STORAGE AREA

INSTRUCTIONS

[1] EFF Technician: Perform the following:

- [a] Prior to performing the inspection, review the RCRA Remedial Description Log (located in upstairs MFC-787).
- [b] If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on the subsequent inspection log until the corrective action has been completed.
- [c] Print your name and record the date and the time.
- [d] Perform inspections monthly (once every 30 days) in all container storage/treatment areas.
- [e] Complete the "Inspection Requirements" checklist for each requirement by marking ✓ Sat=satisfactory or Unsat=unsatisfactory.
- [f] If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ Sat; and describe the corrective action taken (e.g., replaced label).
- [g] If you are not able to take immediate action mark ☑ Unsat, describe the deficiency, and immediately contact the SS or EFF Manager. On backshift, notify the appropriate contacts on the TSDF call-down list (as applicable).
- [h] Place the completed log in the designated location for the SS to review.

[2] SS: Perform the following:

- [a] Record that the inspection was performed on the RCRA Inspection Tracking Index.
- [b] Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
- [c] Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (i.e., EFF-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
- [d] When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

Note: Present, accessible, and operable are satisfactorily met when the following criteria have been met:

Present: means that the emergency shower, eye wash, or fire extinguisher is physically present.

Accessible: means there is a clear path to the emergency shower, eyewash, or fire extinguisher.

Operable: means the emergency shower, eyewash, or fire extinguisher is maintained so personnel handling hazardous waste have emergency equipment available that operates to minimize harm to those individuals during an emergency. For the inspector checking emergency shower and eye wash units, the following must be met to identify the unit is operable: (1) These emergency units have a supply of water (hard-piped or available as part of the self-contained unit) and are not tagged "out-of-service." Note: No discharge of water is required for these monthly inspections. (2) These units have a current annual inspection tag. For fire extinguishers, the following must be met to identify the unit as operable: (1) safety seals and tamper indicators are intact, (2) assembly is intact, and (3) there is no evidence of damage, corrosion, or leakage, and (4) if equipped with a pressure gauge, the indicator is in the "green zone," or the "pop-up" indicator in the fill cap is not in the up position.

Comments: ______________________________

HOT FUELS EXAMINATION FACILITY (HFEF) (785) DAILY/WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS/DEBRIS & CONTAINER/DEBRIS STORAGE/ PROCESS AREAS

(Instructions on page 4)

Record Tracking No. from RCRA Remedial Log if open deficiency, otherwise mark none.					
TSD Inspector: (Please Print First and Last Name)		Date:		Time:	

INSPECTION TYPE

- ❑ Daily[1] (prior to container/debris processing/treatment operations).
- ❑ Weekly (during normal container/debris – storage operations or cask staging area when in use).

INSPECTION

Item	Results: Decon Cell	Spray Chamber	Decon Cell Storage Pits	Hot Repair Area	High Bay Area	Waste Charac. Chamber	Transfer Room	Prep Room	Truck Transfer Area[2]	Cask Staging Area[3]
Mixed waste not present, mark N/A. No inspection is required for items 1-8.	❑N/A	❑N/A	❑N/A	❑N/A	❑N/A	❑N/A	❑N/A	❑N/A	❑N/A	❑N/A
1. Hazardous waste and barcode labels or other unique identifier are in place, legible, and not damaged.[4]	Window 5D ❑Sat ❑Unsat	Window 6D ❑Sat ❑Unsat	Window 3D ❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat	❑Sat ❑Unsat		❑Sat ❑Unsat
2. Container/debris position: upright, elevated[5], and lids/covers secured (unless in process).[6,7]	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat	❑Sat ❑Unsat		
3. Containers/debris/cask condition: intact with no evidence of leaks or deterioration caused by corrosion, pitting, rusting, dents, or swelling.[8]	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat	❑Sat ❑Unsat		❑Sat ❑Unsat
4. Visually verify drain cover (for SC)/plug (for PR) is installed.		❑Sat ❑Unsat						❑Sat ❑Unsat		
5. Visually verify drain isolation valve (DD-HOV-341) is shut. Located on 2nd floor N. corridor, overhead and across from Rm 209.								❑Sat ❑Unsat		
6. Secondary containment (includes portable when used): no gaps, cracks, leaks, or liquids.[9]				❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A		
7. An aisle maintained at least 3 ft for ingress and egress.				❑Sat ❑Unsat	❑Sat ❑Unsat		❑Sat ❑Unsat	❑Sat ❑Unsat		
8. Telephone is working and accessible.	Window 1D: ❑Sat ❑Unsat	Window 1D: ❑Sat ❑Unsat	Window 3D: ❑Sat ❑Unsat	Room 304: ❑Sat ❑Unsat	HRA Window ❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	

HOT FUELS EXAMINATION FACILITY (HFEF) (785) DAILY/WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS/DEBRIS & CONTAINER/DEBRIS STORAGE/ PROCESS AREAS

(Instructions on page 4)

DEFICIENCIES AND CORRECTIVE ACTIONS		
	Corrective Action	
Deficiency Description	Description	Completion Date
Previously Identified ❑Yes ❑No ❑N/A	Scheduled ❑Yes ❑No ❑N/A	

**HOT FUELS EXAMINATION FACILITY (HFEF) (785) DAILY/WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS/DEBRIS & CONTAINER/DEBRIS STORAGE/
PROCESS AREAS**

(Instructions on page 4)

REVIEW			
Facility Manager or Designee:		**Date:**	

1. Daily inspections are required prior to mixed waste container/debris processing/treatment operations in the Decon Cell (DC), Spray Chamber (SC), Hot Repair Area (HRA), Waste Characterization Chamber (WCC), and the Transfer Room (TR). Processing is defined as opening and removing waste from primary container/debris unit. Treatment activities at HFEF are considered to be: verification, repackaging, absorption of free liquids, neutralization, and solidification.
2. The truck transfer area at HFEF is used for receiving and/or shipment of waste. This area is only allowed for staging of HWMA/RCRA hazardous waste (HW)/mixed waste (MW).
3. The cask or transporter staging area is located north of HFEF facility and south of the access road. Casks may be staged up to 60 days prior to either unloading or shipment. The cask area is inspected weekly when in use.
4. Remote handled mixed waste containers/debris stored in DC, SC or DC storage pits are tracked using ID numbers and log entry.
5. Containers/debris with or without liquids are required to be elevated to prevent contact with accumulated liquid, except for containers/debris in DC storage pits.
6. Containers containing solids only, such as the remote-handled mixed waste (RHMW) container stored in the decontamination cell, are considered closed (secured) as long as there is complete contact between the lid and rim all around the top of the container. This is per Environmental Protection Agency (EPA) guidance. Containers with open top lids containing liquids are considered closed if the lid cover is secured with a ring and bolts to prevent the release of organics or to prevent a spill if container is tipped over. Containers with bungholes should have bungholes securely fastened.
7. In process is defined as performing verification, repackaging, absorption of free liquids, neutralization, and solidification. Containers/debris units can be opened and placed on the floor when in process.
8. Aisle space shall be maintained around containers/debris to perform inspection. Only visible surfaces of containers/debris are required to be inspected in DC, SC or DC storage pits.
9. Secondary containment is required for containers/debris with free liquids. Secondary containment consists of portable spill pallets in the HRA, High Bay Area (HBA), and truck transfer area. Secondary containment consists of seal-welded (lined) floors in the TR, Preparation Room (PR) or waste characterization chamber (WCC), but may consist of spill pallets in the TR or PR.

NOTE 1: *The location of the WCC, TR, and PR are located on the third floor of HFEF on the north side located in the Waste Characterization Area (WCA).*

NOTE 2: *Debris means solid material exceeding a 60-mm particle size that is intended for disposal and that is a manufactured object, or plant or animal matter, or natural geologic material. Examples at MFC include pipes, valves, scrap metal, and industrial equipment.*

Comments: ____

INSTRUCTIONS

[1] TSD Inspector: Perform the following:

- [a] Prior to performing the inspection, review the RCRA Remedial Description Log (located in the Record Storage Area).
- [b] If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on this, and subsequent inspection logs, until the corrective action has been completed. If no open deficiencies, mark none.
- [c] Print your first and last name and record the date and time.
- [d] Perform inspections weekly during normal on-going container/debris storage operations or when cask staging area is in use.
- [e] If no HW/MW was present in a container/debris storage area, upon receipt of HW/MW into the container/debris storage area, perform inspection of the container/debris storage area.
- [f] Complete the "Inspection Requirements" checklist for each requirement by marking ✓ Sat=satisfactory, Unsat=unsatisfactory, or N/A=not applicable.
- [g] If you are able to take immediate corrective action; record the deficiency in the deficiency section, correct the deficiency, mark ☑ Sat; and describe the corrective action taken in the corrective action section (e.g., replaced label).
- [h] If you are not able to take immediate action mark ☑ Unsat, describe the deficiency in the deficiency section, and immediately contact one of the following: Staff Specialist, the SS, and/or Facility Manager/Designee.
- [i] Place the completed log in the designated location for the Facility Manager/Designee to review.

[2] Facility Manager/Designee: Perform the following:

- [a] Record that the inspection was performed on the RCRA Inspection Tracking Index.
- [b] Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
- [c] Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (for example, TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
- [d] When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) in the corrective action section and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

FRM-370
12/09/13
Rev. 8

HOT FUEL EXAMINATION FACILITY (HFEF) (785) MONTHLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS & CONTAINER STORAGE/PROCESS AREAS

(Instructions on the reverse side)

COMPLETION					
TSD Inspector: (Please Print Full Name)		Date:		Time:	

MAIN FLOOR	3RD FLOOR
Signage – The following access doors are posted with a legible sign that states: "DANGER – UNAUTHORIZED PERSONNEL KEEP OUT"	**Signage – The following access doors are posted with a legible sign that states: "DANGER – UNAUTHORIZED PERSONNEL KEEP OUT"**
1. Decon cell entry door: ❑ Sat ❑ Unsat	1. Northwest door: ❑ Sat ❑ Unsat
	2. Southeast door: ❑ Sat ❑ Unsat
FIRE ALARM PULLBOXES ARE PRESENT AT THE FOLLOWING LOCATIONS AND ARE ACCESSIBLE.	**FIRE ALARM PULLBOXES ARE PRESENT AT THE FOLLOWING LOCATIONS AND ARE ACCESSIBLE.**
1. Northwest exit: ❑ Sat ❑ Unsat	1. Northwest exit: ❑ Sat ❑ Unsat
2. Southeast exit: ❑ Sat ❑ Unsat	2. Southeast exit: ❑ Sat ❑ Unsat
FIRE EXTINGUISHERS ARE PRESENT, ACCESSIBLE, AND OPERABLE AT THE FOLLOWING LOCATIONS (see Note).	**FIRE EXTINGUISHERS ARE PRESENT, ACCESSIBLE, AND OPERABLE AT THE FOLLOWING LOCATIONS (see Note).**
Northwest corner – ABC: ❑ Sat ❑ Unsat	HRA WALL – CO2: ❑ Sat ❑ Unsat
West wall – CO2: ❑ Sat ❑ Unsat	Room 304 – ABC: ❑ Sat ❑ Unsat
Southeast corner – ABC: ❑ Sat ❑ Unsat	Northeast Corner, Outside Prep Room - ABC: ❑ Sat ❑ Unsat
Truck Trans. Eastwall–2 ABC's: ❑ Sat ❑ Unsat	WCC – ABC: ❑ Sat ❑ Unsat
	WCC – MLX: ❑ Sat ❑ Unsat
	EYE WASH STATION AND EMERGENCY SHOWER ARE PRESENT, ACCESSIBLE, AND OPERABLE AT THE FOLLOWING LOCATIONS (see Note).
	1. Eyewash – Southside: ❑ Sat ❑ Unsat
	2. Shower – Room 304: ❑ Sat ❑ Unsat
Portable Spill Control Cabinet Seal is Intact and Cabinet is Accessible	**Portable Spill Control Cabinet Seal is Intact and Cabinet is Accessible**
1. Truck Transfer Area: ❑ Sat ❑ Unsat	Northeast Corner Prep Room Door ❑ Sat ❑ Unsat

DEFICIENCIES AND CORRECTIVE ACTIONS		
	Corrective Action	
Deficiency Description	Description	Completion Date
Previously Identified ❑Yes ❑No ❑N/A	Scheduled ❑Yes ❑No ❑N/A	

REVIEW			
Facility Manager or Designee:		Date:	

INSTRUCTIONS

[1] **TSD Inspector**: Perform the following:

- [a] Prior to performing the inspection, review the RCRA Remedial Description Log (located in Record Storage Area).
- [b] If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on this inspection log in the Deficiencies Description section or Comments section until the corrective action has been completed.
- [c] Print your name and record the date and time.
- [d] Perform inspections monthly (once every 30 days or calendar month) in all container storage/treatment areas.
- [e] Complete the "Inspection Requirements" checklist for each requirement by marking ✓ Sat=satisfactory or Unsat=unsatisfactory.
- [f] If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ Sat; and describe the corrective action taken (e.g., replace sign).
- [g] If you are not able to take immediate action mark ☑ Unsat, describe the deficiency, and immediately contact one of the following: Staff Specialist, SS, and/or Facility Manager/Designee. On backshift, notify the appropriate contacts on the TSDF call-down list (as applicable).
- [h] Place the completed log in the designated location for the Facility Manager/Designee to review.

[2] **Facility Manager or Designee**: Perform the following:

- [a] Record that the inspection was performed on the RCRA Inspection Tracking Index.
- [b] Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
- [c] Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (for example, TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
- [d] When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

Note: Present, accessible, and operable are satisfactorily met when the following criteria have been met:

Present: means that the emergency shower, eye wash, or fire extinguisher is physically present.

Accessible: means there is a clear path to the emergency shower, eyewash, or fire extinguisher.

Operable: means the emergency shower, eyewash, or fire extinguisher is maintained so personnel handling hazardous waste have emergency equipment available that operates to minimize harm to those individuals during an emergency. For the inspector checking emergency shower and eye wash units, the following must be met to identify the unit is operable: (1) These emergency units have a supply of water (hard-piped or available as part of the self-contained unit) and are not tagged "out-of-service." Note: No discharge of water is required for these monthly inspections. (2) These units have a current annual inspection tag. (3) The units are not tagged "out-of-service." For fire extinguishers, the following must be met to identify the unit as operable: (1) safety seals and tamper indicators are intact, and/or indicated pressure is "normal," (2) assembly is intact, (3) there is no evidence of damage, corrosion, or leakage, and (4) if equipped with a pressure gauge, the indicator is in the "green zone," or the "pop-up" indicator in the fill cap is not in the up position.

Comments ____

FRM-371
11/28/12
Rev. 8

SODIUM COMPONENTS MAINTENANCE SHOP (SCMS) (793) DAILY TANK INSPECTION FORM HWMA UNIT INSPECTION OF TANKS AND TANK STORAGE/PROCESS AREAS

(Instructions on the reverse side)

COMPLETION					
TSD Technician: (Please Print Full Name)		Date:		Time:	

INSPECTION REQUIREMENTS			
LOW BAY		HIGH BAY	
❑ Daily (during normal storage operations).		❑ N/A (Mixed waste not present in the Water Wash System. **Note:** *SCMS-OI-7 verifies no standing water remains in the water wash system after completion of water wash.) No inspection is required for Items 1 thru 3 below.* ❑ Daily (during processing/treatment operations).	
Item	Results	Item	Results
1. Tank and piping are intact; no leaking or deterioration.	❑ Sat ❑ Unsat	1. Tank and piping are intact; no leaking or deterioration.	❑ Sat ❑ Unsat
2. Tank secondary containment (i.e., pit floor) has no gaps or cracks.	❑ Sat ❑ Unsat	2. Area floor coating has no cracks, chips, or lifting. (Use colored tape to cover any defects.)	❑ Sat ❑ Unsat
3. Pit floor has no liquids.	❑ Sat ❑ Unsat	3. Area floor coating has no liquid or leaks accumulated on floor.	❑ Sat ❑ Unsat

DEFICIENCIES AND CORRECTIVE ACTIONS		
	Corrective Action	
Deficiency Description	Description	Completion Date
Previously Identified ❑ Yes ❑ No	Scheduled ❑ Yes ❑ No	

REVIEW			
TSD Shift Supervisor (TSD SS):		**Date:**	

SODIUM COMPONENTS MAINTENANCE SHOP (SCMS) (793) DAILY TANK INSPECTION FORM HWMA UNIT INSPECTION OF TANKS AND TANK STORAGE/PROCESS AREAS

INSTRUCTIONS		
[1]	**TSD Technician** — Perform the following:	
	[a]	Prior to performing the inspection, review the RCRA Remedial Description Log (located in the MFC-765 Room 13).
	[b]	If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on this and subsequent inspection logs until the corrective action has been completed.
	[c]	Print your name and record the date and the time.
	[d]	Perform inspections daily.
	[e]	Complete the "Inspection Requirements" checklist for each requirement by marking ✓ Sat=satisfactory or Unsat=unsatisfactory.
	[f]	If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ Sat; and describe the corrective action taken (e.g., labels). On backshift, ensure that the call down list has been informed of any off-normal condition identified during rounds of SCMS.
	[g]	If you are not able to take immediate action; mark ☑ Unsat, describe the deficiency, and immediately contact the TSD SS, Spent Fuel Treatment/Storage Manager, or on backshift the call down list.
	[h]	Place the completed log in the designated location for the TSD SS to review.
[2]	**TSD SS** — Perform the following:	
	[a]	Record that the inspection was performed on the RCRA Inspection Tracking Index.
	[b]	Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
	[c]	Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Determine if any mixed waste was present in the High Bay and check the ❑ appropriately. If waste was present, assign a tracking number (for example, TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
	[d]	When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

Comments ____

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FRM-379
02/12/14
Rev. 4

SODIUM COMPONENTS MAINTENANCE SHOP (SCMS) (793) DAILY/WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS/DEBRIS & CONTAINER/DEBRIS STORAGE / PROCESS AREAS

(Instructions on the reverse side)

COMPLETION					
TSD Technician: (Please Print Full Name)		Date:		Time:	

INSPECTION TYPE
❑ Waste not present, inspection for items 1-4 not required.
❑ Daily (during container/debris processing/treatment operations).
❑ Weekly (during normal container/debris - storage operations).

INSPECTION				
	Results			
Item	793 Hi-Bay	793 Low Bay	793 C	793 G
1. Hazardous waste and barcode labels are in place, legible, and not damaged.	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A
2. Containers/debris position: upright, elevated, and lids/covers secured (unless in process).	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A
3. Containers/debris condition: intact with no evidence of leaks or deterioration caused by corrosion, pitting, rusting, dents, or swelling.	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A
4. Portable secondary containment: no gaps, cracks, leaks, or liquids.	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A
5. An aisle maintained of at least 3 ft for ingress and egress.	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat
6. Telephone is working and accessible.		❑Sat ❑Unsat		
7. Spill control materials are in place and accessible. • Portable 30-gal can of dry soda, ash, or sand with nonsparking shovel • One 85-gallon salvage drum • Corrosive spill locker including three 5-gal buckets of SPILL-X-C; three 5-gal buckets (empty); two face shields; two pairs of rubber gloves; two rubber aprons; two universal chemical spill kits.			❑Sat ❑Unsat ❑Sat ❑Unsat ❑Sat ❑Unsat	

DEFICIENCIES AND CORRECTIVE ACTIONS		
	Corrective Action	
Deficiency Description	Description	Completion Date
Previously Identified ❑Yes ❑No	Scheduled ❑Yes ❑No	

REVIEW			
TSD Facility Supervisor (TSD FS):		Date:	

SODIUM COMPONENTS MAINTENANCE SHOP (SCMS) (793) DAILY/WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS/DEBRIS & CONTAINER/DEBRIS STORAGE / PROCESS AREAS

INSTRUCTIONS

[1] **TSD Technician**—Perform the following:

- **[a]** Prior to performing the inspection, review the RCRA Remedial Description Log (located in the MFC-768 Work Control Area).
- **[b]** If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on this and subsequent inspection logs until the corrective action has been completed.
- **[c]** Print your name and record the date and the time.
- **[d]** Perform inspections <u>weekly</u> during normal on-going container/debris storage operations and <u>daily</u> during container/debris processing/treatment operations.
- **[e]** Complete the "Inspection Requirements" checklist for each requirement by marking ✓ Sat=satisfactory, Unsat=unsatisfactory, or N/A=not applicable.
- **[f]** If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ Sat; and describe the corrective action taken (e.g., replaced label).
- **[g]** If you are not able to take immediate action mark ☑ Unsat, describe the deficiency, and immediately contact the TSD FS or TSD Manager.
- **[h]** Place the completed log in the designated location for the TSD FS to review.

[2] **TSD FS**—Perform the following:

- **[a]** Record that the inspection was performed on the RCRA Inspection Tracking Index.
- **[b]** Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
- **[c]** Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (for example, TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
- **[d]** When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

NOTE: *Debris means solid material exceeding a 60-mm particle size that is intended for disposal and that is a manufactured object, or plant or animal matter, or natural geologic material. Examples at MFC include pipes, valves, scrap metal, and industrial equipment.*

Comments ____

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FRM-372
12/09/13
Rev. 4

SODIUM COMPONENTS MAINTENANCE SHOP (SCMS) (793) MONTHLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINER AND TANK STORAGE AREA

(Instructions on the reverse side)

TSD Technician: (Please Print)		Date:		Time:	

SIGNS				
THE FOLLOWING ACCESS DOORS ARE POSTED WITH A LEGIBLE SIGN THAT STATES: "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"				
Item	793 Hi-Bay	793 Low Bay	793 C	793 G
1. East door	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	
2. West door		❑Sat ❑Unsat		❑Sat ❑Unsat
FIRE ALARM PULLBOXES AT THE FOLLOWING LOCATIONS ARE ACCESSIBLE:				
1. East door	❑Sat ❑Unsat	❑Sat ❑Unsat	❑Sat ❑Unsat	
2. West door		❑Sat ❑Unsat	❑Sat ❑Unsat	
SODIUM BURN KIT IS PRESENT AND ACCESSIBLE. EYEWASH STATION AND EMERGENCY SHOWER ARE PRESENT, ACCESSIBLE, AND OPERABLE (see Note)				
1. Southeast corner	❑Sat ❑Unsat			
FIRE EXTINGUISHERS ARE PRESENT, ACCESSIBLE, AND OPERABLE (see Note)				
1. Two MLX, south wall	❑Sat ❑Unsat			
2. ABC, south wall	❑Sat ❑Unsat			
3. Portable MLX-350	❑Sat ❑Unsat			
4. ABC, northeast corner	❑Sat ❑Unsat			
5. ABC, near east door		❑Sat ❑Unsat	❑Sat ❑Unsat	
6. ABC, solidification area		❑Sat ❑Unsat		
7. MLX, near east door			❑Sat ❑Unsat	

DEFICIENCIES AND CORRECTIVE ACTIONS				
		Corrective Action		
Deficiency Description	Previously Identified	Description	Scheduled	Completion Date
	❑Yes ❑No		❑Yes ❑No	

REVIEW			
TSD Facility Supervisor (TSD/FS):		Date:	

SODIUM COMPONENTS MAINTENANCE SHOP (SCMS) (793) MONTHLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINER AND TANK STORAGE AREA

INSTRUCTIONS		
[1]	**TSD Technician**—Perform the following:	
	[a]	Prior to performing the inspection, review the RCRA Remedial Description Log (located in the MFC-768 Work Control Area).
	[b]	If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on the subsequent inspection log until the corrective action has been completed.
	[c]	Print your name and record the date and the time.
	[d]	Perform inspections <u>monthly</u> (once every 30 days) in all container and tank storage/treatment areas.
	[e]	Complete the "Inspection Requirements" checklist for each requirement by marking ✓ Sat=satisfactory or Unsat=unsatisfactory.
	[f]	If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ Sat; and describe the corrective action taken (e.g., replace sign).
	[g]	If you are not able to take immediate action mark ☑ Unsat, describe the deficiency, and immediately contact the TSD/FS or TSD Manager. On backshift, notify the appropriate contacts on the TSDF call-down list (as applicable).
	[h]	Place the completed log in the designated location for the TSD/FS to review.
[2]	**TSD/FS**—Perform the following:	
	[a]	Record that the inspection was performed on the RCRA Inspection Tracking Index.
	[b]	Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
	[c]	Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (i.e., TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
	[d]	When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

Note: Present, accessible, and operable are satisfactorily met when the following criteria have been met:
Present: Means that the emergency shower, eyewash, or fire extinguisher is physically present.
Accessible: Means there is a clear path to the emergency shower, eyewash, or fire extinguisher.
Operable: Means the emergency shower, eyewash, or fire extinguisher is maintained so personnel handling hazardous waste have emergency equipment available that operates to minimize harm to those individuals during an emergency. For the inspector checking emergency shower and eyewash units, the following must be met to identify the unit is operable: (1) These emergency units have a supply of water (hard-piped or available as part of the self-contained unit), are not tagged "out-of-service." Note: No discharge of water is required for these monthly inspections. (2) These units have a current annual inspection tag. For fire extinguishers, the following must be met to identify the unit as operable: (1) safety seals and tamper indicators are intact, (2) assembly is intact, (3) there is no evidence of damage, corrosion, or leakage, and (4) if equipped with a pressure gauge, the indicator is in the "green zone," or the "pop-up" indicator in the fill cap is not in the up position.

Comments ____
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FRM-363
02/12/14
Rev. 3

SODIUM STORAGE BUILDING (SSB) (703) WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS/DEBRIS & CONTAINER/DEBRIS STORAGE AREAS

(Instructions on the reverse side)

COMPLETION					
TSD Technician: (Please Print Full Name)		Date:		Time:	

INSPECTION TYPE
❑ Waste not present, inspection for items 1-4 not required, mark N/A
❑ Weekly (during normal container/debris - storage operations).
❑ Weekly HRA inspection from outside the HRA.
❑ Monthly HRA inspection from within the HRA (if all items listed below are not visible for inspection).

INSPECTION		
Item	Results: General Area	Results: High Rad Area
1. Hazardous waste and barcode labels are in place, legible, and not damaged.	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A
2. Containers/debris position: upright, elevated, and lids/covers secured (unless in process).	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A
3. Containers/debris condition: intact with no evidence of leaks or deterioration caused by corrosion, pitting, rusting, dents, or swelling.	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A
4. Portable secondary containment: no gaps, cracks, leaks, or liquids	❑Sat ❑Unsat ❑N/A	❑Sat ❑Unsat ❑N/A
5. An aisle maintained of at least 3 ft for ingress and egress.	❑Sat ❑Unsat	
6. Radio working.	❑Sat ❑Unsat	
7. Spill control material is in place and accessible. • Portable 30-gal can of dry soda, ash, or sand with nonsparking shovel.	❑Sat ❑Unsat	

DEFICIENCIES AND CORRECTIVE ACTIONS		
Deficiency Description	Corrective Action: Description	Corrective Action: Completion Date
Previously Identified ❑Yes ❑No	Scheduled ❑Yes ❑No	

REVIEW			
TSD Facility Supervisor (TSD FS):		Date:	

SODIUM STORAGE BUILDING (SSB) (703) WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINERS/DEBRIS & CONTAINER/DEBRIS STORAGE AREAS

INSTRUCTIONS

[1] **TSD Technician**—Perform the following:

- **[a]** Prior to performing the inspection, review the RCRA Remedial Description Log (located in the MFC-768 Work Control Area).
- **[b]** If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on this and subsequent inspection logs until the corrective action has been completed.
- **[c]** Prior to performing inspection obtain radio and verify radio works. Document operability on Item #6.
- **[d]** Print your name and record the date and the time.
- **[e]** Perform inspections of the general area and Hot Repair Area (HRA) from outside the HRA weekly during normal on-going container/debris storage operations. Perform an inspection of the HRA monthly if a thorough inspection can not be performed from outside the HRA.
- **[f]** Complete the "Inspection Requirements" checklist for each requirement by marking ✓ Sat=satisfactory, Unsat=unsatisfactory, or N/A=not applicable.
- **[g]** If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ Sat; and describe the corrective action taken (e.g., replaced label).
- **[h]** If you are not able to take immediate action, mark ☑ Unsat, describe the deficiency, and immediately contact the TSD FS or TSD Manager.
- **[i]** Place the completed log in the designated location for the TSD/FS to review.

[2] **TSD FS**—Perform the following:

- **[a]** Record that the inspection was performed on the RCRA Inspection Tracking Index.
- **[b]** Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
- **[c]** Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (for example, TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
- **[d]** When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

NOTE: Debris means solid material exceeding a 60-mm particle size that is intended for disposal and that is a manufactured object, or plant or animal matter, or natural geologic material. Examples at MFC include pipes, valves, scrap metal, and industrial equipment.

Comments ____

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FRM-364
01/07/14
Rev. 2

SODIUM STORAGE BUILDING (SSB) (703) MONTHLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINER STORAGE AREAS

(Instructions on the reverse side)

COMPLETION					
TSD Technician: (Please Print)		Date:		Time:	

SIGNS	
THE FOLLOWING ACCESS DOOR IS POSTED WITH A LEGIBLE SIGN THAT STATES: "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"	
1. East Door	❑Sat ❑Unsat
FIRE ALARM PULLBOXES AT THE FOLLOWING LOCATIONS ARE ACCESSIBLE:	
1. Outside east door	❑Sat ❑Unsat
2. Inside east door	❑Sat ❑Unsat
3. Near south door	❑Sat ❑Unsat
FIRE EXTINGUISHERS ARE PRESENT, ACCESSIBLE, AND OPERABLE (see Note)	
1. MLX-350, South of 703 in Tin Shed *	❑Sat ❑Unsat
2. MLX, near east door	❑Sat ❑Unsat
3. ABC, near east door	❑Sat ❑Unsat
4. ABC, near south door	❑Sat ❑Unsat
5. MLX, near south door	❑Sat ❑Unsat
* If snow depth will impede use of this fire extinguisher, mark ☑ Unsat.	

DEFICIENCIES AND CORRECTIVE ACTIONS				
		Corrective Action		
Deficiency Description	Previously Identified	Description	Scheduled	Completion Date
	❑Yes ❑No		❑Yes ❑No	
	❑Yes ❑No		❑Yes ❑No	

REVIEW			
TSD Facility Supervisor (TSD/FS):		Date:	

SODIUM STORAGE BUILDING (SSB) (703) MONTHLY INSPECTION FORM
HWMA UNIT INSPECTION OF CONTAINER STORAGE AREAS

INSTRUCTIONS

[1] **TSD Technician**—Perform the following:

- **[a]** Prior to performing the inspection, review the RCRA Remedial Description Log (located in MFC-765, Room 13, Shift Supervisor's office).
- **[b]** If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on the subsequent inspection log until the corrective action has been completed.
- **[c]** Print your name and record the date and the time.
- **[d]** Perform inspections <u>monthly</u>.
- **[e]** Complete the "Inspection Requirements" checklist for each requirement by marking ✓ Sat=satisfactory or Unsat=unsatisfactory.
- **[f]** If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ Sat; and describe the corrective action taken (e.g., replaced label).
- **[g]** If you are not able to take immediate action mark ☑ Unsat, describe the deficiency, and immediately contact the TSD/FS or TSD Manager. On backshift, notify the appropriate contacts on the TSDF call-down list (as applicable).
- **[h]** Place the completed log in the designated location for the TSD/FS to review.

[2] **TSD/FS**—Perform the following:

- **[a]** Record that the inspection was performed on the RCRA Inspection Tracking Index.
- **[b]** Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
- **[c]** Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (i.e., TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
- **[d]** When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

Note: Present, accessible, and operable are satisfactorily met when the following criteria have been met:
Present: Means that the fire extinguisher is physically present.
Accessible: Means there is a clear path to the fire extinguisher.
Operable: Means the fire extinguisher is maintained so personnel handling hazardous waste have emergency equipment available that operates to minimize harm to those individuals during an emergency. For the inspector checking fire extinguishers, the following must be met to identify the unit as operable: (1) safety seals and tamper indicators are intact, (2) assembly is intact, (3) there is no evidence of damage, corrosion, or leakage, and (4) if equipped with a pressure gauge, the indicator is in the "green zone," or the "pop-up" indicator in the fill cap is not in the up position.

Comments ____

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RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF) (771) WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF MISCELLANEOUS UNIT

(Instructions on the reverse side)

COMPLETION					
TSD Technician: (Please Print Full Name)		Date:		Time:	

INSPECTION	
Item	Results
1. Telephone is working.	❑Sat ❑Unsat
2. "**Danger-Unauthorized Personnel Keep Out**" signs on gates are present and legible.	❑Sat ❑Unsat
3. Barrier fence in good condition.	❑Sat ❑Unsat
4. Gates are in good condition.	❑Sat ❑Unsat
5. Cathodic protection rectifier lights are on.	❑Sat ❑Unsat

DEFICIENCIES AND CORRECTIVE ACTIONS		
	Corrective Action	
Deficiency Description	Description	Completion Date
Previously Identified ❑Yes ❑No	Scheduled ❑Yes ❑No	

REVIEW			
TSD Facility Supervisor (TSD FS):		Date:	

RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF) (771) WEEKLY INSPECTION FORM
HWMA UNIT INSPECTION OF MISCELLANEOUS UNIT

INSTRUCTIONS

[1] **TSD Technician**—Perform the following:

- [a] Prior to performing the inspection, review the RCRA Remedial Description Log (located in the MFC-768 Work Control Area).
- [b] If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on this and subsequent inspection logs until the corrective action has been completed.
- [c] Print your name and record the date and the time.
- [d] Perform inspections <u>weekly</u>.
- [e] Complete the "Inspection Requirements" checklist for each requirement by marking ✓ **Sat**=satisfactory or **Unsat**=unsatisfactory.
- [f] If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ **Sat**; and describe the corrective action taken (e.g., replaced sign).
- [g] If you are not able to take immediate action, mark ☑ **Unsat**, describe the deficiency, and immediately contact the TSD FS or TSD Manager.
- [h] Place the completed log in the designated location for the TSD FS to review.

[2] **TSD FS**—Perform the following:

- [a] Record that the inspection was performed on the RCRA Inspection Tracking Index.
- [b] Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
- [c] Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (for example, TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
- [d] When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

Comments ______________________________

FRM-930
11/11/08
Rev. 0

RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF) (771) LINER INSPECTION AND RADIATION READING FORM (HWMA UNIT INSPECTION OF MISCELLANEOUS UNIT)

(Instructions on the reverse side)

COMPLETION					
TSD Technician: (Please Print Full Name)		Date:		Time:	

INSPECTION
❑ Quarterly visual inspection of all HW/MW liners (see attachment)
❑ Quarterly visual inspection of HW/MW liners not performed (all liners covered by snow)
❑ Quarterly visual inspection of some HW/MW liners (see attachment)
❑ Annual radiation readings – 3 ft above each HW/MW liner (see attachment)

Item	Results	Comments Row/Liner No. (if unsatisfactory)
1. Exposed portion of liners: no cracks and no severe corrosion or deterioration.	❑Sat ❑Unsat	
2. Radiation readings above MW liners are less than 5mr/hr increase from previous year.	❑Sat ❑Unsat	

DEFICIENCIES AND CORRECTIVE ACTIONS		
	Corrective Action	
Deficiency Description	Description	Completion Date
Previously Identified ❑Yes ❑No	Scheduled ❑Yes ❑No	

REVIEW			
TSD Facility Supervisor (TSD FS):		Date:	

RADIOACTIVE SCRAP AND WASTE FACILITY (RSWF) (771) LINER INSPECTION AND RADIATION READING FORM (HWMA UNIT INSPECTION OF MISCELLANEOUS UNIT)

(Instructions on the reverse side)

INSTRUCTIONS

[1] **TSD Technician**—Perform the following:

- **[a]** Prior to performing the inspection, review the Resource Conservation and Recovery Act (RCRA) Remedial Description Log (located in the MFC-768 Work Control Area).
- **[b]** If open deficiencies are identified on the RCRA Remedial Description Log, record the associated tracking number on this and subsequent inspection logs until the corrective action has been completed.
- **[c]** Print your name and record the date and the time.
- **[d]** Perform quarterly visual inspections of liners and arrange for annual HPT radiation readings.
- **[e]** Complete the "Inspection Requirements" checklist for each requirement by marking ✓ **Sat**=Satisfactory, or **Unsat**=Unsatisfactory.
- **[f]** If you are able to take immediate corrective action; record the deficiency, correct the deficiency, mark ☑ **Sat**; and describe the corrective action taken (for example, replaced sign).
- **[g]** If you are not able to take immediate action mark ☑ **Unsat**, describe the deficiency, and immediately contact the TSD FS or TSD Manager.
- **[h]** Place the completed log in the designated location for the TSD FS to review.

[2] **TSD FS**—Perform the following:

- **[a]** Record that the inspection was performed on the RCRA Inspection Tracking Index.
- **[b]** Review the log, and facility, if necessary, to ensure that the inspection and any immediate corrective actions have been satisfactorily completed. Sign and date the log and file it in the designated area.
- **[c]** Record on the RCRA Inspection Tracking Index if the deficiency was satisfactorily corrected immediately or is still outstanding. Assign a tracking number (for example, TSD-06-001) to the unresolved deficiency and record a detailed description of the deficiency on the RCRA Remedial Description Log.
- **[d]** When deficiencies have been corrected, enter the corrective action taken and completion date on the original inspection form(s) and complete the entries for the deficiencies on the RCRA Inspection Tracking Index and the RCRA Remedial Description Log.

Comments ____

	Aug	2013		Field Copy								
	Cells in yellow to be completed in field				By:		Date:					
								Oprtng	Rectifier	Rectifier	Tap	Comment
ROW	DVM Vdc	DVM Vdc Shunt	DC Current	Time	DC Power Out	AC power In	EFF %	Light Y/N	Meter V	Meter A	Adj/Date	
			DVM Shunt * 2.4		DVM * DC Current	51840 / Time	(DC Pwr Out Pair / AC Pwr In) * 100					
R1	18.9	24.2	58.08	22.5	1097.7	2304		Y	18	50		Data from previous month
R2	13.9	24	57.6	22.5	800.64	2304	82	Y	14	46		Data from previous month
R3	12.93	19.9	29.85	56.3	386.0	920		Y	13.5	28		Data from previous month
R4	12.9	15.4	23.1	56.3	298.0	920	74	Y	13	24		Data from previous month
R5	7.05	33.3	53.28	46.3	375.6	1119		Y	7	49		Data from previous month
R6	7.05	31.6	50.56	46.3	356.448	1119	65	Y	8	48		Data from previous month
R7	16.81	21.3	34.08	35.6	572.9	1456		Y	17	31		Data from previous month
R8	16.7	21.5	34.4	35.6	574.5	1456	78	Y	17	34		Data from previous month
R9	5.32	24.2	36.3	70.1	193.1	739		Y	9	35		Data from previous month
R10	5.42	22.9	34.35	70.1	186.177	739	51	Y	5.5	32		Data from previous month
R11	14.26	13.9	22.24	56.7	317.1	914		Y	15	20		Data from previous month
R12	14.5	15	24	56.7	348.0	914	72	Y	16	20		Data from previous month
	Attach page with any additional comments as necessary.											

Example RSWF Monthly Cathodic Protection Data Sheet

Example RSWF Annual Cathodic Protection Data Sheets (select sheets of entire set provided)

2013 Rectifier Units Data Information Sheets

List below the following information for the MT&E used to perform this PM.

TYPE OF TEST EQUIPMENT USED: ___________________	
SERIAL NUMBER________________	**CALIBRATION DUE DATE:**_________

TYPE OF TEST EQUIPMENT USED: ___________________	
SERIAL NUMBER________________	**CALIBRATION DUE DATE:**_________

TYPE OF TEST EQUIPMENT USED: ___________________	
SERIAL NUMBER________________	**CALIBRATION DUE DATE:**_________

TYPE OF TEST EQUIPMENT USED: ___________________	
SERIAL NUMBER________________	**CALIBRATION DUE DATE:**_________

TYPE OF TEST EQUIPMENT USED: ___________________	
SERIAL NUMBER________________	**CALIBRATION DUE DATE:**_________

TYPE OF TEST EQUIPMENT USED: ___________________	
SERIAL NUMBER________________	**CALIBRATION DUE DATE:**_________

TYPE OF TEST EQUIPMENT USED: ___________________	
SERIAL NUMBER________________	**CALIBRATION DUE DATE:**_________

TYPE OF TEST EQUIPMENT USED: ___________________	
SERIAL NUMBER________________	**CALIBRATION DUE DATE:**_________

TYPE OF TEST EQUIPMENT USED: ___________________	
SERIAL NUMBER________________	**CALIBRATION DUE DATE:**_________

2013 Rectifier Units Data Information Sheets

RSWF CATHODIC PROTECTION SYSTEM

ANNUAL INSPECTION AND TEST

WORK TO BE PERFORMED:

NOTE 1: *The steps of these Data Sheets may be worked out of sequence within the prescribed work scope and environmental, safety, health and quality requirements for this work order as instructed by the Job Supervisor. Bullet steps within each step may be performed in the most logical sequence. Checkbox steps within each step are to be worked in order. The portion of each step for a given component, i.e. Rectifier # 1, may be performed and completed before moving on to the next component. Signatures at the end of each step indicated total completion of the step.*

NOTE 2: *Any abnormal, unexpected or questionable readings, images, deficiencies, etc. identified during the performance of these steps will be marked/circled in "RED" so it is easily identifiable by the SSC Engineer who will identify the corrective actions required to correct the abnormal, unexpected or questionable readings/ images, deficiencies, etc.*

Performers (Print Name)

2013 Rectifier Units Data Information Sheets

1. ELECTRICIAN: Date: ____________________

1.1. Perform thermo graphic imaging of the components listed in the table below:

Rectifier No.	Comments	Satisfactory (Yes/No)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

1.2. Provide the information collected to the SSC Engineer for analysis.

Signature:		**Date:**		**S No.:**	

2013 Rectifier Units Data Information Sheets

2. ELECTRICIAN: Date ___/___/___ Time (am/pm) _________

2.1. Visually inspect the rectifier units for evidence of any loose connections, burned places or arc tracks.

2.2. Record by rectifier unit below (if none are found indicate by the word "none" in comments section).

Rectifier No.	Comments	Satisfactory (Yes/No)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

Signature:		Date:		S No.:	

3. ELECTRICIAN: Date ___/___/___ Time (am/pm) _________

3.1. From the outside, ensure all openings are clear of any material that will reduce ventilation of components on all twelve of the rectifier units.

Rectifier No.	Comments	Satisfactory (Yes/No)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

Signature:		Date:		S No.:	

2013 Rectifier Units Data Information Sheets

4. SUPERVISOR/FOREMAN: Date ___/___/___ Time (am/pm) _________

The Supervisor/Foreman has reviewed the data sheets used to perform this PM.
IF any unacceptable/unsatisfactory conditions were noted,
THEN those conditions have been listed on the "Task Evaluation Feedback/Comments Form" and the SSC Engineer notified.

Signature:		**Date:**		**S No.:**	

Supervisor/Foreman

5. SSC ENGINEER: Date ___/___/___ Time (am/pm) _________

Review the information provided in steps, 1 thru 3 and anything identified on the "Task Evaluation Feedback/Comments Form". Any corrective measures/work required shall be listed in the space provided below, corrective information below shall include problem and method for resolution to include PIF numbers, corrective actions etc.

If additional space is needed add an additional page behind this page of the Work Order.

Signature:		**Date:**		**S No.:**	

2013 Rectifier Units Data Information Sheets

Rectifier Data Information is correct for each rectifier listed by placing Yes or NO in the column provided. Line through any errors and write in correct information.

Rectifier Unit Number	Rectifier Serial Number	Rectifier Mfg:	Rectifier Rated AC Input:	Rectifier Rated DC Output:	Installation Date	Rectifier Data Information Correct (Yes/NO
R1	93C1973	Good-All	Volts:480 AC, Amps: 8.0 Phase: 3	Volts 50 DC Amps: 100	2/94	
R2	C090886	Corrpro	Volts:480 AC, Amps: 8.0 Phase: 3	Volts 50 DC Amps: 100	2/94	
R3	89C2101	Good-All	Volts:480 AC, Amps: 2.08 Phase: 3	Volts 20 DC Amps: 60	4/90	
R4	89C2100	Good-All	Volts:480 AC, Amps: 2.08 Phase: 3	Volts 20 DC Amps: 60	4/90	
R5	91C2276	Good-All	Volts:480 AC, Amps: 2.1 Phase: 3	Volts 20 DC Amps: 60	1/92	
R6	91C2280	Good-All	Volts:480 AC, Amps: 2.1 Phase: 3	Volts 20 DC Amps: 60	1/92	

2013 Rectifier Units Data Information Sheets

Rectifier Unit Number	Rectifier Serial Number	Rectifier Mfg:	Rectifier Rated AC Input:	Rectifier Rated DC Output:	Installation Date	Rectifier Data Information Correct (Yes/NO
R7	91C2277	Good-All	Volts:480 AC, Amps: 2.1 Phase: 3	Volts 20 DC Amps: 60	1/92	
R8	91C2279	Good-All	Volts:480 AC, Amps: 2.1 Phase: 3	Volts 20 DC Amps: 60	1/92	
R9	C091461	Corrpro	Volts:480 AC, Amps: 2.8 Phase: 3	Volts 24 DC Amps: 60	8/20/10	
R10	C090885	Corrpro	Volts:480 AC, Amps: 2.8 Phase: 3	Volts 24 DC Amps: 60	1/92 7/09	
R11	95C2927	Good-All	Volts:480 AC, Amps: 2.3 Phase: 3	Volts 20 DC Amps: 60	10/95	
R12	95C2928	Good-All	Volts:480 AC, Amps: 2.3 Phase: 3	Volts 20 DC Amps: 60	10/95	

2013 Rectifier Units Data Information Sheets

Additional Comments:

2013 Rectifier Units Data Information Sheets

With both rectifier pairs operating, perform the following inspection and tests on each liner.

Highlight all LINER-TO-SOIL readings greater than -0.85 Vdc. Example: -0.84 Vdc is greater than -0.85 Vdc.

Rectifier Unit Numbers R1 R2

Rectifier Serial Numbers 93C1973 C090886

Start Date: ________Time:_______

2013 Readings taken by: ______________

LINER NUMBER	LINER-TO-SOIL POTENTIAL (Volts)				REMARKS*
	20010 Date Taken	2011 Date Taken	2012 Date Taken	2013 Date Taken __/__/____	
MM3	-1.75	-1.93	-2.44		
MM4	-2.10	-2.11	-3.20		
MM5	-2.28	-2.14	-3.66		
MM6	-2.94	-2.83	-4.29		
MM7	-3.27	-3.18	-4.52		
MM8	-2.49	-2.66	-4.26		
MM9	-2.03	-1.80	-2.55		
MM10	-2.15	-1.98	-3.01		
MM11	-1.88	-1.75	-2.55		
MM12	-1.80	-1.60	-2.38		
MM13	-1.68	-1.54	-2.07		
MM14	-1.78	-1.68	-2.36		
MM15	-1.55	-1.52	-2.39		
MM16	-1.62	-1.49	-2.22		
MM17	-1.66	-1.41	-2.15		
MM18	-1.84	-1.75	-2.61		
MM19	-2.18	-2.01	-3.03		
MM20	-2.28	-2.23	-3.18		
MM21	-2.56	-2.50	-3.60		
MM22	-2.82	-2.53	-3.64		
MM23	-2.27	-2.23	-3.11		
MM24	-2.15	-2.07	-2.88		
MM25	-2.16	-2.13	-2.88		
MM26	-2.36	-2.31	-3.46		
MM27	-2.87	-2.48	-3.87		
MM28	-2.94	-2.61	-3.86		

*Remarks reflect remedial actions and date completed

2013 Rectifier Units Data Information Sheets

With both rectifier pairs operating, perform the following inspection and tests on each liner.

Highlight all LINER-TO-SOIL readings greater than -0.85 Vdc. Example: -0.84 Vdc is greater than -0.85 Vdc.

Rectifier Unit Numbers R1 R2

Rectifier Serial Numbers 93C1973 C090886

Start Date:____Time:_______

2013 Readings taken by: ______________

LINER NUMBER	LINER-TO-SOIL POTENTIAL (Volts)				REMARKS*
	2010 Date Taken 4/15/10	2011 Date Taken 5/12/11	2012 Date Taken 6/25/12	2013 Date Taken __/__/___	
MM29	-2.85	-2.29	-2.89		
MM30	-2.59	-2.37	-3.15		
MM31	-2.39	-2.30	-3.24		
MM32	-2.10	-2.14	-3.08		
MM33	-2.26	-2.35	-3.44		
MM34	-1.86	-2.08	-3.17		
MM35	-1.48	-1.58	-1.99		
MM36	-1.79	-1.75	-2.58		
MM37	-1.98	-1.98	-2.89		
MM38	-2.18	-2.08	-3.08		
MM39	-1.98	-1.87	-2.77		
MM40	-2.33	-1.89	-2.85		
MM41	-2.55	-1.85	-2.85		
MM42	-2.48	-2.08	-3.01		
MM43	-2.43	-2.14	-3.05		
MM44	-2.49	-2.36	-3.41		
MM45	-2.15	-1.89	-2.54		
MM46	-1.96	-1.83	-2.40		
MM47	-2.03	-2.00	-2.44		
MM48	-1.77	-1.85	-2.36		
MM49	-1.52	-1.70	-1.90		
MM50	-1.34	-1.57	-1.62		
MM51	-1.11	-1.44	-1.36		
MM52	-1.04	-1.62	-1.33		

*Remarks reflect remedial actions and date completed

2013 Rectifier Units Data Information Sheets

2010 Start Date/Time: 04/19/10 Time: ____

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R1 (LL/MM&MM/NN)	11.2	R1 (PP)	24.0	4/19/10	MB	
R1 (NN/OO)	36.7	R1 (NN/OO)	17.6	4/19/10	MB	
R1 (OO/PP&PP/QQ)	2.0	R1 (LL/MM)	8.1	4/19/10	MB	

2011 Start Date/Time: 05/12/11 Time: 1300

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R1 (LL/MM&MM/NN)	12.0 mv	R1 (PP)	7.3 mv	5/12/11	MB	
R1 (NN/OO)	36.3 mv	R1 (NN/OO)	17.3 mv	5/12/11	MB	
R1 (OO/PP&PP/QQ)	.1 mv	R1 (LL/MM)	23.8 mv	5/12/11	MB	

2012 Start Date/Time: 6/27/12 Time: 0930

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R1 (LL/MM&MM/NN)	14.58mv	R1 (PP)	26.47mv	6/27/12	CAJ	
R1 (NN/OO)	40.45mv	R1 (NN/OO)	21.0mv	6/27/12	CAJ	
R1 (OO/PP&PP/QQ)	.014mv	R1 (LL/MM)	8.30mv	6/27/12	CAJ	

2013 Start Date/Time: ________ Time: ________

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R1 (LL/MM&MM/NN)		R1 (PP)				
R1 (NN/OO)		R1 (NN/OO)				
R1 (OO/PP&PP/QQ)		R1 (LL/MM)				

2014 Start Date/Time: ________ Time: ________

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R1 (LL/MM&MM/NN)		R1 (PP)				
R1 (NN/OO)		R1 (NN/OO)				
R1 (OO/PP&PP/QQ)		R1 (LL/MM)				

2015 Start Date/Time: ________ Time: ________

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R1 (LL/MM&MM/NN)		R1 (PP)				
R1 (NN/OO)		R1 (NN/OO)				
R1 (OO/PP&PP/QQ)		R1 (LL/MM)				

*Remarks reflect remedial actions and date completed

2013 Rectifier Units Data Information Sheets

2010 Start Date/Time: 04/19/10 Time: ____

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R2 (OO/PP&PP/QQ)	21.2	R2 (PP)	5.2	4/19/10	MB	
R2 (NN/OO)	33.1	R2 (NN/OO)	15.5	4/19/10	MB	
R2 (LL/MM&MM/NN)	49.6	R2 (LL/MM)	16.7	4/19/10	MB	

2011 Start Date/Time: 05/12/11Time: 1300

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R2 (OO/PP&PP/QQ)	32.8 mv	R2 (PP)	4.9 mv	5/12/11	MB	
R2 (NN/OO)	21.3 mv	R2 (NN/OO)	15.4 mv	5/12/11	MB	
R2 (LL/MM&MM/NN)	49.2 mv	R2 (LL/MM)	16.7 mv	5/12/11	MB	

2012 Start Date/Time: 6/27/12 Time: 1030

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R2 (OO/PP&PP/QQ)	35.60mv	R2 (PP)	8.69mv	6/27/12	MB	
R2 (NN/OO)	26.95mv	R2 (NN/OO)	22.24mv	6/27/12	MB	
R2 (LL/MM&MM/NN)	31.12mv	R2 (LL/MM)	21.57mv	6/27/12	MB	

2013 Start Date/Time: ____

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R2 (OO/PP&PP/QQ)		R2 (PP)				
R2 (NN/OO)		R2 (NN/OO)				
R2 (LL/MM&MM/NN)		R2 (LL/MM)				

2014 Start Date/Time: ____

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R2 (OO/PP&PP/QQ)		R2 (PP)				
R2 (NN/OO)		R2 (NN/OO)				
R2 (LL/MM&MM/NN)		R2 (LL/MM)				

2015 Start Date/Time: ____

ANODE SHUNT NUMBER	ANODE SHUNT VOLTAGE	LINER SHUNT NUMBER	LINER SHUNT Voltage	DATE	BY	REMARKS*
R2 (OO/PP&PP/QQ)		R2 (PP)				
R2 (NN/OO)		R2 (NN/OO)				
R2 (LL/MM&MM/NN)		R2 (LL/MM)				

*Remarks reflect remedial actions and date completed

Rectifier Units Data Information Sheets

2009

LINER NUMBER	STATIONARY REFERENCE ELECTRODE NUMBER	LINER-TO- STATIONARY REFERENCE ELECTRODE POTENTIAL	DATE	BY	REMARKS*
LL26	E2	-.84 VDC	04/21/09	NL	

2010

Start Date/Time: 04/19/10 Time: ____

LINER NUMBER	STATIONARY REFERENCE ELECTRODE NUMBER	LINER-TO- STATIONARY REFERENCE ELECTRODE POTENTIAL	DATE	BY	REMARKS*
LL26	E2	-.73.	4/19/10	MB	

2011

Start Date/Time: 05/12/11 Time: 1300

LINER NUMBER	STATIONARY REFERENCE ELECTRODE NUMBER	LINER-TO- STATIONARY REFERENCE ELECTRODE POTENTIAL	DATE	BY	REMARKS*
LL26	E2	-.73 VOC	5/12/11	MB	

2012

Start Date/Time: ________________

LINER NUMBER	STATIONARY REFERENCE ELECTRODE NUMBER	LINER-TO- STATIONARY REFERENCE ELECTRODE POTENTIAL	DATE	BY	REMARKS*
LL26	E2	-1.4	6/27/12	MB	

2013

Start Date/Time: ________________

LINER NUMBER	STATIONARY REFERENCE ELECTRODE NUMBER	LINER-TO- STATIONARY REFERENCE ELECTRODE POTENTIAL	DATE	BY	REMARKS*
LL26	E2				

2014

Start Date/Time: ________________

LINER NUMBER	STATIONARY REFERENCE ELECTRODE NUMBER	LINER-TO- STATIONARY REFERENCE ELECTRODE POTENTIAL	DATE	BY	REMARKS*
LL26	E2				

2015

Start Date/Time: ________________

LINER NUMBER	STATIONARY REFERENCE ELECTRODE NUMBER	LINER-TO- STATIONARY REFERENCE ELECTRODE POTENTIAL	DATE	BY	REMARKS*
LL26	E2				

*Remarks reflect remedial actions and date completed

Attachment F-5

Examples of RSWF Corrosion Surveillance Liner Assessment

Statement-of-work and Inspection Report

October 16, 2013 CCN 231483

Mr. Brian R. Monson, Manager
Hazardous Waste Program
Idaho Department of Environmental Quality
1410 North Hilton
Boise, ID 83706

SUBJECT: Materials and Fuels Complex- Radioactive Scrap and Waste Facility 2013 Four-year Corrosion Surveillance Liner Assessment Report

Reference: Materials and Fuels Complex Hazardous Waste Management Act/Resource Conservation and Recovery Act Partial Permit #ID4890008952, Module V, Condition V.M., Corrosion Surveillance Liners, Effective Date, August 16, 2004

Dear Mr. Monson:

Enclosed please find three (3) copies of the certified 2013 Corrosion Assessment Report-Radioactive Scrap and Waste Facility Impressed Current Cathodic Protection System, written by Northwest Corrosion Engineering, fulfilling the permit conditions in V.M. and the permittee's certification required by permit condition I.W. Permit condition V.M.1 states: "One of the liners installed to monitor the effectiveness of the impressed current Cathodic Protection System shall be pulled every four (4) years, and inspected in accordance with Attachment 4 of this permit." Permit conditions V.M.1 (a and b) add: "(a) the inspection shall be performed by a corrosion expert, and shall be the basis of a report evaluating the effectiveness of the Cathodic Protection System, and (b) the permittee shall evaluate and propose a revised liner pull inspection schedule, as appropriate, based on the findings of this report and data from the corrosion surveillance tubes." Submittal of this report fulfills permit condition V.M.2 requiring submittal of the inspection report and proposed liner pull schedule, if applicable, within forty-five days of receipt of the report from the corrosion expert.

The Northwest Corrosion Engineering report, mailed to Battelle Energy Alliance on September 11, 2013, concludes that the Radioactive Scrap and Waste Facility (RSWF) Cathodic Protection System continues to be effective in protecting the liners of the RSWF for general external corrosion. Further, based upon the results of the recently completed evaluation as well as inspections performed 1997, 2001, 2005 and 2009, the time between liner removals could be lengthened so as to allow for inspections of the remaining six (6) surrogate liners to extend further into the future. The Idaho National Laboratory is currently evaluating whether or not we will submit a permit modification request for a specific increase in time frame between liner pulls as recommended in the report.

Please contact Alan Carvo at (208) 533-7363 if you have questions regarding this information.

Sincerely,

Carolyn S. Mascareñas, P.E.

Carolyn S. Mascareñas, Director
Environmental Support and Services

MJH:MR

Enclosure

cc: J. Alvarez, INL, MS 3695
M. Ayers, DOE-ID, MS 1222
P. K. Bowers, DOE-ID, MS 1226
T.D. Butler, DOE-ID, MS 1216
R. R. Chase, INL, MS 3695 (w/o Enc.)
R. W. Denning, DOE-ID, MS 7135
S. D. Dossett, INL, MS 3405
J. J. Grossenbacher, INL, MS 3695
L. Guinn Montgomery, INL, MS 3899
N. K. Hernandez, DOE-ID, MS 1216
D. P. Johnson, INL, MS 6144
C. D. Natoni, DOE-ID, MS 6142
S. M. Olson, DOE-ID, MS 1240
T. L. Perkins, DOE-ID, MS 1216
R. Richardson, DOE-ID, MS 1240
T. J. Safford, DOE-ID, MS 1216
D. M. Storms, INL, MS 3898

bcc: B. M. Angle, MS 3405
V. M. Bowen, MS 6174
P. J. Breidenbach, MS 6144
J. H. Burnside, MS 3898
T. L. Carlson, MS 7128 per telecon S.L.
A. E. Carvo, MS 6134 per telecon S.L.
L. M. Coe-Leavitt, MS 6134
J. T. Hartley, MS 6116
T. M. Hipp, MS 6112
M. J. Holzemer, MS 6134 per telecon S.L.
S. D. Lee, MS 3405 SL
J. C. Wass, MS 6144
Environmental Correspondence, MS 3405, email: ENVADD@inl.gov
INL Correspondence Control, MS 3106, email: BEZCC@inl.gov
INL Prime Contracts, MS 3898, email: Jennifer.Burnside@inl.gov
Carolyn S. Mascareñas Letter File (CSM-024-13)

Uniform File Code: 6104
Disposition Authority: ENV1-j-1
Retention Schedule: Destroy 75 years after cut off. Long Term Stewardship

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CERTIFICATION STATEMENT
BATTELLE ENERGY ALLIANCE
AS
OPERATOR

REGULATORY CERTIFICATION
[IDAPA 58.01.05.012; 40 CFR 270.11(d) and 270.30(k)]

Materials and Fuels Complex- Radioactive Scrap and Waste Facility 2013 Four-Year Corrosion Surveillance Liner Assessment Report for the Idaho National Laboratory Materials and Fuels Complex HWMA/RCRA Final Permit, EPA No. ID4890008952

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to 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.

Operator Signature

Sharon Dossett   10/2/2013

Sharon D. Dossett, Director of ES&H,   Date
Battelle Energy Alliance, LLC

CERTIFICATION STATEMENT
DEPARTMENT OF ENERGY – IDAHO OPERATIONS OFFICE
AS
OWNER

REGULATORY CERTIFICATION
[IDAPA 58.01.05.012; 40 CFR 270.11(d) and 270.30(k)]

Materials and Fuels Complex- Radioactive Scrap and Waste Facility 2013 Four-Year Corrosion Surveillance Liner Assessment Report for the Idaho National Laboratory Materials and Fuels Complex HWMA/RCRA Final Permit, EPA No. ID4890008952

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Owner Signature

Robert Boston 10/4/2013

Robert D. Boston, Deputy Manager Operations Support Date
Department of Energy Idaho Operations Office

2013 Corrosion Assessment Report

-

Radioactive Scrap and Waste Facility Impressed Current Cathodic Protection System

Submitted To:
Battelle Energy Alliance
Idaho National Laboratory
Materials and Fuels Complex

Prepared By:
Jeremy A. Hailey, P.E.
Northwest Corrosion Engineering
Sedro-Woolley Washington
August 26, 2013

INTRODUCTION

The Materials and Fuels Complex (MFC) of the Idaho National Laboratory (INL) includes a Radioactive Scrap and Waste Facility (RSWF) that provides interim storage for spent fuel and remote-handled mixed and radioactive waste. The waste materials are housed in steel containers that are placed into individual carbon steel liners. The steel liners are inserted vertically into the ground at varying depths. All liners are connected to an impressed current cathodic protection system that provides corrosion protection current to the liners external surfaces.

The RSWF is permitted as a Miscellaneous Storage Area under the INL's HWMA RCRA Storage and Treatment Permit[1]. Permit Condition V.M.1 requires INL to remove an empty liner from the RSWF and employ an independent corrosion engineer to supervise the inspections and measurements of the liner to assess if corrosion of the liner has occurred. Results of the evaluation are to be used to determine the effectiveness of the corrosion control system and to assess the adequacy of the liner pull/inspection schedule. The initial liner pull and evaluation was completed in 1997 and then every four subsequent years. To date, five of the ten original liners installed in 1993 for the purposes of removal and inspection remain buried and available for future evaluation. The purpose of this report is to document the fifth evaluation conducted in compliance with the RCRA Permit requirements.

QUALIFICATIONS

The work completed under this project was conducted by Jeremy A. Hailey, P.E. Mr. Hailey is a registered Professional Engineer in the State of Idaho and is certified by the National Association of Corrosion Engineers (NACE) as a Corrosion Specialist P, a Cathodic Protection Specialist, and certified Coating Inspector with over 19 years experience in the corrosion industry. Mr. Hailey also serves as an instructor for NACE International Cathodic Protection Certification and Training Program, providing instruction for the associations Cathodic Protection Tester (CP Level 1), Cathodic Protection Technician (CP Level 2), and Coatings in Conjunction with Cathodic Protection certification programs.

Mr. Hailey has worked in numerous facilities similar to the INL conducting corrosion control assessments, testing, and system troubleshooting. Examples of facilities include: oil refineries, crude oil storage facilities (Valdez Marine Terminal Valdez, Alaska), and the radioactive material Waste Treatment Plant on the Hanford site. A copy of Mr. Hailey's current resume is included in Appendix B.

SYSTEM DESCRIPTION

Liners

As described in Table 1 in the System Design Description (SDD-225), there are a total of 1304 liners, of which five remain for corrosion surveillance and the rest are for storage. A majority of the liners are 16, 24, or 26 inches in diameter and range in length from 120 to 164 inches. The remaining liners (8 total) are 30, 48, and 60 inches in diameter. Liner wall thickness is based upon diameter and ranges between 0.25 – 0.5 inches thick. Due to the effects of the varying

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[1] HWMA RCRA Storage and Treatment Permit for the Materials and Fuels Complex, EPA ID No: 4890008952, INL Document No. PER-116, Rev. 4, October 2008 (Effective Date: August 16, 2004)

levels of radioactivity on the life and effectiveness of coating materials, most liners were installed without an external protective coating. It is reported in the System Design Description the earlier liner designs included coatings. However, additional steel life afforded to these coated liners has not been taken into account in the cathodic protection system design. The liners were placed in an oversized hole in the earth and surrounded with non-corrosive sand slurry (consisting of washed sand, water, and air entraining solution) during the backfilling process.

Cathodic Protection System

External corrosion control is provided to the steel liners through the use of an impressed current cathodic protection system (CPS). The CPS consists of a series of linseed oil-impregnated graphite anodes installed throughout the RSWF. Individual anodes are spliced into a varying number of anode header cables that are routed to anode junction boxes for output monitoring purposes. Power is supplied to the anode array by twelve transformer rectifiers located along the northwestern and southeastern side of the RSWF perimeter fencing. The typical design life of individual anodes installed at this facility is 15 – 20 years. There are approximately 528 anodes installed at the RSWF facility for an average of about one anode for every 2.5 liners.

A total of six stationary zinc reference electrodes were installed throughout the site. The reference electrodes are located at the bottom of, and 6-inches lineal from, their associated liner.

Each liner is made electrically continuous with the CPS through the connection of a negative lead wire exothermically welded to the top of the liner. Each negative lead is then spliced into a common negative header cable and routed back to its corresponding rectifier pair.

Rectifier output (DC voltage and DC amperage) is measured and recorded each month. The collected data is reviewed for trends that may indicate deficiencies within the CPS. Liner-to-soil potential measurements are recorded at each liner using a portable reference electrode on an annual basis. Monitoring of the individual stationary reference electrodes is also completed during the annual liner-to-soil electrical potential survey.

Currently, cathodic protection of the external liner surfaces is being established by ensuring that each tested location measures a minimum of -850 millivolts relative to a saturated copper-copper sulfate reference electrode. The recorded readings are measured with all current sources (rectifiers) turned on.

DOCUMENT REVIEW

The following documents were reviewed as part of this investigation.

1. MFC771 Cathodic Protection 12M Test (RCRA Permit Required) 2013

This binder tabulates cathodic protection system test data collected in May 2013, June 2012, and May 2011. Data includes: liner-to-soil potentials, rectifier power consumption and output, shunt box current measurements, potential data using the installed stationary zinc reference electrodes, and conductor impedance measurements.

A review of the provided data shows that all liner-to-soil electrical potential measurements were a minimum of -850 mV referenced to a portable copper-copper sulfate reference electrode and all transformer rectifiers are discharging DC electrical current as designed.

2. ***2009 Corrosion Assessment Report - Radioactive Scrap and Waste Facility Impressed Current Cathodic Protection System***

The report issued by Northwest Corrosion Engineering in 2009 details the results of the fourth quadrennial liner pull. This report concludes that the facilities cathodic protection systems are providing adequate corrosion protection current to the installed liners in accordance with industry standards.

3. ***System Design Description: Radioactive Scrap and Waste Facility Storage Liner System (06/16/08)***

The System Design Description provides a thorough accounting of the design, installation, and operating parameters of the corrosion control systems installed at the RSWF. Included in the appendix of this document is a System History describing the major changes and work completed at the RSWF as it pertains to the cathodic protection systems.

4. ***2005 Corrosion Assessment Report for the Cathodic Protection System of the Radioactive Scrap and Waste Facility, prepared by Jetseal, November 7, 2005***

The 2005 quadrennial liner pull and subsequent corrosion investigation is presented in this document. In general, the report finds that wall loss due to corrosion had not occurred on the extracted liner and that the cathodic protection system has been operating properly for the previous four years.

ON-SITE TESTING

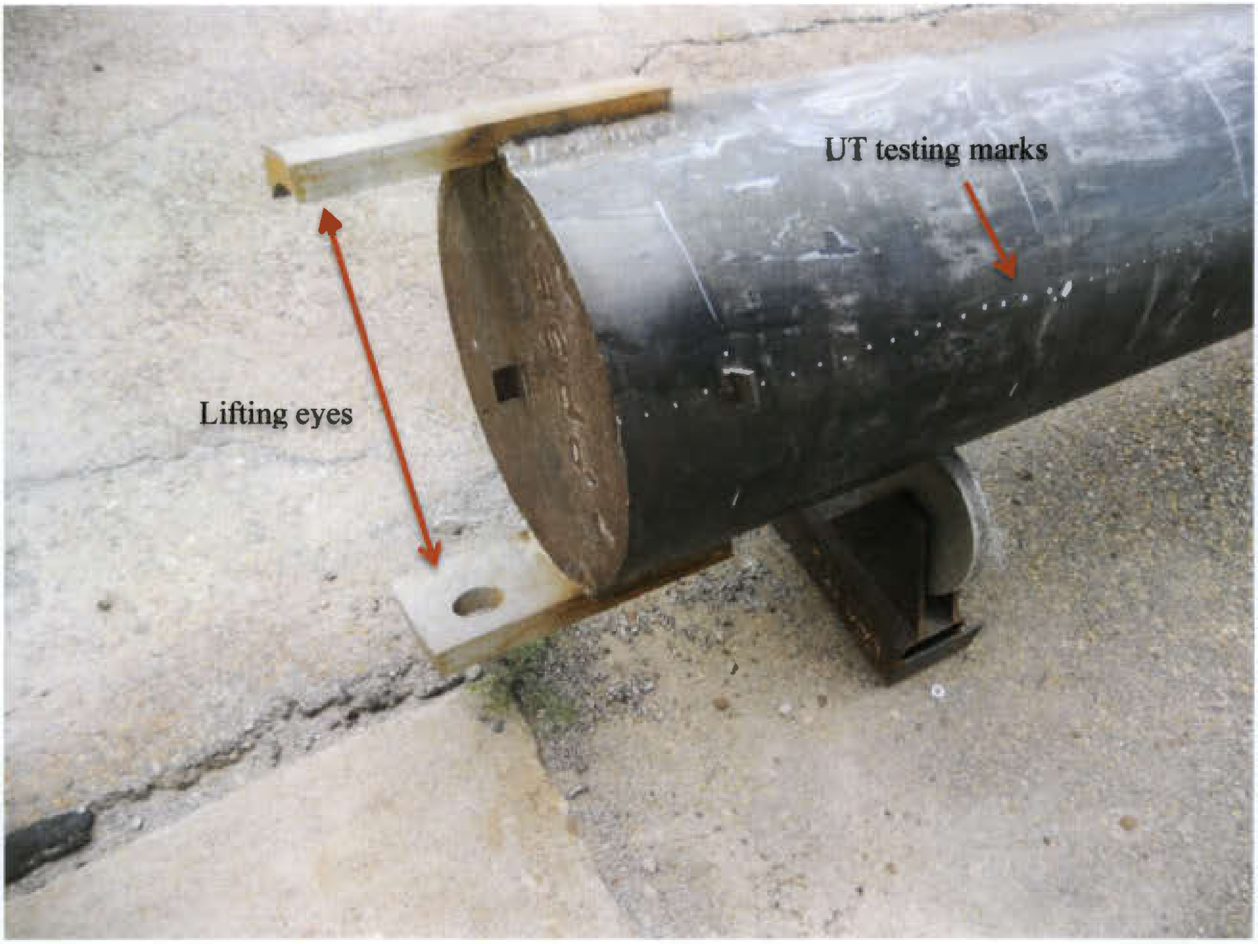
Liner Removal

Prior to our site visit, one of the remaining six steel liners was removed from the ground such that a visual and ultrasonic thickness conditional assessment could be performed. In general, removal of an empty liner involves the following steps: cutting the negative return cable to the liner, drilling multiple small diameter holes around the liner in order to loosen the soil, welding two lifting eyes to the top of the liner, and pulling the liner out of the ground using a crane.

The manner in which the liner is removed is completed so that minimal damage will occur to its external surfaces such that a thorough corrosion investigation can be conducted.

Ultra-Sonic Thickness Testing

Ultra-sonic thickness (UT) testing of the pulled liner was completed after the liner had been inspected upon removal from the ground and cleaned of all foreign debris. UT data was collected along the length of the liner at one-inch intervals at eight separate radial positions (45° separations). A total of 1184 locations were measured on the removed liner. The minimum thickness recorded on the nominal 0.250-inch thick pipe wall was 0.256-inches indicating that there was no measured wall loss. Results of the UT testing are provided in Appendix A.



Photograph 1: Liner PP-35

Analysis of On-Site Visual Inspection

Conditional Assessment of Removed Liner

A visual inspection of the exterior surfaces of the removed liner did not reveal any noted instances of corrosion related damage. An estimated 75% of the original coating was still present on the surface of the liner and was still in good condition. The coating is of unknown type and appears to have been applied to a thickness of approximately 4 – 8 mils (about the thickness of 1 - 2 sheets of standard paper).

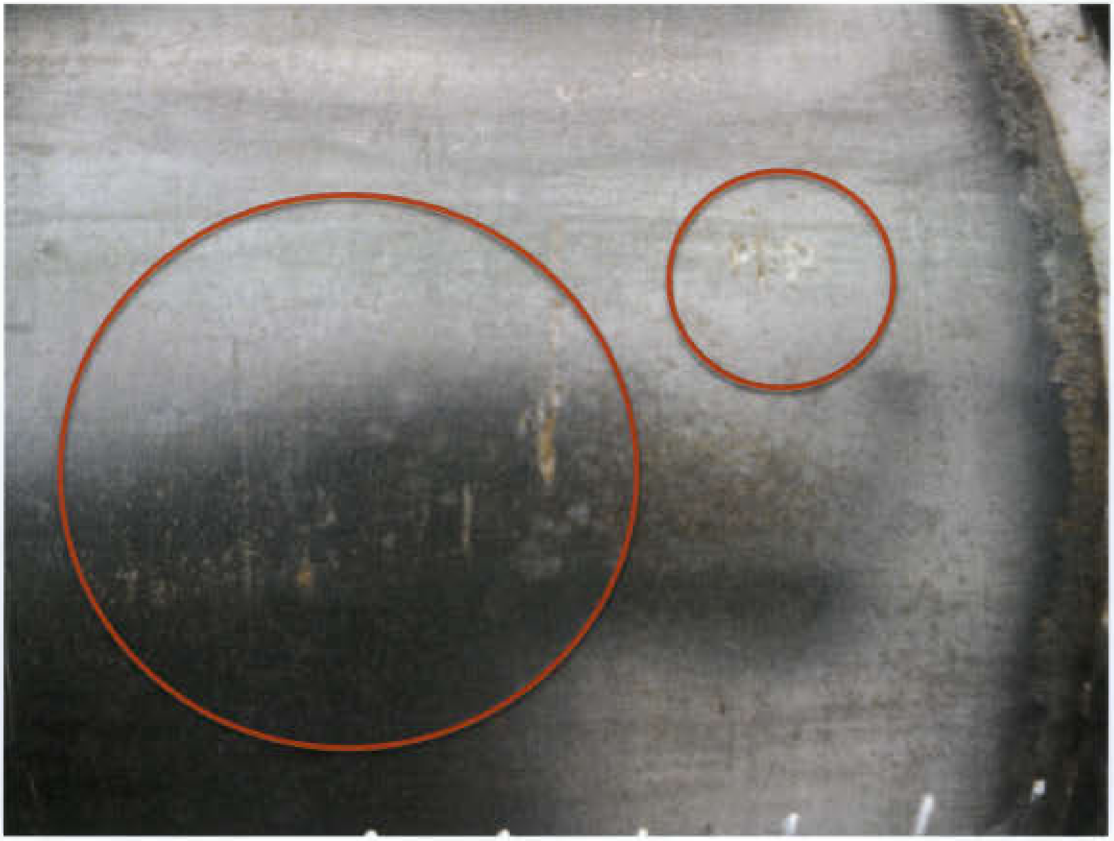
The portions of the liner where the coating had either deteriorated or was damaged during the liner retrieval/cleaning process did show exposed steel. However there was no loss of steel wall and only slight surface rust staining was noted. It is likely that these instances of rust bloom are a result of moisture being left on the surface after the cleaning process and are not attributable to corrosion as a result of being buried.

A steel plate is welded to the bottom of the liner and is used to discourage frost heaving. The weld bead was in very good condition and did not show any signs of corrosion related damage.

Minor pitting was detected on the surface of the weld bead, however this occurred during the welding process and does not indicate a lack of effective corrosion control.

Photograph 2: Liner PP-35 baseplate, no corrosion damage, weld is in good condition

Limited mechanical damage experienced during the installation and/or retrieval process was evident on the side-wall of the liner (Photograph 3). These minor surface disruptions resulted in damage to the coating and exposure of the underlying steel to the environment. Once exposed, the provided cathodic protection current resulted in no visible pitting or other corrosion related metal deterioration.



Photograph 3: Possible mechanical damage

Photograph 4: Close-up of bottom of liner, no observed corrosion damage

Evaluation of Effectiveness of the Cathodic Protection System

Based upon the visual examination of the removed liner, results of previous liner removal evaluations, UT testing data, and field data collected as part of the routine cathodic protection system monitoring, it is evident that the corrosion control systems located in the RSWF are providing adequate corrosion protection to the buried portions of the steel liners. The cathodic protection current distribution along the entire liner length is resulting in complete protection of the steel surfaces. In addition, all groundbed resistances are less than 1.0 ohms. This results in very low voltage gradients surrounding the anodes and no concern for stray current interference between adjacent liner sets.

Evaluation of 4-Year Liner Removal Schedule

Removal and subsequent examination of a liner every four years is a conservative time interval for assessing the effectiveness of the RSWF cathodic protection systems. Based upon the results of the recently completed evaluation as well as past inspections, the time interval between liner removals could be lengthened so as to allow for inspections to extend further into the future.

SUMMARY

1. There are a total of 1304 carbon steel liners used to store radioactive waste installed at the Radioactive Scrap and Waste Facility. The RSWF employs a series of impressed current cathodic protection systems to provide external corrosion control to the liner surfaces.
2. A total of ten liners were installed in 1993 with the purpose of removing a single liner every four years in order to conduct a visual inspection of its external surfaces.
3. To date, five of the ten liners have been removed. Inspections completed on these liners have not revealed any instances of corrosion related damage.
4. Ultra-Sonic thickness testing completed on the liner removed in July 2013 did not show instances of external or internal pitting damage at the tested locations.
5. The operation, data collection and analysis, and maintenance of the corrosion control systems installed at the RSWF are being overseen by an individual who is trained by the National Association of Corrosion Engineers as a Cathodic Protection Tester and is a current registered Professional Engineer.

CONCLUSIONS

1. The impressed current cathodic protection systems utilized by the RSWF are providing adequate external corrosion control to the installed liners. This conclusion is based upon a visual examination of the recently removed liner in conjunction with an evaluation of the associated ultrasonic thickness test data. The corrosion control system testing methods, routine monitoring intervals, and quadrennial visual inspection and steel wall thickness testing completed on removed liners meet or exceed current industry standards for level of care as described in NACE SP1069-2007 Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
2. As part of the annual system checkout, procedures include negative header cable impendence testing. This test is used to confirm that individual liners are electrically continuous with the

cathodic protection system. However, liner continuity is confirmed when potential measurements show a shift in the negative direction with the cathodic protection system in operation. Past testing has confirmed that all negative liner connections are sound and operating effectively. Once continuity is established on the negative (protected) side of the circuit, additional verification on an annual basis is not warranted.

3. Because all liners removed to date have been in like-new condition, it would be acceptable from a liner corrosion monitoring standpoint to extend the retrieval interval from four years to six years without jeopardizing the integrity of the inspection program.

Submitted By:
Northwest Corrosion Engineering

Jeremy A. Hailey, P.E.
NACE Corrosion Specialist, P No 5401

APPENDIX A

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ULTRASONIC THICKNESS TESTING DATA

Ultrasonic Thickness Measurement Record

Date: 7/9/2013
Procedure: TPR-13445 Rev 1
Componant:Liner PP35
Material:Carbon Steel
Pipe Schedule: 10 (nominal wall thickness - .250")
Instrament Brand: Panametrics | Model: 27DL Plus | Serial No.: 91766412
Transducer Brand: Panametrics | Model: D790 SM | Serial No.:1092107
Transducer Size: 3/8 | Frequency: 5 Mhz
Calibration Block: 727369 | Reference Thickness used: .100", .500" | Cal Due: 6/19/2014
Material Temp: Ampbient (within 25 Degrees)
Couplant: Ultragel II

A001	0.259	8001	0.262	C001	0.263	0001	0.262	E001	0.260	F001	0.262	G001	0.261	H001	0.257
A002	0.259	8002	0.262	C002	0.264	0002	0.262	E002	0.260	F002	0.262	G002	0.261	H002	0.260
A003	0.260	8003	0.262	C003	0.26S	0003	0.261	E003	0.260	F003	0.261	G003	0.258	H003	0.2S8
A004	0.260	8004	0.263	C004	0.263	0004	0.261	E004	0.259	F004	0.261	G004	0.261	H004	0.258
ADOS	0.259	BOOS	0.262	COOS	0.263	000S	0.262	EDDS	0.259	FOOS	0.261	GOOS	0.260	HOOS	0.259
ADOS	0.259	BOOS	0.261	COOS	0.263	000S	0.264	E006	0.259	FOOS	0.260	GOOS	0.260	HOOS	0.258
A007	0.262	8007	0.262	C007	0.263	0007	0.264	E007	0.259	F007	0.259	G007	0.259	H007	0.259
AOOB	0.259	BOOB	0.262	COOB	0.263	0008	0.263	EOOB	0.259	FOOB	0.260	GOOB	0.260	HOOB	0.258
AOOS	0.258	BOOS	0.261	COOS	0.262	000S	0.263	EOOS	0.260	FOOS	0.260	GOOS	0.260	HOOS	0.259
A010	0.259	8010	0.261	C010	0.263	0010	0.263	E010	0.259	F010	0.259	G010	0.259	H010	0.259
A011	0.258	8011	0.270	C011	0.263	0011	0.267	E011	0.258	F011	0.260	G011	0.260	H011	0.259
A012	0.258	8012	0.263	C012	0.261	0012	0.268	E012	0.258	F012	0.260	G012	0.260	H012	0.258
A013	0.25S	8013	0.261	C013	0.262	0013	0.262	E013	0.259	F013	0.261	G013	0.260	H013	0.259
A014	0.259	8014	0.261	C014	0.263	0014	0.264	E014	0.260	F014	0.260	G014	0.258	H014	0.258
A01S	0.257	B01S	0.260	C01S	0.262	001S	0.263	E01S	0.259	F01S	0.261	G015	0.259	H015	0.258
A01S	0.258	B01S	0.262	C01S	0.262	001S	0.262	E01S	0.258	F01S	0.260	G01S	0.259	H01S	0.258
A017	0.257	8017	0.261	C017	0.262	0017	0.262	E017	0.259	F017	0.260	G017	0.260	H017	0.259
A018	0.257	8018	0.260	C01B	0.263	0018	0.261	E01B	0.25S	F01B	0.261	G01B	0.259	H018	0.258
A01S	0.258	801S	0.260	C019	0.262	001S	0.262	E01S	0.258	F01S	0.261	G01S	0.260	H01S	0.259
A020	0.258	8020	0.262	C020	0.264	0020	0.262	E020	0.258	F020	0.260	G020	0.260	H020	0.259
A021	0.258	8021	0.261	C021	0.263	0021	0.262	E021	0.258	F021	0.262	G021	0.260	H021	0.259
A022	0.258	8022	0.261	C022	0.264	0022	0.262	E022	0.259	F022	0.259	G022	0.260	H022	0.259
A023	0.257	8023	0.262	C023	0.268	0023	0.262	E023	0.258	F023	0.259	G023	0.260	H023	0.259
A024	0.258	8024	0.260	C024	0.263	0024	0.262	E024	0.256	F024	0.262	G024	0.259	H024	0.259
A02S	0.257	B02S	0.261	C02S	0.264	002S	0.263	E02S	0.258	F02S	0.262	G02S	0.261	H02S	0.260
A026	0.2S7	B02S	0.261	C026	0.264	002S	0.262	E02S	0.260	F02S	0.261	G02S	0.261	H02S	0.258
A027	0.258	8027	0.260	C027	0.264	0027	0.263	E027	0.258	F027	0.261	G027	0.260	H027	0.259
A028	0.258	8028	0.261	C02B	0.263	0028	0.263	E028	0.259	F02B	0.260	G02B	0.261	H028	0.260
A02S	0.257	8029	0.261	C02S	0.264	002S	0.263	E02S	0.261	F02S	0.263	G02S	0.262	H02S	0.259
A030	0.260	8030	0.259	C030	0.263	0030	0.262	E030	0.259	F030	0.262	G030	0.261	H030	0.259
A031	0.258	8031	0.262	C031	0.263	0031	0.264	E031	0.261	F031	0.262	G031	0.260	H031	0.259
A032	0.257	8032	0.262	C032	0.263	0032	0.264	E032	0.259	F032	0.260	G032	0.259	H032	0.259
A033	0.259	8033	0.261	C033	0.262	0033	0.264	E033	0.259	F033	0.259	G033	0.260	H033	0.260
A034	0.258	8034	0.262	C034	0.263	0034	0.263	E034	0.259	F034	0.263	G034	0.257	H034	0.260

A03S	0.2S9	B03S	0.260	C03S	0.266	D03S	0.263	E03S	0.261	F03S	0.264	G03S	0.260	HD3S	0.260
A03G	0.260	8036	0.262	C036	0.266	D036	0.264	E03G	0.2SB	F03G	0.262	G036	0.261	H036	0.260
A037	0.2S9	8037	0.262	C037	0.267	D037	0.264	E037	0.25B	F037	0.259	G037	**0.260**	H037	0.260
A03B	0.260	803B	0.261	C03B	0.265	D03B	0.26S	E03B	0.261	F03B	0.260	G03B	0.261	H03B	0.261
A039	0.260	8039	0.261	C039	0.270	D039	0.263	E039	0.261	F039	0.261	G039	0.259	H039	0.260
A040	0.260	8040	0.263	C040	0.276	D040	0.264	E040	0.263	F040	0.262	G040	0.260	H04D	0.260
A041	0.259	8041	0.263	C041	0.270	D041	0.264	E041	0.262	F041	0.260	G041	0.260	H041	0.260
A042	0.257	8042	0.261	C042	0.266	D042	0.262	E042	0.260	F042	0.260	G042	0.260	H042	0.259
A043	0.260	8043	0.262	C043	0.26B	D043	0.26S	E043	0.2S9	F043	0.262	G043	0.262	HD43	0.261
A044	0.260	8044	0.262	C044	0.271	D044	0.264	E044	0.260	F044	0.261	G044	0.262	H044	0.261
A04S	0.259	8045	0.263	C04S	0.264	D04S	0.262	E04S	0.261	F04S	0.261	G04S	0.262	H04S	0.260
A04G	0.260	8046	0.264	C046	0.263	D046	0.263	E046	0.259	F046	0.262	G046	0.262	H046	0.260
A047	0.259	8047	0.264	C047	0.264	D047	0.264	E047	0.259	F047	0.261	G047	0.262	H047	0.260
A04B	0.260	804B	0.261	C04B	0.264	D04B	0.263	E04B	0.260	F04B	0.262	G04B	0.262	H04B	0.261
A049	0.260	8049	0.262	C049	0.263	D049	0.263	E049	0.261	F049	0.262	G049	0.261	HD49	0.260
AOSO	0.260	8050	0.261	C050	0.260	DOSO	0.263	EOSO	0.262	FOSO	0.262	GOSO	0.261	HOSO	0.260
AOS1	0.260	8051	0.263	COS1	0.261	DOS1	0.262	EOS1	0.261	FOS1	0.261	GOS1	0.261	H051	0.260
AOS2	0.260	BOS2	0.262	C052	0.263	DOS2	0.26S	EOS2	0.260	FOS2	0.261	GOS2	0.259	HOS2	0.260
AOS3	0.260	80S3	0.260	COS3	0.265	DOS3	0.263	EOS3	0.261	FOS3	0.261	GOS3	0.260	HOS3	0.259
AOS4	0.260	BOS4	0.263	C054	0.263	DOS4	0.263	EOS4	0.259	FOS4	0.260	GOS4	0.260	HOS4	0.259
AOSS	0.2S6	BOSS	0.261	COS5	0.26S	DOSS	0.265	EOSS	0.258	FOSS	0.261	GOSS	0.262	HOSS	0.259
AOS6	0.260	BOSS	0.261	COSS	0.265	DOSS	0.264	E05G	0.260	FOSS	0.261	GOSS	0.264	HOSS	0.2S9
AOS7	0.259	80S7	0.261	COS7	0.263	DOS7	0.267	EOS7	0.25B	'FOS7	0.260	GOS7	0.266	HOS7	0.259
AOSB	0.259	BOSB	0.262	C05B	0.264	DOSB	0.264	EOSB	0.2SB	FOSB	0.261	GOSB	0.267	H05B	0.2S9
AOS9	0.261	BOS9	0.266	C059	0.263	DOSS	0.266	EOS9	0.2SB	FOS9	0.260	GOS9	0.260	HOS9	0.259
A060	0.260	8060	0.261	C060	0.263	D0G0	0.261	E060	0.25B	F0G0	0.259	G060	0.260	H0B0	0.25B
A061	0.259	8061	0.260	C061	0.263	DOG1	0.265	EOG1	0.259	F061	0.260	G061	0.260	HD61	0.259
A062	0.261	8062	0.261	C062	0.261	DOG2	0.260	EOG2	0.25B	FOG2	0.260	G062	0.259	H062	0.259
A063	0.2S8	8063	0.260	C063	0.262	DOG3	0.261	E063	0.260	F063	0.261	G063	0.2S9	H063	0.2S9
A064	0.284	8064	0.260	C064	0.262	DOG4	0.261	E064	0.259	F064	0.261	G064	0.260	H064	0.259
A06S	0.259	806S	0.261	COGS	0.262	DOGS	0.263	EOGS	0.261	FOGS	0.261	GOSS	0.259	HOGS	0.259
A066	0.261	8066	0.261	C066	0.262	DOGG	0.264	EOGG	0.260	FOGG	0.261	G066	0.260	H066	0.259
A067	0.261	8067	0.261	C067	0.262	DOG7	0.262	E067	0.260	F067	0.260	GOG7	0.259	H067	0.260
A06B	0.260	806B	0.261	COBB	0.263	D0GB	0.263	E06B	0.260	F06B	0.259	GOGB	0.261	HOBB	0.259
A069	0.259	8069	0.261	COGS	0.262	D069	0.263	E069	0.260	F069	0.260	G069	0.262	H069	0.259
A070	0.259	8070	0.262	C070	0.263	D070	0.262	E070	0.261	F070	0.261	G070	0.261	HD70	0.259
A071	0.259	8071	0.263	C071	0.264	D071	0.262	E071	0.260	F071	0.261	G071	0.261	H071	0.260
A072	0.259	8072	0.261	C072	0.263	D072	0.262	E072	0.261	F072	0.261	G072	0.262	H072	0.260
A073	0.260	8073	0.262	C073	0.261	D073	0.262	E073	0.262	F073	0.262	G073	0.263	H073	0.259
A074	0.259	8074	0.262	C074	0.264	D074	0.262	E074	0.262	F074	0.262	G074	0.262	H074	0.259
A07S	0.260	807S	0.261	C07S	0.263	D07S	0.262	E07S	0.262	F07S	0.262	G07S	0.260	HD7S	0.260
A076	0.261	8076	0.262	C076	0.263	D07G	0.262	E076	0.261	F076	0.262	G076	0.262	H076	0.259
A077	0.260	8077	0.262	C077	0.264	D077	0.263	E077	0.262	F077	0.262	G077	0.261	H077	0.259
A07B	0.259	807B	0.262	C07B	0.262	D07B	0.262	E07B	0.2S9	F07B	0.262	G07B	0.260	H07B	0.2S9
A079	0.2S9	8079	0.262	C079	0.265	D079	0.263	E079	0.260	F079	0.262	G079	0.261	H079	0.260
AOBO	0.259	BOB0	0.263	COBO	0.262	DOBO	0.264	EOBO	0.261	FOBO	0.262	GOBO	0.260	HOBO	0.260
AOB1	0.259	BOB1	0.263	COB1	0.262	DOB1	0.264	EOB1	0.263	FOB1	0.261	GOB1	0.260	HOB1	0.260
AOB2	0.2SB	80B2	0.262	COB2	0.263	DOB2	0.2B7	EOB2	0.261	FOB2	0.262	GOB2	0.261	HOB2	0.2S9
AOB3	0.2S9	BOB3	0.262	COB3	0.262	DOB3	0.264	EOB3	0.262	FOB3	0.261	GOB3	0.262	HDB3	0.260
AOB4	0.260	BOB4	0.263	COB4	0.262	DOB4	0.262	EOB4	0.261	FOB4	0.261	GOB4	0.261	HDB4	0.259
AOBS	0.260	80BS	0.263	COBS	0.263	DOBS	0.265	EOBS	0.264	FOBS	0.262	GOBS	0.261	HOBS	0.261
AOB6	0.260	BOB6	0.261	COBS	0.264	DOBB	0.266	EOB6	0.260	FOB6	0.262	GOBS	0.263	HOBS	0.260
AOB7	0.259	BOB7	0.261	COB7	0.265	DOB7	0.264	EOB7	0.263	FOB7	0.262	GOB7	0.262	HOB7	0.260

AOBB	0.261	BOBB	0.261	COBB	0.265	DOBB	0.264	EOBB	0.260	FOBB	0.261	GOBB	0.262	HOBB	0.260
AOB9	0.259	BOBS	0.261	COBS	0.264	DOB9	0.264	EOB9	0.260	FOB9	0.261	GOB9	0.262	HOB9	0.260
A090	0.260	8090	0.264	C090	0.264	0090	0.263	E090	0.261	F090	0.261	G090	**0.263**	H090	0.260
A091	0.259	8091	0.262	C091	0.262	0091	0.264	E091	0.260	F091	0.260	G091	0.262	H091	0.260
A092	0.261	8092	0.263	C092	0.264	0092	0.266	E092	0.261	F092	0.261	G092	0.262	H092	0.260
A093	0.260	8093	0.262	C093	0.264	D093	0.262	E093	0.261	F093	0.261	G093	0.261	H093	0.260
A094	0.261	8094	0.261	C094	0.263	D094	0.266	E094	0.260	F094	0.261	G094	0.256	H094	0.263
A095	0.259	8095	0.262	C095	0.263	D095	0.267	E095	0.260	F095	0.261	G095	0.261	H095	0.261
A096	0.260	8096	0.261	C096	0.262	0096	0.265	E096	0.260	F096	0.261	G096	0.262	H096	0.260
A097	0.260	8097	0.262	C097	0.263	0097	0.263	E097	0.260	F097	0.258	G097	0.261	H097	0.260
A098	0.260	809B	0.261	C09B	0.266	D09B	0.262	E09B	0.261	F09B	0.260	G09B	0.261	H098	0.259
A099	0.259	8099	0.261	C099	0.265	D099	0.261	E099	0.260	F099	0.261	G099	0.262	H099	0.259
A100	0.260	8100	0.261	C100	0.264	0100	0.261	E100	0.258	F100	0.261	G100	0.262	H100	0.260
A101	0.260	8101	0.262	C101	0.263	D101	0.261	E101	0.260	F101	0.262	G101	0.264	H101	0.260
A102	0.259	8102	0.261	C102	0.263	0102	0.261	E102	0.261	F102	0.261	G102	0.262	H102	0.260
A103	0.261	8103	0.262	C103	0.263	0103	0.263	E103	0.260	F103	0.261	G103	0.262	H103	0.260
A104	0.259	8104	0.263	C104	0.260	D104	0.262	E104	0.259	F104	0.272	G104	0.262	H104	0.256
A105	0.259	8105	0.263	C105	0.263	D105	0.263	E105	0.260	F105	0.259	G105	0.263	H105	0.260
A106	0.258	8106	0.261	C106	0.262	0106	0.261	E106	0.260	F106	0.266	G106	0.261	H106	0.259
A107	0.259	8107	0.262	C107	0.262	D107	0.262	E107	0.260	F107	0.261	G107	0.261	H107	0.260
A10B	0.259	B10B	0.261	C108	0.263	D10B	0.262	E10B	0.260	F10B	0.261	G10B	0.264	H10B	0.259
A109	0.259	8109	0.261	C109	0.263	0109	0.264	E109	0.261	F109	0.261	G109	0.263	H109	0.259
A110	0.261	8110	0.261	C110	0.262	D110	0.261	E110	0.261	F110	0.261	G110	0.272	H110	0.259
A111	0.261	8111	0.261	C111	0.263	D111	0.265	E111	0.260	F111	0.261	G111	0.265	H111	0.260
A112	0.260	8112	0.261	C112	0.264	D112	0.265	E112	0.263	F112	0.262	G112	0.273	H112	0.260
A113	0.260	8113	0.261	C113	0.265	D113	0.262	E113	0.262	F113	0.263	G113	0.267	H113	0.261
A114	0.261	8114	0.262	C114	0.265	D114	0.263	E114	0.263	F114	0.262	G114	0.276	H114	0.262
A115	0.259	8115	0.261	C115	0.266	0115	0.263	E115	0.260	F115	0.262	G115	0.272	H115	0.258
A116	0.260	8116	0.261	C116	0.264	D116	0.263	E116	0.260	F116	0.262	G116	0.275	H116	0.260
A117	0.260	8117	0.262	C117	0.265	D117	0.263	E117	0.260	F117	0.263	G117	0.271	H117	0.261
A11B	0.262	8118	0.260	C118	0.264	D11B	0.265	E11B	0.260	F11B	0.261	G11B	0.273	H11B	0.260
A119	0.261	8119	0.263	C119	0.263	D119	0.264	E119	0.260	F119	0.261	G119	0.275	H119	0.260
A120	0.260	8120	0.260	C120	0.264	D120	0.263	E120	0.261	F120	0.262	G120	0.276	H120	0.260
A121	0.261	8121	0.261	C121	0.266	D121	0.265	E121	0.261	F121	0.261	G121	0.278	H121	0.260
A122	0.261	8122	0.262	C122	0.266	0122	0.264	E122	0.262	F122	0.261	G122	0.279	H122	0.260
A123	0.260	8123	0.263	C123	0.266	D123	0.265	E123	0.261	F123	0.261	G123	0.276	H123	0.261
A124	0.261	8124	0.262	C124	0.266	D124	0.263	E124	0.261	F124	0.264	G124	0.277	H124	0.260
A125	0.262	8125	0.262	C125	0.265	0125	0.265	E125	0.261	F125	0.260	G125	0.271	H125	0.260
A126	0.259	8126	0.266	C126	0.266	D126	0.264	E126	0.266	F126	0.262	G126	0.274	H126	0.260
A127	0.260	8127	0.269	C127	0.266	D127	0.265	E127	0.263	F127	0.263	G127	0.277	H127	0.260
A12B	0.260	8128	0.263	C128	0.267	D12B	0.266	E12B	0.263	F12B	0.261	G12B	0.266	H12B	0.259
A129	0.262	8129	0.263	C129	0.267	D129	0.264	E129	0.260	F129	0.260	G129	0.276	H129	0.260
A130	0.261	8130	0.263	C130	0.266	D130	0.269	E130	0.261	F130	0.260	G130	0.276	H130	0.260
A131	0.260	8131	0.262	C131	0.271	0131	0.266	E131	0.263	F131	0.261	G131	0.265	H131	0.260
A132	0.260	8132	0.263	C132	0.271	0132	0.266	E132	0.261	F132	0.261	G132	0.260	H132	0.260
A133	0.260	8133	0.264	C133	0.268	D133	0.266	E133	0.264	F133	0.259	G133	0.274	H133	0.261
A134	0.260	8134	0.263	C134	0.266	D134	0.265	E134	0.259	F134	0.261	G134	0.272	H134	0.260
A135	0.260	8135	0.263	C135	0.266	D135	0.264	E135	0.260	F135	0.260	G135	0.275	H135	0.259
A136	0.260	8136	0.262	C136	0.266	0136	0.265	E136	0.260	F136	0.261	G136	0.272	H136	0.261
A137	0.260	8137	0.263	C137	0.266	0137	0.267	E137	0.260	F137	0.261	G137	0.270	H137	0.260
A13B	0.261	B13B	0.263	C13B	0.265	D13B	0.266	.E13B	0.261	F13B	0.262	G13B	0.271	H13B	0.260
A139	0.261	8139	0.262	C139	0.265	D139	0.266	E139	0.262	F139	0.264	G139	0.260	H139	0.261
A140	0.260	8140	0.262	C140	0.264	D140	0.265	E140	0.261	F140	0.262	G140	0.274	H140	0.259

A141	0.260	8141	0.262	C141	0.263	0141	0.265	E141	0.260	F141	0.261	G141	0.266	H141	0.259
A142	0.259	8142	0.262	C142	0.263	0142	0.263	E142	0.260	F142	0.260	G142	0.260	H142	0.259
A143	0.260	8143	0.262	C143	0.266	0143	0.261	E143	0.262	F143	0.261	G143	0.260	H143	0.258
A144	0.260	8144	0.263	C144	0.262	0144	0.263	E144	0.260	F144	0.261	G144	0.261	H144	0.259
A145	0.260	8145	0.262	C145	0.262	0145	0.263	E145	0.260	F145	0.261	G145	0.260	H145	0.259
A146	0.258	8146	0.261	C146	0.261	0146	0.263	E146	0.260	F146	0.262	G146	0.260	H146	0.259
A147	0.259	8147	0.259	C147	0.262	0147	0.260	E147	0.261	F147	0.259	G147	0.260	H147	0.257
A148	0.260	8148	0.266	C148	0.263	0148	0.262	E148	0.260	F148	0.260	G148	0.262	H148	0.257

Average	0.260	0.262	0.264	0.264	0.260	0.261	0.264	0.259
Max	0.284	0.270	0.276	0.287	0.266	0.272	0.286	0.263
Min	0.256	0.259	0.260	0.260	0.256	0.258	0.257	0.257
Standard Deviation	0.002	0.001	0.002	0.003	0.001	0.001	0.006	0.001

Examiner: Blaine R. Ward UT-III Date: [illegible]

QE Review: R. Ashby Date: [illegible]

APPENDIX B

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RESUME
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CONSULTING RESUME
JEREMY A. HAILEY, P.E.

Education

Bachelor of Science, Agricultural Engineering - Washington State University

Minor Mathematics - Washington State University

Professional Licenses/Certifications

Registered Professional Civil Engineer: Washington, Oregon, Alaska, Idaho, Colorado

Licensed Electrical Administrator, Washington State

Certified by the National Association of Corrosion Engineers in the following categories:

- NACE International Corrosion Specialist, P
- NACE International Cathodic Protection Specialist
- NACE International Certified Coating Inspector

Experience

Mr. Hailey is the President and Owner of Northwest Corrosion Engineering, a consulting firm providing specialized engineering services in the field of corrosion control. Mr. Hailey has over nineteen years experience providing Professional Corrosion Engineering services. Specific areas of expertise include: corrosion control engineering, cathodic protection system design, specification development, design review, corrosion surveys, soil and water analysis, coating evaluation/inspection, material selection, failure analysis, data interpretation, installation supervision, and system troubleshooting.

Mr. Hailey has been involved with the development of comprehensive corrosion control programs for several clients including petroleum refineries, natural gas companies, and sewer and water districts. Additional clients include consulting engineering firms, local, state, and federal agencies, and municipal utilities.

Mr. Hailey has several years of experience providing corrosion engineering services to operators and owners of Underground Storage Tanks (UST's). Northwest Corrosion Engineering provides corrosion control system checkouts, impressed current cathodic protection system commissioning, detailed cathodic protection system design, and system installation support/inspection.

Prior to establishing Northwest Corrosion Engineering, Mr. Hailey provided corrosion engineering consulting services to Alyeska, stewards of the trans-Alaska pipeline system.

His responsibilities included providing corrosion engineering design for both impressed current and galvanic anode cathodic protection systems for the buried portions of the pipeline from the north slope of Alaska to the Valdez Marine Terminal. Additional responsibilities included corrosion control system design and design oversight for numerous other Alyeska facilities including aboveground/belowground petroleum storage tanks, natural gas piping, and marine berth loading structures.

Mr. Hailey currently serves as a lead instructor for the National Association of Corrosion Engineers Cathodic Protection Certification and Training Program, providing instruction for the associations Cathodic Protection Tester (CP Level 1), Cathodic Protection Technician (CP Level 2), and Coatings in Conjunction With Cathodic Protection certification programs. In addition, Mr. Hailey serves as the Past-Chairman for the Puget Sound Section of the National Association of Corrosion Engineers, is the Past-Chairman of the American Water Works Association Pacific Northwest Engineering Committee, and is currently a director of the American Water Works Association Northwest subsection.

Professional Affiliations

NACE – National Association of Corrosion Engineers

SSPC – Society for Protective Coatings

AWWA – American Water Works Association

Document ID: SOW-10887
Revision ID: 0
Effective Date: 04/03/13

Statement of Work

2013 CONTRACT INDEPENDENT CORROSION ENGINEER TO IMPLEMENT RSWF PERMIT CONDITION V.M.1

Idaho National Laboratory

The INL is a U.S. Department of Energy National Laboratory operated by Battelle Energy Alliance.

REVISION LOG

Rev.	Date	Affected Pages	Revision Description
0	04/03/13	All	New issue. See eCR 613301.

CONTENTS

1. INTRODUCTION

1.1 Background

The Materials and Fuels Complex (MFC) Resource Conservation and Recovery Act Permit, Condition V.M.1, requires the Idaho National Laboratory (INL) to remove an empty liner from the Radioactive Scrap and Waste Facility (RSWF) every four years and employ an independent corrosion engineer (called “inspector” or “subcontractor” below) to supervise the inspections and measurements of the liner to assess if corrosion of the liner has occurred. The results of the assessment will be used as the basis for a report evaluating the effectiveness of the cathodic protection system and the present schedule (i.e., every 4 years) of future liner evaluations. Since the last assessment was in 2009, an assessment is due in 2013.

1.2 Purpose / Objectives

Perform independent inspection of a surrogate liner to ensure that the RSWF cathodic protection system is maintaining adequate exterior protection to the liners.

1.3 Anticipated Benefits

This inspection by a qualified Corrosion Engineer provides an independent assessment of the effectiveness of the RSWF cathodic protection system by pulling a surrogate liner for close inspection and measurement.

2. APPLICABLE CODES AND REFERENCES

NACE SP0169-2007, Standard Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems, National Association of Corrosion Engineers

3. SCOPE

3.1 Work to be Performed

3.1.1 Subcontractor shall provide any specific instructions (in writing) for the retrieval, cleaning, and measurements of the liner. The INL will make a good faith effort to follow these instructions. These instructions shall be provided to the INL within two weeks after the award of the contract.

3.1.2 Subcontractor’s attendance at a meeting to discuss the methods (i.e., ultrasonic measurements versus micrometer measurements) that the INL will use to perform the wall thickness measurements. This meeting may be conducted by telephone.

3.1.3 Subcontractor's review of cathodic protection system test results, liner installation procedures, and soil characteristics of the soil in the area where the liner was located.

3.1.4 Subcontractor may be present at RSWF and MFC while the liner is being pulled and the measurements are being performed.

3.1.5 Subcontractor review of measurement data and documentation of personal visual inspection results, measurement data, etc. in a written report that shall evaluate the effectiveness of the cathodic protection system and validate the present (every 4 years) empty liner removal schedule. The report shall be provided to INL within one month after the subcontractor receives the measurement data from INL. The report shall be an attachment to a transmittal letter that shall also include the qualifications of the corrosion engineer.

3.1.6 A separate report shall be submitted to:

- Estimate the expected life of the existing cathodic protection system
- Provide a recommendation on the practicality of a routine/planned replacement of anodes
- Provide recommendations on adding/replacing anodes other than locating anodes in the same existing locations
- Provide recommendations on alternate methods to provide cathodic protection of liners
- Provide recommendations on enhancing the maintenance of the existing cathodic protection system.

NOTE: *The above estimates and recommendations should be addressed in general terms. The INL does not expect detailed narrative. One to two paragraphs per bullet would be adequate.*

3.1.7 Subcontractor shall participate in a four hour review of their findings and recommendations at the end of their site visit.

3.2 Work Excluded

All hands-on work will be performed by INL crafts. Actual thickness measurements will be performed by an INL Quality Engineer. Pictures will be taken at the request of the inspector but must be cleared for release by the INL Security authority.

3.3 Requirements

The inspector will be escorted within the fenced area of MFC at all times.

3.4 Place of Performance

MFC at the INL

3.5 Interfaces

The RSWF Electrical Facility Engineer will work with the inspector to accomplish this inspection. The inspector and Facility Engineer will coordinate work with the craft foreman.

3.6 Qualifications

3.6.1 The inspector shall be a licensed Professional Engineer in the state of Idaho.

3.6.2 The inspector shall be licensed by the National Association of Corrosion Engineers as an International Cathodic Protection Specialist.

3.6.3 The inspector must have a minimum of ten years of experience in the field of corrosion engineering.

4. DELIVERABLES

The reports shall be provided to the INL within one month after the subcontractor visits MFC and receives the measurement data from INL. The reports shall be an attachment to a transmittal letter that shall also include the qualifications of the corrosion engineer.

Provide an agenda and lead a meeting to review conclusion and recommendations given in the report (no more than four hours). The Facility Engineer will assist the inspector in preparing the agenda and setting up the meeting. Note: A formal presentation with handouts and visual aids/slides is not required.

5. SCHEDULE AND MILESTONES

It is expected that the surrogate liner will be pulled sometime in the April to June 2013 time frame. Factors such as weather, soil conditions, and availability of crafts and equipment may, and likely will, impact the exact date of liner removal. It is not necessary that the inspector be present during the removal. He or she may be present at their choosing. However, only a one week notice may be provided for the liner pull. Once the liner has been pulled and measured, the inspector should plan to visit the INL within two weeks. If the on-site visit extends beyond two weeks, the inspector shall provide written instructions to maintain the liner for the delayed inspection.

6. COMPLETION CRITERIA AND FINAL ACCEPTANCE

The contract shall be complete upon receipt of signed and stamped copies of the reports.

7. APPENDICES

NA

8. ATTACHMENTS

NA

Attachment F-6

Example of RSWF Annual Grading and Landscaping

Preventative Maintenance Model Work Order

Planned Work Order	**771 Drainage And Erosion 12m Repair (RCRA)**	WO Number: **125409** Page 1 of **7**

Laboratory-wide	Laboratory Instruction	**USE TYPE 1/2**	Planned Work Order

☐ RECURRING MAINTENANCE: PREVIOUS WO# __127059____

WORK ORDER ATTACHMENT COVER SHEET

Section	Title
I	CMMS Work Order
II	SME and Additional Concurrence Reviewers
III	Hazards/Hazard Control Set (HCS)
IV	List of Personal Protective Equipment
V	Training/Special Skills
VI	Special Tools and Equipment (such as M&TE)
VII	Waste Stream Disposition
VIII	Initial Conditions and Prerequisites
IX	Work Instructions
X	Post Maintenance Testing Instructions (PMT)
XI	Return to Service
XII	Closeout

Attachments:

- Table of Contents
- Actual Labor Resources
- INL Briefing(to be attached if documented pre-job is preformed)
- Task Evaluation Feedback Form
- Supplemental Material List

SCOPE STATEMENT: This WO performs grading and landscaping (using heavy equipment and laborers) to correct erosion and ensure adequate draining from the facility

.

II. SME AND ADDITIONAL CONCURRENCE REVIEWERS

Review and approval signatures can be found electronically in Asset Suite.

III. LIST OF HAZARDS AND THEIR CONTROLS

Activity(s)	Hazard	Mitigation
All Work	**Working in Permitted Facility**	Training as TSDF Support Worker per PDD-162, "MFC HWMA/RCRA TSDF Personnel Training Program" (see Table 1 MFC HWMA Unit Training Requirements, PDD-162) as follows: • General Employee Training • HWMA Facility Specific Training • Rad Worker Training • Pre-Job Brief required per LWP-9201
Grading Ground in RSWF	**Operation of Heavy Equipment**	Qualified Heavy Equipment Operator
Cleaning coverts and ditches	**Snakes**	Contained in LI-295

IV. LIST OF PERSONNEL PROTECTIVE EQUIPMENT

PPE	Craft(s)
Safety glasses, Leather Gloves, Sturdy leather boots	All

V. LIST OF TRAINING/SPECIAL SKILLS

Training/Special Skills	Craft(s)
QLU13000: Heavy Equipment Operator	Equipment Operator
TSDF Support Worker per PDD-162 (see Section III above)	Equipment Operator/ Laborer

VI. LIST OF SPECIAL TOOLS AND EQUIPMENT

Required Special Tools and Equipment	Location
Shovels	753

VII. WASTE STREAM DISPOSITION

- No waste is anticipated

VIII. INITIAL CONDITIONS AND PREREQUISITES

8.1 Briefing

Perform a briefing with all personnel that will be involved with this WO per LWP-9201. Discuss the work scope, topics as specified on Form 434.14, "Briefing Checklist," and the specific topics listed below. The radiological controls department is to be contacted to cover the RWP to be used and radiological hazard information prior to entry into the radiological area or prior to performing radiological work.

☐ Documented briefing with briefing checklist completed, OR

☐ Non-documented briefing:

Signature:		**Date:**		**S No.:**	

8.2 Workability Walkdown

Perform a workability walk down **PRIOR** to commencing work to ensure that the plant conditions and hazard identified/mitigation in work order are valid.

Signature:		**Date:**		**S No.:**	

8.3 Prerequisites

The following prerequisites must be completed or verified complete, or conditions met prior to starting work:

☐ None

IX. WORK INSTRUCTIONS

SCOPE STATEMENT: This WO performs grading and landscaping (using heavy equipment and laborers) to correct erosion and ensure adequate draining from the facility

WARNING

BEWARE OF SNAKES

NOTE: *Steps 9.1 and 9.2 may be performed in any order or simultaneously.*

9.1 **EQUIPMENT OPERATOR**-Perform grading and landscaping as necessary to correct erosion and ensure adequate draining from the facility as directed by Operations personnel.

- Inform facility management immediately, of any damage to liners, fencing, culverts, etc.

Signature ____ Date __/__/__ S # __________

9.2 **LABORER-**Clean culverts as directed by Operations personnel.

- Inform facility management immediately, of any damage to liners, fencing, culverts, etc.

Signature ____ Date __/__/__ S # __________

X. POST-MAINTENANCE TESTING (PMT)

- None

XI. RETURN TO SERVICE

11.1 Noting Deficiencies

Maintenance/Operations: Record equipment or system deficiencies in the table below being sure to note at which step the deficiency occurred and actions (RFS#, etc.) taken to correct the deficiency.

Step No.	Deficiencies and Comments	*RFS Number

11.2 Work Representative/Craftsman

Review the work site for cleanliness and the WO for completeness according to the instructions. Ensure any ISMS Feedback has been identified on the Task Evolution/Feedback Form. Sign and date below for completion of work.

Work Rep/Craftsman Signature:		**Date:**		**S No.:**	

11.3 System Engineer

NOTE: *Operations Management may mark Engineering Signature as N/A if no deficiencies are identified.*

Review and evaluate the deficiencies and provide a recommendation as follows (mark one):

☐ The equipment or system will perform its intended function and is acceptable for continued service or return to service.

☐ The equipment/system is acceptable for continued service or return to service with the following temporary compensatory measure(s) in place until permanent repairs are completed. (Ensure the condition has been dispositioned per LWP-13830, Control of Nonconforming Items, for Safety Class and Safety Significant components).

____

____

____

____

☐ The equipment or system is not acceptable for continued service or return to service until repaired or replaced.

System Engineer Signature:		**Date:**		**S No.:**	

11.4 Facility/Operations

Based on review and evaluation of the work performed and input from maintenance and engineering, determine the following (mark one):

☐ The equipment or system is acceptable for continued service or return to service.

☐ The equipment or system is acceptable for continued service or return to service with the following temporary compensatory measure(s) in place until permanent repairs are completed.

____

____

____

____

☐ The equipment or system is not acceptable for continued service or return to service and requires maintenance and/or repair.

Facility/Operations Signature:		**Date:**		**S No.:**	

XII. CLOSEOUT

12.1 Maintenance Foreman

Review the work order for completeness and technical content. Determine if additional actions are required and notify Operations if necessary. Sign for acceptance in one of the Asset Suite "Work Completion Signature" blocks.

12.2 Quality Engineer (Optional)

QA concurrence and closeout review is required for all Quality Level 1 work. QA concurrence and closeout review is required for Quality Level 2 work involving QA performed test or inspection steps. Sign for acceptance in one of the Asset Suite "Work Completion Signature" blocks.

12.3 Work Control Administrative Center (WCAC)

Verify that all required closeout signatures have been obtained, and that the WO status has been updated in Asset Suite.

Attachment 5
Personnel Training

CONTENTS

TABLES

ATTACHMENTS

H. PERSONNEL TRAINING [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR 264.16(a)(1) and 270.14(b)(12)]

In accordance with the requirements of Idaho Administrative Procedures Act (IDAPA) 58.01.05.008 and 58.01.05.012, and 40 Code of Federal Regulations (CFR) 264.16(a)(1) and 270.14(b)(12), this section of the Materials and Fuels Complex (MFC) Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) Permit Application describes the introductory and continuing training programs for operations and support personnel performing work assignments in MFC HWMA units. Implementation and application of these training programs will ensure HWMA unit personnel are trained to operate/maintain the HWMA units in a safe manner.

The information provided in this section is organized by subsection as follows:

- Subsection H-1, Training Director
- Subsection H-2, Training Program Design
- Subsection H-3, Training Program Content
- Subsection H-4, Training Program Implementation
- Subsection H-5, Training Records Management.

H-1 Training Director [IDAPA 58.01.05.008; 40 CFR 264.16(a)(2)]

The MFC Training Manager, in cooperation with the HWMA unit manager, functions as the Training Director for the HWMA units. In this position, the Training Manager and HWMA unit manager direct and maintain the HWMA unit training programs, which include the analysis, design, development, implementation, and evaluation of training. In addition, they have knowledge of the applicable sections of the following:

- HWMA unit design, systems, operation, and maintenance
- DOE/Idaho National Laboratory (INL) policies and requirements
- DOE Orders
- HW/MW facility operations
- Nuclear Regulatory Commission (NRC) regulations

- American National Standards Institute (ANSI)/American Nuclear Society (ANS) Standards
- CFRs
- Laboratory organization, administration, and management practices
- Performance-based training methods
- Backgrounds that include experience in development of training and qualification materials for nuclear facility operators, HWMA unit facility operators, presentation of training classes, preparation of training program accreditation plans, and development of training materials and programs.

H-2 Training Program Design [IDAPA 58.01.05.008; 40 CFR 264.16(a)(3)]

HWMA unit training programs are designed to ensure that personnel, through classroom and/or on-the-job training, can perform their operations in a way that ensures the HWMA unit will be operated in accordance with all applicable IDAPA 58.01.05.008 and 40 CFR 264 requirements. In addition, the training ensures they will be able to respond effectively to emergencies at the HWMA units by familiarizing them with the following emergency procedures, equipment, and systems (as applicable):

- Procedures for using, inspecting, repairing, and/or replacing facility emergency and monitoring equipment
- Key parameters for automatic waste feed cut-off systems
- Communications or alarm systems
- Response to fire or explosions
- Response to groundwater contamination incidents
- Shutdown of operations.

The training applicable to the HWMA unit facility operations and support personnel is summarized in the table provided in Attachment H-1. In addition to HWMA unit personnel, INL firefighters, providing On-Scene-Commander and hazardous material (HAZMAT) response services, receive appropriate training regarding this information as part of the INL Fire/Rescue Department's training program, which includes instruction regarding hazardous waste (HW)/mixed waste (MW) properties, potential dangers, preventive and remedial measures, and worker exposure first aid.

H-3 Training Program Content [IDAPA 58.01.05.008 40 CFR 264.16 (d)(3)]

All HWMA unit personnel receive training appropriate to their job classifications, as required by the regulatory requirements described above. A schedule of the MFC HWMA unit training programs is provided in Attachment H-1.

H-3(a) Classroom/Computer-Based Instruction

Training is performed and documented through the INL Training Records and Information Network (TRAIN) computer-based training program and/or classroom instruction. Student attendance is verified and documented through the computer-based training program or by signature on attendance sheets. A training file for each student is maintained electronically in the INL TRAIN system.

H-3(b) On-the-Job Training

On-the-job training (OJT) is conducted by qualified individuals, instructing from approved lesson plans or procedures, and documented on qualification cards. Should any item be performed unsatisfactorily, the individual will receive additional instruction and then repeat the task until the instructor is satisfied that the student can perform the task properly. All tasks will be listed on a qualification card for the training level being pursued by the student.

H-4 Training Program Implementation

H-4(a) Job Titles/Job Descriptions [IDAPA 58.01.05.008 40 CFR 264.16(d)(1) and (2)]

HWMA unit facility operations and support personnel job classifications and job titles for all positions at the HWMA units have been identified. For the purposes of training, personnel filling these jobs have been grouped into one of two classifications (based on the type of work they perform in the units) as defined in Table H-1.

Table H-1. MFC HWMA Units Job Titles.

Personnel Classification	Frequency of Work	Job Titles
HWMA Unit Workers	Performs direct work with the waste in the HWMA units. Reasonable possibility of exposure.	• Operations Personnel • Emergency Responders-Fire Fighters • Equipment Operator • Inspector and Backshift Worker/Maintenance Personnel • Health Physics Technician
HWMA Unit Support Personnel	Performs periodic work assignments at the HWMA units that do not involve opening a container or transferring contents of a tank, and/or coordinates emergency response duties. Exposure is extremely unlikely.	• Life Safety System (LSS)/Maintenance Personnel • Emergency Action Manager

Brief job descriptions for the above-identified job titles are provided in Attachment H-2. Detailed job descriptions (i.e., MFC HWMA unit personnel position descriptions) that include the requisite skill, education, or other qualifications, and duties of personnel assigned to the positions will be kept on file in the Human Resources Department.

H-4(b) Required Training and Relevance to Job Positions [IDAPA 58.01.05.008; 40 CFR 264.16(a)(2) and (d)(3)]

All HWMA unit operations and support personnel (as identified in Attachment H-1) are provided training that is relevant to the positions in which they are assigned, as summarized in Attachment H-2. Training requirements, frequency, and applicability to HWMA unit personnel classification and job title are detailed in Attachment H-1.

H-4(c) Completion of Required Training [IDAPA 58.01.05.008; 40 CFR 264.16(b) and (c)]

All HWMA unit operations and support personnel are required to successfully complete the training requirements defined in Attachment H-1. These personnel must satisfactorily complete initial training requirements within six months after the date of their initial employment or assignment to the HWMA unit(s). Until affected personnel have successfully completed required training, they are directly supervised during the performance of job assignments at the HWMA units by qualified HWMA unit operations or support personnel. In addition, all other MFC personnel and visitors requiring access to HWMA units are escorted by qualified HWMA unit operations and support personnel.

H-5 Training Records Management [IDAPA 58.01.05.008 40 CFR 264.16(d)(4) and (e)]

Records that document successful completion of required training for HWMA unit personnel are maintained at the facility. Training records for each affected individual are updated upon successful completion of required training. For current HWMA unit operations and support personnel, individual training records will be maintained for the operational life of the facility. For HWMA unit operations and support personnel who terminate employment or are reassigned to another job classification at MFC, individual training records will be maintained for at least 3 years following the date of termination/reclassification.

Attachment H-1

MFC HWMA Unit Training Requirements and Frequency

MFC HWMA Unit Training Requirements								
Training Requirements		HWMA Unit Workers[a]					HWMA Unit Support Personnel	
		Operations Personnel	Emergency Responders-Fire Fighters	Equip. Operator	Inspector and Backshift Worker/ Maint. Personnel	Health Physics Technician	LSS/Maint. Personnel	Emergency Action Manager
General Employee Training	Biennial	X	X	X	X	X	X	X
HWMA Facility-Specific Training	Biennial	X	X	X	X	X	X	X
Radiation Worker Training	Biennial	X	X	X	X	X	X	X
Respirator Training	Annual	X	X	—	—	X	—	—
Job-Specific Training	Variable	X	X	X	X	X	X	X
HAZWOPER Training[b]	Annual	X	X	X	X	X	—	—

a. Annual RCRA training is provided through job specific training to ensure personnel perform their duties as required by 40 CFR § 264.16.
b. Performs direct work with the waste and/or job function involves a possibility of exposure (e.g., accidental spill). May perform movement or inspection of hazardous waste containers, surveying of hazardous waste or open hazardous waste containers, and maintaining permitting waste treatment/storage tank systems.

Attachment H-2

MFC HWMA Unit Position Descriptions

- HWMA Unit Workers
  - Operations Personnel
    - Supervisor
    - Technician
  - Emergency Responder-Fire Fighter
  - Equipment Operator
  - Health Physics Technician
  - Inspector and Backshift Worker/Maintenance Personnel
- HWMA Unit Support Personnel
  - LSS/Maintenance Personnel
  - Emergency Action Manager

<table>
<tr><th colspan="2">HWMA Unit Job Descriptions</th></tr>
<tr><th>Job Title/Description</th><th>Primary Activities</th></tr>
<tr><td>Operations Supervisor</td><td>Directs the activities of HWMA unit facility operators/technicians in the operations of the facility during all modes of operation and within applicable operating and maintenance instructions.</td></tr>
<tr><td colspan="2">Directs day-to-day activities of HWMA unit facility personnel in all modes of operation.

Follows up work assignments to ensure they are completed in accordance with written and oral instructions. Provides assistance in troubleshooting and correcting routine operational problems.

Maintains cognizance of all work going on in the facility and monitors all work for safety and procedural considerations.

Makes periodic tours of all systems to verify system parameters are normal and equipment is operating properly. Reviews data sheets and logs to ensure their completeness and checks system performance.

Assists in training facility personnel and ensures that technicians/operators remain current in their review of changes to operating and maintenance instructions, administrative procedures, and plant equipment.

Maintains the unit operating record logbook.

Responds immediately to any deficiencies identified on inspection logs and documents corrective action(s).</td></tr>
<tr><td>Operations Technician</td><td>Operates the HWMA unit safely and efficiently under normal and off-normal conditions. Maintains level of facility knowledge by compliance with an approved training program. Helps in the OJT of lower grade personnel.</td></tr>
<tr><td colspan="2">Operates and monitors facility systems. Maintains accurate records of facility operation, maintenance activities, and equipment performance.

Assists trainees by giving oral checkouts on general qualification topics; supervises operator trainees on training watches and during performance of practical factors.

Reviews and comments on proposed revisions to operating instructions, emergency procedures, and training documents.

Provides feedback to facility supervisor on system malfunctions, abnormalities, or unusual trends in system performance.

Provides recommendations on troubleshooting plant problems.

Performs RCRA tank system/container storage area inspections.</td></tr>
</table>

HWMA Unit Job Descriptions	
Job Title/Description	**Primary Activities**
Emergency Responder - Fire Fighter	Performs direct work with the waste during emergency response actions.
Fire Department or fire fighters are a group of designated personnel prepared to respond, in a specific capacity, to any time-urgent or emergency event, regardless of time, location, or complexity. Fire fighters provide hands-on response to fire and explosions involving all MFC facilities, including the TSD facilities, as well as providing response to significant releases of hazardous material.	
Equipment Operator	Performs driving assignments to transport materials and equipment on and offsite. Operates mobile and fixed equipment and performs rigging assignments to move, place, build, and/or dismantle material, equipment, and fixtures, and excavate, backfill, and grade for underground utility installation removal or repair.
Loads and secures shipping casks containing radioactive material and hazardous materials containers on transport vehicles, and operates vehicles to deliver shipments to MFC and other INL locations. Operates various types of material handling equipment (such as mobile cranes, bridge cranes, forklifts, and manual and powered hoisting equipment) to lift, move, and place items as required. Operates various types of earth moving equipment (such as road graders, backhoes, end loaders, and dozers) to excavate, backfill, grade, and move earth and snow as required. Inspects objects to determine weight, center of gravity, rigging method, and route of movement. Selects and attaches rigging tackle to minimize the likelihood of damage to objects or injury to personnel. Inspects and load tests rigging tackle and hoisting equipment and attaches certification tags.	

<table>
<tr><th colspan="2">HWMA Unit Job Descriptions</th></tr>
<tr><th>Job Title/Description</th><th>Primary Activities</th></tr>
<tr><td>Health Physics Technician</td><td>Provides radiological protection of personnel, facilities, and equipment. Provides radiological assistance for site or personnel emergencies, including first aid.</td></tr>
<tr><td colspan="2">Completes and evaluates routine radiation safety surveillance of HWMA units. Maintains accurate records of daily health physics activities. Ensures proper operation of radiation/contamination monitoring equipment.

Maintains cognizance of HWMA unit work procedures to ensure radiological control and to ensure that HWMA units conform with sound ALARA principles.

Evaluates radiological impacts of operational facility systems. Provides radiological evaluation and monitoring of facility handling of radioactive material.

Maintains health physics training and qualifications required by DOE and MFC requirements.

Involved in surveying hazardous waste or open hazardous waste containers.

Provides assistance for MFC unit inspections of the RSWF, as applicable.

Trains lower grade and lesser qualified HPTs.</td></tr>
<tr><td>Inspector and Backshift Worker/Maintenance Personnel</td><td>Performs RCRA Inspections or performs maintenance, repairs, and modifications to HWMA unit systems and components.</td></tr>
<tr><td colspan="2">Performs routine preventive maintenance activities and specific maintenance to support HWMA unit operations.

Performs daily inspections of permitted tanks/tank areas in SCMS.

Performs RCRA container/miscellaneous unit area inspections.</td></tr>
</table>

<table>
<tr><th colspan="2">HWMA Unit Job Descriptions</th></tr>
<tr><th>Job Title/Description</th><th>Primary Activities</th></tr>
<tr><td>LSS/Maintenance Personnel</td><td>Performs maintenance, repairs, and modifications to plant electrical, mechanical, or fire protection systems and components.</td></tr>
<tr><td colspan="2">Troubleshoots and repairs malfunctioning mechanical and electrical equipment.

Performs preparation, installation, inspection, and checkout work for changes to electrical, mechanical, or fire protection systems.

Trains lower grade and lesser qualified personnel.</td></tr>
<tr><td>Emergency Action Manager</td><td>Coordinates emergency response duties for all imminent or actual emergency situations at MFC HWMA units.</td></tr>
<tr><td colspan="2">Coordinates all MFC HWMA unit emergency response measures to safely and effectively mitigate the situation/emergency and commits the resources needed to carry out contingency plans.

Performs necessary follow-up activities, such as making notifications, completing and submitting required reports, and ensuring designated emergency response equipment is returned to service in a clean and operable condition.

Maintains knowledge of all aspects of MFC contingency plans, and MFC operations and activities.</td></tr>
</table>

Attachment 6
Procedures to Prevent
Hazards

F-3 Prevention and Preparedness (IDAPA 58.01.05.008; 40 CFR 264 Subpart C)

F-3(a) Equipment Requirements (IDAPA 58.01.05.008; 40 CFR 264.32)

This subsection documents compliance with the preparedness and prevention equipment requirements. The required equipment includes internal and external communication equipment, emergency equipment, and water for fire control.

F-3(a)(1) Internal Communications [IDAPA 58.01.05.008; 40 CFR 264.32(a)]

MFC uses a site-wide emergency signal and paging system to alert facility personnel of emergencies (ref. Attachment 7, Section G, Contingency Plan). Attachment 7 shows the signals used and, for each signal, the type of emergency and required action. All MFC personnel are trained to respond appropriately to these signals. The siren signals are Site-wide, while radiation alarms are facility-specific. Emergency messages can be sent over the MFC paging system.

F-3(a)(2) External Communications [IDAPA 58.01.05.008; 40 CFR 264.32(b)]

The means of communication between HWMA unit and emergency-response personnel includes telephones, cellular phones, radios and fire-alarm pullboxes. The dial 777 emergency telephone system enables an individual to dial the numbers 777 on any business telephone, which will then put the individual in contact with emergency-response personnel. For cellular phones 208-526-7777 is used. In areas where cellular phones are not allowed business telephones, radios, or fire alarm pullboxes are in place. Fire-alarm pullboxes automatically notify the INL site-wide Fire Alarm Center. The Fire Alarm Center then communicates the pullbox location information to Station No. 2 (located at the MFC) Fire Department personnel.

F-3(a)(3) Emergency Equipment [IDAPA 58.01.05.008; 40 CFR 264.32(c)]

The MFC HWMA units have facility-specific emergency equipment available (for their use in the unit) that is regularly inspected and maintained (ref. Attachment F-3). This equipment, and its quantities, locations, and capabilities, are identified in Attachment 4, Section F, and Attachment 7, Section G (ref. Attachments F-4 and G-2). Emergency access routes to emergency-response equipment for use at the HWMA units are shown in Attachment 7, Section G, Contingency Plan, Attachment G-3.

F-3(a)(4) Water for Fire Control [IDAPA 58.01.05.008; 40 CFR 264.32(d)]

Water for fire control of non-reactive HW/MW fires is available throughout the MFC site for use in each HWMA unit as identified in Attachment 7, Section G, Contingency Plan. Water is not used for control of fires involving water reactive HW/MW; the use of water to fight reactive metal fires would only accelerate the fire. Instead, Class D extinguishing media, which is formulated for reactive metal fires, is used to fight these fires. Water is used for fire control only if reactive HW/MW is not involved, or if the fire department or facility manager determines it is appropriate for the situation.

Fire control is evaluated at MFC facilities by the fire engineers. Certain facilities are required to have a Fire Hazard Analysis, while all facilities are required to have a Fire Safety Assessment. If conditions change the fire engineers use procedures to modify the assessments. Each assessment describes the conditions found in the building and the appropriate corresponding fire controls.

Controls such as isolation from water, carbon dioxide and Met-L-X fire extinguishers, halon, and fire barriers may be appropriate for non-water fire control.

F-3(a)(5) Access to Communication or Alarm System [IDAPA 58.01.05.008; 40 CFR 264.34]

Whenever hazardous waste is being handled personnel involved have access to the types of alarms or communication systems as specified in Section F-3(a)(2).

F-3(b) Aisle Space Requirements (IDAPA 58.01.05.008; 40 CFR 264.35)

In accordance with National Fire Protection Association (NFPA) 101, The Life *Safety Code (LSC) for Industrial Occupancies (National Fire Protection Association) and Occupational Safety and Health Standards (OSHA)*, a minimum of 3 feet of aisle space is maintained for any means of ingress or egress into the MFC HWMA units. Placement of containers and process equipment within the HWMA unit in accordance with this minimum aisle spacing requirement ensures unobstructed movement of emergency response personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of the facility operation in an emergency.

F-4 Prevention Procedures, Structures, and Equipment

F-4(a) Loading and Unloading Operations [IDAPA 58.01.05.012; 40 CFR 270.14(b)(8)(i)]

HWMA unit container loading and unloading operations include (as applicable to the specific unit) the following:

- Unloading containers of HW/MW from trucks or trailers and casks using forklifts, mobile cranes, or facility cranes
- Moving containers from HWMA storage areas to the HWMA unit process areas and/or to another HWMA unit storage or treatment facility
- Daily inspection following transfer operations.

Hazards that may result from loading and unloading operations are minimized by the use of trained and qualified rigging and hoisting operators, trained material handling personnel, proper handling of containers and inspection of containers as described in Attachment 1, Section D, Process Description.

F-4(b) Run-On and Run-Off [IDAPA 58.01.05.012; 40 CFR 270.14(b)(8)(ii)]

F-4(b)(1) Indoor HWMA Units

Containers of HW/MW are elevated off the floor during storage (e.g., stored on secondary containment pallets or skids or by container design), ensuring that the containers do not come in contact with runoff from HW/MW handling operations or run-on from precipitation. Note: During processing, containers may be staged on the floor as required by the process.

F-4(b)(2) Outdoor HWMA Unit (RSWF)

MW stored in the RSWF is contained within welded or blind-flanged, cathodically protected steel liners with the tops of the liners above (approximately 4 inches) ground level. The RSWF is graded to slope gently from the centerline to the parallel sides. This serves to prevent run-on of precipitation toward the liners and facilitates run-off of precipitation away from the liners.

F-4(c) Water Supplies [IDAPA 58.01.05.012; 40 CFR 270.14(b)(8)(iii)]

Contamination of water supplies due to HWMA unit operations is highly unlikely because:

- HW/MW is stored in sealed containers; HW/MW with free liquids is stored in containers/tanks with secondary containment.
- HWMA units are >50 ft from the nearest site production/drinking water well.
- The MFC site is maintained with the necessary grading and ditches to channel run-off to the Industrial Waste Pond.
- MFC is more than 10 miles removed from the nearest surface water (the Big Lost River) protected by the Clean Water Act.
- The water table of the Snake River Plain Aquifer is > 600 ft below grade.

F-4(d) Equipment and Power Failure [IDAPA 58.01.05.012; 40 CFR 270.14(b)(8)(iv)]

Equipment failures are minimized and prevented by thorough preventive maintenance and servicing programs. Possible equipment failure during HW/MW handling activities is primarily limited to crane or hoist breakdowns in the HWMA units. Crane breakdown could encompass motor, mechanical, and structural failure. Failures of the cranes or hoists are minimized through routine maintenance.

Forklift failure could encompass motor, hydraulic, mechanical, and structural failure. Rigging tackle failure could encompass breakage or deformation of slings, wire ropes, shackles, hooks, or other lifting devices. Forklift failure is minimized by routine maintenance and pre-use equipment checks. Delays in unloading and storage of waste containers as a result of forklift failure are also minimized because other forklifts are available if one is out of service.

To mitigate effects of electrical power failures:

- Ongoing operations (such as movement of HW/MW containers and treatment systems in operation) will be secured and placed in a safe condition
- Open containers of HW/MW will be closed and secured
- Automatic valves and controls in HW/MW treatment systems will fail in safe positions (as they are designed to do in case of power failures).

HWMA unit operations personnel complete facility shutdown operations, as necessary, to place equipment and waste in a safe standby configuration.

F-4(d)(1) Equipment and Power Failure at RSWF

The casks, forklift, and cranes used at the RSWF are uniquely constructed or purchased to perform operations at the RSWF, and, as a result, equipment failure is minimized. The casks used at RSWF have very few moving parts with no electrical components to fail.

F-4(e) Personnel Protective Equipment [IDAPA 58.01.05.012; 40 CFR 270.14(b)(8)(v)]

HW/MW is received at HWMA units in closed containers. HW/MW containers are only opened for the removal or transfer of the HW/MW at the time of waste verification, repackaging, and/or treatment. When HW/MW is exposed to the atmosphere during repackaging and/or treatment, personnel are protected by personnel protective equipment (PPE), as necessary.

F-4(f) Releases to the Atmosphere [IDAPA 58.01.05.012; 40 CFR 270.14(b)(8)(vi)]

In the event of an airborne release from a waste management unit addressed in this permit, the ventilation system in the building will direct hazardous constituents to the building’s HEPA filter off-gas system, which minimizes releases to the atmosphere.

At EFF (MFC-794) the ventilation system includes HEPA filters for both the east and west end of the building. If a tent is installed in the building, it would be provided with negative pressure and the ventilation system for the tent would include HEPA filtration, as needed, and exhaust out the main ventilation system. In addition, all containers are maintained closed while in storage, except for adding or removing waste.

At HFEF (MFC-785) the cell exhaust system draws air from contaminated areas around the decon cell into the decon cell and from there into the exhaust system ducts. Extensions to the cell exhaust system provide exhaust air flow from the Waste Characterization Chamber and its ancillary glove boxes. Gaseous exhaust then passes through at least two stages of HEPA filters. In addition, all containers are maintained closed while in storage, except for adding or removing waste.

At RSWF (MFC-771) air emissions are prevented by the waste being sealed within carbon steel liners. In addition, the liners contain containers that are also sealed. The liners are either welded shut or fitted with a blind flange, as applicable. The opening of waste containers is not allowed at the RSWF and therefore, is not a potential cause of air emissions.

SCMS consists of three separate buildings referred to as MFC-793, -793C, and -793G.

MFC-793 ventilation system consists of an exhaust fan, a smaller auxiliary exhaust fan, two main HEPA filter banks, an exhaust stack, and associated ductwork and dampers. The fan takes a suction from the SCMS High Bay and the SMCS Low bay through two HEPA filter banks. The fan discharges to the outside through the exhaust stack. Dual banks of filters were installed to provide redundancy in the event of filter failure or excessive fume loading. The ventilation system draws air through the water-wash vessel and passes it through a venturi scrubber and cyclonic liquid separator, a moisture separator and air heater before discharge to the HEPA filters.

MFC-793C and MFC-793G are container and debris storage buildings. All containers are maintained closed while in storage, except for adding or removing waste.

SSB (MFC-703) is a container and debris storage building. All containers are maintained closed while in storage, except for adding or removing waste.

F-5 Ignitable, Reactive, and Incompatible Wastes [IDAPA 58.01.05.012; 40 CFR 270.14(b)(9)]

Since the HWMA units may handle ignitable and reactive HW/MW, units managing this waste are designed, constructed, and operated to prevent accidental ignition or the reaction of the HW/MW with water or other incompatible material.

F-5(a) Prevent Ignition or Reaction of Ignitable or Reactive Waste [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(9) and 264.17(a)]

Engineering and administrative controls are in place at the HWMA units that manage ignitable or reactive HW/MW to prevent the accidental reaction or ignition of ignitable and reactive HW/MW and include the following:

- Protecting HW/MW containers from physical damage by minimizing handling
- Not storing incompatible materials together such as water (other than the industrial service water), corrosives, oxidizers, or halogenated solvents in the area
- Prohibiting sources of heat or ignition in the storage areas where ignitable or reactive HW/MW are stored
- Restricting access to HW/MW storage areas to trained personnel
- Keeping doors to HWMA units closed (when not in use) to prevent precipitation from accumulating in the storage area
- Using only properly trained personnel to place or remove HW/MW from the storage areas
- When venting drums use only non-sparking tools and provide monitoring of gases
- Work control documents.

F-5(b) General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(9) and 264.17(b)]

The design and operating practices at the HWMA units that manage ignitable or reactive HW/MW prevent reactions that:

- Generate uncontrolled extreme heat or pressure, fire, explosions, or violent reactions
- Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to pose a risk of fire or explosion or to threaten human health or the environment
- Damage the structural integrity of containers, tanks systems or secondary

containment systems.

These practices and design features are intended to separate and protect waste from sources of ignition, reaction, or spontaneous ignition, as follows:

- Incompatible waste is segregated as described in Subsection F-5(d).
- When containers are required to be opened for the purpose of HW/MW waste verification, repackaging, and/or treatment, only the containers in process will be opened.
- The atmosphere in the area where containers are opened is controlled to keep HW/MW confined. If necessary, containers will be opened in atmospheres that have appropriate ventilation or atmospheric controls with respect to areas where unopened containers or personnel are located.
- All equipment and wiring complies with applicable NFPA codes. Portable electric tools used are double-insulated or have ground fault interruption (GFI) circuit protection.
- Open-flame cutting, welding, or other similar spark or ignition sources will not be allowed inside the HWMA unit unless repair is required on a piece of equipment, in which case the equipment and the open flame or spark source will be isolated to the extent feasible from the HW/MW. To the extent necessary, the HW/MW will be transferred to one of the HWMA unit storage/treatment areas where potential ignition sources do not exist.
- Routine inspections of HWMA unit container storage/process areas provide regular assessment of storage conditions and early identification of potentially hazardous situations.

F-5(c) Management of Ignitable or Reactive Waste in Containers [IDAPA 58.01.05.012 and 58.01.05.00 8; 40 CFR 270.15(c) and 264.176]

MFC is located approximately 4 miles from the nearest INL facility property line. A buffer zone surrounding the MFC, and including the HWMA units, is greater than 50 ft from the property line, in compliance with IDAPA 58.01.05.008 and 40 CFR 264.176.

F-5(d) Management of Incompatible Waste in Containers [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.15(d) and 264.177]

Prior to HW/MW shipment to a HWMA unit, the generator provides information to the HWMA unit manager (or designee). The HWMA unit manager or designee reviews this information for conformance with the Permit. This provides a check as to whether or not the generator is placing incompatible HW/MW together in a single container or in a single shipment (both of which are prohibited). All HW/MW received at a HWMA unit is packaged by the generator. Information regarding the review of generator-supplied information for compatibility is addressed in Attachment 2, Section C, Waste Analysis Plan.

If noncompliant conditions are discovered by HWMA unit operations personnel during the course of storage, repackaging, and/or treatment, the generator is contacted, and the situation is evaluated and documented on a case-by-case basis. To the extent possible, the noncompliant condition is remedied, at least to the point where the HW/MW can be safely returned to the generator.

HW/MW generated at a HWMA unit as a result of repackaging, and/or treatment, is packaged in compatible containers and with compatible HW/MW if consolidated. No HW/MW generated at a HWMA unit is placed in containers with HW/MW, or HW/MW residue, that could be potentially incompatible.

If a container of HW/MW received at a HWMA unit is incompatible with any HW/MW or materials stored nearby, it will be separated from the other HW/MW or materials, or isolated from them by means of a wall, other device, or procedure.

F-5(e) Management of Ignitable or Reactive Waste in Tank Systems [IDAPA 58.01.05.012 and 58.01.05.00 8; 40 CFR 270.16(j) and 264.198]

Ignitable and reactive HW/MW that is placed in the tank system used to deactivate the HW/MW (i.e., at SCMS) is managed to ensure that the waste will not react or ignite outside of the designed treatment process. The headspaces of tanks holding Na/NaK are typically filled with inert gas, nitrogen for example, to minimize the potential for an air to waste reaction. The controlled reaction of ignitable and reactive HW/MW in SCMS tank systems meets the requirements of IDAPA 58.01.05.008 and 40 CFR 264.198 and 264.17(b).

F-5(f) Management of Incompatible Waste in Tank Systems [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.16(j) and 264.199]

Incompatible HW/MW will not be placed together in SCMS storage tanks or tank systems. As identified above, SCMS tank systems are designed specifically to react ignitable and reactive HW/MW with water under controlled conditions.

Attachment 7
Contingency Plan

CONTENTS

TABLES

ATTACHMENTS

G. CONTINGENCY PLAN [IDAPA 58.01.05.008 and 012; 40 CFR 264.52 through 264.56]

In accordance with the requirements of Idaho Administrative Procedures Act (IDAPA) 58.01.05.008 and 40 *Code of Federal Regulations* (CFR) 264.50 through 264.56, this section of the Materials and Fuels Complex (MFC) Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) Permit Application describes the contingency plans and emergency response actions that will be taken at an MFC HWMA unit in response to emergencies such as fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste (HW) mixed waste (MW) or HW/MW constituents to the air, soil, or surface water that could threaten human health or the environment. For reference, the locations of the MFC HWMA units discussed in this section are shown in Attachment 1, Section B, MFC Facility Description, Attachment B-2.

The information provided in this section is organized by subsection as follows:

- Subsection G-1, General Information
- Subsection G-2, Emergency Action Manager List
- Subsection G-3, Emergency Response Procedures
- Subsection G-4, Notifications and Reporting
- Subsection G-5, Emergency Equipment
- Subsection G-6, Coordination Agreements
- Subsection G-7, Evacuation Plan.

G-1 General Information [IDAPA 58.01.05.008; 40 CFR 264.51(a) and (b)]

G-1(a) Purpose, Implementation, and Content

The HWMA unit contingency plan applies to all HWMA units on the MFC site and is designed to minimize hazards to human health or the environment from fire, explosion, or any unplanned sudden or non-sudden release of HW, MW, or HW/MW constituents to the air, soil, or surface water that could threaten human health or the environment, and describes the actions the HWMA unit and support emergency response personnel must take in response. The provisions of the plan will be implemented whenever there is a fire, explosion, or release of HW/MW or

HW/MW constituents that could threaten human health or the environment. This contingency plan is consistent with Idaho National Laboratory (INL) emergency plans. The INL Emergency Plan/RCRA Contingency Plan (PLN-114) will be used in conjunction with the HWMA unit contingency plan in the event of an imminent or actual emergency.

In the event of an emergency at a HWMA unit, the HWMA unit contingency plan will be implemented to:

- Coordinate HWMA unit and the INL emergency response personnel during the emergency
- Coordinate MFC response with INL facilities and other emergency response personnel that may potentially be affected by or required to respond to the emergency.

The HWMA unit contingency plan provides a mechanism for alerting MFC or INL facilities and other response agencies to an emergency at a HWMA unit that would require MFC or the INL emergency response personnel to respond to the emergency.

G-1(b) Copies and Amendments [IDAPA 58.01.005.08; 40 CFR 264.53(a) and (b) and 264.54(a) through (e)]

Copies of this HWMA unit contingency plan will be maintained at the facility. In addition, copies of the contingency plan will be submitted to key INL, local, and state response agencies [such as the MFC Emergency Control Center (ECC), INL Fire Department, INL Warning Communications Center (WCC) and INL Emergency Operations Center (EOC)] so that emergency response personnel from these organizations will be familiar with the HWMA unit contingency plan and can refer to the plan in the event of an emergency at a HWMA unit that may affect other facilities at MFC and/or the INL.

This HWMA unit contingency plan will be reviewed and amended/updated, as necessary, if the:

- HWMA permit is revised
- HWMA unit contingency plan fails in an emergency

- HWMA unit changes its design, construction, operations, maintenance, or other circumstances in a way that materially increases the potential for fires, explosions, or releases of HW, MW, or HW/MW constituents, or changes the response necessary in an emergency

- List of HWMA unit Emergency Action Manager (EAM) changes

- List of HWMA unit emergency equipment changes.

G-2 Emergency Action Manager List [IDAPA 58.01.05.008; 40 CFR 264.52(d), 264.55, and 264.56]

This subsection lists the titles and names of MFC personnel filling the HWMA unit EAM position, a description of the specific duties, roles, and responsibilities of these personnel, and a brief description of how the HWMA unit emergency response personnel function.

Due to the shift-work structure and remoteness of MFC, it is not possible or practical for one individual to assume “primary” responsibilities, rather, responsibility is best assigned through “redundant primary” EAMs, without alternates. The on-duty EAM is available to respond 24 hours a day when notified of an emergency by pager or telephone.

The names, addresses, and phone numbers of the MFC personnel available to fill the EAM position are provided in Attachment G-1. The EAM list will be amended when necessary to reflect the identity of personnel available to serve as the EAM. These changes to the EAM list will be made as Equivalent Materials/Information changes in accordance with Permit Condition II.M. The current list of EAMs is maintained in Appendix G of the INL Emergency Plan/RCRA Contingency Plan (PLN-114). EAM candidates are to be available to serve 24 hours a day, when notified of an emergency by pager or telephone. The INL Fire Station No. 2 Captain fulfills the role of Incident Commander (IC).

G-2(a) Emergency Action Manager Duties

MFC EAM-trained personnel have been given the responsibility and authority for coordinating all emergency response actions. How the EAM functions in response to an emergency at a HWMA unit is based on the INL site-wide Incident Command System (ICS) philosophy, consistent with the INL Emergency Plan/RCRA Contingency Plan. As part of their training, the EAMs are familiar with all aspects of the HWMA unit contingency plan and the operations and activities of the HWMA units. If emergency response is required, the EAM will ensure that the appropriate actions are taken to resolve the emergency.

The INL Fire Department Station No. 2 is a fully staffed, trained, and equipped emergency response force that can respond in an expeditious manner to potential and actual emergencies at the HWMA unit. The INL Fire Department Station No. 2 is available 24 hours a day to provide fire suppression, rescue, medical, and hazardous material response. For emergencies that exceed the response capabilities of INL Fire Department No. 2, assistance is available from INL Fire Department Fire Stations No. 1 and 3, and through implementation of off-Site memoranda of understandings (MOUs). When responding to time-urgent situations or operational emergencies at a HWMA unit, the Fire Captain maintains command of Station 2 personnel and works in unified command with the EAM. Fire Department Station No. 2 also supplies its own emergency response equipment.

The MFC EAM performs the duties of the emergency coordinator (EC) as specified in IDAPA 58.01.05.008 and 40 CFR 264.56 and as described below.

- Whenever there is an imminent or actual emergency situation, the EAM must immediately:
  - Activate internal HWMA unit or facility alarms or communication systems, where applicable, to notify all facility personnel, and
  - Notify appropriate local/state emergency response agencies with designated response roles if their help is needed.
- Whenever there is a HW/MW release, fire, or explosion, the EAM must immediately identify the character, exact source, amount, and areal extent of any released HW/MW. The EAM may do this by observation or review of facility records or manifests, and, if necessary, by chemical analysis.
- Concurrently, the EAM must assess possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment must consider both direct and indirect effects of the release, fire, or explosion (e.g., the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water run-off from water or chemical agents used to control fire and heat-induced explosions).

- If the EAM determines that the HWMA unit has had a release, fire, or explosion that could threaten human health, or the environment outside the HWMA unit, the EAM must verbally report these findings as follows:

    - If the EAM's assessment indicates that evacuation of local/regional areas may be advisable, the EAM must immediately notify appropriate emergency response authorities. The EAM must be available to help appropriate officials decide whether any areas should be evacuated, and

    - The EAM must immediately notify the local/regional/state government communications center(s) and/or the official designated as the on-scene coordinator for that geographical area (in the applicable regional contingency plan under 40 CFR 1510), or the National Response Center (using their 24-hour toll free number 800-424-8802). The report must include:

        - Name and telephone number of reporter

        - Name and address of MFC HWMA facility

        - Time and type of incident (e.g., release, fire)

        - Name and quantity of HW/MW involved, to the extent known

        - The extent of injuries, if any

        - The possible hazards to human health or the environment outside the HWMA unit.

- During an emergency, the EAM must take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other HW/MW at the HWMA unit. These measures must include, where applicable, stopping processes and operations, collecting and containing released HW/MW, and removing or isolating containers.

- If the HWMA unit stops operations in response to a fire, explosion, or release, the EAM must monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, as appropriate.

- Immediately after an emergency, the EAM must provide for treating, storing, or disposing of recovered HW/MW, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the HWMA unit.

- The EAM must ensure that, in the affected area(s) of the HWMA unit:
  - No HW/MW that may be incompatible with the released HW/MW is treated, sorted, or disposed until cleanup procedures are completed
  - All HWMA unit emergency equipment listed in the contingency plan (see attachment G-2) is cleaned and fit for its intended use before operations are resumed.

G-3 Emergency Response Procedures [IDAPA 58.01.05.008; 40 CFR 264.52(b) and 264.56]

The following subsections describe the HWMA unit emergency response procedures that will be implemented in response to emergencies at a HWMA unit, such as fire, explosion, or any unplanned sudden or non-sudden release of HW, MW, or HW/MW constituents to air, soil, or surface water that could threaten human health or the environment.

G-3(a) Contingency Plan Implementation [IDAPA 58.01.05.008; 40 CFR 264.51(b) and 264.56(a), (c), (d)]

The HWMA unit contingency plan is designed to minimize hazards to human health and the environment and will be implemented whenever there is a fire, explosion, or any unplanned sudden or non-sudden release of HW/MW or HW/MW constituents to air, soil or surface water that could threaten human health or the environment.

Table G-1 Provides examples of situations at an MFC HWMA unit that would cause the HWMA unit contingency plan to be implemented.

Table G- 1. Situations that Could Activate the HWMA Unit Contingency Plan.

Fire and/or Explosion
• Fire that results in any of the following: – Fire that may cause the release of toxic fumes – Fire that could spread HW/MW and contamination – Fire that could spread, possibly igniting materials in other locations on-site, or could cause heat-induced leaks or explosions – Fire that could endanger human health for any other reason. • Explosion that could result in danger from flying fragments or shock waves • Explosion that could ignite other HW/MW at the HWMA unit • Explosion that could release toxic and/or radioactive materials.
HW/MW Release
• Release that results in any of the following: – Toxic or flammable liquids or vapors, causing a fire or gas explosion hazard – Soil contamination – Endangerment of human health or the environment for any other reason.

The HWMA units are continuously staffed when receiving HW/MW and when operating. If there is a fire, explosion, or release of a HW/MW in a HWMA unit as described above, the HWMA unit personnel will initiate an emergency response by using the dial 777 emergency telephone system, or by pulling a manual fire-alarm pullbox.

Personnel shall stand clear and upwind of the HWMA unit, keeping others clear and upwind of the area, but not putting themselves in danger. HWMA unit personnel are only concerned with proper notification, and being available until the MFC EAM arrives. The HWMA unit personnel will then turn over incident information to the EAM.

In response to an emergency that originates at a HWMA unit, the EAM has the authority and is required to:

- Recognize that an emergency condition exists and provide initial classification and assessment

- Take immediate corrective actions and provide recommendations for the protection of health and safety of MFC personnel, emergency response personnel, the INL population, and the public, and for the protection of property and environment

- Notify members of appropriate INL, DOE, state, local, and tribal organizations(as appropriate)

- Stabilize the emergency.

Three classifications of imminent or actual emergencies (as defined in DOE Order 5500.2a) could occur at the HWMA unit that may require support from the INL emergency response personnel. The classifications of Alert, Site Area Emergency, and General Emergency are briefly described in the following subsections.

G-3(b) Alert

An Alert is an emergency that is in progress or has occurred, and involves an actual or potential substantial reduction of the level of safety of a facility or the Site. Limited off-Site releases of hazardous materials may occur, but are not expected to exceed applicable permissible limits.

G-3(c) Site Area Emergency

A Site Area Emergency is an emergency that is in progress or has occurred, and which involves actual or likely major failures of facility functions needed for the protection of on-Site personnel, the public health and safety, and/or the environment. Releases of HW/MW are likely or are occurring, but are not expected to exceed applicable permissible limits beyond the INL administrative boundary.

G-3(d) General Emergency

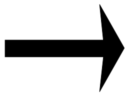
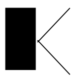
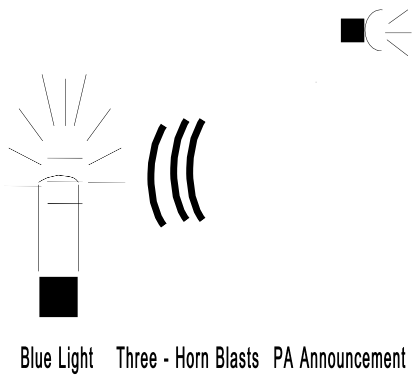
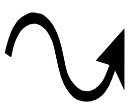
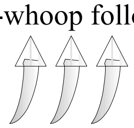
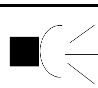
A General Emergency is an emergency that is in progress or has occurred and involves actual or imminent substantial reduction of facility safety systems. Releases of HW/MW off of the INL site are occurring or are expected to occur and will exceed applicable permissible limits.

G-3(e) Emergency Signals

Several emergency signals have been defined and are used to notify HWMA unit personnel that site-wide or HWMA unit specific emergencies exist. HWMA unit personnel are trained to respond appropriately to these signals. In addition, HWMA unit personnel may be notified of an evacuation by use of the paging system. Information regarding the different signals, their meaning, and the action to be taken when they are activated is summarized in Table G-2. The siren signals are site-wide, while slow whoops and radiation alarms are facility-specific. In addition, emergency messages are sent over the paging system. Sirens are of sufficient volume to be heard by personnel working at all HWMA units.

The EAM will determine whether or not the HWMA unit will be evacuated as a result of a HW/MW incident. During a HWMA unit evacuation, personnel in the area are to assemble upwind at a safe distance from HWMA unit. Personnel will report pertinent situation information to the EAM and then evacuate to a predetermined assembly area. All HWMA unit personnel shall remain at the assembly area and follow directions as provided by the EAM. A map indicating emergency routes out of the HWMA unit, and the main and alternate evacuation routes leading away from HWMA unit and exiting the MFC protective property area, is provided in Attachment G-3.

1 Table G-2. MFC Emergency Signals.

Signals Used	Type of Emergency	Required Action(s)
 Steady siren	Take Cover	*All Personnel*—Immediately seek shelter in nearest building with All-Call PA system, avoiding buildings with flashing blue lights. Prepare to evacuate.
Steady siren followed by an All-Call PA stating: This is a Security Take Cover 	Security Take Cover	*All Personnel*—Immediately go indoors. Stay indoors and await further instructions over All-Call PA system.
Flashing blue light(s)/three horn blasts followed by All-Call PA 	Criticality	*Personnel in Affected Facility*—Immediately evacuate affected facility and assemble in designated assembly area. *Personnel Who Normally Work in Affected Facility*—Report to designated assembly area. *All Other Personnel*—Stay clear of affected facility.
Alternating siren 	Evacuation	*All Personnel*—Proceed immediately to bus loading area and board buses.
Radiation alarm (normally fast ringing bell) 	High Radiation or Contamination	*Personnel in Affected Area*—Vacate immediate vicinity. Contact Health Physics Technician.
Slow-whoop followed by All-Call PA 	Fire	*Personnel in Affected Facility*—Evacuate affected facility. *All Other Personnel*—Stay clear of affected facility.
 All-Call PA	Any Emergency	*All Personnel/Personnel in Affected Facility*—Follow verbal instruction(s).

For a major incident such as a fire, explosion, or any unplanned sudden or non-sudden release of HW/MW or HW/MW constituents to air, soil or surface water that could threaten human health or the environment (or have the potential for such to occur), evacuation of the MFC site may be necessary. Evacuation activities will be coordinated between the EAM, on-Site personnel and off-Site agencies, as necessary.

G-4 Notifications and Reporting [IDAPA 58.01.05.008; 40 CFR 264.56(a),(d),(i), 264.196(d) and 270.30(l)(6)]

G-4(a) Notification and Reporting—General (264.56(a),(d),(i))

Whenever there is an imminent or actual emergency situation, the EAM must immediately:

- Activate internal HWMA unit alarms or communication systems, where applicable, to notify all HWMA unit personnel, and notify appropriate state or local emergency response agencies with designated response roles if their help is needed.

- If the EAM determines that the HWMA unit has had a release, fire, or explosion that could threaten human health or the environment outside the HWMA unit, the EAM must verbally report these findings as follows:

    - If the EAM's assessment indicates that evacuation of local/regional areas may be advisable, the EAM must immediately notify appropriate emergency response authorities. The EAM must be available to help emergency response officials decide whether any areas should be evacuated.

    - The EAM must immediately notify the local/regional/state government communications center(s) and/or official designated as the State on-scene coordinator for that geographical area (in the applicable regional contingency plan under part 1510 of this title), or the National Response Center (using their 24-hour toll free number 800-424-8802). In addition, the EAM must notify the State Communications Center at 800-632-8000. The report must include the following:

        - Name and telephone number of reporter;

    - Name and address of MFC HWMA facility
    - Time and type of incident (e.g. release, fire);
    - Name and quantity of material(s) involved, to the extent known;
    - The extent of injuries, if any; and
    - The possible hazards to human health, or the environment, outside the HWMA unit.

- The HWMA unit owner or operator must note in the operating record the time, date, and details of any incident that requires implementing the contingency plan if the EAM determines that the HWMA unit has had a release, fire, or explosion that could threaten human health or the environment outside the HWMA unit. Within 15 days after the incident, the HWMA unit owner/operator must submit a written report of the incident to the DEQ Director.

- The report must include:
    - Name, address, and telephone number of the owner or operator;
    - Name, address, and telephone number of the MFC HWMA facility;
    - 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; and
    - Estimated quantity and disposition of recovered material that resulted from the incident.

Reports will be sent to:

Director—Idaho Department of Environmental Quality

1410 North Hilton

Boise, ID 83706-1225

G-4(b) Notifications and Reports—Non-Compliance (270.30(l)(6))

The following protocol will be implemented by the HWMA unit owner or operator if an event of non-compliance with the contingency plan occurs**:**

- The HWMA unit owner or operator will verbally report to the IDEQ Director, within 24 hours from the time the permittee becomes aware of the circumstances, any noncompliance with the HWMA unit contingency plan that may endanger health or the environment. The verbal report must include:
  - Information concerning release of any HW/MW that may cause an endangerment to public drinking water supplies
  - Any information of a release or discharge of HW/MW or of a fire or explosion from the HWMA unit that could threaten the environment or human health outside the HWMA unit.
  - The description of the occurrence and its cause shall include:
    - Name, address, and telephone number of the HWMA unit
    - Date, time, and type of incident
    - Name and quantity of material(s) involved
    - The extent of injuries, if any
    - An assessment of actual or potential hazards to the environment and human health outside the HWMA unit, where this is applicable
    - Estimated quantity and disposition of recovered material that resulted from the incident.

- A written report shall also be provided to the IDEQ Director within 5 days of the time that the HWMA unit owner or operator become aware of the circumstances. The written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The IDEQ Director may waive the 5 day written notice requirement in favor of a written report within 15 days.

G-4(c) Notifications and Reports—Tank Systems (264.196(d))

Whenever there is a release to the environment from a tank or tank system, the HWMA unit owner or operator will:

- Verbally report to the DEQ Director, within 24 hours of its detection, any release to the environment, except as described below. If the release has been reported pursuant to 40 CFR Part 302, that report will satisfy this requirement. A leak or spill of hazardous waste is exempted from this report if it is:
  - Less than or equal to a quantity of one (1) pound, and
  - Immediately contained and cleaned up.
- Within 30 days of detection of a release to the environment, the HWMA unit owner or operator must submit a written report containing the following information to the DEQ Director:
  - Likely route of migration of the release;
  - Characteristics of the surrounding soil (soil composition, geology, hydrogeology, climate);
  - Results of any monitoring or sampling conducted in connection with the release (if available). If sampling or monitoring data relating to the release are not available within 30 days, the data must be submitted to the Regional Administrator as soon as they become available;
  - Proximity to downgradient drinking water, surface water, and populated areas; and

- Description of response actions taken or planned.

G-4(d) Identification of Hazardous Materials [IDAPA 58.01.05.008; 40 CFR 265.56(b)]

Immediately, the EAM will identify the character, exact source, amount, and areal extent of any released HW/MW. The primary sources of information about the HW/MW at the HWMA units include:

- HWMA unit and/or MFC personnel familiar with the HWMA unit and/or working in the HWMA unit at the time the imminent or actual emergency was first recognized
- Various records that document HW/MW quantities and conditions at various stages in the process stream at the HWMA unit
- Records that document quantities/conditions of nonprocess stream HW/MW that should be taken into consideration when planning emergency response actions.

G-4(e) Assessment [IDAPA 58.01.05.008; 40 CFR 264.56(c) and (d)]

Concurrently, the EAM, will assess any possible threat to human health or the environment that may result from the release, fire, or explosion. The EAM will assess the hazards posed by each emergency by evaluating the:

- Origin of the HW/MW release, fire, or explosion
- Conditions of the source
- HW/MW involved
- Radiological conditions
- Physical state of the HW/MW release
- Noticeable reactions
- Knowledge of the HW/MW being treated and stored at the HWMA unit.

Based on this assessment, the EAM will determine the appropriate types of notifications, reports, and level of response action. The EAM will then perform the necessary notifications and take the appropriate protective actions. This is in accordance with Subsection G-4(a), Notification and Reporting.

G-4(f) Control Procedures [IDAPA 58.01.05.008; 40 CFR 264.52(a)]

Procedures for responding to various emergency conditions are described below. Natural disasters such as tornadoes may also occur. For natural disasters, the MFC will be secured and personnel will be evacuated, as appropriate.

G-4(f)(1) Fire Response

The following actions will be taken at the HWMA unit in response to a fire:

- The INL Fire Department Station 2 personnel and appropriate safety personnel will be notified
- Personnel in the immediate vicinity will be evacuated as appropriate
- If water reactive HW/MW is present in the HWMA unit, Class D fire suppression media will be used to extinguish the fire
- Response personnel will wear appropriate personal protective equipment (PPE)
- Qualified emergency response personnel will administer medical treatment to the injured
- The EAM will take additional emergency response actions as necessary.

The INL Fire Station No. 2 is fully trained and equipped to handle all types of fires that may occur and are knowledgeable regarding the reactive nature and associated hazards of HW/MW being treated at the HWMA unit.

G-4(f)(2) HW/MW Release Response

The initial response to any HW/MW release will be oriented toward protecting human health and the environment. Identification, containment, decontamination, and disposal of the HW/MW will be the secondary responses. All release responses will be well planned and conducted while wearing all appropriate safety equipment and PPE.

The affected area will be defined using wind direction and velocity, appropriate sampling and monitoring techniques, and available emergency reference materials.

G-4(f)(2)(a) HW/MW Release Cleanup and Decontamination Verification

When the EAM determines that the release is contained and the cleanup and decontamination activities can be performed without jeopardizing personnel safety, such activities will be conducted under the supervision of qualified personnel following termination of the emergency. The target cleanup level, decontamination, and HW/MW disposal procedures will be developed and approved by an industrial hygienist, safety engineer, and waste engineer based on the nature of the release. Cleanup, decontamination, and verification activities will be recorded in the HWMA unit's operating record.

HW/MW releases will be cleaned up, decontaminated, and verified to ensure that hazardous constituents have been removed as specified in the previous subsections.

G-4(g) Prevention of Recurrence or Spread of Fires, Explosions, or Releases [IDAPA 58.01.05.008; 40 CFR 264.56(e) and (f)]

In an emergency, the EAM will initiate response actions that prevent the recurrence or spread of fires, explosions, and released HW/MW. Operations in the vicinity of, or affected by, the incident will cease, emergency response will be initiated, and unnecessary personnel evacuated.

If INL operations are placed in standby or shut down as a result of an emergency, the EAM can direct the reentry planning group to send a team to monitor for leaks; pressure buildup; gas generation; or ruptures in valves, pipes, or other equipment, depending on the facility.

Response measures for a HW/MW release include identifying its source and either repairing or replacing the container/containment. For example, a breached or leaking container can be placed into a second container.

These control procedures will be applied as appropriate during incident response and cleanup. No routine operations will resume until affected systems have been repaired and inspected to ensure their safe operation.

G-4(h) Storage and Treatment of Released Material [IDAPA 58.01.05.008; 40 CFR 264.56(g) and (h)(1)]

Small-volume releases and the residuals from larger release cleanup will be covered with an appropriate release control material, contained in dry buckets, and double bagged in dry plastic bags. Releases of solids will be returned to the original container, if it is secure. All collected HW/MW will be handled, stored, transported, treated, or disposed in accordance with State of Idaho HW/MW management regulations.

Precautions will be taken to preclude mixing of incompatible HW/MW in accordance with IDAPA 58.01.05.008; 40 CFR 264.56(h)(1). Specifically, some HW/MW are extremely reactive with water [such as sodium (Na)/sodium-potassium alloy (NaK)], halogenated hydrocarbons, and many other organic materials. Except for reactive components being purposefully mixed in the process vessel and tanks, all HW/MW treatment and handling areas outside of HWMA unit treatment vessels, container and/or tank containments will be free of other HW/MW that might react with released reactive HW/MW. Liquid corrosive HW/MW will be segregated while in storage and/or during treatment.

Containers of HW/MW will not be accepted or located in an area where a HW/MW release has occurred until cleanup is complete, an inspection is performed in accordance with the inspection schedule, and the HWMA unit manager approves the area as suitable for use.

G-4(i) Post-Emergency Equipment Maintenance [IDAPA 58.01.05.008; 40 CFR 264.56(h)(2)]

HWMA unit personnel will ensure that each piece of HWMA unit emergency equipment in the HWMA unit used in response to an emergency is cleaned (decontaminated), in operating condition for future emergency response, and/or replaced, if necessary. HWMA unit personnel will report completion of these activities to the EAM. Any equipment contaminated during emergency response that cannot be cleaned (such as PPE) will be disposed of appropriately and replaced. An overall HWMA unit inspection will be conducted prior to approval to resume operations in the affected area.

G-4(j) Container Releases and Leakage [IDAPA 58.01.05.008; 40 CFR 264.52 and 264.171]

Container-related HW/MW releases may occur during container receiving and HW/MW handling and storage at the HWMA unit. Procedures for responding to these incidents are described in Subsection G-4(e).

G-4(k) Tank Releases and Leakage [IDAPA 58.01.05.008; 40 CFR 264.52 and 264.196]

Tank releases and leakage may occur at the Sodium Components Maintenance Shop (SCMS) HWMA unit.

In the event of a SCMS tank system breach, response measures will first be oriented toward protecting human health and safety. Cessation of use, removal of HW/MW from the affected systems, and protection of the environment will be secondary responses. Cleanup, decontamination, and tank repair will be tertiary responses. Within 24 hours, or if this is not possible, at the earliest practicable time after detection of the release, HWMA unit personnel will remove as much of the HW/MW from the tank system (including tank secondary containment) as necessary to prevent further release and harm to human health and the environment, and to allow for inspection and repair of the tank system. However, because of the highly reactive nature of HW/MW to be treated at SCMS, removing HW/MW from breached tanks requires transfer to another form of containment with particular attention to the control of reactive conditions. Proper implementation of the safest and most environmentally protective methods of removing HW/MW from a breached SCMS tank will require careful implementation. The cessation of use and removal of tank contents will be performed as described in the following subsections.

Secondary containment for the tanks in SCMS consists of an epoxy coated concrete floor and/or epoxy coated sump. Cracks or other defects in the epoxy coated floor are temporarily covered until repairs are made. Repairs to the epoxy coating are done at least weekly. Cracks or gaps identified in the epoxy coated sump pit are repaired through the work control process, due to confined space entry and radiological work permit requirements to enter sump pit.

G-4(k)(1) Cessation of Use and Removal of Contents from SCMS Tanks

G-4(k)(1)(a) Na/NaK or Hydroxide Release/Leak From 90-Gal Water Wash Vessel (WWV)

Although ignitable and reactive HW/MW is processed in the WWV, operation of the WWV limits the amount of HW/MW allowed in the WWV at any one time. The WWV burn pan is administratively controlled to contain a maximum amount of ignitable and reactive HW/MW at any one time, but is never to exceed 156 gallons/day. A detailed engineering evaluation is written and maintained in the facility operating record to document the maximum amount of ignitable and reactive HW/MW that can be treated in the WWV at any one time, and to determine needed safety and administrative limits. These limits are implemented through operating procedures to prevent over-pressurization of the WWV. This small amount of HW/MW is processed in the burn pan, which sits directly above a 50 to 90-gal reservoir of water. When the HW/MW drains to the burn pan into the water, it produces a caustic HW/MW. This controlled reaction is safely contained in the WWV. As a result, the cessation of use and removal of tank contents from the WWV will typically involve a corrosive solution, and the actions listed below will be performed for ignitable, reactive, and corrosive HW/MW leaks. The cessation of use and removal of contents from the WWV will be performed as follows:

- Emergency response activities will be initiated in accordance with Subsection G-4(e)

- If safe to do so, personnel will immediately secure the system to prevent continued inflow of HW/MW into the WWV (eliminate vacuum or pressure on tank) and reduce mobility of tank contents (turn tank heaters off)

- Conditions will be evaluated to gain needed information to implement the most appropriate method of cessation of use and removal of contents

- Continued processing is used as a method to remove the solution, produced as a result of deactivating the ignitable, reactive HW/MW from the WWV. This is appropriate as the solution in the WWV gravity-drains to the scrubber water tank during processing

- If the WWV cannot be emptied via continued processing (gravity drained to the scrubber-water tank), it will be emptied by transferring any ignitable, reactive, or corrosive HW/MW to compatible containers

- Once the breach has ceased leaking, the following actions will be taken:

  - Ignitable, reactive, or corrosive HW/MW will be collected from the secondary containment (High Bay Floor or floor drain piping and Low Bay Pit). The ignitable, reactive, or corrosive HW/MW will then be transferred to compatible containers or into an SCMS tank system for continued processing

  - The release area will be cleaned and decontaminated in accordance with Subsection G-4(e)

  - The WWV will be repaired at the point of the leak.

G-4(k)(1)(b) Hydroxide Release/Leak From 30-Gal Carbonation Vessel

The carbonation vessel is designed to be a flow-through tank and, therefore, is not likely to have a tank release or breach. In the event a leak or breach, the cessation of use and removal of contents from the carbonation vessel will be performed as follows:

- Emergency response activities will be initiated in accordance with Subsection G-4(e)

- Personnel will immediately secure the system to prevent continued inflow of caustic solution into the carbonation vessel

- The corrosive HW/MW in the vessel at the time of the leak or breach will be allowed to gravity drain back to the scrubber water tank

- If the carbonation vessel cannot be emptied via gravity draining to the scrubber water tank, it will be emptied by transferring any corrosive HW/MW to a compatible container

- Once the breach has ceased leaking, the following actions will be taken:

  - Removal of the contents of the carbonation vessel will be verified.

  - Any HW/MW will be collected from secondary containment (High Bay Floor, floor drain piping, or Low Bay Pit) and transferred to compatible containers or into the scrubber water tank for continued processing

- The area will be cleaned and decontaminated, neutralizing and removing residual corrosive HW/MW in accordance with Subsection G-4(e)

- The carbonation vessel will be repaired at the point of the leak

G-4(k)(1)(c) Hydroxide Release/Leak From 300-Gal Scrubber Water Tank

The cessation of use and removal of contents from the scrubber-water tank will be performed as follows:

- Emergency response activities will be initiated in accordance with Subsection G-4(e)

- Personnel will immediately secure the system to prevent continued inflow of HW/MW into the scrubber-water tank

- The contents of the scrubber-water tank will be transferred to compatible containers

- Once the breach has ceased leaking, the following actions will be taken:

  - Removal of the contents will be verified

  - Any HW/MW will be collected from secondary containment (Low Bay Pit vault) and transferred to compatible containers

  - The release area will be cleaned and decontaminated, neutralizing and removing residual corrosive HW/MW in accordance with Subsection G-4(e)

  - The scrubber water tank will be repaired at the point of leak.

G-4(k)(2) Containment of Visible Releases to the Environment

All processing of HW/MW at a HWMA unit occurs indoors. All major processing tanks, areas, and most process piping are bounded by secondary containment basins of sufficient capacity to contain the collective volumes of all tanks. As such, the conventional type of release to the environment (i.e., a large puddle of hazardous substance on the ground) is not likely even in the event of a large leak from a tank. However, the open air reaction of released HW/MW could produce noxious fumes that could escape the confines of the HWMA unit and be released to the atmosphere.

In the event of any type of environmental and/or atmospheric release from a HWMA unit, response measures will first be oriented toward protecting human health and safety, and then toward containing and recovering the released HW/MW and restoring the affected environment.

G-4(k)(3) Certification of Major Repairs

As required by IDAPA 58.01.05.008 and 40 CFR 264.196(f), any extensive repair to a tank system will be reviewed and certified by a qualified professional engineer. This certification must be placed in the operating record and maintained until closure of the facility.

G-5 Emergency Equipment [IDAPA 58.01.05.008; 40 CFR 264.52(e)]

Emergency equipment such as fire extinguishers and spill/release control equipment is staged at each HWMA unit as appropriate for the HW/MW stored and/or treated in the HWMA unit.

A list of the equipment staged in each HWMA unit is provided in Attachment G-2. A map of the MFC site, showing the emergency equipment locations and access routes, is provided in Attachment G-3. Inspection of the equipment is described in Attachment 4, Section F, Inspections. The exact quantities and locations of the equipment are listed on the HWMA unit inspection logs.

MFC HWMA units rely primarily on the INL Fire Department Station No. 2 to provide emergency response personnel, equipment, and materials to respond to an emergency at an HWMA unit. Maintenance and inspection of this equipment is the responsibility of the INL Fire Department Station No. 2.

G-6 Coordination Agreements [IDAPA 58.01.05.008; 40 CFR 264.52(c), 264.37]

In the event of a HW/MW emergency at a HWMA unit that requires emergency response beyond the capabilities of the HWMA unit, INL and local and state emergency response assistance can be summoned. As required by IDAPA

58.01.05.008; 40 CFR 264.52(c), 264.37, arrangements have been made with local hospitals, police departments, fire departments and state and local emergency response teams for support (if requested) in the event of an emergency. A listing of existing MOUs/memorandum of agreement (MOAs) with local and state emergency response agencies is contained in the INL Emergency Plan/RCRA Contingency Plan (appendix C). If a state or local authority declines to enter into such agreements the refusal will be included in the operating record.

G-7 Evacuation Plan [IDAPA 58.01.05.008; 40 CFR 264.52(f)]

HWMA unit evacuation plans will be implemented where there is a possibility that evacuation of the HWMA unit could be necessary. In the event that an evacuation is necessary, the EAM will coordinate with other emergency response organizations. In the event an emergency originating on the INL has the potential to impact a HWMA unit, and evacuation is or may be necessary, the EAM will be so advised by the Warning Communications Center (WCC) and will in turn notify HWMA unit personnel. Standard INL procedures will be followed during such an evacuation. MFC and HWMA unit building/area evacuation routes are provided in Attachment G-3.

Attachment G-1

MFC HWMA Unit Emergency Personnel Contact List

MATERIALS AND FUELS COMPLEX EMERGENCY PERSONNEL CONTACT LIST			
Name	**Address**	**Work Phone**	**Home Phone/Cell**
Emergency Action Managers (EAM)			
M. A. Willmore	3953 E 600 N, Rigby, ID 83442	208-533-7737	208-589-8338
P. K. Kern	2381 U.S. Highway 20, Arco, ID 83213	208-533-7512	208-527-3189
R. B. Belcher	1880 Riviera Circle, Idaho Falls, ID 83404	208-533-7715	208-313-1844
J. C. Blankenship	2275 Oak Trail Drive, Idaho Falls, ID 83404	208-533-7059	208-521-4839
V. M. Bowen	2122 Colonial Lane, Pocatello, ID 83201	208-533-8069	208-241-4580
Incident Commander			
INL Fire Station No. 2	MFC Complex	208-533-7233 208-533-7968	NA

Attachment G-2

MFC HWMA Unit Emergency Equipment List

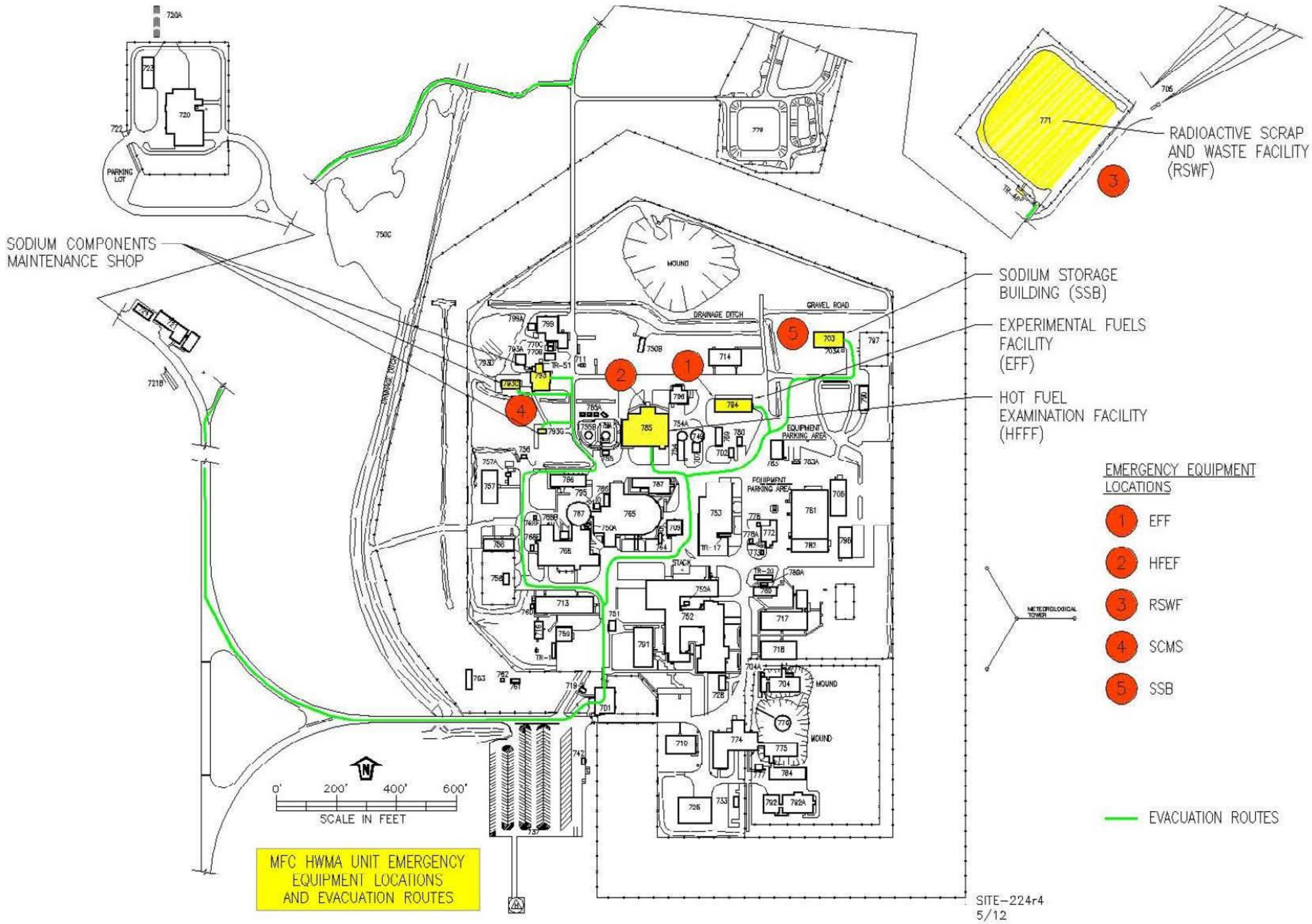
MFC HMWA UNIT EMERGENCY EQUIPMENT LIST[1]					
	EFF	**HFEF**	**RSWF**	**SCMS**	**SSB**
Equipment Available	**794**	**785**	**771**	**793/793C**	**703**
Fire Extinguisher	X	X	—	X	X
Fire Pullbox	X	X	—	X	X
Telephone	X	X	X	X	—
Spill Control Cabinet/Material	X	X	—	X	X
Eye Wash Station	X	X	—	X	—
Emergency Shower	X	X	—	X	—

1. The exact quantities and locations of the HMWA unit emergency equipment are listed on the facility-specific HWMA unit inspection logs. The schedule for inspecting the emergency equipment is provided in , Attachment 4, Section F.

Attachment G-3

MFC Plot Plan Showing Location of HWMA Unit Emergency Equipment, Access Routes, and Site Evacuation Routes

HWMA Unit Building/Area Evacuation Routes



MFC HWMA UNIT EMERGENCY
EQUIPMENT LOCATIONS
AND EVACUATION ROUTES

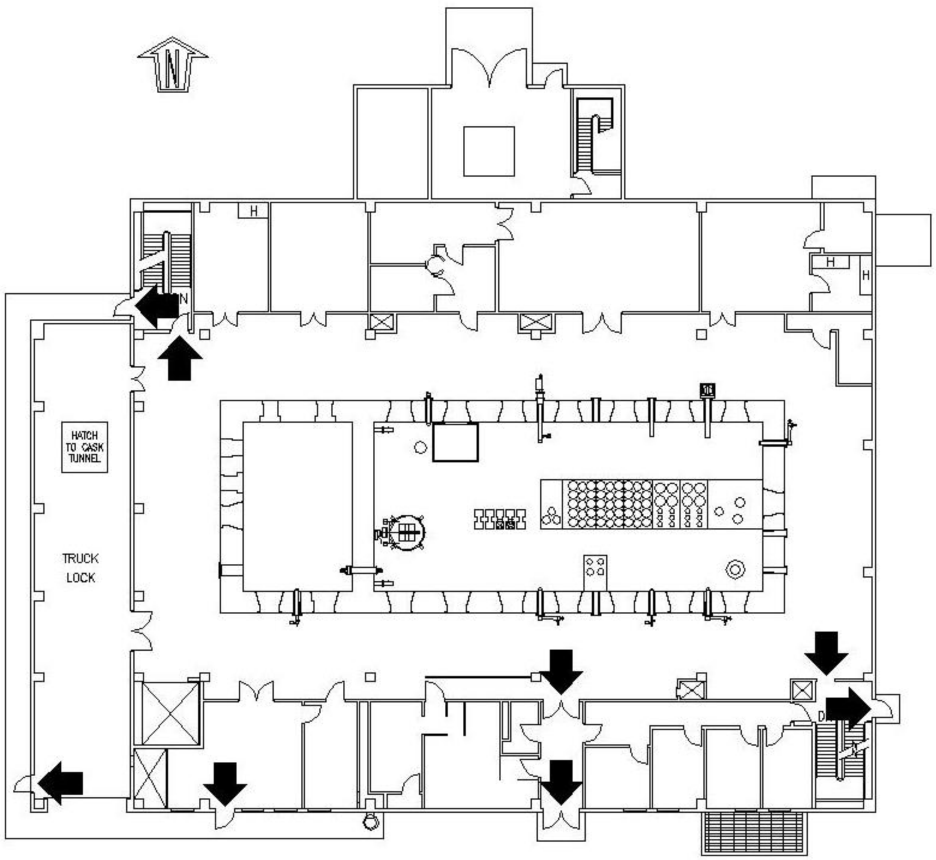
SITE-224r4
5/12

SODIUM STORAGE BUILDING MFC-703
EVACUATION ROUTES

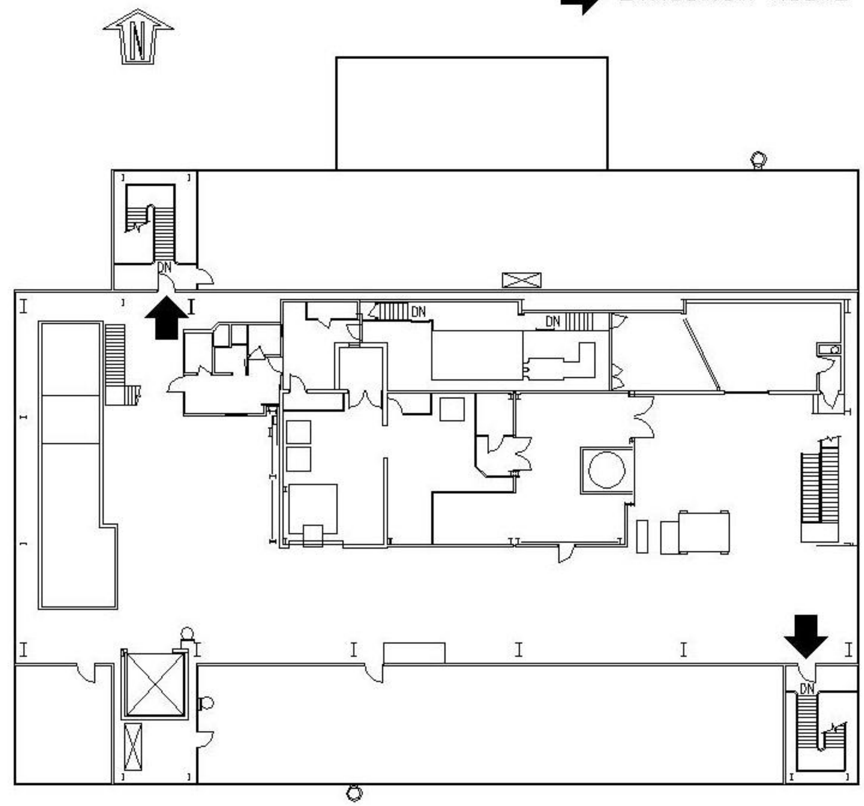
703-011
REV 0, 2/15

LEGEND

EVACUTION ROUTE



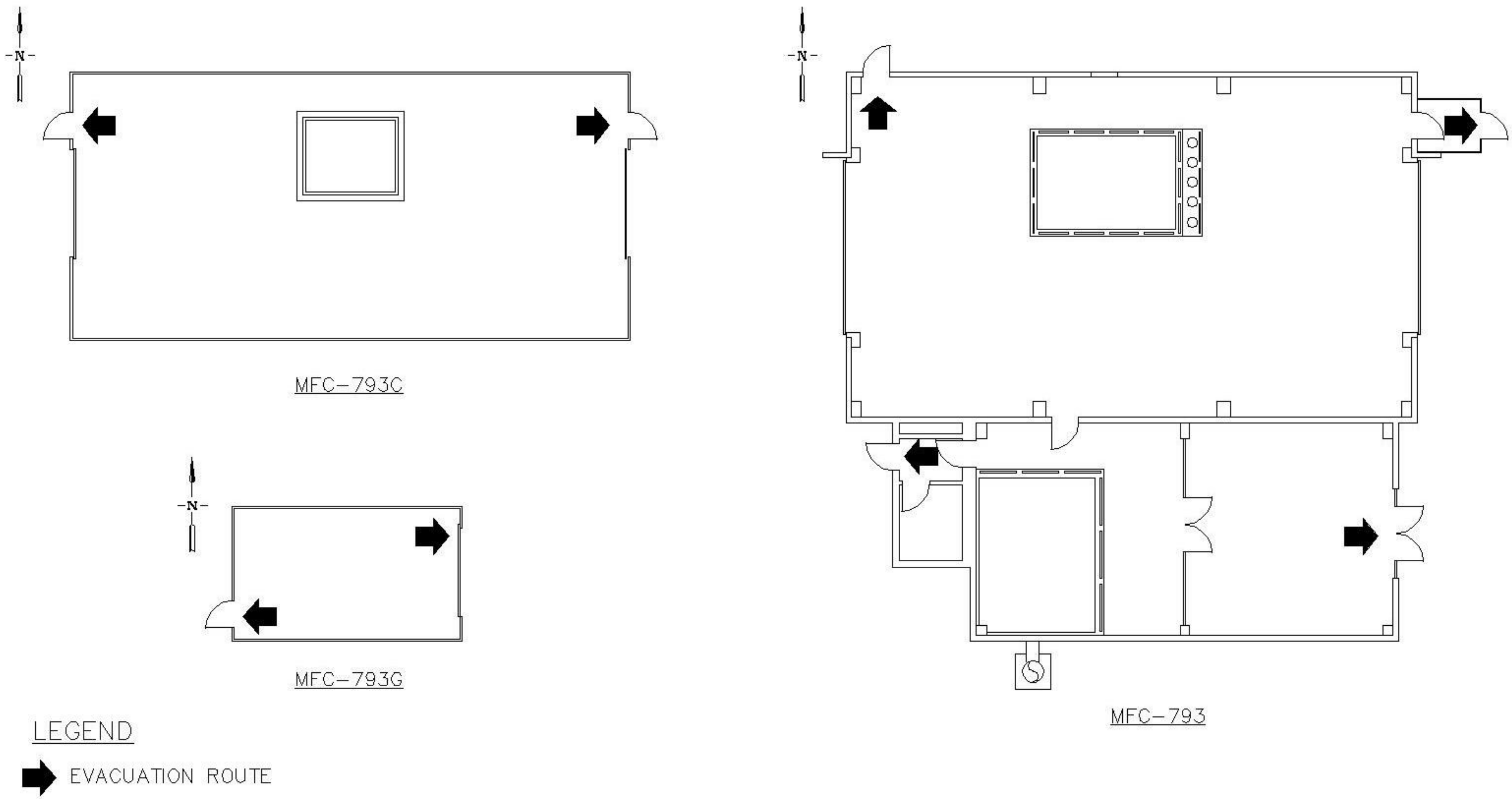
1ST FLOOR



HIGH BAY FLOOR

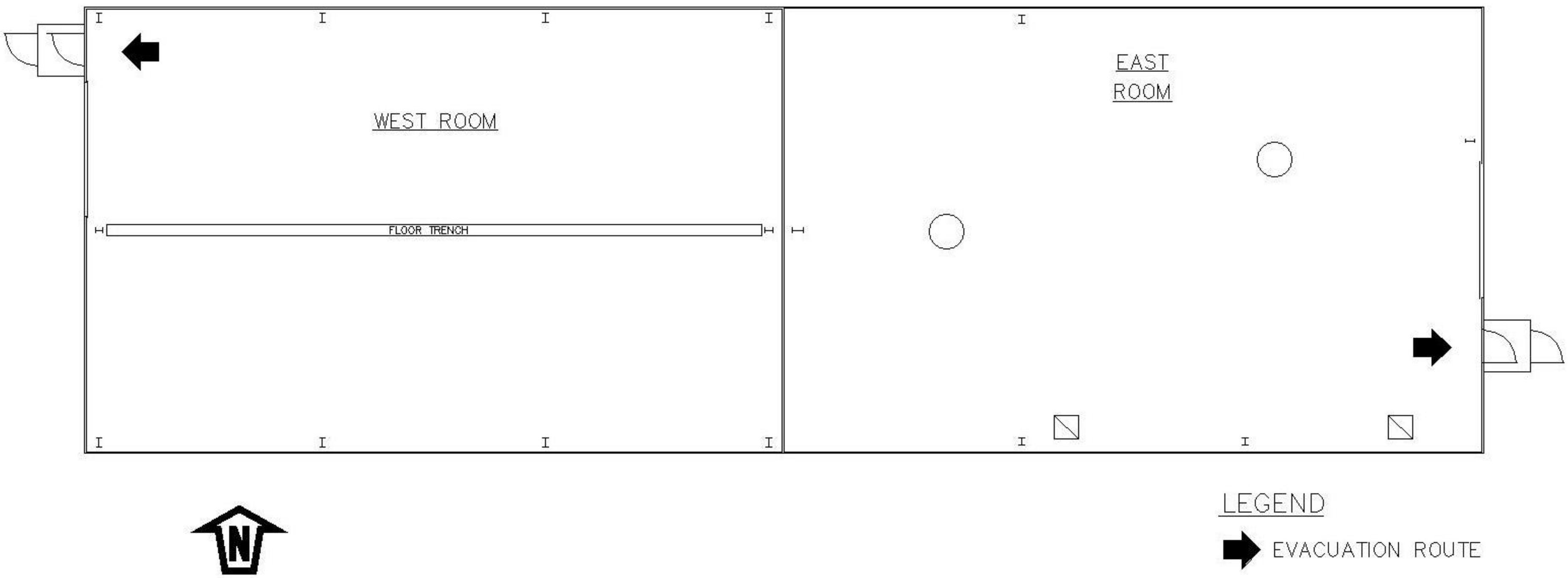
785-369
REV 0, 2/15

HFEF BUILDING MFC-785 1ST FLOOR AND HIGH BAY FLOOR
EVACUATION ROUTES



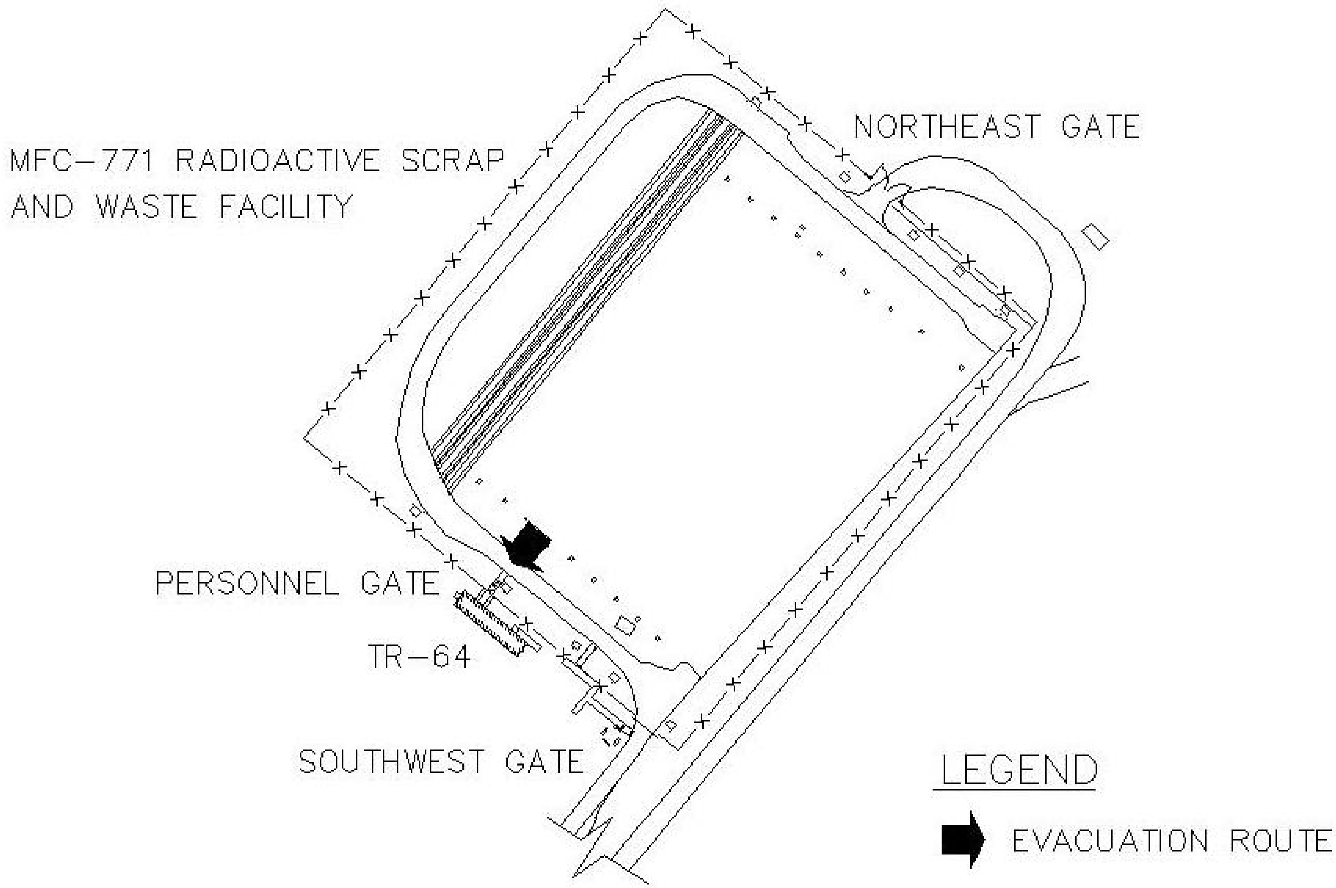
SCMS BUILDINGS MFC-793, 793C, 793G
EVACUATION ROUTES

793-050r0
REV 0, 2/15



EFF MFC-794
EVACUATION ROUTES

794-015
REV 0, 2/15



SITE-260
REV 0, 2/15

RSWF EVACUATION ROUTES

Attachment 8
Closure Plan

EXHIBITS

I. CLOSURE PLANS [IDAPA 58.01.05.012 and 58.01.05.008; 40 CFR 270.14(b)(13) and 264.111 through 264.115]

In accordance with the requirements of the Idaho Administrative Procedures Act (IDAPA) 58.01.05.008 and 58.01.05.012, and 40 Code of Federal Regulations (CFR) 264.111 through 264.115 and 270.14(b)(13)**,** this section of the Materials and Fuels Complex (MFC) Hazardous Waste Management Act (HWMA)/Resource Conservation and Recovery Act (RCRA) Permit Application describes the closure plans that will be implemented at each MFC HWMA unit prior to and during closure of the HWMA unit. Implementation of the closure plans will ensure that the HWMA units are closed in a manner that will protect human health and the environment.

The information provided in this section is organized by subsection as follows:

- Subsection I-1, Plan Overview
- Subsection I-2, Closure Performance Standard
- Subsection I-3, Partial Closure Activities
- Subsection I-4, Maximum Waste Inventory
- Subsection I-5, Disposal or Decontamination of Equipment, Structures, and Soil
- Subsection I-6, Closure of Container Storage/Process Areas
- Subsection I-7, Closure of Tanks
- Subsection I-8, Closure of Miscellaneous Units
- Subsection I-9, Ancillary Closure Activities
- Subsection I-10, Schedule for Closure and Notification for Closure
- Subsection I-11, Certification of Closure

I-1 Closure Plan Overview

The HWMA units will be closed using a multi-step review and evaluation closure process (ref. Exhibit I-1) to ensure successful closure and certification to the applicable clean closure performance standards. The actual closure activities and clean closure performance standards may differ among HWMA units (different HWMA units have different operational processes to close), but the multi-step closure process itself is the overall general approach for closure of all the HWMA units. Exhibit I-1 illustrates this multi-step closure process. A detailed description of the multi-step closure process is provided in Exhibits I-2 through I-5. After approval to close a HWMA unit is received from the Idaho Department of Environmental Quality (DEQ), the multi-step process begins with waste transfer, treatment, and/or decontamination activities specific to the HWMA unit. Any waste generated during closure activities is characterized, packaged, and managed as hazardous waste/mixed waste (HW/MW), as applicable. Based on the results of the Preliminary Review and Visual Site Inspection (PR/VSI), if closure standards have been met, closure will be certified by a registered professional engineer (PE) and a closure certification report will be sent to the DEQ. If closure performance standards cannot be met, a Facility Investigation and Decontamination (FI&D) will be performed and if closure standards are still not met, a revised closure plan will be prepared and submitted to DEQ for review and approval.

In the future, as the actual closure of any MFC HWMA unit is considered, this closure plan will be modified to reflect any information or condition that has changed or occurred and may precipitate different closure options and to address HWMA unit specific clean closure performance standards. This closure plan will be modified in accordance with IDAPA 58.01.05.008 and 40 CFR 264.112(c).

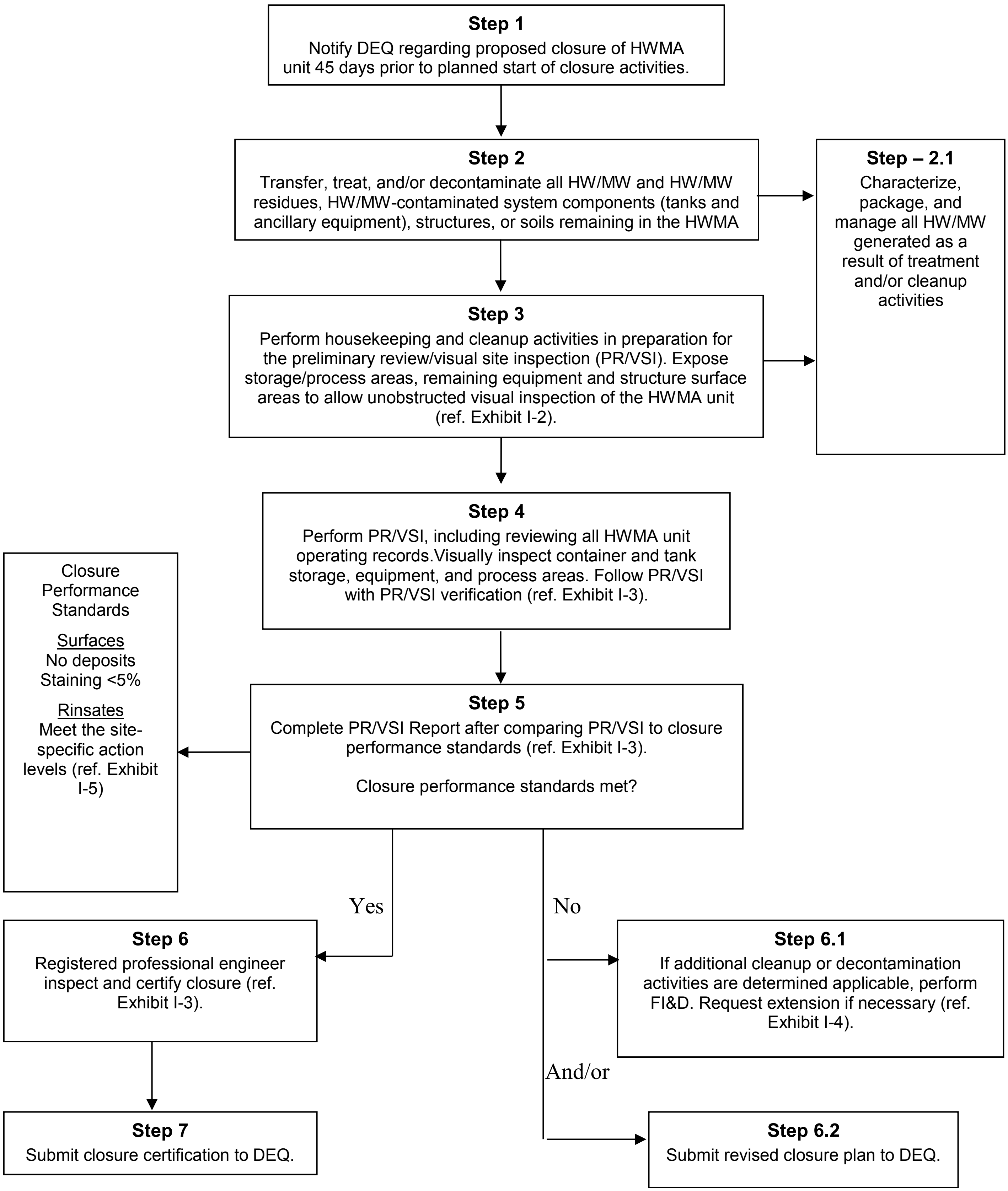


Exhibit I-1. HWMA Unit Multi-Step Closure Process

Exhibit I-2. HWMA Unit General Housekeeping and Cleanup	
Objective	Prepare HWMA unit for PR/VSI and final closure.
Prior Activity	Transfer, treat, and/or decontaminate all HW/MW, HW/MW residues, HW/MW-contaminated system components and equipment (tanks and ancillary equipment), structures, or soils remaining in the HWMA unit.
Housekeeping/ Cleanup	Perform the following housekeeping and cleanup activities as necessary: • Perform general housekeeping and cleanup of the entire facility in preparation for the PR/VSI. • Expose the surfaces of the facility structures, tanks, and ancillary equipment to accommodate an unimpaired visual inspection of the facility • Collect non-HWMA waste or HW/MW generated as a result of housekeeping and cleanup activities (which generally consists of rags and personnel protective equipment). • All HW/MW generated as a result of housekeeping activities will be characterized, packaged, and managed in accordance with applicable procedures and requirements. • If evidence or suspect evidence of HW/MW exists, perform additional housekeeping and cleanup activities.
Conclusion	Proceed to PR/VSI as described in Exhibit I-3.

Exhibit I-3. HWMA Unit Preliminary Review and Visual Site Inspection (PR/VSI)	
Objective	Prepare to compare PR/VSI results to closure performance standards(1) in order to prepare PR/VSI Report. This report will determine if the HWMA unit can be closed without further closure activities or if further FI&D must be performed.
Prior Activity	General housekeeping and cleanup activities have been performed as described in Exhibit I-2.
Preliminary Review (PR) Development of Closure Performance Standard(1)	Review the HWMA unit operating records for the following, which will allow development of final performance closure standards(1) and enable comparison to the standards in the PR/VSI Report: • HW/MW codes stored in HWMA units • HW/MW constituents of concern • HW/MW matrixes of concern • HWMA unit design and operating characteristics • HW/MW inventory records and Waste Stream Profiles • Previous release cleanup records (if applicable) • Previous decontamination records (if applicable) • Housekeeping/cleanup activities and records.
Visual Site Inspection (VSI)(2)	Visually inspect the entire facility and surfaces for evidence that HW/MW may exist as indicated by HW/MW residuals remaining (deposits or staining).
PR/VSI-Verification	If no evidence of HW/MW deposits/staining exists, perform a radiological survey and/or a wipe survey and analyze for radioactivity and/or hazardous constituents. If evidence of HW/MW deposits or stains exists, perform FI&D (ref. Exhibit I-4).
Finalize Closure Performance Standards(1) PR/VSI Report	Closure Performance Standards(1) (ref. Subsection I-5) will include action levels for pH and hazardous constituents, visible deposits and/or staining. Based on the PR/VSI: • Develop a PR/VSI Report based on comparison of HWMA unit PR/VSI to closure performance standards. • Specify if closure performance standards have/have not been met with recommendations from MFC management.
Conclusion	• If the closure performance standards have been met, perform closure certification using a registered PE and submit the certification report to DEQ. • If closure performance standards have not been met, complete a FI&D.

(1) The closure plan will be modified, in accordance with IDAPA 51.01.05.008 and 40 CFR 264.112(c), to include the HWMA unit specific final performance closure standards prior to implementation of the closure plan.
(2) HWMA unit specific visual site inspection requirements and the visual inspection procedures will be included in the closure plan that will be modified in accordance with IDAPA 51.01.05.008 and 40 CFR 264.112(c).

Exhibit I-4. Facility Investigation and Decontamination (FI&D) for Building/Equipment Sealed or Impermeable, and Cracked or Nonsealed Surfaces	
Objective	Meet PR/VSI Report closure performance standards and obtain closure certification.
Prior Activities	PR/VSI-verification has been performed as described in Exhibit I-3. Closure performance standards have not been met.

Facility Investigation and Decontamination (FI&D)	By performing the following actions, contamination on building/equipment surfaces is eliminated:
	• Determine hazardous constituents of concern (identified in PR/VSI Report).
	• Determine released HW/MW matrixes (identified in PR/VSI Report).
	• Visually (with the naked eye) inspect surfaces. Are there stains evident greater than 5% per square inch? For sealed or impermeable surfaces, are cracks present? For cracked or nonsealed surfaces, are stains present on cracked surfaces?
	• If yes and the surface is sealed or impermeable, wipe or rinse down the area. If yes and the surface/media is cracked or nonsealed, take a sample of the surface area/media. Analyze the rinsate[(1)], wipes, and/or samples for hazardous constituents of concern.
	    • If hazardous constituents are not detectable above action levels, perform closure certification (i.e., closure performance standards have been met).
	    • If hazardous constituents are detected above the appropriate action levels, perform decontamination using water washing and spraying, solvent extraction, or an equivalent technology (IDAPA 58.01.05.011 and 40 CFR 268.45). When hazardous constituents are no longer detected above action levels, perform closure certification (i.e., closure performance standards have been met).
	    • If hazardous constituents continue to be present, a revised closure plan can be submitted to DEQ.

PR/VSI-Verification	Return to PR/VSI-Verification (ref. Exhibit I-3).
Finalize Closure Performance Standards PR/VSI Report	Return to PR/VSI Report (ref. Exhibit I-3).
Conclusion	• If the closure performance standards have been met, perform closure certification using a registered PE and submit to DEQ. • If closure performance standards specified in the PR/VSI Report cannot be met, submit a revised closure plan to DEQ and return to PR/VSI.

(1) Rinsate and associated sample/analysis details will be included in the closure plan that will be modified in accordance with IDAPA 51.01.05.008 and 40 CFR 264.112(c).

I-2 Closure Performance Standard [IDAPA 58.01.05.008; 40 CFR 264.111 and 264.112(b)(1) and (b)(2)]

This closure plan is designed to ensure that the HWMA units will not require further maintenance and controls after closure. Implementation of the plan will minimize or eliminate any threats to human health and the environment and post closure release of HW/MW to ground or surface waters or to the atmosphere.

The HWMA unit is designed and operated in a manner that minimizes the potential for contamination of the facility structures and surrounding property. HW/MW storage and handling activities are limited to specific areas. The facility designs, coupled with frequent inspections and corrective maintenance, provide safe operations that will minimize the need for cleanup and decontamination at closure. All HW/MW inventories will be transferred to a HWMA storage or treatment facility prior to closure.

Final closure of the HWMA unit will be performed in a manner that achieves the closure performance standards defined in Exhibit I-5 and will:

- Minimize the need for further maintenance and controls after closure of the HWMA unit
- Control, minimize, and/or eliminate to the extent necessary to protect human health and the environment, the post-closure release of HW/MW to the ground, water, or atmosphere from the HWMA unit
- Comply with all applicable federal and state regulatory closure requirements for closure of the HWMA unit.

Exhibit I-5. Preliminary Closure Performance Standards for Sealed or Impermeable Surfaces and Cracked or Nonsealed Surfaces

Sample Matrix	Evaluation Method	Standard	Action Levels	Analytical Method
Final water rinsate for impermeable surfaces	Analysis	pH≤ 12.5 pH≥2	pH≥12.5 pH≤2	pH meter
HW/MW deposits	Visual[1]	no deposit	deposit visible	naked eye or camera, as applicable
HW/MW staining	Visual	≤5% per square inch	≥5% per square inch	naked eye or camera, as applicable
Final water rinsate[2] for impermeable surfaces Porous surfaces samples or wipe samples[2]	Compare contaminants of concern to action levels	< Action Levels	TBD[2]	TBD[2]

(1) Visual - Deposits detectable by the human eye. A visual examination of surface areas (floor, tanks, equipment, piping and valves) will be performed looking for signs of leaks and/or residuals.

(2) The closure plan will be modified, in accordance with IDAPA 51.01.05.008 and 40 CFR 264.112(c), to include the HWMA unit specific final performance closure standards and demonstration methods prior to implementation of the closure plan.

The closure process will be performed in accordance with a DEQ approved closure plan and will be certified by a registered PE.

To ensure personnel safety during the performance of closure activities:

- Closure activities will be supervised and performed by qualified MFC personnel in accordance with comprehensive safety procedures.
- Personnel performing closure activities will be trained to adhere to applicable procedures and equipped with proper personal protective equipment (PPE).
- Personnel and equipment will be decontaminated to established MFC radiological control levels prior to leaving any contaminated work area.

I-3 Partial Closure Activities [IDAPA 58.01.05.008; 40 CFR 264.112(b)(3)]

All previous partial closures that have occurred at MFC are listed in Exhibit I-6.

Exhibit I-6. Partial Closures at MFC

Facility/Area	PE Certification Date	DEQ Approval Date	Operator
Sodium Process Facility Transfer Line	04/03/07	05/15/07	Battelle Energy Alliance, LLC
MFC-720 TREAT Administrative Closure	08/10/07	08/30/07	Battelle Energy Alliance, LLC
MFC 793E and 793F Storage Buildings	10/21/09	10/30/09	CH2M-WG Idaho, LLC
MFC-767 EBR-II Container Storage Area	06/29/12	09/20/12	CH2M-WG Idaho, LLC
MFC-766 Secondary Sodium Drain Tank	07/09/12	09/20/12	CH2M-WG Idaho, LLC
MFC-767 EBR-II Primary Sodium System	08/13/12	09/20/12	CH2M-WG Idaho, LLC
Sodium Process Facility Tank Area	06/18/13	09/02/13	CH2M-WG Idaho, LLC
Sodium Process Facility Storage Final	11/27/13	03/07/14	CH2M-WG Idaho, LLC
Radioactive Sodium Storage Facility	07/07/04	08/03/04	Argonne National Laboratory - West

I-4 Maximum Waste Inventory [IDAPA 58.01.05.008; 40 CFR 264.112(b)(3)]

The maximum inventory of HW and MW in container and/or tank storage at any time during the operational life of each HWMA unit is provided in the MFC HWMA/RCRA Partial Permit Attachment 1, Part A and in Section B, MFC Facility Description, Table B-1.

I-5 Disposal or Decontamination of Equipment, Structures, and Soils [IDAPA 58.01.05.008; 40 CFR 264.112(b)(4) and 264.114]

During closures of the HWMA unit, all equipment, structures and soils contaminated/suspect contaminated with HW/MW (including HW/MW waste generated as a result of closure activities) will be disposed of/decontaminated in accordance with all applicable regulations. Subsection I-1 and Exhibits I-1 through I-5 provide detailed descriptions of the actions necessary to prepare the HWMA unit for closure certification.

I-6 Closure of Container Storage/Process Areas [IDAPA 58.01.05.008; 40 CFR 264.178]

Prior to closure, all HW managed in containers will be removed, transported to, and managed in an on-Site or off-Site storage and disposal unit. Container storage units may be closed in compliance with IDAPA 58.01.05.008 (40 CFR 264.178) upon verification and documentation that none of the HW/MW containers stored in the unit had been breached. HWMA unit container storage and/or process areas will be closed using a multi-step review and evaluation closure process to ensure successful certification of the clean closure performance standards. Exhibit I-1 illustrates the multi-step closure process that will be implemented. Detailed descriptions of the steps in the process are provided in Exhibits I-2 through I-4.

In the future, as the actual closure of any MFC HWMA unit is considered, this closure plan will be modified to reflect any information or condition that has changed or occurred and may precipitate different closure options and to address HWMA unit specific clean closure performance standards. This closure plan will be modified in accordance with IDAPA 58.01.05.008 and 40 CFR 264.112(c).

I-7 Closure of Tanks [IDAPA58.01.05.008; 40 CFR 264.197]

I-7(a) Closure of SCMS Tanks/Tank Systems and Ancillary Equipment

SCMS has three tank systems requiring closure; the water wash system, scrubber water system, and carbonation system. These tank systems will be closed using a multi-step review and evaluation closure process to ensure successful certification of the clean closure performance standards. Exhibit I-1 illustrates the multi-step closure process that will be implemented during closure. Detailed descriptions of the steps in the process are provided in Exhibits I-2 through I-4.

In the future, as the actual closure of the SCMS tanks/tank systems and ancillary equipment is considered, this closure plan will be modified to reflect any information or condition that has changed or occurred and may precipitate different closure options and to address HWMA unit specific clean closure performance standards. This closure plan will be modified in accordance with IDAPA 58.01.05.008 and 40 CFR 264.112(c).

I-8 Closure of Miscellaneous Unit [IDAPA58.01.05.008; 40 CFR 264.600]

The Radioactive Scrap and Waste Facility (RSWF) will be closed as a miscellaneous unit following the same multi-step review and evaluation closure process to ensure successful certification of the clean closure performance standards. Exhibit I-1 illustrates the multi-step closure process that will be implemented. Detailed descriptions of the steps in the process are provided in Exhibits I-2 through I-4.

In the future, as the actual closure of the RSWF is considered, this closure plan will be modified to reflect any information or condition that has changed or occurred and may precipitate different closure options and to address HWMA unit specific clean closure performance standards. This closure plan will be modified in accordance with IDAPA 58.01.05.008 and 40 CFR 264.112(c).

I-9 Ancillary Closure Activities [IDAPA 58.01.05.008; 40 CFR 264.112(b)(5)]

Ancillary closure activities, for example, groundwater monitoring, will only be performed if ground water contamination is encountered during PR/VSI and FI&D.

I-10 Schedule for Closure and Notification of Closure [IDAPA 58.01.05.008; 40 CFR 264.112(b)(6) and (d)]

If the HWMA unit is not closed prior to the permit expiration date, a new application will be submitted extending the closure date an additional 10 years.

The Director, State of Idaho, DEQ, will be notified in writing, with the submittal of a closure plan, at least 45 days prior to the expected date that closure activities will begin. The closure process for the HWMA unit will be completed within 180 days following the removal of the final volume of HW/MW, or the approval of the closure plan, whichever is the latest. However, if a revised closure plan is determined to be applicable, an extension will be requested 30 days before day 180. The closure schedule for the HWMA unit is shown in Exhibit I-7.

Exhibit I-7. HWMA Unit Schedule for Closure

Process Step	Activity	Day Completed
1	Notify the DEQ 45 days prior to the planned start of closure of the HWMA unit.	45 days before
2	Transfer, treat, and/or decontaminate all HW/MW, HW/MW residues, HW/MW contaminated system components and equipment (tanks, ancillary equipment, secondary containment), structures, or soils remaining in the HWMA unit.	Day 90
3	Perform general housekeeping and cleanup activities to expose surfaces and allow unobstructed visual inspection of the facility in preparation for the PR/VSI.	Day 135
4	Perform PR/VSI, including review of the applicable HWMA unit operating records, and visually inspect container and tank storage/process areas, as applicable. Closure performance standards can be finalized as a result of this activity. The PR/VSI includes conducting a PR/VSI verification.	Day 150
5	Complete PR/VSI Report after comparing PR/VSI to closure performance standards. Determine if closure performance standards have been met.	Day 150
6	If closure performance requirements have been met, inspect and certify closure using a registered PE.	Day 180 or per DEQ extension
7	Submit closure certification report to DEQ.	w/in 60 days of closure

I-10(a) Extensions for Closure Time [IDAPA 58.01.05.008; 40 CFR 264.113(a) and (b)]

Planned closure of the HWMA unit is not expected to exceed 180 days. However, if a revised closure plan is determined to be applicable, an extension will be requested 30 days before Day 180.

I-11 Certification of Closure [IDAPA 58.01.05.008; 40 CFR 264.115]

At the conclusion of the closure process, the registered PE will certify that closure has been successfully completed in accordance with this closure plan, and the closure performance standard(s) has (have) been achieved. The certification will be submitted within 60 days of the closure to the:

Director, c/o Hazardous Waste Program Manager
Idaho Department of Environmental Quality
1410 North Hilton
Boise, ID 83706

A Final PR/VSI Closure Report will be written documenting compliance with the closure plan and plans for the final disposition of the waste generated as a result of the closure. The closure report will be retained as part of the HWMA unit operating records.

I-12 Post-Closure Plan [IDAPA 58.01.05.009; 40 CFR 264.110(b)(1)]

Because the MFC HWMA units are to be clean closed and are not disposal facilities, the post-closure requirements of IDAPA 58.01.05.009 and 40 CFR 264.116 through 264.120 do not apply.

I-13 Post-Closure Notices [IDAPA 58.01.05.009; 40 CFR 264.119]

This requirement does not apply because post-closure plans are not required.

I-14 Closure Cost Estimate [IDAPA 58.01.05.009; 40 CFR 264.142]

Under IDAPA 58.01.05.009 and 40 CFR 264.140(c), the Federal government, as owner of the INL, is exempt from requirements to provide cost estimates for closure.

I-15 Financial Assurance Mechanism for Closure [IDAPA 58.01.05.009; 40 CFR 264.143]

Under IDAPA 58.01.05.009 and 40 CFR 264.140(c), the Federal government, as owner of the INL, is exempt from requirements to provide a financial assurance mechanism for closure.

I-16 Post-Closure Cost Estimate [IDAPA 58.01.05.009; 40 CFR 264.144]

This requirement does not apply because post-closure plans are not required.

I-17 Financial Assurance Mechanism for Post-Closure Care [IDAPA 58.01.05.009; 40 CFR 264.145]

This requirement does not apply because post-closure plans are not required.

I-18 Liability Requirements [IDAPA 58.01.05.009; 40 CFR 264.147]

Under IDAPA 58.01.05.009 and 40 CFR 264.140(c), the Federal government, as owner of the INL, is exempt from liability requirements.

I-19 Use of State Required Mechanism and State Assumption of Responsibility [IDAPA 58.01.05.009; 40 CFR 264.149]

Under IDAPA 58.01.05.009 and 40 CFR 264.140(c), the Federal government, as owner of the INL, is exempt from these requirements.

Attachment 9 Revision Log

Solid Waste
Management Units

J. CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS [IDAPA58.01.05.008; 40 CFR 264.101]

The Materials and Fuels Complex (MFC) is a solid waste management unit located within the boundary of the Idaho National Laboratory (INL). As such, information regarding corrective action necessary to protect human health and the environment in the event of a release of hazardous waste or constituents is addressed in a Federal Facility Agreement and Consent Order (FFA/CO) involving the United States Environmental Protection Agency (EPA), the State of Idaho, and the Department of Energy (DOE). A FFA/CO is commonly known as an Interagency Agreement. For more information, see the Hazardous Waste Management Act/Resource Conservation and Recovery Act (HWMA/RCRA) Part B Permit Application, Volume 3, General Information for INL Waste Management Units, Section J, Corrective Action for Solid Waste Management Units (DOE/ID-10131).

K. OTHER FEDERAL LAWS [IDAPA 58.01.05.012; 40 CFR 270.14(b)(20) and 270.3]

The Materials and Fuels Complex (MFC) is a solid waste management unit located within the boundary of the Idaho National Laboratory (INL). Information regarding other federal laws applicable to the MFC is addressed in the Hazardous Waste Management Act/Resource Conservation and Recovery Act (HWMA/RCRA) Part B Permit Application, Volume 3, General Information for INL Waste Management Units, Section K, Other Federal Laws (DOE/ID-10131).