PUGET SOUND NAVAL SHIPYARD (PSNS) & INTERMEDIATE MAINTENANCE FACILITY (IMF)
ADDENDUM D
PROCESS INFORMATION

CHANGE CONTROL LOG

Change Control Logs ensure that changes to this unit are performed in a methodical, controlled, coordinated, and transparent manner. Each unit addendum will have its own change control log with a modification history table. The "**Modification Number**" represents Ecology's method for tracking the different versions of the permit. This log will serve as an up to date record of modifications and version history of the unit.

Modification History Table

Modification Date	Modification Number
03/18/2022	PSNS.2021.1F

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ADDENDUM D
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D. PROCESS INFORMATION

D.1 Introduction

The Mixed Waste Storage Facility (MWSF) is a 54 by 42 foot concrete building designed for the storage of mixed waste. The MWSF has two rooms, a main storage bay and a small mechanical room. Addendum B of this application contains additional information regarding facility description including the location of the MWSF at Naval Base Kitsap–Bremerton (NBK–Bremerton).

The maximum storage capacity of the MWSF is any combination of containers not to exceed 24,750 gallons, subject to the limitations that the maximum storage capacity for liquid mixed waste is 11,500 gallons, and the maximum storage capacity of flammable liquid mixed waste is 120 gallons. Section D.2.2, paragraph 6 provides additional details.

The classes of waste stored at the MWSF are ignitable, corrosive, and toxic. Waste codes allowed for storage at the MWSF are listed in Part A of this application and delineated in Addendum C, "Waste Analysis Plan," by waste stream.

Mixed waste is transported into and out of the MWSF through the vehicle access door or the personnel access doors by hand, forklift, pallet jack, or drum dolly with a qualified MWSF Operator present. Arrangement of waste in the MWSF always considers the conditions set forth in the permit (i.e., aisle space requirements, elevation, labeling requirements, safe handling of containers) as well as common management practices (e.g., ability to move container) regardless of the type of container.

Secondary containment is provided through the design of the floor which provides a sealed surface berm at least 8 inches high around the inside perimeter of the MWSF. Section D.2.4 provides additional details.

Solid mixed waste is contained at the job site, within compatible packaging, to prevent the spread of hazardous constituents. Liquid mixed waste is contained at the job site in rigid containers with mechanical seals. Mixed waste is packed into shipping containers (e.g., metal drums, metal boxes, fire-resistant wood boxes, etc.) meeting the design standards set forth in Code of Federal Regulations (CFR) Title 49 - *Transportation* (49 CFR) prior to storage in the MWSF. Containers are closed prior to storage at the MWSF. Containers of mixed waste are stored in the MWSF until arrangements can be made to ship the containers to an authorized off-site treatment or disposal facility. Mixed waste is not processed or treated at the MWSF. All shipping containers in the MWSF are kept closed except where consolidation, validation of contents, or unexpected circumstances requires opening a container.

D.2 Containers

D.2.1 Description of Containers

Mixed waste is packaged in a compatible packaging, as described below, at the job site prior to being sent for accumulation and eventual storage at the MWSF. The packaging is inner packaging within the waste drums, but is not considered to be a liner. Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS & IMF) does not use inner liners because a mixed waste subject matter expert (SME) evaluates compatibility of packaging prior to generation of mixed waste during the upfront characterization process described in Section C.4.1.1.1. Inner packaging prevents shipping containers from coming in direct contact with hazardous constituents. If there is direct contact, the mixed waste is compatible with both the inner packaging and the shipping container as described in Section C.4.1.1.5, of the Waste Analysis Plan, therefore the ability to contain the mixed waste is not impaired.

1. Solid mixed waste is packaged at the job site in heavy-duty plastic bags. PSNS & IMF solid mixed waste is compatible with heavy-duty plastic bags, with few exceptions. Mixed waste known to degrade heavy-duty plastic bags is packaged in compatible containers at the job site (e.g., citrus-based cleaner wastes are packed in high-density polyethylene (HDPE) or metal containers). The open end of the heavy-duty plastic bags are securely closed by twisting the free

corners and taping the twisted "neck," ensuring that the "neck" is folded over once prior to taping to provide a seal. Items with sharp corners are padded to prevent tearing of the bag.

2. When packaging in a heavy-duty plastic bag is not practical due to size and configuration, items are wrapped, or capped and sealed, at the job site to contain loose surface radiological contamination.
3. Vacuum systems also collect solid mixed waste and are closed at the job site by mechanical devices. Vacuum systems are sized to be portable in shipboard spaces. All waste within the MWSF must be compatible as described in Section C.4.1.1.5, Compatibility. Vacuum system contents must be compatible with other contents in the canister, and the canister must be compatible with the vacuum system contents.
4. Liquid mixed waste is contained at the job site in sealed rigid containers (e.g., poly bottles, HDPE containers, etc.) which are compatible with the waste based on 49 CFR, Part 172, Subpart B, "Table of Hazardous Materials and Special Provisions" (Hazardous Materials Table).

Mixed wastes are transferred from the job site to an accumulation area operated in accordance with Washington Administrative Code (WAC) 173-303-200.

Mixed wastes are packed into shipping containers prior to placement in the MWSF. The standards set forth in 49 CFR, Part 173, Subpart I – *Class 7 (Radioactive)* for Class 7 transportation are also used to determine appropriate packaging for storage in the MWSF. Radioactive material placed in the MWSF will be contained in packages meeting the 49 CFR requirements for: excepted package, industrial package Type 1, industrial package Type 2, industrial package Type 3, Type A package, Type B(U) package, or Type B(M) package. When a hazard class other than Class 7 radioactive material is the primary hazard class (e.g., Class 8 corrosive material, Class 9 miscellaneous hazardous material, etc.) the packaging standards other than those specified in 49 CFR, Part 173, Subpart I apply. Table D-1 shows the package (container) types used for storage at the MWSF, package specifications with 49 CFR reference, and package capacities. A Mixed Waste SME evaluates and directs the specific type of package used and ensures it is an acceptable 49 CFR shipping container, is compatible with the waste stored, and meets secondary containment capacity restraints.

Table D-1 Mixed Waste Storage Facility Shipping Container Specifications

Type of Packaging	Package Specifications (49 CFR Reference)	Capacity (Based upon 49 CFR, Part 173 Requirements)	Acceptable Waste Streams	Minimum Aisle Space
Steel drum	7A Type A (Part 173, Subpart I; Part 178, Subpart K)	1 – 119 gallons	All	30 inches
	1A1, or 1A2 (Part 178, Subpart L)		All	
Plastic drum	1H1 or 1H2 (Part 178, Subpart L)	1 – 119 gallons	All	30 inches
Metal Intermediate Bulk Container	11A, 21A, or 31A (Part 178, Subpart N)	119 – 793 gallons	MW7	30 inches
Rigid Plastic Intermediate Bulk Container	11H1, 11H2, 21H1, 21H2, 31H1, or 31H2 (Part 178, Subpart N)	119 – 793 gallons	MW7	30 inches

Table D-1 Mixed Waste Storage Facility Shipping Container Specifications

Type of Packaging	Package Specifications (49 CFR Reference)	Capacity (Based upon 49 CFR, Part 173 Requirements)	Acceptable Waste Streams	Minimum Aisle Space
Composite Intermediate Bulk Container	11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1, 31HA2, 31HB2, 31HN2, 31HD2, or 31HH2 (Part 178, Subpart N)	119 – 793 gallons	MW7	30 inches
Wood Boxes	Excepted Package (Part 173, Subpart I)	Note 1	MW1, MW1-CC, MW2, MW3, MW4, MW4-CC, MW4-BAT, MW5	Note 2
Steel box	7A Type A (Part 173, Subpart I; Part 178, Subpart K)	Note 1	All	100 inches
	IP-1, IP-2, or IP-3 (Part 173, Subpart I)	Note 1	All	100 inches
	Excepted Package (Part 173, Subpart I)	Note 1	All	100 inches
Other: • Cask. • Specially designed steel package.	Type A, Type B(U), or Type B(M) package (Part 173, Subpart I)	Note 1	All	Note 2

Note 1 – 49 CFR, Part 173 does not impose capacity restrictions on the types of packages listed. The capacity is limited by the ability of each package to meet the performance standards in Part 173, Subpart I. The general capacity for these types of packages is 60 to 100 cubic feet; larger capacities are limited to the MWSF containment volume, floor loading capacity, and access door dimensions.

Note 2 – Shipping containers will vary in size. The minimum aisle space for these containers will be 30 inches.

PSNS & IMF confirms compatibility of mixed waste streams and containers stored in the MWSF based on the following methods:

1. All mixed waste within a PSNS & IMF waste stream (see Addendum C, "Waste Analysis Plan," for a list of waste streams with waste codes) is compatible as determined using *A Method for Determining the Compatibility of Hazardous Wastes* (Hatayama, et al, 1980).
2. Each waste stream stored in the MWSF is compatible with its container as determined by 49 CFR, Part 172, Subpart B (Hazardous Materials Table). Container compatibility with the waste is determined by use of the applicable proper shipping name for the waste. The container for the proper shipping name must meet the packaging requirements of 49 CFR, Part 172, in Section 8 of the Hazardous Materials Table. Identification numbers from the Hazardous Materials Table associated with the proper shipping name are in Addendum C, Table C-1 for each waste stream. The proper shipping name also provides the hazard class of the waste, which in combination with Table C-2 of the Waste Analysis Plan determines compatibility of the containers and if separation of wastes is necessary. Waste streams are packed in separate containers and are not commingled.

3. Incompatible waste streams require separate secondary containment in accordance with WAC 173-303-630(9)(c). Containers holding incompatible waste streams, as documented in Table C-2 of the Waste Analysis Plan, will be stored on a containment device such as a containment pallet or in a flammable cabinet that can contain the contents of the containers. Incompatible wastes stored on a containment pallet will additionally be kept separate by using a portable spill berm as a physical barrier. Aisle space from the outside edge of the spill berm to other waste pallets is maintained based on container size, as noted in Table D-1.

Compatibility with the floor coating is determined based on chemical resistance testing performed by the manufacturer of the current floor coating. The chemical resistance testing identifies applications of the floor coating for use in a secondary containment application. For this application, the coating must be suitable for continuous contact with the chemical for up to 72 hours. Table D-2 lists the chemicals that are not recommended and those not tested by the manufacturer for use with the secondary containment coating. These results are based on the top coat of the floor coating. PSNS & IMF can store up to 30 gallons of wastes that contain chemicals listed in Table D-2 in the MWSF if the wastes have compatible separate secondary containment, ensuring that the coating and future coating will not contact incompatible waste in the facility.

Table D-2 Chemical Compatibility with Top Layer Floor Coating

Chemicals Not Recommended	Chemicals Not Tested
Acetic Acid, Glacial	Allyl Chloride
Acetic Anhydride, 100%	Ammonium Fluoride
Acetyl Chloride	Amyl Alcohol
Acrylonitrile	Aniline Hydrochloride
Aniline	Arsenous Acid
Benzene Thiol	Beer
Boric Acid, 5%	Bromine Gas
Bromine, 5%	Butyl Acrylate
Butyl Amine	Calcium Nitrite
Butyric Acid	Caprylic Acid (Octanoic Acid)
Chloroacetic Acid (50%, 100%)	Chlorobutane
Chloroform	Diethylene Chloroformate
Chlorophenol	Dimethyl Sulfoxide
Chlorosulfonic Acid	Ethyl Acrylate
Cresol	Ethyl Hexyl Acrylate
Cresylic Acid	Ethyl Sulfate
Cumene	Ethylene Oxide
Dichloroacetic Acid, 20%	Grape Juice
Diethylene Glycol Monobutyl Ether Acetate (Butyle “Carbitol” Acetate)	Hydriodic Acid, 20%
Dimethyl Carbonyl Chloride	Hydrobromic Acid, 20%, 48%
Dimethylaminopropylamine	Lard
Dimethylaniline	Lauryl Chloride

Table D-2 Chemical Compatibility with Top Layer Floor Coating

Chemicals Not Recommended	Chemicals Not Tested
Ethyl Bromide	Methyl Amyl Alcohol
Ethyl Chloride	Milk
Ethylamine	Molasses
Ethylene Dichloride	Pelargonic Acid
Hydrazine, 35%	Pentachloroethane
Hydrazine Hydrate	Picric Acid, 10%
Hydrofluoric Acid, 20%	Polyacrylic Acid, 50%
Hydrogen Peroxide, 30%	Potassium Persulfate
Hypochlorous Acid	Silicon Tetrachloride
Isophorone	Sodium Chlorite (>6 pH)
Isopropyl Ether	Sugars
Methanol (Methyl Alcohol)	Sulfur Dioxide (wet)
Methyl Chloride	Sulfur Trioxide (wet)
Methylene Chloride	Tetrahydrofuran
Naphthenic Acid	Toluidine
Nitric Acid, 70%	Vinegar
Perchloric Acid, 30%	Wine
Phenol (Carbolic Acid)	Zinc Plating (Acid Fluoborate)
Phenolsulfonic Acid, 65%	Zinc Plating (Acid Sulfate)
Phosphoric Acid, 5%	Zinc Plating (Cyanide)
Potassium Permanganate	
Pyridine	
Rayon Spin Liquor	
Sodium Aluminate	
Sulfuric Acid (Sulphuric Acid), 50%	
Tetrachloroethane	
Tetrasodium Pyrophosphate	
Thionyl Chloride	
Thionyl Chloride (water solution)	
Triethylenetetramine	
Vinyl Chloride	

Prior to being accepted for storage in the MWSF, containers of mixed waste are inspected. Only shipping containers that are in good, non-leaking condition and compatible with the mixed waste packaged within the shipping container will be stored. If a container is compromised or leaking, the actions for spill response in Addendum F, "Procedures to Prevent Hazards," will be initiated. If a shipping container requires replacement, PSNS & IMF will provide remedial actions in accordance with Addendum F, "Procedures to Prevent Hazards" (e.g., provide secondary containment for the container until replacement, over pack the container, etc.).

Mixed waste is packed into shipping containers prior to storage in the MWSF. Containers that previously held waste may be used as the shipping container as long as the container is evaluated as "empty" in accordance with WAC 173-303-160(2). Inner packaging is intended to prevent the container from contact with the hazardous constituents of the mixed waste. If the container does come in contact with the hazardous constituents of the mixed waste, that container is properly disposed of.

D.2.2 Container Management Practices

Mixed waste is stored at the MWSF in closed shipping containers. All shipping containers in the MWSF are kept closed, except where consolidation, validation of contents, or unexpected circumstances requires opening a container. The closure requirement is verified during required MWSF inspections.

Containers are moved into or out of the MWSF by hand, forklift, pallet jack, or drum dolly. Containers are secured to pallets when a forklift or pallet jack is used prior to being moved. When containers of liquid mixed waste are moved into or out of the MWSF, storm drains within the load/unload area are covered unless it is precipitating. If it is precipitating, material to cover the drain is staged in case of a spill. The potential for gases in a sealed mixed waste container to build to sufficient pressure to forcefully eject from a container when opened is very unlikely given the stability and compatibility of the waste. Precautions are employed to prevent uncontrolled movement of the lids when opening drums. These primarily include the practice of slowly releasing the locking device/gasket for evidence of a pressure differential (e.g., hissing sound). The primary response is to immediately re-secure the locking device/gasket. A Mixed Waste SME will direct corrective action to prevent forceful lifting of the container lid during subsequent removal attempts. In addition, preventive measures such as use of bung sized high-efficiency particulate air (HEPA) filters may be employed.

The building has a passive ventilation system with two wall vents and one roof vent, which is sufficient for the storage of mixed waste containers at the MWSF. When forklifts are used to bring waste into or out of the facility, the vehicle access door is open and allows for additional ventilation of the MWSF.

Figures D-1 and D-2 provide examples of layouts of mixed waste stored in the MWSF. Figure D-1 shows a layout of the MWSF at maximum capacity prior to required stacking of drums. Figure D-2 shows a layout of the MWSF when drums are stacked. On occasion, containers are moved (e.g., due to housekeeping, building maintenance, staging for shipment, etc.), and movement is performed using a pallet jack or by hand. Mixed waste shipped to and from off-site locations is transported in accordance with applicable 49 CFR regulations.

In order to allow for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment in case of an emergency, a minimum aisle space is maintained as specified in Table D-1 between containers of mixed waste. A 36-inch aisle space is incorporated into the flammable waste storage area. Each row of containers is no more than two wide and each container is elevated to prevent contact with accumulated liquids. All storage containers are oriented such that labels are visible from the aisle.

Maximum storage capacity of the MWSF is any combination of storage containers not to exceed 24,750 gallons, the equivalent of 450 55-gallon drums. The maximum storage capacity for liquid mixed waste is 11,500 gallons, the equivalent of approximately 209 55-gallon drums. The maximum storage capacity of ignitable liquid mixed waste is 120 gallons. The total 24,750 gallon maximum storage capacity of the MWSF includes any combination of solid, liquid, and ignitable mixed wastes, however, no more than 11,500 gallons of liquid mixed waste may be stored in the MWSF at one time. Storage containers may be stacked no more than three high. The containers used at the MWSF are listed in Table D-1.

Mixed wastes stored at the MWSF can be stored within the same secondary containment as demonstrated in Section D.2.1, paragraph 4.

Containers are tracked with a unique identification number as they enter the MWSF from both on- and off-site locations, and during transport from the MWSF for treatment.

Upon arrival of a mixed waste shipment from off-site to the MWSF, the shipment and manifest are inspected prior to accepting and off-loading the mixed waste. A visual inspection of all mixed waste containers is performed upon arrival at the MWSF to check each container's condition, labeling, and packaging. The container markings, manifest, and shipping document information are verified to be in alignment. PSNS & IMF personnel prepare shipping paperwork for waste sent from off-site facilities to the MWSF; therefore manifest discrepancies are unlikely. Following satisfactory inspection, the shipment is accepted for storage at the MWSF. If there is a manifest discrepancy, PSNS & IMF will attempt to reconcile the discrepancy with the transporter. If the discrepancy is not resolved within fifteen days after receiving the waste, PSNS & IMF will immediately submit to Washington State Department of Ecology (Ecology) a letter describing the discrepancy, attempts to reconcile it, and a copy of the manifest or shipping paper at issue in accordance with WAC 173-303-370(5).

Mixed waste is not processed or treated at the MWSF. All shipping containers in the MWSF are kept closed, except where consolidation, validation of contents, or unexpected circumstances requires opening a container. In these circumstances physical controls including containment, personal protective equipment appropriate for the hazards, and a written work procedure will be used.

Mixed waste is not generated at the MWSF. All mixed wastes entering the MWSF will be analyzed according to Addendum C, "Waste Analysis Plan."

Miscible flammable liquid mixed wastes with concentrations of ≤50%, but >20% are stored on a pallet within the flammable waste storage area. Miscible flammable liquid mixed wastes with concentrations ≤20% will also be stored on a pallet within the flammable waste storage area. Non-miscible flammable liquid mixed wastes and miscible flammable liquid mixed wastes with concentrations of >50% are not to exceed one gallon of waste per metal container, and are stored in a National Fire Protection Association (NFPA) 30 compliant metal cabinet within the flammable waste storage area.

D.2.3 Container Labeling

Each mixed waste container is clearly marked with the following information:

- Hazards (major risks) associated with the waste.
- Identification of the waste as "Hazardous Waste" or "Dangerous Waste."
- The date that each container of waste is first stored in the MWSF (Initial Storage Date).
- Applicable hazardous or dangerous waste codes.

Labels are removed from a storage container if it is emptied.

Labels are printed and filled-in legibly. Labels are placed on containers such that they are visible from the aisle. If a label is found to be missing, illegible, or incomplete, the deficiency will be documented on the inspection record of Addendum F, "Procedures to Prevent Hazards," and will be corrected by replacing the label or completing the missing information. Labels that are partially separated from the container will be replaced.

D.2.4 Secondary Containment Requirements for Staging, Storing and Processing Dangerous Waste Containers

D.2.4.1 Secondary Containment System Design for Containers

As-built drawings for the MWSF are contained in Attachment D-1.

The MWSF was designed and constructed in 1995 to meet federal and state codes and regulations for a MWSF. Construction of the MWSF conformed to the 1991 Uniform Building Code. The MWSF includes:

Roof: Polymer sheet roofing, roof insulation, steel roof deck and steel joist. Roof deck and joist are spray-applied fireproofed with cementitious fireproofing for 1-hour (hr) roof.

Exterior Walls: 8-inch textured concrete masonry unit (CMU), painted. Walls have a split faced and fluted texture in a striped pattern.

Exterior Windows: None.

Exterior Doors: Exterior doors are painted, insulated, steel doors with steel frames. The vehicle access door is a coiling door.

Floors: The floor of the container storage area of the MWSF consists of an 8-inch thick reinforced concrete slab on grade, which slopes to a 2-foot 6-inch wide x 2-foot 6-inch long x 2-foot 6-inch deep reinforced concrete blind sump located near the center of the container storage area. It also consists of an 8-inch high reinforced concrete berm along the entire perimeter of the storage area. All construction joints between the slab, blind sump, and berm are made watertight by installation of a chemically resistant waterstop membrane embedded in the concrete (spanning all construction joints), which is fusion welded at all intersections to provide a continuous seal. All construction joints (above the waterstop membrane) are sealed with backer rod and polyurethane sealant. The floor slab, blind sump, and berm are sealed with a multi-layered epoxy paint coating that is resistant to chemicals, stains, and abrasion. The finished floor slab, sump pit, and berm, with the multi-layered epoxy paint coating, which make up the secondary containment for the container storage area, is sufficiently impervious to contain leaks, spills, and accumulated rainfall until the collected material is detected and removed. The as built coating system is described in Table D-3 and will be maintained to the equivalent performance standard.

Table D-3 Epoxy Floor Coating System Information

System Component	Products	Application
Elastomeric Filler Surfacer	Tnemec Series 265 Trowel Grade	Minimum 250 mils dry film thickness; Minimum 60 mils at edges Surface has been scuffed prior to priming
Primer	Tnemec Series 201 Epoxoprime	6-8 mils dry film thickness
Reinforcing Fabric	Tnemec Series 152 Tneme-Tape	Fabric embedded in wet coating (280 Tneme-Glaze)
Fabric Saturated Coat	Tnemec Series 280 Tneme-Glaze	12-16 mils dry film thickness
Finish Coat	Tnemec Series 280 Tneme-Glaze	10-12 mils dry film thickness

Interior Walls: Interior walls are limited to construction of a 2-hr firewall between the mechanical room and storage room. Wall is constructed of water-resistant gypsum board and metal studs.

The containers are protected from precipitation, since the storage area is inside the MWSF. Precipitation runoff outside the building flows to catch basins and a storm water runoff system designed to handle a 25-year storm with a 24-hour duration.

D.2.4.2 System Design

As-built drawings of the MWSF are provided as Attachment D-1. The personnel listed on the drawings are as listed in Table D-4 below.

Table D-4 Professional Engineer Information

Independent Qualified Professional Name	Drawing Numbers	License Number	Discipline
Niranjan V. Paranjpye	C-1, S-1, S-2	18675	Structural/Civil
Wallace Fraser	A-1, A-2, A-3	4899	Architect
James Pressnal	E-1, E-2	15538	Electrical
David L. Budd	M-1	27583	Mechanical

The inside perimeter of the MWSF building is fitted with an 8-inch reinforced concrete berm. This forms the container storage area and the secondary containment. The concrete base of the container storage area is constructed from reinforced concrete fitted with construction joints with a fusion welded waterstop to prevent the passage of fluid. The berm and concrete base are coated with a chemically impervious coating to prevent any spills from penetrating the concrete.

D.2.4.3 Structural Integrity of Base

The information provided below is a summary of the design information contained in Attachments D-1 and D-2.

The foundation is a conventional continuous footing, founded 18-inches below grade. The slab and perimeter 8-inch by 8-inch berm were each cast monolithically over the footing with water stops between the two secondary containment elements. The 8-inch CMU wall is built up from the berm. A sump is located in the interior of the slab and the slab is sloped to the sump at 1 percent. The slab is used to store containers of mixed waste, and along with the berm and sump, form the secondary containment area. Containment is provided at the doors by exterior and interior concrete ramps. The interior ramps are placed over the slab-on-grade and against the berm.

The important design considerations of the slab-on-grade are the storage live load (800 pounds per square foot [psf]) and the drying shrinkage of the slab. Construction joints with sealant and waterstops have been used to divide the slab into smaller segments in order to force the drying shrinkage to come out at the construction joints with waterstops.

The slab has been designed for the storage of live loads in accordance with the Wire Reinforcement Institute (WRI) method, based on a live load of 800 psf and a subgrade modulus of 400 pounds per cubic inch (pci). The subgrade modulus of 400 pci is based on the Subsurface Exploration and Geotechnical Engineering Report referenced on page S-1 of Attachment D-1. The reinforcement is used to resist shrinkage and temperature stresses and controls crack widths as well as provide a bridge for the support of loads across the construction joint by shear friction.

Because the slab and berm are to function as a part of the secondary containment, the following measures have been taken to mitigate the shrinkage cracking between the joints:

1. For strength purposes (resisting the 800 psf live load), the slab-on-grade requires a compressive strength of only 3000 pounds per square inch (psi), however, in order to minimize cracking due to drying shrinkage the water/cement (w/c) ratio has been held to 0.43. Since compressive strength of concrete is a direct function of w/c ratio, this will result in a much higher compressive strength than the specified minimum of 3000 psi. The contract documents set the minimum compressive strength required at 5000 psi in order to make it closer to that which will be achieved at a w/c ratio of 0.43.
2. In addition to a low w/c ratio, the curing period was extended from 7 days (per American Concrete Institute [ACI] 301, Section 12.2.3) to 21 days. This helped lessen the drying shrinkage. Moisture retaining covers were used to keep the slab wet during the 21 day curing period.

3. The slab reinforcement was increased over nominal shrinkage and temperature reinforcement ratios to control net shrinkage between the joints as well as bridge the storage loads across the construction joints by shear friction.

Cast-in-place Concrete	F'c = 5,000 psi @ slab-on-grade
	3,000 psi @ footings
Steel reinforcing bars	Fy = 60,000 psi

F'c is Characteristic concrete strength.

Fy is Force to yield.

D.2.4.4 Containment System Capacity

The required capacity of containment is:

- 10 percent of the volume of all containers or the volume of the largest container, whichever is greater, holding either free liquids or wastes designated as F020, F021, F022, F023, F026, or F027 [WAC 173-303-630(7)(a)] and
- 20 minutes of fire water resulting from operation of the automatic sprinkler.

The calculations to determine facility containment capacity are as follows:

Facility Containment Volume

(Capacity of 8-inch berm) + (Capacity between bottom of berm and sump) + (Capacity of sump) - (Volume of coiling door ramp) - (Volume of mechanical room inside berm) - (Volume of south entrance ramp and stairs) - (Volume of north entrance stairs) - (Volume of pallets) - (Volume of containers within the berm)

Assumption: The volume of equipment within the facility is negligible, and is not considered in the calculation.

Capacity of 8-inch Berm

= (Width of berm) x (Length of berm) x (Height of berm)

= 52.66' x 40.66' x 0.67'

= 1,434.57 ft^3

Capacity Between Bottom of Berm and Sump

= 0.33 x (Width of berm) x (Length of berm) x (Distance from bottom of berm to top of sump grate)

= 0.33 x 52.66' x 40.66' x 0.30'

= 211.97 ft^3

Assumption: The volume is calculated using the formula for a regular pyramid, whose vertex is the top of the sump cover. This method of calculation is conservative, since the vertex of the pyramid formed by the actual slope of the facility floor is below the grate of the sump.

Capacity of Sump

= (Width of sump) x (Length of sump) x (Height of sump)

= 2.50' x 2.50' x 2.50'

= 15.63 ft^3

Volume of Coiling Door Ramp

= 0.50 x (Width of ramp) x (Length of ramp) x (Height of ramp)
= 0.50 x 12.00' x 10.00' x 0.67'
= 40.2 ft^3

Volume of Mechanical Room Inside Berm

= (Mechanical room width) x (Mechanical room length) x (Mechanical room height)
= 4.33' x 8.33' x 0.67'
= 24.17 ft^3

Volume of South Entrance Ramp and Stairs

= [(Width of entry block) x (Length of entry block) x (Height of entry block)] + [(0.50) x (Width of ramp) x (Length of ramp) x (Height of ramp)] + [(Width of berm) x (Length of berm) x (Height of berm)] + [(Width of section above step) x (Length of section above step) x (Height of section above step)] + [(Width of step) x (Length of step) x (Height of step)]
= [5.00' x 3.83' x 0.67'] + [0.50 x 3.83' x 8.5' x 0.67'] + [0.50' x 10.50' x 0.67'] + [2.17' x 3.33' x 0.67'] + [3.33' x 1.00' x 0.33']
= 33.20 ft^3

Volume of North Entrance Stairs

= [(Width of entry block) x (Length of entry block) x (Height of entry block)] + [(Width of step) x (Length of step) x (Height of step)]
= [4.50' x 4.00' x 0.67'] + [4.50' x 0.92' x 0.33']
= 13.43 ft^3

Volume of Pallets

= (Maximum number of pallets in use) x (Volume per pallet)
= (50 pallets) x (1 ft^3 per pallet)
= 50 ft^3

Assumption: 1) The volume per pallet is estimated as 1 ft^3.
2) Metal boxes will not be stored on pallets, however, calculations are made assuming that only drums are being stored in the facility. The difference in volume between stored drums and stored boxes is negligible.

Volume of Containers Within the Berm

= (Number of containers) x (Height of drum in berm) x (Area of drum bottom)
= (200 drums) x (0.34') x (2.88 ft^2)
= 195.84 ft^3

Assumption: The area of a drum is πr^2, where r is the radius. The radius of a 55-gallon drum is 11.5-inches.

Facility Secondary Containment Capacity (Volumes Listed are in ft^3)

= (Capacity of 8-inch berm) + (Capacity between bottom of berm and sump) + (Capacity of sump) – (Volume of coiling door ramp) – (Volume of mechanical room inside berm) – (Volume of south entrance ramp and stairs) – (Volume of north entrance stairs) – (Volume of pallets) – (Volume of containers within the berm)

= (1,434.57) + (211.97) + (15.63) - (40.2) - (24.17) - (33.20) - (13.43) - (50) - (195.84)

= 1,305.33 ft^3

Required Capacity

1) The facility must have sufficient capacity to contain ten percent of the volume of all containers or the volume of the largest container, whichever is greater [WAC 173-303-630(7)(a)]. Only containers holding either free liquids or wastes designated as F020, F021, F022, F023, F026 or F027 need to be considered in this determination.

   Up to 11,500 gallons of liquid mixed waste may be stored in the MWSF. Containers used at the MWSF are listed in Table D-1. See Section D.2.1 for a description of overpack methods for the storage of liquid mixed waste.

   Ten percent of maximum volume of liquids

   = (11,500 gallons) x (10%) x (0.13368 ft^3/gallon)

   = 153.73 ft^3

   Volume of largest container holding liquid

   = 110 ft^3

2) The facility must also have an additional capacity to hold 20 minutes of fire water from operation of the automatic sprinkler system. This quantity:

   = (Flow rate per unit area of automatic sprinkler system) x (Area of the secondary containment) x (20 minutes)

   a) Flow rate per unit area of automatic sprinkler system

   = 0.20 gallons per minute (GPM)/ft^2

   b) Area of the secondary containment

   = (Width of berm) x (length of berm)

   = 52.66’ x 40.66’ = 2,141.16 ft^2

   c) 20 minute sprinkler capacity required

   = 0.20 GPM/ft^2 x 2,141.16 ft^2 x 20 minutes

   = 8,564.64 gallons

   = 1,144.92 ft^3 (at 0.13368 ft^3/gallon)

The calculated containment capacity of the MWSF is 1305.33 ft^3. The containment capacity sufficiently exceeds the WAC 173-303-630(7)(a) requirement of 153.73 ft^3, which is ten percent of the maximum stored liquid mixed waste volume. The containment capacity also exceeds the capacity required to contain 1,144.92 ft^3 of water from the automatic sprinkler system after operating for 20 minutes at 0.20 GPM/ft^2, as described in Section D.2.5.2, paragraph 2. Additionally, the sum of both containment volumes is 1,298.65 ft^3, which is less than the MWSF’s calculated containment capacity.

D.2.4.5 Control of Run-on

The MWSF is an enclosed building. Precipitation drains from four downspouts to the storm sewer drainage system. The area surrounding the MWSF is paved and graded away from the building to prevent precipitation run-on from entering the building. Run-on is prevented by the building itself.

D.2.4.6 Removal of Liquids from Containment System

Liquids collected in the containment system will be removed in a timely manner with absorbents and/or a portable pump as required in Addendum F, "Procedures to Prevent Hazards." The source of the spill will determine the characterization of the spill clean-up materials. All equipment and materials coming into contact with the liquids will be evaluated for management as a mixed waste in accordance with Section C.4.1.1.2 of the Waste Analysis Plan.

D.2.4.7 Demonstration that Containment is Not Required Because Containers Do Not Contain Free Liquids, Wastes that Exhibit Ignitability or Reactivity, or Wastes Designated F020 – 023, F026, or F027

Wastes that exhibit reactivity are not stored in the MWSF. The MWSF has been designed and built with a system to provide adequate secondary containment. Wastes are stored in shipping containers. Drums are stored on pallets preventing waste containers from coming into contact with liquids collected in the secondary containment system. The MWSF is an enclosed and roofed preventing precipitation from entering. Details on the containment system design are in Section D.2.4. Exemption from secondary containment requirements is not being sought.

D.2.5 Prevention of Reaction of Ignitable, Reactive, and Incompatible Wastes in Containers

D.2.5.1 Management of Certain Reactive Wastes in Containers

This section is not applicable because reactive wastes are not stored in the MWSF.

D.2.5.2 Management of Ignitable and Certain Other Reactive Wastes in Containers

All incompatible waste streams require separate secondary containment. PSNS & IMF will use a containment and separation device as described in Section D.2.4.3, paragraph 2 above.

Ignitable wastes stored in the MWSF designate as classes IB, IC, II, and III liquids and are managed in metal containers in accordance with NFPA 30, Flammable and Combustive Liquids Code. The flammable material storage area consists of a NFPA 30-compliant metal cabinet unit, a single pallet, and 36" around the cabinet unit and pallet. The maximum flammable liquid volume in the flammable material storage area is 120 gallons. Each container holding flammable liquid waste will be marked in accordance with NFPA 30, section 9.5.5, and Section D.2.3. The existing fire sprinkler density of 0.20 GPM/ft^2 over 2000 ft^2 is suitable for the protection of Class IB through Class III liquids in the following configurations:

1. For miscible flammable liquid wastes with concentrations ≤ 20% stored in one or two metal drums on a pallet, NFPA 30 (2015 edition), Figure 16.4.1(a), requires protection as NFPA 13 Class I commodities. NFPA 13 (2016 edition), Table 13.2.1 for protection of Class I commodities requires the use of sprinkler design curve OH1 in Figure 13.2.1. The OH1 curve indicates that a density of 0.15 GPM/ft^2 over 1500 ft^2, or better, is acceptable.
2. For miscible flammable liquid wastes with concentrations ≤50% and >20% stored in one or two metal drums on a pallet, NFPA 30 (2015 edition), Figure 16.4.1(a), requires protection as NFPA 13 Class III commodities. NFPA 13 (2016 edition) Table 13.2.1 for protection of Class III commodities requires the use of sprinkler design curve OH2 curve in Figure 13.2.1. The OH2 curve indicates that a density of 0.20 GPM/ft^2 over 1500 ft^2, or better, is acceptable.

3. For ≤1 gallon of non-miscible flammable liquid wastes or miscible flammable liquid wastes with concentration >50% stored in metal containers in a 34" deep NFPA 30 compliant metal cabinet unit, NFPA 30 (2015 edition), Figure 16.4.1(a), requires protection in accordance with NFPA 30, Table 16.5.2.6. NFPA 30, Table 16.5.2.6 indicates that a density of 0.19 GPM/ft^2 over 1500 ft^2, or better, is acceptable.

Reactive wastes are not stored in the MWSF.

Annual fire inspection requirements for ignitable wastes are provided in Addendum F, "Procedures to Prevent Hazards."

D.2.5.3 Design of Areas to Manage Incompatible Wastes

All waste streams are stored in separate containers and do not require segregation in accordance with 49 CFR, Part 177, Subpart C – *Segregation and Separation Chart of Hazardous Materials* (Segregation Table for Hazardous Materials). If container separation is required, PSNS & IMF will use a containment device such as a containment pallet that can contain the contents of the containers. The containment pallet segregates the two secondary containment systems, as required by WAC 173-303-630(9)(c).

D.3 Tank Systems

The MWSF does not have Tank Systems.

D.4 Air Emissions Controls

D.4.1 Process Vents

The MWSF does not have Process Vents as described in WAC 173-303-690. The air emission control requirements in WAC 173-303-690 for emissions associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam-stripping operations are outside the scope of MWSF operations. Section D.2.2, paragraph 3 details the MWSF's passive ventilation system.

D.4.2 Equipment Leaks

MWSF does not operate equipment described in WAC 173-303-691. WAC 173-303-691(b) is not applicable to MWSF equipment, as the equipment will not contain or contact hazardous wastes with organic concentrations 10 percent or greater by weight.

D.4.3 Tanks and Containers

The containers in the MWSF are used solely for the storage of mixed waste and are exempt from the requirements of 40 CFR 264, Subpart CC as incorporated by WAC 173-303-692(1)(a).

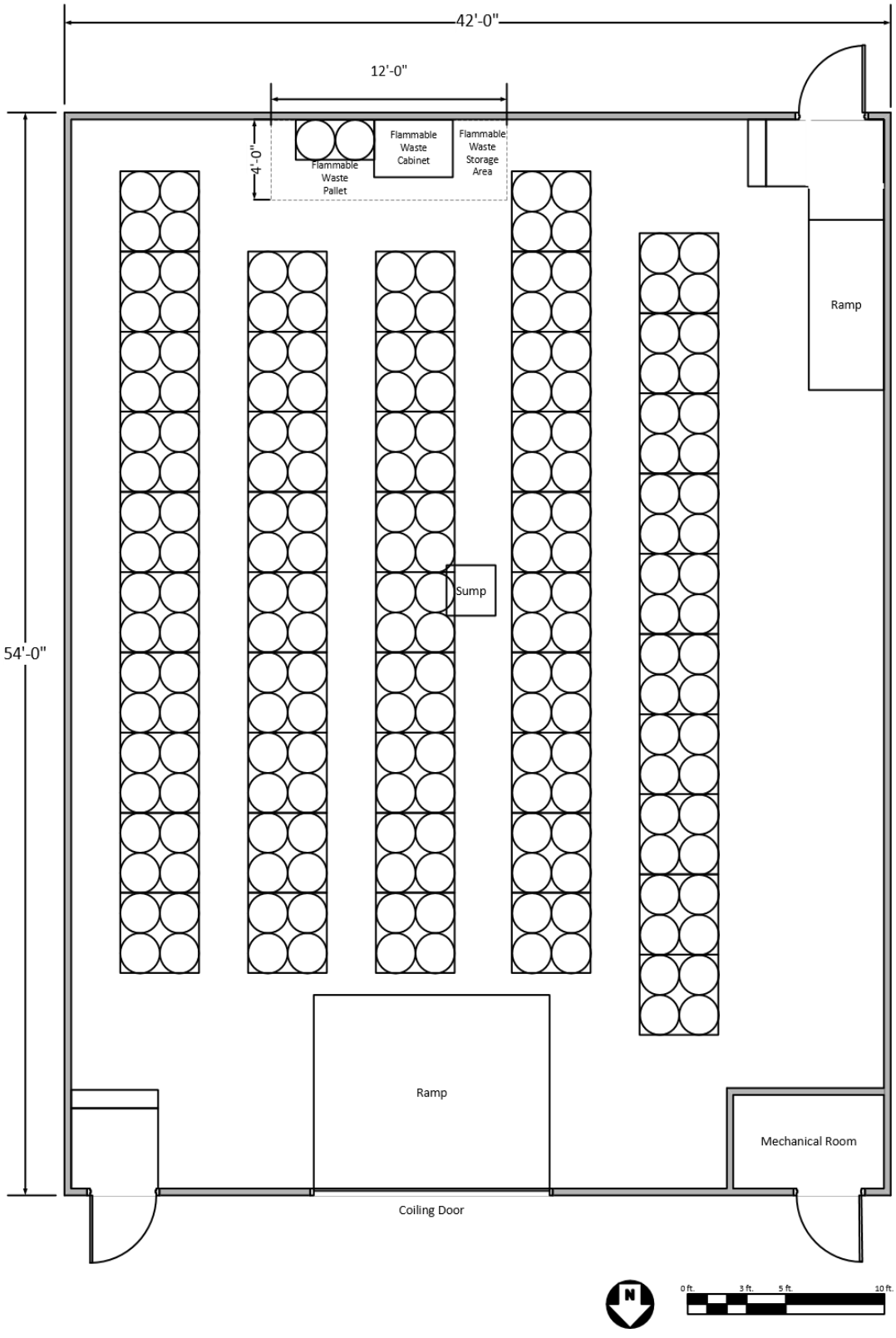
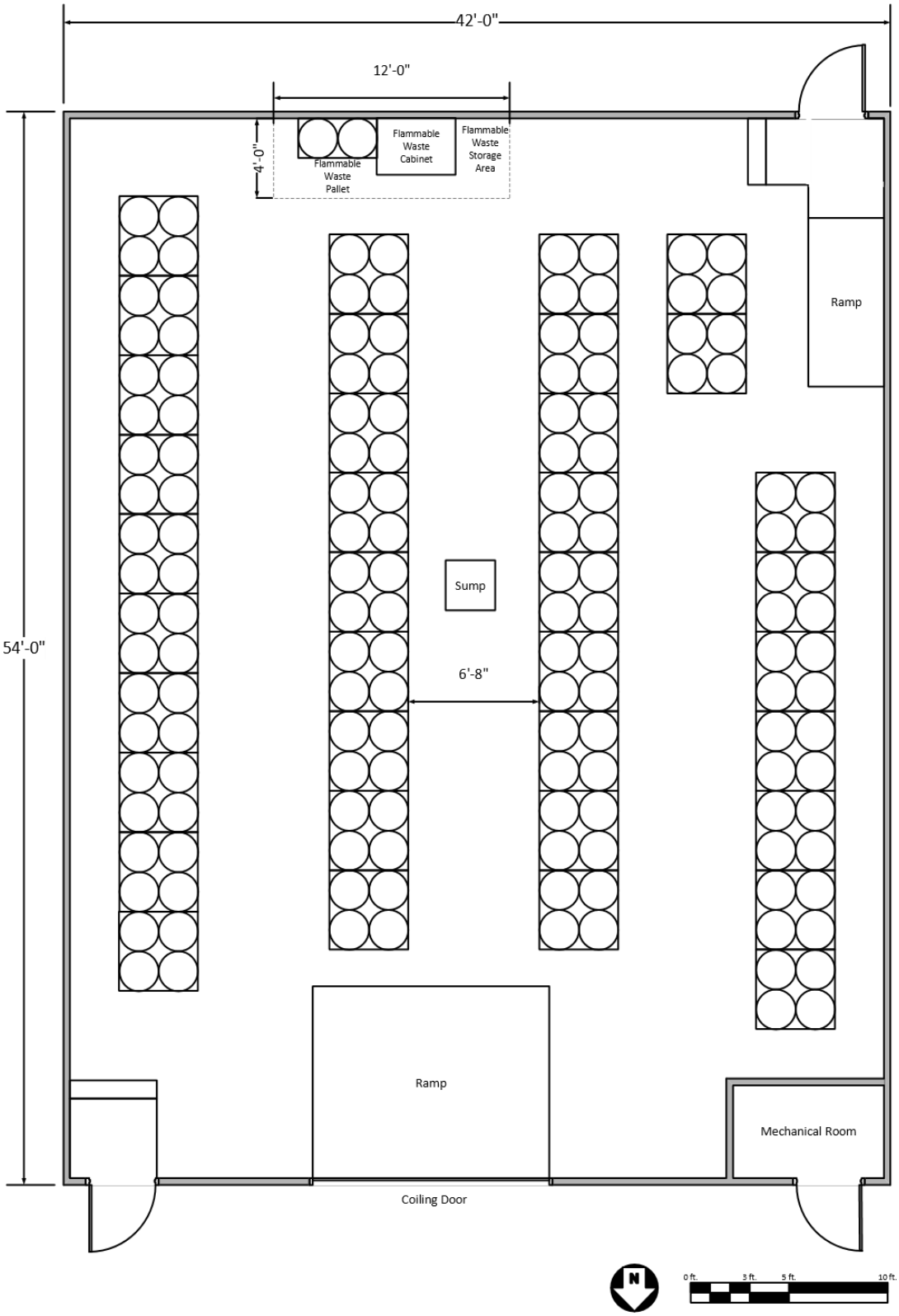


Figure D-1 Mixed Waste Storage Facility Layout Example – 55-Gallon Drums



1 **Figure D-2 Mixed Waste Storage Facility Layout Example – Stacked 55-Gallon Drums**

ATTACHMENT D-1
MIXED WASTE STORAGE FACILITY DRAWINGS

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ATTACHMENT D-2
BASIS OF DESIGN FOR MIXED WASTE STORAGE FACILITY

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