# ADDENDUM C
# PROCESS INFORMATION

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# C. PROCESS INFORMATION

This Addendum discusses the processes used to store sodium (Na)- and sodium potassium (NaK)-contaminated waste at the 400 Area WMU. It includes a description of the containers used to store mixed waste at the two waste storage areas, the container management practices, the use of secondary containment systems, and special procedures related to ignitable, reactive, and incompatible wastes.

## C.1 Containers

The following sections provide a description of 400 Area WMU waste containers, their management, their secondary containment, and removal of liquids from secondary containment systems.

### C.1.1 Description of Containers

All mixed waste stored at the 400 Area WMU is packaged in containers. The specific size and type of container is dictated by the size, shape, or form of the waste. Containers generally consist of:

- Standard metal containers [e.g., 208-liter (55-gallon) drums]
- Large metal boxes [e.g., 1.2 meters by 1.2 meters by 2.4 meters (4 feet by 4 feet by 8 feet), 2.7 meters by 2.7 meters by 3.7 meters (9 feet by 9 feet by 12 feet)] fabricated to accommodate the size and shape of a particular component or piece of debris
- Unique components removed from FFTF that, when closed in accordance with WAC 173-303-630(5)(a), can serve as a primary container (e.g., large pumps, valves, tube bundles, cold traps).

Specific debris or components removed from FFTF may require the design and fabrication of additional boxes and, in some cases, containers smaller than 208-liter (55-gallon) may be appropriate for the waste type. The remainder of this Addendum describes storage of Na- and NaK-contaminated waste in standard metal containers [e.g., 208-liter (55-gallon) drums], large metal boxes, and unique components. Metallic containers (either carbon steel or stainless steel) are compatible with Na and NaK for storage.

Na- and NaK-contaminated waste stored at the 400 Area WMU is designated ignitable (D001) and reactive (D003) per WAC 173-303-090(7). In addition to D003, this waste may also exhibit the characteristics of corrosivity from generation of small quantities of sodium hydroxide or potassium hydroxide due to the reaction of waste residuals with atmospheric moisture. Therefore, waste managed in the FSF and the ISA are also designated as D002 (corrosive liquids) and WSC2 (corrosive solid).

The 400 Area WMU consists of two container storage dangerous waste management units: the FSF (Building 403) and the ISA. The ISA is an outdoor storage area with a concrete pad and a gravel-surface pad. Refer to the map in Addendum A, Part A Form, and Figures C.1 and C.2 in this Addendum for locations of these storage sites within the FFTF PPA. A combined maximum of 76,000 liters (20,000 gallons, 1,000 gallons in the FSA and 19,000 gallons in the ISA) of the Na or NaK contaminant could potentially be stored in the two 400 Area WMU container storage units.

The quantity of the NaK stored in the ISA is estimated to be 0.8 liters (28 fluid ounces). The NaK is contained with debris stored in the ISA containers. The sodium in the CCPs stored in the FSF has approximately 0.02 volume percent potassium due to the mixing of NaK in the Na. This small quantity would represent an impurity of trace amount and would not affect the chemical properties of the Na in the CCPs.

#### C.1.1.1 Description of Containers in the FSF (Building 403)

The Core Component Pots (CCPs), cylindrical containers previously used to hold assemblies and other components are stored in FSF (Building 403) in two large metal boxes. Each box measures 1.78 meters by 2.29 meters by 3.56 meters (5.84 feet by 7.51 feet by 11.68 feet). The box serves as the primary container for the residual sodium inside the CCPs. Each CCP has been emptied of sodium to the extent practicable, but a maximum of 14 liters (3.7 gallons) of radiologically contaminated sodium remains in each CCP.

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The volume of actual sodium in each box is estimated to be less than 757 liters (200 gallons). Each box lid is closed with an elastomer gasket and bolted flange closures. An inert gas (argon or nitrogen) cover is maintained on storage of each box to prevent contact of the metallic sodium with the water vapor in the air. Shielding is provided for worker protection and to meet as low as reasonably achievable (ALARA) requirements.

#### C.1.1.2 Description of Containers in the ISA

The ISA is an outdoor storage area, which includes a concrete pad and an additional area of open level ground. The two types of containers stored in the ISA are the unique components and standard metal containers described in Sections C.1.1.2.1 and C.1.1.2.3, respectively.

##### C.1.1.2.1 Storage of Standard Metal Containers in the ISA

The standard metal containers stored in the ISA are contained in container storage modules, specifically configured for the storage of reactive, ignitable, and corrosive waste. Each module is totally enclosed to protect the containers from the weather. The modules are placed directly onto the gravel pad and anchored by conventional methods (e.g., screw anchor or conventional dead man).

##### C.1.1.2.2 Storage of Large Metal Boxes in the ISA

Large metal boxes can be stored in the ISA. Waste placed in the large metal boxes will not be amenable for storage in standard metal containers, but does not require development of a unique package. Large metal boxes are commercially available and will be placed within secondary containment in the ISA.

##### C.1.1.2.3 Storage of Unique Components in the ISA

Unique components can be stored in the ISA. Unique components are anticipated to be removed as intact units, except for severed inlet and outlet piping. The inlets and outlets are closed as part of the removal process to prevent any residual Na or NaK inside the component from reacting with water vapor in the air to form sodium hydroxide or potassium hydroxide, respectively. Each component, once closed, serves as the primary container for the sodium waste residue on the interior surfaces of the component.

### C.1.2 Container Management Practices

During the container receipt inspection, any discrepancies that have been noted are resolved in accordance with Addendum B, Waste Analysis Plan. Appropriate labels are applied to the containers before acceptance at any of the two waste storage locations in the 400 Area WMU to meet the requirements of WAC 173-303-630(3) and WAC 173-303-395(6). The container packaging and container handling are designed to maintain containment of the waste, maintain damage-free and contamination-free containers, limit storage intrusion, and limit human exposure to mixed waste.

The subsections below describe the container management practices for the FSF and the ISA.

#### C.1.2.1 Container Management Practices for the FSF

The FSF is a steel-framed, metal-sided, one-story building that is erected on a reinforced concrete substructure. It has electrical service, lighting, and ventilation, but no water services. The reinforced concrete floor has a load rating of approximately 0.49 kilograms per square centimeter (1,000 pounds per square foot). The loaded weight of each storage container is approximately 8,256 kilograms (18,200 pounds), which provides a floor load factor of safety of approximately four (Figure C.1).

The drip pan is placed on the floor and the large metal box is placed onto the drip pan. A forklift/rigging packet is provided as an integral part of the base of each metal box. Lifting slings are also available on each box and the overhead bridge crane can be used to lift and position the box.

Sodium is stored at room temperature under an inert gas blanket to protect sodium from reaction with air.

Shielding is provided for worker protection and to meet ALARA requirements. Containers are inspected for deterioration and leakage semi-annually using video cameras to view all outer surfaces of the waste

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boxes. The aisle space requirements of WAC 173-303-630(5)(c) do not apply because there are only two containers. The waste is stored in a manner equivalent to WAC 173-303-630(5)(c) and the International Fire Code as interpreted by the Hanford Fire Department.

### C.1.2.2 Container Management Practices for the ISA

The three types of containers identified in Section C.1.1 can be stored at the ISA. This dangerous waste management unit will be in compliance prior to use (Figure C.2). Management practices for these three container types are described in Sections C.1.2.2.1, C.1.2.2.2, and C.1.2.2.3.

#### C.1.2.2.1 Management of Standard Metal Containers in the ISA

The waste is stored in standard metal containers [e.g., 208-liter (55-gallon) drums], as described in Section C.1.1.2.1. Standard metal containers are placed into the container storage modules by means of a forklift or by manual placement depending on weight of the container and storage configuration.

Container storage modules in the ISA will be placed in a manner equivalent to the International Fire Code as interpreted by the Hanford Fire Department.

Standard metal containers placed into a container module can be stored four to a pallet, and multiple pallets will constitute a row of containers. Since only one row of pallets can be placed within the container storage modules, there are no aisles between rows, and therefore, the 30-inch aisle spacing requirement of WAC 173-303-630(5)(c) does not apply. Spacing between the pallets and the walls of the container storage module will be maintained to facilitate inspection and emergency response. Standard metal containers can be stacked two high within the container storage modules.

Standard metal containers managed in container storage modules are positioned so labels are visible for inspection. Receipt inspections of the containers are preformed at the time the containers are loaded into the module according to Addendum B, Waste Analysis Plan. Standard metal containers in storage are visually inspected at least weekly in accordance with WAC 173-303-630(6) (refer to Addendum I, Inspection Requirements).

Container receipt inspections of standard metal containers are performed at the storage location within the ISA. The standard metal containers are visually inspected at least semi-annually while in storage (refer to Addendum I, Inspection Requirements).

#### C.1.2.2.2 Management of Large Metal Boxes in the ISA

The waste is stored in large metal boxes as described in Section C.1.1.2.2. Large metal boxes in the ISA will be placed in a manner equivalent to the International Fire Code as interpreted by the Hanford Fire Department. Prior to placement of a large metal box in the ISA, a drip pan described in Section C.1.3.2 will be placed at the storage location. The large metal box serves as the primary container. The drip pan used for secondary containment of the large metal box is placed on the ground; the large metal box is placed in the drip pan, and elevated from the base of the drip pan. Each large metal box is handled and positioned in a manner to prevent rupture and container leakage.

Container receipt inspections of large metal boxes are performed at the storage location within the ISA. The large metal boxes are visually inspected at least weekly while in storage (refer to Addendum I, Inspection Requirements).

#### C.1.2.2.3 Management of Unique Components in the ISA

Waste is stored as unique components as described in Section C.1.1.2.3. Unique components in the ISA will be placed in a manner equivalent to the International Fire Code as interpreted by the Hanford Fire Department.

Prior to placement of a unique component in the ISA, a drip pan described in Section C.1.3.2 will be placed at the storage location. The unique component serves as the primary container.

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The drip pan used for secondary containment of the unique component is placed on the ground. The unique components are placed in the drip pans and elevated from the base of the drip pans. Each unique component is handled and positioned in a manner to prevent rupture and container leakage.

Container receipt inspections of unique components are performed at the storage location within the ISA. The unique components are visually inspected at least weekly while in storage (refer to Addendum I, Inspection Requirements).

#### C.1.2.3 Container Labeling

Containers are labeled and marked to meet the requirements of WAC 173-303-630(3) and WAC 173-303-395(6).

### C.1.3 Secondary Containment Requirements for Storing Containers

The following sections describe secondary containment systems for the 400 Area WMU.

#### C.1.3.1 Secondary Containment System Design and Operation

The design of secondary containment systems varies depending on the particular dangerous waste management unit and the container type. Design, placement, and operation of each type of secondary containment system are discussed in Sections C.1.3.1.1 and C.1.3.1.2.

##### C.1.3.1.1 Secondary Containment System Design and Operations for the FSF

Secondary containment requirements in WAC 173-303-630(7) are met for the large metal boxes by placing the waste containers in drip pans. A forklift/rigging packet is provided as an integral part of the base of each metal box and results in elevation of the base of the box approximately 10.2 cm (four inches) above the drip pan keeping the base of the container from contacting any waste that could accumulate in the drip pan. The depth of the drip pan is approximately 8.9 centimeters (3.5 inches).

##### C.1.3.1.2 Secondary Containment System Design and Operations for the ISA

For each type of container stored within the ISA, secondary containment is provided compliant with WAC 173-303-630(7). The design can include provisions for indoor or outdoor storage. Indoor storage is provided for small metal containers managed in container storage modules. The container storage modules will be procured to be compliant with WAC 173-303-630(7). Outdoor storage is provided for large metal containers and unique components. A forklift/rigging packet is provided as an integral part of each secondary containment drip pan for outdoor storage. Outdoor containers are elevated in the drip pan keeping the base of the container from contacting any waste or liquids that could accumulate in the drip pan. Capacity will be designed on a case-by-case basis in accordance with Section C.1.3.2.

#### C.1.3.2 Secondary Containment System Capacity

Each secondary containment system is designed to provide a base underlying the boxes, containers, or components that is free of cracks or gaps and is sufficiently impervious (WAC 173-303-630(7)(a)(i)). For outdoor storage, the capacity of the containment (e.g., drip pan) will also meet the 25-year 24-hour storm value of 3.35 centimeters (1.32 inches) [WAC 173-303-630(7)(a)]. In rare cases, when a container can contain free liquids, the drip pan will also be designed to meet the requirements of WAC 173-303-630(7)(a)(iii). Since sodium melts at 98 degrees C, an event causing liquid sodium to be released into the secondary containment is extremely unlikely. Although NaK is typically liquid at ambient conditions, most if not all NaK will have been drained from contaminated debris and components. Spills or leaks of liquid NaK into secondary containment will be negligible and unlikely to pose any human health or environmental threats. Since run-on is prevented as described in Section C.1.3.3, additional capacity is not required for run-on.

#### C.1.3.3 Control of Run-On

There is not a credible pathway through which run-on can come into contact with the sodium-contaminated waste or enter the secondary containment for the waste containers. The contour of the

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ground and the 400 Area storm water drainage systems around the FSF and the ISA prevents run-on. Waste containers stored at the ISA are stored either on covered drip pans or in weather-tight storage modules. Run-on is prevented in either case.

Refer to Section C.1.4 for a discussion of response to accumulation of water from a known source (e.g., rainwater or snowmelt) in secondary containment.

### C.1.4 Removal of Liquids from Secondary Containment System

In the unlikely event of liquid intrusion into the secondary containment system, the following is performed:

- Liquid in the secondary containment system is visually inspected for signs of other materials (e.g., dust, etc.).
- Containers affected are inspected for signs of damage. Damaged containers are repackaged and identified in the 400 Area WMU operating logbook.
- Previous inspection checklists are reviewed to identify any waste releases in the waste storage areas for which remedial actions have not been completed.
- Liquid removed from secondary containment is removed and characterized under the generator provisions of WAC 173-303-200 and is outside the scope of TSD unit operations.
- The 400 Area WMU supervisor signs the operating logbook indicating that the previous steps have been completed and that the secondary containment and/or storage structure(s) are clean.

Records of spills and releases of mixed waste are maintained as part of the 400 Area WMU operating record. For related records maintained elsewhere, both a description and the location of such records are entered into the operating record. These records include, but are not limited to, electronic and/or paper records. These records will be retained in accordance with Permit Condition I.F.2. These records will eventually be used during closure activities at the 400 Area WMU, as noted in Addendum H, Closure Plan. Additional actions taken in response to a spill or discharge are detailed in the Addendum J, Contingency Plan.

## C.2 Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste in Containers

Ignitable and reactive waste stored in containers is packaged and managed in the manner described in Sections C.1.1 and C.1.2. The waste stored in the 400 Area WMU is not incompatible with storage container materials of construction or other waste in the storage unit based on the waste codes and generating source documented in Addendum A, Part A Form.

### C.2.1 Management of Reactive Waste in Containers

Wastes managed at the FSF and the ISA are designated as reactive solely with respect to the requirements of WAC 173-303-090(7)(a)(ii) and (iii). Management of these wastes as documented in this Addendum provide appropriate protection from contact with liquid water and the risk of generation of potentially explosive hydrogen gas. The reactive designation for waste identified in the Addendum A, Part A Form, is not based on WAC 173-303-090(7)(a)(vi), (vii) or (viii), which address explosives and materials that can be detonated. Therefore, no specific management requirements are necessary with respect to the potential for explosion or detonation.

### C.2.2 Management of Ignitable and Reactive Waste in Containers

Waste storage limits and spacing requirements are equivalent to those specified in the International Fire Code as interpreted by the Hanford Fire Department, demonstrating compliance with the requirements of WAC 173-303-395(1).

A qualified staff member will inspect the areas storing mixed waste annually as specified in WAC 173-303-395(1)(d). This inspection will be performed in the presence of a professional person who is familiar with the International Fire Code.

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### C.2.3 Design of Areas to Manage Incompatible Wastes

Only waste as documented in Addendum B will be stored in the 400 Area WMU container storage units.

## C.3 Air Emissions Control

Air emission requirements of WAC 173-303-690 through WAC 173-303-691 do not apply to mixed waste stored at the 400 Area WMU. The air emission standards of WAC 173-303-692 (Subpart CC) apply to tank, surface impoundment, and container storage units. However, since containers that are used solely for management of mixed waste are exempt, all containers in the FSF and the ISA are exempt from the requirements of WAC 173-303-692.

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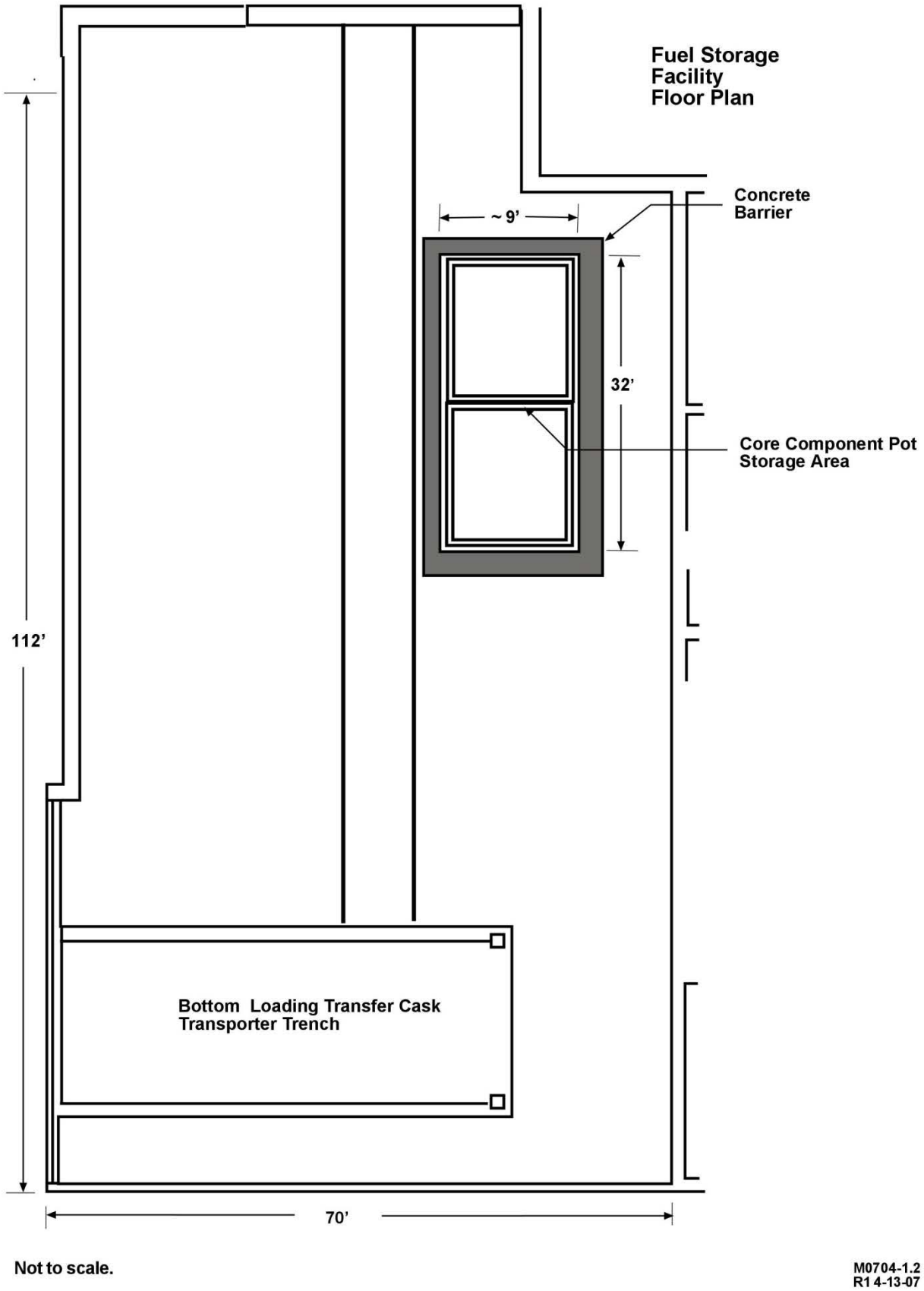


**Figure C.1. Fuel Storage Facility**

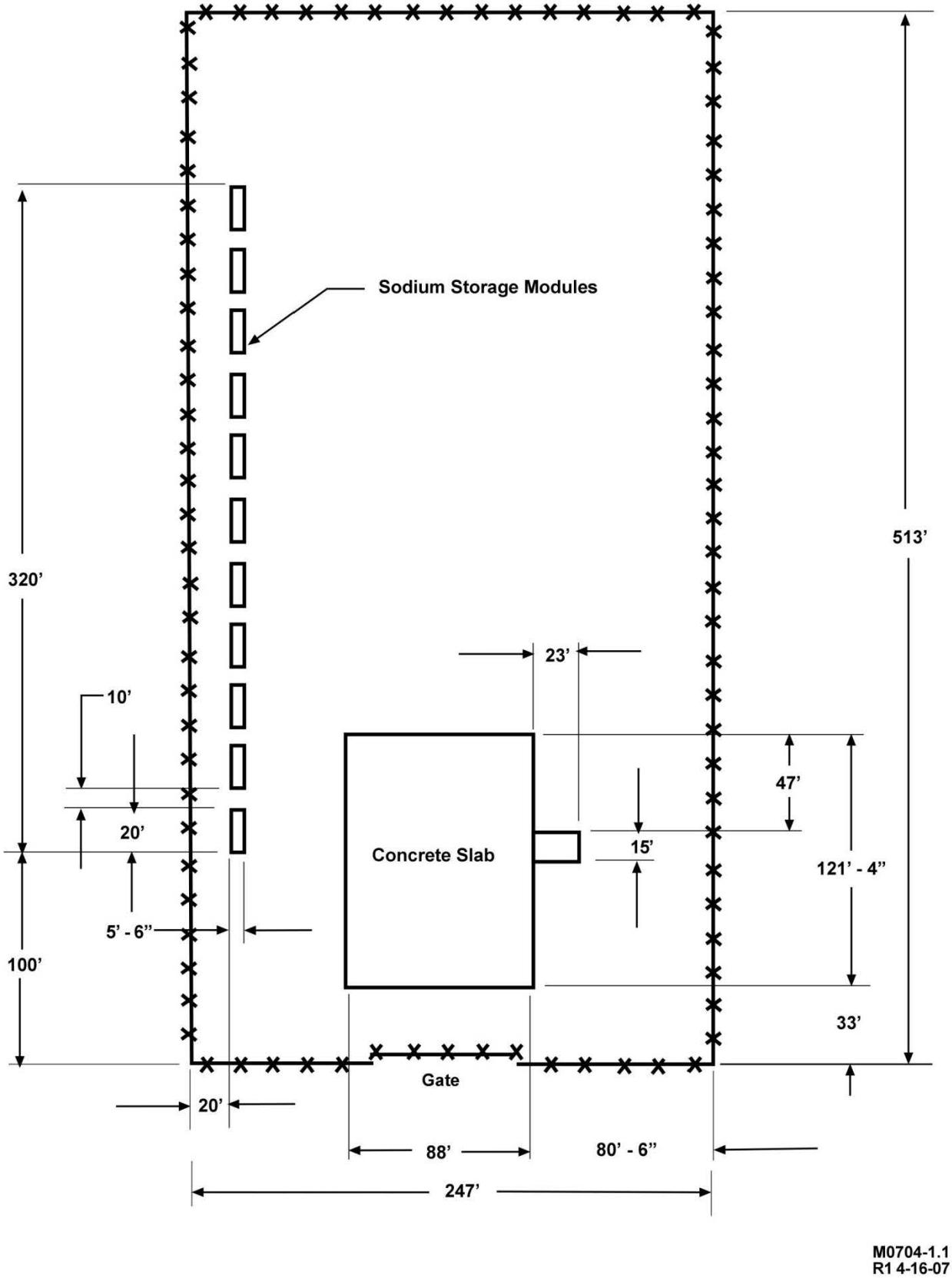


**Figure C.2. Container Management Area**

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